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Title: **MULTI ROBOT COMMUNICATION AND TARGET TRACKING SYSTEM WITH CONTROLLER DESIGN AND IMPLEMENTATION OF SWARM ROBOT USING ARDUINO**

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## MULTI ROBOT COMMUNICATION AND TARGET TRACKING SYSTEM WITH CONTROLLER DESIGN AND IMPLEMENTATION OF SWARM ROBOT USING ARDUINO

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### ABSTRACT:

SWARM robotics or multi robot systems is a novel approach to the coordination of large numbers of relatively simple robots which takes its inspiration from social insects - ants, termites, wasps and bees etc. Robot mapping or trajectory plotting is the process of building an environment representation using mobile robot. In this paper we present a design and implementation of mapping robot using Digital Magnetic Compass, Ultrasonic Sensor and Arduino UNO which is having Atmel's ATmega328 microcontroller. We presents mapping of mobile robot in the indoor environment. The designed robot uses a metric, world centric approach for mapping algorithm. Robot follows the wall while continuously sending its co-ordinates to the base station. Target Tracking or Move to Goal algorithm is implemented on robot which allows one robot to reach target directed by other robot. Communication between robots is achieved using low cost CC2500 wireless transceiver module which is designed for very low-power wireless applications.

**Keywords:** Multi level inverter, 5level inverter, MATLAB, RES network.

### 1. INTRODUCTION

SWARM robotics is a concept to provide a robust robotics System using large numbers of identical robots inspired from social behaviour of animals or insects. Collective behaviour of robots comes from the interactions between individual robots and interactions of robots with the environment. With this approach it is easily possible to complete the tasks that are difficult to do with single robot. Research is going on in the area of sensor technology, motor technology, power supply technology, telecommunications technology, control

technology and artificial intelligence technology for robotics. In SWARM robotics, cooperative task solving capability refers to self-organization and emergence. Self-organization refers to the SWARM's organization which comes from system itself and emergence means that the organization need to have local interaction between individual robots comes about decentralized way . For controlling motions of individual robot different coordination approaches have been reported such as task allocation , self-configuration , pattern generation . Instead of investigation of a single robot system,



researchers are working for exploration of coordination of multirobot/SWARM systems as there are several advantages and application of multi-robot systems. These are; efficiency adaptability, fault-tolerance, scalability, and so on. Application areas of multi robot system are environmental monitoring, surveillance, distributed sensing task, oil cleaning, underwater localization and many more. Role of sensing system is to detect the presence of objects and measure their positions. The objects can be neighbouring robots, obstacles and target. Technical challenge is to develop and deploy real mobile robots at a reasonable cost. If data obtained from location sensing system is based on fixed global reference then it is absolute sensing and if it is based on local coordinates of a robot then it is relative sensing. Global positioning system (GPS) with central monitoring system is an example of absolute location sensing. Examples of relative location sensing include proximity sensors, cameras and received signal strength indicator (RSSI). A SWARMBOT is comprised of autonomous mobile robots called S-Bots. It discuss the self-assembling capabilities of the SWARM-BOT, this concept lies at the intersection between collective and self-reconfigurable robotics. For interaction of the multiple robots, communication between robots is important to carry out specific task where one robot delivers orders or updates to other robots. With advance in wireless communication technology it is possible to interface one device to other device. Advantage of communication between the

robots is completing the task in efficient way. Wireless Local Area Network (WLAN) which is based on IEEE 802.11 standards and WPAN uses some technologies such as Infrared, Wireless USB, Bluetooth, and ZigBee for communication between sensors and electronic devices. Inductive Communication is one of the methods of communication for Millimeter-sized Wireless Robots. In this paper we present the design and implementation of S-Bot robot for SWARM application using Arduino microcontroller. In first algorithm, Multi Robot Communication is implemented to achieve Leader-Follower approach of SWARM navigation in which one robot follows other robot. Concept of co-operative navigation using master-slave SWARM robot is introduced. To achieve Target Tracking system, another algorithm is implemented on the S-Bot robot which allows one robot to track a location directed by other robot.

## OVER VIEW:

Robotics is a branch of engineering that deals with the design, construction, operation and application of robots, as well as computer systems for their control, feedback from sensors, and information processing. Mobile robots are used increasingly in safety critical applications namely production industries, defence and the military. Due to the time critical nature of such domains, automating the communication and coordination between these mobile robots are important. In

applications, such as military operations, where the human operators themselves are under stress. In such situations, robots must be highly flexible and autonomous so that they can carry out complex tasks with minimal command effort from humans. Multi-Robot Systems can be generally characterized as a set of robots operating in the same environment. Multi Robot communication has a great significance. Multi Robot Systems can be generally characterized as a set of robots operating in the same environment. Multi-robot systems (MRSs) have a variety of applications, such as search and rescue in disaster hit areas, where many robots coordinate with each other to complete a task. Robotics industrial automation is changing the pace of production. Manufacturers of different companies are implementing some form of automation to become more efficient, safe and ultimately to increase revenues. It has many advantages including quality control, repeatability and faster cycle times. Implementation of master-slave framework in the robotic automation helps in increased efficiency and rise in production in case of robotics automation in production industries. So in our work we are focusing on developing autonomous mobile robots which are able to communicate and coordinate among themselves in the master-slave fashion.

## **2. LITERATURE SURVEY**

Xiao-Lin Long [1] discussed some of the wireless communication schemes and their applications that can be used in multirobot

communication such as Implicit & explicit communication, Global & local communication and Synchronous & Asynchronous communication. Noa Agmon [2], evaluated the effect of different coordination schemes on the performance of the robotic team some of them are Uncoordinated, Tightly Coordinated and Loosely coordinated mechanisms and stated that Uncoordinated and Tightly Coordinated have better impact than loosely coordinated [3]. Avinash Gautam [4], proposed a system where a collection of two or more autonomous mobile robots working together are termed as teams or societies of mobile robots. In multi robot systems simple robots are allowed to coordinate with each other to achieve some pre-defined goals. Cooperation between two or more autonomous mobile robots is achieved using Implicit communication method and TCP protocol. A. Anand [5], described how a single robot is chosen as a central coordinator controls the movement of the rest of the robots. Master bot decides on the path to be taken and also directs the slave bots with the coordinates of the location to be reached. They have used ZigBee communication protocol is used for interaction among the robots. Punit Mittal [6], this paper resolves interference in accordance with the assigned priority to robots in a multirobot task allocation system (MRTA) [7]. New NFS algorithm for robot and Interference resolving strategy for a robot was used. Rajesh Doriya, Siddharth Mishra, Swati Gupta [8], described the Robot navigation is achieved by Particle

Swarm Optimization (PSO) that is used to coordinate the movement and control the communication of multiple robots. DhirajArunPatil [9], proposed an approach of leaderfollower where Multi Robot Communication is implemented and approach of SWARM navigation where leader robot guides the slave robots. Target Tracking or Move to Goal algorithm is implemented on robots which helps one robot to reach target directed by other robot. Communication between robots is achieved using low cost Nrf24L01 wireless transceiver module which is designed for very low-power wireless applications. LiHan Chang [10], proposed a system where Conclusions are drawn that a multi-robot system can explore more quickly than a single robot system.

### **3. RELATED STUDY**

Role of sensing system is to detect the presence of objects and measure their positions. The objects can be neighbouring robots, obstacles and target. Technical challenge is to develop and deploy real mobile robots at a reasonable cost [1],[6]. If data obtained from location sensing system is based on fixed global reference then it is absolute sensing and if it is based on local coordinates of a robot then it is relative sensing. Global positioning system (GPS) with central monitoring system is an example of absolute location sensing [7]. Examples of relative location sensing include proximity sensors [8], cameras [9] and received signal strength indicator (RSSI) [10]. A SWARMBOT is comprised of

autonomous mobile robots called S-Bots. Authors in [4] discuss the self-assembling capabilities of the SWARM-BOT, this concept lies at the intersection between collective and self-reconfigurable robotics. For interaction of the multiple robots, communication between robots is important to carry out specific task where one robot delivers orders or updates to other robots. With advance in wireless communication technology it is possible to interface one device to other device. Advantage of communication between the robots is completing the task in efficient way [3]. Wireless Local Area Network (WLAN) which is based on IEEE 802.11 standards and WPAN uses some technologies such as Infrared, Wireless USB, Bluetooth, and ZigBee for communication between sensors and electronic devices [4]. Inductive Communication is one of the methods of communication for Millimeter-sized Wireless Robots [5]. In this paper we present the design and implementation of S-Bot robot for SWARM application using Arduino microcontroller. In first algorithm, Multi Robot Communication is implemented to achieve Leader-Follower approach of SWARM navigation in which one robot follows other robot. Concept of co-operative navigation using master-slave SWARM robot is introduced. To achieve Target Tracking system, another algorithm is implemented on the S-Bot robot which allows one robot to track a location directed by other robot. Sender robot gives target coordinates along with final angle position to receiver robot. After successfully

calculating path trajectory receiver robot reaches to its goal configuration.

## 4. PROPOSED SYSTEM

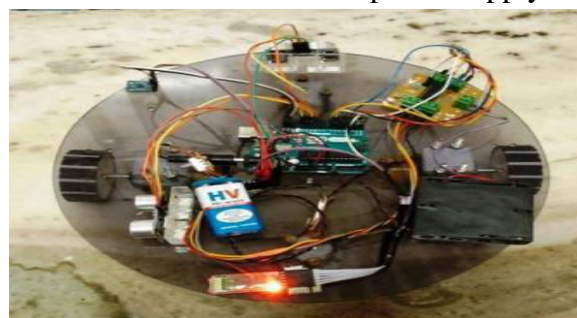
After successfully calculating path trajectory receiver robot reaches to its goal configuration. In this section, the methodology procedures divided into two parts. The first part is a hardware implementation of the used parts, while the second is the software design details. Our proposed system is designed and developed to perform tasks in the master and slave fashions shown in figure where one robot will be guiding the other robot. Intruder monitoring is also achieved using ultrasonic sensor.

**Hardware Model:** In our paper both the robots operate with the help of the battery. Both consist of 12v battery which supplies power to different components of the system. Both robots consist of motors which are driven by L293D motor driver which in turn drives the wheels of the robot. Initially when the master robot starts moving, the slave robot starts following the master bot. With the help of the ultrasonic sensor present in the master robot, master robot gets to know if there are any obstacles on its way. If the obstacle was found it sends a notification to the slave robot which directs the slave robot to change its direction of motion. Notification sending is achieved with the help of the transceiver model NRF24101.

**Software Model:** We have used Arduino application to carry out programming part of the project. Once the code is compiled and

executed both the robots starts moving. Whenever the obstacle is found a notification is sent to slave robot in a wireless fashion. All these process happens automatically when a program is introduced into hardware and after execution. In our work we have the design of two robots both having different controllers. The master robot consists of Arduino NANO which is a 22 pin controller out of which 14 are digital input/output pins and 8 are analog pins. It's powered on 5V regulator which is connected to a 12V lead acid battery. The digital pins are used to drive the L298 motor driver for controlling robots directions. The motor is supplied with 12V lead acid battery.

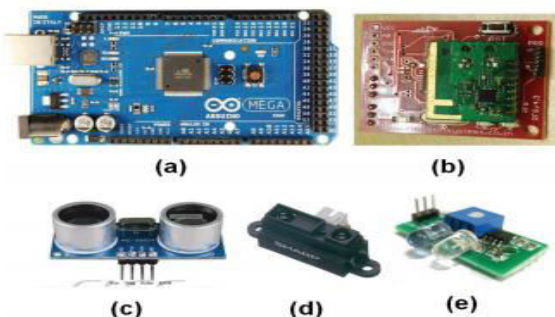
The hardware assembly and specifications of S-Bot robot is explained in this section. Fig 1 shows the S-Bot robot and its different modules. Fig shows basic architecture block diagram of the S-Bot robot. The robot uses Arduino MEGA2560 board as central processor and other input and output devices along with communication module and power supply.



**Fig.4.1. S-Bot Mobile Robot**

HMC5883L is 3-Axis Digital Compass IC. The I2C serial bus allows for easy interface. It enables 1 to 2 Degree Compass Heading Accuracy. Working range of Ultrasonic ranging module HC - SR04 is 2cm to 400cm

with accuracy of 3mm. Output voltage from sensor is corresponding to the detection distance from sensor to an object. Robot has two DC geared motors for motion control. Two caster wheels are attached to front and back end of robot for support. Driving system of robot allows it to move forward, backward and rotate clockwise or anticlockwise. Communication between robot and PC is achieved using Bluetooth. HC05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. This robot has 12 Volts battery for powering of driving system and 9 Volts battery for Arduino. Base station or has PC with bluetooth link connected with mobile robot. PC has NI's LabVIEW software with NI's VISA driver to communicate with PC's COM port. Live coordinates send by mobile robot receives by PC and map is plotted on LabVIEW's graph Fig shows mechanical layout assembly of designed robot.



**Fig.4.2. Hardware contains of S-Bot (a) Arduino Microcontroller MEGA2560 (b) CC2500 Communication Module (c) Ultrasonic Distance sensor - HC-SR04 (d) Sharp Distance sensor 2Y0A21 (e) IR Proximity sensor.**

Task of leader robot is to continuously broadcast a character serially related to its motion. We have used four motions Forward, Backward, rotate right (clockwise) and rotate left (anticlockwise). Special character value has been assigned to each motion. This value is used to send serially for particular motion continuously with standard baud rate. While a receiver robot continuously receives a character value and depending on its value motions are performed. For successful communication baud rate at leader robot and all the follower robots should be same. Also channel used for all CC2500 maintained same.

## 5. CONCLUSION

Secured communication between robots is achieved. Effective Coordination between heterogeneous bots is considered. Obstacle detection and avoidance is achieved which makes this system suitable for real-time applications. Autonomous mobile robots are built which eliminates the need of external control. Leader-Follower approach algorithm for Multi Robot Communication and Move to Goal or Target Tracking algorithm were successfully implemented on S-Bot. Multi Robot Communication is observed from Leader-Follower experiment. In Move to Goal approach one robot guides other robot to reach particular location and angle. Both experiments show expected results. Future work would include use of other sensors (ultrasonic, sharp distance, IR proximity) which are implemented on S-Bot robot. Those sensors would be useful to avoid collision between multiple robots.

Further algorithm would include Simultaneous localization and mapping (SLAM) and pattern formation.

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Title: **SMART SHOPPING CART WITH AUTOMATIC BILLING SYSTEM THROUGH RFID AND ZIGBEE**

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Paper Authors

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## SMART SHOPPING CART WITH AUTOMATIC BILLING SYSTEM THROUGH RFID AND ZIGBEE

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### ABSTRACT:

Now-a-days shopping is increasing rapidly. People take the items and put it into trolley. After shopping they go at the billing counter for billing but there are many people standing in queue for billing purpose. So more time is required for the individuals for billing because of existing barcode technology. To reduce this time we have implemented a system which is based on RFID technology. The system contains the items attached with RFID tags. The cart is interacting with the main server and it will have the facility to generate the bill for all the products added into the cart. The proposed system will be helpful for avoiding queues in shopping malls for billing. The customer can identify the location of product in shopping malls with automatic billing. With the proposed design there is no conventional queue system instead of that automatic billing is generated and hence the shopping becomes easy and enjoyable.

**Keywords:** RFID, tags, Zigbee, transmitter, receiver section.

### 1. INTRODUCTION

In recent years a deep structural change has occurred, with consequences on economic growth and society, especially in factors such as territorial occupation, urbanization, openness to global markets, demography, family structures and cultural and consuming patterns. Innovation in communication and information technologies have caused a revolution in values, knowledge and perceptions in practically all areas of human understanding, deeply carving the so-called "Age of Information and Knowledge". The grocery industry sector in nowadays extremely

important in worldwide economy, with its recent evolution in technological, political, social and economic terms making it one of the most convenient and diverse businesses across the globe. In their journal "Consumer perception of privacy, security and trust in ubiquitous commerce" mentioned that the proliferation of electronic commerce technologies has utterly transformed the way business is conducted, causes range from the new mobile technologies and ubiquitous computing, to the recognition by business of the strategic benefits offered by the implementation of communication and



ubiquitous computing structures, to the emergence of new business models made possible due to the new technologies and to the development of new economies that can be used to understand and value the ubiquitous commerce activity. The challenges and opportunities created by electronic business in the supply chain have cause the sharing of information between business patterns to impure operational performance, consumer service and solution development. Businesses have evolved from the sharing and co-ordination of information to the sharing of knowledge and advanced co-operation practices. The emergence of new technologies such as radio frequency identification device (RFID) and wireless network makes the traditional retail processes faster, transparent and efficient. The technology represent to retails and opportunity to reduce costs and to impure services, allowing attaining clients quickly, precisely and supplying personalized services. The advances manufacturing, distribution and information combined with the urbanization of modern society and social demographical challenges created the so-called new consumer. The consumer has a deeper understanding in comparing product costs ; is more versatile in brand preferences ;shows little loyalty to retailers has great expectations in services and client regard; is self sufficient and is more demanding towards supplied information. There was clear control transference from the manufacturers and retailers to the consumer. Strong competition between larger retail changes caused the

minimization of profit margins as a form of keeping aggressive prices and winning more clients. Today, this is no longer enough. One has to bet on offer differentiation and in the adoption of client retention strategies through the strengthening of the relation with the consumer, allowing adequate answers to the clients' needs through personalize service and promotion plans that augment their satisfaction and, most importantly, their enthusiasm. RFID tag, or simply "tags", is small transponders that respond to queries from a reader by wirelessly transmitting a serial number or similar identifier. They are heavily used to track items in production environments and to label items in supermarkets. They are usually thought of as an advanced barcode. However, their possible area of use is much larger. This paper presents a few new applications that are possible using RFID technology such as locating lost items, tracking moving objects, and others. RFID tags are expected to proliferate into the billions over the next few years and yet, they are simply treated the same way as barcodes without considering the impact that this advanced technology has on privacy. This paper presents possible exploits of RFID systems and some proposed solutions as well. RFID is the special type wireless card which has inbuilt the embedded chip along with loop antenna. The inbuilt embedded chip represents the 12 digit card no.

## 2. LITERATURE SURVEY

A. Development of Smart Shopping Carts with Customer-Oriented Service The system

specified here is assisted by the functionality of tablet or embedded computer .The functionality of this system is partially implemented in C language and LabVIEW, in order to provide a smart user interface and also to establish connection between embedded computer and other accessories .The user interface here provides with the map information, product searching and also automated billing .To make the flexible designing of user interface easy the buffered state machine based on a queued message handler (QMH) is adopted .The algorithm used here for the purpose of facial recognition is LBPH( local binary patterns histograms) which mostly used to extract the features of human face. The obtained characteristics data is then transformed into LBP data array, which is obtained from trained images .The face recognition here is basically used for the purpose of login, which would be stored in the database during the customer registration .The automated billing system is also provided here , and also the assistive information to the customers are provided.[1]

**B. Smart Trolley: A Fast and Smart Shopping Experience Using Android and Cloud** In this paper, the system database is created on the cloud which holds all the information about all the products. When the product is purchased, since it contains RFID tag and the trolley contains RFID reader which is connected to the android display through Bluetooth, its information gets stored in the database of the particular trolley for which trolley id is assigned by the server. Bill payment can be done through an

android application or desktop application. Products purchased are cross-checked at the exit gate and RFID tags of the products get removed there.[2]

**C. RFID based smart shopping: an overview** In this paper ,RFID based smart shopping and billing concept is used .The system integrates Cart location detection unit(CLDU) which is used to detect the location of the shopping cart inside the mall or supermarket ,Server communication unit(SCU) which will help in establishing and maintaining the connection of shopping cart with the central or the main server, User interface and display unit(UIDU) which will provide the customers with the user interface, and billing and inventory management unit(BIMU) which will handle and deal with all the shopping bill and inventory management. Shopping area is divided into multiple aisles. Also the IR transmitters are used at both ends of the aisle, to obtain information regarding the entry and exit of the shopping cart in the shopping malls. Including the location of the shopping cart as an attribute ,database is maintained at the central server.[3]

### 3. RELATED STUDY

Frequently people encounter a problem of spending too much of their time waiting in queues for billings their purchases in different shopping centers, malls and supermarkets. Waiting in-queues negatively affects human morale and may cause misunderstandings or conflict amongst people for instants, when someone breaks the line and stands in front of other people [2].

The proposed system aims to eliminate this problem by introducing a novel alternative to traditional billing methods, speeding up the payment process. The Arduino UNO is a microcontroller board. It has an Atmega328 M.C. It contains 14 digital input and output pins. So our aim is to design an automatic billing system which is based on RFID (Radio Frequency Identification) technology. The smart card uses a serial interface and receives its power from sources like a card reader. A smart card is like a chip card. It is a plastic card that contains an embedded computer chip—either a memory or microcontroller type that stores and transacts data. This data is usually associated with either value, processed within the card's chip. The card data is transacted via a reader that is part of the computing system. Smart shopping systems usually require other auxiliary wireless communication systems, but the proposed system we are using is called as ZIGBEE wireless communication (especially low-cost) to perform indoor positioning and product information broadcasting. Thus, the dual-antenna RFID reader is adopted in the developed SSC to identify the items in the cart (internal antenna) and out of the cart (external antenna). A customer when purchases an item after swiping the card, the price and number of items are read by the RFID reader, and the number of items purchased are already entered into the cart before reaching up to the counter. There will be elimination of queue. After the card is swiped, the number of items are read by the RFID Reader and they are entered into the cart

before one reaches to the counter, queues would be eliminated. Another important technology used in a Smart Cart system is called ZIGBEE wireless communication, which is one measure to reduce the waiting time of a customer's is to introduce an intelligent billing system using electronic Smart Cart as an alternative to existing barcode systems. Smart cart allows a customer to manually perform billing without relying on a cashier by means of swiping the RFID tags over an RFID reader. Unlike a barcode system, smart cart does not need any visual contact with barcodes which may get distorted in real life situations. All data about purchased products and user account data are stored in a cloud database on the Internet. Then, smart cart shows this information to customers on its display. A customer can delete an item from the list whenever he or she wishes by selecting a subtraction button. If the customer decides to finish purchasing, there's a total button press is required to upload all purchased product data and their total cost to the billing counter PC through ZIGBEE. Once all payment data is sent to the PC, total cost is withdrawn from the registered account cash of the customer and the customer can freely pass the anti-theft gate with the purchased products.

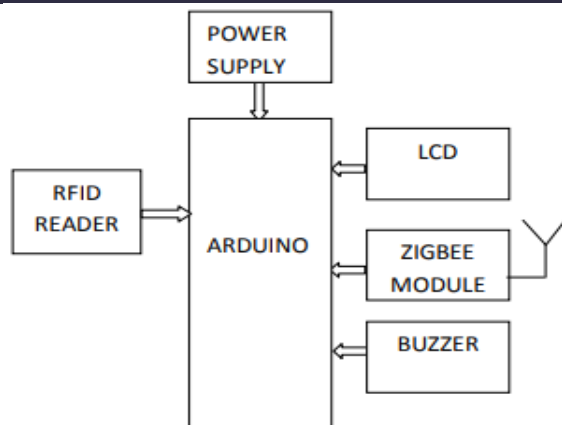
#### 4. PROPOSED SYSTEM

The technology currently used in checkouts at a supermarket is barcodes, which were developed in the 1970s. Today barcodes are found on almost every item. Barcodes are a universal technology in that they are the

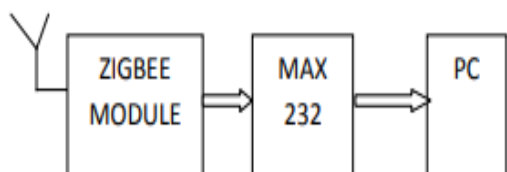


norm for retail products; stores that own a barcode reader can process barcodes and imprint it on the products. The most important factor that is involved in barcode scanning is that the product should be in the Line of Sight (LOS) of the reader in order to get the barcode imprinted on the product scanned. Thus Shopping in the present day usually involves waiting online to get your items scanned for checkout. During a shopping excursion to a shopping mall, you would have noticed the cashier scanning your products using some Laser device to produce a bill. What actually he is doing that he is reading the product barcodes using a Laser/Barcode scanner. Barcode scanner reads the code, data is sent to the computer, and computer looks up into the database for the price and description of the item[4]. Barcodes are structured to contain specific product related information. It basically encodes alphanumeric characters and symbols using black and white stripes, also called bars. Bar-coding is one of the AIDC (Automatic Identification and Data Collection) technologies. Some major drawbacks of existing systems are barcode scanners need a direct line of sight to the barcode to be able to read, and in order to read barcodes the scanner needs to be quite closer, Barcodes have no read or write capabilities; they do not contain any information such as expiry date etc. They are very labour intensive, Barcode have less security than RFID, and Barcodes are more easily prone to damages, Waiting in a line to get your items scanned from barcodes in supermarket for checkout is the major

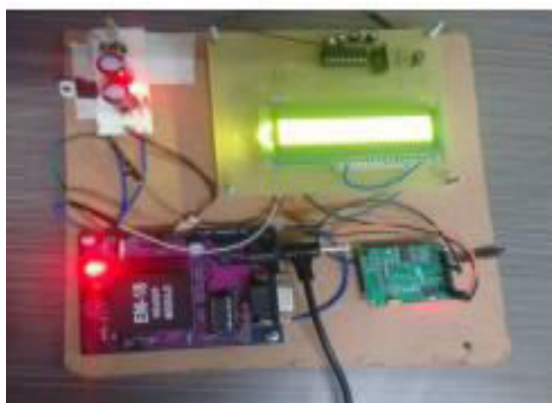
drawback. The range of the RIFD reader must not extend beyond the horizontal shopping cart limits so that reading products inside other shopping carts or on shelves does not happen. Nevertheless, range cannot be less than the cart's limits with consequence of not identifying products that are inside the shopping cart but out of the reader's range. The RFID reader should be able to read all the tags no matter the material (paper, plastic, metal, etc)they are inserted into. The usage of RFIDs in this solution comprehend benefits such as increasing safety and the consequent reduction in product loss, reduced human intervention and error, increased speed in involved processes, unique identification of products with additional information and availability of real-time information, amongst others. By using RFID technology there are many advantages like RFID tags can be read from a greater distance than barcodes, RFID tags don't need to be positioned in line of sight with the scanner, RFID tags can be read at faster rate than barcodes, RFID tags are read/write devices, RFID contains high level of security, RFID tags are more reusable, RFID tags carry large data capabilities such as product maintained, shipping history and expiry date etc, and by using this technology bills can be paid very easily and quickly And it also removes the waiting in a line to get the item scanned for checkout.



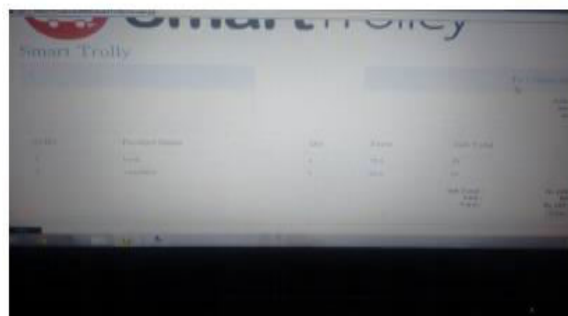
**Fig.4.1. Block diagram of Transmitter.**



**Fig.4.2. Block diagram of receiver.**



**Fig.4.3. Hardware kit image.**



**Fig.4.4. shows the reward points on Android Application.**

## 5. CONCLUSION

Thus the proposed system created bill of the purchased items. This process saved the time of customer and also reduced the manpower in the malls. So ultimately it becomes a easiest way of the shopping. Also with this system we have implemented the reward point system using Android application. The objective behind the application is to replace the existing card based system by android application. So the intended objective is successfully achieved in given system.

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Title: **MONITORING THE OPERATION OF TRANSMISSION LINE IN A SMART GRID SYSTEM THROUGH IOT**

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Paper Authors

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## MONITORING THE OPERATION OF TRANSMISSION LINE IN A SMART GRID SYSTEM THROUGH IOT

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### ABSTRACT:

One of the main implementation of wireless sensor network is monitoring equipment. Wireless sensor network (WSN) are able for cost efficient monitoring over enormous geo location. Construction of smart grid is based on the internet of thing(IOT) are made. Smart grid is attractive, and it is a new type of intelligent power system realized with the existing transmission and distribution power infrastructure. To pass the electricity to the consumers, we require a high voltage transmission. High voltage transmission line is responsible for transmission of electric power. Electricity is very essential to understand and monitor the behaviour of the system. In this paper, we present a survey of electric transmission line monitoring system, highlight the key concept, and state of art implementation as well as investigate challenges. The goal of this paper is to provide a better understanding of the design challenges of electric distribution line monitoring system and identify important research in this increasing important field.

**Keywords:** *High voltage, short circuit, model, efficiency.*

### 1. INTRODUCTION

It is known that when a fault occurs in overhead transmission line system then instantaneous changes in voltage and current at the point of fault generate high frequency. Electromagnetic impulses called travelling wave which propagate along the transmission line in both directions away from the fault point. The electric power infrastructure is highly end angered against many form of natural and spiffy physical events. Which can sceptically affect the overall performance and stability of the grid.

The fault impedance being low. The fault current is relatively high, during the fault. The power flow is diverted towards the fault and supply to the neighbouring zone is affected Voltage become unbalanced. It is important to detect the fault as early as possible that is why a kit is being made using microcontroller to make its process faster. The transmission line conductor resistance and inductance distributed uniformly along the length of the line. Travelling wave fault location methods are usually more suitable for application long lines. Power transmission lines employ at



50- HZ are more than 80-km long are considered to have the properties of voltage and current wave that travel on the line have the properties of voltage and current wave that travel on the line with finite speed of propagation. Traveling wave methods for transmission line fault location have been reported since a long time. Following developments employ high speed digital recording technology by using the traveling wave transients created by the fault. Currently, the electric power infrastructure is more vulnerable against many forms of natural and malicious physical events [1], which is directly affect the stability of grid. There will be some parameter which is affected. With this, there is an approaching need to equip the age old transmission line infrastructure with a high performance data communication network, that supports future operational requirements like real in the time record and control necessary for smart grid integration [2], [3]. Due to this technique the real time monitoring is necessary. Many electric power transmission companies have primarily depended on circuit indicators to detect the faulty sections of their transmission lines. However, there are still challenges in identifying the exact location of these faults. Although fault indicator technology has provided a flexible means to locate permanent faults, the technical crew and patrol teams still has to physically patrol and inspect the devices for large duration to detect faulty sections of their transmission lines. Wireless sensor based monitoring of transmission lines provides a solution for several of these disquiet like real time

structural awareness, faster fault localization, accurate fault diagnosis by identification and difference of electrical faults from the mechanical faults, cost reduction due to condition based maintenance rather than periodic maintenance, etc. These implementations identify stringent requirements such as fast delivery of enormous amount of highly reliable data. The success of these appeal depends on the design of cost effective and reliable network architecture with a fast response time. The network must be able to transport confidential information such as current state of the transmission line and control information to and from the transmission grid. This research provides an economical substructure to design a real time data transmission network. To observe the status of the power system in real time, sensors are put in various components in the power network. These sensors are able to taking fine grained measurements of a variety of physical or electrical parameters and generate a lot of information. Sending this information to the control centre in a cost efficient and appropriate time is a critical challenge to be addressed in order to build an intelligent smart grid.

## 2. LITERATURE SURVEY

These sources of power contain fossil fuels such as coal and natural gas, hydro, nuclear, solar, and wind power. Furthermore, the transmission system is made up of transmission lines that are in control of passing power from the power station where the power is transferred to the location of the

consumers. The distribution system is the network that supplies power to the load that can be consumed by the user's apparatus [1-2]. IoT is the network of physical substances that include entrenched technology to connect and sense or work together with their interior circumstances or the outer environment. The Internet of Things was "Born" in 2008-2009. By the year 2013, the IoT had progressed into a system by many technologies, going from the internet to wireless communication and from Micro-Electromechanical Systems (MEMS) to established systems. The IoT is supported by traditional fields, and wireless sensor networks, GPS, control systems, and others. The architecture layers of IoT are: the object layer, made of sensors and smart devices, the communication layer deals with latency, error probability, scalability, bandwidth, and security, and the application layer that is grouped based on the type of network, coverage, size, heterogeneity, business model, and real-time or non-real-time requirement. By 2020, the internet will be connected with about 30-50 billion appliances. Thus, the IoT retained the third revolution in the digital technology after the computer and Internet [3]. IoT gets important benefits to the smart grid between other systems. Disaster prediction and prevention of power-lines outages are the most challenging problems for electricity transmission for lots of reasons. For example, analogue collection of the data being generated at remote areas is difficult, but, when using IoT for data acquisition, it becomes just a data gathering and system

monitoring and controlling, which is easier. Progressive sensing and communication technologies of the Internet of Things can efficiently avoid or minimize the damage of natural disasters confronted by the power-lines, and hence develop the reliability and stability of power transmission [4].

### 3. RELATED STUDY

For our current society electricity is important, and in order to properly maintain and develop power distribution system, it is needed to understand and monitor the system behaviour [1]. The system behaviour i.e. Power grid constitute the electricity generation system, electric power transmission system, and electric distribution system[2]. Transmission line monitoring is very significant issue to ensure useful and reliable transmission of electricity. For transmission of electric power high voltage transmission line are responsible. Their sag and electric current are important parameter for transmission line monitoring[3]. internet of thing (IOT) used in smart grid is the predictable result of the growth of information communication technology to a certain stage. It will be capable of effective integrate of the infrastructure resources in communications and electrical power system, make the information and communication services manage for electrical power system , increase the level of power system information, and to get better the utilization efficiency of infrastructure in the existing power system. Because IOT technology has been used in smart grid, the important

technical support for the generation, transmission, substation, distribution, electricity and other aspects of power grid can be efficiently provided[4]. Smart grid is totally enclosed with an electrical system. For the developing countries, smart grid technology has great importance. Smart grid involve the complete electrical network and regional electrical network and a sub network like local utility transmission grid and distribution grid. Electricity in a remote location is carried by a simple distribution grid linking a central generator to homes. In India during the process of electricity transmission and electricity distribution losses are occurred at very large amount and change between 30 to 45%. Low metering efficiency, theft and pilferage this are the main reason for electricity losses in India [5].for electricity and security of smart grid, intelligent power line monitoring is important part. For that large number of sensors are required to find out the power system fault in a distributed network.. By including the number of sensor nodes, position of accuracy can be easily found. WSN are generally used to detect and locate the fault [6]. Our goal and contribute in this work is to provide an efficient electrical distribution line.

#### 4. PROPOSED SYSTEM

The architecture of IoT is expressed by three layers i) perception layer, ii) network layer, and iii) application layer, as shown in Figure. The perception layer contains two dimensions, and is usually split into two sub-layers: perception communication

extension and control sub-layers. The functions of the perception layer depend on sub-layers. First, the perception control is realizing smart perception of physical world together with recognition, data acquisition, processing, and automatic control with the second sub-layer which is communication extension sub-layer that is connected to the physical entities with the network layer and the application layer by the communication module. The network layer consists of all types of communication and the core network. When the information transmission, routing, and control are often implemented in the fundamental network, the communication network is looked at as the access network. The application layer provides many smart applications for certain industry. Hence, IoT technologies can be combined with all forms of the industrial undertaking. The application layer contains application infrastructure/middleware and terminal units. Through the application layer, the development of economy and society would be influenced greatly when the deep integration of IoT technology with industry is achieved.

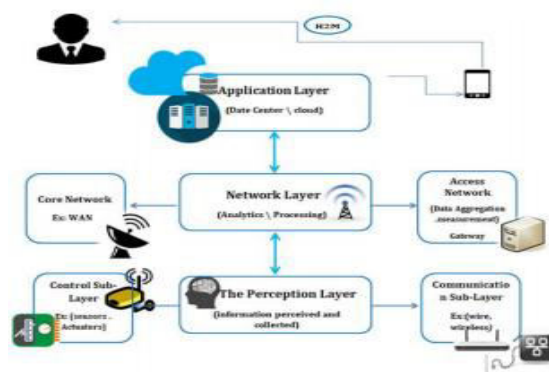


Fig..4.1. Proposed IOT network.

Arduino Uno is the latest revision of the basic Arduino USB board. It is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins: 6 can be used as Pulse Width Modulation- outputs, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP (in-circuit serial programming) header and a reset button as shown in Figure 5. It covers everything required to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. It can be extended with a variety of shields: custom daughter-boards with specific features. It is similar to the Duemilanove (Another type of Arduino), but has a diverse USB-to-serial wafer the ATmega8U2, and anew designed labeling to make inputs and outputs easier to identify. The Uno varies from all other Arduino boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. In the project, we chose the Uno because the drivers (operating systems) are easily available, and the installation takes very little time. The Arduino is shifted to using ATmega16U2 from FTDI chips for 'code burning.



**Fig.4.2. Proposed hardware kit.**

## 5. CONCLUSION

The paper represent a novel approach for controlling and monitoring the electrical distribution line . It will possible using IOT. Overhead transmission lines are vulnerable to weather, common weather component like smokes, fumes, rainfalls, snowfalls, winds and heavy storms, humidity, line and air temperature, all this things affect a lot, therefore, the damages occurred in power transmission line and due to this type of obstacle power line failure is occurred at any area. For this purpose we need an advance monitoring system. Transmission line is important to measure the use of power line capacity. Electric current and line position are two important parameters to measure the transmission line. The aim of this paper to monitor the line position at any area using the concept of electrical distribution line.

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Title: **INTELLIGENT MEDICINE BOX FOR MEDICATION MANAGEMENT USING IOT**

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## INTELLIGENT MEDICINE BOX FOR MEDICATION MANAGEMENT USING IOT

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### ABSTRACT:

A modern health care and in addition to this intelligent home monitoring, controlling embedded system capable of taking care of the patients from all aspects, covering personalized medication, vital signs monitoring. The project gives an experimental idea of patient's health condition and monitor environmental conditions and controlling. The platform involves an open-platform-based intelligent medicine box with enhanced connectivity and interchange ability for the integration of devices and services, Intelligent pharmaceutical packing with communication capability enabled by Zigbee and actuation capability enabled by functional materials and, flexible and wearable bio-medical sensor device enabled. The proposed platform devices with in-home healthcare services for improved user experience and service efficiency. The feasibility of the implemented Health platform has been proven in field trials and if any vital signs recognized then gives alert to predefine care takers through SMS alert and monitor the conditions continuously with an IP address of WIFI.

**Keywords:** *High voltage, short circuit, model, efficiency.*

### 1. INTRODUCTION

Medication compliance (adherence) describes the degree to which a patient correctly follows medical advice. The definition by Cramer et al.: Adherence "refers to the act of conforming to the recommendations made by the provider with respect to timing, dosage, and frequency of medication taking." [2]. According to the study of Times of India, over 20% of the India's population suffers from at least one of the non-communicable diseases (NCDs), which are estimated to cost India \$6.2 trillion during the period 2012-2030 (Times of India). As per the data from World Health

Organization (WHO), non-communicable diseases or chronic diseases, such as cancer, heart ailments, respiratory diseases and diabetes, 38 million people dies in every year. The aging of the population increases the prevalence of chronic diseases. According to Frost & Sullivan, in Europe a total of 50% of the hospital bed occupancy is by patients suffering from chronic illnesses such as diabetes and COPD (chronic obstructive pulmonary disease). This places a huge strain on the health care infrastructure [3]. In order to track the physical status of the elderly and in the

meanwhile keep them healthy, the following two daily tasks are essential: 1) real-time monitoring and analysing vital signs to early detect or predict life-threatening adverse events, 2) checking whether they are following their prescribed treatment, including taking their prescribed medicine on time. However, with rapidly aging populations, these daily tasks have brought great pressure and challenges to global health care systems. One review estimates that about 25% of the adult population does not adhere to their prescribed medication, which may lead to poor health outcomes and increased mortality. Poor medication adherence is a major problem for both individuals and health care providers. Technology improvements in health care facilities and services are highly desirable to meet the requirements of this giant group. A complete solution for in-home health care is still missing. A desirable system should be capable of taking care of the patients from all aspects, covering personalized medication, vital signs monitoring, on-site diagnosis and interaction with remote physicians. In addition, the existing systems rarely integrate new materials or apply new manufacturing approaches, which are always the key elements for bringing new devices or solutions into healthcare fields. By taking the above-mentioned issues into consideration, an intelligent home-based healthcare IoT system, Home Health-IoT, is proposed.

## 2. LITERATURE SURVEY

### Existing System:

A person performs daily activities at regular interval of time. This implies that the person is mentally and physically fit and leading a regular life. This tells us that the overall well-being of the person is at a certain standard. If there is decline or change in the regular activity, then the wellness of the person is not in the normal state. Elderly people desire to lead an independent lifestyle, but at old age, people become prone to different accidents, so living alone has high risks and is recurrent. A growing amount of research is reported in recent times on development of a system to monitor the activities of an elderly person living alone so that help can be provided before any unforeseen situation happened.

### Proposed System:

An intelligent home monitoring system based on ZigBee wireless sensors network has been designed and developed to monitor and evaluate the well-being of the elderly living alone in a home environment. Wellness of elderly can be evaluated for forecasting unsafe situations during monitoring of regular activities. The developed system is intelligent, robust and does not use any camera or vision sensors as it intrudes privacy. Based on a survey among elderly we find that it has a huge acceptability to be used at home due to non use of the camera or vision based sensors. The intelligent software, along with the electronic system, can monitor the usage of different household appliances and

recognize the activities to determine the well-being of the elderly.

### **3. RELATED STUDY**

Physiologic measurements like blood pressure and temperature, x-ray and ultrasound imaging, administration of intravenous medications, and support of critical life functions are all routine procedures that use medical devices. However, at present, each device is designed to stand alone as an island. To address this issue, the Institute of Electrical and Electronics Engineers Inc. (IEEE) is developing two new point-of-care medical device standards. IEEE P1073.2.2.0 Health Informatics Point-of-Care Medical Devices Communication Application Profile Association Control Function will provide for the establishment, release and disconnection of an association between a medical device agent and a system acting as a manager. In medical device communications [14], manager systems indicate a set of desired capabilities when requesting an association. Agent systems respond by stating the capabilities they support across the connection. IEEE P1073.2.2.0 is referenced by other application-profile mode standards within the ISO/IEEE 11073 family. The second standards project, IEEE P1073.2.2.1 Health Informatics Point of Care Medical Device Communication Application Profile Polling Mode will define a method for retrieving application data with medical devices that communicate through polling protocols. will enable “plug-and-play” interoperability [14]

for simple medical devices that use for management systems to query devices for all information to be communicated. There is a clear trend that the devices are getting smaller, lighter, and less obtrusive and more comfortable to wear. Although physiological measurement devices have been widely used in clinical settings for many years, some unique features of unobtrusive and wearable devices due to the recent advances in sensing, networking and data fusion have transformed the way that they were used in. First, with their wireless connectivity [10] together with the widely available infrastructure, the devices can provide real-time information and facilitate timely remote intervention to acute events such as stroke, epilepsy and heart attack, particularly in rural or otherwise underserved areas where expert treatment may be unavailable. The objectives of this paper are to provide an overview of unobtrusive sensing and wearable systems with particular focus on emerging technologies [8], and also to identify the major challenges related to this area of research.

### **4. PROPOSED SYSTEM**

We propose a smart system that will continuously monitor the patient’s health with the help of a sensor and also at the same time will monitor the patients daily dose of medicine. Each medicine box will have its own set of timing information which will be compared to a real world clock. If the information matches, the buzzer will go off and thereby remind the patient to take his/her medicine. A data will also be

maintained regarding the patient's health and his daily intake of medicines.

## DESIGN AND IMPLEMENTATION

The whole system is implemented in the following manner:

- The entire medicine box will be initiated once the power is switched on.
- Once initiated the circuit is set up according to the real time clock.
- The touch sensor for each slot or box is adjusted according to the real time clock as for how many intervals the box should be initiated.
- For example box 1 is set for twelve hours, box 2 is set for 'n' hours etc.
- Each box according to set time will have a buzzer set off at the intervals provided.
- If there is no touch detected the touch sensor will register as medicine not taken which is stored on the cloud.
- This process is repeated as required.
- A glucometer or any other health monitoring sensor is also interfaced to the arduino board to detect the glucose of a diabetic patient which will be stored on the cloud as well.

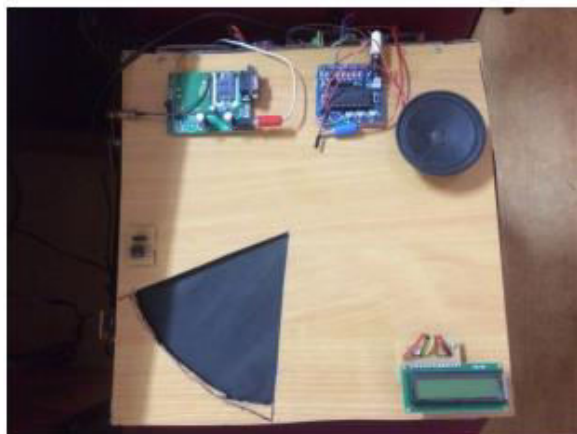
The received parameters compares with the stored threshold values, if any variation present in the measured values then a message is sent to registered number through the GSM module. All the comparison and comparing functions are done by the microcontroller. When the medicine time has been set, the medicine box will remind users or patients to take pills using sound and message. A real time clock is provided for updating the time. During the scheduled time, medicines are put forward by using a mechanical structure

with two motors. The parameter from the health monitoring part is stored in a webpage using IoT module. The doctor can update the medicine time using this webpage.



**Fig.4.1. Hardware kit image.**

Once the boxes are emptied after medicine consumption by the patient, and then refill the boxes with the medicines. For that a EEPROM card is used. If the card is valid the medicine box will be open and the user can refill the medicine. Once the card is removed system automatically going to locked stage. During scheduled time of medicine the LCD displayed the medicine slot number. As per the number of slots/sections in the medicine box the degree of rotation of motor varies. For example if 3 types of medicine present then each 180 degree servo motor rotates 60, 120 and 180 degree for medicine section 1,2 and 3 respectively. After this rotation the tray motor rotates according to the size of each slot. Here each section divided into 3 slots representing 3 times of a day. After a 1 minute delay the tray motor rotates anticlockwise and the servo motor rotates opposite for reaching initial condition.



**Fig.4.2. Output image.**

## 5. CONCLUSION

The intelligent medicine box and health monitoring and management system can effectively solve the error or negligence in the field of medications. The system consists of smart sensors attached to a human body for physiological monitoring and intelligent medicine packaging to the daily medicine management. The medical data collected from the sensors are stored in a webpage and history acquired for the patients are personal in nature. Hence the system ensures security of the highest order for the medical data on cloud storage.

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## IOT BASED AIR AND SOUND POLLUTION MONITORING SYSTEM

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### ABSTRACT:

The pollution of air and sound is increasing abruptly. To bring it under control its monitoring is majorly recommended. To overcome this issue, we are introducing a system through which the level of sound and the existence of the harmful gases in the surroundings can be detected. The growing pollution at such an alarming rate has started creating trouble for the living beings, may it be high decibels or toxic gases present in the environment leaves a harmful effect on human's health and thus needs a special attention. This device is also capable of detecting the fire in its area and notify the same to the fire brigade authorities so that they could take necessary actions accordingly, and also the mobile applications will be installed in the fire brigades itself so that if a fire is taking place nearby, it could be controlled in time to reduce loss of people and property. This system works on the methods of IOT which is a rising technology based on the fusion of electronics and computer science. The embedded sensors in the system help to detect major air polluting gases such as CO<sub>2</sub>, SO<sub>2</sub> and CO and level of sound pollution. The concept of IOT helps to access data from remote locations and save it in database so that we don't need to actually be present in that area.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Air and sound pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in particular areas through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also system keeps

measuring sound level and reports it to the online server over IOT. The sensors interact with microcontroller which processes this data and transmits it over internet. This allows authorities to monitor air pollution in different areas and take action against it. Also authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to control the issue. Some future consumer applications envisioned for IoT sound like science fiction, but some of the more practical and



realistic sounding possibilities for the technology include: Receiving warnings on your phone or wearable device when IoT networks detect some physical danger is detected nearby. Self-parking automobiles. Automatic ordering of groceries and other home. Automatic tracking of exercise habits and other day-to-day personal activity including goal tracking and regular progress reports. Network Devices and the Internet of Things All kinds of ordinary household gadgets can be modified to working an IoT system. Wi-Fi network adapters, motion sensors, cameras, microphones and other instrumentation can be embedded in these devices to enable them for work in the Internet of Things. Home automation systems already implement primitive versions of this concept for things like light bulbs, plus other devices like wireless scales and wireless blood pressure monitors that each represent early examples of IoT gadgets.

## 2. LITERATURE SURVEY

The motive of making a smart city can be fulfilled by using technology, thus making the life better and also enhancing the quality of services, therefore meeting every individual's needs. With modern technology in fields of information and communication, it has become easy to interact with the authorized people of city to tell the whereabouts of the area or city, how well the city is developing and how to make it possible to achieve a better life quality. In this system, an application was created to make one more step in the fulfillment of the goal. An area is

analyzed for evaluating how much pollution is affecting the area. The components of gases and their amounts are calculated and checked. If the amount is higher than normal then the officials are reported about it. After that the people are made to clear the area and taken to a safe place. The combined network architecture and the interconnecting mechanisms for the accurate estimation of parameters by sensors is being explained and delivery of data through internet is presented.[1] Some of the research work made for monitoring the pollution parameters in a particular location in order to make the environment safe and that area smart. Different methods were used in the past and are described in this section [4]. First is Smart Environment Monitoring using Wireless sensor networks[5] in which the main focus was on the developing an environment free of pollution by making it smart. Wireless sensors are fitted all over the city and in public transports. By monitoring all the sensor networks, all the environmental happenings can be gathered as a streaming database to analyze the environmental position. The monitoring data gathered from stationary nodes installed in the city to the mobile nodes placed on public transports is given by this technique. Second is Toward a Green campus with the internet of things. It is an implementation of idea to save energy through adequate management of computer machines and air conditioner. It is based on the theory of internet of things [7]. Third is WSN- and IOT based Smart Homes and their extension to Smart Buildings [7]. This work is based on the use



of reliable, efficient, real-time and economical sensor networks for making smart homes. In this, the sensor nodes are fitted into the different areas of home. These nodes produce data of the movement done in the home or any usage of an object. Further, these homes are extended to smart buildings [4].

### 3. RELATED STUDY

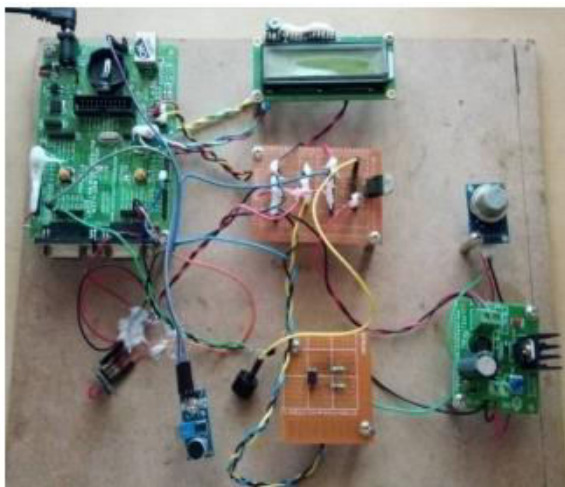
In recent years, IoT has gained a lot of importance in the field of science, The Internet of things (IoT) is the network of vehicles, home appliances, and other items which have electronics embedded within, there are software, sensors which help in connectivity which enables these things to connect, collect and exchange data. The word "Internet of Things" is consisted of two main parts; Internet the backbone of connectivity, and "Things" meaning devices . According to analyst firm Gartner and as shown in figure 1.1, there will be 8.4 billion connected things in 2017, setting the stage for 20.4 billion Internet of Things (IoT) devices to be deployed by 2020[5]. The purpose of this project is to identify the harm caused by the air and sound pollution to the environment. Pollution in simple words can be explained by, the presence of an foreign object in the environment which has harmful effect, we as a society have to ensure that all the pollution levels are maintained to the minimum, both first and second tier cities in Indian perform extremely poorly in cases of Air and Noise pollution India tops the world in pollution related deaths, accounting to 2.5 million

deaths of the total 9 million worldwide. This project helps in detecting the major gases in air and the decibel levels in the surrounding environment. Our project will be a boon to the society as our project will be making sure that every individual will be able to keep a track of the pollution from our app. It is the need of the hour to monitor air quality and keep it under control for a better future and healthy living for all. Some of the research work made for monitoring the pollution parameters in a particular location in order to make the environment safe and that area smart. Different methods were used in the past and are described in this section. First is Smart Environment Monitoring using Wireless sensor networks in which the main focus was on the developing an environment free of pollution by making it smart. Wireless sensors are fitted all over the city and in public transports. By monitoring all the sensor networks, all the environmental happenings can be gathered as a streaming database to analyse the environmental position.

### 4. PROPOSED SYSTEM

The air and noise pollution monitoring system consists of ARM7 microcontroller [5] and sensors. Microcontroller is also known as the mind of the device. Initially, the microcontroller is provided with a 5V supply. Sensors provide the data to the microcontroller that is displayed on the LCD display continuously, LCD Display is connected to the microcontroller board and if the air pollution exceeds the set limit (defined by the programmer) then the output

is shown in the analog form i.e. if the air pollution is raised it will be displayed on the output pane, Buzzer simultaneously buzz and similarly when the sound pollution exceeds the set limit (90dB in this case) the buzzer will be displayed as output on the output panel. Now the data which is retrieved from air and sound sensor will be provided to the WiFi module which is connected to the 3.3 V pin on the microcontroller board. This WiFi module (nRF24L01 module) will then provide this data to the android application accessible to all the android phone users and accordingly the local people can take actions on their part.



**Fig.4.1. Proposed hardware model.**

The air and sound pollution monitoring system monitors air and noise pollution using a mobile application. It shows the digital value of air and sound pollution and user can analyse it with a graph. It becomes very easy for us to rectify the levels and air and noise pollution around and plan for a healthy living and surrounding. The figures that are included in our paper shows the way

the system works and how the output is obtained from the input after processing.



**Fig.4.2. Output results.**

## 5. CONCLUSION

This IOT based air and sound pollution monitoring device is a great step towards a healthy livelihood. With the help of this device not only the municipal authorities but even the common people can participate in the process of controlling pollution and ensure safe environment. This automatic device, once installed is capable of continuously tracking the pollution level and analyse the detected information. The most highlighting feature of this device is that the output is represented in digital as well as analog format with the help of a simple mobile application which is usable on all android devices like smart phones, tablets, PDA's etc. The device itself is very eco-friendly and does not harm the environment in any way. Moreover, it is based on one of the modern technology and also inexpensive as compared to other technologies developed so far and can be installed anywhere.

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## VEHICLE TRACKING AND MONITORING SYSTEM TO ENHANCE THE SAFETY AND SECURITY DRIVING USING IOT

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### ABSTRACT:

In this paper, vehicle monitoring and tracking systems are implemented using Blynk platform acting as a medium for data transfer and visualization. The system is developed to monitor various driver help parameters like eye blinking, alcohol consumption and vehicle parameters like engine temperature, the distance between the vehicles and tracking of the live location of the Vehicle. The Ultrasonic sensor is placed in the front part of the vehicle, if any two vehicles draw near to one another then an alert message is sent to the mail through Blynk application. The Temperature sensor is placed in the engine part. When the temperature raise's in the engine, caution is sent to the mail. Eye-blink sensor and alcohol sensor are utilized to check the condition of the driver, if the state of the driver is abnormal then a notification is sent to mail. The developed system takes care of vehicles and s driver's safety.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Vehicle tracking systems are popular among people as a retrieval device and theft prevention. The main benefit of vehicle tracking systems is the security purposes by monitoring the vehicle's location which can be used as a protection approach for vehicles that are stolen by sending its position coordinates to the police center as an alert for the stolen. When a police center receives an alert for stolen vehicles, they can make an action to prevent this theft. Nowadays, it is used either as a replacement or addition for car alarms to protect it from theft or it can be used as a monitoring system to keep track the vehicle at the real time. So, many

applications can be used for this purpose to block car's engine or doors as an action to protect the vehicle. Due to the advancement in technology vehicle tracking systems that can even identify and detect vehicle's illegal movements and then attentive the owner about these movements. This gives an advantage over the rest applications and other pieces of technology that can serve for the same purpose. Nowadays, vehicle tracking is one of the most important applications. For example, the maps given to vehicle drivers may play a large role in vehicle tracking and monitoring. The major difficulty is that vehicle owners may not be



able to distinguish the vehicle in a place as a result of overlapping maps, which adversely affects the process of tracking and monitoring[1]. It requires some types of systems to identify and detect where objects were at some time or what distance traveled during a trip to a vehicle. This may be an additional point and help the police in preventing thefts and locating the vehicle by relying on reports from these approved systems and studying and analyzing them to detect stolen vehicles' locations. This system is a necessary device for tracking of vehicles any time the owner wants to observe or monitor it and today it is really trendy among people having costly cars, used as theft avoidance and recovery of the stolen car. The collected data can be observed on a digital maps by using internet and software[2]. There is tremendous demand for object tracking application for the business process. The real-time tracking information on valuable things and assets could solve many problems in the world. GPS is the Global Positioning System which provides the location, using off-line and on-line both in any atmospheric conditions. There are several types of GPS tracking system available in the market.

## 2. LITERATURE SURVEY

Manasi Patil et al., suggested a better traffic management system using Raspberry pi and RFID technology. The vehicle has a raspberry pi controller fixed in it which is interfaced with sensors like gas sensor, temperature sensor and shock sensor. These sensors are fixed at a predetermined value

before accident. When an accident occurs, the value of one of the sensor changes and a message to a predefined number (of the ambulance) is sent through GSM. The GPS module which is also interfaced with the controller also sends the location of the vehicle. When the message is received by the ambulance, a clear route has to be provided to the ambulance. The ambulance has a controller ARM which is interfaced with the RFID tag sends electromagnetic waves. When an ambulance reaches the traffic signal the RFID reader which is placed on the joints detect the electromagnetic waves of the tag. If the traffic signal is red, then the readers goes through the database in fraction of seconds and turn the red light green. And automatically in such condition the RFID on opposite joints turn the opposite signal red. This provides a clear route to the ambulance. [1].V.Sagar Reddy et al., developed an accelerometer based System for driver safety. The system has the advantage of tracking or identifying vehicles location just by sending a SMS or email to the authorized person. The system is designed by using Raspberry Pi (ARM11) for fast access to accelerometer for event detection. Is there any event is occurs the message sent to the authorized person so they can take immediate action to save the lives and reduce the damages. Images captured by the camera on the vehicle are emailed to the concerned person (for example the owner of the vehicle) along with the type of accident and the time of the accident. [2].Sri Krishna Chaitanya Varma et al., proposed an



Automatic Vehicle Accident Detection and Messaging System Using GPS and GSM Modems. AT89C52 microcontroller is used in the system. When the system is switched on, LED is ON indicating that power is supplied to the circuit. When the IR sensors that are used sense any obstacle, they send interrupt to microcontroller. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information is sent to a mobile number as a message. This message is received using GSM modem present in the circuit. The message gives the information of longitude and latitude values. Using these values the position of the vehicle can be estimated [3]. Apurva Mane et al., described the methods for vehicle collision detection and remote alarm device using Arduino.

### 3. RELATED STUDY

This system provides a mechanism to reduce disasters by monitoring eye blinking of the driver, which indicates drowsiness, obstacles located in the road and the drunken state of the driver. Accident and the location of the vehicle are detected. By this system primary care is received as the accident information is available Anusha et al[2] implemented a system using LPC2148 and the system has features like storing in the database. The work includes GPS, GSM modules. The framework also detects Alcohol consumption and Engine Temperature, All the values can be seen on the Web page. so safety is provided to the travellers in the vehicle. Imteaj et al[3] developed an Android-based application that

detects an accidental situation and sends an alert message to the nearest police station and medical care center. This application is organized with an external pressure sensor to extract the outward force of the vehicle body. Hence, the application plays an important role in Post-accident services and could lessen the effect due to an accident Mayuresh et al[4] described a system that uses an open source platform and intended to monitor and trace the location of a vehicle, the framework also checks fuel consumption, engine temperature and vehicle speed, GPS/GPRS/GSM modules are used for communication. All the values are stored in the data base on the web server.

### 4. PROPOSED SYSTEM

The vehicle monitoring and tracking system have been developed in this paper. An ultrasonic sensor is placed in the front part of the vehicle, if any vehicle draws near then alert message is sent to the mail via Blynk application. To avoid the sparks in the vehicle temperature sensor is utilized and it is placed in the engine part of the vehicle if the temperature inside the car increases then Notification is sent to mail through Blynk. If alcohol consumption is in high range then caution will be sent. If the person feels drowsiness then it is detected by IR sensor and alarm will be in on state and an alert is sent to mail saying the driver is in the drowsy state. The values of all the sensors are collected by NodeMCU as it has inbuilt Wi-Fi module all the data is transferred to the cloud through Wi-Fi and analysis is done

in Blynk app and notifications are sent according to the conditions.

Vehicle monitoring system with GPS helps in tracking vehicles. The tracking process alerts the driver and cautions him to drive carefully., Thus preventing the accidents [7]. In this research work, investigation to monitor driver condition, engine temperature, abnormalities in driver are recorded by the amalgamation of GPS, GPRS. The temperature sensor attached to the vehicle, monitors the variations in temperature there by indicating overheating of the engine motor. The Alcohol sensor checks the amount of Alcohol consumption, sleepiness /drowsiness of the driver. The method incorporated is given in Fig:2.The step by step procedure of operations is listed below.

Step-1: Installation of GPS Module in Vehicle

Step-2: Monitoring of moving Vehicle

Step-3:Check for various Parameters such as temperature of engine, drowsiness of driver and /or drunken.

Step-4: Obtain the Parametric display on display board

Step-5: Any Deviation, Stop Vehicle and /or Alarm by a buzzer.



**Fig.4.1. Hardware kit image.**

To interact with users, a website has been developed where a user with the hardware can create an account and monitor all the vehicle installed this system. User will get notification if any vehicle gets into accident through the website account, mobile application and mobile SMS with the exact GPS location of accident. Also any police station and hospital can open an account from the website and will get notification through website and mobile SMS about an accident with the accident location and direction towards the accident location using google map. It considers a network with  $N$  mobile unlicensed nodes that move in an environment according to some stochastic mobility models. It also assumes that entire spectrum is divided into number of  $M$  non-overlapping orthogonal channels having different bandwidth. The access to each licensed channel is regulated by fixed duration time slots. Slot timing is assumed to be broadcast by the primary system. Before transmitting its message, each transmitter node, which is a node with the message, first selects a path node and a frequency channel to copy the message. After the path and channel selection, the transmitter node negotiates and handshakes with its path node and declares the selected channel frequency to the path. The communication needed for this coordination is assumed to be accomplished by a fixed length frequency hopping sequence (FHS) that is composed of  $K$  distinct licensed channels. In each time slot, each node consecutively hops on FHS within a given order to transmit and receive a coordination

packet. The aim of coordination packet that is generated by a node with message is to inform its path about the frequency channel decided for the message copying.



**Fig.4.2. Output results.**



**Fig.4.3. Sleep mode activated time.**

### 5. CONCLUSION

A novel method for assessing the quality of vehicle tracking system using IoT is presented in this paper. Vehicle tracking system is very essential in major cities and nowadays vehicle accidents are rapidly increasing, hence this module is developed for tracking the vehicle, vehicle temperature, alcohol consumption of driver, sleepiness or drowsiness. This work survey has improved the Quality of service and security. Internet of Things (IoT), the emerging technology has benefited in facing the challenges especially for vehicle tracking system in the real world environment.

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## DESIGN AND IMPLEMENTATION OF A FINGERPRINT BASED LOCK SYSTEM FOR SHARED ACCESS

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### ABSTRACT:

This paper presents an enhanced methodology in implementing and designing a security system for door locking purpose based on fingerprint, GSM technology, monitoring camera, alarm system and password system. This security system will provide enough security by limiting unauthorized people access and taking a record of those who pass through it. Sometimes unauthorized people or burglars try to break the door for evil intentions at a time when no one is available at a targeted place, so this paper introduces some security solutions for that problem and they are the main contribution of our paper. We introduce an alarm system to alert the people at the surroundings, GSM module that's used to send an SMS message to the registered user's (responsible person) and a web camera that's used to take a video for a person who tries to break the lock, password keypad that's used after fingerprint sensing to provide extra security. Definitely the registered users are the only persons who can access the lock, and the door closes after five seconds from the opening time. The method used to implement this experiment involves the use of a fingerprint scanner R305 that's interfaced with Arduino microcontroller-ATMEGA328P to control the locking and unlocking process of a door. During all the opening and closing processes, the 16x2 Liquid Crystal Display (LCD) displays some commands which can be used to instruct the users like, place your finger on the sensor, the door is opened, the door is closed, the message is sent, please enter the password etc. If an unregistered user tries to access the door using their fingerprints, automatically his/her access is denied. The proposed door lock security system is can be used at homes, offices, banks, hospitals, and in other governmental and private sectors. Our proposed system was tested in real-time and has shown competitive results compared to other projects using RFI and password.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Biometrics refers to the automatic identification of a living person based on physiological or behavioural characteristics

for authentication purpose. Among the existing biometric technologies are the face recognition, fingerprint recognition, finger-geometry, hand geometry, iris recognition, vein recognition, voice recognition and



signature recognition, Biometric method requires the physical presence of the person to be identified. This emphasizes its preference over the traditional method of identifying what you have such as, the use of password, a smartcard etc. Also, it potentially prevents unauthorized admittance to access control systems or fraudulent use of ATMs, Time Attendance Systems, cellular phones, smart cards, desktop PCs, Workstations, vehicles and computer networks. Biometric recognition systems offer greater security and convenience than traditional methods of personal recognition. Fingerprint recognition represents the oldest method of biometric identification which is dated back to 2200 BC. The use of fingerprints as a personal code has a long tradition and was already used. This system focuses on the use of fingerprints for door opening and closing. The fingerprint recognition software enables fingerprints of valid users of the vehicle to be enrolled in a database. Before any user can use the vehicle, his/her fingerprint image is matched against the fingerprints in the database while users with no match in the database are prevented from using the vehicle. A microcontroller stores the data equivalent of fingerprint of the master user. Comparison between this enrolled fingerprint and the fingerprint of the person who is about to use the vehicle is done by the micro- controller. If both the fingerprints are identical control circuitry of the microcontroller sends appropriate signals to the motor relays operating the door of the vehicle. If the fingerprints are not identical microcontroller

sends signals to alarm circuitry to warn about an unauthorised use.

## 2. LITERATURE SURVEY

One more disadvantage of traditional lock is that when homeowners lose the key and have no alternative key, in this case, they should wait for long hours for a technician to come, otherwise they should break the door. Another challenge or disadvantage is that when the key is locked away or maybe misplaced inside the house, in this case even authorized persons won't have access to his/her property or belongings. This will issue can be solved with the help of technician again and may cost the authorized [4]. In addition to providing access to the target building, personal belongings and important documents at homes or offices can be accessed depending on the lock system; personal belongings can be very valuable things such as expensive pieces of jewelry, confidential documents, and money in cash, etc. To overcome all those challenges and drawbacks in the traditional locks, smart security systems are developed which provide more security to the individuals, however, these systems are easy to use, to access, and can be reliable. Such of these security systems, the use of smartcards, voice technology, passcode, and biometrics [5-8]. In this work, we develop a biometric security system based fingerprint. Biometrics involves the science which can statistically analyze the biological characteristics. A biometric system is defined as a technology that can recognize and verify the identity of a person using a



measurable physical or behavioural characteristic of the person. There are some conditions to choose characteristics such as performance, universality, collectability, uniqueness, acceptability, circumvention and permanence. Some other characteristics can be used by biometrics such as fingerprint, eye features, facial features, etc. [9]. Our work developed a biometric-based fingerprint which involves other technologies like GSM, cam web, and password keypad system. At present, there are six major biometric technologies available in today's market. They are Fingerprint recognition, Hand geometry recognition, Iris and Retina recognition, Voice recognition, Signature recognition, and Facial recognition. Of these recognition technologies, facial recognition, fingerprint recognition, and iris recognition are the most dominantly used for numerous applications. In this work, fingerprint recognition technology is considered. Fingerprint recognition technology is a technique that's used to detect and recognize different human fingerprints based on different patterns of fingers, which is found to be unique among each person. It is very common and maybe the best way of obtaining details of any person and identifying a person can be done most easily and conveniently [5]-[6]. Study of fingerprints for recognition and identification the individuals is scientifically called Dactylography. The main advantage of the fingerprint recognition method is that each person has a unique fingerprint pattern that remains the same and never changes throughout life, making the fingerprint

recognition method an unailing method of human identification.

### 3. RELATED STUDY

Door access control is accomplished by locks indoors [2]. Recent advancements in every phase of modern living and the world around us progressively digitized, it becomes very difficult for protecting one's confidential information. Old-fashioned passwords and keys are originally considered to be sufficient to provide secure data transactions or for any other purpose. However, in the current scenario, they became weak because of sophisticated hacker attacks and unauthorized users across the internet. With more and more electronic gadgets such as tablets, multiple sensors, smart phones, and cloud-based services, etc interconnected to the internet, and with simultaneous sending and receiving of data, there arises a need to keep the data unavailable to hackers and unauthorized individuals. To prevent this, passwords can be used. However, the problem is that the user may use the same password for multiple devices. Besides, these passwords are sometimes shareable and persons with strong technical knowledge can use a variety of methods to crack these passwords. During the time of civilization changes in different falling and rising manner, equipment, and tools used for security intentions developed by locksmiths [3]. In the period of medieval, there are many traditional methods were used to implement security tools. As days pass and time move on, that equipment and tools turned to be disused, as people could



breach the perimeters of security set by the security equipment and supplement. . As a result, continually, people seek for more dependable and reliable measures of security. The blow winds of civilizations and industrialization movement all over the world have strengthened the deep intentions of individuals in manufacturing more advanced and sophisticated security systems which could be able to battle the obstacles and challenges of securing worthy possessions. Sometimes during the day, most of the homeowners leave their homes for different purposes, some of them go to their work offices, some of them go to schools, sport fields, farms, etc. thus, their homes will be easy to attack by burglars, because of homes' traditional locks which can be opened by the burglars in case if they have the same key or duplicate key to open the door, making their belongings such as jewelry, bank cards, money and other valuable things easy to steal, this is one of this disadvantages of using the traditional locks which has no security and no one can rely on.

#### 4. PROPOSED SYSTEM

The block diagram of the implemented system involving all hardware components that are used to accomplish the security task. Arduino Uno microcontroller board acts as a master and it is the body of our project, while other hardware components act as slaves. The system behaves according to the written program and performs all mentioned security actions without human intervention, and all other

automatic operations are carried out. All hardware components are of vital importance for the system to provide enough security, and all these tools work together under one controller.

Tx-out and Rx-in of the sensor are connected to the pin 2 and pin 3 of the Arduino Uno respectively. The electronic lock is connected with one of the output ports of the Uno. Making a network with the relay allows switching between the 5V and the 12V electrical components. Now we have attached the Arduino Uno to the laptop for registering fingerprints. We require the connection with the computer for assigning the ID to the prints. This can be done through Smartphone with Arduino application as well. We save the ID into the sensor and upload the code to the Uno. We disconnect the Uno with the computer and turn on the power adaptor. Once it gains power, the system boots up the fingerprint IDs saved inside and waits for a print to be matched. If no match is found, the keypad and the switch remain active. Once a match is found, the buzzer will buzz once and the lock will open. If no match is found, the system will not take any action at all. The scanner can perform over 100 scans per second, so when someone places a finger, it will respond instantly if the prints match. This system can store up to 126 fingerprint IDs. So, it can control the access of 126 different people. Review of the whole system

- 126 different fingerprints can be enrolled into the system to open door/doors.

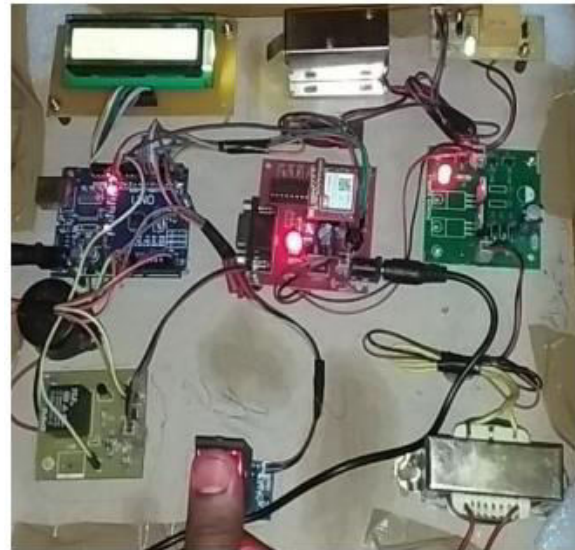
- On placing a registered finger, the lock unlocks for 5 seconds with no noise or buzz.
- A 4-digit password can be entered through the keypad.
- Each key pressed results in a beeping sound. A successful code opens the door with a single buzz.
- An incorrect input will not open the door; the system will buzz shortly twice.
- 3 failed attempts on the keypad will make the system buzz continuously for 3 seconds notifying an intrusion attempt.
- On pressing the switch from inside, the lock unlocks for 5 seconds with a single buzz.



**Fig.4.1. Hardware kit image.**

The solenoid lock can be fixed on the door from inside and if it is at the closing state and then powered by an authorized person, the state will change to opening state and vice versa. The status of the solenoid lock is always displayed in the LCD screen, for example, if the door is opened then the status will be displayed in LCD. Different kinds of status are displayed by the LCD screen and each status denotes the current situation of the security system. The opening and closing situations of the solenoid lock are illustrated in the following figures;

please focus on the lock to find out its situation. Our experiment is carried out with the help of several hardware components such as transformer, rectifier, LCD (16X2 lines), GSM Technology, keypad, piezo buzzer-12VAC, MEMS Sensor, optical fingerprint scanner-R305, solenoid door lock (NC-0837L). All these components are interfaced and connected to the Arduino Uno R3 microcontroller according to their functionality. It can be concluded that this security system can be improved by adding face recognition along with fingerprints in the more sensitive places which require higher security.



**Fig.4.2. Door is closed**

## 5. CONCLUSION

The design and implementation of fingerprint based lock system is customizable and flexible. This door locking mechanism is comparatively cost-effective than the available lock systems in the traditional market. Our fingerprint based lock system has high accuracy rate and is also quick to recognize fingerprints which



enable seamless integration with the users and provides tighter security. In our country, private and government organizations are very much concerned about security. Many companies are interested in using this type of locking mechanism but the system which is available have very high installation cost. Due to this excessive cost, many small firms cannot afford such systems. Keeping the installation cost in mind we planned to develop a system that should be affordable to both large and small firms. This design can be improved by more intensive development and additional features such as more locks can be added to the system. Thus we do not need to spend so much for just one lock if this can be used to control several doorways. A system to save prints without the use of a computer could have been made, but it will require more parts than the ones we used.

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Paper Authors

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## VEHICLE ACCIDENT DETECTION SYSTEM BY USING GSM AND GPS

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### ABSTRACT:

With the growing population the use of vehicles has become superfluous. And this has led to the accidents increasing at an alarming rate resulting in a large loss of property and human life. This project aims at finding the occurrence of any accident and reporting the location of accident to the previously coded numbers so that immediate help can be provided by ambulance or the relative's concerned. GSM technology is used to intimate the vehicle position in the form of latitude and longitude coordinates through sms. The location spot is retrieved using Global Positioning System which is a navigational system using a network of satellites orbiting the earth. Sensors such as vibration, alcohol and fire detectors detect signal in case of an accident occurrence and send a signal to the connected microcontroller. The controller in turn operates the relay to blow the airbag and automatically lock the brakes. Meanwhile a message reaches to the necessary help. And thus ambulance service and required aid can reach in the shortest time possible. This system can also aid companies in the rental vehicle business to keep a track of the vehicular activity by sending message at regular intervals to the authorised numbers.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Today, it is very difficult to find that an accident has occurred and to find the position where it the accident occurred. It's more difficult for the lives of victims until any person know the information and informed it to the emergency vehicles like ambulance or to hospitals and if it occurs in remote areas it will becomes no hope to survive. To avoid these, different technologies like GSM/CDMA and Global positioning systems are used. The GPS based accident identification module

contains a Micro Electro Mechanical System(MEMS), vibrating sensor, fire sensor, infrared sensor and a GPS module connected to the processor unit. At the moment of accident, the vibration sensor or MEMS or fire sensor detects the accident gives the information to the microcontroller, which will display the information on LCD, switch on the buzzer unit and sends the information to the ambulance, police and owner/parents through GSM network. Here the system also provide the user to track the



vehicle location, when he/she required. Here the position of the vehicle is also send to the mobile in terms of latitude and longitude. The main objective of this project is to detect the vehicle accident and transmit the location of the accident with the information of victim and type of accident to the medical help centre and police control room. So medical help centre and police control room will get the exact location by the geographical co-ordinates transmitted via message with the help of map.

## 2. LITERATURE SURVEY

At present criteria, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. In this project GPS is used for tracking the position of the vehicle, GSM is used for sending the message and the ARM controller is used for saving the mobile number in the EEPROM and sends the message to it when an accident has been detected. From the past event and the existing approach the below Drawback are been noted:

1. Manual system is adopted.
2. Tracking of accident is a crucial process in the system.
3. Required medical attention cannot be given to the needed person.
4. Life loss and property loss were not stopped in large scale. Considering all the

drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.

5. The Automated system is used once the accident occurs.

6. This system GSM will send the message to the More Human life can be saved using this automated system. Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.

## 3. RELATED STUDY

Due to employment the usage of vehicles like cars, bikes can be increased, because of this reason the accidents can be happened due to over speed. People are going under risk because of their over speed, due to unavailability of advanced techniques, the rate of accidents can't be decreased. To reduce the accident rate in the country this paper introduces a optimum solution. Automatic alert system for vehicle accidents is introduced; the main objective is to control the accidents by sending a message to the registered mobile using wireless communications techniques. When an accident occurs at a city, the message is sent to the registered mobile through GSM module in less time. Arduino is the heart of the system which helps in transferring the message to different devices in the system. Vibration sensor will be activated when the accident occurs and the information is transferred to the registered number through GSM module. GPS system will help in finding the location of the accident spot. The

proposed system will check whether an accident has occurred and notifies to nearest medical centers and registered mobile numbers about the place of accident using GSM and GPS modules. The location can be sent through tracking system to cover the geographical coordinates over the area. The accident can be detected by a vibration sensor which is used as major module in the system

## 4. PROPOSED SYSTEM

Now a days large amount of accidents are happening in highways due to increase in traffic and also due to rash driving of the drivers. And in many situation the family members or the ambulance and police authorities cannot able to get information regarding to that accident in an appropriate time. This result in delaying the help which is more important to that person who suffer from that accident. Our project automatic accident vehicle detection and messaging system using GSM modem is designed to overcome such problem and to prove help for the person who met with accident and save their life too by passing message to rescue team in right time. In this project we are using accident detection unit which fitted the vibration sensor in the vehicle. For example, In case of accident, occurs if the car is hit to some other vehicle or an object it create some vibration in that case then the vibration sensor will detect the vibrating signal and it pass the message to the arduino. Arduino is used as a Central Processing Unit (CPU) of our project. When the arduino receives a signal from vibration sensor it

immediately pass the message to GSM modem then the GSM modem then the GSM modem will starts its process. In this project we used reset button it will be used by the driver if the accident is very normal for example if the driver hit the wall in some situation like parking then the driver will press the reset button this will inform the arduino to that system will not send SMS. But if the driver is not in a situation to press the switch or if the accident is really a major accident then the driver will not press the reset button and then the system will send SMS. Here, we use GSM modem to send SMS to the family members and the rescue team. Buzzer is also used to indicate as a accident has been occurred which will create a beep sound. Thus the life of a person who met with an accident has been identified and save their life too.



**Fig.4.1. Hardware kit image.**

The system detects accident from vehicle and send message through GSM module. The message is received by another GSM module. Google Map Module It displays Google map show u exact location of accident and it details. It gets detail SMS from accident location. Hence there is small variation in the coordinates, initial value of

latitude and longitude are same but fractional value changes with small difference.



**Fig.4.2. Output results.**

## 5. CONCLUSION

Our idea is used to detect accident and automate emergency assistance services. As a result, system is sending SMS to the nearest Emergency assistance service provider from accident location. The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents. This design is a system which can detect accidents in significantly less time and sends the basic information. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. A Switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue

team and to the police station and the message is sent through the GSM module.

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## WOMEN SECURITY SYSTEM USING GSM AND GPS

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### ABSTRACT:

Women's safety plays a very vital role now days due to rising crimes against women. To help resolve this issue we propose a GPS based women's safety system that has dual security feature. The proposed system consists of dual alerts that is buzzer and message is sent through GSM. Hence there must be a system which can protect them in such difficult situation. This paper suggests a new technology for a women safety with one touch system using GSM & GPS so that women never feel helpless while facing such social problems or challenges. Here we introduce a device which ensures the protection of women. The problems we have overcome here using raspberry pi, GSM, GPS and force sensor. Anytime when women sense danger only button is to be pressed on the device. In such case GPS tracks the location of the women & sends emergency message using GSM to saved contacts & police control room. The system proven that it is providing complete security to women's and kids wherever we are using it.

**Keywords:** IOT, GSM, GPS, keypad.

### 1. INTRODUCTION

In today's world, women safety has become a major issue as they can't step out of their house at any given time due to physical/sexual abuse and a fear of violence. Even in the 21st century where the technology is rapidly growing and new gadgets were developed but still women's and girls are facing problems. Women are adapt at mobilizing diverse groups for a common reason. They often work across ethnic, religious, political, and cultural divides to promote liberty. We are all aware of importance of women safety, but we must analyze that they should be properly protected. Women are not as physically fit as men, in an emergency situation a helping

hand would be assistance for them. The best way to cur tail your probability of becoming a dupe of violent crime (robbery, sexual assault, rape, domestic violence) is to recognize, defence and look up resources to help you out of hazardous situation. If you're in dilemma or get split from friends during a night out and don't know how to find back residence, this device with you will guard you and can reduce your risk and bring assistance when you need it. There are several app reduce the risk of sexual assault on women by informing control centre and their associates through SMS, but inlay of those this apparatus have much more efficient way to inform those this respected personals and also has a defending system which cannot be provided by existing app.



This paper focuses on a security system that is designed solely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges. The system resembles a normal clothes which when activated, tracks the location of the victim using GPS (Global Positioning System) and sends emergency messages using GSM (Global System for Mobile communication), to three emergency contacts and the police control room. The system also incorporates a screaming alarm that uses real-time clock, to call out for help and also generates an electric shock to injure the attacker for self defence.

## 2. LITERATURE SURVEY

At present criteria, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. In this project GPS is used for tracking the position of the vehicle, GSM is used for sending the message and the ARM controller is used for saving the mobile number in the EEPROM and sends the message to it when an accident has been detected. From the past event and the existing approach the below Drawback are been noted:

1. Manual system is adopted.
2. Tracking of accident is a crucial process in the system.

3. Required medical attention cannot be given to the needed person.
4. Life loss and property loss were not stopped in large scale. Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.
5. The Automated system is used once the accident occurs.
6. This system GSM will send the message to the More Human life can be saved using this automated system. Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.

## 3. RELATED STUDY

Loaded with security apps for women, you're smart phone can help you send emergency alerts to chosen people and also let people know about your whereabouts if anything goes wrong. Sometimes here might be a situation that when women had an accident in the late night and there are no one to help them, in such situations the person will not be able to tell the situation that he/she facing. And they do not know the basic first-aid details and to know the person where the incident has happened. Nowadays though there are many apps and devices evolved for women safety via smart phone which can be activated only by a touch or one click or shake the mobile. The metal detector detects the presence of metals like knife and other things present with the kidnapers and with the help of shocking



circuit; the shock was applied to the kidnappers. The shock that was applied is mild. The GPS is meant for tracking the location of the spot and with the help of GSM the emergency message is sent to the predefined contact. The UART is used to communicate with GPS and GSM module. The message is sent using peripherals with continuous I/O communication. Here we discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic; hence the probability of error is reduced. The data is highly secured and it not only solves the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management. The database stores the current month and also all the previous month data for the future use. Hence the system saves a lot amount of time and energy. Due to the power fluctuations, there might be damage in the home appliances. Hence to avoid such damages and to protect the appliances, the voltage controlling method can be implemented.

#### 4. PROPOSED SYSTEM

This work develop a women's safety system which provides the current location details of the women in danger using GPS and GSM modules. IoT module will track the current location of the victim and update in the webpage. In addition to location tracking it also provides some safety and security to women like giving electric shock to the attacker. The proposed system of this project

is shown in Fig. Workflow of the proposed System The workflow of the women safety and security is explained in this section. The flow chart of the proposed system is illustrated in Fig.

Step 1: Start.

Step 2: Switch ON the 12 Volt power supply.

Step 3: Emergency button is pressed.

Step 4: If GPS receives signal, GPS will start calculating the current latitude and longitude values of the victim and send it as SMS to the registered mobile number using GSM module.

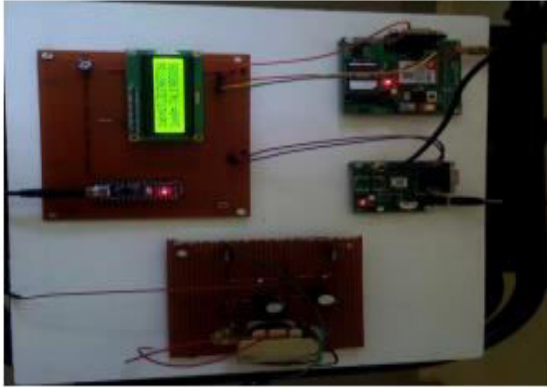
Step 5: If any vibrations detected by vibration sensor, get the last location from GPS and send to GSM module.

Step 6: IoT module tracks the last location of the victim and that location is updated in the Webpage.

Step 7: Neuro stimulator is turned ON, to apply shock to the attacker.

The implementation of women security system achieved in three levels. In the first, alarm is raised based on force sensor when it detects force being applied on women. In second, shock is applied to kidnappers when metal detector detects the presence of metal. At third, message will be sent to the predefined numbers using GSM and spot is being tracked using GPS. The main advantage of this system is that the user does not require a Smartphone unlike other applications that have been developed earlier. The use of sophisticated components ensures accuracy and makes it reliable. The system provides with all the features which

will leave no stone unturned to help the victim in any kind of emergency situations.



**Fig.4.1. Hardware kit image.**



**Fig.4.2. Output results.**

IoT module will track the current location of the victim and it will update the location on the webpage. The microcontroller will switch ON the buzzer in the device, so that nearby people may come to know that someone is in danger and they will come to rescue.



**Fig.4.3. Output in LCD**

## 5. CONCLUSION

The proposed design will deal with critical issues faced by women and will help to solve them with technologically sound equipment and ideas. The merit of this work is it not only provides safety and it also provides security by means of self-defence mechanism. The crime against the women can be now brought to an end with the help of real system implementation of the proposed model.

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## IOT BASED COOPERATIVE AGENTS ARCHITECTURE

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### ABSTRACT:

After briefly discussing the Internet of Things and Cyber physical device main features, their application in a specific architecture for a simple distributed intelligent system was presented. The system works as a Multi agent system and it is based on Arduino Uno boards, each one hosting an intelligent agent. The system was developed as test equipment for an active intelligent water meter for a SMART CITY project. The proposed system can be generalized and usable also with very simple (and therefore economical) computational units and allows to delocalize in similar units the computational load exceeding the single node capability; a specific data protocol, based on I 2C, is used to share the knowledge between agents.

**Keywords:** *Smart city, data protocol, chip, IOT applications.*

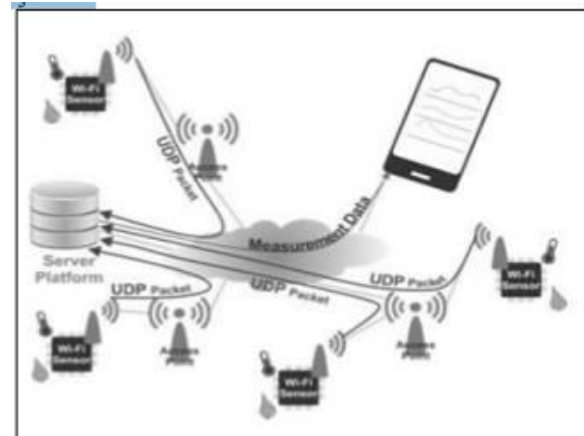
### 1. INTRODUCTION

The demand of service over the internet necessitated the data collection and exchange in an efficient manner. Internet of Things refers to the rapidly growing network of connected objects that are able to collect and exchange data using embedded sensors. It is nowadays finding profound use in each and every sector and plays a key role in the proposed environmental monitoring system too. IoT converging with cloud computing offers a novel technique for better management of data coming from different sensors, collected and transmitted by low power, low cost microcontroller “Arduino UNO”. An open source website, Thingspeak is used where the measurement of the parameters are updated. Thingspeak is an open source Internet of Things application and API to store and retrieve data from the

sensors using the HTTP Protocol over the Internet. Thingspeak is an IoT analytics platform service that allows you to aggregate, visualize, and analyze live data streams in the cloud. The cloud utilizes the operations of Graphical visualization and available in the form of virtual server for the users and the objects are communicated with the cloud via possible ‘wireless internet connections’ available to the users and the majority objects uses the sensors to tell regarding the environmental analogue data. The IoT helps bring all things together and permits us to communicate with our very own things. The measurements thus received can be viewed in these scripts such as JSON, XML and CSV. In the proposed system, the environmental parameters can directly be accessed by the user, thus eliminating the need for third parties.

## 2. LITERATURE SURVEY

Recently climatic change and environmental monitoring and management have received much attention. The paper introduces three different IoT based wireless sensors for environmental and ambient monitoring: one employing User Datagram Protocol (UDP)-based Wi-Fi communication, one communicating through Wi-Fi and Hypertext Transfer Protocol(HTTP) and third one using Bluetooth Smart. The above presented systems help in recording data at remote locations and viewing it from every device with an Internet connection. Here Zigbee is used to monitor and control application where wireless connectivity is required. UDP based cyber physical system monitors the temperature and relative humidity. Here the losses are caused by the network itself. The WiFi sends the UDP or HTTP packets to a Cloud Platform which makes it available only to the administrator who decides whether the data must be public or private. BLE consist of sensors placed at various areas at which they produce a beacon when data is received and the server takes the information from the sensors whenever the beacon is produced. The available Environmental Monitoring System (EMS) uses UDP protocol which requires the establishment of connection and IP matching every time. Direct access of the geographical information is not available since the information is sent to a centralized platform and admin plays a major role.



**Fig.2.1. Proposed model.**

## 3. RELATED STUDY

Today, the large number of devices equipped with sensors and connected to the network produces an enormous amount of data. These data are characterized by elevated heterogeneity, aperiodicity and, generally, expressed without reference ontology or at least one semantics/synthesis evident. Certainly, expressions in rich and structured formats such as XML and similar one are often replaced by lighter forms but poor in information, JSON (JavaScript Object Notation). It is easy for humans to read and write but not explicit. It is easy for machines to parse and generate and it is based on a subset of the JavaScript Programming Language. The relevant amount of collected data may be difficult to use, or even unnecessary without further processing that could turn it into usable and contextualized information. As a result, in recent years there has been a change in research trends, which have focused towards the fusion of engineering with IoT technologies. In this context, ambient

intelligence and autonomous control experienced a growing attention. By mediating the high computational capacity of the current single board computers (SBC) used in IoT infrastructures and the extreme granularity reachable, it is evident the use of approaches such as intelligent agents, or, for example, hardware and software combinations that can be used to enable autonomous and intelligent systems. In fact, agents can represent any entity, perform a wide variety of human-like tasks such as learning, reasoning, negotiation, self-organization and mutual trust. Considering the free-fall cost of hardware, along with the rise of easy-to-use programming frameworks, these applications are wide-spreading. The aim of this paper is to present a distributed and intelligent architecture, compatible with Arduino (open source platform) or similar SBC that is scalable and modular according to the desired application. Constraints in the architecture definition were a low computational load and a reduced data transfer between nodes. At the same time, each agent is aware of his or her surroundings and can pursue both local (owners) and global goals. The test bed, developed at the Polytechnic of Bari in cooperation with my Hermes company, for a Smart-city project financed by the Ministry of Research and Education, is presented. The system is aimed at the creation of a calibration and control system for electronic water meters. In details the tested here presented is aimed at evaluating an intelligent anti-freezing system, based on a

multivalent architecture where a fuzzy controller unit is present as decision support.

#### 4. PROPOSED SYSTEM

The proposed system keeps track on the parameters such as moisture, temperature, humidity, rainfall, gas content and earthquake intimation with the help of the real time sensors. These parameters are continuously monitored by an open source platform called Thingspeak for an interval of every 2 minutes. The data can be viewed in any one of the three formats such as JSON, XML and CSV. The sensors in the proposed system collect the data such as the temperature, humidity, soil moisture, pollution level, rain water level and movement in the earth surface. The Wi-Fi network helps in the process of sending the collected data to the open source platform, Thingspeak. Alternate to that, an app is made for the purpose of viewing the collected data in even more easier manner. Through the application/Thingspeak, the user will be able to know about the status of his/her own agricultural land and counter-measures can be taken after the keen observation of the parameters of the land.



Fig.4.1. Hardware kit image.

The main role of updating data continuously is done by Thingspeak, which has APIs for collecting data produced by sensors and APIs for reading that data from applications. The paper is divided into two parts. One part of the paper is where one has to program a thing to send data. And, the second part is where the other has to see the data. Thingspeak sits in the middle and makes it handy to do both. The paper uses easily accessible hardware to build a proof-of-concept IoT system to monitor air temperature, humidity, soil moisture, soil humidity etc. Further this can be modified with different sensors or actuators for building something for individual purposes. Thus a direct access to all the environmental parameters is given to the user after the above stated procedure is completed.



**Fig.4.2. OUTPUT in thingspeak.**

## 5. CONCLUSION

The paper presents an architectural scheme and a protocol for implementing a network of SBCs hosting cooperating intelligent agents [40]. In this specific case, the system,

based on 10 SBCs of the Arduino-Uno type, has been used to control a test system for electronic water meters carried out as part of a SMART CITY project. The system is scalable and modular and can integrate both agents equipped with sensors and/or actuators, but also computational units always based on simple and low-cost boards able to communicate via I2C bus. The possibility of sharing goals among agents makes both local and global optimizations possible and simplifies both the external communication of global states (test results but also errors and anomalies), but also from outside the system by redefining global objectives. Local objectives can also be modified externally or seen as local functions that are included in the definition of global objectives.

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## MULTI-LEVEL SMART PARKING SYSTEM

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### ABSTRACT:

The proliferation of the variety of motors is leading to troubles of vehicles parking at the precise area specially the automobile parking. This not directly results in website visitor's congestion. This is because of the fact that present day-day transportation infrastructure and automobile park facility are not capable of deal with the advent of a massive number of vehicles on the road. A fundamental hassle in everyday life is parking of cars specially the car parking at the suitable region. And this problem in a roundabout manner outcomes in site traffic congestion. This paper affords the simple concept of using server or cloud-based totally clever parking services in clever cities as an important software of the Internet of Things (IoT) paradigm. This device permits improvising the control of parking device through following rules of the authorities, for example dealing with outstanding parking areas within the metropolis. The instinct of imparting this paper is to reduce clever city problem along with the web site visitors on road and decreases the pollutants inside the town and the parking. The various steps involved in this operation are vehicle identity the use of RFID tags, free slot detection using IR sensors and fee calculation is achieved on the basis of the duration of parking and that is accomplished with the help of the real-time clock.

**Keywords:** *IOT (Internet of things), IR sensor, Smart parking, RFID, tags, Online registration.*



## 1. INTRODUCTION

Traffic congestion due to cars is an alarming trouble on a worldwide scale and it's been developing exponentially. Car parking hassle is a primary contributor and has been nonetheless the main trouble with constrained parking regions in city cities. Searching for a parking area is a normal (and often frustrating) hobby for lots of humans in cities around the sector. This seeks burns approximately a million barrels of the sector's oil every day. Any citizen may also use his cellular tool, a laptop having the Internet to get admission to the clever metropolis application from anywhere in the international to find an free parking spot within the metropolis and get to recognize the which parking spot continues to be to be had. It affords inexperienced automobile parking management via some distance-flung parking spot localization and fast car retrieval. Presently, Car parking system is based totally on a

reservation foundation, but, this device has a drawback in phrases of time and region. This task management device can be grouped into multi-parking manipulate which can be used to govern each outside and indoor parking location and single parking control which commonly objectives indoor parking plenty. A parking zone need to provide customers enough areas to park their automobile on the grounds that automobile plays a massive position in transportation, there's want for locating out parking place to park the cars. By growing a trendy device, it can help manage and decrease the street traffic. A new tool facilitates clients to hold time in finding a parking spot. The Internet of Things is about putting in one of a kind sensors like ultrasonic sensors; active and passive RFID, and so on.

## 2. RELATED STUDY

This enhances the individual to test the recognition/availability of parking regions in advance than





putting their journey. Here the venture is to apply the winning belongings in most suited level to reduce the looking time, web site visitor's congestion inside the metropolis. Some embedded systems collectively with auridino, raspberry pi, ARM 7. Are used to expand internet of things applications. A few contemporary parking device which makes use of sensors to accumulate the records but the use of sensors like video sensors in a parking system are expensive so our purpose is to growth a machine with much less fee with extra overall performance. As the range of population improved within the metropolitan towns, the want of vehicles additionally were given increased. Ultimately, it causes issues in parking which leads to traffic congestion, using force frustration, and air pollution. When we go to the only-of-a-type public places like Shopping branch shops, multiplex cinema hall &

accommodations throughout the competition time or weekends it creates quite a few the parking trouble. According to the modern research determined that a cause force takes almost 8 mins to park his vehicle because of the fact he spends more time searching the parking slot. These looking outcomes in 30 to forty% of visitor's congestion. Here we're going to see a manner to lessen the parking problem and to do secured parking using the clever parking device. The parking device is designed on this type of manner that it's miles applicable for blanketed parks, open parks and avenue facet parking. The fig.1 suggests the cloud-primarily based absolutely IOT structure for smart parking device which includes cloud provider which presents cloud garage to maintain records about the reputе of parking slots in a parking vicinity and so on. The centralized server which manages to keep entire clever parking structures statistics



collectively with amount of slots, availability of motors and plenty of others. And this statistics might be accessed through a few secured gateways thru network.

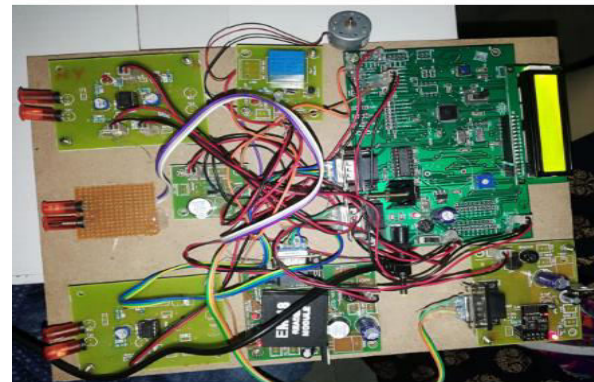
### 3. AN OVERVIEW OF PROPOSED SYSTEM

Moving in the direction of smart metropolis, clever parking is a very good instance for a not unusual citizen of the way the Internet-of-Things (IoT) can be efficiently and correctly utilized in our everyday existence to offer distinctive services to special customers. Proposed software is person friendly or even non-technical character can use it via mobile device. Through this utility consumer can search an unfastened parking slot from everywhere in the global. Proposed system gives properly-prepared vehicle parking management thru remote parking spot localization. Conventional reservation based vehicle parking approach has a hindrance of space and time. Proposed smart parking

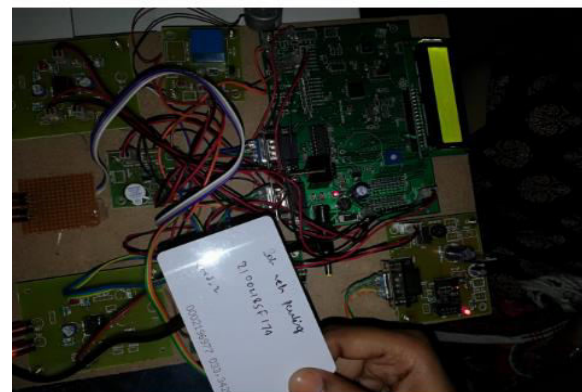
machine presenting the unfastened parking slot efficaciously that saves time and gas and reduces atmospheric pollution and congestion in towns. IOT primarily based new Parking platform allow to connect, analyze and automate records amassed from gadgets, and execute efficaciously that makes clever parking viable. Cloud storage is a cloud computing version, in which information is stored on faraway servers accessed from the net, or “cloud” [9]. It is maintained, operated and managed with the aid of a cloud storage service issuer on garage servers which might be built on virtualization techniques. For a few pc proprietors, finding sufficient storage area to hold all of the data they’ve received is a real mission. Some human beings put money into large hard drives. Others select external garage devices like thumb drives or compact discs. Desperate computer owners might delete entire folders well worth of antique

documents to make area for brand spanking new records. However, some are deciding on to depend upon a developing trend: Cloud storage. The controlling device of the entire system is a Microcontroller. Wi-Fi module, IR sensors are interfaced to the Microcontroller. IR sensors are fed as enter to the Microcontroller. The Microcontroller techniques this statistics and transmits over Wi-Fi, on the way to be obtained from MOBILE. In attaining the venture the controller is loaded with an application written using Embedded „C“ language. The user who wants to park the automobile is hooked up to the Wi-Fi community of that precise parking lot thru the password. The IR sensors ship the status to the microcontroller in which the data processing is completed. The microcontroller sends data to the webpage approximately the status of the slot to the consumer the usage of IOT.

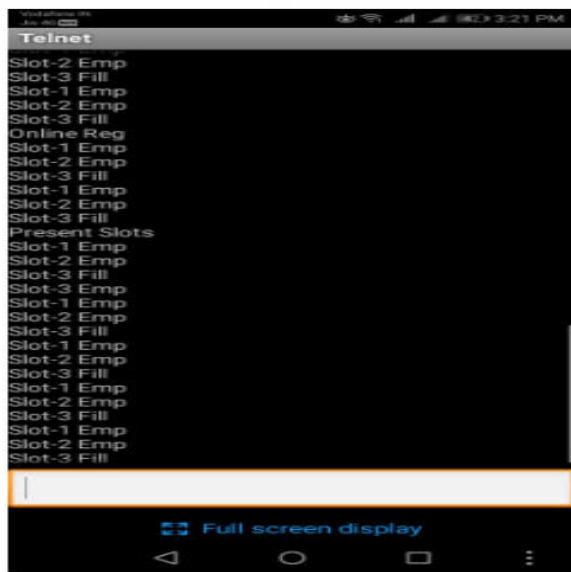
This manner the consumer can without problems discover a parking spot with none congestion and in much less time.



**Fig.3.1. Working model.**



**Fig.3.2. RFID card using for Online registration.**



**Fig.3.3. Output results across Telnet app.**

#### 4. CONCLUSION

Our device minimizes the parking prepared time in a big-sized parking facility. It additionally enables in maximizing their venue era for the parking facility proprietors. It would possibly moreover help lessen the need for manpower in the parking facility which would greatly reduce the value and mistakes of the technique. Also, this technique ought to decrease the usage of paper making sure a green device. This portray can be in addition prolonged to the reserving of parking's lots

over a time frame from growing. The cellular software can be extended to different operating systems which consist of iOS, Windows, and so on. In the server, offerings may even be extended to the protection measures together with hearth, theft, and so forth.

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# Field Programmable Gate Array Implementation for Highly Secured Palm Print Authentication

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To guarantee individual ID and profoundly secure recognizable proof issues, biometric innovations will give more prominent security while improving precision. This new innovation has been done lately because of exchange misrepresentation, security breaks, individual ID, and so on. The excellence of biometric innovation is that it gives an exceptional code to every individual and can't be duplicated or manufactured by others. So as to conquer the withdrawal of finger impression frameworks, this paper proposed a palm-based individual distinguishing proof framework, a promising and new research region in biometric recognizable proof frameworks in light of their uniqueness, adaptability and a quicker and wide scope of utilitarianity speeds. It gives higher security on biometric unique mark frameworks with rich highlights, for example, wrinkles, constant brushes, mainlines, details focuses and single focuses. The fundamental motivation behind the proposed palm unique finger impression framework is to actualize a framework with higher exactness and speed up palm unique finger impression acknowledgment for some clients. Here, in this we presented an exceptionally ensured palm print recognizable proof framework with intrigue extraction territory (ROI) with a morphological procedure utilizing a two-way un-crushed or course vector (UDBW) change to separate low-level palm fingerprints enrolled capacities for its vector work (FV) and afterward after correlation is by estimating the separation between the palm transporters and the capacity of the palm and the capacity of the enlisted transport line and palm control. The after effects of the recreation show that the proposed biometric recognizable proof framework gives more noteworthy precision and solid distinguishing proof speed.

**Keywords:** Field Programmable Gate Arrays, Verilog, Personal Identification, Finger Print Recognition, ROI, Recognition Rate.

## 1. INTRODUCTION

Individual biometric acknowledgment is generally acknowledged in the organized network, supplanting passwords and keys in view of their unwavering quality, uniqueness and developing interest for security. Regular strategies utilized are fingerprints and faces, however for facial validation, individuals are as yet taking a shot at the issue of lighting and lighting, as fingerprints don't have a decent mental impact on the client because of their broad application in criminal examinations. In the event that any biometric strategy is to prevail later on, it should have highlights of selectiveness, precision, riches, simplicity of procurement, dependability or more all client acknowledgment. Palm print dependent on close to home character is a broadly acknowledged new biometric strategy and has

all the characteristics important to make it a piece of our every day lives.

This paper analyzes the utilization of palm fingerprints for individual distinguishing proof utilizing waves. Palm print has extraordinary data accessible on fingerprints, however it has an a lot bigger measure of detail as far as principle lines, wrinkles and overlap. Also, it tends to be effortlessly done alongside a unique hand metric structure, in this way shaping an exceptionally exact and dependable biometric-based individual distinguishing proof framework. Individual check dependent on his palm print. It has become an inexorably dynamic research subject throughout the years. Palm printing is educational and has likewise been dissected.

Our prejudicial highlights, for example, where wave transformation has been utilized have been invigorated to extricate the advantage of exploring the adequacy of utilizing a mix of various waves to examine the tissue of

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palm prints. Individual personality is wherever in our every day lives. For instance, we frequently need to demonstrate our character so as to get to the financial balance, enter an ensured site, pull back money from an ATM, sign in to a PC, etc. Generally, we distinguish ourselves and get entrance via conveying travel papers, keys and access cards, or by recollecting passwords, PIN codes and PIN numbers.

Shockingly, identifications, keys and allows can be lost, copied, taken or overlooked. Passwords, mystery codes and PIN numbers can without much of a stretch be overlooked, contacted, shared or took note. These weaknesses or inadequacies in customary individual recognizable proof systems have made critical issues for all concerned. For instance, programmers regularly upset PC systems, and charge card extortion is evaluated at billions of dollars a year around the world. The expense of overlooked passwords is high and speaks to 40–80% of all IT help work area calls and reset determinations that have been lost or hacked cost up to \$340/client/year. Hence, solid, dependable and secure answers for individual character must be tried to address the deficiencies of customary procedures that can affirm that somebody is by and by the individual who professes to be him.

Biometrics are a remarkable and quantifiable component or human element of programmed recognizable proof or check. Singular check can be done by biometric distinguishing proof by measurable investigation of organic qualities. This capacity can be quantifiable physical, for example, the eye, face, finger, hand or conduct picture, for example, the unmistakable beat and musicality of composing.

Notwithstanding expanded security, biometric frameworks additionally improve ease of use by encouraging the need to plan and recall various complex passwords. No big surprise extraordinary frameworks have been brought into applications as different as U.S. visits and access to Disney Park, Orlando.

Despite the fact that law authorization offices around the globe have been utilizing robotized unique finger impression based biometric distinguishing proof frameworks (known as AFIS) for over 40 years, biometric ID remains amazingly troublesome. The biometric framework should address high picture issues (non-membership), non-separation (constrained mistake rates), huge contrasts in the class (pseudo-repulsive) and tricky reenactment assaults (framework security). In this way, it is important to structure a reasonable framework to control the individual rapidly and consequently.

Different specialists have made biometric confirmation models subject to different spatial and change strategies. Reference [1] proposed another calculation for changed assembling of low-goals palm prints. Notwithstanding, comfort is the standard lines obliged by its position and thickness. The fundamental lines are picked and

are portrayed by their position and thickness. A lot of controlling identifiers is proposed to expel the key line. Utilizing these pointers, the initials are detached from the potential line of the significant lines, and dependent on the initials of the potential artistic style ousted, the whole standard lines are expelled utilizing a dull framework. Near to data about the detached piece of the standard line is utilized to pick the appearance on experience, and a fitting line locator is picked to evacuate the going with bit of this ROI fundamental line. Following to discharging the standard lines, there are several guidelines for mentioning palm print. Reference [2] is another way to deal with remove a limit, a genuine coding intend to choose the palm impression. This graph isolates track information from palm lines and stores it in competition rules. Angaciated planning is organized with effective execution to consider genuine pictures. The outright control execution time is around 1 s, which is snappy enough for steady applications. The proposed coding system was evaluated using a database of 7,752 palm-printed pictures from 386 unmistakable palm trees. To check, the proposed procedure can work with a 98.4% high real affirmation and low fake affirmation of  $3 \times 10^{-6}$ .

Dai et al. [3] offer a high-goals way to deal with palm print acknowledgment with different highlights of the concentrate. Highlights, for example, details, thickness, direction and fundamental line extraction work are taken. To gauge the data, the DFT is utilized and radon-based steering is assessed. Particulars wilderness channel separate is utilized to improve brushes as indicated by the bearing of neighborhood slopes and thickness. Thickness cards are determined utilizing a composite calculation, gabor channel, Hough transformation. The concentrate is outfitted with the principle line court change utilized. The checking, confirmation and framework is utilized as a methods for incorporating the confirmation framework and the proposed proof base for the recognizable proof framework. References [4] and [5] recommended checking palm prints dependent on solid line direction. Radon Conversion Modification Ltd. has been utilized to extricate the capacity, which removes the street work. To coordinate the test picture with the preparation picture, text style coordinating innovation was utilized dependent on the pixel-to-run calculation. Reference [6] proposed online the character of palm print. The proposed system takes palm prints on the web and uses low-objectives pictures. A channel is used with low traffic and periphery following during the pre-planning stage. The gas exhausting ring channel used to expel the limit and encode the Gabor 2D stage is used to address this limit. Conventional hing space is used to facilitate.

Reference [7] proposed a unique determination framework by presenting an estimation of widespread surface capacity and identification of nearby focal points. Our similar investigation of palm print work extricate shows that

palm print examples can be all around portrayed through surface, and surface vitality estimation conveys a critical contrast between various classifications while keeping up high storing inside range. Evaluated crude as indicated by the compelling worldwide surface highlights and important to lessen the quantity of tests for additional treatment at a decent level. The best match-based match is aimed at improving framework proficiency. Reference [8] a successful ordering and quest plan for the picture database to encourage snappy database recovery when the palm print database is enormous. There are three principle issues to consider: include extraction, ordering, and coordinating. When all is said in done, highlights separated from the picture database are regularly connected with unique pictures, for example, hars. The best match is looked for in a layered way, where a capacity is first chosen to lead the pursuit by decreasing the quantity of competitors. At that point, different capacities are utilized to lessen the gathering of competitors. This procedure is rehashed until the conclusive outcome is resolved based on the pre-defined coordinating models. The selection of highlights assumes a significant job in viable hunt. A compelling activity choice framework ought to bar the most inconceivable applicants, think about effectively and require less extra room. Reference [9] Recommended confirming printing utilizing combination of wave-based portrayals. Added substances are surface capacity and line capacities. In the proposed pre-preparing framework, low pass filtration, fracture, fixed point mode, change and extraction approach. OWE is utilized to separate the capacity. Match focuses for texture and text style capacities are made independently and in shared modes. The weighted sum rule and item rule are utilized to coordinate the outcome level. Reference [10] Proposed a high-exactness palm print acknowledgment framework dependent on precise extraction. Pre-handling is shaped by dividing a picture from the foundation. To improve picture quality, nearby frequencies and neighborhood rules are evaluated. The nearby direction is assessed utilizing a unique mark tilt-extraction approach, and neighborhood frequencies are evaluated by ascertaining the quantity of pixels between two sequential dim tops along the ordinary course to the foot of the nearby slope. The particulars work is removed in the extraction and capacity stage. To extricate particulars capacities, setting sifting is applied with gabor separating strategy. The Minutiae chamber code was utilized to coordinate particulars capacities.

Reference [11] is a requesting procedure that can either use either a biometric organize starting at now in the biometric system or use another free match. Rundown codes for each technique are made using a match. During recuperation, the test list code is stood out from the code in the show using the Equality Scale to recoup the summary of contender for biometric planning. The requesting development proposed on a dependable intelligent media database

lessened request space by a typical of 84% by copying by 100%. The most huge factor for speedy distinctive confirmation was the record consideration rate. To overcome all the disadvantages of the above works developed by many authors, here we are supposed to introduce a highly secure biometric authentication system with palm printing using UDBW adapters and morphology return extract. Software hardware implementation provides a software system, and even greater implementation. Equal death penalty creates maximum backup pipe algorithms in time.

There are two types of hardware design techniques. A common application of specific integrated circuits (namely isaas hardware software), such as the design of digital signal processors, is described in full custom hardware and Field Program Gate Arrays (FPGA). The full custom design offers the highest performance, Isaac Kompanniss, with extremely high development costs and so on. During design and design, Isaac Plus can't be changed much. Isaac's design in large quantities of industrial applications.

The chip fabric created around makes it a problem. There are 10 types of hardware and a computer between design and presentation, according to Isaac. 10 custom laptop, C or collection code for the best monitoring, usually with this program. It is a very complex picture of the scientific specialization of nature, which performs intensive tasks. Electronic storage hardware design, but rarer than the will to know that the alternative track design curve is higher on FPGA technology such as equality and pipe-like hardware design techniques, which is not a custom DSP capacity design. Imaging Rikonforbla on algorithms for the market value of stop-work devices, so faster and simpler troubleshooting and verification of the Potting complex. So the system implementing real-time image processing alternative is FPGA [12].

## 2. METHODOLOGY

Here in this section, we described the proposed palm print authentication model using hybrid process and UDBW transform [13]. Figure 1 shows that the proposed model for palm print authentication, in which we had three modules [14]:

- (1) Edge detection
- (2) Registration process
- (3) Testing
- (4) Palm matching

### A. Registration

In this module input palm image will be registered by applying region of interest with morphological operation there by calculate the distance transform and then extracting the low level features using 3-level UDBW transform. After getting the UDBW coefficients, statistical computation will be done by taking the mean and variance of the decomposed coefficients. Then all the statistics will be stored in a vector to make a train feature vector.



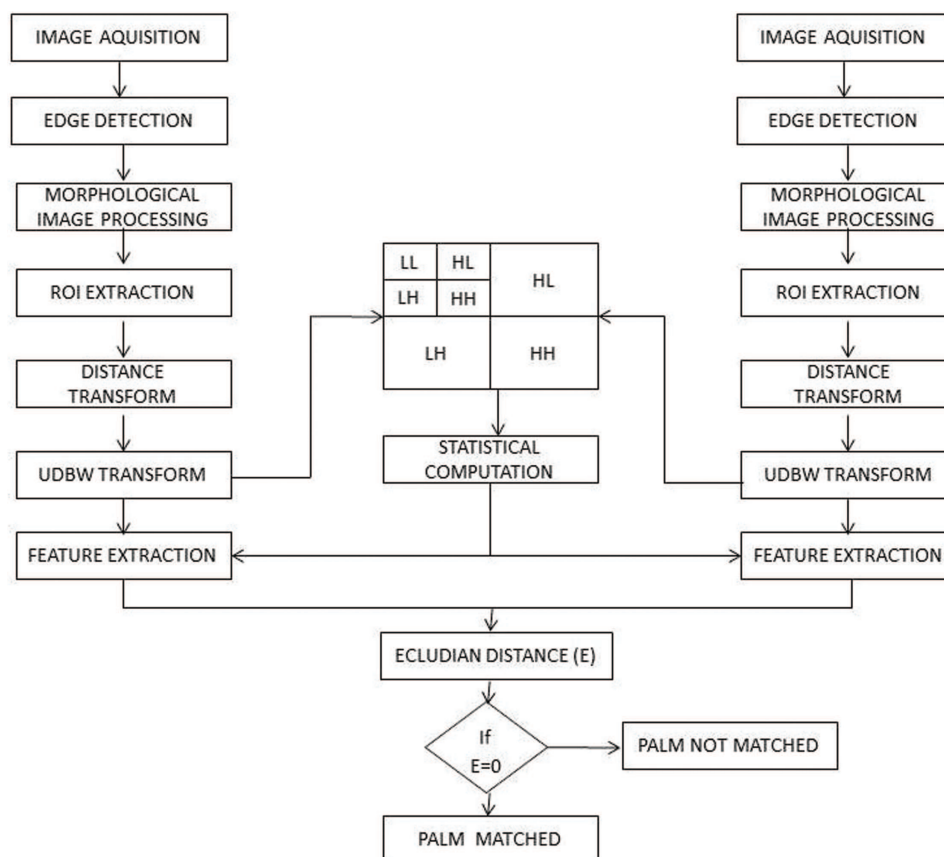


Fig. 1. Flow chart of proposed palm print authentication system.

### B. Morphological Operation

Binary images can contain many shortcomings. In particular, the binary areas produced by a simple threshold of noise and texture are distorted. Morphology seeks to achieve the objectives of eliminating these shortcomings by taking into account the shape and structure of the image.

### C. ROI extraction

The area of interest is a selected subset of the sample in a data set characterized by a specific goal. This can be used in many applications such as medical imaging, tumor boundaries can be determined on an MRI or CT image to measure its size. The endocarpal limit can be determined on an image, possibly at different stages of the heart cycle, for example the final sewing chair and final diatol, in order to assess the function of the heart. In GIS, ROI can be considered literally as a polygonal choice from a 2D map. In computer vision and visual character recognition, ROI determines the boundaries of the object under consideration.

### Distance Transform

The spacing adapter is a trigger that can only be applied to binary images. It results in a gray-level image that looks the same as the input, except that the gray level density of the points within the foreground areas

changes to show the distance to the nearest limit of each point.

### D. UDBW Transform

The non-lethal dual-doom shift is well used to analyze multi-resolution analyses due to multiple sizing functions, i.e., two scaling functions to generate wave filtering banks for degradation and reconstruction separately. It will provide more effective decomposition coefficients due to multiple sizing. In the case of the calendar, we have a hierarchy of rounding area and perpendicular degradation. This makes us use two filtering sequences for degradation and reconstruction. Therefore, we need to build two different wave functions and two different scaling functions.

#### a. Testing

The second module in the proposed system is testing process which includes that the database palm image will be selected for testing with the registered palm image by applying morphological processing; ROI extraction, distance transform and UDBW transform there by calculating the statistics to get the test feature vector.

#### b. Matching Process

In this step, Euclidean distance will be calculated between both the feature vectors i.e., train and test to obtain the most matched image that is stored in database

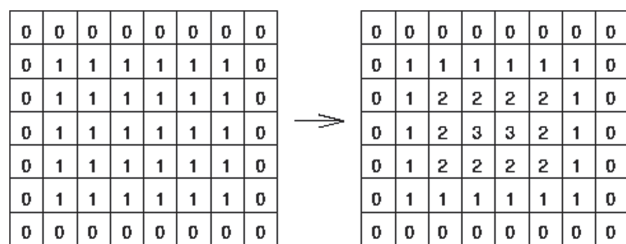


Fig. 2. Example of distance transform with chessboard metric.

to found that whether authorized person’s identification is available or not. If the distance is zero then the person will be identified otherwise it displays that the match not found.

### 3. SIMULATION RESULTS

The code has written in Matlab and Figures 3–5 shows the output results of the system. Figure 6 shows the wave form for the FPGA implementation of the system generated

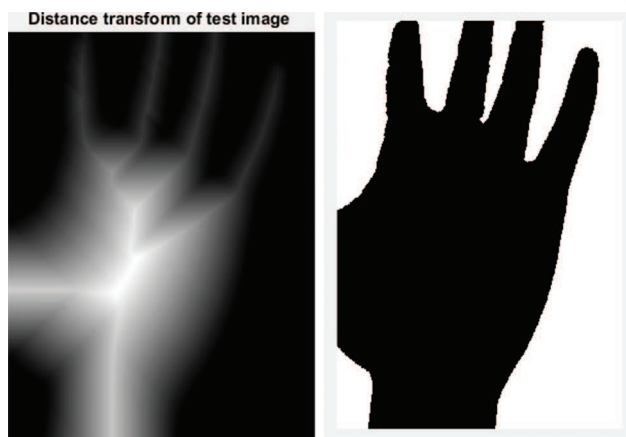


Fig. 3. Out put results.



Fig. 4. Out put results.

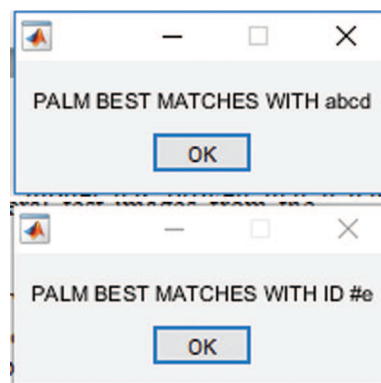


Fig. 5. Out put results.

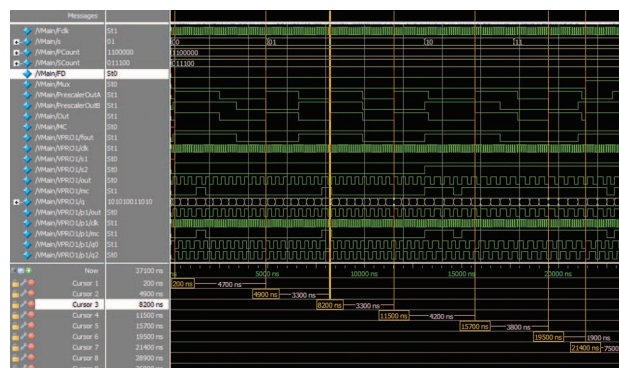


Fig. 6. Output wave forms in modelsim.

Table I.

Design parameters	This work
Process ( $\mu\text{M}$ )	0.18
Supply voltage (V)	1.5
Maximum frequency (GHz)	5
Power	0.060 ( $\mu\text{W}$ )

using modelsim. Table I shows the synthesis results generated in Xilinx.

### 4. CONCLUSION

Here, we introduced a novel and highly secured biometric authentication model with palm print identification system using morphological ROI extraction with distance transform and undecimated biorthogonal wavelet transform. Due to its multi scaling functionality, two different wavelet filter banks will be used to extract the features of distance transformed image to obtain the most effective feature factor for comparing with a test feature vector. The proposed model has proven that it has achieved 100% accuracy with several test images from the database.

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# An Effective Ir Based Satellite Communications With Deep Learning Methodologies

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## **Abstract**

*This paper proposes an obstruction affirmation technique reliant against profound learning for satellite interchanges. Purpose of this paper is via improve precision of obstruction affirmation through profound learning strategies. Via begin with, we use arrangement of convolutional neural network (CNN) via expel structures after dissimilar types of impedance gesture; aside then we decline dimensionality of geographies over strategy for multidimensional scaling (MDS). At former we pass structures via support vector machine (SVM) and acquire course of action outcome. Eventual outcome of assessments demonstrations that anticipated framework can accomplish an incredible gathering accuracy.*

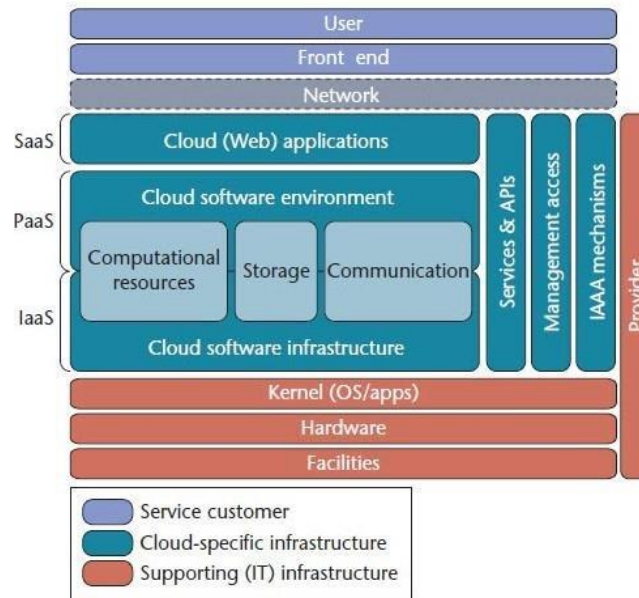
## **Keywords**

*Interference Identification; Deep Learning; Convolution Neural Network; Support Vector Machine; Satellite Communication, Applied Computing, Internet Telephony.*

## **I. INTRODUCTION**

With headway of correspondence advancement, satellite correspondence system resolve go up against continuously complex electromagnetic condition & more classes of obstruction signals. via face among tangled obstruction signals, it is basic via recognize classes of impedance hails before using against obstruction measures.

Applied computing is investigation of both hypothetical & applied software engineering. ... Therefore, applied computing graduates remain balanced among hands-on specialized aptitudes expected via do an assortment of IT employments. Applied computing abilities & information include: Current programming dialects & innovation.



At present, ordinary sign planning procedures & DEEP LEARNING systems remain totally applied via impedance acknowledgment [1]. Customary sign taking care of methods, for instance, cyclic range figuring & high-demand cumulates count, all take noteworthy employments against impedance affirmation. Signal planning computations based cyclic range assessment has extraordinary execution against controlling commotion [2]. High-request cumulates (HOC) counts use quality of Gaussian uproar that its third-demand cumulates & higher remain enduring zero, so HOC estimations have incredible foe of upheaval execution [3].

Obstruction affirmation issues remain from a general perspective structure affirmation issue, for clarification that a great deal of DEEP LEARNING computations for plan affirmation can endure applied via impedance affirmation issues. Support Vector Machine (SVM) is a bye & large used model affirmation count for course of action & backslide assessment, & is a characterization of managed learning models [4].

Starting late, aside righteousness of strong computational breaking point, a different sort of DEEP LEARNING named significant knowledge originates via endure structure. Appeared differently in relation via standard DEEP LEARNING strategies, significant learning has more grounded data taking care of limit, continuously versatile, & snappier quickness at assessment period. Yet unmistakable significant knowledge estimations have stood realistic via hail affirmation & alteration affirmation, they remain now & again applied via obstruction affirmation. Current assessment also just unite significant learning counts among standard DEEP LEARNING estimations. At this moment, solidify CNN, a significant learning system,

among SVM which is a standard DEEP LEARNING process for obstruction affirmation. We resolve use CNN via isolate go geographies, subsequently a gentle of dimensionality decline count; we refer structures via readied SVM classifier. Highlights of our responsibilities right presently remain delineated as follows:

- 1) Greatest explores gather CNN assembly for request, yet we relate CNN via remove impedance structures. We correspondingly begin via stand out in taking significant learning methodologies for impedance affirmation at satellite correspondences clarification.
- 2) We join standard DEEP LEARNING methodologies among significant learning strategies for impedance affirmation & result shows that this blend gains mind boggling ground.
- 3) Moreover, we produce an obstruction dataset over reenactment exertion. We find 5 sorts of impedance indications at altered transistor of adhering via disturbance, which can endure applied for extra assessment.

## II. PROPOSAL METHODOLOGY

### 2.1 Convolution Neural Network (CNN)

Convolution Neural Network (CNN) is greatest notable significant picking up building against planet right now. CNN is a progression of neural system. Commitment of standard neural system is a solitary trajectory; aside then it resolve endure prepared over a movement of hid coatings. Previous sheet is assigned "yield layer" & address game plan result[7]. Rather than standard neural system, commitments of CNN have at any rate 2 estimations; covered layers contain in any occasion 3 estimations. Thusly, CNN can manage dynamically confounded issues, for instance, picture getting ready.

CNNs execute a limited accessibility plan amongst neurons of adjoining sheets as trail representation appears:

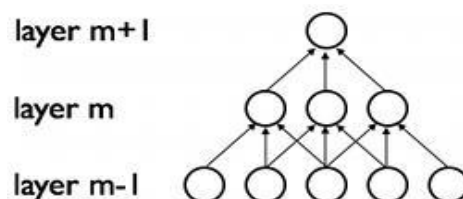
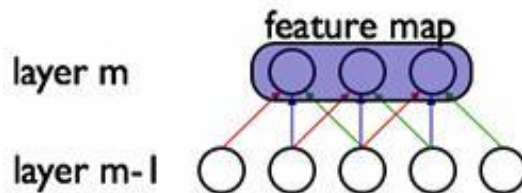


Figure 1. Sparse connectivity

Such neighborhood accessibility sheets remain weighted via non-direct "channels" which can end up being progressively around world.

### 2.1.1 Shared weights

In each convolutional layer, channels remain pragmatic via rehash over entire open field. These copied units contain a segment guide & they share comparable burdens & inclination. Structure is showed up as going with:

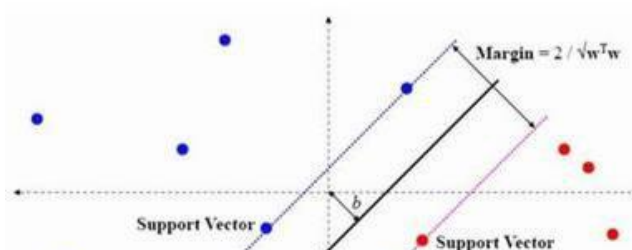


### 2.1.2 Pooling sheet

Despite way that heaps can endure shared during readiness system, proportion of check is as yet huge. Extension of a pooling sheet progressively decreases proportion of calculations & parameters in neural system. Lessening of parameters can moreover help among controlling over fitting. Pooling sheet calculates specific limit estimation of area data system & thereafter replace local this limit regard. Limit used right now most outrageous limit.

### 2.3 Support Vector Machine (SVM)

In SVM, a hyper plane is worked in high-dimensional interplanetary aimed at gathering before relapse [12]. Hyper plane can detach adjacent statistics centers among greatest division for classifier



### Figure 3 the schematic diagram of SVM

Everywhere adjacent planning statistic centers via hyper plane make equal sign set up, & thus they remain assigned "the help vectors", & edge, as ought to via endure self-evident, is given in Figure 3:

#### 2.4 Interference Signal Model

Five sorts of normal obstruction indication in cable correspondence structure remain used right currently solid impedance, narrowband obstruction in comparable band, cleared repeat impedance, spread range & rectangular heartbeat impedance [14].

##### 2.4.1 *Narrowband* interference in same band

Narrowband obstruction happening a comparative group suggests impedance that disturbance of impedance is amassed in a comparable repeat band through correspondence interface & impedance signal has against contrasting repeat gatherings. Narrowband obstruction in a comparative band can endure seen as a zero-mean summarized fixed sporadic system, its two-sided power range can endure made as follows:

$$S_J = \begin{cases} \frac{P_J}{2W_J}, & |f \pm f_J| \leq \frac{W_J}{2} \\ 0, & |f \pm f_J| > \frac{W_J}{2} \end{cases}$$

Narrowband obstruction in a comparable band is definitely not hard via convey & power can similarly endure made enormous.

##### 2.4.2 *Rectangular pulse* interference



Heartbeat impedance insinuates obstruction includes various predictable restricted heartbeat. Expecting that is quadrilateral heartbeat measurement, T is beat excess time frame is beat plentifulness; logical verbalization of beat impedance can endure imparted as follows:

$$n_j(t) = \sum_{n=-\infty}^{\infty} g(t - nT) * A_j \cos(2\pi f_j t + \varphi_0)$$

### 2.4.3 Swept frequency interference

Cleared repeat impedance infers clearing a particular range over some indistinct time period among a narrowband signal. Straight cleared repeat impedance can endure seen as an immediate repeat change signal. outpouring of cleared repeat obstruction is assumed as follows:

$$s(t) = A(t) \text{rect} \left( \frac{1}{T} \right) \exp[j(2\pi f_0 t + \pi K t^2)]$$

Where T is length of cleared repeat impedance, a (t) is sufficiency of sign, is beginning stage repeat signal. Is cutoff repeat. B is information move limit.

## 3. EXPERIMENTS DESIGN

### 3.1 Experiments Design

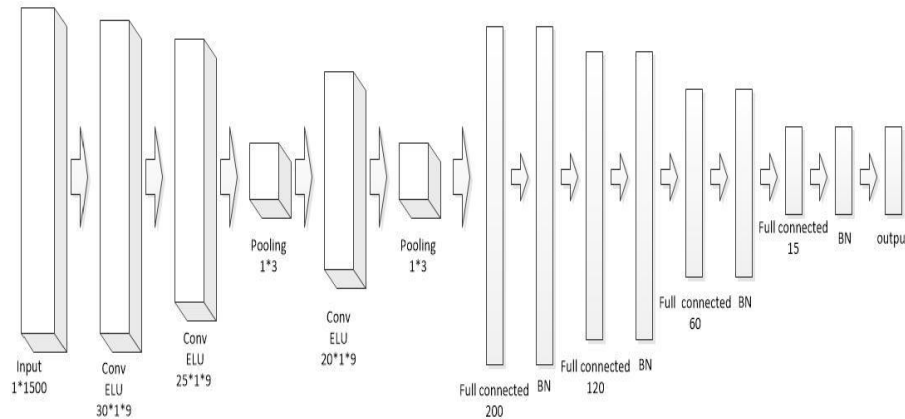
We resolve via enterprise binary examinations: solitary obstruction gathering & combination impedance request. For single impedance plan, five sorts of obstruction signs resolve endure set into white Gaussian clamor condition for gathering independently. In genuine satellite correspondence circumstance, it is hard via get only a solitary kind of impedance, so combination obstruction gathering is required. We enhance interesting 5 sorts of impedance signs via 15 sorts of signs, which join novel 5 sorts of obstruction & 10 combination obstruction among each 2 of cause 5 sorts of impedance.

### 3.2 CNN Structure

The complete CNN arrangement we recycled consumes 15 sheets, which encompass 3 obscurity sheets, 2 assembling sheets, 4 bursting related layers & 4 group normalization layers. Principle sheet is data layer, last sheet is yield layer, second, and third sheet & fifth sheet remain convolution layers. Fourth & sixth

sheet remain pooling layers. Seventh, ninth, eleventh & thirteenth layers remain full related layers. Eighth, tenth, twelfth & fourth layers remain bunch standardization (BN) layers.

**Figure 4 CNN structure**



## CONCLUSION

At present time, novel procedure is proposed reliant against DEEP LEARNING for impedance affirmation against satellite correspondence verbalization. Result of this figuring reveals that our procedure reliant against DEEP LEARNING can achieve shocking execution & has a transcendent energy among instability of JNR. Regardless of way that this methodology has high exactness, multifaceted design of this count is moreover astoundingly high. Future work resolve focus against diminishing multifaceted idea of estimation while keeping precision.

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# CLUSTERING BASED FEATURES SELECTION ALGORITHM

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## ABSTRACT

Identifying a subset of the most valuable features that gives the same results as the whole collection of features is what feature selection entails. A feature selection algorithm can be assessed in terms of both efficiency and efficacy. While efficiency refers to the amount of time it takes to locate a subset of features, effectiveness refers to the subset's quality. This work proposes and experimentally evaluates a fast clustering-based feature selection method (FAST) based on these criteria. The FAST algorithm is split into two parts. Graph-theoretic clustering methods are used to partition characteristics into clusters in the initial stage. Because the properties in various clusters are relatively independent, FAST's clustering-based technique is likely to produce a subset of valuable and independent features. We use the efficient minimum-spanning tree (MST) clustering method to assure FAST's efficiency.

## INTRODUCTION

In general, data mining (also known as data or knowledge discovery) is the act of examining data from various angles and synthesising it into meaningful information - information that may be utilised to boost revenue, reduce costs, or do both. Data mining software is one of several analytical techniques available for data analysis. It enables users to study data from a variety of perspectives, categorise it, and describe the links discovered. Data mining is the process of identifying patterns or connections between dozens of fields in huge relational databases. While large-scale information technology has developed separate transaction and analytical systems, data mining bridges the gap. Based on open-ended user queries, data mining software examines linkages and patterns in stored transaction data. Statistical, machine learning, and neural networks are all examples of analytical software. In most cases, one of four sorts of relationships is desired:

**Classes:** Data is organised into specified groupings using stored data. A restaurant chain, for example, may use consumer purchase data to figure out when clients come in and what they usually order. By offering this information might be used to drive traffic.

**Clusters:** Information is sorted into clusters based on logical correlations or consumer preferences. Data can be mined to find market categories or consumer affinities, for example.

**Associations:** Data can be mined to discover relationships. Associative mining is demonstrated by the beer-diaper example.

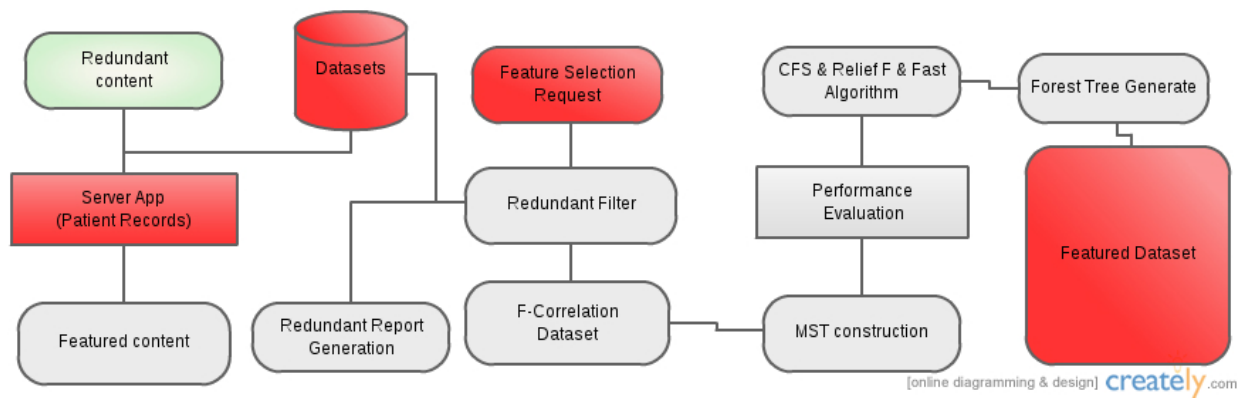
**Sequential patterns:** Data is mined to predict patterns and trends in behaviour. For example, based on a consumer's purchases of sleeping bags and hiking shoes, an outdoor equipment merchant may anticipate the possibility of a backpack being purchased.

## LITERATURE SURVEY

This paper describes efficient methods for exact and approximate implementation of the MINFEATURES bias, which prefers consistent hypotheses definable over as few features as possible. This bias is useful for learning domains where many irrelevant features are present in the training data. We first introduce FOCUS-2, a new algorithm that exactly implements the MINFEATURES bias. This algorithm is empirically shown to be substantially faster than the FOCUS algorithm. We then introduce the Mutual-Information-Greedy, SimpleGreedy and Weighted-Greedy algorithms, which apply efficient heuristics for approximating the MINFEATURES bias. These algorithms employ greedy heuristics that trade optimality for computational efficiency. Experimental studies show that the learning performance of ID3 is greatly improved when these algorithms are used to preprocess the training data by eliminating the irrelevant features from ID3's consideration.

## METHODOLOGY

The practise of detecting and deleting as many unnecessary and redundant characteristics as possible is referred to as feature subset selection. This is due to the fact that irrelevant characteristics do not add to predictive accuracy, and redundant features do not result in a stronger predictor because they supply information that is already included in other features (s). Some feature subset selection algorithms can effectively delete unnecessary features while failing to handle redundant features, while others can effectively eliminate irrelevant features while taking care of duplicate features. The second group includes our proposed FAST algorithm. Feature subset selection research has traditionally focused on finding relevant characteristics. Relief is a well-known example, which weights each feature based on its ability to identify instances under various targets using a distance-based criteria function. Relief, on the other hand, fails to remove redundant features because two predictive but highly associated features are likely to be equally weighted. Relief-F improves on Relief by allowing it to function with noisy and incomplete data sets as well as multiclass problems, but it still lacks the ability to detect redundant features. Figure 1 shows the architecture of the proposed work.



**Figure 1: Proposed system Work Flow**

### THE BENEFITS OF THE PROPOSED SYSTEM INCLUDE:

Good feature subsets have traits that are highly correlated (predictive of) the class but uncorrelated (not predictive of) one another.

- Get a decent feature subset by efficiently and effectively dealing with both irrelevant and duplicated features.
- By picking only a small percentage of the original characteristics, all six techniques accomplish significant dimensionality reduction.
- The Friedman test's null hypothesis is that all feature selection techniques are equal in terms of runtime.

### RESULT AND DISCUSSION

The efficiency and effectiveness of the FAST algorithm are evaluated through an empirical study. Extensive experiments are carried out to compare FAST and several representative feature selection algorithms, namely, FCBF, ReliefF, CFS, Consist, and FOCUS-SF, with respect to four types of well-known classifiers, namely, the probabilitybased Naive Bayes, the tree-based C4.5, the instance-based IB1, and the rule-based RIPPER before and after feature selection. The results, on 35 publicly available real-world high-dimensional image, microarray, and text data, demonstrate that the FAST not only produces smaller subsets of features but also improves the performances of the four types of classifiers.

The screenshot shows a web browser window titled "Server Form" displaying a "Patient Records" form. The form contains the following fields and values:

- DataSet Selection :** A dropdown menu with "dataset-1" selected.
- First Name :** A text input field containing "kannan".
- Sex :** Radio buttons for "male" (selected) and "Female".
- Year of Birth :** A text input field containing "23-01-1987".
- Age on Admission :** A text input field containing "26".
- Residence :** A text input field containing "Chennai".
- Admitting doctor :** A text input field containing "kumar".
- Disease :** A text input field containing "Diabetes".
- Disease Group:** A text input field containing "Diabetes".
- Date of Discharge:** A text input field containing "23-01-2013".
- Disease outcome :** A text input field containing "normal".

At the bottom of the form is a "Submit" button. The background of the form is a light blue grid with a binary code pattern.

Figure 2: Feature selection of the patient

## CONCLUSION:

We describe an unique clustering-based feature subset selection approach for high-dimensional data in this work. 1) eliminating irrelevant features, 2) creating a minimal spanning tree from relative ones, and 3) splitting the MST and picking representative features are all part of the process. A cluster is made up of features in the proposed algorithm. The dimensionality is greatly decreased because each cluster is handled as a single feature. A cluster is made up of features in the proposed algorithm. The dimensionality is greatly decreased because each cluster is handled as a single feature. On 35 publicly available image, microarray, and text data, we compared the performance of the proposed algorithm with that of the five well-known feature selection algorithms FCBF, ReliefF, CFS, Consist, and FOCUS-SF in four different aspects: proportion of selected features, runtime, classification accuracy of a given classifier, and the Win/Draw/Loss record.

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# Public Key Image Encryption for Secured Image Transmission

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## Abstract

For diverse uses, numerous sorts of photographs are communicated through the Internet. Typically, these photographs include personal or private information. As a result, maintaining image secrecy, integrity, authentication, and nonrepudiation throughout transmission is critical. These highly secret data can be changed by an unauthorised individual during data transmissions, resulting in insecurity for the sender. Recent improvements in audio-visual systems and network architecture have made it easier to send and receive multimedia over the internet, while also increasing the security requirements for multimedia data. Extrinsic methods like watermarking are used in traditional visual content security solutions. Extrinsic data communication, on the other hand, isn't always possible. As a result, to overcome the watermarking problem, forensic methodologies based on Public Key Image Encryption are being developed. Many well-known picture source encoders' visual cryptography is used as proof in source coding, which is a typical stage in natural image capture.

## 1. Introduction

Traditional forensic technologies protect multimedia data by using proactive and additive approaches to hide extra information in the original signal. For example, by inserting a digital watermark into the image at the moment of capture, the concept of a trustworthy camera was proposed to make the trustworthiness of digital images accountable.

Changes in the digital watermark can be used to track down any subsequent picture manipulation. In traitor-tracing digital fingerprinting, user identifying information is included in each distributed copy to identify the matched user and find the source of the illicit copies.

When it comes to implementing content protection, extrinsic approaches are typically ineffectual. On the other hand, each copy of multimedia data has its own capture, processing, and transmission technique. To ensure that multimedia data is handled solely for the intended purposes, the data route must be validated by identifying each step: collection, source coding, channel coding, transmission, and any other possible user path.

Extrinsic procedures are employed to protect multimedia content, whereas intrinsic fingerprint analysis is utilised to protect it. Extrinsic multimedia protection entails embedding an additive signal into the picture prior to distribution and making it available to the forensic detector, whereas intrinsic-fingerprint forensics employs the received image in raw format as the forensic detector's only input.

There is some literature dedicated to defining the unique features of each sort of image processing, such as resampling, unusual noise patterns, copy and paste, double compression, and so on. By looking for discrepancies in images, higher order statistics like the bispectrum and bicoherence were utilised to discover contrast shifts like gamma correction and other nonlinear processes.

During the previous several decades, the fast convergence of multimedia signal processing, communications, and networking technologies has sped up the interchange of digital multimedia data and permitted widespread digital media dissemination. Digital photos have been used extensively in news reporting, insurance claim inquiry, criminal investigation, and a number of other purposes.

## 2. Literature survey

Differential image encoders employ spatial filtering to remove redundancy between pixels. This method is still in use today, as seen by video Interframe prediction and lossless JPEG. As a consequence, our forensic system combines all three source coding approaches to form a core technology, as shown in the two diagrams above.

Digital grayscale photos with an eight-bit per pixel resolution were used in this investigation. On the basis of a test image, we develop an iterative source coder identification and verification approach. The first step in the identification process is to see if the image was preprocessed before being compressed.

Then, in the test picture, locate the trace of each feasible source coding scheme and compute its similarity measure (that is, the likelihood that the test image was compressed using this source coding scheme). Then, select the one with the highest similarity score and compute the coding parameters.

Consequently, we exclude this input scheme from our search region, select another proposal with the next highest similarity measure, and continue the classification and parameter estimation operations until we find a solution that fulfils the stopping criteria. The system shows the error message "No source coding scheme identified" if we search the whole list of image coding schemes and none of them pass the verification phase.

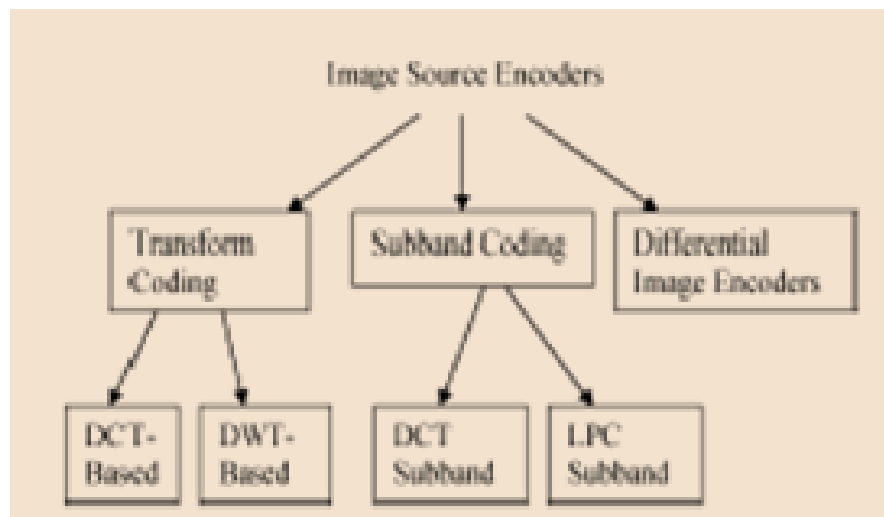
Inconsistency in lighting conditions, geometry invariants, and consistency of camera properties were also proposed for detecting picture alteration. Wavelet-based features were utilised in previous studies to detect photo alteration. Physics-based aspects were created to distinguish photographic images from computer graphics. In order to identify the source of a photograph, pixel flaws and image sensor noise were used to uniquely identify the source camera.

In the absence of the original image, we may use non-intrusive forensic analysis to detect the type of processing module, offering some confidence in subsequent image analysis. The primary purpose of this research is to propose a forensic technique that uses intrinsic fingerprints to detect traces and identify the history of coding operations done on digital images.

### 3. Methodology

We must first handle any image preparation before we can begin the forensic method. Preprocessing detection is an obvious and crucial first step, since any mistakes here might invalidate all subsequent tests. The most common method of image preprocessing is block processing, which is what we'll look at today. Existing work in block processing measurement is not suited to addressing this difficulty due to significant assumptions made about the input data.

The contents of multimedia material must be safeguarded when sent via networks. Extrinsic methods, such as watermarking, are used in image content security strategies. If any preprocessing, such as blocking, was performed prior to compression, what the coding scheme parameters are, and how confident we are in the detection and estimation findings.



**Fig.1 Tree-structure of the image coding forensics system.**

When inverse quantization, the quantized coefficients are increased by the quantization step size. As a result, we may observe peaks in the histogram at step size multiples and zeros everywhere. Consider employing an integrated DWT programmer owing to the truncation and rounding impacts created during reconstruction, as indicated by each embedded coder's algorithm determines the order in which the zero trees are accessed and the coefficients are transmitted.

This study's test images are all digital grayscale photos with an eight-bit per pixel resolution. Based on a test image, we develop an iterative source coder identification and verification approach. The first step in recognising a photograph is determining if it was preprocessed before compression. Then, in the test image, locate the trace of each feasible source coding scheme and compute its similarity measure (that is, the likelihood that the test image was compressed using this source coding scheme).

The forensic detector may then utilise the intrinsic fingerprint of each image source encoder as evidence to figure out which type of source encoder was used after establishing the block size. This section investigates the inherent fingerprints of subband coding, transform coding, and differential image coding. We utilise a similarity measure to evaluate the possibility that this encoder has been used by analysing its fingerprint.

DCT-based data compression is frequently a block-based image analysis approach in which the entire image is divided into non-overlapping blocks of the same size (for example, 8-by-8 in JPEG base-line) and each block is individually edited and compressed. DWT-based source coding approaches generally consider the entire picture as a single block, whereas wavelet transform and decompose it into numerous frequency bands with varied statistics.

The existence of histogram peaks, which is an intrinsic fingerprint of transform coding, is a substantial difference between the transform coefficient histograms of transform-compressed and non-transform compressed pictures, and we'd want to use a distance metric to characterise this difference. Our goal is to compare the observed picture's transform coefficient histogram to the nontransform compressed image's transform coefficient histogram.

#### 4. Result and discussion

Because residues are quantized in the integer DCT domain, if we compute the residue correctly, we should receive the same histogram peaks as transform coding. Furthermore, the decrypted picture's boundary pixel may be exposed to linear filters to reduce the blocking effect, changing the value of reference samples in the decoded image.

Finally, think about integrating a DWT programmer. Each embedded coder has its own mechanism for determining how to visit the zero trees and convey the coefficients. Because the coefficient values are bitplane encoded, the transform coefficient histogram of the previously compressed picture will contain peaks at the required reconstruction values as well, but not necessarily equally spaced. The coefficient histogram of an SPIHT-coded picture in the level-4 LH subband with a bit rate of 1.0 bit per pixel is shown in the figure above.

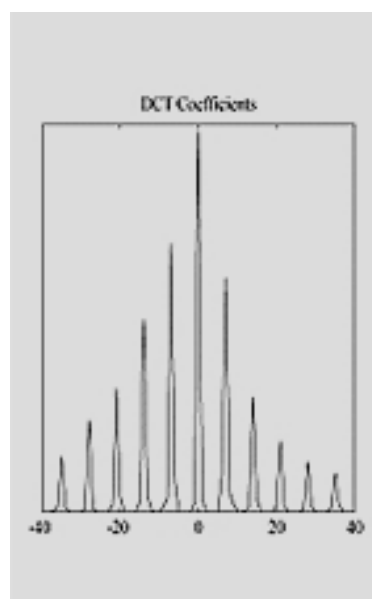
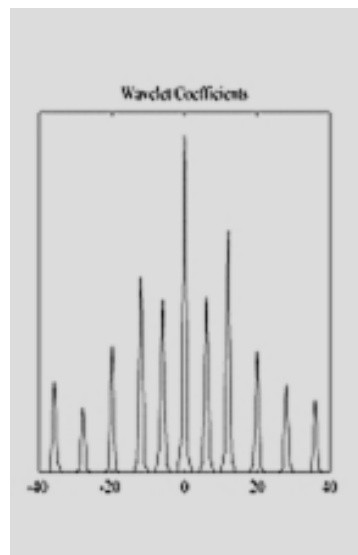


Fig.2 DCT coefficient histogram



**Fig.3 Wavelet coefficient histogram**

## 5. Conclusion

We provide a forensic methodology based on Public Key Image Encryption for identifying the compression method used to compress a digital image, as well as parameter estimates and a confidence measure for the projected coding scheme. Our forensic detector requires no information other than the decoded image at the receiver since we examine and probe the unique Public Key Image Encryption of the image source encoder embedded in the received picture.

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# Robust Auto White Balance System for Real-Time Video Capturing

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## Abstract

To match the brightness of the scene, the Auto White Balance system of a video camera selects the optimum aperture size, gain setting, and exposure length. Although CMOS (Complementary metal oxide semiconductor) technology has enabled techniques such as automated white balance and automatic exposure, sophisticated systems to quickly determine the right exposure when users change the scene are absent. The problem becomes more serious when sections of the recorded video frame are overexposed or underexposed. The suggested system includes a robust AWB approach for real-time video capture. This includes a well-designed control flow as well as some heuristic approaches for changing exposure and evaluating scene brightness. To produce a more accurate estimation of scene brightness, the system adaptively selects appropriate sensor operational modes. Devices to detect moving objects and fluorescent light flicker are also included in the auto exposure system. The dependable AWB system works well in a range of situations and helps to improve the quality of recorded footage.

## Introduction

The video colour representation is described by the name of the colour model. In NTSC television, YIQ was utilised. It closely resembles the YUV system used in NTSC and PAL television, as well as the YDbDr scheme used by SECAM. The amount of unique colours that a pixel may represent is determined by the number of bits in the pixel (bpp). Chroma subsampling (e.g. 4:4:4, 4:2:2, 4:2:0/4:1:1) is a typical approach to minimise the amount of bits per pixel in digital video.

However video system was originally developed for cathode ray tube (CRT) television sets, several alternative technologies for video display devices have subsequently been constructed. The first usable video tape recorder (VTR) was created by an Ampex research team led by Charles Ginsburg.

PAL (Europe, Asia, Australia, and other parts of the world) and SECAM (France, Russia, parts of Africa, and other parts of the world) standards provide 25 frames per second, whereas NTSC (USA, Canada, Japan, and other parts of the world) specifies 29.97 frames per second. Film is shot at a slower frame rate of 24photograms/s, which makes converting a cinematic motion image to video significantly more difficult. A frame rate of roughly fifteen frames per second is required to create the appearance of a moving image. PAL video format, is typically stated as 576i50, where 576 denotes the total number of horizontal scan lines, I denotes interlacing, and 50 denotes 50 fields (half-frames) per second. When producing a natively progressive broadcast or recorded signal, both the stationary and moving sections of the image have optimal spatial resolution.

## Literature Survey

Understanding the capture, processing, and presentation of colour pictures necessitates knowledge of numerous fields, including image generation, radiometry, colorimetry, psychophysics, and colour reproduction, which are not covered in typical engineering training. Nonetheless, with the advancement of sensor, computing, and display technology, engineers now regularly deal with components of colour imaging, some more frequently than others. This paper is meant for engineers and scientists as an introduction to colour imaging science. It will be valuable for people who are about to enter or are currently working in the field of colour imaging, as well as those in other fields who would benefit from learning the fundamental processes of colour imaging.

This study describes a sophisticated video camera system with robust automated focus (AF), automatic exposure (AE), and automatic white-balance (AWB) management. Even when the scene is obstructed by high light intensity, the suggested AF algorithm determines the right movement direction of the lens and recognises the accurate in-focus condition. The experimental findings show that the suggested system can be a viable alternative to existing systems that use the hill-climbing approach.

For digital still cameras, the suggested method provides rapid and precise auto-exposure capabilities. The number of preview frames and the exposure error are both within 3.5 frames and 3.92 percent under typical lighting circumstances. The number of preview frames and the exposure inaccuracy are both within 8.8 frames and 6.56 percent under high contrast lighting situations. Furthermore, it provides reliable detection for both backlit and excessively frontlit settings at the same time, resulting in optimal exposures to the main object.

This article describes the design and hardware implementation of a video camera with a CMOS sensor that includes a module that combines the functionalities of automated white balancing (AWB) and automatic exposure management (AEC). The capability is provided by the use of dynamic control of sensor registers via the I2C sensor interface. A field programmable gate array is used to process picture data (FPGA). A combined AWB/AEC module with a gate count of 10k can be constructed. The findings show that the integrated video camera provides the needed functionality with a quick response time.





## SCREENCAST

A screen cast, also known as a video screen capture, is a digital recording of a computer screen output that typically includes audio commentary. Screencast is similar to the related phrase screenshot; although a screenshot is a snapshot of a computer screen, a screen cast is basically a video of the changes on a computer screen over time, augmented by voice commentary. Screencasts may be used to show and teach how to use software applications. Making a screencast is a great way for software engineers to showcase their work.

Educators can also utilise screencasts as a way to incorporate technology into the classroom. On an interactive whiteboard, students may capture video and audio as they illustrate the right technique for solving an issue. Screencasts are also beneficial to regular programme users: They assist in the submission of bug reports by replacing possibly ambiguous textual explanations with screencasts; they assist in demonstrating others how to do a task in a specific software environment.

## Result and discussion

The installation of product software, as the final link in the software production deployment chain, is a huge cost challenge. The Implementation process is divided into four stages: Discovery, System Development, User Acceptance Testing, and Production Rollout. It's easy to become overwhelmed by sophisticated marketing presentations, especially when the sales team is discussing topics that most consumers don't fully comprehend.

These phases of deployment are intended to give clients with a smooth transition from an existing electronic or paper-based system to Sigmund while ensuring that the software accounts for all elements of the client's activities. The Sigmund project team, which includes personnel with clinical, billing, and operations experience, is prepared to oversee the full process, from system requirements collection through implementation.

### Fig.1 Applying Frame grabber Technique

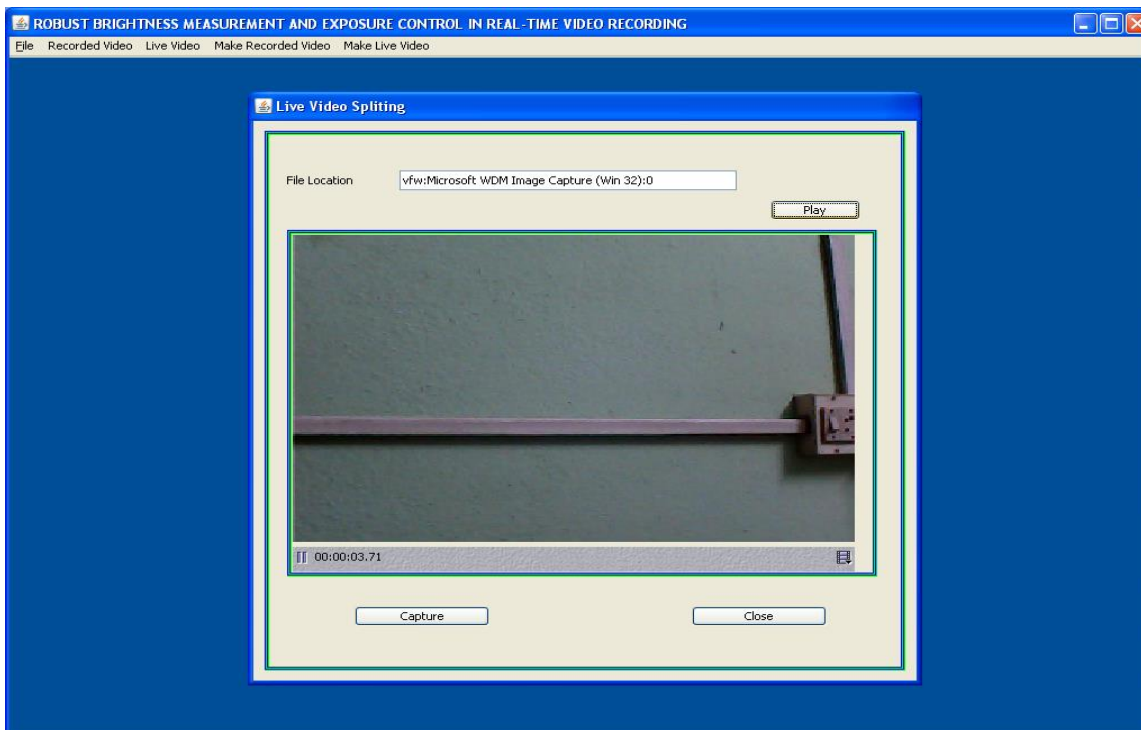
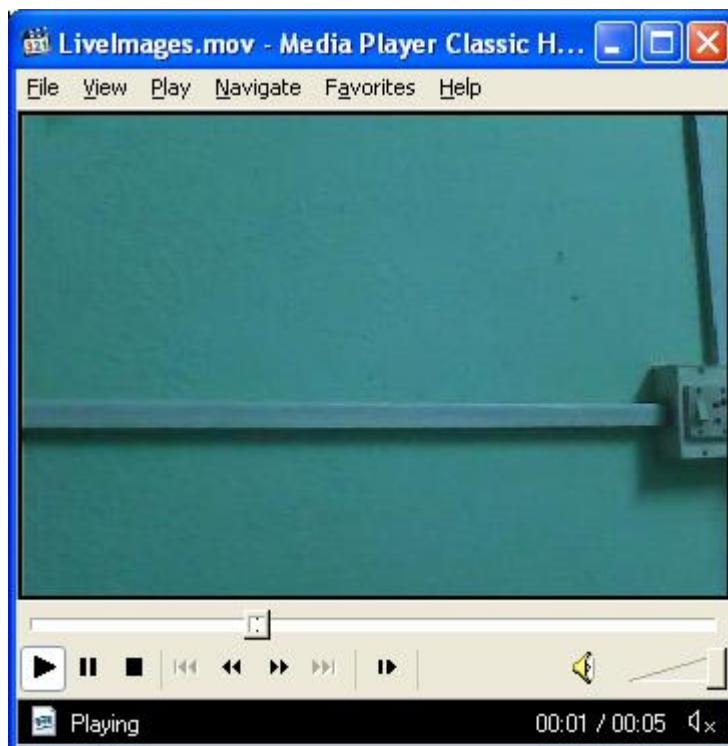
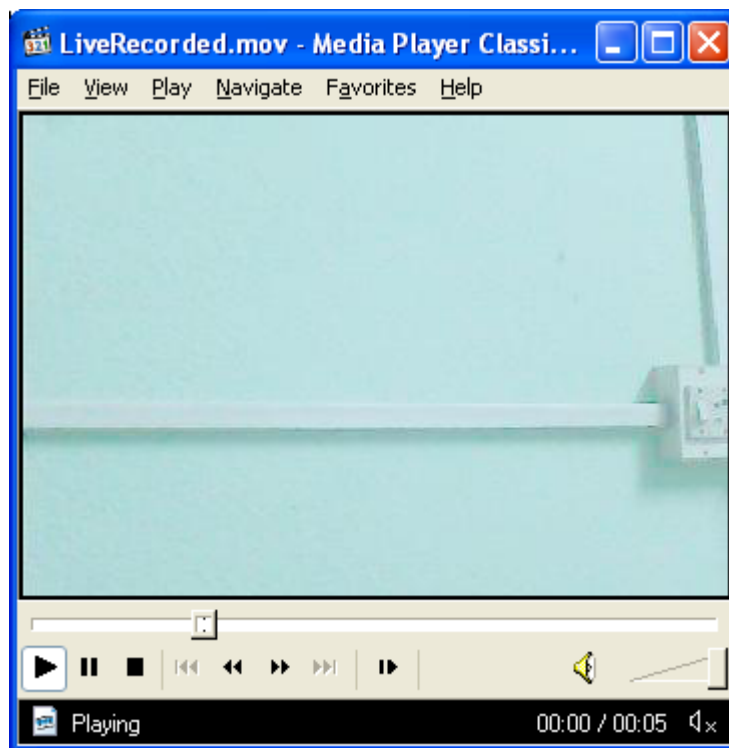


Fig.2 Playing Original Live Video



**Fig.3 Playing Enhanced Live Video**

## Conclusion

The video quality of a real-time video recording system is strongly dependent on the accuracy of scene brightness measurement as well as the speed of exposure adjustment. A comprehensive AWB system with more exact scene brightness estimations and high speed exposure adjustment has been provided. The accuracy of brightness measurement has been substantially improved by adaptively selecting the sensor's subsampling modes and applying histogram analysis to further improve brightness measurement accuracy. As a consequence of a more exact evaluation of scene brightness, the speed and precision of exposure adjustment have been enhanced.

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# Secured Digital Image Transmission via Intrinsic Fingerprint

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## Abstract

Recent advancements in multimedia processing and network technology have improved the distribution and sharing of multimedia via networks while increasing the security requirements of multimedia material. Extrinsic techniques, such as watermarking, are used in traditional picture content protection schemes. Extrinsic content protection, on the other hand, is not always practicable. As a result, forensic methods based on intrinsic fingerprints are being developed to overcome the watermarking problem. The distinct intrinsic fingerprint of many prominent picture source encoders is used as evidence in source coding, which is a typical stage in natural image capture.

## Introduction

The rapid convergence of multimedia signal processing, communications, and networking technologies has expedited the exchange of digital multimedia data and enabled ubiquitous digital media distribution during the last few decades. News reporting, insurance claim investigation, criminal investigation, and a variety of other applications have all made extensive use of digital photographs.

Individuals can, for example, use popular picture editing software like Adobe Photoshop to access, replicate, or change information outside the limits and conditions agreed upon due to the digital nature of information. As a result, the conventional belief that a photograph communicates the truth is weakened in the case of digital photos, raising serious concerns regarding the image's validity and authenticity. Image forensics allows you to check the legitimacy of digital photographs and confirm their provenance.

Traditional forensic tools safeguard multimedia material by concealing additional information in the original signal via proactive and additive methods. The notion of a trustworthy camera, for example, was offered to make the trustworthiness of digital photos responsible by embedding a digital watermark into the image at the time of capture.

Changes in the digital watermark can be used to identify any later alteration of the image. Similar identity information is encoded in each spread copy in traitor-tracing digital fingerprinting to identify the



matching user and locate the source of the unlawful copies. However, they require that all camera manufacturers agree on a single standard, and implementing such extrinsic safety systems may be too expensive and unfeasible for some real-world applications.

Extrinsic measures are frequently ineffective in enforcing content protection. Each copy of multimedia data, on the other hand, has an own acquisition, processing, and transmission procedure. To guarantee that multimedia data is handled by the proper organisations for the intended objectives exclusively, the data route must be validated by identifying each of the steps: collection, source coding, channel coding, transmission, and any other possible user processing.

## Literature survey

The most extensively used picture encoding systems today are those based on the discrete cosine transform (DCT), such as JPEG. DWT-based encoders, such as JPEG2000 and SPIHT, are also commonly employed in current picture source coding, and they may be thought of as specific realisations of sub band encoders with similar inherent fingerprints.

To make our system more broad, we need to look at the common inherent fingerprint of sub band coding. Spatial filtering is used by differential image encoders to eliminate redundancy between pixels. As may be seen in video Interframe prediction and lossless JPEG, this technology is still in use today. As a result, our forensic system integrates these three source coding techniques to give a core technology, as illustrated in the two figures above, which explain the suggested system model.

The test pictures utilised in this study are all digital grayscale images with an eight-bit per pixel resolution. We create an iterative source coder identification and verification technique based on a test picture. The first stage in the identifying procedure is to determine whether the picture was preprocessed before compression. After that, look for each possible source coding scheme's trace in the test picture and compute its similarity measure (that is, the likelihood that the test image was compressed using this source coding scheme). Then choose the one with the best similarity score and calculate the coding parameters.

If we choose the relevant information classification method and properly assess all of the coding specifications during the classification process, then we can compress and decompress the input test image using the chosen source coding systems and the approximated specifications, and the outcome will be similar to the training images except for calculation errors. When the difference between and is less than a certain threshold, we halt the search and report the system's confidence measure.

However, we remove this input schemes from our search area, choose another proposal with the next greatest similarity measure, and continue the classification and parameter estimation procedures until we discover a solution that meets the stopping requirements. If we search through the whole list of image coding schemes and none of them pass the verification step, the system displays the error message "No source coding scheme discovered."

## Methodology

To begin the forensic procedure, we must first handle any picture preparation. Preprocessing detection is a clear and critical initial step, because any errors here might invalidate all future tests. Block processing is the most frequent type of picture preprocessing, and it's what we'll be looking at today. Due to substantial assumptions made about the input data, existing work in block processing measurement is not adapted to solve this challenge.

## Intrinsic Fingerprint Analysis

Blocking elements can occur as a consequence of coarse quantization of different blocks in either the spatial or transform domains. Because quantization is conducted on each block independently, a boundary will appear between the blocks as an abrupt shift in the luminance value. This artefact is unlikely to emerge in an original, unquantized image since natural images, on the whole, exhibit smooth variations.

The existence of block artifacts should be shown by the gradient magnitude picture, which takes into account the luminance discontinuities occurring across block borders. As a result, we anticipate to observe peaks at each block boundary point after computing the gradient magnitude of each row and column in a block-processed picture. These peaks can be shown further by aggregating the gradient magnitudes of all rows (or columns) simultaneously.

## Intrinsic Fingerprint Analysis of Source Encoders

After determining the block size, the forensic detector may begin to establish which type of source encoder was used by using the intrinsic fingerprint of each image source encoder as evidence. The intrinsic fingerprints of sub band coding, transform coding, and differential image coding are examined in this section. We analyse the inherent fingerprint of each encoder and create a similarity metric to estimate the likelihood that this encoder has been used.

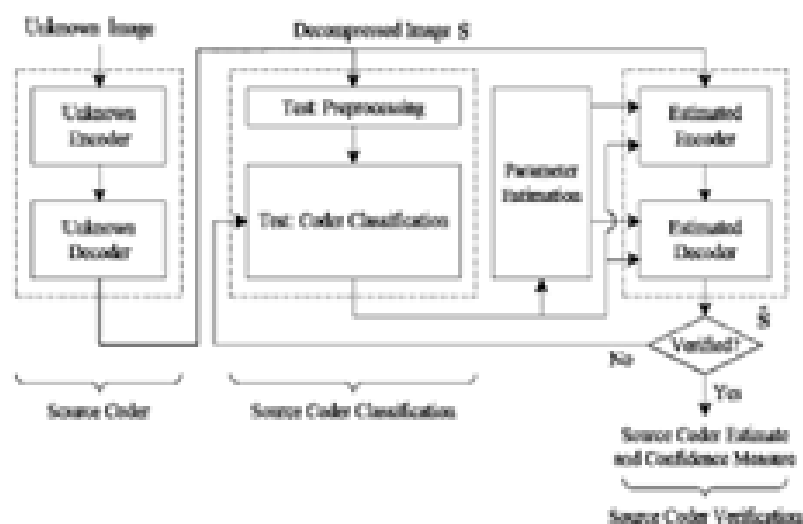
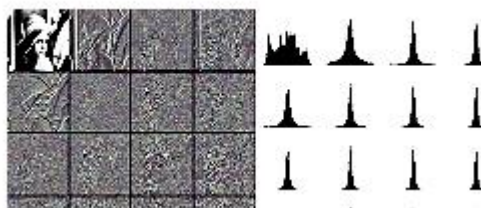


Fig.1 Overview of the proposed system

## Transform Coding

DCT-based data compression is often a block-based image analysis method in which the entire picture is split into non-overlapping blocks of the same size (for example, 8-by-8 in JPEG base-line) and each block is modified and compressed independently. While DWT-based source coding techniques frequently treat the entire image as a single block, wavelet transform it and decompose it into multiple frequency bands with varying statistics.

We use insights from, which interpreted each 8-by-8 block of transform coefficients in a DCT-block coder as a 64-subband decomposition of the original 8-by-8 image block, to unify the transformation methods of DCT coders with embedded DWT. To put it another way, we regard all (0, 0) coefficients as a subband, then all (0, 1) coefficients as another subband, and so on.



**Fig. 2 Left: Reorganization of 4-by-4 DCT coefficients into subbands. Right: Histograms for each coefficient subband**

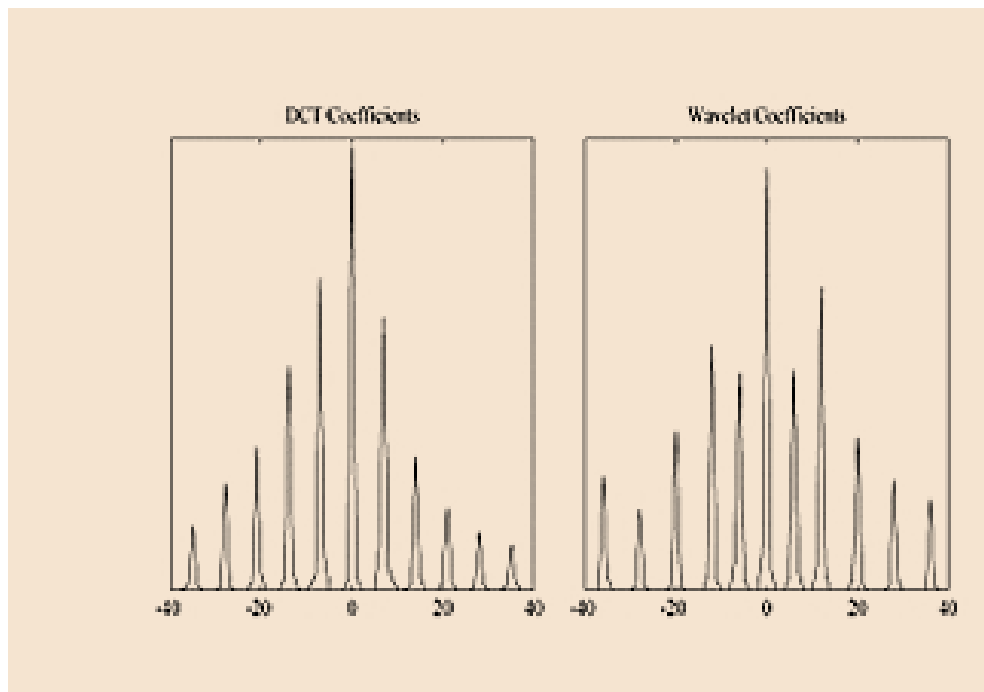
A discrete cosine modification with a block size of 4 was performed to the original uncompressed picture in the above fig. All of the DCT coefficients for the same frequency are aggregated into a single subband, which is then tiled together.

## Result and discussion

Let's start with a DCT block coder. The DCT coefficients are discretized during the quantization process. The quantized coefficients are multiplied by the quantization step size during the inverse quantization process. As a result, we should expect to see peaks in the histogram at step size multiples and zeros everywhere. However, as pointed out by, because of the truncation and rounding effects generated by reconstruction.

Consider an integrated DWT coder next. Each embedded coder has its own method for determining how the zero trees are visited and the coefficients are communicated. Because the coefficient values are bitplane encoded, the previously compressed image's transform coefficient histogram will likewise have peaks at the prescribed reconstruction values, but not necessarily evenly spaced. The graphic above depicts the coefficient histogram of an SPIHT-coded image with a bit rate of 1.0 bit per pixel in the level-4 LH subband.





**Fig. 3 Example coefficient histograms of two images previously compressed with different schemes.**

## Conclusion

In this research, we offer a forensic approach based on intrinsic fingerprints to identify the compression method used to compress a digital picture, as well as estimation of all parameters and a confidence measure for the predicted coding scheme. Because we explore and probe the unique intrinsic fingerprint of the image source encoder encoded in the received picture, our forensic detector requires no information other than the decoded image at the receiver. Our image source coding forensic detector can determine the proper image encoder among transform-based encoders, subband encoders, and DPCM encoders with a probability of greater than 90% when PSNR dB by using the inherent fingerprint of each source encoder. Even with a PSNR of 40 dB, the chance of successful estimate remains around 80%.

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# A NOVEL 64 BIT MULTIPLIER DESIGN USING MULTIBIT FLIP FLOP BASED SHIFT REGISTER AND CARRY SAVE ADDER

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## Abstract

We propose a quick however vitality proficient estimated multiplier. The substantial check part of the duplication is erased, which improves speed and vitality utilization at a little blunder rate. The proposed approach applies both to marked and unsigned augmentation. We have indicated a 64-bit multiplier plan and usage utilizing multi-bit flip flop and carry save adder. As the quantity of bits expands, the extra circuits become increasingly mind bogging and the speed diminishes. Our proposed framework utilizes 64-bit numbers and leads to 128-bit, which is for bigger applications. The proposed add-on multiplier conservation, the proposed multiplier proficiency is evaluated by contrasting execution and the presentation of various surmised and exact products utilizing diverse structure parameters. The proposed algorithm of this plan examination of the deferral and the region with Xilinx 14.2.

**Keywords:** Multiplier, Multi bit flip flop, CLAA, CSLA, CSA, Shift register.

## 1. Introduction

The computerized architect should concentrate on numerous models, for example, circuit speed, power utilization, space and expenses. When planning advanced circuits, essential estimations, for example, mix and multiplying are the most significant upgrades. Our structure centers around duplicating twofold numbers for bigger applications. A tale moving toward a multiplier in [1]. The principle thought of this multiplier is to the most significant bits of the multiplier utilizing the specific radix-4 Booth encoding and moving toward the staying high spiral microproduct, which creates from the less significant bits, utilizing an expected logarithmic multiplier. encode Information way cutting innovation acquainted with lessen the general unpredictability of the proposed multiplier gadgets. The multiplier is unable regarding precision and plan effectiveness [1].

Another rough multiplier is proposed, which can decrease the unpredictability of augmentation while improving the zone and vitality execution by OR and entryways. So as to surmised the adequacy of the proposed multiplier, the plan parameters are contrasted and the specific multiplier and the as of late proposed estimated structures [2]. The four plans are from around 15-4 blower. Around 16-16 piece products are structured utilizing proposed blowers 15-4 [3]. Surmised augmentations furnish preferred execution over definite increase with a trade off of mistake rate. Furthermore, the creators accomplished a high pass rate and an ordinary blunder separation esteem for products planned utilizing an exceptionally little proposed 15-4 blower. The proposed numerous defeat is around equivalent to the specific products [3]. Broad research writing shows that the sorts of duplicating and adder contribute less to vitality reserve funds and the manner by which the sort of rationale is assuming a significant job in vitality arrangement [4].

Another methodology technique to ascertain  $\log_2 N$  productively. This strategy is structured by two improved logics, ILM-EA and ILM-AA. The two structures are extremely exact and have littler MRED values contrasted with other logarithmic plans in writing. At long last, The JPEG Image was viewed as a pressure application, which the proposed plans show the highest caliber of picture yield than different structures [5]. [6] Implement a logarithm structure with successful equipment with less ports in LOD, supplanting the need developer with coding and planning another ton change with less stages and improved inside structure. The changed structure comprises of basic circles. They have been assimilated that devour improved benefits as far as timing, involved region and authority. The composite outcomes reason that the logarithm's stock multiplier shows a 14.02% change in vitality and a 5.61% change in the region for a 16-piece structure.

Two inexact identifier (LOD) plans and assessed snake (to abridge two log frameworks) that can be utilized to improve the equipment productivity of the logarithm multiplier proposed in [7]. The first LOD configuration utilizes one fixed an incentive to rough the less significant bits (LSBs). For  $d = 16$ , this structure lessens equipment costs by 19.91% looked at customary 32-piece Mitchell multiplier and with 15.19% contrasted with late plan in the writing [7].

A vitality sparing and territory sparing multiplier where input coefficients are cut at various lengths,  $t$  and  $h$ , and afterward adjusted to the closest individual numbers to limit the mistake brought about by the proposed cut off procedure in [8]. The proposed multiplier was adaptable and surpassed different difficulties as far as speed, space and vitality. All things considered, improves vitality utilization 95% contrasted with the specific Wallace multiplier.

consuming 85% less space. Inertness and vitality utilization were improved in the scope of 4%-41% and 89%-97%, separately, contrasted with the specific duplication rate. Contrasted with the specific multiplier, the speed, zone and vitality enhancements of the proposed multiplier turned out to be better with expanded multiplier width. This is because of the straightforward and adaptable level of figuring of the proposed multiplier. Additionally, the high goals of the proposed multiplier is a decent alternative to abuse in picture handling and order applications [8].

A financially savvy way to deal with the logarithm of ordinary neural systems (CN) proposed in [9], where two multipliers are associated with multipliers to address the blunder. The proposed logarithm accomplishes a low and unprejudiced normal mistake, while equipment costs are altogether decreased by utilizing the cut away Mitchell multiplier and moving toward the blunder states of the principal stage. The proposed structure has defective attributes appropriate for the finishes of the neural system, and investigations on CNN today show that the proposed multiplier doesn't cause a critical crumbling in exactness contrasted with precise increase [9].

Record multiplier plans are adjustable dependent on the Mitchell calculation that can give a lot of vitality to the CNs. The low-power execution of the Mitchell multiplier was made with improved LOD square and C1-based change sum computations, just as enhancement of the unscrambling iterator and the presentation of a zero discovery unit to improve CNN's exhibition in [10].

Five products are thought about dependent on space, speed, power utilization, and circuit intricacy examinations dependent on surface, speed, power utilization, and circuit multifaceted nature. On the above conversation we reason that the exhibit multiplier has the easiest circuit contrasted with different difficulties and the little zone required, with a low speed dependent on change and the expansion of a calculation, it devours high vitality. On an examination conversation talked about on modification tree multiplier Wallace who has fast and has numerous advantages [11].

The report introduced new plans for both redundant and non-repeated logarithms. The non-monotonic LU approach, referred to as ALM-LOA, ALM-MAA3 and ALM-SOA, uses three types of off-base shift register for expanding. A cut-out double logarithm connector (TBLC) with no loss of accuracy is used in the ALM-SOA structure. Adders1 and Adder2 are also used in the TBLC and STD, while Adder3 uses LOA and MAA3 to increase the precision of the Lu method. Virtually every text has been broken down using distinctive measurements with blunder. It has just been shown to be more precise than the usual LU and ILMs, for example, that use a good number of off base bits. The proposed IALMs can include NMED (up to 12 percent), change and standard PDP (up to 37 percent) bits (12).

The proposed Radix-4 Booth Wallace multiplier dependent on GDI shows better outcomes in low force, territory care and postpone execution in [13]. The enhancement will be more up not or bits. Likewise, this kind of multiplier will be successful for multiplying the bit marked [13].

Around there vlsi configuration is one of the significant issues that should be tended to. To arrive at the decreased zone are examined various sorts of flip tumbles and pink enlistment. The slightest bit flip failure and multi-bit flip lemon are performed to accomplish less utilization of the zone. [14] An alternate size balance recording is performed with a multi-face flop bit [14].

Tetris was effectively planned as a layout for the advancement of other optical control frameworks in [15]. Multi-bit face-flop innovation is utilized to lessen power utilization and the watch cradle territory in part of the Tetris game framework. Reenactment results demonstrate that Multi-bit Flip-Flops is a profoundly successful and viable approach to make low-control and decrease the clock organize [15]. A definite investigation shows the advantages and difficulties that mbff brings to low-vitality structures in [16].

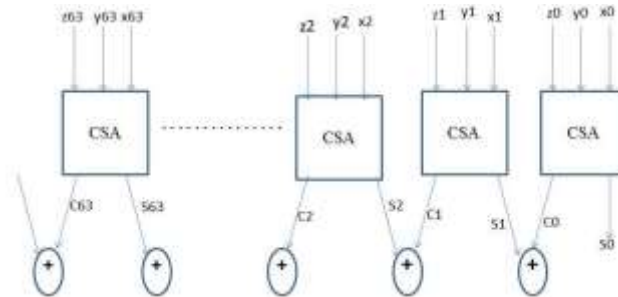
A NVFF multi-bit dependent on NAND-like spintronics memory, which was utilized for the quick and low force switch proposed in [17]. This structure indicated fast eradicating forms (0.5 ns), programming ( $\star$ 1.6 ns) and sensors (200 ps). The deviated change to the customary STT composing system can be defeated since the switch was just actualized from AP to State P, which additionally spares power exchanging and disentangles the composing circuit.

The augmentation procedure requires including and changing over bits. Given these two procedures, we planned a 64-piece multiplier utilizing convey spare viper and move register. In this article, we indicated a correlation of duplication calculations dependent on schedule. Contrasted with convey look forward snake (CLAA) and convey select viper (CSLA), convey spare snake multiplier (CSA) indicated that the CSA-based multiplier was quicker than the two different products.

The move register is a significant advanced structure square. It has a huge volume of utilizations. Records are frequently used to briefly store the double data showed in the yield. move registers are legitimate sorts utilized predominantly to store and move computerized information. The essential stockpiling components are flip lemon. Most records use D-flip failures as a result of its effortlessness. Broad research writing shows that the sorts of duplicating and adder contribute less to vitality investment funds and a way which the sort of rationale is assuming a significant job in vitality sparing [18].

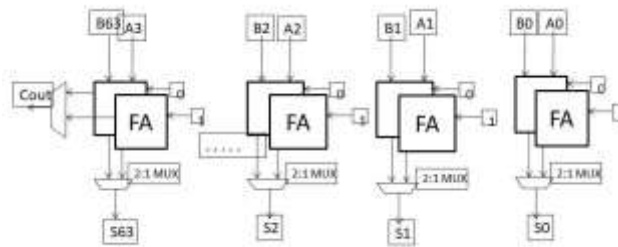
**2. Adders**

The additional saving of the carriage can further reduce the timing performance. This save carry will be first ignored and only sum taken into account [20]. Carry vipers save does not have more difficulty, as the adder selects and looks ahead. We have therefore used the carry save adder to enforce the 64-bit multiplier. Although large numbers of records are required for the carriages to be stored separately, their output can be beneficial. The main advantage of saving is that the addition of three bits is possible simultaneously. But we do not think of multi-operator redundant addition in our architecture. The third bit is considered null. The carry save adder block chart is shown in Figure 1.



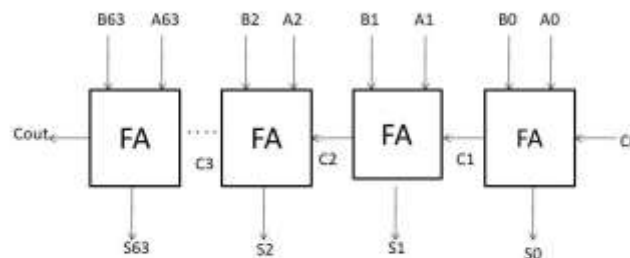
**Fig.1.** Carry save adder

The chosen viper is a variation from the forward look adder in which we have to choose the vial as 0 again and again, and then you choose the vial as 1. The additional operation is then performed for both cases and the output is given to the 2:1 multiplexer. Finally, the only production is received. We must not wait until the earlier addition results are reached in the next stage [19]. The select adder is shown in Figure 2. The output multiplexer equations for sum and carry



**Fig.2.** Carry select adder

The multiplexer is supplied with these two SUMs. In this case, it is not necessary to wait for the last stage to perform the operation. Thus, it reduces the time it takes to make the addition. Over time, we see a substantial improvement. Carry adder, without delay, looks all the carrier equal. We need additional circuits to do this. These additional circuits and capacity components require an additional area to looking forward and the strength used throughout the high circuit. The accompanying comparisons illustrate the future of the carry. The block diagram [18] is illustrated in Figure 3.

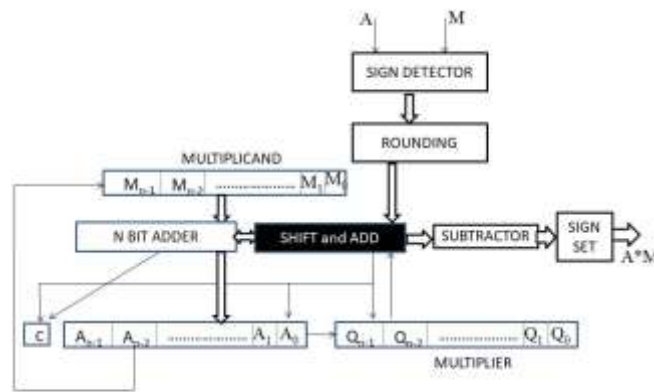


**Fig.3.** Carry look ahead adder

**3. Multiplication Algorithm**

Enable 128 sizes of the product. The number and the multiplier is 64 bits. Empty the largest half of the record label. Maintain the multiplier at the minimum half of the product record. The steps below are 64 times repeated.

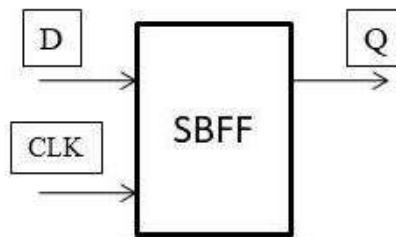
- If the lowest product record component is 1, add to the main product report half a multiplication.
- Move slightly to the right (ignore the turning bit) contents of the recording object.
- Main part of the Register [21 , 22, 23] shifts in capacity. Figure 4 shows the multiplication algorithm.



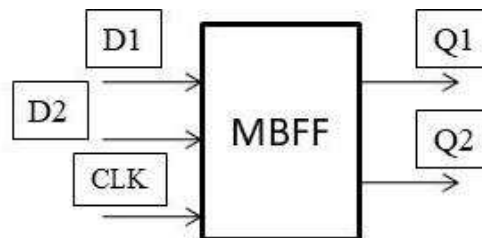
**Fig. 4.** Multiplication algorithm

Here is the important problem of converting bits. We suggest recording the shift using multiple bit flip flops. Rounding is also done before multiplication and this multiplier also focuses on the number marker. Generally to store bit memory elements are locked and flip flops. Here in our proposed system, flip flops store multiple bits. The diagram of the pink record, the serial in the progressive series appears in Figure 5. When you have a high time clock in the positive trigger edge, the edge that triggers d-flip flop output is given the input value and it takes the input value if the clock is low in the negative edge. Under the clock pulse integration technology the multi-bit Flip Flop functions. Figure 6, which shows a negative border effect that leads to D flip flop, is a time chart for a multibit flip flop

- The first and second quarters are initially expected to be high, d1 and D2 to be low and the average (CLK) to be low.
- D1 and D2, meaning Q1 and Q2, both are small on the negative pulse edge of the first hour.
- D1 and D2, meaning Q1 and Q2 are also high in the second negative direction of the watch.
- The high D rating, Q1 and Q2 are high at the edge of passive pulse transmission for the second hour.
- The same goes on ...



(a)

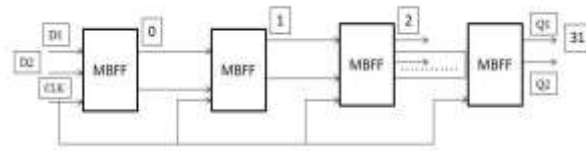


(b)

**Fig. 5.** (a) Single bit flip flop (b) Multi bit flip flop

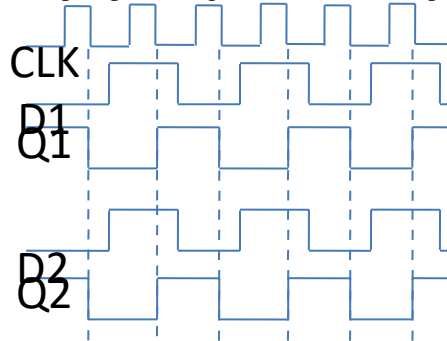


(a)



(b)

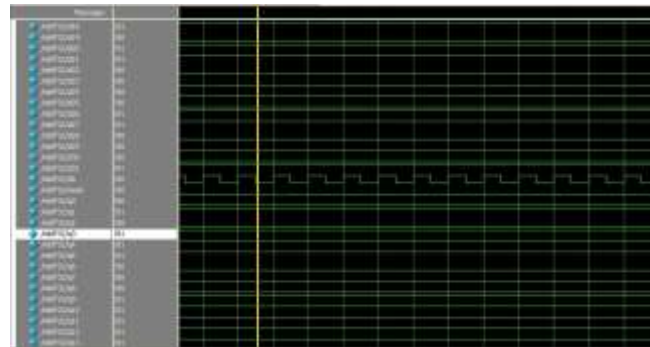
**Fig. 6.** (a) Single bit flip flop shift register (b)Multi bit flip flop shift register



**Fig.7.** Timing diagram for multi bit flip flop

**4. Simulation Results**

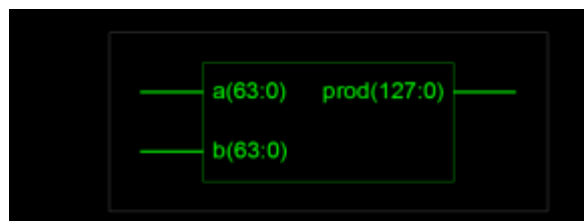
64-bit multiplier analysis was performed based on a carry save adder with the multi-bit flip flop move registry. The architecture is conceived in version 14.2 of xilinx ISE. In the following figures, the results are presented. The flip, multibit and move registers display in Figure 5, Figure 6. Illustration 7 is the flip flop time chart. Table 1 presents clear multiplier timing details. The waveforms for the three different platforms are shown in Figure 8. The RTL graph for the proposed multiplier is shown in Fig 9(a) and (b).



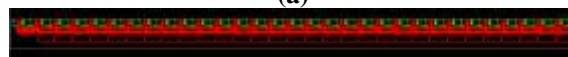
**Fig. 8.** Waveforms generated

**Table 1.** Timing Analysis

	CLAA	CSLA	CSA
TIME (ns)	21.1	18.2	3.4



(a)



(b)

**Fig.. 9.** RTL views for carry save adder based multiplier

## 5. Conclusion

This paper shows a design and implementation of a 64-bit multiplier with various adders. To simulate and synthesize the multiplier, the VHDL language is used. The overall design speed was enhanced by using the carrying save adder. We showed that, compared to the CLAA, the proposed multiplier increased its speed by 77 percent and the CSLA by 69 percent. A quick hitch can improve the multiplier's efficiency significantly. The multiplier's speed based on the carrying save adder is high. Although the area increases by using the carry save adder, the speed performance is negligible. This paper presents the 64-bit multiplier built and implemented with various adders. To model and synthesize a multiplier, the VHDL language is used. The use of carry save adder increases the overall design speed. We showed that the multiplier proposed increased its speed by 77% in comparison with CLAA and 69% in comparison with CSLA. A rapid snake can improve performance dramatically. Double speed based on carry save adder. over all speed. Although the area increases with carry save adder, the speed is negligible.

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# SMART PARKING IN VEHICULAR ENVIRONMENTS USING ZIGBEE IEEE 802.15.4 AND RF TRANSMITTER

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**Abstract:** In this work we propose a smart parking technique in heavy traffic environments using ZigBee wireless transmission module. The major problem in transportation systems is that the controlling of the traffic in cross roads. Smart car parking technique finds a solution using the ZigBee technology. ZigBee technology is a low data rate, low power consumption, low cost; wireless networking protocol targeted towards automation and remote control applications. ZigBee, Depending on the RF (Radio Frequency) environment and the power output consumption required for a given application, and will operate in the RF. The power consumption and transition delay are the main advantages when compared to the other wireless technologies like WIFI, Blue tooth, etc...

**Key words:** Zigbee, smart parking, 8051, RF Module.

## I. INTRODUCTION

With fast development of economy in India, the demand of electricity is higher and higher, and the problem between lag of construction of network and inadequacy of transmission capacity becomes increasingly prominent. A system for the intensive use of parking spaces proposed in [1]. It is an automated system based on monitoring the situation in parking places using a mobile camera set equipped with data storage and means for data transfer to the central database. The data is evaluated in a suitable GIS-based software according to parking rules. It is this evaluation that is a critical part of the whole system. In practice, there have been cases where a complaint was sent to municipal police on parking rules violation, which was not fully justified. Therefore, the further development of the described system will be aimed at improving the evaluation process in order to minimize unauthorized cases. Detailed information about the parking system is very well presented on the web or in the form of a smartphone application [1].

The system in [2] consists of hardware components and software modules which closely interact with each other. Using this system, drivers of cars can park quickly, and will save fuel, time and money. The experimental result shows very fast runtime and high success rate. This approach can save billions of wasted dollars in the US alone. The saved fuel, time and money can be reapplied in more productive places. By causality, it will help the environment as well. In this era of rapid urbanization, designing the city system modern and systematic by maintaining everything is a major challenge. Under the pressure

of increasing population, Dhaka is becoming tougher to change. Proposed solution is to keep the city parking system as a fully automated and additionally use garage management controllers system so that user can get parking facilities with the android application as well as without android application [3]. Proposed a new VANET-based smart parking scheme (SPARK) for large parking lots in [4]. With SPARK scheme, RSUs installed across a parking lot can surveil the whole parking lot, and provide three convenient services for drivers: 1) real-time parking navigation; 2) intelligent anti-theft protection; and 3) friendly parking information dissemination. In addition, the SPARK scheme also provides conditional privacy preservation for OBUs. Extensive simulations have also been conducted to demonstrate that the SPARK scheme can efficiently reduce the searching time delay for an available parking space, and subsequently save the fuels and driver's parking time. A wireless personal area network (WPAN) is meant to span a small area such as a private home or an individual workspace. It is used to communicate over a relatively short distance. The specification does not preclude longer ranges being achieved with the trade-off of a lower data rate [5][6].

In contrast to other network types, there is little to no need for infrastructure with a WPAN. Ad-hoc networking is one of the key concepts in WPANs. This allows devices to be part of the network temporarily; they can join and leave at will. This works well for mobile devices like PDAs, laptops and phones. Some of the protocols employing WPAN include Bluetooth, ZigBee, Ultra-wideband (UWB) and IrDA. Each of these is optimized for particular applications or domains. ZigBee, with its sleepy, battery-powered end devices, is a perfect fit for wireless sensors. Typical ZigBee application domains include: agricultural, building and industrial automation, home control, medical monitoring, security and, lest we take ourselves too seriously, toys, toys and more toys [5].

Wireless local area networks (WLANs) are meant to span a relatively small area, e.g., a house, a building, or a college campus. WLANs are becoming more prevalent as costs come down and standards improve. A WLAN can be an extension of a wired local area network (LAN), its access point connected to a LAN technology such as Ethernet. A popular protocol for WLAN is 802.11, also known as Wi-Fi. Among all of the wireless networks ZigBee gained It's renewed interest because of less complexity and usage of power.

The main problem in traffic areas is the parking the vehicles by searching an exact place to park the vehicle. The aim of this paper is to solve this problem in highly traffic affected areas. Equipping vehicles with various on-board sensors and implementing vehicle-to-vehicle (V2V) communication will allow for large-scale sensing, decision, and control actions in support of these goals. The parking process can be a straightforward and non-stop process. From the point of management's view, Smart Parking is an intelligent parking system. The parking process can be modeled as birth-death stochastic process and the prediction of revenues can be made [6].

## II. PROPOSED SYSTEM

The smart vehicle parking is a tremendous technology in automobile field. Our proposed system is a smart vehicle parking using ZigBee module. The figure 1 shows the Proposed smart vehicle parking system.

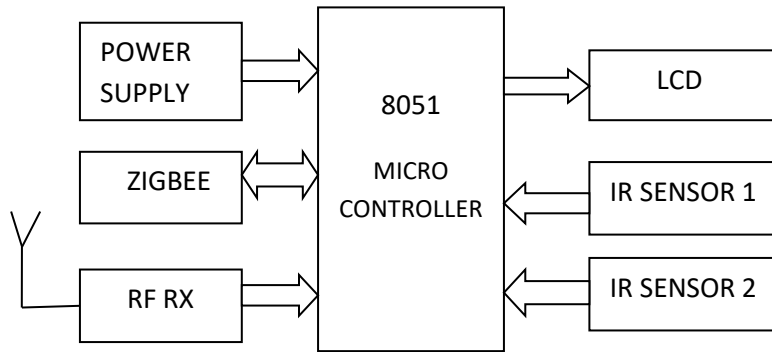


Figure 1 (a)

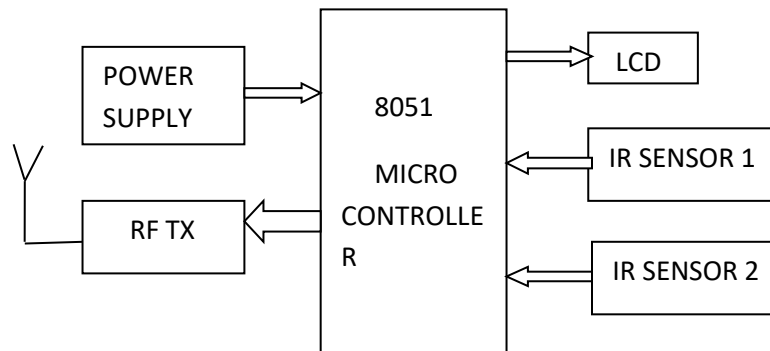


Figure 1(b)

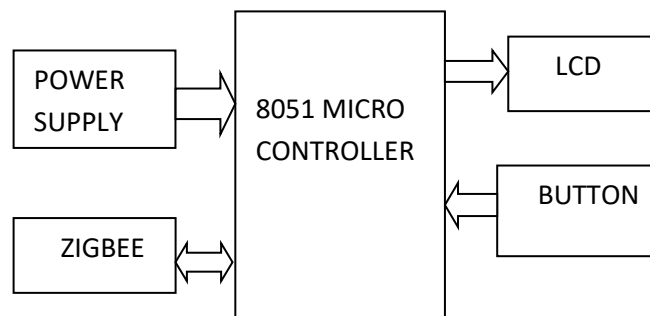


Figure 1(c)

The proposed system contains three modules which are shown in figure 1. The vehicle section shown in figure 1(c), contains a switch, ZIGBEE module and LCD. The vehicle section is kept in the vehicle, when the person in the vehicle wants to know the information about the free parking slots then he will press the button in the vehicle then a missed call goes to the ZIGBEE section in the first section shown in figure 1(a) about the free parking space from the ZIGBEE in the vehicle section. Then on receiving the message from vehicle section, the parking space for the vehicle whether it is empty or full is checked with IR sensors and sends an SMS to the vehicle section regarding the space. This is received by ZIGBEE and displayed on the LCD like section 1 is available. When section 1 is not empty then it takes the information about the second section using RF communication Shown in Figure 1 (b). We have RF TX in section 2 and RF RX in section 1. The information about the space in section 2 is continuously given to the RX section whether empty or full. If it is empty or full then this information is given to the vehicle section by section 1 using ZIGBEE.

### III. 8051 MICRO CONTROLLER

Microcontroller manufacturers have been competing for a long time for attracting choosy customers and every couple of days a new chip with a higher operating frequency, more memory and upgraded A/D converters appeared on the market.

The whole story has its beginnings in the far 80s when Intel launched the first series of microcontrollers called the MCS 051. Even though these microcontrollers had quite modest features in comparison to the new ones, they conquered the world very soon and became a standard for what nowadays is called the microcontroller.

Besides, the software has been developed in great extend in the meantime, and it simply was not profitable to change anything in the microcontroller's basic core.

The 8051 microcontroller has nothing impressive in appearance:

- 4 Kb of ROM is not much at all.
- 128b of RAM (including SFRs) satisfies the user's basic needs.
- 4 ports having in total of 32 input/output lines are in most cases sufficient to make all necessary connections to peripheral environment.

The whole configuration is obviously thought of as to satisfy the needs of most programmers working on development of automation devices.

### IV. ZIGBEE and IEEE802.15.4

ZigBee technology is a low data rate, low power consumption, low cost, wireless networking protocol targeted towards automation and remote control applications. IEEE 802.15.4 committee started working on a low data rate standard a short while later. Then the ZigBee Alliance and the IEEE decided to join forces and ZigBee is the commercial name for this technology ZigBee is expected to provide low cost and low power connectivity for equipment that needs battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. In addition,

ZigBee can be implemented in mesh networks larger than is possible with Bluetooth. ZigBee compliant wireless devices are expected to transmit 10-100 meters, depending on the RF environment and the power output consumption required for a given application, and will operate in the RF worldwide (2.4GHz global, 915MHz Americas or 868 MHz Europe). The data rate is 250kbps at 2.4GHz, 40kbps at 915MHz and 20kbps at 868MHz. IEEE and ZigBee Alliance have been working closely to specify the entire protocol stack. IEEE 802.15.4 focuses on the specification of the lower two layers of the protocol(physical and data link layer). On the other hand, ZigBee Alliance aims to provide the upper layers of the protocol stack(from network to the application layer) for interoperable data networking, security services and a range of wireless home and building control solutions, provide interoperability compliance testing, marketing of the standard, advanced engineering for the evolution of the standard. This will assure consumers to buy products from different manufacturers with confidence that the products will work together. IEEE 802.15.4 is now detailing the specification of PHY and MAC by offering building blocks for different types of networking known as "star, mesh, and cluster tree". Network routing schemes are designed to ensure power conservation, and low latency through guaranteed time slots. A unique feature of ZigBee network layer is communication redundancy eliminating "single point of failure" in mesh networks. Key features of PHY include energy and link quality detection, clear channel assessment for improved coexistence with other wireless networks [7].



Figure 2 ZigBee module

## V. RADIO FREQUENCY SIGNALS

Radio frequency communication signals are engineered to trade off efficient use of the electromagnetic (EM) spectrum with the complexity and performance of the RF hardware required to process them. The process of converting baseband (or low-frequency) information to RF is called modulation of which there are two types: analog and digital modulation. In analog modulation, the RF signal has a continuous range of values; in digital modulation, the output has a number of prescribed discrete states. There are just a few modulation schemes that achieve the optimum trade-offs of spectral

efficiency and ease of use with hardware complexity [8][9]. The figure 3 represents the hard ware modules of RF Transmitter and Receiver.



Figure 3 RF Transmitter and Receiver modules

## VI. RESULTS

Figure 4 shows the kit photographs of the proposed system.





Figure 4. Kit Photographs.

## VII. CONCLUSION

We have designed a smart car vehicle parking system using ZigBee 802.15.4, 8051 advanced micro controller and RF module. This architecture is faster and power consumption is very less than the other wireless technologies. This can implement in the future cars and can be avoid the traffic problems in the heavy parking areas like shopping malls, theatres, and etc.. other busy areas.

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# IMAGE SEGMENTATION BASED ON EDGE DETECTION AND ENHANCEMENT BASED ON EECS ALGORITHM

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## **Abstract**

*Digital images are typically used to bring information from or a user scene in the form of visual perspectives. Imaging methods are therefore very important for assets to restore the degradation of the information disseminated in the viewer or a computer for further testing. There are a wide range of technical and engineering claims to make visual information. Examples of this include tomography and medical diagnosis of reconnaissance images and exploration for remote sensing resources on Earth. Engineering applications of images are even more diversified. For example, imaging technology is used in ferrography to monitor machine health conditions during operation. Furthermore, image processing techniques can be employed in infrared imageries.*

*Medical image processing is a regularly growing and dynamic territory with applications connecting into our regular daily existence, for example, solution, space investigation, observation, validation, mechanized industry review and numerous more zones. For the medical diagnosis segmentation of image plays a vital role. My research since 7 years mainly focuses on segmentation of medical microscopy images. Applications includes brain tumor , leaf disease identification, Mammography etc. I want to introduce a method which is very advanced and accurate for Segmentation based on EECS algorithm. This technique focuses mainly on pre- processing, Edge detection, Enhancement, Thresholding, Feature extraction, Clustering using advanced fuzzy K-means algorithm. Pre-processing will be done first for filtering, after filtering edge detection is applied to the image, then after image will be enhanced, next thresholding will divide the exact object at a particular point in the image. Later feature will be extracted and advance fuzzy K-means clustering will be applied for the segmentation. Due to this technique when compared with other techniques like c-means clustering the time has decreased up to 71% and efficiency of the particular object detection increased more than 22%.*

**Keywords:** *EECS algorithm, Segmentation, Medical Image Processing, K-Means Clustering, Edge Detection, Image enhancement.*

## **INTRODUCTION**

Digital images are typically used to bring information from or a user scene in the form of visual perspectives. Imaging methods are therefore very important for assets to restore the degradation of the information disseminated in the viewer or a computer for further testing. There are a wide range of technical and engineering claims to make visual information. Examples of this include tomography and medical diagnosis of reconnaissance images and exploration for remote sensing resources on Earth. Engineering applications of images are even more diversified. For example, imaging technology is used in

ferrography to monitor machine health conditions during operation [3]. Furthermore, image processing techniques can be employed in infrared imageries [4]. In addition, vision is used in the identification and tracking of objects [5,6].

The image enhancement Problem was aimed at preserving or improving the edges of objects in the figure [7]. The color saturation work is performed first, and then the edge is preserved. Another method using morphological filters to improve the edges for increased sharpness on resultant image [8] is proposed. The Problem with improving contrast was also approached by adopting a bloc-based improvement strategy [9, 10]. These localized improvement approaches may be more complex for these applications compared to the global method of equalisation histogram. Histogramic image enhancement algorithms are often classified in the statistical and global approach [11]. Essentially, equating attempts to re-map the intensity or other image color of the channel to a certain probability density. In most cases, in order to obtain the highest information content from the output image, the target density must be uniform. It has been noted that direct application of this program may introduce some unwanted artifacts; Therefore, alternative implementation procedures are proposed and advanced [12].

In the case of histogram offsetting implementation, there are different methods that can be retrieved. For example, empirically specific changes can be used [13, 14]. On the other hand, it is usually a challenge to achieve the required optimum setting parameters. To this end, an unfurnished method is created [15]. In this way, the coefficient for a change of power law is determined using the average intensity of the image. The output image, while corrected to the average intensity of the supplied image, cannot provide an attractive perception of a human seer. Another method is built to improve an input image and to maintain the same output average light [16]. Since this algorithm is directed to a flatter mapping density, the complete brightness level is not fully used to convey the information of the scene. At the same time, it acknowledges that the single density of the target will change the average brightness in half of the permitted levels and, if no agreement is reached on the average intensity of the original image, undesirable artifacts will appear. The researchers then started looking for procedures that would keep the original mean light [17]. In the original work, the pixels are isolated to a lower group in accordance with their means that the values in light. The two sub-images are applied to a uniform density. It also emphasized that it means to remain with some extent. However, a perfect retention of the mean value is not possible even for the image of symnof intensity density.

An attempt was made to reduce the variances between input and improved image media brightness. The input image is first separated by the average light, and then the tops of the input image histograms are trimmed using the median of each subframe [18]. Although the average brightness error could shrink, there was no fixed justification for selecting the median value as the clipping limit. A method of limiting the scope was later developed [19]. Instead of aligning the image to cover the entire allowable brightness, the narrow limits are emitted for brightness, so that the resulting brightness was approximate to the original image. An alternative method introduced a weighted sum method that would solve the average brightness problem [12]. Lower and higher intensity pixel groups were created based on the average brightness value. Unlike other methods, tiated group groups were aggregated with supplementary groups and then weighed to create an enhanced image. However, since weighting factors are not always feasible, the requirement to perfectly minimise the average brightness error was relaxed to compensate for the possible weights. A variation of the histogram trimming principle [20] was further proposed. The clipping Limit was specified as the minimum value for the histogram, median, and mean

values. When working in it, there is a potential problem when the median is very low and provides a low cropping size, the pixel functions with the corresponding subgroup can be destroyed. Based on the available methods, a comparative evaluation of the commonly used color space of color images was performed [21]. The work of reporting suggested that when leveling the histogram, a green color space is used, where this channel approximates the brightness of the image.

In addition to separating the image into high and low brightness sub-images as aforementioned, contrast enhancement could also be accomplished by modifying and specifying a target density profile in histogram equalization. For instance, the input histogram was smoothed using an intensity-based window width [22]. Additionally, you can extend the policies that are listed in it to return the brightness of the output image that is adjusted to the input image. This work proposes a new way to reduce the difficulties encountered in areas that occur in the doors and in the dispensing departments. Based on the ratio of half the maximum strength, the target histogram shows the square surface balance above the desired middle level. The input image is then corrected to ensure that the average brightness is close to the input image.

## METHODOLOGY

### A. K-MEANS ALGORITHM

Here we discuss clearly about the basic structure of K-means clustering. Let  $A = \{a_i | i=1, \dots, f\}$  be attributes of  $f$ -dimensional vectors and  $X = \{x_i | i=1, \dots, N\}$  be each data of  $A$ . K-means clusters which  $X$  is  $SK = \{S_i | i=1, \dots, k\}$  where  $M = \{M = 1, n(S_i), \dots, J\}$   $S_i$  members, where  $n(s_i)$  is number of members for  $s_i$ . Each cluster has cluster center of  $C = \{c_i | i=1, \dots, k\}$ . The following steps will be involved in the K-means clustering algorithm [20-21]

1. Generate the random starting points with centroids  $C$ .
2. By utilizing the Euclidean separation discover the separation  $d$  between  $X$  to  $C$ .
3. Ascertain the base  $d(x_i, C)$  from the partition of  $x_i$  for  $i=1 \dots N$  into.
4. Ascertain the new centre  $c_i$  for  $i=1 \dots k$  characterized as:

$$C_i = \frac{1}{n_i} \sum_{j=1}^{n(s_i)} m_{ij} \in s_i$$

5. Rehash the procedure stage 2 until the point that all centroids are concurrent.

The centroids, in case if they do not change their position then they will be said as converged in a particular cycle. It additionally may stop in the  $t$  emphasis with a threshold  $\epsilon$  if those positions have been refreshed by the separation underneath  $\epsilon$ :

$$\left| \frac{c^t - c^{t-1}}{c^t} \right| < \epsilon$$

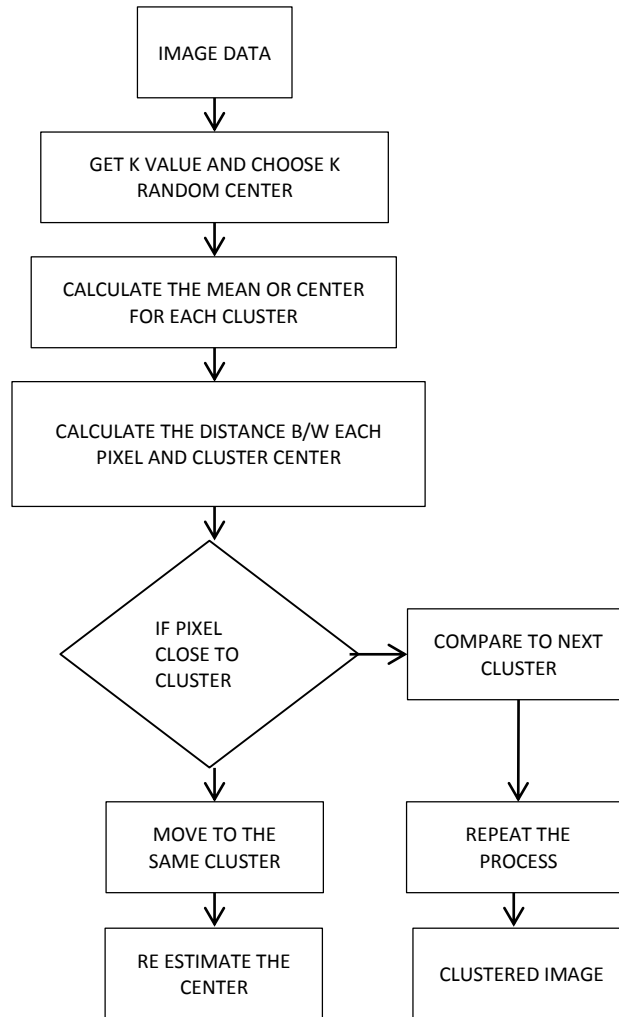


Fig. 2. K –means clustering algorithm

### B. FUZZY C-MEANS CLUSTERING

Fuzzy logic to process data through partial membership in reflection is a method of each pixel value. Fuzzy membership in the set value is 0 1 ranges. The fuzzy cluster basically allows a multi-value logical values, such as the intermediate I. E., a member of the same member can be set in fuzzy sets blurred picture. Full membership, non-membership is between any bad transfer. An image of a fosaniss function, in the form of a Buddha-figure and also a membership in information to define. The membership function that is involved includes three main primary attributes. They have support, restrictions. The core member is set to be completely opaque. The subscription is supported by a non-intermediate or partial subscription, and is a border that is set to value between 0 and 1 [23].

Obscure logic, fuzzy clusters, in each cluster location entirely, just one degree from a cluster. The cluster is on the periphery of the cluster, with fewer points than points. Each point  $x$  is given status as we are in the  $k$ th cluster  $uk(x)$  digital head. The contribution coefficient for any given  $x$  1 is usually clear:

$$\forall x \left( \sum_{k=1}^{\text{num. clusters}} u_k(x) = 1 \right).$$

Fuzzy c-means clustering, which kantroad all points with a cluster of his degree of leverage over it, means:

$$\text{center}_k = \frac{\sum_x u_k(x)^m x}{\sum_x u_k(x)^m}.$$

The distance to the cluster center is related to the inverse state:

$$u_k(x) = \frac{1}{d(\text{center}_k, x)},$$

Then coefficients is a true parameter to fosified distribution > 1 So their is 1.

$$u_k(x) = \frac{1}{\sum_j \left( \frac{d(\text{center}_k, x)}{d(\text{center}_j, x)} \right)^{2/(m-1)}}.$$

The equivalent of 2 m for coefficients to equal their money to 1 along a linear normalizing. When 1 m is close, and the cluster closest to the center at this point is much more weighted than others, and it is similar to the K-means algorithm.

Fuzzy c-means the algorithm K-means that is similar to the algorithm:

- Select the number of clusters.
- Clusters assigned to go to each endpoint are Lakki coefficients.
- Repeat algorithm (that is, the change of the threshold of coefficients sensitivity between two atrance is from someone else): • Calculate kanterwads for each cluster using the formula above.
- Using the formula above, calculate their coefficients for each location in the clusters.

Intra-cluster analytics K-means are less than the algorithm, however there are problems, in the same way that there is at least one local minimum depending on weights and the initial selection of results. In a more orderly way, the statistics algorithms Mksmyzaon expect some of the following to be views: Partial membership in classes. They know they've given precedence to properties and simple fuzzy-C-means.

## I. PROPOSED SEGMENTATION METHOD

Here in this section we proposed that our hybrid fuzzy K-means cluster acronym (AFKM). First, what the average used for preprocessing will be to remove from digital photos using filter noise and improve image quality. The product of the first phase will then be able to identify the margins of the image, and then it's K-i.e. the Segmented generated mines of the cluster: image. Now, the fuzzy cluster signaling accuracy and precise detection of the cancer of the capsule will be applied to the product of MR images

with the improve K-roots. Size of the tumor will be detected. The algorithm that steps up for the proposed system is shown in the diagram of a block.

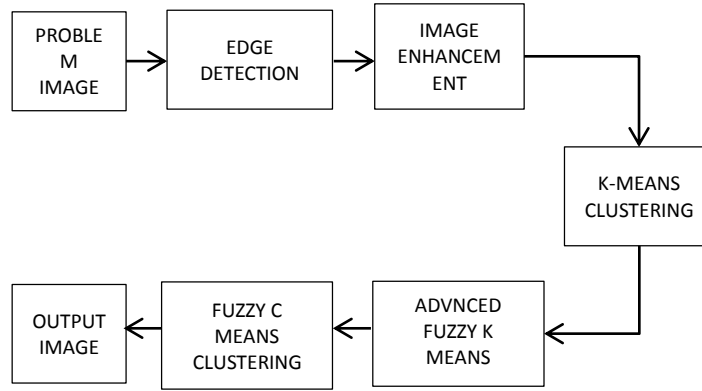


Fig. 3. Proposed system block diagram

## II. SIMULATION RESULTS

Simulation has been done in Matlab. Fig. 4 represents the edges found in the image, Fig. 5 shows the original image and Fig. 6, Fig. 7, Fig 8 shows the segmented images of K-means clustering, Fuzzy C-means clustering and proposed segmented method.

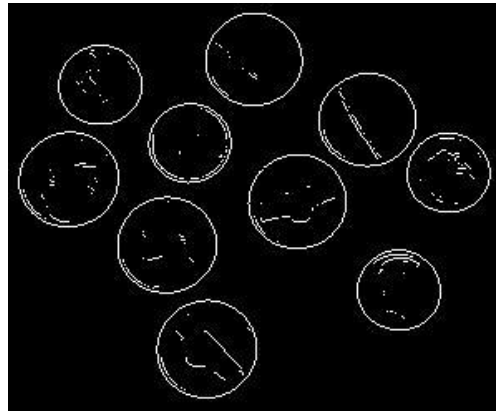


Fig. 4. Edges detection

TABLE I. COMPARISON WITH OTHER METHODS

S.NO.	SEGMENTATION METHOD	TIME(Sec)
1	K-MEANS CLUSTERING	3.625
2	FUZZY C-MEANS CLUSTERING	4.0625
3	AFKM ALGORITHM	2.8433
4	EELCS ALGORITHM	1.0692

Above table I shows the comparison results with K-means clustering and C-Means clustering, which have produced the better results in terms of time.

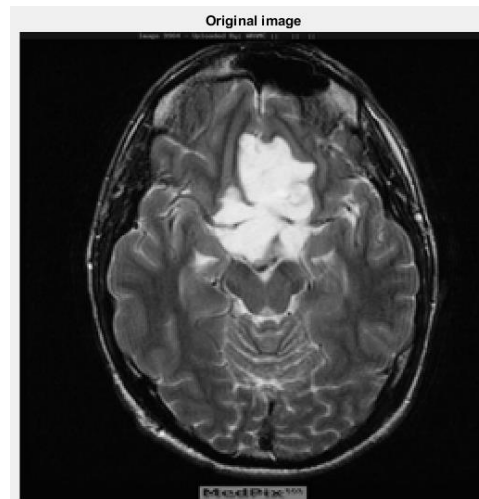


Fig. 5. Original image

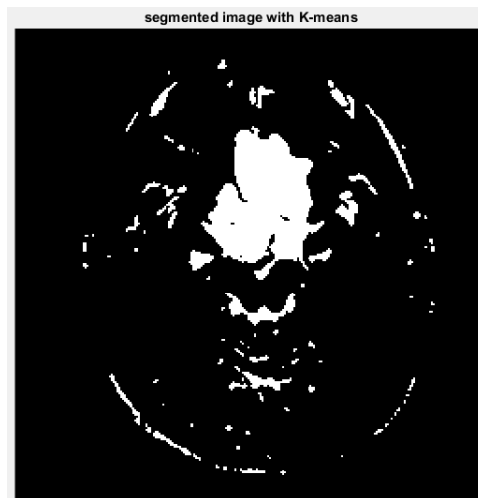


Fig. 6. Segmented image with K-means clustering



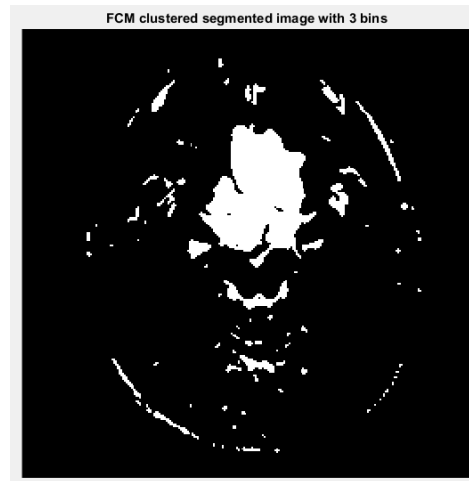


Fig. 7. Segmented image with Fuzzy C-means clustering

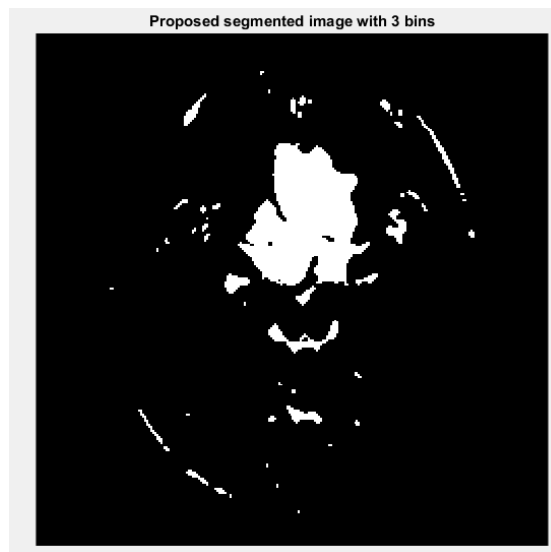


Fig. 8. Segmented image with Proposed Structure algorithm

## CONCLUSION

An approach had been presented in this paper that directly specifies a profile for histogram equalization-based image contrast enhancement. The proposed method makes use of a linear adjustment of the target histogram taking into account to minimize the difference between the mean brightness between the input and enhanced image. This method removes the need to separate the image into sub-groups and simplifies the equalization process to a single run. Furthermore, a rationalized choice of threshold was formulated where a balancing condition was met. Thus, fulfilling the requirement for minimum input-output brightness error. Experiments on a large data set of natural images reveals that although there is no single technique that can perform best in all performance criteria.

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# Application of Internet of Things and Solutions Analysis

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**Abstract**—IoT (Internet of Things) Solutions will be explained and explored to illustrate the business goal. The topology of the key components is extracted from any information available about the solution. These components are presented in two diagrams, one of which illustrates the cardinality of the association between the components. The second diagram shows how the data flows between the components. The vocabulary used when discussing software architectural styles contain components and connectors, hence the choice of identifying this for each solution and displaying it in diagrams.

**Keywords**—Actuators, Communication network, Transport layer security, RFID, SIOT, Neural sensors, Mobile Cloud Computing, preprocessing, Homeseer, RFID, Array of Things (AoT).

## I. INTRODUCTION

Firstly the IoT Solutions will be explained and explored to illustrate the business goal. The topology of the key components is extracted from any information available about the solution. These components are presented in two diagrams, one of which illustrates the cardinality of the association between the components. The second diagram shows how the data flows between the components. The vocabulary used when discussing software architectural styles contain components and connectors, hence the choice of identifying this for each solution and displaying it in diagrams.

The very first diagram displays the cardinalities of interaction between the parts (Cardinality diagram). A one-to-many link suggests that one example of a part is going to communicate with one or maybe more instances of another component. For each of these interactions we have to determine the scale, as it is able to reveal whether scalability is actually essential for the answer and therefore which software architectural styles could be used. Also provided in the diagram is actually the location of the information storage as well as the application logic.

The next diagram contains arrows indicating the flow of messages between components (message flow diagram). Within this diagram we're attracted to possibly the flow of information which is calculated from the sensors or maybe command emails which are sent to actuators. Note that not all messages between all elements are actually illustrated, as this's out of range. Both diagrams also indicate which components contain sensors and/or actuators. The remedies are actually grouped by their respective IoT Domains. The rest of this particular appendix has an evaluation of the remedies. [6][7]

## II. APPLICATIONS OF IOT

### A. Connected home

1) *Nest Thermostat*: The Nest thermostat is actually a smart thermostat which tries to study the daily routine of yours for temperature changes in the house of yours. When it learns this, it is going to apply these changes instantly without the user having to think about it. The end user also can replace the heat in their house via the Nest app or perhaps via the thermostat directly. Information regarding the Nest Thermostat was discovered on the Nest Home page Nest, the specialized specification page and the NEST developer documentation page. [1]

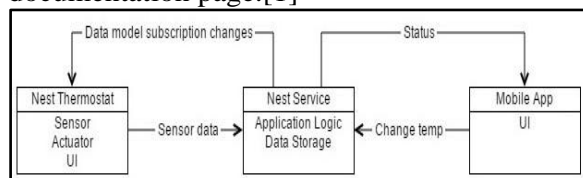


Figure 1: Nest Thermostat message flow diagram

2) *Homeseer*: The Homeseer is a comprehensive bundle for home automation. Instead of paying attention on one specific feature of the connected home domain, homeseer offers automation for lights, energy, water, security, locks, temperature, video and sound. A huge selling point because of this remedy is they promise not to save private user info in the cloud. Information regarding the Homeseer was discovered on the home page as well as the developer support page.

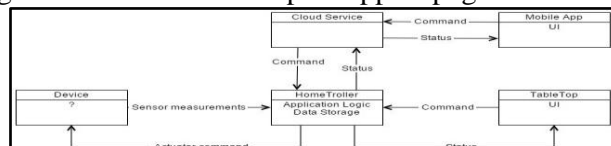


Figure 2: Homeseer message flow diagram

3) *Smart Things*: Smart Things also provides a smart house environment. The primary nodes are actually the Smart Things Hub and the SmartThings app. Like the Homeseer, the scale of the solution may be as large as the user needs it to be. The largest difference being which SmartThings has a cloud service which has the information gathered by the SmartThings program and also has application logic to come up with the product work. Another distinction is the fact that it mainly will depend on third party products as the amount of Actuators and smartthings sensors are limited. Information regarding the SmartThings answer was discovered on the home page and the Developer Documentation page.

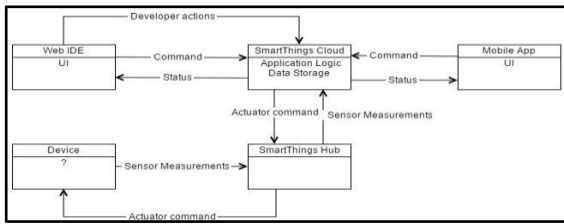


Figure 3: Smart Things message flow diagram

**B) ConnectedBody**

1) *Angel Wristband*: The Angel Wristband has 3 sensors that could monitor the wellbeing of the user. It really works with a range of physical fitness and wellness tracker mobile applications. There's an SDK in order to create for the Angel Wristband and extract the health metrics, device information, the Raw Waveform as well as to configure the alarm clock and that is also contained in the band. Information regarding the Angel Wristband was discovered on the house page8 and the SDK GitHub page.[5]

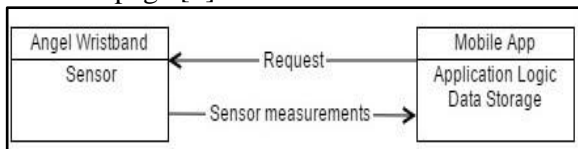


Figure 4: Angel Wristband message flow diagram

2) *Nymi Wristband*: The Nymi band makes use of the user's unique heart signature to authenticate them to a method or perhaps device. A good example of a possible application is actually logging into a computer or even gaining access to an area using the Nymi band. The company provides a developer kit for the platform. Information regarding the Angel Wristband was discovered on the home page, the Nymi SDK page and a whitepaper.



Figure 5: Nymi Wristband message flow diagram

3) *Zebra Motion works*: The Zebra motionworks solution utilizes a set of Zebra receivers (RFID) to go along with the motions of NFL players that each have an RFID transmitter tag placed inside the shoulder pads of theirs. The program measures precise location measurements of the players to give real time stats. The mentors are able to utilize the motion information to change their algorithms and tactics can aggregate player's stats and display them real time for fans to develop a deeper experience. Information regarding the Zebra Motionworks was discovered on the homepage.

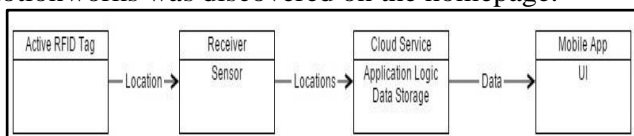


Figure 6: Zebra Motion works message flow diagram

**C) ConnectedRetail**

1) *Scanalytics floor sensors*: Scanalytics floor sensors extend the floor with receptors that evaluate exactly how folks walk on the floor. This information could be utilized to analyze customer behavior in a department store. The store may then alter the arrangements of the things for sale to better emphasize the most popular products. One of the selling points of the scanalytics floor sensor is actually it doesn't collect private info. Individuals add to the information anonymously. Information regarding the Zebra Motionworks was discovered on the homepage. I tried to access the SDK though I haven't got a reply from Scanalytics.

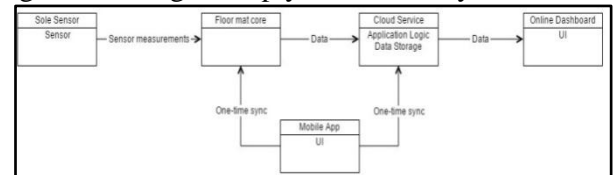


Figure 7: Scanalytics message flow diagram

2) *S5 Electronic Shelf labels*: The S5 Electronic Shelf labels will be positioned in stores to be able to keep costs of items up to date. Transmitters called T3 are actually positioned around the shop to develop a network to be able to drive the prices from the management application to the S5 shelf labels. Information regarding the S5 Electronic Shelf labels was discovered on the home page

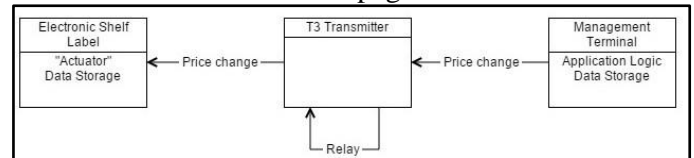


Figure 8: S5 Electronic Shelf labels message flow diagram

**D) ConnectedTransportation**

1) *WeatherCloud*: In an effort to provide much better weather and road quality info, the WeatherCloud solution places multiple sensors inside and outside of an automobile. These sensors measure precipitation fee and kind, road conditions, pavement temperature, ambient temperature, dew point, ambient lighting, slip/grip of tires and vehicle dynamics. This information is then aggregated by an on board Smart Hub which drives it to the Cloud. The resulting information on the Cloud is actually sent to driver's cell phones or maybe navigation screens or perhaps could be seen through the WeatherCloud desktop application. Information regarding the Weather Cloud was discovered on the homepage.

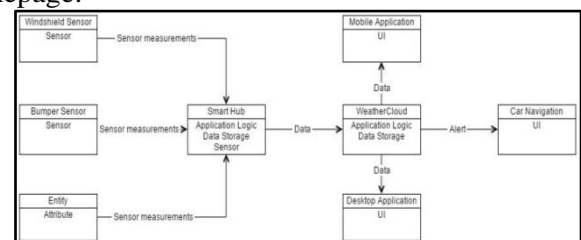


Figure 9: WeatherCloud message flow diagram

2) *Truvolo Connected Car Solution*: The Truvolo Connected Car Solution is a comprehensive solution for vehicle connectivity and data management. It provides real-time monitoring and control of various vehicle parameters, including engine status, fuel consumption, and location tracking. The solution is designed to be scalable and secure, ensuring that user data is protected and accessible only to authorized users. Information regarding the Truvolo Connected Car Solution was discovered on the homepage.

will provide an automobile connectivity by plugging a tiny unit (Truvolo Drive) into the On board diagnostics (OBD) port of the automobile, which relays info about the automobile via a mobile phone to the Cloud which could then be seen by an internet dashboard. The information on the dashboard shows exactly how much gasoline is used, just how secure the automobile is being pushed and monitors the condition of the automobile and provides an alert in case the automobile has to be maintained. All automobiles of a home may be handled by the dashboard. Information regarding the Truvolo Connected Car Solution was discovered on the home page.

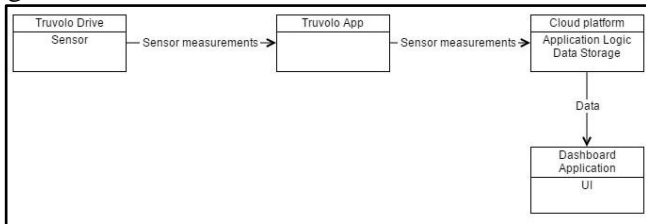


Figure 10: Truvolo message flow diagram

3) Veniam Vehicular Networking: Marketed as "The Internet of Moving Things", this IoT solution turns vehicles into WiFi hotspots. This networking may be viewed as a means to offer pervasive Internet and hence support the IoT by offering access to the Internet for products. The main reason why Veniam is also regarded as an IoT Solution is actually since it also gathers info about the location of the automobile. The connected vehicles act as a sensor for the city, providing info that is important to enhance fleet management, security and operations.

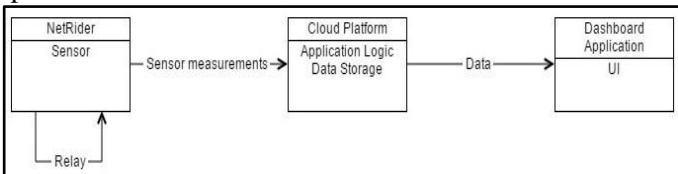


Figure 11: Veniam Vehicular networking message flow diagram

E) SmartCity

1) Bitlock Bicycle Lock: Bitlock is actually a bicycle lock that unlocks when a smartphone containing the most appropriate key is actually in proximity to it. The program also recalls the previous location of interaction with Bitlock and will demonstrate a history of usage. Access to the bicycle may also be shared with other people of the app. The digital key is actually discussed between the mobile phones; therefore the Bitlock itself just must have the correct element to be opened. It doesn't have to be hooked up to the Internet. Information regarding the Bitlock was discovered on the home page.

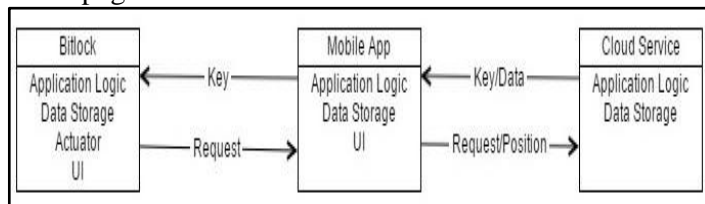


Figure 12: Bitlock message flow diagram

2) Array of Things: The Array of Things (AoT) is actually a wise city IoT solution where a lot of sensors are actually positioned around the city. The sensors around Chicago at the second collect real time info about this data and the city is actually posted on an open data source for researchers as well as the public to make use of. Factors as temperature, carbon monoxide, light, humidity, nitrogen dioxide and vibrations to name just a few. The solution promises not to gather some private information. Information regarding the Array of Things was discovered on the home page and the Waggle home page, and that is the platform the AoT is actually based on.

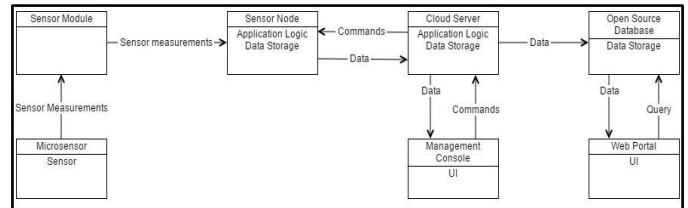


Figure 13: Array of Things message flow diagram

3) Enevo Waste Collection: The Enevo waste collection solution also links the city by measuring just how full trash containers are actually so that garbage trucks are able to enhance the routes of theirs. The option promises to give as much as fifty % in immediate cost savings. It'll also make the city look and feel cleaner, as waste containers are not as likely to be complete and optimized routes are able to lead to fewer garbage trucks on the street. Information regarding Enevo Waste Collection was discovered on the homepage.[8]

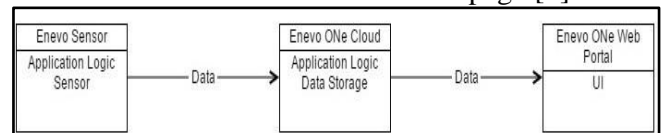


Figure 14: Enevo Waste Collection message flow diagram

f) Industrial Application

1) Farmobile Fleet Management: The Farmobile Simplicity PUC is actually a fleet management system for farms. It collects information to produce a digital farm record and also shows info about the motion of farm vehicles in mobile app or a web. The devices called PUC are actually installed on a farm car like a tractor and hook up to the Cloud. This information is actually gathered for archive but also for analysis. Farmobile also manages a cellular data plan for that answer. Information regarding the Farmobile PUC Fleet Management was discovered on the home page.

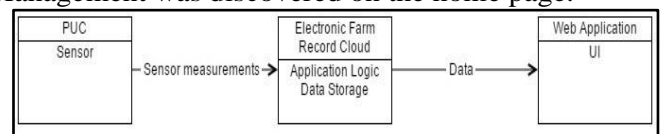


Figure 15: Farmobile message flow diagram

2) Condeco Workspace Occupancy Sensors: The Condeco Workspace Occupancy Sensor is actually a sensor which reports to the Cloud the way in which a workspace is actually occupied. According to this

information, the business is able to decide exactly how to more effectively make use of the workspace. The occupancy sensors push the information of theirs to a Cloud service. This information could be seen via mobile application or a web. The software allows for numerous ways to see the information. The owners of the system can then decide themselves exactly how to better use workspaces, you will find no actuators in this particular product. Information regarding the Condeco Workspace Occupancy Sensors was discovered on the home page.

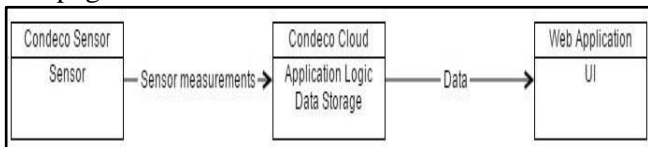


Figure 16: Condeco Workspace Occupancy cardinality diagram

iii) DAQRI Smart Helmet: Created especially for manufacturing applications, the DAQRI smart helmet utilizes an array of sensors, cameras and augmented reality to link your work environment by simply being there. The cameras recognize the equipment in the work environment of yours and publish the state of the equipment online. Other customers that are also using the helmet within this atmosphere is able to make use of this information. The whole landscape of the work environment of yours is collaboratively mapped by all smart helmets. The Helmet also offers a display which shows the wearer what his job goals are actually for the day, that are given by a main server running the DAQRI application. Information regarding the DAQRI Smart Helmet was discovered on the home page.[3,4]

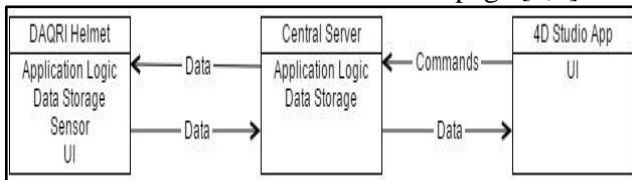


Figure 17: DAQRI message flow diagram

### III. Quality Attributes analysis

This section offers an analysis quality attributes in the Internet of Things depending on the treatments explored. It'll also be found that not all of these quality characteristics are actually a high priority in the truth, since there is actually such a great assortment of solutions.

- **Interoperability.** The solutions that were explored exhibit different levels of interoperability with many other ways. The one real instance of interoperability between various ways in the dataset examined is actually in the connected home domain. The remedies in other domains provide the chance of interoperability for the future. There's also a team of remedies that at the moment don't point out the ability to speak with other ways at all. The SmartThings solution achieves interoperability by having SmartApps run in the Cloud which understands the various kinds of third party devices. Owners can also create their own SmartApps.

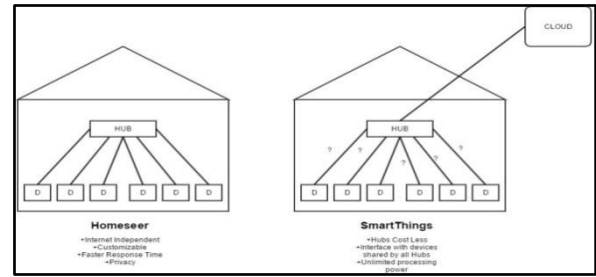


Figure 18: Homeseer VS. SmartThings Interoperability

Both fixes provide a "Hub" which functions as a main communication point between the equipment inside the home environment. Figure 18 illustrates these 2 methods. The distinction between these 2 treatments is actually the location of the logic required to recognize the interaction with the equipment. This logic is necessary to reach semantic interoperability between the many products inside a smart house. For the Homeseer, the logic is actually put in the Hub itself, while for the SmartThings solution this logic is actually located in the SmartServices level in the SmartThings Cloud. The SmartThings Hub merely relays the interaction to the Cloud.

This style choice has impact on the system on levels that are various. The interoperability between products in the Homeseer solution is actually Internet independent, the hub is actually customizable can react more quickly and is a lot more privacy friendly. The SmartThings Hub on the other hand shares the intelligence with any other hubs linked to the Cloud, which makes it easier to add brand new intelligence to interface to products to all hubs at one time. Since the logic is actually put in the Cloud, the computation power isn't restricted by the hardware on the hub. Last but not least, as the hub just functions as a gateway between equipment and also the Cloud, it could be assumed that the SmartThings hub costs much less to make than the Homeseer hub. Both of these connected home solutions offer interoperability via the IFTTT web service. IFTTT is actually a webservice which allows users to link up 2 services by a conditional declaration called recipes. If a particular state occurs, for instance a SmartThings motion sensor picks up a little movement, then the IFTTT webservice is able to send a message to a Phillips Hue bridge to switch all of the lights on. These "If This Then That" recipes may be utilized for interoperability between fixes, so long as the IFTTT is actually granted permission to speak with them. A reason why this's a good feature is actually since it enables individuals that are not programmers to produce recipes that provide for interoperability as well as autonomous behavior.

Lastly, there's a team of remedies which don't interoperate with another solution. This supports the statement that interoperability with various ways isn't essential for most IoT Solutions. There are several remedies which may not wish to be available due to security, security and privacy reasons. They may develop an interconnected network of items with a select few remedies in the long term, but not in such an open fashion as some other IoT solutions.

A good example is actually the DAQRI smart helmet that is an augmented reality based helmet which can map an industrial setting while receiving work goals for the work day. The helmet contains

processing power to recognize its surroundings and assist the employees with their daily routines while trying to keep the state of the devices in an industrial workplace synced with a data type on a main server. Some possible reasons why interoperability is not essential for this particular remedy is actually since it manage a great deal of information that is private and the information it measures is quite intricate, making it difficult for another system to realize. It might also be argued that such a program would probably evolve itself if much more function is actually required rather than relying on many other remedies, since it's such a complex and specific solution.[10][12]

To summarize, the coming levels of interoperability between solutions had been determined for current IoT Solutions:

- **Hub/Gateway:** The Hub/Gateway middleware node contains the logic to achieve semantic interoperability between devices.
- **Cloud:** The Cloud component contains the logic to achieve semantic interoperability between devices.
- **Third Party Service:** A Third party service is used as a mediator between two IoT solutions.
- **SDK:** An SDK is available to develop for the platform.
- **Open Database:** The data measured by the IoT Solution is available to other systems.
- **No Interoperability:** The solution currently does not support interoperability with other systems
- **Evolvability.** Although not a lot of information is available about the modularity of the software in IoT Solutions, one thing that is important for the IoT with respect to evolvability is the ability to push software updates to a node via the network.

Several fixes have quite slim edges, which include just sensors that push the information of theirs to the cloud. All of the application logic for these kinds of treatments is actually this centrally located in the Cloud. What this means for evolvability is the fact that the program just has to be updated in one location to evolve the system. This way, the evolution of the method is much more quickly controlled, which is also among the attributes we identified for evolvability. When the expertise is actually distributed amongst nodes at the edge of the network, these updates have to be propagated to all of these nodes. Furthermore, if the edges are much less wise, they're much more easily replaceable with respect to cost in case of theft or harm. This means the exchangeability is actually enhanced in such a scenario, allowing for brand new variations of sensors to be deployed a lot more easily. Figure 19 illustrates this difference.

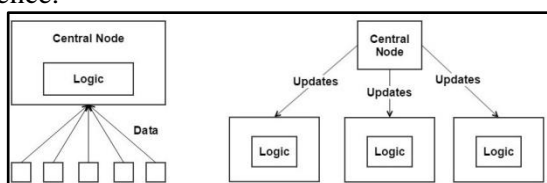


Figure 19: Centralization vs. Decentralization for Evolvability

Having a centralized intelligence also has an impact on evolvability with respect to interoperability. If there's an atmosphere where the selection of heterogeneous devices is actually more likely to boost at a quick speed, having a centralized intelligence means only updating

one node in the network with the logic to speak with these brand new products. If the advantage of the network is actually responsible for the interoperability, these updates will have to be pressed to these nodes. These nodes are also bound by their hardware capacity, which is actually in many instances very limited.

The preference for which sort of formula to create, centralized or perhaps decentralized with respect to evolvability, is dependent on the anticipated price of selection and change of nodes at the edge. If both are actually high, a centralized remedy could be the most desirable option. Nevertheless, if this's not the case and changes are actually occasional, then having more logic at the edge of the network also brings benefits including availability and performance.

- **Performance** As previously stated, decentralization of the method is able to result in an increase in performance as a result of low latency. One half of the treatments examined rely completely on a centralized intelligence which is often a Cloud component. This may suggest that for these remedies, low latency isn't the highest priority. For a number of these devices, the idea of having information "eventually consistent", i.e. measured information from the real world is ultimately synced to its digital counterpart or maybe the shift to the digital counterpart is eventually propagated to the advantage node and then altered in the real world, is actually good enough. In an environment like a connected home, there's a reliable Internet connection and the products are actually stationary. This combination helps make it possible to attain fairly good performance even though every one of the logic is actually in the Cloud. Take another planet where the connectivity may be unstable and the nodes are continuously in motion, and suddenly having logic closer to the edge is able to have a huge influence on performance, particularly if the unit is able to sense, process and then give feedback to the user without actually requiring a connection. The DAQRI smart helmet is actually a good example of a smart device at the edge of the network.

- **Scalability** For the vast majority of the methods analyzed (eleven out of eighteen), the remedies have a Cloud component which all equipment and users speak with. For these methods nothing much more can be said other than the "Cloud servers have to be scalable". The simple fact that the Cloud is actually scalable is actually a safe assumption to make, however having an architecture which requires less scaling decreases costs. By the estimation of mine, the Cloud server which would have to be most scalable out of the systems evaluated is actually the SmartThings Cloud. Each device inside a household is going to communicate with this Cloud component, albeit indirectly via the SmartThings Hub.

Several fixes have much less of a scalability issue if either the selection of number or maybe devices of owners is fixed. For the Zebra Motionworks instance, the amount of products is actually fixed, because there's



a fixed amount of NFL athletes allowed to play on the area in the process. The amount of RFID readers positioned around the stadium is also fixed. The S5 Electronic Shelf answer is actually an example where the amount of owners is actually fixed. The amount of shelf labels may possibly improve significantly if the market expands or maybe gives a new branch, but there's surely a fixed (or perhaps quite small) selection of administrators which manages the product. There are a variety of fixes where scalability doesn't play a role. Take for instance the Angel or perhaps the Nymi wristband. They speak with one to a couple of uses at a time via Bluetooth. In this particular situation both the amount of devices and users is actually fixed. The Nomi Brickstream live team argues that their method is much more scalable because intelligence is actually put in the advantage device, which happens to be a camera. It is then easier to add numerous nodes as each of them do their own computations and don't result in much stress on the main server. This's particularly crucial when the main server isn't always in the Cloud but maybe a private data server.

The following statements can be made regarding scalability:

- Decentralization is good for scalability, especially if the central node is not a Cloud component, as the logic in the edge of the network decreases the workload for the central node.
- Some systems have a fixed number of devices or fixed number of users, making scalability less of a priority.
- Some solutions do not need to scale at all.
- Scalability in the IoT becomes more interesting when interoperability between solutions come into play.
- **Accessibility** A primary reason a remedy may become unavailable in the IoT is actually whether the battery of the equipment at the edge run out. The majority of the
- respect to privacy because of the technology used. Another example is actually the Array of Things, which also makes claims not to collect private information of individuals in the city. They do however measure mobile device signals to present an estimation of just how busy particular part of the city is actually. One interesting IoT Solution with respect to privacy is actually the Homeseer. The Homeseer continues to be the privacy friendly substitute for the Smart Things, simply because the private information is still not saved in the Cloud. The Cloud is just used as a router between the mobile app and the Homeseer Hub. From this we are able to conclude that decentralizing data storage is able to offer much more privacy, since most of the information is actually kept on a neighborhood community. There's no guarantee however that no information at all is actually kept on the Homeseer Cloud router, which makes privacy such a hard issue. Nevertheless, trusting companies with information without getting a full guarantee what's done with it's always been a privacy problem even before the IoT.[9]

remedies analyzed either plugs in to a power outlet or even has very long battery life. Probably The shortest battery life among the remedies is the fact that of the DAQRI smart helmet, that is estimated at 1 day. The accessibility of answers in the IoT may also be influenced by connectivity issues. One way this's managed is by enabling the unit to keep the measurements of its locally and publish them when a sure link has been started. This's how the Farmobile solution handles this particular issue, where connectivity in the farm lands might be restricted. This connectivity issue is managed by the DAQRI smart helmet by enabling the unit itself to process the data of its locally and put it, allowing for the vast majority of the performance to remain publicly available.

• **Protection.** It's difficult to say something about security measures that the IoT Solutions consumption, since they're typically not open about this particular. This's to be anticipated as making the protection protocols used public will allow it to be a lot easier for an attacker to begin an attack.

• **Privacy.** The IoT solutions exhibit many ways to provide privacy. One of the ways is through information minimization, exactly where the remedies say just to gather information which is required. A good example is the Nomi Brickstream living, which happens to be a digital camera which is able to find faces so that a retailer could be counted the number of folks walk in and from the shop. Nevertheless, they claim not to truly save the faces which are found on camera. The Scanalytics floor sensors have the same goal as the Nomi, except that they just measure action on the floor, which is actually certain to be anonymous. While both devices most likely provide the exact same amount of privacy for the same objective, the Scanalytics floor sensors offer a feeling of trustability with

#### IV CONCLUSION

A good example of an IoT solution was privacy plays no role is actually the Zebra movement works. The information which is actually being gathered will be the game behavior of NFL players on the field. This's info that's currently available to other individuals attending the game or even watching at your home.

Taking look at several of the privacy statements made by fixes, one that stood out is actually the Nymi band. For this particular answer, Privacy by Design was used. Privacy by Design contains seven goals to be able to ensure privacy in systems. These are the following:

- **Proactive not Reactive:** Anticipate and prevent privacy-invasive events before they happen.
- **Privacy as the Default Setting:** Maximum degree of privacy should be the default setting. Users don't have to do anything to ensure their privacy.
- **Privacy Embedded into Design:** Privacy should be an integral part of the architecture and not an after-the-fact add-on.
- **Full Functionality:** Instead of considering trade-offs such as privacy vs. functionality, the system

should be designed in a win-win manner where both can be achieved.

- **End-to-End Security:** Privacy by Design extends throughout the lifecycle of the data collected, where at the end the data is securely destroyed
- **Visibility and Transparency:** Privacy is individually verifiable to all stakeholders.
- **Respect for User Privacy:** Design of a system should be user-centric with the privacy of the user always in mind.

While it's possible to attain much more performance while maintaining privacy in the IoT, it's more difficult to make certain owners that the situation continues to be privacy friendly after such a connection has been created with another program. Take for instance the Homeseer once more, where in the past it wasn't likely for the system to be privacy unfriendly due to the technology and style options used, specifically Internet dependent and no Cloud component. The brand new version of the Homeseer can still work in a privacy friendly manner, the way it's more difficult for subscribers to believe in that. This's exactly where visibility and transparency play a job, allowing specific people to confirm for them.

What we have learned about Privacy in the IoT Reality is the following [2]:

- Decentralization of data storage is deemed privacy friendly.
- Privacy is promised by assuring the user that onl unnecessary data is gathered and not personal data (data minimization).
- There is a trade-off between Privacy and Functionality in the IoT.
- There are some solutions where privacy does not play a role at all because of the nature of the data being gathered and processed.[11]

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# Collection of thoughts using Text Evidence

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## Abstract

We prescribe learning the term contained in this thing with a specific feeling. presented word inserting learning calculations as a rule as it utilized words, but disregard enthusiastic messages. Since the words with comparative settings but inverse feeling extremity are connected to neighboring word vectors such as great or awful, a wistful examination is tricky. This issue is managed by scrambling data with content sentiments (e.g. sentences and words) at the side word settings in outstanding inserting. The near neighbors in space of feeling are related in a pioneering manner, integrating proof of meaning and degree of feeling. We create neuro networks with evolving loss roles to reliably interpret the embedded feeling and instantly gather broad texts with emoticon-like signals. Sentiment integration can actually be used in a variety of sentiment analyzes without a plug-in as word-features. We use inbuilt stimuli to understand words, to recognize the sentence of emotions and to create lexicons of emotions. Experimental results show that emotions are regularly incorporated into several benchmarking data sets. This work provides information on neural networks design in other natural ways for the study of word embedding.

## Keywords:

## 1. INTRODUCTION

WORD interpretation attempts to reflect facets of the meaning of the word. Of example, "cell phone" description should reflect the fact that cell phones are electrical devices, include the battery and computer, are able to talk to others, etc[1]. Text interpretation is a vital module in a lot of accepted language processing systems, the most commonly referred to as the simple text computing unit. A direct way forward is to view each word as a single hot matrix; with only one dimension and the length of a vocabulary 1 with all other sections is 0. One hot word representation, however, encodes only the words' indexes in a language but does not absorb the rich relation of the lexicon. Most studies represent a continuous, poorly dimensioned and reevaluated vector for each term in solving this problem often referred to as word embedding. Current embedded learning strategies are based largely on a distributive assumption [9] whereby words with similar grammatical uses as well as semanticist In the area of integration, concepts like "hostel" and "motel," are translated into adjacent vectors. Because word embedding captures sentimentonal similarities between words[3], it is used as inputs or add-ons for several natural language processing tasks, including machine translations. Although the context-based word embedding has been successful in a number of NLP jobs[10] that they are not sufficiently effective if applied directly to feeling analysis, a research field aimed at extracting, analyzing and

organizing the feelings / opinions of the text (e.g. thumbs up or thumbs down). The most serious problem with contextual learning algorithms is that they model only meanings of words but overlook the feelings of the word. This means that in the embedding space in near vectors terms of opposite polarity, such as good and bad, are represented. This is important as both word shave similar uses and grammar positions are important for some functions, such as post-tagging. Yet, because they have different feeling marks, it becomes a disaster in sentiment analysis.

## 2. DESIGN AND DESIGN OUTPUT

### 2.1 INPUT DESIGN:

Input design is the user's link to the information system. This requires the establishment of processes for data collection. These actions can be carried out by testing the computer to decrypt data from records or scans placing the information directly into the program. This is important because transaction data are stored in a useable manner for analysis[2]. The input architecture emphasizes feedback control, error reduction, the avoidance of delay, the avoidance of further steps and the simplification of the procedure. The data entry is structured so that anonymity is protected in a safe and easy manner. The following things were considered by Input Design:

- The results what input should be provided?
  - Completion or coding of the data?
  - The input dialog that leads the operating staff.
  - Methods and steps to follow when error occur for prepare input validations.
1. The method of translating a user-oriented data definition to a computer-based system is the Data Design process. This development is necessary if data input process errors are to be avoided and for the management to be able to get proper information from the computerized system.
  2. Large volumes of data can be managed with user-friendly data entry screens. The aim is to promote and prevent input design errors in the data entry. The panel of the data input is designed to perform both manipulations. This offers archive watching tools as well.
  3. The authenticity shall be verified if the details are entered. With the help of cameras, data can be accessed. Suitable notifications are given as So the consumer isn't in maize immediately. The interface architecture is therefore aimed at creating a conveniently followed feedback style.

### 2.2 OUTPUT DESIGN

A quality performance satisfies the end user's expectations and clearly displays the details. In any processing system tests, consumers and other processes are represented by outputs. In the production configuration the material is replaced and the hard copy output is calculated[3][4]. It is the user's main and most direct source information. Efficient and clever performance architecture strengthens partnerships with the system to help users decide show in fig1.

1. Computer outputs should be organized and well thought out. And well thought out. To ensure that every element is designed, the right output must be developed to make it easy

and effective for people to find the system. When analyzing computer output, the specific output needed to meet the needs should be identified.

2. Use information sharing approaches.
3. Build papers, records, or other forms containing system-generated information.
4. One or more of the above goals must be met in the production form of an information system.
  - Convey historical activity, current status or —the future projections.
  - Signals key events, openings, problems or warnings.
  - Operation cause.
  - Complete a count.

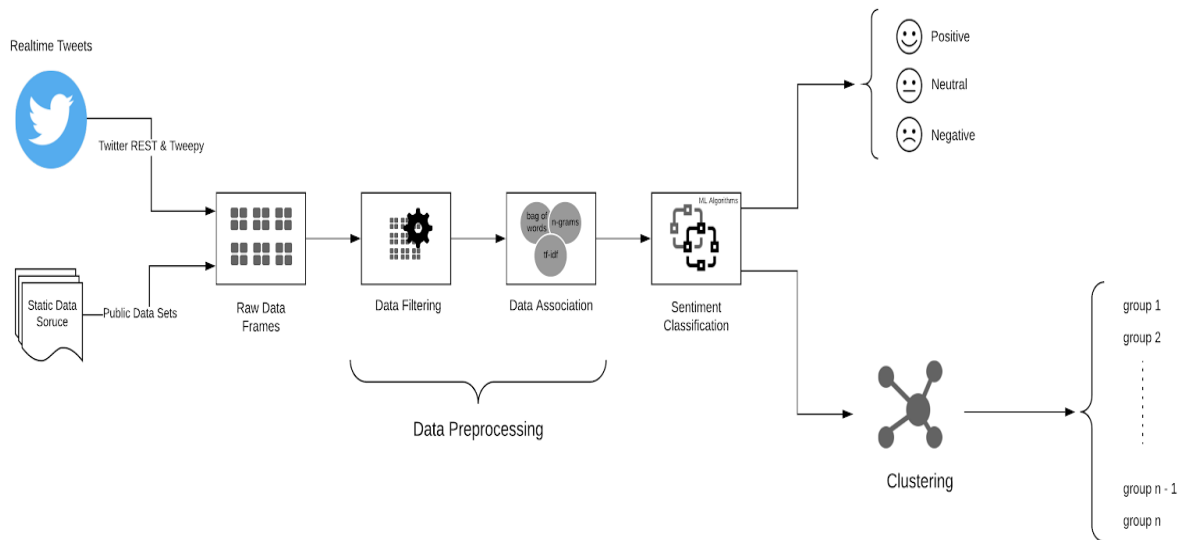


Figure 1: Input and Output Design of Sentimental Analysis

### 3. STUDY OF THE SYSTEM

Existing embedding approaches to learning are largely based on distributional premises that their expressions are represented by their meanings. As a consequence, words with similar grammar and semitone meaning like "hotel" and "motel" are laid down in the embedding space in the neighboring vectors. Because word embedding catches semantic similarity between words, it has been used for a wide range of natural language processing tasks as inputs or additional word features. A log bilinear language model is presented by Minch and Hinton[5]. With the rating-type hinge loss feature, Clobber and Weston train word embedding to replace the median term within a window by the chosen randomly. Continuous word bag (CBOW) and continuous skip-grams are introduced by Mikonos, and the tool kit is released. Based on its context words integration, the CBOW model predicts the current word and In the current word incrustation, Skip-Gram predicts the terms. The main problem with contextual learning algorithms is that they

only model word meanings but ignore information about text-related sensations. In the embedding region in close vectors, opposite terms, including good and bad polarity, are represented.

- The major problem of context-based learning algorithms is that they only form meanings of words but ignore information about texts. Conditions that have opposite polarity are converted into closely integrated vectors, like good and bad[10]. Algorithms usually use the existing word embedding only language contexts, but they ignore text emotions.
- TO We empirically test the feasibility of feeling embedding in three sentiment analysis tasks.
- Comparison of feeling standard with benchmark emotion lexicon allows us to see if feeling embedding is useful for finding correlations between feeling terms[6].
- Taxes and tweets help us to understand if feeling inclusion is beneficial in catching discrimination and anticipate the feeling in the letter.
- Taxes and comments
- Creating a feeling lexicon is useful to test how embedding feelings will enhance the lexical tasks needed to identify similarities among verbs.
- Experimental results demonstrate that emotions are reliably incorporated into the context-based term and produce up-to-date output with a variety of benchmarks.

#### 4. FLOW DATA DIAGRAM

1.DFD is also called the bubble representation. It's just a graphical formality. serve as a systematic representation for the system entry data, different processing of these data and the system output data[7].

2. One of the most common modeling tools is the data flow diagram (DFD). The device elements are modeled. This is the system operation, process data, an External agent interacting with the system and the system information flow in fig 2.

3. DFD reveals how the knowledge flows across the system and how a sequence of transformations modifies it. It is an information flow analysis technique.The transformations used as the data passes between inputs and outputs.

4. Bubble map is also known as DFD. A DFD can be used in any abstraction level to describe a device. DFD can be separated into gradual information flow and practical description stages.

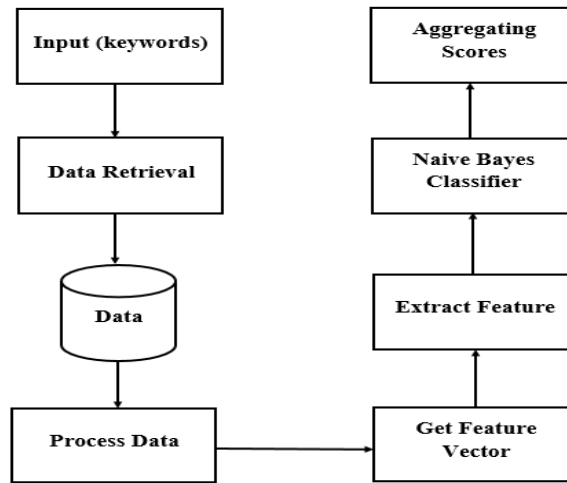


Figure 2 : Flow Data Diagram of Sentimental Analysis

#### 4.1 ARCHITECTURE

1. Provide users with an intuitive and ready-to-use vocabulary of visual modeling to create and share functional models shown in fig 3.
2. Offer methods of extension and differentiation to expand core concepts.
3. Regardless of different programming and development languages.
4. Offer a formal framework for understanding the language of modeling.

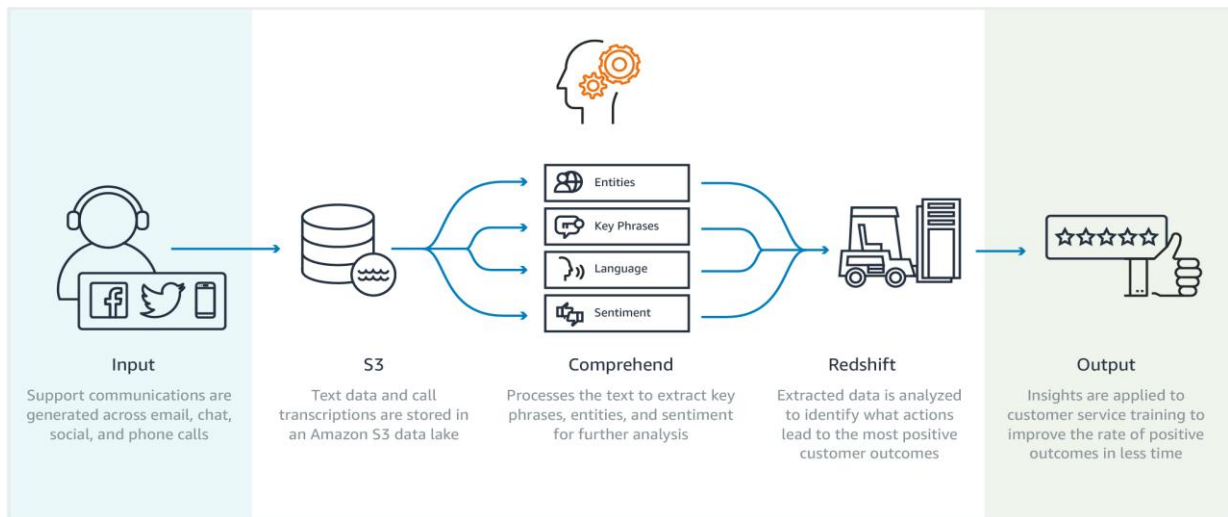


Figure 3: UML Architecture of Sentimental Analysis

5. Promote OO instruments market growth.
6. Support concepts such as collaborations, frames, patterns and components at the higher level development levels.

## 4.2 ACTIVITY DIAGRAM:

Operation diagrams reflect workflows for step-by-step operations and behavior assisted by preference, iteration and competition. Event diagrams for defining the business and operating component workflows in a program can be used in the Unified Modeling Language. The total control flow is shown in fig 4 the activity diagram.

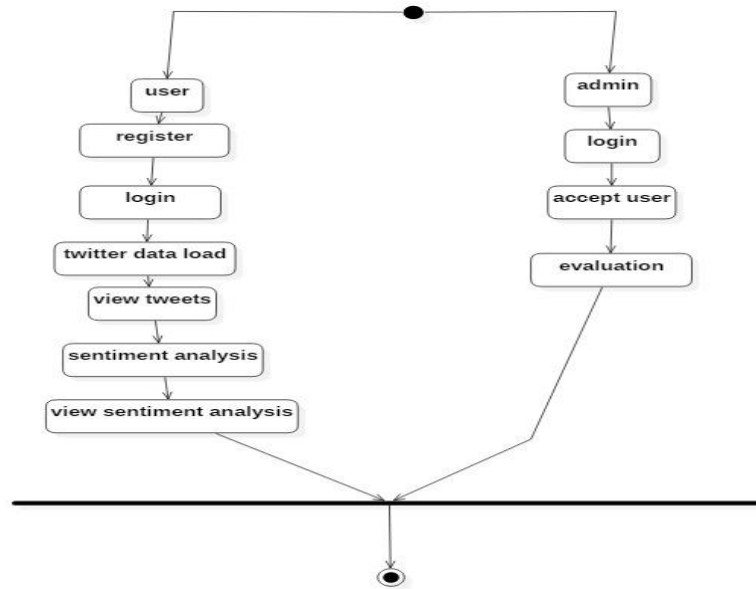


Figure 4: Activity Diagram of Sentimental Analysis

## 5. SYSTEM TESTING

The test is supposed to detect errors. Any flaws or shortcomings in the work product can be checked. This allows the operation of components, sub-assemblies, assemblies and/or finished items to be tested[8]. It is the technological process that ensures that the system fulfills its specifications and consumer expectations. There are different types of examinations. The specific test criteria are discussed by all test forms.

## 6. CONCLUSION

We are studying sentiment-specific embedding of words (also called embedding feeling) in this article. Unlike most studies outgoing which encrypt word only contexts in word embedding, we facilitate the ability of word integration to capture similitude's in terms of feeling semantics. The words in the feeling space, with similar backgrounds but opposite feelings, can therefore be separated from polarity marks like "good" and "bad." We are implementing Several neural networks encode context and level of sensation information in a unified manner simultaneously in word embedding. Three tasks of feeling analysis empirically test the effectiveness of



sentiment embedding. With the analysis of feelings at word level, we show that feelings are useful in the discovery of similarities of feelings between words. In the grouping of sentences, emotions are included in the avoidance of the thoughts of sentences. discriminative characteristics. In lexical tasks like building lexicons for sentiment, feeling embedding is useful to measure the similarities of words. The best performer on all three tasks is hybrid versions, which capture both meaning and feeling information.

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# Color Image Enhancement with Brightness Preservation Using A Histogram Specification Approach

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## Abstract:

Improving image quality is a fundamental requirement before pictorial information can be used in several real-time and manufacturing applications. For precise duplicate of the scene data, degradations ensuing in the contrast of loss should be corrected when effective histogram equalization is often used. In addition, it is also necessary to maintain the brightness of corrected image to truly represent the landscape properties. In this task, a strategy is suggested to specify an appropriate histogram profile so that the values of the image intensity are adjusted in accordance with, and the output brightness is kept close to the input image. Precisely, the equalization shape is shaped by discovery of a harmonising control threshold by mixing rectangular and triangle sections. These trials are performed using a large number of images in natural colors and compared to other available image improvement methods based on histogram. The results show that the suggested strategy will be able to achieve a wide range of performance goals, including content information, with color quality.

**Keywords:** Image enhancement, Histogram, Brightness preservation.

## INTRODUCTION

Digital images are common means to carry the information from or of a scene to the user in terms of visual perceptions. Image processing techniques are therefore indispensable assets to restore degradations of the information conveyed to a viewer or a computer for further analysis. There is a wide range of scientific and engineering applications that require visual information. Examples include medical diagnosis of tomography scout images and uses in remote sensing of the earth for resource exploration [1,2]. Engineering applications of images are even more diversified. For example, imaging technology is used in ferrography to [9,10]. These localized enhancement approaches could be more complicated in their implementations when comparing to the class of global histogram equalization

monitor machine health conditions during operation [3]. Furthermore, image processing techniques can be employed in infrared imageries [4]. In addition, vision is used in the identification and tracking of objects [5,6]. The problem of image enhancement had been tackled with focus on the preservation or enhancement of object edges in the image [7]. A color saturation boost operation is first carried out and then rectified for edge preservation. Another method was proposed which employs a morphological filter to enhance edges for an increased sharpness on the resultant image [8]. The contrast enhancement problem was also approached adopting a block-based enhancement strategy [ methods. Image enhancement algorithms based on histogram equalization are often categorized as a statistical and global approach [11].

equalization attempts to re-map the intensity or other image color channels to a specified probability density. In most cases, in order to obtain the highest information content from the output image, the target density has to be uniform. It had been observed that a direct application of this scheme might introduce some undesirable artifacts; hence, alternative implementation procedures are being proposed and advanced [12].] In the context of histogram equalization implementation, there are various approaches that can be taken. For instance, empirically determined transformations can be applied [13,14]. On the other hand, it is generally a challenge to obtain the required optimal parameter settings. To this end, a non-parametric method was developed [15]. In that method, the coefficient of a modification power law was determined using the mean image intensity. The output image, while corrected to the mean intensity of the given image, may not provide an appealing perception to a human viewer. Another method was developed to enhance an input image and to maintain the same output average brightness [16]. Since that algorithm had targeted at a flattest mapping density, the complete brightness level was not fully used to convey scene information. Histogram equalization toward a uniform density, on the other hand, is able to make use of all available brightness level to represent the information captured in the image and the measured entropy would be maximized. However, it is also recognized that the uniform target density would change the average brightness to the middle of the permitted levels and when not agreeing with the mean intensity value of original image, undesirable artifacts would appear. Researchers then began to seek for techniques that preserve the original mean brightness [17]. In that original work, pixels were separated to a lower and a higher group according to their mean brightness values. The two sub-images were evaluation of commonly used color spaces for color images was conducted [21]. The work reported there suggested utilizing the green color space during histogram equalization where this channel is a close

then equalized to a uniform density. It was also pointed out that the mean value was preserved to a certain degree. However, a perfect maintenance of mean value is not feasible even for input images of symmetrical intensity density. Variations or improvement were attempted to minimize the discrepancy between the input and enhanced image mean brightness. The input image was first separated using the mean brightness and then peaks in the input image histogram were clipped using the median of each sub-image [18]. Although the mean brightness error could be reduced, there was no solid rationale for the choice of the median value as the clipping limit. A range limitation approach was later developed [19]. Instead of equalizing the image to cover the entire allowed brightness, narrower bounds on the brightness were derived such that the resultant brightness was driven closer to that of the original image. An alternative method had adopted the weighted sum approach to tackle the mean brightness preservation problem [12]. Lower and higher intensity pixel groups were formed on the basis of the mean brightness value. Unlike the other methods, equalized groups were aggregated with the complementary groups and then weighted to produce an enhanced image. However, due to the fact that weighting factors are not always feasible, the requirement for perfect minimization of mean brightness error was relaxed to cope with feasible weights. A variation on the histogram clipping principle was further suggested [20]. The clipping limit was set as the minimum value of the histogram, median and mean. In the work therein, a potential problem exists when the median value is very low and gives a low clipping magnitude, features of pixels with the corresponding sub-group may be destroyed. Based on the available methods, a comparative

approximation to the image brightness. In addition to separating the image into high and low brightness sub-images as aforementioned, contrast enhancement could also be accomplished by modifying and

target density profile in histogram equalization. For instance, the input histogram was smoothed using an intensity-based window width [22]. The strategy reported therein can be further extended to return an output image brightness which is adjusted to that of the input image. In this work, a new method is proposed to reduce the difficulties encountered in choosing a proper sub-image division threshold. First, the mean brightness of the input image is calculated. Then depending on its magnitude as compared to half of the maximum intensity, a target histogram that balances the histogram areas over the desired mean is specified. The input image is then equalized, guaranteeing a mean brightness close to the input image. Histogram equalization for brightness preservation While attempts had been made to restore image contrasts from Degraded sources, researchers had paid attention to drawbacks found on the histogram equalization method where the resultant mean brightness is deviated from the input image. This effect gives rise to loss of a true representation of the scene and often causes artifacts as observed by human viewers. A class of techniques to maintain the brightness was then developed. Their salient features are reviewed below.

## METHODOLOGY

### Conventional Histogram Equalization

Let an input image be given as  $I = \{I(u, v)\} \in [0, L - 1]$ , where  $(u, v)$  is the pixel coordinate and  $I(u, v) \in \mathbb{Z}$  is the pixel intensity or brightness ranging from 0 to  $L - 1$ . For an 8-bit digital image,  $L = 2^8 = 256$ . The image resolution is  $U \times V$  width-by-height and  $u = 1, \dots, U$ ,  $v = 1, \dots, V$ . A histogram is formed and then normalized to Give the probability density, from

$$I_{\min} = I_m - \Delta I$$

$$I_{\max} = I_m + \Delta I,$$

$$\Delta I = \min(I_m, 2 \times I_m - (L - 1)).$$

gathering the number of pixels  $n(i)$  that have intensity value  $i$ , that is [11]

$$h(i) = \frac{n(i)}{UV}.$$

A cumulative distribution function is formed from

$$c(i) = \sum_{j=0}^i h(j),$$

Where  $\sum_i c(i) = 1$ . The enhanced image contains pixels whose values are modified according to

$$I_{enh}(i) = (L - 1) \times c(i),$$

assuming that the desired minimum and maximum intensities are 0 and  $L - 1$ . The probability density would obey a uniform distribution and the mean intensity becomes  $(L - 1)/2$ . This differs from the original image and is generally considered undesirable.

### Truncated Histogram Equalization

If the enhancement objectives are to increase the image contrast and to maintain the resultant mean brightness, then it is possible to truncate the range of intensities used in the equalization process [23]. Let the mean brightness  $I_m$  be

$$I_m = \frac{1}{UV} \sum_{u,v} I(u, v), \quad I_m \in \mathbb{Z},$$

then a range  $I_{\min} \sim I_{\max}$  is determined from

Furthermore, the whole image is equalized within the range  $I_{\min} \sim I_{\max}$  using the transformation

$$I_{enh}(i) = I_{\min} + (I_{\max} - I_{\min}) \times c(i).$$

Because it is permitted that  $I_{min} > 0$  and  $I_{max} < L - 1$  the equalization range is said to be truncated. Furthermore, since all pixel intensities are confined in the symmetric range about  $I_{max}$ , brightness maintenance can be achieved. However, due to the limited range, the output image contrast may be below a desired level.

Other than specification approach solely focusing on improving image contrast using histogram equalization while maintaining the output mean brightness that is closer to the input image, a pipelined procedure is

developed to full fill these objectives. The motivation is three-fold. Firstly, an increase in image contrast is required. Secondly, the output mean brightness should be made close to the original value. Finally, over-enhancement has to be reduced and without reducing its colourfulness and saturation for color input images. The first two objectives can be accomplished by adopting the histogram specification strategy. The third objective is achieved by incorporating a dynamic range stretching operation in a pre-processing stage. A block diagram of the proposed histogram specification approach is shown in fig. 1

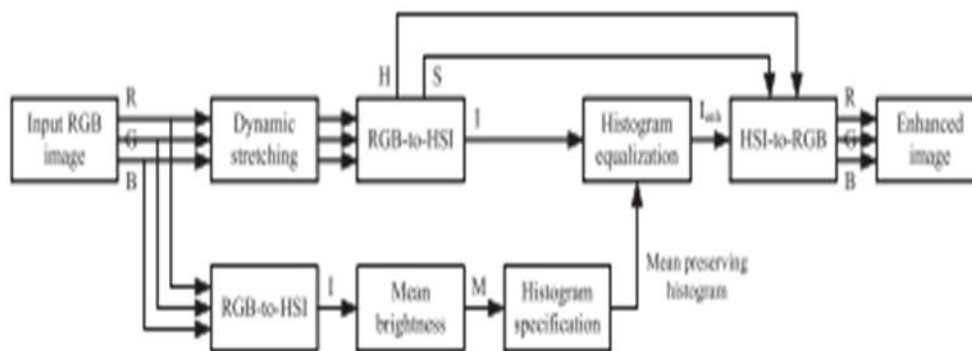


Fig. 1 Proposed block diagram for brightness preserving histogram equalization

approach

### Dynamic-range Stretching

Given a color image in the conventional red-green-blue (RGB) format, the color may not be in an ideal condition and degradation may be caused by illumination color casts. While stretching individual color channels, the color content is distributed across the allowable magnitude ranges. Thus, a dynamic range stretching in all color components provides a restoration of color degradations. We have the stretched color channels obtained from

The input image is applied to an RGB-to-HSI convertor. The output of the converter also contains three channels which are the hue (H), saturation (S) and intensity (I). They are more suitable to describe the perception perceived by a human viewer. In particular,

$$C(u, v) \leftarrow \frac{C(u, v) - C_{min}}{C_{max} - C_{min}},$$

Where  $C \in \{R, G, B\}$  denotes the color channels.  $C_{min}$  and  $C_{max}$  are the permitted minimum and maximum values. The result after dynamic range stretching ensures that most of the allowed color magnitudes are covered. However, it is noted that stretching changes the mean brightness from the original image.

### Histogram specification for mean brightness preservation

the I-channel is the brightness as regarded by the viewer. From the I-channel, the reference mean brightness is calculated as

$$M = I_m = \frac{1}{UV} \sum_{u,v} I(u, v).$$

This mean value is then applied to derive the specified profile in the form of a histogram used in the equalization process.

**Case A: target mean brightness greater than half-max Intensity**

Consider a given input image converted to the HSI format and the I-channel is extracted to obtain the mean brightness. In Fig. 2(a), for example, the mean brightness  $M$  is greater than half-max intensity  $(L - 1)/2$

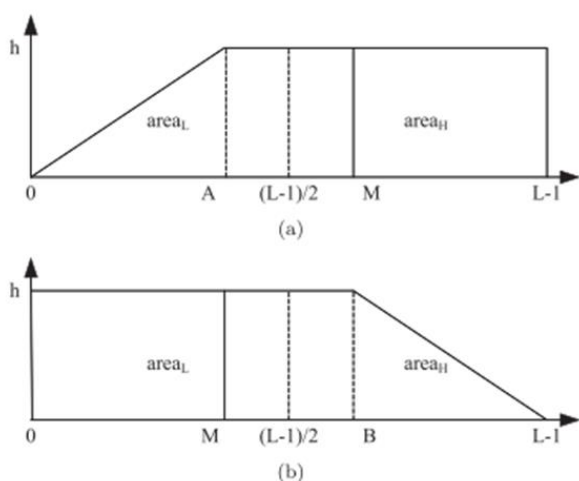


Fig. 2 Histogram profile specified according to mean brightness (a) mean brightness greater than half-max intensity (b) mean brightness less than half-max intensity

In order to increase the mean brightness of the lower intensity group pixels, an inclined profile starting from the control point  $A$  and reduces to zero intensity is suggested. By the principle of center moment, the lower and higher areas divided by the mean value should be balanced. The areas are

$$\begin{aligned} \text{area}_L &= hM - \frac{hA}{2} \\ \text{area}_H &= h(L - 1 - M). \end{aligned}$$

Then the balance condition requires

$$\text{area}_L = \text{area}_H \Rightarrow hM - \frac{hA}{2} = h(L - 1 - M).$$

After some calculation, we have a profile control point  $A$  given by

$$A = 2(2M - (L - 1)).$$

Consider, when  $A = 0$ , we have a complete uniform density. This situation corresponds to

$$M = \frac{L - 1}{2} |_{A=0}$$

Which is the lower bound of the case considered here. On the other hand, when  $A = L - 1$ , then

$$M = \frac{3(L - 1)}{4} |_{A=L-1}.$$

This occurs when the profile becomes a triangle. For input mean brightness greater than this value, the constructed profile is not able to drive the mean brightness to its required value. However, for image mean brightness above this limit, the image can be considered as over-exposed

**Case B: target mean brightness less than half-max intensity**

The situation of this case is depicted in Fig. 2(b). Now the areas of the low and high sub-image on the histogram are

$$area_L = hM$$

$$area_H = h(L - 1 - M) - \frac{h(L - 1 - B)}{2}.$$

The balanced condition requires

$$area_L = area_H \Rightarrow hM = h(L - 1 - M) - \frac{h(L - 1 - B)}{2}.$$

The control point B becomes

$$B = 4M - (L - 1).$$

When  $B = 0$ , we have a triangular profile and the resultant mean value is

$$M = \frac{L - 1}{4} |_{B=0}.$$

This corresponds to the bound where below which a match of input-output mean brightness cannot be established. However, for images whose mean intensity is so low may be regarded as not intelligible. When  $B = L - 1$ , then

$$M = \frac{L - 1}{2} |_{B=L-1}.$$

Which equals to the half maximum intensity range as expected

### Final Process

Depending on the characteristics of the input image, one of the above profiles is generated. The other source to the equalization stage is the I-channel converted from the range stretched RGB channels.

Let the profile generated be  $h_A(i)$  or  $h_B(i)$ , which confirms to the specification either case A or B. For case A,  $M > (L - 1)/2$

$$h_A(i) = \begin{cases} i, & 0 \leq i < A \\ A, & A \leq i < L \end{cases}.$$

The specified histogram further normalized giving

$$h_A(i) \leftarrow \frac{h_A(i)}{\sum_{i=0}^{L-1} h_A(i)}.$$

For case B,  $M < (L - 1)/2$  then

$$h_B(i) = \begin{cases} B, & 0 \leq i < B \\ L - 1 - B, & B \leq i < L \end{cases}.$$

After normalization, the histogram becomes

$$h_B(i) \leftarrow \frac{h_B(i)}{\sum_{i=0}^{L-1} h_B(i)}.$$

The specified histogram is employed in the equalization process for the I-channel. We have the enhanced image given by

$$I_{enh}(u, v) = (L - 1) \times c(i),$$

where

$$c(i) = \begin{cases} \sum_{j=0}^i h_A(j), & M > (L - 1)/2 \\ \sum_{j=0}^i h_B(j), & M < (L - 1)/2 \end{cases}$$

After the equalization, the output is combined with the hue (H) and saturation display, (S) signals and re-converted back to the RGB format for storage or transmission [11].

## RESULTS

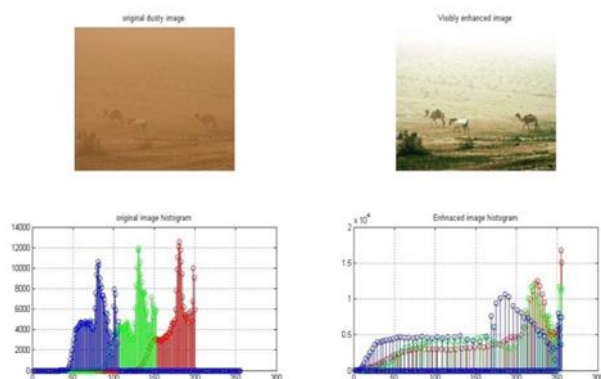


Figure 3 : enhanced image

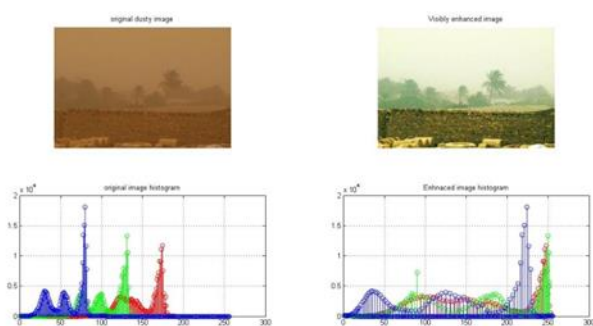


Figure 4 : enhanced image

## CONCLUSION

An approach had been presented in this paper that directly specifies a profile for histogram equalization-based image contrast enhancement. The proposed method makes use of a linear adjustment of the target histogram taking into account to minimize the difference between the mean brightness between the input and enhanced image. This method removes the need to separate the image into sub-groups and simplifies the equalization process to a single run. Furthermore, a rationalized choice of threshold was formulated where a balancing condition was met. Thus, fulfilling the requirement for minimum input-output brightness error. The process was integrated into a pipelined framework that catered for mitigating

colourfulness and saturation reductions. Experiments on a large data set of natural images reveals that although there is no single technique that can perform best in all performance criteria, results had shown that the technique developed in this work is able to provide color image enhancement that is both qualitatively and quantitatively satisfactory.

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Title: **MULTI ROBOT COMMUNICATION AND TARGET TRACKING SYSTEM WITH CONTROLLER DESIGN AND IMPLEMENTATION OF SWARM ROBOT USING ARDUINO**

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## MULTI ROBOT COMMUNICATION AND TARGET TRACKING SYSTEM WITH CONTROLLER DESIGN AND IMPLEMENTATION OF SWARM ROBOT USING ARDUINO

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### ABSTRACT:

SWARM robotics or multi robot systems is a novel approach to the coordination of large numbers of relatively simple robots which takes its inspiration from social insects - ants, termites, wasps and bees etc. Robot mapping or trajectory plotting is the process of building an environment representation using mobile robot. In this paper we present a design and implementation of mapping robot using Digital Magnetic Compass, Ultrasonic Sensor and Arduino UNO which is having Atmel's ATmega328 microcontroller. We presents mapping of mobile robot in the indoor environment. The designed robot uses a metric, world centric approach for mapping algorithm. Robot follows the wall while continuously sending its co-ordinates to the base station. Target Tracking or Move to Goal algorithm is implemented on robot which allows one robot to reach target directed by other robot. Communication between robots is achieved using low cost CC2500 wireless transceiver module which is designed for very low-power wireless applications.

**Keywords:** Multi level inverter, 5level inverter, MATLAB, RES network.

### 1. INTRODUCTION

SWARM robotics is a concept to provide a robust robotics System using large numbers of identical robots inspired from social behaviour of animals or insects. Collective behaviour of robots comes from the interactions between individual robots and interactions of robots with the environment. With this approach it is easily possible to complete the tasks that are difficult to do with single robot. Research is going on in the area of sensor technology, motor technology, power supply technology, telecommunications technology, control

technology and artificial intelligence technology for robotics. In SWARM robotics, cooperative task solving capability refers to self-organization and emergence. Self-organization refers to the SWARM's organization which comes from system itself and emergence means that the organization need to have local interaction between individual robots comes about decentralized way . For controlling motions of individual robot different coordination approaches have been reported such as task allocation , self-configuration , pattern generation . Instead of investigation of a single robot system,



researchers are working for exploration of coordination of multirobot/SWARM systems as there are several advantages and application of multi-robot systems. These are; efficiency adaptability, fault-tolerance, scalability, and so on. Application areas of multi robot system are environmental monitoring, surveillance, distributed sensing task, oil cleaning, underwater localization and many more. Role of sensing system is to detect the presence of objects and measure their positions. The objects can be neighbouring robots, obstacles and target. Technical challenge is to develop and deploy real mobile robots at a reasonable cost. If data obtained from location sensing system is based on fixed global reference then it is absolute sensing and if it is based on local coordinates of a robot then it is relative sensing. Global positioning system (GPS) with central monitoring system is an example of absolute location sensing. Examples of relative location sensing include proximity sensors, cameras and received signal strength indicator (RSSI). A SWARMBOT is comprised of autonomous mobile robots called S-Bots. It discuss the self-assembling capabilities of the SWARM-BOT, this concept lies at the intersection between collective and self-reconfigurable robotics. For interaction of the multiple robots, communication between robots is important to carry out specific task where one robot delivers orders or updates to other robots. With advance in wireless communication technology it is possible to interface one device to other device. Advantage of communication between the

robots is completing the task in efficient way. Wireless Local Area Network (WLAN) which is based on IEEE 802.11 standards and WPAN uses some technologies such as Infrared, Wireless USB, Bluetooth, and ZigBee for communication between sensors and electronic devices. Inductive Communication is one of the methods of communication for Millimeter-sized Wireless Robots. In this paper we present the design and implementation of S-Bot robot for SWARM application using Arduino microcontroller. In first algorithm, Multi Robot Communication is implemented to achieve Leader-Follower approach of SWARM navigation in which one robot follows other robot. Concept of co-operative navigation using master-slave SWARM robot is introduced. To achieve Target Tracking system, another algorithm is implemented on the S-Bot robot which allows one robot to track a location directed by other robot.

## OVER VIEW:

Robotics is a branch of engineering that deals with the design, construction, operation and application of robots, as well as computer systems for their control, feedback from sensors, and information processing. Mobile robots are used increasingly in safety critical applications namely production industries, defence and the military. Due to the time critical nature of such domains, automating the communication and coordination between these mobile robots are important. In

applications, such as military operations, where the human operators themselves are under stress. In such situations, robots must be highly flexible and autonomous so that they can carry out complex tasks with minimal command effort from humans. Multi-Robot Systems can be generally characterized as a set of robots operating in the same environment. Multi Robot communication has a great significance. Multi Robot Systems can be generally characterized as a set of robots operating in the same environment. Multi-robot systems (MRSs) have a variety of applications, such as search and rescue in disaster hit areas, where many robots coordinate with each other to complete a task. Robotics industrial automation is changing the pace of production. Manufacturers of different companies are implementing some form of automation to become more efficient, safe and ultimately to increase revenues. It has many advantages including quality control, repeatability and faster cycle times. Implementation of master-slave framework in the robotic automation helps in increased efficiency and rise in production in case of robotics automation in production industries. So in our work we are focusing on developing autonomous mobile robots which are able to communicate and coordinate among themselves in the master-slave fashion.

## **2. LITERATURE SURVEY**

Xiao-Lin Long [1] discussed some of the wireless communication schemes and their applications that can be used in multirobot

communication such as Implicit & explicit communication, Global & local communication and Synchronous & Asynchronous communication. Noa Agmon [2], evaluated the effect of different coordination schemes on the performance of the robotic team some of them are Uncoordinated, Tightly Coordinated and Loosely coordinated mechanisms and stated that Uncoordinated and Tightly Coordinated have better impact than loosely coordinated [3]. Avinash Gautam [4], proposed a system where a collection of two or more autonomous mobile robots working together are termed as teams or societies of mobile robots. In multi robot systems simple robots are allowed to coordinate with each other to achieve some pre-defined goals. Cooperation between two or more autonomous mobile robots is achieved using Implicit communication method and TCP protocol. A. Anand [5], described how a single robot is chosen as a central coordinator controls the movement of the rest of the robots. Master bot decides on the path to be taken and also directs the slave bots with the coordinates of the location to be reached. They have used ZigBee communication protocol is used for interaction among the robots. Punit Mittal [6], this paper resolves interference in accordance with the assigned priority to robots in a multirobot task allocation system (MRTA) [7]. New NFS algorithm for robot and Interference resolving strategy for a robot was used. Rajesh Doriya, Siddharth Mishra, Swati Gupta [8], described the Robot navigation is achieved by Particle

Swarm Optimization (PSO) that is used to coordinate the movement and control the communication of multiple robots. DhirajArunPatil [9], proposed an approach of leaderfollower where Multi Robot Communication is implemented and approach of SWARM navigation where leader robot guides the slave robots. Target Tracking or Move to Goal algorithm is implemented on robots which helps one robot to reach target directed by other robot. Communication between robots is achieved using low cost Nrf24L01 wireless transceiver module which is designed for very low-power wireless applications. LiHan Chang [10], proposed a system where Conclusions are drawn that a multi-robot system can explore more quickly than a singlerobot system.

### 3. RELATED STUDY

Role of sensing system is to detect the presence of objects and measure their positions. The objects can be neighbouring robots, obstacles and target. Technical challenge is to develop and deploy real mobile robots at a reasonable cost [1],[6]. If data obtained from location sensing system is based on fixed global reference then it is absolute sensing and if it is based on local coordinates of a robot then it is relative sensing. Global positioning system (GPS) with central monitoring system is an example of absolute location sensing [7]. Examples of relative location sensing include proximity sensors [8], cameras [9] and received signal strength indicator (RSSI) [10]. A SWARMBOT is comprised of

autonomous mobile robots called S-Bots. Authors in [4] discuss the self-assembling capabilities of the SWARM-BOT, this concept lies at the intersection between collective and self-reconfigurable robotics. For interaction of the multiple robots, communication between robots is important to carry out specific task where one robot delivers orders or updates to other robots . With advance in wireless communication technology it is possible to interface one device to other device. Advantage of communication between the robots is completing the task in efficient way [3]. Wireless Local Area Network (WLAN) which is based on IEEE 802.11 standards and WPAN uses some technologies such as Infrared, Wireless USB, Bluetooth, and ZigBee for communication between sensors and electronic devices [4]. Inductive Communication is one of the methods of communication for Millimeter-sized Wireless Robots [5]. In this paper we present the design and implementation of S-Bot robot for SWARM application using Arduino microcontroller. In first algorithm, Multi Robot Communication is implemented to achieve Leader-Follower approach of SWARM navigation in which one robot follows other robot. Concept of co-operative navigation using master-slave SWARM robot is introduced. To achieve Target Tracking system, another algorithm is implemented on the S-Bot robot which allows one robot to track a location directed by other robot. Sender robot gives target coordinates along with final angle position to receiver robot. After successfully

calculating path trajectory receiver robot reaches to its goal configuration.

## 4. PROPOSED SYSTEM

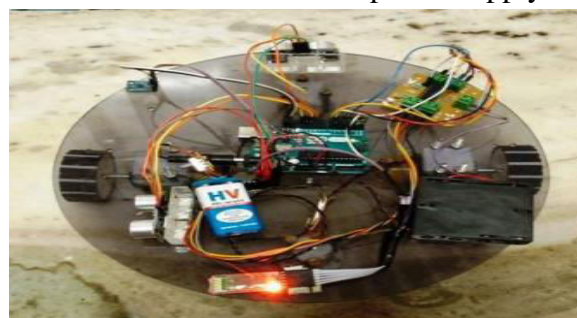
After successfully calculating path trajectory receiver robot reaches to its goal configuration. In this section, the methodology procedures divided into two parts. The first part is a hardware implementation of the used parts, while the second is the software design details. Our proposed system is designed and developed to perform tasks in the master and slave fashions shown in figure where one robot will be guiding the other robot. Intruder monitoring is also achieved using ultrasonic sensor.

**Hardware Model:** In our paper both the robots operate with the help of the battery. Both consist of 12v battery which supplies power to different components of the system. Both robots consist of motors which are driven by L293D motor driver which in turn drives the wheels of the robot. Initially when the master robot starts moving, the slave robot starts following the master bot. With the help of the ultrasonic sensor present in the master robot, master robot gets to know if there are any obstacles on its way. If the obstacle was found it sends a notification to the slave robot which directs the slave robot to change its direction of motion. Notification sending is achieved with the help of the transceiver model NRF24101.

**Software Model:** We have used Arduino application to carry out programming part of the project. Once the code is compiled and

executed both the robots starts moving. Whenever the obstacle is found a notification is sent to slave robot in a wireless fashion. All these process happens automatically when a program is introduced into hardware and after execution. In our work we have the design of two robots both having different controllers. The master robot consists of Arduino NANO which is a 22 pin controller out of which 14 are digital input/output pins and 8 are analog pins. It's powered on 5V regulator which is connected to a 12V lead acid battery. The digital pins are used to drive the L298 motor driver for controlling robots directions. The motor is supplied with 12V lead acid battery.

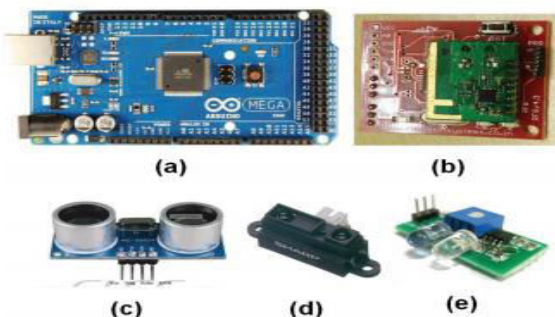
The hardware assembly and specifications of S-Bot robot is explained in this section. Fig 1 shows the S-Bot robot and its different modules. Fig shows basic architecture block diagram of the S-Bot robot. The robot uses Arduino MEGA2560 board as central processor and other input and output devices along with communication module and power supply.



**Fig.4.1. S-Bot Mobile Robot**

HMC5883L is 3-Axis Digital Compass IC. The I2C serial bus allows for easy interface. It enables 1 to 2 Degree Compass Heading Accuracy. Working range of Ultrasonic ranging module HC - SR04 is 2cm to 400cm

with accuracy of 3mm. Output voltage from sensor is corresponding to the detection distance from sensor to an object. Robot has two DC geared motors for motion control. Two caster wheels are attached to front and back end of robot for support. Driving system of robot allows it to move forward, backward and rotate clockwise or anticlockwise. Communication between robot and PC is achieved using Bluetooth. HC05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. This robot has 12 Volts battery for powering of driving system and 9 Volts battery for Arduino. Base station or has PC with bluetooth link connected with mobile robot. PC has NI's LabVIEW software with NI's VISA driver to communicate with PC's COM port. Live coordinates send by mobile robot receives by PC and map is plotted on LabVIEW's graph Fig shows mechanical layout assembly of designed robot.



**Fig.4.2. Hardware contains of S-Bot (a) Arduino Microcontroller MEGA2560 (b) CC2500 Communication Module (c) Ultrasonic Distance sensor - HC-SR04 (d) Sharp Distance sensor 2Y0A21 (e) IR Proximity sensor.**

Task of leader robot is to continuously broadcast a character serially related to its motion. We have used four motions Forward, Backward, rotate right (clockwise) and rotate left (anticlockwise). Special character value has been assigned to each motion. This value is used to send serially for particular motion continuously with standard baud rate. While a receiver robot continuously receives a character value and depending on its value motions are performed. For successful communication baud rate at leader robot and all the follower robots should be same. Also channel used for all CC2500 maintained same.

## 5. CONCLUSION

Secured communication between robots is achieved. Effective Coordination between heterogeneous bots is considered. Obstacle detection and avoidance is achieved which makes this system suitable for real-time applications. Autonomous mobile robots are built which eliminates the need of external control. Leader-Follower approach algorithm for Multi Robot Communication and Move to Goal or Target Tracking algorithm were successfully implemented on S-Bot. Multi Robot Communication is observed from Leader-Follower experiment. In Move to Goal approach one robot guides other robot to reach particular location and angle. Both experiments show expected results. Future work would include use of other sensors (ultrasonic, sharp distance, IR proximity) which are implemented on S-Bot robot. Those sensors would be useful to avoid collision between multiple robots.



Further algorithm would include Simultaneous localization and mapping (SLAM) and pattern formation.

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Title: **SMART SHOPPING CART WITH AUTOMATIC BILLING SYSTEM THROUGH RFID AND ZIGBEE**

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Paper Authors

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## SMART SHOPPING CART WITH AUTOMATIC BILLING SYSTEM THROUGH RFID AND ZIGBEE

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### ABSTRACT:

Now-a-days shopping is increasing rapidly. People take the items and put it into trolley. After shopping they go at the billing counter for billing but there are many people standing in queue for billing purpose. So more time is required for the individuals for billing because of existing barcode technology. To reduce this time we have implemented a system which is based on RFID technology. The system contains the items attached with RFID tags. The cart is interacting with the main server and it will have the facility to generate the bill for all the products added into the cart. The proposed system will be helpful for avoiding queues in shopping malls for billing. The customer can identify the location of product in shopping malls with automatic billing. With the proposed design there is no conventional queue system instead of that automatic billing is generated and hence the shopping becomes easy and enjoyable.

**Keywords:** *RFID, tags, Zigbee, transmitter, receiver section.*

### 1. INTRODUCTION

In recent years a deep structural change has occurred, with consequences on economic growth and society, especially in factors such as territorial occupation, urbanization, openness to global markets, demography, family structures and cultural and consuming patterns. Innovation in communication and information technologies have caused a revolution in values, knowledge and perceptions in practically all areas of human understanding, deeply carving the so-called "Age of Information and Knowledge". The grocery industry sector in nowadays extremely

important in worldwide economy, with its recent evolution in technological, political, social and economic terms making it one of the most convenient and diverse businesses across the globe. In their journal "Consumer perception of privacy, security and trust in ubiquitous commerce" mentioned that the proliferation of electronic commerce technologies has utterly transformed the way business is conducted, causes range from the new mobile technologies and ubiquitous computing, to the recognition by business of the strategic benefits offered by the implementation of communication and



ubiquitous computing structures, to the emergence of new business models made possible due to the new technologies and to the development of new economies that can be used to understand and value the ubiquitous commerce activity. The challenges and opportunities created by electronic business in the supply chain have cause the sharing of information between business patterns to impure operational performance, consumer service and solution development. Businesses have evolved from the sharing and co-ordination of information to the sharing of knowledge and advanced co-operation practices. The emergence of new technologies such as radio frequency identification device (RFID) and wireless network makes the traditional retail processes faster, transparent and efficient. The technology represent to retails and opportunity to reduce costs and to impure services, allowing attaining clients quickly, precisely and supplying personalized services. The advances manufacturing, distribution and information combined with the urbanization of modern society and social demographical challenges created the so-called new consumer. The consumer has a deeper understanding in comparing product costs ; is more versatile in brand preferences ;shows little loyalty to retailers has great expectations in services and client regard; is self sufficient and is more demanding towards supplied information. There was clear control transference from the manufacturers and retailers to the consumer. Strong competition between larger retail changes caused the

minimization of profit margins as a form of keeping aggressive prices and winning more clients. Today, this is no longer enough. One has to bet on offer differentiation and in the adoption of client retention strategies through the strengthening of the relation with the consumer, allowing adequate answers to the clients' needs through personalize service and promotion plans that augment their satisfaction and, most importantly, their enthusiasm. RFID tag, or simply "tags", is small transponders that respond to queries from a reader by wirelessly transmitting a serial number or similar identifier. They are heavily used to track items in production environments and to label items in supermarkets. They are usually thought of as an advanced barcode. However, their possible area of use is much larger. This paper presents a few new applications that are possible using RFID technology such as locating lost items, tracking moving objects, and others. RFID tags are expected to proliferate into the billions over the next few years and yet, they are simply treated the same way as barcodes without considering the impact that this advanced technology has on privacy. This paper presents possible exploits of RFID systems and some proposed solutions as well. RFID is the special type wireless card which has inbuilt the embedded chip along with loop antenna. The inbuilt embedded chip represents the 12 digit card no.

## 2. LITERATURE SURVEY

A. Development of Smart Shopping Carts with Customer-Oriented Service The system

specified here is assisted by the functionality of tablet or embedded computer .The functionality of this system is partially implemented in C language and LabVIEW, in order to provide a smart user interface and also to establish connection between embedded computer and other accessories .The user interface here provides with the map information, product searching and also automated billing .To make the flexible designing of user interface easy the buffered state machine based on a queued message handler (QMH) is adopted .The algorithm used here for the purpose of facial recognition is LBPH( local binary patterns histograms) which mostly used to extract the features of human face. The obtained characteristics data is then transformed into LBP data array, which is obtained from trained images .The face recognition here is basically used for the purpose of login, which would be stored in the database during the customer registration .The automated billing system is also provided here , and also the assistive information to the customers are provided.[1]

**B. Smart Trolley: A Fast and Smart Shopping Experience Using Android and Cloud** In this paper, the system database is created on the cloud which holds all the information about all the products. When the product is purchased, since it contains RFID tag and the trolley contains RFID reader which is connected to the android display through Bluetooth, its information gets stored in the database of the particular trolley for which trolley id is assigned by the server. Bill payment can be done through an

android application or desktop application. Products purchased are cross-checked at the exit gate and RFID tags of the products get removed there.[2]

**C. RFID based smart shopping: an overview** In this paper ,RFID based smart shopping and billing concept is used .The system integrates Cart location detection unit(CLDU) which is used to detect the location of the shopping cart inside the mall or supermarket ,Server communication unit(SCU) which will help in establishing and maintaining the connection of shopping cart with the central or the main server, User interface and display unit(UIDU) which will provide the customers with the user interface, and billing and inventory management unit(BIMU) which will handle and deal with all the shopping bill and inventory management. Shopping area is divided into multiple aisles. Also the IR transmitters are used at both ends of the aisle, to obtain information regarding the entry and exit of the shopping cart in the shopping malls. Including the location of the shopping cart as an attribute ,database is maintained at the central server.[3]

### 3. RELATED STUDY

Frequently people encounter a problem of spending too much of their time waiting in queues for billings their purchases in different shopping centers, malls and supermarkets. Waiting in-queues negatively affects human morale and may cause misunderstandings or conflict amongst people for instants, when someone breaks the line and stands in front of other people [2].

The proposed system aims to eliminate this problem by introducing a novel alternative to traditional billing methods, speeding up the payment process. The Arduino UNO is a microcontroller board. It has an Atmega328 M.C. It contains 14 digital input and output pins. So our aim is to design an automatic billing system which is based on RFID (Radio Frequency Identification) technology. The smart card uses a serial interface and receives its power from sources like a card reader. A smart card is like a chip card. It is a plastic card that contains an embedded computer chip—either a memory or microcontroller type that stores and transacts data. This data is usually associated with either value, processed within the card's chip. The card data is transacted via a reader that is part of the computing system. Smart shopping systems usually require other auxiliary wireless communication systems, but the proposed system we are using is called as ZIGBEE wireless communication (especially low-cost) to perform indoor positioning and product information broadcasting. Thus, the dual-antenna RFID reader is adopted in the developed SSC to identify the items in the cart (internal antenna) and out of the cart (external antenna). A customer when purchases an item after swiping the card, the price and number of items are read by the RFID reader and the number of items purchased are already entered into the cart before reaching up to the counter. There will be elimination of queue. After the card is swiped, the number of items are read by the RFID Reader and they are entered into the cart

before one reaches to the counter, queues would be eliminated. Another important technology used in a Smart Cart system is called ZIGBEE wireless communication, which is one measure to reduce the waiting time of a customer's is to introduce an intelligent billing system using electronic Smart Cart as an alternative to existing barcode systems. Smart cart allows a customer to manually perform billing without relying on a cashier by means of swiping the RFID tags over an RFID reader. Unlike a barcode system, smart cart does not need any visual contact with barcodes which may get distorted in real life situations. All data about purchased products and user account data are stored in a cloud database on the Internet. Then, smart cart shows this information to customers on its display. A customer can delete an item from the list whenever he or she wishes by selecting a subtraction button. If the customer decides to finish purchasing, there's a total button press is required to upload all purchased product data and their total cost to the billing counter PC through ZIGBEE. Once all payment data is sent to the PC, total cost is withdrawn from the registered account cash of the customer and the customer can freely pass the anti-theft gate with the purchased products.

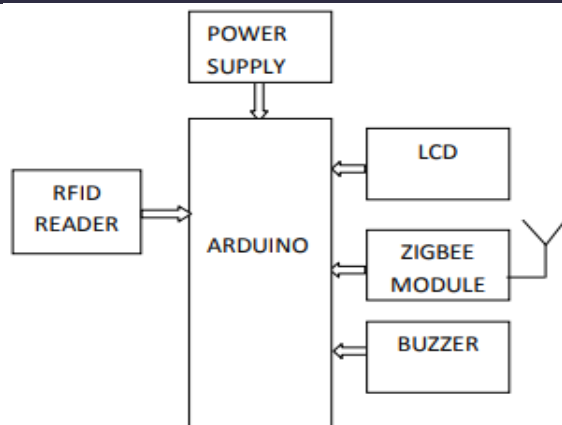
#### 4. PROPOSED SYSTEM

The technology currently used in checkouts at a supermarket is barcodes, which were developed in the 1970s. Today barcodes are found on almost every item. Barcodes are a universal technology in that they are the

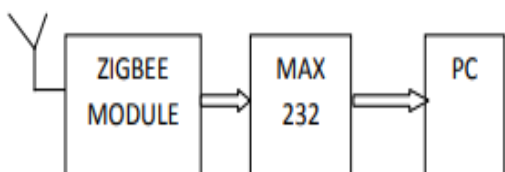


norm for retail products; stores that own a barcode reader can process barcodes and imprint it on the products. The most important factor that is involved in barcode scanning is that the product should be in the Line of Sight (LOS) of the reader in order to get the barcode imprinted on the product scanned. Thus Shopping in the present day usually involves waiting online to get your items scanned for checkout. During a shopping excursion to a shopping mall, you would have noticed the cashier scanning your products using some Laser device to produce a bill. What actually he is doing that he is reading the product barcodes using a Laser/Barcode scanner. Barcode scanner reads the code, data is sent to the computer, and computer looks up into the database for the price and description of the item[4]. Barcodes are structured to contain specific product related information. It basically encodes alphanumeric characters and symbols using black and white stripes, also called bars. Bar-coding is one of the AIDC (Automatic Identification and Data Collection) technologies. Some major drawbacks of existing systems are barcode scanners need a direct line of sight to the barcode to be able to read, and in order to read barcodes the scanner needs to be quite closer, Barcodes have no read or write capabilities; they do not contain any information such as expiry date etc. They are very labour intensive, Barcode have less security than RFID, and Barcodes are more easily prone to damages, Waiting in a line to get your items scanned from barcodes in supermarket for checkout is the major

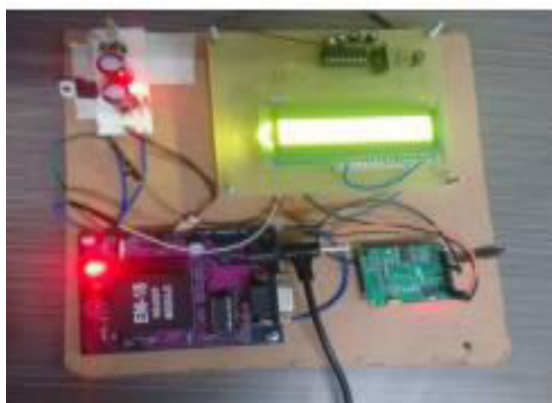
drawback. The range of the RIFD reader must not extend beyond the horizontal shopping cart limits so that reading products inside other shopping carts or on shelves does not happen. Nevertheless, range cannot be less than the cart's limits with consequence of not identifying products that are inside the shopping cart but out of the reader's range. The RFID reader should be able to read all the tags no matter the material (paper, plastic, metal, etc)they are inserted into. The usage of RFIDs in this solution comprehend benefits such as increasing safety and the consequent reduction in product loss, reduced human intervention and error, increased speed in involved processes, unique identification of products with additional information and availability of real-time information, amongst others. By using RFID technology there are many advantages like RFID tags can be read from a greater distance than barcodes, RFID tags don't need to be positioned in line of sight with the scanner, RFID tags can be read at faster rate than barcodes, RFID tags are read/write devices, RFID contains high level of security, RFID tags are more reusable, RFID tags carry large data capabilities such as product maintained, shipping history and expiry date etc, and by using this technology bills can be paid very easily and quickly And it also removes the waiting in a line to get the item scanned for checkout.



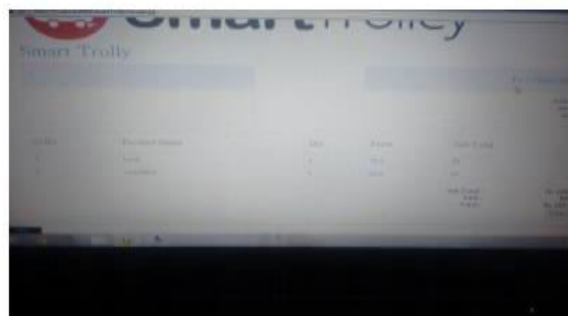
**Fig.4.1. Block diagram of Transmitter.**



**Fig.4.2. Block diagram of receiver.**



**Fig.4.3. Hardware kit image.**



**Fig.4.4. shows the reward points on Android Application.**

## 5. CONCLUSION

Thus the proposed system created bill of the purchased items. This process saved the time of customer and also reduced the manpower in the malls. So ultimately it becomes a easiest way of the shopping. Also with this system we have implemented the reward point system using Android application. The objective behind the application is to replace the existing card based system by android application. So the intended objective is successfully achieved in given system.

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Title: **MONITORING THE OPERATION OF TRANSMISSION LINE IN A SMART GRID SYSTEM THROUGH IOT**

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Paper Authors

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## MONITORING THE OPERATION OF TRANSMISSION LINE IN A SMART GRID SYSTEM THROUGH IOT

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### ABSTRACT:

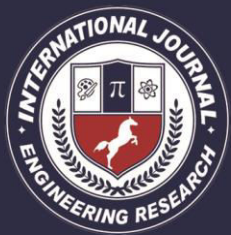
One of the main implementation of wireless sensor network is monitoring equipment. Wireless sensor network (WSN) are able for cost efficient monitoring over enormous geo location. Construction of smart grid is based on the internet of thing(IOT) are made. Smart grid is attractive, and it is a new type of intelligent power system realized with the existing transmission and distribution power infrastructure. To pass the electricity to the consumers, we require a high voltage transmission. High voltage transmission line is responsible for transmission of electric power. Electricity is very essential to understand and monitor the behaviour of the system. In this paper, we present a survey of electric transmission line monitoring system, highlight the key concept, and state of art implementation as well as investigate challenges. The goal of this paper is to provide a better understanding of the design challenges of electric distribution line monitoring system and identify important research in this increasing important field.

**Keywords:** *High voltage, short circuit, model, efficiency.*

### 1. INTRODUCTION

It is known that when a fault occurs in overhead transmission line system then instantaneous changes in voltage and current at the point of fault generate high frequency. Electromagnetic impulses called travelling wave which propagate along the transmission line in both directions away from the fault point. The electric power infrastructure is highly end angered against many form of natural and spiffy physical events. Which can sceptically affect the overall performance and stability of the grid.

The fault impedance being low. The fault current is relatively high, during the fault. The power flow is diverted towards the fault and supply to the neighbouring zone is affected Voltage become unbalanced. It is important to detect the fault as early as possible that is why a kit is being made using microcontroller to make its process faster. The transmission line conductor resistance and inductance distributed uniformly along the length of the line. Travelling wave fault location methods are usually more suitable for application long lines. Power transmission lines employ at



50- HZ are more than 80-km long are considered to have the properties of voltage and current wave that travel on the line have the properties of voltage and current wave that travel on the line with finite speed of propagation. Traveling wave methods for transmission line fault location have been reported since a long time. Following developments employ high speed digital recording technology by using the traveling wave transients created by the fault. Currently, the electric power infrastructure is more vulnerable against many forms of natural and malicious physical events [1], which is directly affect the stability of grid. There will be some parameter which is affected. With this, there is an approaching need to equip the age old transmission line infrastructure with a high performance data communication network, that supports future operational requirements like real in the time record and control necessary for smart grid integration [2], [3]. Due to this technique the real time monitoring is necessary. Many electric power transmission companies have primarily depended on circuit indicators to detect the faulty sections of their transmission lines. However, there are still challenges in identifying the exact location of these faults. Although fault indicator technology has provided a flexible means to locate permanent faults, the technical crew and patrol teams still has to physically patrol and inspect the devices for large duration to detect faulty sections of their transmission lines. Wireless sensor based monitoring of transmission lines provides a solution for several of these disquiet like real time

structural awareness, faster fault localization, accurate fault diagnosis by identification and difference of electrical faults from the mechanical faults, cost reduction due to condition based maintenance rather than periodic maintenance, etc. These implementations identify stringent requirements such as fast delivery of enormous amount of highly reliable data. The success of these appeal depends on the design of cost effective and reliable network architecture with a fast response time. The network must be able to transport confidential information such as current state of the transmission line and control information to and from the transmission grid. This research provides an economical substructure to design a real time data transmission network. To observe the status of the power system in real time, sensors are put in various components in the power network. These sensors are able to taking fine grained measurements of a variety of physical or electrical parameters and generate a lot of information. Sending this information to the control centre in a cost efficient and appropriate time is a critical challenge to be addressed in order to build an intelligent smart grid.

## 2. LITERATURE SURVEY

These sources of power contain fossil fuels such as coal and natural gas, hydro, nuclear, solar, and wind power. Furthermore, the transmission system is made up of transmission lines that are in control of passing power from the power station where the power is transferred to the location of the

consumers. The distribution system is the network that supplies power to the load that can be consumed by the user's apparatus [1-2]. IoT is the network of physical substances that include entrenched technology to connect and sense or work together with their interior circumstances or the outer environment. The Internet of Things was "Born" in 2008-2009. By the year 2013, the IoT had progressed into a system by many technologies, going from the internet to wireless communication and from Micro-Electromechanical Systems (MEMS) to established systems. The IoT is supported by traditional fields, and wireless sensor networks, GPS, control systems, and others. The architecture layers of IoT are: the object layer, made of sensors and smart devices, the communication layer deals with latency, error probability, scalability, bandwidth, and security, and the application layer that is grouped based on the type of network, coverage, size, heterogeneity, business model, and real-time or non-real-time requirement. By 2020, the internet will be connected with about 30-50 billion appliances. Thus, the IoT retained the third revolution in the digital technology after the computer and Internet [3]. IoT gets important benefits to the smart grid between other systems. Disaster prediction and prevention of power-lines outages are the most challenging problems for electricity transmission for lots of reasons. For example, analogue collection of the data being generated at remote areas is difficult, but, when using IoT for data acquisition, it becomes just a data gathering and system

monitoring and controlling, which is easier. Progressive sensing and communication technologies of the Internet of Things can efficiently avoid or minimize the damage of natural disasters confronted by the power-lines, and hence develop the reliability and stability of power transmission [4].

### 3. RELATED STUDY

For our current society electricity is important, and in order to properly maintain and develop power distribution system, it is needed to understand and monitor the system behaviour [1]. The system behaviour i.e. Power grid constitute the electricity generation system, electric power transmission system, and electric distribution system[2]. Transmission line monitoring is very significant issue to ensure useful and reliable transmission of electricity. For transmission of electric power high voltage transmission line are responsible. Their sag and electric current are important parameter for transmission line monitoring[3]. internet of thing (IOT) used in smart grid is the predictable result of the growth of information communication technology to a certain stage. It will be capable of effective integrate of the infrastructure resources in communications and electrical power system, make the information and communication services manage for electrical power system , increase the level of power system information, and to get better the utilization efficiency of infrastructure in the existing power system. Because IOT technology has been used in smart grid, the important

technical support for the generation, transmission, substation, distribution, electricity and other aspects of power grid can be efficiently provided[4]. Smart grid is totally enclosed with an electrical system. For the developing countries, smart grid technology has great importance. Smart grid involve the complete electrical network and regional electrical network and a sub network like local utility transmission grid and distribution grid. Electricity in a remote location is carried by a simple distribution grid linking a central generator to homes. In India during the process of electricity transmission and electricity distribution losses are occurred at very large amount and change between 30 to 45%. Low metering efficiency, theft and pilferage this are the main reason for electricity losses in India [5].for electricity and security of smart grid, intelligent power line monitoring is important part. For that large number of sensors are required to find out the power system fault in a distributed network.. By including the number of sensor nodes, position of accuracy can be easily found. WSN are generally used to detect and locate the fault [6]. Our goal and contribute in this work is to provide an efficient electrical distribution line.

#### 4. PROPOSED SYSTEM

The architecture of IoT is expressed by three layers i) perception layer, ii) network layer, and iii) application layer, as shown in Figure. The perception layer contains two dimensions, and is usually split into two sub-layers: perception communication

extension and control sub-layers. The functions of the perception layer depend on sub-layers. First, the perception control is realizing smart perception of physical world together with recognition, data acquisition, processing, and automatic control with the second sub-layer which is communication extension sub-layer that is connected to the physical entities with the network layer and the application layer by the communication module. The network layer consists of all types of communication and the core network. When the information transmission, routing, and control are often implemented in the fundamental network, the communication network is looked at as the access network. The application layer provides many smart applications for certain industry. Hence, IoT technologies can be combined with all forms of the industrial undertaking. The application layer contains application infrastructure/middleware and terminal units. Through the application layer, the development of economy and society would be influenced greatly when the deep integration of IoT technology with industry is achieved.

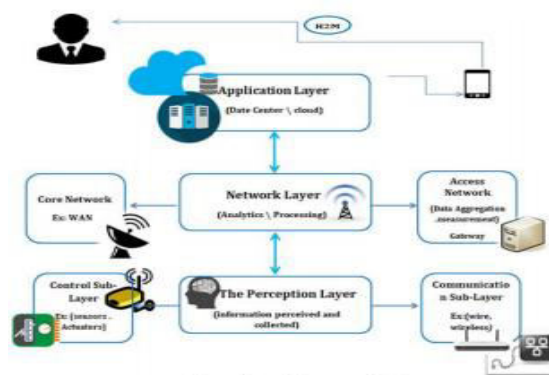


Fig..4.1. Proposed IOT network.

Arduino Uno is the latest revision of the basic Arduino USB board. It is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins: 6 can be used as Pulse Width Modulation- outputs, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP (in-circuit serial programming) header and a reset button as shown in Figure 5. It covers everything required to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. It can be extended with a variety of shields: custom daughter-boards with specific features. It is similar to the Duemilanove (Another type of Arduino), but has a diverse USB-to-serial wafer the ATmega8U2, and anew designed labeling to make inputs and outputs easier to identify. The Uno varies from all other Arduino boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. In the project, we chose the Uno because the drivers (operating systems) are easily available, and the installation takes very little time. The Arduino is shifted to using ATmega16U2 from FTDI chips for 'code burning.



**Fig.4.2. Proposed hardware kit.**

## 5. CONCLUSION

The paper represent a novel approach for controlling and monitoring the electrical distribution line . It will possible using IOT. Overhead transmission lines are vulnerable to weather, common weather component like smokes, fumes, rainfalls, snowfalls, winds and heavy storms, humidity, line and air temperature, all this things affect a lot, therefore, the damages occurred in power transmission line and due to this type of obstacle power line failure is occurred at any area. For this purpose we need an advance monitoring system. Transmission line is important to measure the use of power line capacity. Electric current and line position are two important parameters to measure the transmission line. The aim of this paper to monitor the line position at any area using the concept of electrical distribution line.

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Title: **INTELLIGENT MEDICINE BOX FOR MEDICATION MANAGEMENT USING IOT**

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Paper Authors

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## INTELLIGENT MEDICINE BOX FOR MEDICATION MANAGEMENT USING IOT

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### ABSTRACT:

A modern health care and in addition to this intelligent home monitoring, controlling embedded system capable of taking care of the patients from all aspects, covering personalized medication, vital signs monitoring. The project gives an experimental idea of patient's health condition and monitor environmental conditions and controlling. The platform involves an open-platform-based intelligent medicine box with enhanced connectivity and interchange ability for the integration of devices and services, Intelligent pharmaceutical packing with communication capability enabled by Zigbee and actuation capability enabled by functional materials and, flexible and wearable bio-medical sensor device enabled. The proposed platform devices with in-home healthcare services for improved user experience and service efficiency. The feasibility of the implemented Health platform has been proven in field trials and if any vital signs recognized then gives alert to predefine care takers through SMS alert and monitor the conditions continuously with an IP address of WIFI.

**Keywords:** *High voltage, short circuit, model, efficiency.*

### 1. INTRODUCTION

Medication compliance (adherence) describes the degree to which a patient correctly follows medical advice. The definition by Cramer et al.: Adherence "refers to the act of conforming to the recommendations made by the provider with respect to timing, dosage, and frequency of medication taking." [2]. According to the study of Times of India, over 20% of the India's population suffers from at least one of the non-communicable diseases (NCDs), which are estimated to cost India \$6.2 trillion during the period 2012-2030 (Times of India). As per the data from World Health

Organization (WHO), non-communicable diseases or chronic diseases, such as cancer, heart ailments, respiratory diseases and diabetes, 38 million people dies in every year. The aging of the population increases the prevalence of chronic diseases. According to Frost & Sullivan, in Europe a total of 50% of the hospital bed occupancy is by patients suffering from chronic illnesses such as diabetes and COPD (chronic obstructive pulmonary disease). This places a huge strain on the health care infrastructure [3]. In order to track the physical status of the elderly and in the

meanwhile keep them healthy, the following two daily tasks are essential: 1) real-time monitoring and analysing vital signs to early detect or predict life-threatening adverse events, 2) checking whether they are following their prescribed treatment, including taking their prescribed medicine on time. However, with rapidly aging populations, these daily tasks have brought great pressure and challenges to global health care systems. One review estimates that about 25% of the adult population does not adhere to their prescribed medication, which may lead to poor health outcomes and increased mortality. Poor medication adherence is a major problem for both individuals and health care providers. Technology improvements in health care facilities and services are highly desirable to meet the requirements of this giant group. A complete solution for in-home health care is still missing. A desirable system should be capable of taking care of the patients from all aspects, covering personalized medication, vital signs monitoring, on-site diagnosis and interaction with remote physicians. In addition, the existing systems rarely integrate new materials or apply new manufacturing approaches, which are always the key elements for bringing new devices or solutions into healthcare fields. By taking the above-mentioned issues into consideration, an intelligent home-based healthcare IoT system, Home Health-IoT, is proposed.

## 2. LITERATURE SURVEY

### Existing System:

A person performs daily activities at regular interval of time. This implies that the person is mentally and physically fit and leading a regular life. This tells us that the overall well-being of the person is at a certain standard. If there is decline or change in the regular activity, then the wellness of the person is not in the normal state. Elderly people desire to lead an independent lifestyle, but at old age, people become prone to different accidents, so living alone has high risks and is recurrent. A growing amount of research is reported in recent times on development of a system to monitor the activities of an elderly person living alone so that help can be provided before any unforeseen situation happened.

### Proposed System:

An intelligent home monitoring system based on ZigBee wireless sensors network has been designed and developed to monitor and evaluate the well-being of the elderly living alone in a home environment. Wellness of elderly can be evaluated for forecasting unsafe situations during monitoring of regular activities. The developed system is intelligent, robust and does not use any camera or vision sensors as it intrudes privacy. Based on a survey among elderly we find that it has a huge acceptability to be used at home due to non use of the camera or vision based sensors. The intelligent software, along with the electronic system, can monitor the usage of different household appliances and

recognize the activities to determine the well-being of the elderly.

### **3. RELATED STUDY**

Physiologic measurements like blood pressure and temperature, x-ray and ultrasound imaging, administration of intravenous medications, and support of critical life functions are all routine procedures that use medical devices. However, at present, each device is designed to stand alone as an island. To address this issue, the Institute of Electrical and Electronics Engineers Inc. (IEEE) is developing two new point-of-care medical device standards. IEEE P1073.2.2.0 Health Informatics Point-of-Care Medical Devices Communication Application Profile Association Control Function will provide for the establishment, release and disconnection of an association between a medical device agent and a system acting as a manager. In medical device communications [14], manager systems indicate a set of desired capabilities when requesting an association. Agent systems respond by stating the capabilities they support across the connection. IEEE P1073.2.2.0 is referenced by other application-profile mode standards within the ISO/IEEE 11073 family. The second standards project, IEEE P1073.2.2.1 Health Informatics Point of Care Medical Device Communication Application Profile Polling Mode will define a method for retrieving application data with medical devices that communicate through polling protocols. will enable “plug-and-play” interoperability [14]

for simple medical devices that use for management systems to query devices for all information to be communicated. There is a clear trend that the devices are getting smaller, lighter, and less obtrusive and more comfortable to wear. Although physiological measurement devices have been widely used in clinical settings for many years, some unique features of unobtrusive and wearable devices due to the recent advances in sensing, networking and data fusion have transformed the way that they were used in. First, with their wireless connectivity [10] together with the widely available infrastructure, the devices can provide real-time information and facilitate timely remote intervention to acute events such as stroke, epilepsy and heart attack, particularly in rural or otherwise underserved areas where expert treatment may be unavailable. The objectives of this paper are to provide an overview of unobtrusive sensing and wearable systems with particular focus on emerging technologies [8], and also to identify the major challenges related to this area of research.

### **4. PROPOSED SYSTEM**

We propose a smart system that will continuously monitor the patient’s health with the help of a sensor and also at the same time will monitor the patients daily dose of medicine. Each medicine box will have its own set of timing information which will be compared to a real world clock. If the information matches, the buzzer will go off and thereby remind the patient to take his/her medicine. A data will also be

maintained regarding the patient's health and his daily intake of medicines.

## DESIGN AND IMPLEMENTATION

The whole system is implemented in the following manner:

- The entire medicine box will be initiated once the power is switched on.
- Once initiated the circuit is set up according to the real time clock.
- The touch sensor for each slot or box is adjusted according to the real time clock as for how many intervals the box should be initiated.
- For example box 1 is set for twelve hours, box 2 is set for 'n' hours etc.
- Each box according to set time will have a buzzer set off at the intervals provided.
- If there is no touch detected the touch sensor will register as medicine not taken which is stored on the cloud.
- This process is repeated as required.
- A glucometer or any other health monitoring sensor is also interfaced to the arduino board to detect the glucose of a diabetic patient which will be stored on the cloud as well.

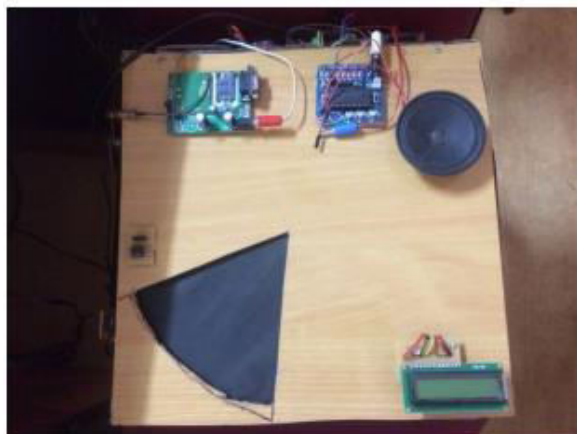
The received parameters compares with the stored threshold values, if any variation present in the measured values then a message is sent to registered number through the GSM module. All the comparison and comparing functions are done by the microcontroller. When the medicine time has been set, the medicine box will remind users or patients to take pills using sound and message. A real time clock is provided for updating the time. During the scheduled time, medicines are put forward by using a mechanical structure

with two motors. The parameter from the health monitoring part is stored in a webpage using IoT module. The doctor can update the medicine time using this webpage.



**Fig.4.1. Hardware kit image.**

Once the boxes are emptied after medicine consumption by the patient, and then refill the boxes with the medicines. For that a EEPROM card is used. If the card is valid the medicine box will be open and the user can refill the medicine. Once the card is removed system automatically going to locked stage. During scheduled time of medicine the LCD displayed the medicine slot number. As per the number of slots/sections in the medicine box the degree of rotation of motor varies. For example if 3 types of medicine present then each 180 degree servo motor rotates 60, 120 and 180 degree for medicine section 1,2 and 3 respectively. After this rotation the tray motor rotates according to the size of each slot. Here each section divided into 3 slots representing 3 times of a day. After a 1 minute delay the tray motor rotates anticlockwise and the servo motor rotates opposite for reaching initial condition.



**Fig.4.2. Output image.**

## 5. CONCLUSION

The intelligent medicine box and health monitoring and management system can effectively solve the error or negligence in the field of medications. The system consists of smart sensors attached to a human body for physiological monitoring and intelligent medicine packaging to the daily medicine management. The medical data collected from the sensors are stored in a webpage and history acquired for the patients are personal in nature. Hence the system ensures security of the highest order for the medical data on cloud storage.

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## IOT BASED AIR AND SOUND POLLUTION MONITORING SYSTEM

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### ABSTRACT:

The pollution of air and sound is increasing abruptly. To bring it under control its monitoring is majorly recommended. To overcome this issue, we are introducing a system through which the level of sound and the existence of the harmful gases in the surroundings can be detected. The growing pollution at such an alarming rate has started creating trouble for the living beings, may it be high decibels or toxic gases present in the environment leaves a harmful effect on human's health and thus needs a special attention. This device is also capable of detecting the fire in its area and notify the same to the fire brigade authorities so that they could take necessary actions accordingly, and also the mobile applications will be installed in the fire brigades itself so that if a fire is taking place nearby, it could be controlled in time to reduce loss of people and property. This system works on the methods of IOT which is a rising technology based on the fusion of electronics and computer science. The embedded sensors in the system help to detect major air polluting gases such as CO<sub>2</sub>, SO<sub>2</sub> and CO and level of sound pollution. The concept of IOT helps to access data from remote locations and save it in database so that we don't need to actually be present in that area.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Air and sound pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in particular areas through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also system keeps

measuring sound level and reports it to the online server over IOT. The sensors interact with microcontroller which processes this data and transmits it over internet. This allows authorities to monitor air pollution in different areas and take action against it. Also authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to control the issue. Some future consumer applications envisioned for IoT sound like science fiction, but some of the more practical and





realistic sounding possibilities for the technology include: Receiving warnings on your phone or wearable device when IoT networks detect some physical danger is detected nearby. Self-parking automobiles. Automatic ordering of groceries and other home. Automatic tracking of exercise habits and other day-to-day personal activity including goal tracking and regular progress reports. Network Devices and the Internet of Things All kinds of ordinary household gadgets can be modified to working an IoT system. Wi-Fi network adapters, motion sensors, cameras, microphones and other instrumentation can be embedded in these devices to enable them for work in the Internet of Things. Home automation systems already implement primitive versions of this concept for things like light bulbs, plus other devices like wireless scales and wireless blood pressure monitors that each represent early examples of IoT gadgets.

## 2. LITERATURE SURVEY

The motive of making a smart city can be fulfilled by using technology, thus making the life better and also enhancing the quality of services, therefore meeting every individual's needs. With modern technology in fields of information and communication, it has become easy to interact with the authorized people of city to tell the whereabouts of the area or city, how well the city is developing and how to make it possible to achieve a better life quality. In this system, an application was created to make one more step in the fulfillment of the goal. An area is

analyzed for evaluating how much pollution is affecting the area. The components of gases and their amounts are calculated and checked. If the amount is higher than normal then the officials are reported about it. After that the people are made to clear the area and taken to a safe place. The combined network architecture and the interconnecting mechanisms for the accurate estimation of parameters by sensors is being explained and delivery of data through internet is presented.[1] Some of the research work made for monitoring the pollution parameters in a particular location in order to make the environment safe and that area smart. Different methods were used in the past and are described in this section [4]. First is Smart Environment Monitoring using Wireless sensor networks[5] in which the main focus was on the developing an environment free of pollution by making it smart. Wireless sensors are fitted all over the city and in public transports. By monitoring all the sensor networks, all the environmental happenings can be gathered as a streaming database to analyze the environmental position. The monitoring data gathered from stationary nodes installed in the city to the mobile nodes placed on public transports is given by this technique. Second is Toward a Green campus with the internet of things. It is an implementation of idea to save energy through adequate management of computer machines and air conditioner. It is based on the theory of internet of things [7]. Third is WSN- and IOT based Smart Homes and their extension to Smart Buildings [7]. This work is based on the use

of reliable, efficient, real-time and economical sensor networks for making smart homes. In this, the sensor nodes are fitted into the different areas of home. These nodes produce data of the movement done in the home or any usage of an object. Further, these homes are extended to smart buildings [4].

### 3. RELATED STUDY

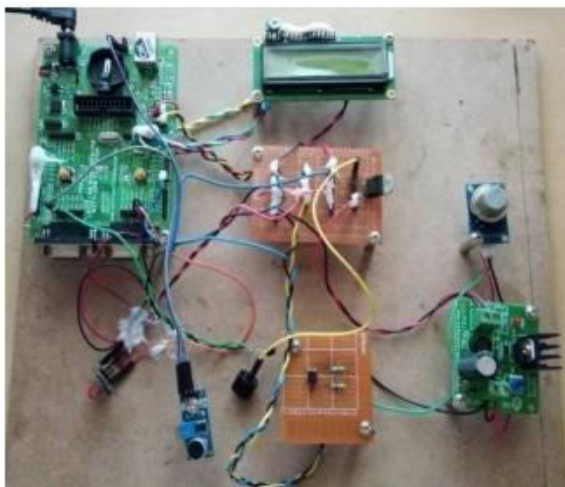
In recent years, IoT has gained a lot of importance in the field of science, The Internet of things (IoT) is the network of vehicles, home appliances, and other items which have electronics embedded within, there are software, sensors which help in connectivity which enables these things to connect, collect and exchange data. The word "Internet of Things" is consisted of two main parts; Internet the backbone of connectivity, and "Things" meaning devices . According to analyst firm Gartner and as shown in figure 1.1, there will be 8.4 billion connected things in 2017, setting the stage for 20.4 billion Internet of Things (IoT) devices to be deployed by 2020[5]. The purpose of this project is to identify the harm caused by the air and sound pollution to the environment. Pollution in simple words can be explained by, the presence of an foreign object in the environment which has harmful effect, we as a society have to ensure that all the pollution levels are maintained to the minimum, both first and second tier cities in Indian perform extremely poorly in cases of Air and Noise pollution India tops the world in pollution related deaths, accounting to 2.5 million

deaths of the total 9 million worldwide. This project helps in detecting the major gases in air and the decibel levels in the surrounding environment. Our project will be a boon to the society as our project will be making sure that every individual will be able to keep a track of the pollution from our app. It is the need of the hour to monitor air quality and keep it under control for a better future and healthy living for all. Some of the research work made for monitoring the pollution parameters in a particular location in order to make the environment safe and that area smart. Different methods were used in the past and are described in this section. First is Smart Environment Monitoring using Wireless sensor networks in which the main focus was on the developing an environment free of pollution by making it smart. Wireless sensors are fitted all over the city and in public transports. By monitoring all the sensor networks, all the environmental happenings can be gathered as a streaming database to analyse the environmental position.

### 4. PROPOSED SYSTEM

The air and noise pollution monitoring system consists of ARM7 microcontroller [5] and sensors. Microcontroller is also known as the mind of the device. Initially, the microcontroller is provided with a 5V supply. Sensors provide the data to the microcontroller that is displayed on the LCD display continuously, LCD Display is connected to the microcontroller board and if the air pollution exceeds the set limit (defined by the programmer) then the output

is shown in the analog form i.e. if the air pollution is raised it will be displayed on the output pane, Buzzer simultaneously buzz and similarly when the sound pollution exceeds the set limit (90dB in this case) the buzzer will be displayed as output on the output panel. Now the data which is retrieved from air and sound sensor will be provided to the WiFi module which is connected to the 3.3 V pin on the microcontroller board. This WiFi module (nRF24L01 module) will then provide this data to the android application accessible to all the android phone users and accordingly the local people can take actions on their part.



**Fig.4.1. Proposed hardware model.**

The air and sound pollution monitoring system monitors air and noise pollution using a mobile application. It shows the digital value of air and sound pollution and user can analyse it with a graph. It becomes very easy for us to rectify the levels and air and noise pollution around and plan for a healthy living and surrounding. The figures that are included in our paper shows the way

the system works and how the output is obtained from the input after processing.



**Fig.4.2. Output results.**

## 5. CONCLUSION

This IOT based air and sound pollution monitoring device is a great step towards a healthy livelihood. With the help of this device not only the municipal authorities but even the common people can participate in the process of controlling pollution and ensure safe environment. This automatic device, once installed is capable of continuously tracking the pollution level and analyse the detected information. The most highlighting feature of this device is that the output is represented in digital as well as analog format with the help of a simple mobile application which is usable on all android devices like smart phones, tablets, PDA's etc. The device itself is very eco-friendly and does not harm the environment in any way. Moreover, it is based on one of the modern technology and also inexpensive as compared to other technologies developed so far and can be installed anywhere.

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## VEHICLE TRACKING AND MONITORING SYSTEM TO ENHANCE THE SAFETY AND SECURITY DRIVING USING IOT

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### ABSTRACT:

In this paper, vehicle monitoring and tracking systems are implemented using Blynk platform acting as a medium for data transfer and visualization. The system is developed to monitor various driver help parameters like eye blinking, alcohol consumption and vehicle parameters like engine temperature, the distance between the vehicles and tracking of the live location of the Vehicle. The Ultrasonic sensor is placed in the front part of the vehicle, if any two vehicles draw near to one another then an alert message is sent to the mail through Blynk application. The Temperature sensor is placed in the engine part. When the temperature raise's in the engine, caution is sent to the mail. Eye-blink sensor and alcohol sensor are utilized to check the condition of the driver, if the state of the driver is abnormal then a notification is sent to mail. The developed system takes care of vehicles and s driver's safety.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Vehicle tracking systems are popular among people as a retrieval device and theft prevention. The main benefit of vehicle tracking systems is the security purposes by monitoring the vehicle's location which can be used as a protection approach for vehicles that are stolen by sending its position coordinates to the police center as an alert for the stolen. When a police center receives an alert for stolen vehicles, they can make an action to prevent this theft. Nowadays, it is used either as a replacement or addition for car alarms to protect it from theft or it can be used as a monitoring system to keep track the vehicle at the real time. So, many

applications can be used for this purpose to block car's engine or doors as an action to protect the vehicle. Due to the advancement in technology vehicle tracking systems that can even identify and detect vehicle's illegal movements and then attentive the owner about these movements. This gives an advantage over the rest applications and other pieces of technology that can serve for the same purpose. Nowadays, vehicle tracking is one of the most important applications. For example, the maps given to vehicle drivers may play a large role in vehicle tracking and monitoring. The major difficulty is that vehicle owners may not be



able to distinguish the vehicle in a place as a result of overlapping maps, which adversely affects the process of tracking and monitoring[1]. It requires some types of systems to identify and detect where objects were at some time or what distance traveled during a trip to a vehicle. This may be an additional point and help the police in preventing thefts and locating the vehicle by relying on reports from these approved systems and studying and analyzing them to detect stolen vehicles' locations. This system is a necessary device for tracking of vehicles any time the owner wants to observe or monitor it and today it is really trendy among people having costly cars, used as theft avoidance and recovery of the stolen car. The collected data can be observed on a digital maps by using internet and software[2]. There is tremendous demand for object tracking application for the business process. The real-time tracking information on valuable things and assets could solve many problems in the world. GPS is the Global Positioning System which provides the location, using off-line and on-line both in any atmospheric conditions. There are several types of GPS tracking system available in the market.

## 2. LITERATURE SURVEY

Manasi Patil et al., suggested a better traffic management system using Raspberry pi and RFID technology. The vehicle has a raspberry pi controller fixed in it which is interfaced with sensors like gas sensor, temperature sensor and shock sensor. These sensors are fixed at a predetermined value

before accident. When an accident occurs, the value of one of the sensor changes and a message to a predefined number (of the ambulance) is sent through GSM. The GPS module which is also interfaced with the controller also sends the location of the vehicle. When the message is received by the ambulance, a clear route has to be provided to the ambulance. The ambulance has a controller ARM which is interfaced with the RFID tag sends electromagnetic waves. When an ambulance reaches the traffic signal the RFID reader which is placed on the joints detect the electromagnetic waves of the tag. If the traffic signal is red, then the readers goes through the database in fraction of seconds and turn the red light green. And automatically in such condition the RFID on opposite joints turn the opposite signal red. This provides a clear route to the ambulance. [1].V.Sagar Reddy et al., developed an accelerometer based System for driver safety. The system has the advantage of tracking or identifying vehicles location just by sending a SMS or email to the authorized person. The system is designed by using Raspberry Pi (ARM11) for fast access to accelerometer for event detection. Is there any event is occurs the message sent to the authorized person so they can take immediate action to save the lives and reduce the damages. Images captured by the camera on the vehicle are emailed to the concerned person (for example the owner of the vehicle) along with the type of accident and the time of the accident. [2].Sri Krishna Chaitanya Varma et al., proposed an



Automatic Vehicle Accident Detection and Messaging System Using GPS and GSM Modems. AT89C52 microcontroller is used in the system. When the system is switched on, LED is ON indicating that power is supplied to the circuit. When the IR sensors that are used sense any obstacle, they send interrupt to microcontroller. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information is sent to a mobile number as a message. This message is received using GSM modem present in the circuit. The message gives the information of longitude and latitude values. Using these values the position of the vehicle can be estimated [3]. Apurva Mane et al., described the methods for vehicle collision detection and remote alarm device using Arduino.

### 3. RELATED STUDY

This system provides a mechanism to reduce disasters by monitoring eye blinking of the driver, which indicates drowsiness, obstacles located in the road and the drunken state of the driver. Accident and the location of the vehicle are detected. By this system primary care is received as the accident information is available Anusha et al[2] implemented a system using LPC2148 and the system has features like storing in the database. The work includes GPS, GSM modules. The framework also detects Alcohol consumption and Engine Temperature, All the values can be seen on the Web page. so safety is provided to the travellers in the vehicle. Imteaj et al[3] developed an Android-based application that

detects an accidental situation and sends an alert message to the nearest police station and medical care center. This application is organized with an external pressure sensor to extract the outward force of the vehicle body. Hence, the application plays an important role in Post-accident services and could lessen the effect due to an accident Mayuresh et al[4] described a system that uses an open source platform and intended to monitor and trace the location of a vehicle, the framework also checks fuel consumption, engine temperature and vehicle speed, GPS/GPRS/GSM modules are used for communication. All the values are stored in the data base on the web server.

### 4. PROPOSED SYSTEM

The vehicle monitoring and tracking system have been developed in this paper. An ultrasonic sensor is placed in the front part of the vehicle, if any vehicle draws near then alert message is sent to the mail via Blynk application. To avoid the sparks in the vehicle temperature sensor is utilized and it is placed in the engine part of the vehicle if the temperature inside the car increases then Notification is sent to mail through Blynk. If alcohol consumption is in high range then caution will be sent. If the person feels drowsiness then it is detected by IR sensor and alarm will be in on state and an alert is sent to mail saying the driver is in the drowsy state. The values of all the sensors are collected by NodeMCU as it has inbuilt Wi-Fi module all the data is transferred to the cloud through Wi-Fi and analysis is done

in Blynk app and notifications are sent according to the conditions.

Vehicle monitoring system with GPS helps in tracking vehicles. The tracking process alerts the driver and cautions him to drive carefully., Thus preventing the accidents [7]. In this research work, investigation to monitor driver condition, engine temperature, abnormalities in driver are recorded by the amalgamation of GPS, GPRS. The temperature sensor attached to the vehicle, monitors the variations in temperature there by indicating overheating of the engine motor. The Alcohol sensor checks the amount of Alcohol consumption, sleepiness /drowsiness of the driver. The method incorporated is given in Fig:2.The step by step procedure of operations is listed below.

Step-1: Installation of GPS Module in Vehicle

Step-2: Monitoring of moving Vehicle

Step-3:Check for various Parameters such as temperature of engine, drowsiness of driver and /or drunken.

Step-4: Obtain the Parametric display on display board

Step-5: Any Deviation, Stop Vehicle and /or Alarm by a buzzer.



**Fig.4.1. Hardware kit image.**

To interact with users, a website has been developed where a user with the hardware can create an account and monitor all the vehicle installed this system. User will get notification if any vehicle gets into accident through the website account, mobile application and mobile SMS with the exact GPS location of accident. Also any police station and hospital can open an account from the website and will get notification through website and mobile SMS about an accident with the accident location and direction towards the accident location using google map. It considers a network with N mobile unlicensed nodes that move in an environment according to some stochastic mobility models. It also assumes that entire spectrum is divided into number of M non-overlapping orthogonal channels having different bandwidth. The access to each licensed channel is regulated by fixed duration time slots. Slot timing is assumed to be broadcast by the primary system. Before transmitting its message, each transmitter node, which is a node with the message, first selects a path node and a frequency channel to copy the message. After the path and channel selection, the transmitter node negotiates and handshakes with its path node and declares the selected channel frequency to the path. The communication needed for this coordination is assumed to be accomplished by a fixed length frequency hopping sequence (FHS) that is composed of K distinct licensed channels. In each time slot, each node consecutively hops on FHS within a given order to transmit and receive a coordination



packet. The aim of coordination packet that is generated by a node with message is to inform its path about the frequency channel decided for the message copying.



**Fig.4.2. Output results.**



**Fig.4.3. Sleep mode activated time.**

### 5. CONCLUSION

A novel method for assessing the quality of vehicle tracking system using IoT is presented in this paper. Vehicle tracking system is very essential in major cities and nowadays vehicle accidents are rapidly increasing, hence this module is developed for tracking the vehicle, vehicle temperature, alcohol consumption of driver, sleepiness or drowsiness. This work survey has improved the Quality of service and security. Internet of Things (IoT), the emerging technology has benefited in facing the challenges especially for vehicle tracking system in the real world environment.

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## DESIGN AND IMPLEMENTATION OF A FINGERPRINT BASED LOCK SYSTEM FOR SHARED ACCESS

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### ABSTRACT:

This paper presents an enhanced methodology in implementing and designing a security system for door locking purpose based on fingerprint, GSM technology, monitoring camera, alarm system and password system. This security system will provide enough security by limiting unauthorized people access and taking a record of those who pass through it. Sometimes unauthorized people or burglars try to break the door for evil intentions at a time when no one is available at a targeted place, so this paper introduces some security solutions for that problem and they are the main contribution of our paper. We introduce an alarm system to alert the people at the surroundings, GSM module that's used to send an SMS message to the registered user's (responsible person) and a web camera that's used to take a video for a person who tries to break the lock, password keypad that's used after fingerprint sensing to provide extra security. Definitely the registered users are the only persons who can access the lock, and the door closes after five seconds from the opening time. The method used to implement this experiment involves the use of a fingerprint scanner R305 that's interfaced with Arduino microcontroller-ATMEGA328P to control the locking and unlocking process of a door. During all the opening and closing processes, the 16x2 Liquid Crystal Display (LCD) displays some commands which can be used to instruct the users like, place your finger on the sensor, the door is opened, the door is closed, the message is sent, please enter the password etc. If an unregistered user tries to access the door using their fingerprints, automatically his/her access is denied. The proposed door lock security system is can be used at homes, offices, banks, hospitals, and in other governmental and private sectors. Our proposed system was tested in real-time and has shown competitive results compared to other projects using RFI and password.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Biometrics refers to the automatic identification of a living person based on physiological or behavioural characteristics

for authentication purpose. Among the existing biometric technologies are the face recognition, fingerprint recognition, finger-geometry, hand geometry, iris recognition, vein recognition, voice recognition and



signature recognition, Biometric method requires the physical presence of the person to be identified. This emphasizes its preference over the traditional method of identifying what you have such as, the use of password, a smartcard etc. Also, it potentially prevents unauthorized admittance to access control systems or fraudulent use of ATMs, Time Attendance Systems, cellular phones, smart cards, desktop PCs, Workstations, vehicles and computer networks. Biometric recognition systems offer greater security and convenience than traditional methods of personal recognition. Fingerprint recognition represents the oldest method of biometric identification which is dated back to 2200 BC. The use of fingerprints as a personal code has a long tradition and was already used. This system focuses on the use of fingerprints for door opening and closing. The fingerprint recognition software enables fingerprints of valid users of the vehicle to be enrolled in a database. Before any user can use the vehicle, his/her fingerprint image is matched against the fingerprints in the database while users with no match in the database are prevented from using the vehicle. A microcontroller stores the data equivalent of fingerprint of the master user. Comparison between this enrolled fingerprint and the fingerprint of the person who is about to use the vehicle is done by the micro-controller. If both the fingerprints are identical control circuitry of the microcontroller sends appropriate signals to the motor relays operating the door of the vehicle. If the fingerprints are not identical microcontroller

sends signals to alarm circuitry to warn about an unauthorised use.

## 2. LITERATURE SURVEY

One more disadvantage of traditional lock is that when homeowners lose the key and have no alternative key, in this case, they should wait for long hours for a technician to come, otherwise they should break the door. Another challenge or disadvantage is that when the key is locked away or maybe misplaced inside the house, in this case even authorized persons won't have access to his/her property or belongings. This will issue can be solved with the help of technician again and may cost the authorized [4]. In addition to providing access to the target building, personal belongings and important documents at homes or offices can be accessed depending on the lock system; personal belongings can be very valuable things such as expensive pieces of jewelry, confidential documents, and money in cash, etc. To overcome all those challenges and drawbacks in the traditional locks, smart security systems are developed which provide more security to the individuals, however, these systems are easy to use, to access, and can be reliable. Such of these security systems, the use of smartcards, voice technology, passcode, and biometrics [5-8]. In this work, we develop a biometric security system based fingerprint. Biometrics involves the science which can statistically analyze the biological characteristics. A biometric system is defined as a technology that can recognize and verify the identity of a person using a



measurable physical or behavioural characteristic of the person. There are some conditions to choose characteristics such as performance, universality, collectability, uniqueness, acceptability, circumvention and permanence. Some other characteristics can be used by biometrics such as fingerprint, eye features, facial features, etc. [9]. Our work developed a biometric-based fingerprint which involves other technologies like GSM, cam web, and password keypad system. At present, there are six major biometric technologies available in today's market. They are Fingerprint recognition, Hand geometry recognition, Iris and Retina recognition, Voice recognition, Signature recognition, and Facial recognition. Of these recognition technologies, facial recognition, fingerprint recognition, and iris recognition are the most dominantly used for numerous applications. In this work, fingerprint recognition technology is considered. Fingerprint recognition technology is a technique that's used to detect and recognize different human fingerprints based on different patterns of fingers, which is found to be unique among each person. It is very common and maybe the best way of obtaining details of any person and identifying a person can be done most easily and conveniently [5]-[6]. Study of fingerprints for recognition and identification the individuals is scientifically called Dactylography. The main advantage of the fingerprint recognition method is that each person has a unique fingerprint pattern that remains the same and never changes throughout life, making the fingerprint

recognition method an unailing method of human identification.

### 3. RELATED STUDY

Door access control is accomplished by locks indoors [2]. Recent advancements in every phase of modern living and the world around us progressively digitized, it becomes very difficult for protecting one's confidential information. Old-fashioned passwords and keys are originally considered to be sufficient to provide secure data transactions or for any other purpose. However, in the current scenario, they became weak because of sophisticated hacker attacks and unauthorized users across the internet. With more and more electronic gadgets such as tablets, multiple sensors, smart phones, and cloud-based services, etc interconnected to the internet, and with simultaneous sending and receiving of data, there arises a need to keep the data unavailable to hackers and unauthorized individuals. To prevent this, passwords can be used. However, the problem is that the user may use the same password for multiple devices. Besides, these passwords are sometimes shareable and persons with strong technical knowledge can use a variety of methods to crack these passwords. During the time of civilization changes in different falling and rising manner, equipment, and tools used for security intentions developed by locksmiths [3]. In the period of medieval, there are many traditional methods were used to implement security tools. As days pass and time move on, that equipment and tools turned to be disused, as people could



breach the perimeters of security set by the security equipment and supplement. . As a result, continually, people seek for more dependable and reliable measures of security. The blow winds of civilizations and industrialization movement all over the world have strengthened the deep intentions of individuals in manufacturing more advanced and sophisticated security systems which could be able to battle the obstacles and challenges of securing worthy possessions. Sometimes during the day, most of the homeowners leave their homes for different purposes, some of them go to their work offices, some of them go to schools, sport fields, farms, etc. thus, their homes will be easy to attack by burglars, because of homes' traditional locks which can be opened by the burglars in case if they have the same key or duplicate key to open the door, making their belongings such as jewelry, bank cards, money and other valuable things easy to steal, this is one of this disadvantages of using the traditional locks which has no security and no one can rely on.

#### 4. PROPOSED SYSTEM

The block diagram of the implemented system involving all hardware components that are used to accomplish the security task. Arduino Uno microcontroller board acts as a master and it is the body of our project, while other hardware components act as slaves. The system behaves according to the written program and performs all mentioned security actions without human intervention, and all other

automatic operations are carried out. All hardware components are of vital importance for the system to provide enough security, and all these tools work together under one controller.

Tx-out and Rx-in of the sensor are connected to the pin 2 and pin 3 of the Arduino Uno respectively. The electronic lock is connected with one of the output ports of the Uno. Making a network with the relay allows switching between the 5V and the 12V electrical components. Now we have attached the Arduino Uno to the laptop for registering fingerprints. We require the connection with the computer for assigning the ID to the prints. This can be done through Smartphone with Arduino application as well. We save the ID into the sensor and upload the code to the Uno. We disconnect the Uno with the computer and turn on the power adaptor. Once it gains power, the system boots up the fingerprint IDs saved inside and waits for a print to be matched. If no match is found, the keypad and the switch remain active. Once a match is found, the buzzer will buzz once and the lock will open. If no match is found, the system will not take any action at all. The scanner can perform over 100 scans per second, so when someone places a finger, it will respond instantly if the prints match. This system can store up to 126 fingerprint IDs. So, it can control the access of 126 different people. Review of the whole system

- 126 different fingerprints can be enrolled into the system to open door/doors.

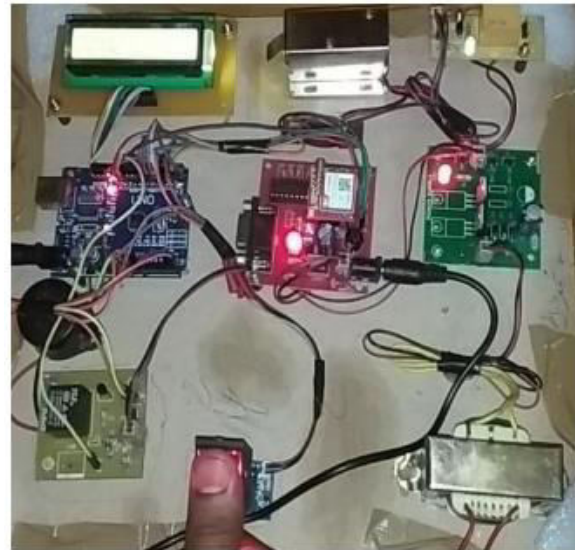
- On placing a registered finger, the lock unlocks for 5 seconds with no noise or buzz.
- A 4-digit password can be entered through the keypad.
- Each key pressed results in a beeping sound. A successful code opens the door with a single buzz.
- An incorrect input will not open the door; the system will buzz shortly twice.
- 3 failed attempts on the keypad will make the system buzz continuously for 3 seconds notifying an intrusion attempt.
- On pressing the switch from inside, the lock unlocks for 5 seconds with a single buzz.



**Fig.4.1. Hardware kit image.**

The solenoid lock can be fixed on the door from inside and if it is at the closing state and then powered by an authorized person, the state will change to opening state and vice versa. The status of the solenoid lock is always displayed in the LCD screen, for example, if the door is opened then the status will be displayed in LCD. Different kinds of status are displayed by the LCD screen and each status denotes the current situation of the security system. The opening and closing situations of the solenoid lock are illustrated in the following figures;

please focus on the lock to find out its situation. Our experiment is carried out with the help of several hardware components such as transformer, rectifier, LCD (16X2 lines), GSM Technology, keypad, piezo buzzer-12VAC, MEMS Sensor, optical fingerprint scanner-R305, solenoid door lock (NC-0837L). All these components are interfaced and connected to the Arduino Uno R3 microcontroller according to their functionality. It can be concluded that this security system can be improved by adding face recognition along with fingerprints in the more sensitive places which require higher security.



**Fig.4.2. Door is closed**

## 5. CONCLUSION

The design and implementation of fingerprint based lock system is customizable and flexible. This door locking mechanism is comparatively cost-effective than the available lock systems in the traditional market. Our fingerprint based lock system has high accuracy rate and is also quick to recognize fingerprints which



enable seamless integration with the users and provides tighter security. In our country, private and government organizations are very much concerned about security. Many companies are interested in using this type of locking mechanism but the system which is available have very high installation cost. Due to this excessive cost, many small firms cannot afford such systems. Keeping the installation cost in mind we planned to develop a system that should be affordable to both large and small firms. This design can be improved by more intensive development and additional features such as more locks can be added to the system. Thus we do not need to spend so much for just one lock if this can be used to control several doorways. A system to save prints without the use of a computer could have been made, but it will require more parts than the ones we used.

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## VEHICLE ACCIDENT DETECTION SYSTEM BY USING GSM AND GPS

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### ABSTRACT:

With the growing population the use of vehicles has become superfluous. And this has led to the accidents increasing at an alarming rate resulting in a large loss of property and human life. This project aims at finding the occurrence of any accident and reporting the location of accident to the previously coded numbers so that immediate help can be provided by ambulance or the relative's concerned. GSM technology is used to intimate the vehicle position in the form of latitude and longitude coordinates through sms. The location spot is retrieved using Global Positioning System which is a navigational system using a network of satellites orbiting the earth. Sensors such as vibration, alcohol and fire detectors detect signal in case of an accident occurrence and send a signal to the connected microcontroller. The controller in turn operates the relay to blow the airbag and automatically lock the brakes. Meanwhile a message reaches to the necessary help. And thus ambulance service and required aid can reach in the shortest time possible. This system can also aid companies in the rental vehicle business to keep a track of the vehicular activity by sending message at regular intervals to the authorised numbers.

**Keywords:** IOT, Gas, Air pollution, with cloud resistance.

### 1. INTRODUCTION

Today, it is very difficult to find that an accident has occurred and to find the position where it the accident occurred. It's more difficult for the lives of victims until any person know the information and informed it to the emergency vehicles like ambulance or to hospitals and if it occurs in remote areas it will becomes no hope to survive. To avoid these, different technologies like GSM/CDMA and Global positioning systems are used. The GPS based accident identification module

contains a Micro Electro Mechanical System(MEMS), vibrating sensor, fire sensor, infrared sensor and a GPS module connected to the processor unit. At the moment of accident, the vibration sensor or MEMS or fire sensor detects the accident gives the information to the microcontroller, which will display the information on LCD, switch on the buzzer unit and sends the information to the ambulance, police and owner/parents through GSM network. Here the system also provide the user to track the

vehicle location, when he/she required. Here the position of the vehicle is also send to the mobile in terms of latitude and longitude. The main objective of this project is to detect the vehicle accident and transmit the location of the accident with the information of victim and type of accident to the medical help centre and police control room. So medical help centre and police control room will get the exact location by the geographical co-ordinates transmitted via message with the help of map.

## 2. LITERATURE SURVEY

At present criteria, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. In this project GPS is used for tracking the position of the vehicle, GSM is used for sending the message and the ARM controller is used for saving the mobile number in the EEPROM and sends the message to it when an accident has been detected. From the past event and the existing approach the below Drawback are been noted:

1. Manual system is adopted.
2. Tracking of accident is a crucial process in the system.
3. Required medical attention cannot be given to the needed person.
4. Life loss and property loss were not stopped in large scale. Considering all the

drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.

5. The Automated system is used once the accident occurs.

6. This system GSM will send the message to the More Human life can be saved using this automated system. Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.

## 3. RELATED STUDY

Due to employment the usage of vehicles like cars, bikes can be increased, because of this reason the accidents can be happened due to over speed. People are going under risk because of their over speed, due to unavailability of advanced techniques, the rate of accidents can't be decreased. To reduce the accident rate in the country this paper introduces a optimum solution. Automatic alert system for vehicle accidents is introduced; the main objective is to control the accidents by sending a message to the registered mobile using wireless communications techniques. When an accident occurs at a city, the message is sent to the registered mobile through GSM module in less time. Arduino is the heart of the system which helps in transferring the message to different devices in the system. Vibration sensor will be activated when the accident occurs and the information is transferred to the registered number through GSM module. GPS system will help in finding the location of the accident spot. The

proposed system will check whether an accident has occurred and notifies to nearest medical centers and registered mobile numbers about the place of accident using GSM and GPS modules. The location can be sent through tracking system to cover the geographical coordinates over the area. The accident can be detected by a vibration sensor which is used as major module in the system

## 4. PROPOSED SYSTEM

Now a days large amount of accidents are happening in highways due to increase in traffic and also due to rash driving of the drivers. And in many situation the family members or the ambulance and police authorities cannot able to get information regarding to that accident in an appropriate time. This result in delaying the help which is more important to that person who suffer from that accident. Our project automatic accident vehicle detection and messaging system using GSM modem is designed to overcome such problem and to prove help for the person who met with accident and save their life too by passing message to rescue team in right time. In this project we are using accident detection unit which fitted the vibration sensor in the vehicle. For example, In case of accident, occurs if the car is hit to some other vehicle or an object it create some vibration in that case then the vibration sensor will detect the vibrating signal and it pass the message to the arduino. Arduino is used as a Central Processing Unit (CPU) of our project. When the arduino receives a signal from vibration sensor it

immediately pass the message to GSM modem then the GSM modem then the GSM modem will starts its process. In this project we used reset button it will be used by the driver if the accident is very normal for example if the driver hit the wall in some situation like parking then the driver will press the reset button this will inform the arduino to that system will not send SMS. But if the driver is not in a situation to press the switch or if the accident is really a major accident then the driver will not press the reset button and then the system will send SMS. Here, we use GSM modem to send SMS to the family members and the rescue team. Buzzer is also used to indicate as a accident has been occurred which will create a beep sound. Thus the life of a person who met with an accident has been identified and save their life too.



**Fig.4.1. Hardware kit image.**

The system detects accident from vehicle and send message through GSM module. The message is received by another GSM module. Google Map Module It displays Google map show u exact location of accident and it details. It gets detail SMS from accident location. Hence there is small variation in the coordinates, initial value of

latitude and longitude are same but fractional value changes with small difference.



**Fig.4.2. Output results.**

## 5. CONCLUSION

Our idea is used to detect accident and automate emergency assistance services. As a result, system is sending SMS to the nearest Emergency assistance service provider from accident location. The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents. This design is a system which can detect accidents in significantly less time and sends the basic information. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. A Switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue

team and to the police station and the message is sent through the GSM module.

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## WOMEN SECURITY SYSTEM USING GSM AND GPS

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### ABSTRACT:

Women's safety plays a very vital role now days due to rising crimes against women. To help resolve this issue we propose a GPS based women's safety system that has dual security feature. The proposed system consists of dual alerts that is buzzer and message is sent through GSM. Hence there must be a system which can protect them in such difficult situation. This paper suggests a new technology for a women safety with one touch system using GSM & GPS so that women never feel helpless while facing such social problems or challenges. Here we introduce a device which ensures the protection of women. The problems we have overcome here using raspberry pi, GSM, GPS and force sensor. Anytime when women sense danger only button is to be pressed on the device. In such case GPS tracks the location of the women & sends emergency message using GSM to saved contacts & police control room. The system proven that it is providing complete security to women's and kids wherever we are using it.

**Keywords:** IOT, GSM, GPS, keypad.

### 1. INTRODUCTION

In today's world, women safety has become a major issue as they can't step out of their house at any given time due to physical/sexual abuse and a fear of violence. Even in the 21st century where the technology is rapidly growing and new gadgets were developed but still women's and girls are facing problems. Women are adapt at mobilizing diverse groups for a common reason. They often work across ethnic, religious, political, and cultural divides to promote liberty. We are all aware of importance of women safety, but we must analyze that they should be properly protected. Women are not as physically fit as men, in an emergency situation a helping

hand would be assistance for them. The best way to cur tail your probability of becoming a dupe of violent crime (robbery, sexual assault, rape, domestic violence) is to recognize, defence and look up resources to help you out of hazardous situation. If you're in dilemma or get split from friends during a night out and don't know how to find back residence, this device with you will guard you and can reduce your risk and bring assistance when you need it. There are several app reduce the risk of sexual assault on women by informing control centre and their associates through SMS, but inlay of those this apparatus have much more efficient way to inform those this respected personals and also has a defending system which cannot be provided by existing app.



This paper focuses on a security system that is designed solely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges. The system resembles a normal clothes which when activated, tracks the location of the victim using GPS (Global Positioning System) and sends emergency messages using GSM (Global System for Mobile communication), to three emergency contacts and the police control room. The system also incorporates a screaming alarm that uses real-time clock, to call out for help and also generates an electric shock to injure the attacker for self defence.

## 2. LITERATURE SURVEY

At present criteria, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. In this project GPS is used for tracking the position of the vehicle, GSM is used for sending the message and the ARM controller is used for saving the mobile number in the EEPROM and sends the message to it when an accident has been detected. From the past event and the existing approach the below Drawback are been noted:

1. Manual system is adopted.
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5. The Automated system is used once the accident occurs.

6. This system GSM will send the message to the More Human life can be saved using this automated system. Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks.

## 3. RELATED STUDY

Loaded with security apps for women, you're smart phone can help you send emergency alerts to chosen people and also let people know about your whereabouts if anything goes wrong. Sometimes here might be a situation that when women had an accident in the late night and there are no one to help them, in such situations the person will not be able to tell the situation that he/she facing. And they do not know the basic first-aid details and to know the person where the incident has happened. Nowadays though there are many apps and devices evolved for women safety via smart phone which can be activated only by a touch or one click or shake the mobile. The metal detector detects the presence of metals like knife and other things present with the kidnappers and with the help of shocking



circuit; the shock was applied to the kidnappers. The shock that was applied is mild. The GPS is meant for tracking the location of the spot and with the help of GSM the emergency message is sent to the predefined contact. The UART is used to communicate with GPS and GSM module. The message is sent using peripherals with continuous I/O communication. Here we discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic; hence the probability of error is reduced. The data is highly secured and it not only solves the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management. The database stores the current month and also all the previous month data for the future use. Hence the system saves a lot amount of time and energy. Due to the power fluctuations, there might be damage in the home appliances. Hence to avoid such damages and to protect the appliances, the voltage controlling method can be implemented.

#### 4. PROPOSED SYSTEM

This work develop a women's safety system which provides the current location details of the women in danger using GPS and GSM modules. IoT module will track the current location of the victim and update in the webpage. In addition to location tracking it also provides some safety and security to women like giving electric shock to the attacker. The proposed system of this project

is shown in Fig. Workflow of the proposed System The workflow of the women safety and security is explained in this section. The flow chart of the proposed system is illustrated in Fig.

Step 1: Start.

Step 2: Switch ON the 12 Volt power supply.

Step 3: Emergency button is pressed.

Step 4: If GPS receives signal, GPS will start calculating the current latitude and longitude values of the victim and send it as SMS to the registered mobile number using GSM module.

Step 5: If any vibrations detected by vibration sensor, get the last location from GPS and send to GSM module.

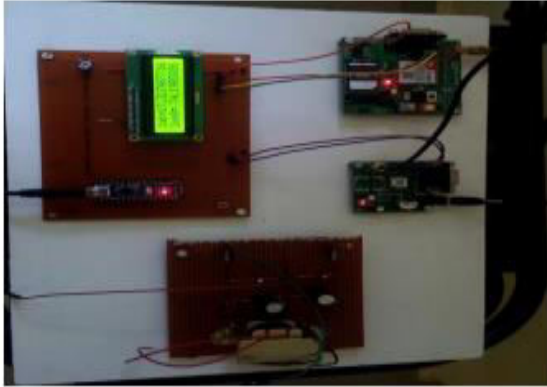
Step 6: IoT module tracks the last location of the victim and that location is updated in the Webpage.

Step 7: Neuro stimulator is turned ON, to apply shock to the attacker.

The implementation of women security system achieved in three levels. In the first, alarm is raised based on force sensor when it detects force being applied on women. In second, shock is applied to kidnappers when metal detector detects the presence of metal. At third, message will be sent to the predefined numbers using GSM and spot is being tracked using GPS. The main advantage of this system is that the user does not require a Smartphone unlike other applications that have been developed earlier. The use of sophisticated components ensures accuracy and makes it reliable. The system provides with all the features which



will leave no stone unturned to help the victim in any kind of emergency situations.



**Fig.4.1. Hardware kit image.**



**Fig.4.2. Output results.**

IoT module will track the current location of the victim and it will update the location on the webpage. The microcontroller will switch ON the buzzer in the device, so that nearby people may come to know that someone is in danger and they will come to rescue.



**Fig.4.3. Output in LCD**

## 5. CONCLUSION

The proposed design will deal with critical issues faced by women and will help to solve them with technologically sound equipment and ideas. The merit of this work is it not only provides safety and it also provides security by means of self-defence mechanism. The crime against the women can be now brought to an end with the help of real system implementation of the proposed model.

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## IOT BASED COOPERATIVE AGENTS ARCHITECTURE

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### ABSTRACT:

After briefly discussing the Internet of Things and Cyber physical device main features, their application in a specific architecture for a simple distributed intelligent system was presented. The system works as a Multi agent system and it is based on Arduino Uno boards, each one hosting an intelligent agent. The system was developed as test equipment for an active intelligent water meter for a SMART CITY project. The proposed system can be generalized and usable also with very simple (and therefore economical) computational units and allows to delocalize in similar units the computational load exceeding the single node capability; a specific data protocol, based on I 2C, is used to share the knowledge between agents.

**Keywords:** *Smart city, data protocol, chip, IOT applications.*

### 1. INTRODUCTION

The demand of service over the internet necessitated the data collection and exchange in an efficient manner. Internet of Things refers to the rapidly growing network of connected objects that are able to collect and exchange data using embedded sensors. It is nowadays finding profound use in each and every sector and plays a key role in the proposed environmental monitoring system too. IoT converging with cloud computing offers a novel technique for better management of data coming from different sensors, collected and transmitted by low power, low cost microcontroller “Arduino UNO”. An open source website, Thingspeak is used where the measurement of the parameters are updated. Thingspeak is an open source Internet of Things application and API to store and retrieve data from the

sensors using the HTTP Protocol over the Internet. Thingspeak is an IoT analytics platform service that allows you to aggregate, visualize, and analyze live data streams in the cloud. The cloud utilizes the operations of Graphical visualization and available in the form of virtual server for the users and the objects are communicated with the cloud via possible ‘wireless internet connections’ available to the users and the majority objects uses the sensors to tell regarding the environmental analogue data. The IoT helps bring all things together and permits us to communicate with our very own things. The measurements thus received can be viewed in these scripts such as JSON, XML and CSV. In the proposed system, the environmental parameters can directly be accessed by the user, thus eliminating the need for third parties.

## 2. LITERATURE SURVEY

Recently climatic change and environmental monitoring and management have received much attention. The paper introduces three different IoT based wireless sensors for environmental and ambient monitoring: one employing User Datagram Protocol (UDP)-based Wi-Fi communication, one communicating through Wi-Fi and Hypertext Transfer Protocol(HTTP) and third one using Bluetooth Smart. The above presented systems help in recording data at remote locations and viewing it from every device with an Internet connection. Here Zigbee is used to monitor and control application where wireless connectivity is required. UDP based cyber physical system monitors the temperature and relative humidity. Here the losses are caused by the network itself. The WiFi sends the UDP or HTTP packets to a Cloud Platform which makes it available only to the administrator who decides whether the data must be public or private. BLE consist of sensors placed at various areas at which they produce a beacon when data is received and the server takes the information from the sensors whenever the beacon is produced. The available Environmental Monitoring System (EMS) uses UDP protocol which requires the establishment of connection and IP matching every time. Direct access of the geographical information is not available since the information is sent to a centralized platform and admin plays a major role.

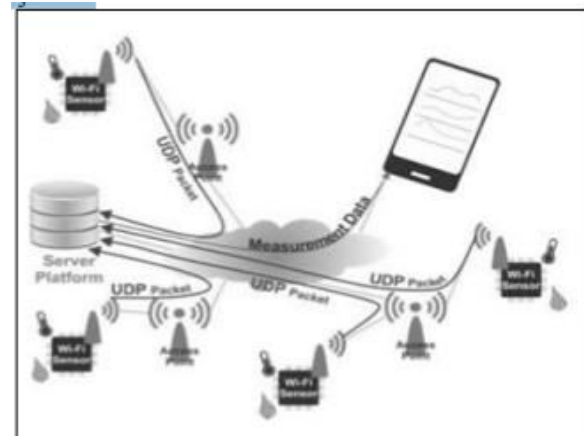


Fig.2.1. Proposed model.

## 3. RELATED STUDY

Today, the large number of devices equipped with sensors and connected to the network produces an enormous amount of data. These data are characterized by elevated heterogeneity, aperiodicity and, generally, expressed without reference ontology or at least one semantics/synthesis evident. Certainly, expressions in rich and structured formats such as XML and similar one are often replaced by lighter forms but poor in information, JSON (JavaScript Object Notation). It is easy for humans to read and write but not explicit. It is easy for machines to parse and generate and it is based on a subset of the JavaScript Programming Language. The relevant amount of collected data may be difficult to use, or even unnecessary without further processing that could turn it into usable and contextualized information. As a result, in recent years there has been a change in research trends, which have focused towards the fusion of engineering with IoT technologies. In this context, ambient

intelligence and autonomous control experienced a growing attention. By mediating the high computational capacity of the current single board computers (SBC) used in IoT infrastructures and the extreme granularity reachable, it is evident the use of approaches such as intelligent agents, or, for example, hardware and software combinations that can be used to enable autonomous and intelligent systems. In fact, agents can represent any entity, perform a wide variety of human-like tasks such as learning, reasoning, negotiation, self-organization and mutual trust. Considering the free-fall cost of hardware, along with the rise of easy-to-use programming frameworks, these applications are wide-spreading. The aim of this paper is to present a distributed and intelligent architecture, compatible with Arduino (open source platform) or similar SBC that is scalable and modular according to the desired application. Constraints in the architecture definition were a low computational load and a reduced data transfer between nodes. At the same time, each agent is aware of his or her surroundings and can pursue both local (owners) and global goals. The test bed, developed at the Polytechnic of Bari in cooperation with my Hermes company, for a Smart-city project financed by the Ministry of Research and Education, is presented. The system is aimed at the creation of a calibration and control system for electronic water meters. In details the tested here presented is aimed at evaluating an intelligent anti-freezing system, based on a

multivalent architecture where a fuzzy controller unit is present as decision support.

#### 4. PROPOSED SYSTEM

The proposed system keeps track on the parameters such as moisture, temperature, humidity, rainfall, gas content and earthquake intimation with the help of the real time sensors. These parameters are continuously monitored by an open source platform called Thingspeak for an interval of every 2 minutes. The data can be viewed in any one of the three formats such as JSON, XML and CSV. The sensors in the proposed system collect the data such as the temperature, humidity, soil moisture, pollution level, rain water level and movement in the earth surface. The Wi-Fi network helps in the process of sending the collected data to the open source platform, Thingspeak. Alternate to that, an app is made for the purpose of viewing the collected data in even more easier manner. Through the application/Thingspeak, the user will be able to know about the status of his/her own agricultural land and counter-measures can be taken after the keen observation of the parameters of the land.

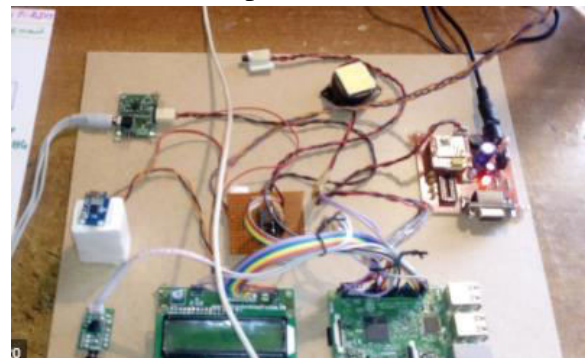


Fig.4.1. Hardware kit image.

The main role of updating data continuously is done by Thingspeak, which has APIs for collecting data produced by sensors and APIs for reading that data from applications. The paper is divided into two parts. One part of the paper is where one has to program a thing to send data. And, the second part is where the other has to see the data. Thingspeak sits in the middle and makes it handy to do both. The paper uses easily accessible hardware to build a proof-of-concept IoT system to monitor air temperature, humidity, soil moisture, soil humidity etc. Further this can be modified with different sensors or actuators for building something for individual purposes. Thus a direct access to all the environmental parameters is given to the user after the above stated procedure is completed.



**Fig.4.2. OUTPUT in thingspeak.**

## 5. CONCLUSION

The paper presents an architectural scheme and a protocol for implementing a network of SBCs hosting cooperating intelligent agents [40]. In this specific case, the system,

based on 10 SBCs of the Arduino-Uno type, has been used to control a test system for electronic water meters carried out as part of a SMART CITY project. The system is scalable and modular and can integrate both agents equipped with sensors and/or actuators, but also computational units always based on simple and low-cost boards able to communicate via I2C bus. The possibility of sharing goals among agents makes both local and global optimizations possible and simplifies both the external communication of global states (test results but also errors and anomalies), but also from outside the system by redefining global objectives. Local objectives can also be modified externally or seen as local functions that are included in the definition of global objectives.

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## MULTI-LEVEL SMART PARKING SYSTEM

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### ABSTRACT:

The proliferation of the variety of motors is leading to troubles of vehicles parking at the precise area specially the automobile parking. This not directly results in website visitor's congestion. This is because of the fact that present day-day transportation infrastructure and automobile park facility are not capable of deal with the advent of a massive number of vehicles on the road. A fundamental hassle in everyday life is parking of cars specially the car parking at the suitable region. And this problem in a roundabout manner outcomes in site traffic congestion. This paper affords the simple concept of using server or cloud-based totally clever parking services in clever cities as an important software of the Internet of Things (IoT) paradigm. This device permits improvising the control of parking device through following rules of the authorities, for example dealing with outstanding parking areas within the metropolis. The instinct of imparting this paper is to reduce clever city problem along with the web site visitors on road and decreases the pollutants inside the town and the parking. The various steps involved in this operation are vehicle identity the use of RFID tags, free slot detection using IR sensors and fee calculation is achieved on the basis of the duration of parking and that is accomplished with the help of the real-time clock.

**Keywords:** *IOT (Internet of things), IR sensor, Smart parking, RFID, tags, Online registration.*





## 1. INTRODUCTION

Traffic congestion due to cars is an alarming trouble on a worldwide scale and it's been developing exponentially. Car parking hassle is a primary contributor and has been nonetheless the main trouble with constrained parking regions in city cities. Searching for a parking area is a normal (and often frustrating) hobby for lots of humans in cities around the sector. This seeks burns approximately a million barrels of the sector's oil every day. Any citizen may also use his cellular tool, a laptop having the Internet to get admission to the clever metropolis application from anywhere in the international to find an free parking spot within the metropolis and get to recognize the which parking spot continues to be to be had. It affords inexperienced automobile parking management via some distance-flung parking spot localization and fast car retrieval. Presently, Car parking system is based totally on a

reservation foundation, but, this device has a drawback in phrases of time and region. This task management device can be grouped into multi-parking manipulate which can be used to govern each outside and indoor parking location and single parking control which commonly objectives indoor parking plenty. A parking zone need to provide customers enough areas to park their automobile on the grounds that automobile plays a massive position in transportation, there's want for locating out parking place to park the cars. By growing a trendy device, it can help manage and decrease the street traffic. A new tool facilitates clients to hold time in finding a parking spot. The Internet of Things is about putting in one of a kind sensors like ultrasonic sensors; active and passive RFID, and so on.

## 2. RELATED STUDY

This enhances the individual to test the recognition/availability of parking regions in advance than



putting their journey. Here the venture is to apply the winning belongings in most suited level to reduce the looking time, web site visitor's congestion inside the metropolis. Some embedded systems collectively with auridino, raspberry pi, ARM 7. Are used to expand internet of things applications. A few contemporary parking device which makes use of sensors to accumulate the records but the use of sensors like video sensors in a parking system are expensive so our purpose is to growth a machine with much less fee with extra overall performance. As the range of population improved within the metropolitan towns, the want of vehicles additionally were given increased. Ultimately, it causes issues in parking which leads to traffic congestion, using force frustration, and air pollution. When we go to the only-of-a-type public places like Shopping branch shops, multiplex cinema hall &

accommodations throughout the competition time or weekends it creates quite a few the parking trouble. According to the modern research determined that a cause force takes almost 8 mins to park his vehicle because of the fact he spends more time searching the parking slot. These looking outcomes in 30 to forty% of visitor's congestion. Here we're going to see a manner to lessen the parking problem and to do secured parking using the clever parking device. The parking device is designed on this type of manner that it's miles applicable for blanketed parks, open parks and avenue facet parking. The fig.1 suggests the cloud-primarily based absolutely IOT structure for smart parking device which includes cloud provider which presents cloud garage to maintain records about the reputе of parking slots in a parking vicinity and so on. The centralized server which manages to keep entire clever parking structures statistics



collectively with amount of slots, availability of motors and plenty of others. And this statistics might be accessed through a few secured gateways thru network.

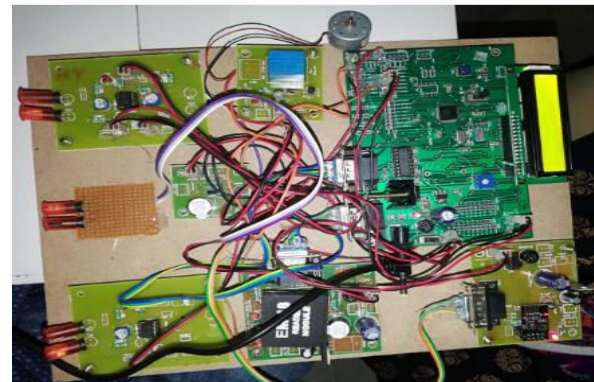
### 3. AN OVERVIEW OF PROPOSED SYSTEM

Moving in the direction of smart metropolis, clever parking is a very good instance for a not unusual citizen of the way the Internet-of-Things (IoT) can be efficiently and correctly utilized in our everyday existence to offer distinctive services to special customers. Proposed software is person friendly or even non-technical character can use it via mobile device. Through this utility consumer can search an unfastened parking slot from everywhere in the global. Proposed system gives properly-prepared vehicle parking management thru remote parking spot localization. Conventional reservation based vehicle parking approach has a hindrance of space and time. Proposed smart parking

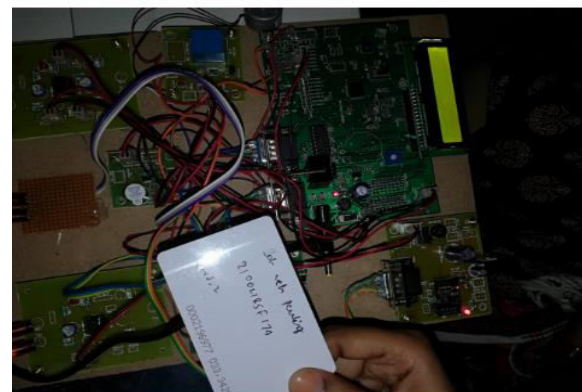
machine presenting the unfastened parking slot efficaciously that saves time and gas and reduces atmospheric pollution and congestion in towns. IOT primarily based new Parking platform allow to connect, analyze and automate records amassed from gadgets, and execute efficaciously that makes clever parking viable. Cloud storage is a cloud computing version, in which information is stored on faraway servers accessed from the net, or “cloud” [9]. It is maintained, operated and managed with the aid of a cloud storage service issuer on garage servers which might be built on virtualization techniques. For a few pc proprietors, finding sufficient storage area to hold all of the data they’ve received is a real mission. Some human beings put money into large hard drives. Others select external garage devices like thumb drives or compact discs. Desperate computer owners might delete entire folders well worth of antique

documents to make area for brand spanking new records. However, some are deciding on to depend upon a developing trend: Cloud storage. The controlling device of the entire system is a Microcontroller. Wi-Fi module, IR sensors are interfaced to the Microcontroller. IR sensors are fed as enter to the Microcontroller. The Microcontroller techniques this statistics and transmits over Wi-Fi, on the way to be obtained from MOBILE. In attaining the venture the controller is loaded with an application written using Embedded „C“ language. The user who wants to park the automobile is hooked up to the Wi-Fi community of that precise parking lot thru the password. The IR sensors ship the status to the microcontroller in which the data processing is completed. The microcontroller sends data to the webpage approximately the status of the slot to the consumer the usage of IOT.

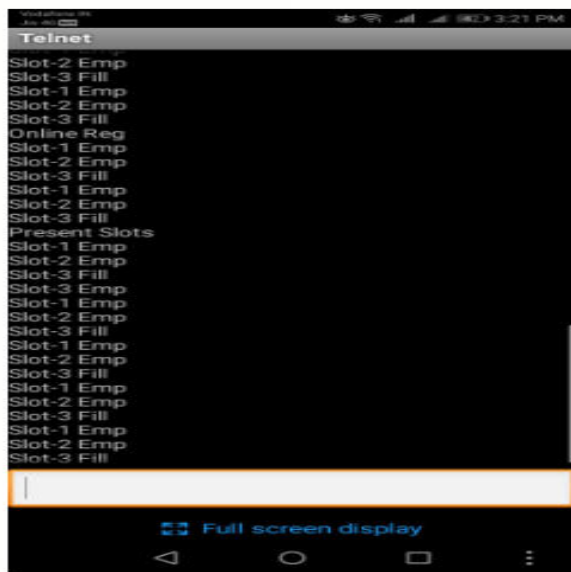
This manner the consumer can without problems discover a parking spot with none congestion and in much less time.



**Fig.3.1. Working model.**



**Fig.3.2. RFID card using for Online registration.**



**Fig.3.3. Output results across Telnet app.**

#### 4. CONCLUSION

Our device minimizes the parking prepared time in a big-sized parking facility. It additionally enables in maximizing their venue era for the parking facility proprietors. It would possibly moreover help lessen the need for manpower in the parking facility which would greatly reduce the value and mistakes of the technique. Also, this technique ought to decrease the usage of paper making sure a green device. This portray can be in addition prolonged to the reserving of parking's lots

over a time frame from growing. The cellular software can be extended to different operating systems which consist of iOS, Windows, and so on. In the server, offerings may even be extended to the protection measures together with hearth, theft, and so forth.

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# Field Programmable Gate Array Implementation for Highly Secured Palm Print Authentication

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To guarantee individual ID and profoundly secure recognizable proof issues, biometric innovations will give more prominent security while improving precision. This new innovation has been done lately because of exchange misrepresentation, security breaks, individual ID, and so on. The excellence of biometric innovation is that it gives an exceptional code to every individual and can't be duplicated or manufactured by others. So as to conquer the withdrawal of finger impression frameworks, this paper proposed a palm-based individual distinguishing proof framework, a promising and new research region in biometric recognizable proof frameworks in light of their uniqueness, adaptability and a quicker and wide scope of utilitarianity speeds. It gives higher security on biometric unique mark frameworks with rich highlights, for example, wrinkles, constant brushes, mainlines, details focuses and single focuses. The fundamental motivation behind the proposed palm unique finger impression framework is to actualize a framework with higher exactness and speed up palm unique finger impression acknowledgment for some clients. Here, in this we presented an exceptionally ensured palm print recognizable proof framework with intrigue extraction territory (ROI) with a morphological procedure utilizing a two-way un-crushed or course vector (UDBW) change to separate low-level palm fingerprints enrolled capacities for its vector work (FV) and afterward after correlation is by estimating the separation between the palm transporters and the capacity of the palm and the capacity of the enlisted transport line and palm control. The after effects of the recreation show that the proposed biometric recognizable proof framework gives more noteworthy precision and solid distinguishing proof speed.

**Keywords:** Field Programmable Gate Arrays, Verilog, Personal Identification, Finger Print Recognition, ROI, Recognition Rate.

## 1. INTRODUCTION

Individual biometric acknowledgment is generally acknowledged in the organized network, supplanting passwords and keys in view of their unwavering quality, uniqueness and developing interest for security. Regular strategies utilized are fingerprints and faces, however for facial validation, individuals are as yet taking a shot at the issue of lighting and lighting, as fingerprints don't have a decent mental impact on the client because of their broad application in criminal examinations. In the event that any biometric strategy is to prevail later on, it should have highlights of selectiveness, precision, riches, simplicity of procurement, dependability or more all client acknowledgment. Palm print dependent on close to home character is a broadly acknowledged new biometric strategy and has

all the characteristics important to make it a piece of our every day lives.

This paper analyzes the utilization of palm fingerprints for individual distinguishing proof utilizing waves. Palm print has extraordinary data accessible on fingerprints, however it has an a lot bigger measure of detail as far as principle lines, wrinkles and overlap. Also, it tends to be effortlessly done alongside a unique hand metric structure, in this way shaping an exceptionally exact and dependable biometric-based individual distinguishing proof framework. Individual check dependent on his palm print. It has become an inexorably dynamic research subject throughout the years. Palm printing is educational and has likewise been dissected.

Our prejudicial highlights, for example, where wave transformation has been utilized have been invigorated to extricate the advantage of exploring the adequacy of utilizing a mix of various waves to examine the tissue of

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palm prints. Individual personality is wherever in our every day lives. For instance, we frequently need to demonstrate our character so as to get to the financial balance, enter an ensured site, pull back money from an ATM, sign in to a PC, etc. Generally, we distinguish ourselves and get entrance via conveying travel papers, keys and access cards, or by recollecting passwords, PIN codes and PIN numbers.

Shockingly, identifications, keys and allows can be lost, copied, taken or overlooked. Passwords, mystery codes and PIN numbers can without much of a stretch be overlooked, contacted, shared or took note. These weaknesses or inadequacies in customary individual recognizable proof systems have made critical issues for all concerned. For instance, programmers regularly upset PC systems, and charge card extortion is evaluated at billions of dollars a year around the world. The expense of overlooked passwords is high and speaks to 40–80% of all IT help work area calls and reset determinations that have been lost or hacked cost up to \$340/client/year. Hence, solid, dependable and secure answers for individual character must be tried to address the deficiencies of customary procedures that can affirm that somebody is by and by the individual who professes to be him.

Biometrics are a remarkable and quantifiable component or human element of programmed recognizable proof or check. Singular check can be done by biometric distinguishing proof by measurable investigation of organic qualities. This capacity can be quantifiable physical, for example, the eye, face, finger, hand or conduct picture, for example, the unmistakable beat and musicality of composing.

Notwithstanding expanded security, biometric frameworks additionally improve ease of use by encouraging the need to plan and recall various complex passwords. No big surprise extraordinary frameworks have been brought into applications as different as U.S. visits and access to Disney Park, Orlando.

Despite the fact that law authorization offices around the globe have been utilizing robotized unique finger impression based biometric distinguishing proof frameworks (known as AFIS) for over 40 years, biometric ID remains amazingly troublesome. The biometric framework should address high picture issues (non-membership), non-separation (constrained mistake rates), huge contrasts in the class (pseudo-repulsive) and tricky reenactment assaults (framework security). In this way, it is important to structure a reasonable framework to control the individual rapidly and consequently.

Different specialists have made biometric confirmation models subject to different spatial and change strategies. Reference [1] proposed another calculation for changed assembling of low-goals palm prints. Notwithstanding, comfort is the standard lines obliged by its position and thickness. The fundamental lines are picked and

are portrayed by their position and thickness. A lot of controlling identifiers is proposed to expel the key line. Utilizing these pointers, the initials are detached from the potential line of the significant lines, and dependent on the initials of the potential artistic style ousted, the whole standard lines are expelled utilizing a dull framework. Near to data about the detached piece of the standard line is utilized to pick the appearance on experience, and a fitting line locator is picked to evacuate the going with bit of this ROI fundamental line. Following to discharging the standard lines, there are several guidelines for mentioning palm print. Reference [2] is another way to deal with remove a limit, a genuine coding intend to choose the palm impression. This graph isolates track information from palm lines and stores it in competition rules. Angaciated planning is organized with effective execution to consider genuine pictures. The outright control execution time is around 1 s, which is snappy enough for steady applications. The proposed coding system was evaluated using a database of 7,752 palm-printed pictures from 386 unmistakable palm trees. To check, the proposed procedure can work with a 98.4% high real affirmation and low fake affirmation of  $3 \times 10^{-6}$ .

Dai et al. [3] offer a high-goals way to deal with palm print acknowledgment with different highlights of the concentrate. Highlights, for example, details, thickness, direction and fundamental line extraction work are taken. To gauge the data, the DFT is utilized and radon-based steering is assessed. Particulars wilderness channel separate is utilized to improve brushes as indicated by the bearing of neighborhood slopes and thickness. Thickness cards are determined utilizing a composite calculation, gabor channel, Hough transformation. The concentrate is outfitted with the principle line court change utilized. The checking, confirmation and framework is utilized as a methods for incorporating the confirmation framework and the proposed proof base for the recognizable proof framework. References [4] and [5] recommended checking palm prints dependent on solid line direction. Radon Conversion Modification Ltd. has been utilized to extricate the capacity, which removes the street work. To coordinate the test picture with the preparation picture, text style coordinating innovation was utilized dependent on the pixel-to-run calculation. Reference [6] proposed online the character of palm print. The proposed system takes palm prints on the web and uses low-objectives pictures. A channel is used with low traffic and periphery following during the pre-planning stage. The gas exhausting ring channel used to expel the limit and encode the Gabor 2D stage is used to address this limit. Conventional hing space is used to facilitate.

Reference [7] proposed a unique determination framework by presenting an estimation of widespread surface capacity and identification of nearby focal points. Our similar investigation of palm print work extricate shows that



palm print examples can be all around portrayed through surface, and surface vitality estimation conveys a critical contrast between various classifications while keeping up high storing inside range. Evaluated crude as indicated by the compelling worldwide surface highlights and important to lessen the quantity of tests for additional treatment at a decent level. The best match-based match is aimed at improving framework proficiency. Reference [8] a successful ordering and quest plan for the picture database to encourage snappy database recovery when the palm print database is enormous. There are three principle issues to consider: include extraction, ordering, and coordinating. When all is said in done, highlights separated from the picture database are regularly connected with unique pictures, for example, hars. The best match is looked for in a layered way, where a capacity is first chosen to lead the pursuit by decreasing the quantity of competitors. At that point, different capacities are utilized to lessen the gathering of competitors. This procedure is rehashed until the conclusive outcome is resolved based on the pre-defined coordinating models. The selection of highlights assumes a significant job in viable hunt. A compelling activity choice framework ought to bar the most inconceivable applicants, think about effectively and require less extra room. Reference [9] Recommended confirming printing utilizing combination of wave-based portrayals. Added substances are surface capacity and line capacities. In the proposed pre-preparing framework, low pass filtration, fracture, fixed point mode, change and extraction approach. OWE is utilized to separate the capacity. Match focuses for texture and text style capacities are made independently and in shared modes. The weighted sum rule and item rule are utilized to coordinate the outcome level. Reference [10] Proposed a high-exactness palm print acknowledgment framework dependent on precise extraction. Pre-handling is shaped by dividing a picture from the foundation. To improve picture quality, nearby frequencies and neighborhood rules are evaluated. The nearby direction is assessed utilizing a unique mark tilt-extraction approach, and neighborhood frequencies are evaluated by ascertaining the quantity of pixels between two sequential dim tops along the ordinary course to the foot of the nearby slope. The particulars work is removed in the extraction and capacity stage. To extricate particulars capacities, setting sifting is applied with gabor separating strategy. The Minutiae chamber code was utilized to coordinate particulars capacities.

Reference [11] is a requesting procedure that can either use either a biometric organize starting at now in the biometric system or use another free match. Rundown codes for each technique are made using a match. During recuperation, the test list code is stood out from the code in the show using the Equality Scale to recoup the summary of contender for biometric planning. The requesting development proposed on a dependable intelligent media database

lessened request space by a typical of 84% by copying by 100%. The most huge factor for speedy distinctive confirmation was the record consideration rate. To overcome all the disadvantages of the above works developed by many authors, here we are supposed to introduce a highly secure biometric authentication system with palm printing using UDBW adapters and morphology return extract. Software hardware implementation provides a software system, and even greater implementation. Equal death penalty creates maximum backup pipe algorithms in time.

There are two types of hardware design techniques. A common application of specific integrated circuits (namely isaas hardware software), such as the design of digital signal processors, is described in full custom hardware and Field Program Gate Arrays (FPGA). The full custom design offers the highest performance, Isaac Kompanniss, with extremely high development costs and so on. During design and design, Isaac Plus can't be changed much. Isaac's design in large quantities of industrial applications.

The chip fabric created around makes it a problem. There are 10 types of hardware and a computer between design and presentation, according to Isaac. 10 custom laptop, C or collection code for the best monitoring, usually with this program. It is a very complex picture of the scientific specialization of nature, which performs intensive tasks. Electronic storage hardware design, but rarer than the will to know that the alternative track design curve is higher on FPGA technology such as equality and pipe-like hardware design techniques, which is not a custom DSP capacity design. Imaging Rikonforbla on algorithms for the market value of stop-work devices, so faster and simpler troubleshooting and verification of the Potting complex. So the system implementing real-time image processing alternative is FPGA [12].

## 2. METHODOLOGY

Here in this section, we described the proposed palm print authentication model using hybrid process and UDBW transform [13]. Figure 1 shows that the proposed model for palm print authentication, in which we had three modules [14]:

- (1) Edge detection
- (2) Registration process
- (3) Testing
- (4) Palm matching

### A. Registration

In this module input palm image will be registered by applying region of interest with morphological operation there by calculate the distance transform and then extracting the low level features using 3-level UDBW transform. After getting the UDBW coefficients, statistical computation will be done by taking the mean and variance of the decomposed coefficients. Then all the statistics will be stored in a vector to make a train feature vector.

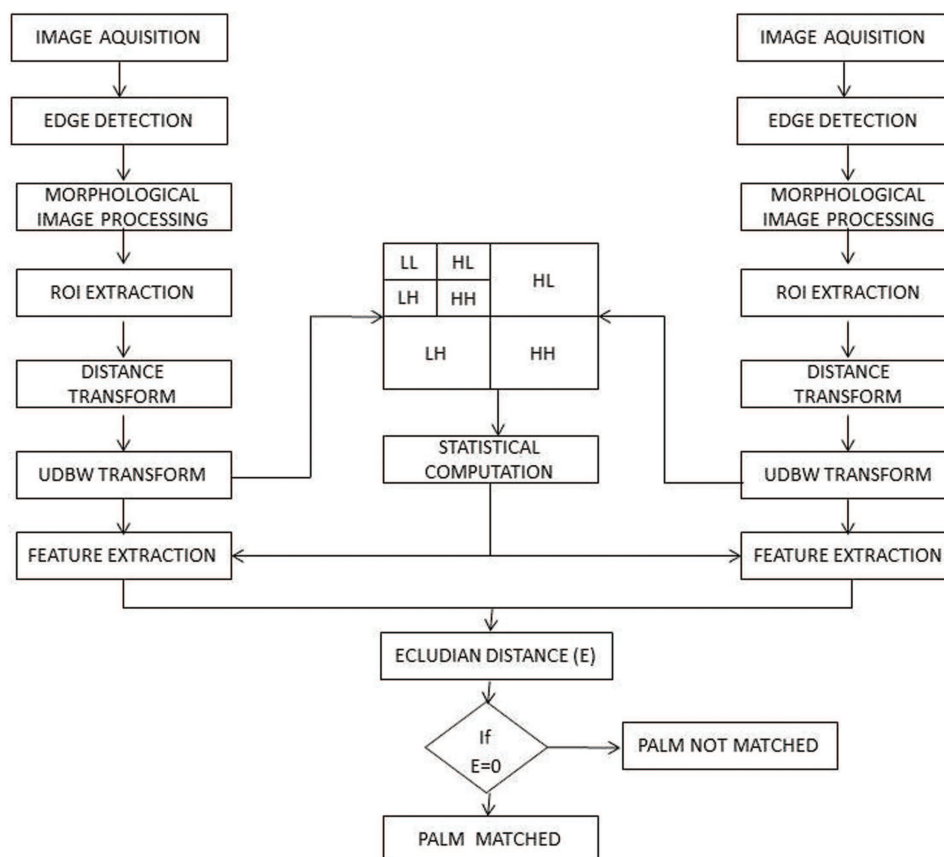


Fig. 1. Flow chart of proposed palm print authentication system.

### B. Morphological Operation

Binary images can contain many shortcomings. In particular, the binary areas produced by a simple threshold of noise and texture are distorted. Morphology seeks to achieve the objectives of eliminating these shortcomings by taking into account the shape and structure of the image.

### C. ROI extraction

The area of interest is a selected subset of the sample in a data set characterized by a specific goal. This can be used in many applications such as medical imaging, tumor boundaries can be determined on an MRI or CT image to measure its size. The endocarpal limit can be determined on an image, possibly at different stages of the heart cycle, for example the final sewing chair and final diatol, in order to assess the function of the heart. In GIS, ROI can be considered literally as a polygonal choice from a 2D map. In computer vision and visual character recognition, ROI determines the boundaries of the object under consideration.

### Distance Transform

The spacing adapter is a trigger that can only be applied to binary images. It results in a gray-level image that looks the same as the input, except that the gray level density of the points within the foreground areas

changes to show the distance to the nearest limit of each point.

### D. UDBW Transform

The non-lethal dual-doom shift is well used to analyze multi-resolution analyses due to multiple sizing functions, i.e., two scaling functions to generate wave filtering banks for degradation and reconstruction separately. It will provide more effective decomposition coefficients due to multiple sizing. In the case of the calendar, we have a hierarchy of rounding area and perpendicular degradation. This makes us use two filtering sequences for degradation and reconstruction. Therefore, we need to build two different wave functions and two different scaling functions.

#### a. Testing

The second module in the proposed system is testing process which includes that the database palm image will be selected for testing with the registered palm image by applying morphological processing; ROI extraction, distance transform and UDBW transform there by calculating the statistics to get the test feature vector.

#### b. Matching Process

In this step, Euclidean distance will be calculated between both the feature vectors i.e., train and test to obtain the most matched image that is stored in database

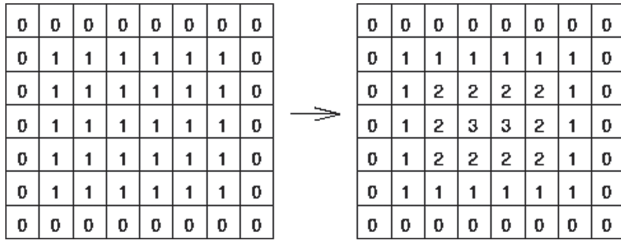


Fig. 2. Example of distance transform with chessboard metric.

to found that whether authorized person’s identification is available or not. If the distance is zero then the person will be identified otherwise it displays that the match not found.

**3. SIMULATION RESULTS**

The code has written in Matlab and Figures 3–5 shows the output results of the system. Figure 6 shows the wave form for the FPGA implementation of the system generated

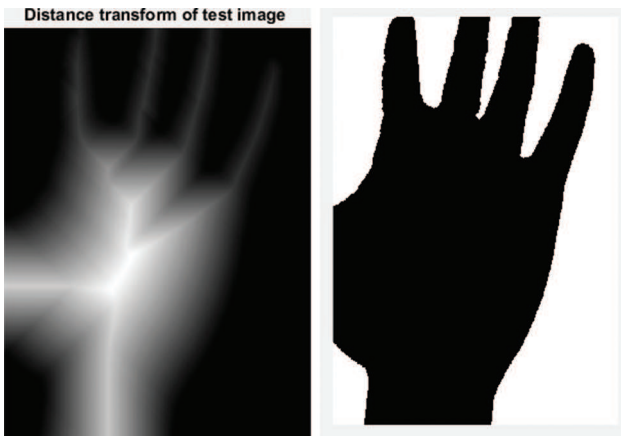


Fig. 3. Out put results.



Fig. 4. Out put results.

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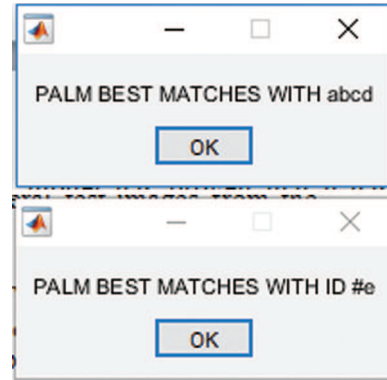


Fig. 5. Out put results.

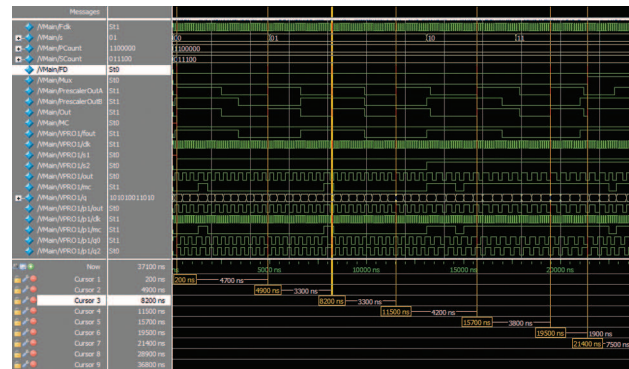


Fig. 6. Output wave forms in modelsim.

Table I.

Design parameters	This work
Process ( $\mu\text{M}$ )	0.18
Supply voltage (V)	1.5
Maximum frequency (GHz)	5
Power	0.060 ( $\mu\text{W}$ )

using modelsim. Table I shows the synthesis results generated in Xilinx.

**4. CONCLUSION**

Here, we introduced a novel and highly secured biometric authentication model with palm print identification system using morphological ROI extraction with distance transform and undecimated biorthogonal wavelet transform. Due to its multi scaling functionality, two different wavelet filter banks will be used to extract the features of distance transformed image to obtain the most effective feature factor for comparing with a test feature vector. The proposed model has proven that it has achieved 100% accuracy with several test images from the database.

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# An Effective Ir Based Satellite Communications With Deep Learning Methodologies

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## **Abstract**

*This paper proposes an obstruction affirmation technique reliant against profound learning for satellite interchanges. Purpose of this paper is via improve precision of obstruction affirmation through profound learning strategies. Via begin with, we use arrangement of convolutional neural network (CNN) via expel structures after dissimilar types of impedance gesture; aside then we decline dimensionality of geographies over strategy for multidimensional scaling (MDS). At former we pass structures via support vector machine (SVM) and acquire course of action outcome. Eventual outcome of assessments demonstrations that anticipated framework can accomplish an incredible gathering accuracy.*

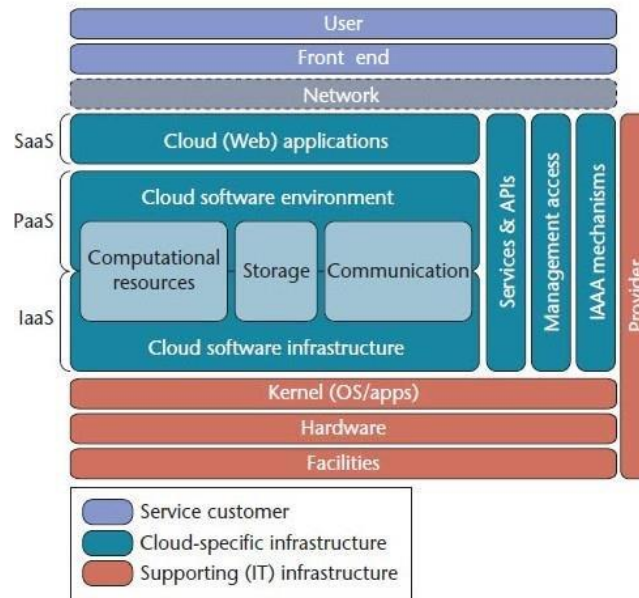
## **Keywords**

*Interference Identification; Deep Learning; Convolution Neural Network; Support Vector Machine; Satellite Communication, Applied Computing, Internet Telephony.*

## **I. INTRODUCTION**

With headway of correspondence advancement, satellite correspondence system resolve go up against continuously complex electromagnetic condition & more classes of obstruction signals. via face among tangled obstruction signals, it is basic via recognize classes of impedance hails before using against obstruction measures.

Applied computing is investigation of both hypothetical & applied software engineering. ... Therefore, applied computing graduates remain balanced among hands-on specialized aptitudes expected via do an assortment of IT employments. Applied computing abilities & information include: Current programming dialects & innovation.



At present, ordinary sign planning procedures & DEEP LEARNING systems remain totally applied via impedance acknowledgment [1]. Customary sign taking care of methods, for instance, cyclic range figuring & high-demand cumulates count, all take noteworthy employments against impedance affirmation. Signal planning computations based cyclic range assessment has extraordinary execution against controlling commotion [2]. High-request cumulates (HOC) counts use quality of Gaussian uproar that its third-demand cumulates & higher remain enduring zero, so HOC estimations have incredible foe of upheaval execution [3].

Obstruction affirmation issues remain from a general perspective structure affirmation issue, for clarification that a great deal of DEEP LEARNING computations for plan affirmation can endure applied via impedance affirmation issues. Support Vector Machine (SVM) is a bye & large used model affirmation count for course of action & backslide assessment, & is a characterization of managed learning models [4].

Starting late, aside righteousness of strong computational breaking point, a different sort of DEEP LEARNING named significant knowledge originates via endure structure. Appeared differently in relation via standard DEEP LEARNING strategies, significant learning has more grounded data taking care of limit, continuously versatile, & snappier quickness at assessment period. Yet unmistakable significant knowledge estimations have stood realistic via hail affirmation & alteration affirmation, they remain now & again applied via obstruction affirmation. Current assessment also just unite significant learning counts among standard DEEP LEARNING estimations. At this moment, solidify CNN, a significant learning system,

among SVM which is a standard DEEP LEARNING process for obstruction affirmation. We resolve use CNN via isolate go geographies, subsequently a gentle of dimensionality decline count; we refer structures via readied SVM classifier. Highlights of our responsibilities right presently remain delineated as follows:

- 1) Greatest explores gather CNN assembly for request, yet we relate CNN via remove impedance structures. We correspondingly begin via stand out in taking significant learning methodologies for impedance affirmation at satellite correspondences clarification.
- 2) We join standard DEEP LEARNING methodologies among significant learning strategies for impedance affirmation & result shows that this blend gains mind boggling ground.
- 3) Moreover, we produce an obstruction dataset over reenactment exertion. We find 5 sorts of impedance indications at altered transistor of adhering via disturbance, which can endure applied for extra assessment.

## II. PROPOSAL METHODOLOGY

### 2.1 Convolution Neural Network (CNN)

Convolution Neural Network (CNN) is greatest notable significant picking up building against planet right now. CNN is a progression of neural system. Commitment of standard neural system is a solitary trajectory; aside then it resolve endure prepared over a movement of hid coatings. Previous sheet is assigned "yield layer" & address game plan result[7]. Rather than standard neural system, commitments of CNN have at any rate 2 estimations; covered layers contain in any occasion 3 estimations. Thusly, CNN can manage dynamically confounded issues, for instance, picture getting ready.

CNNs execute a limited accessibility plan amongst neurons of adjoining sheets as trail representation appears:

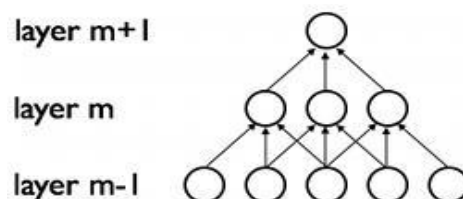
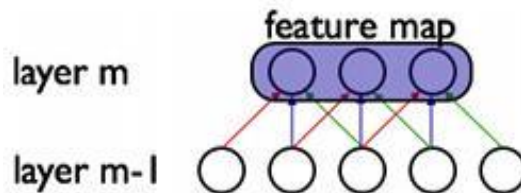


Figure 1. Sparse connectivity

Such neighborhood accessibility sheets remain weighted via non-direct "channels" which can end up being progressively around world.

### 2.1.1 Shared weights

In each convolutional layer, channels remain pragmatic via rehash over entire open field. These copied units contain a segment guide & they share comparable burdens & inclination. Structure is showed up as going with:

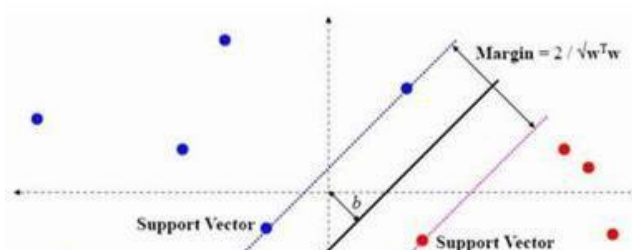


### 2.1.2 Pooling sheet

Despite way that heaps can endure shared during readiness system, proportion of check is as yet huge. Extension of a pooling sheet progressively decreases proportion of calculations & parameters in neural system. Lessening of parameters can moreover help among controlling over fitting. Pooling sheet calculates specific limit estimation of area data system & thereafter replace local this limit regard. Limit used right now most outrageous limit.

### 2.3 Support Vector Machine (SVM)

In SVM, a hyper plane is worked in high-dimensional interplanetary aimed at gathering before relapse [12]. Hyper plane can detach adjacent statistics centers among greatest division for classifier





### Figure 3 the schematic diagram of SVM

Everywhere adjacent planning statistic centers via hyper plane make equal sign set up, & thus they remain assigned "the help vectors", & edge, as ought to via endure self-evident, is given in Figure 3:

#### 2.4 Interference Signal Model

Five sorts of normal obstruction indication in cable correspondence structure remain used right currently solid impedance, narrowband obstruction in comparable band, cleared repeat impedance, spread range & rectangular heartbeat impedance [14].

##### 2.4.1 *Narrowband interference in same band*

Narrowband obstruction happening a comparative group suggests impedance that disturbance of impedance is amassed in a comparable repeat band through correspondence interface & impedance signal has against contrasting repeat gatherings. Narrowband obstruction in a comparative band can endure seen as a zero-mean summarized fixed sporadic system, its two-sided power range can endure made as follows:

$$S_J = \begin{cases} \frac{P_J}{2W_J}, & |f \pm f_J| \leq \frac{W_J}{2} \\ 0, & |f \pm f_J| > \frac{W_J}{2} \end{cases}$$

Narrowband obstruction in a comparable band is definitely not hard via convey & power can similarly endure made enormous.

##### 2.4.2 *Rectangular pulse interference*

Heartbeat impedance insinuates obstruction includes various predictable restricted heartbeat. Expecting that is quadrilateral heartbeat measurement, T is beat excess time frame is beat plentifulness; logical verbalization of beat impedance can endure imparted as follows:

$$n_j(t) = \sum_{n=-\infty}^{\infty} g(t - nT) * A_j \cos(2\pi f_j t + \varphi_0)$$

### 2.4.3 Swept frequency interference

Cleared repeat impedance infers clearing a particular range over some indistinct time period among a narrowband signal. Straight cleared repeat impedance can endure seen as an immediate repeat change signal. outpouring of cleared repeat obstruction is assumed as follows:

$$s(t) = A(t) \text{rect} \left( \frac{1}{T} \right) \exp[j(2\pi f_0 t + \pi K t^2)]$$

Where T is length of cleared repeat impedance, a (t) is sufficiency of sign, is beginning stage repeat signal. Is cutoff repeat. B is information move limit.

## 3. EXPERIMENTS DESIGN

### 3.1 Experiments Design

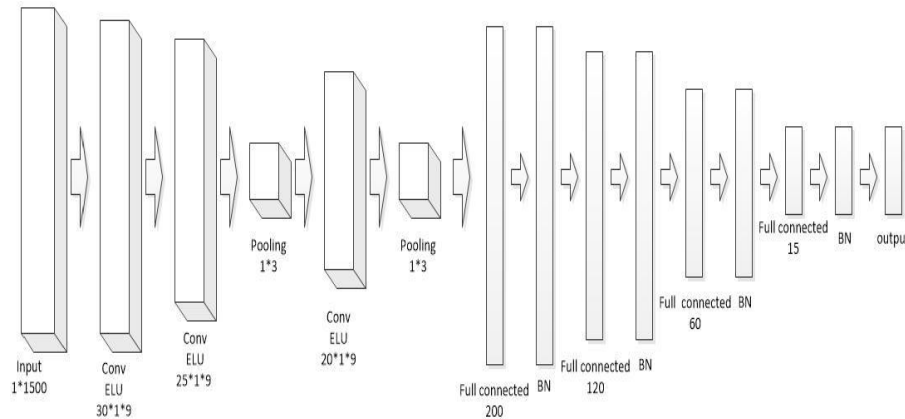
We resolve via enterprise binary examinations: solitary obstruction gathering & combination impedance request. For single impedance plan, five sorts of obstruction signs resolve endure set into white Gaussian clamor condition for gathering independently. In genuine satellite correspondence circumstance, it is hard via get only a solitary kind of impedance, so combination obstruction gathering is required. We enhance interesting 5 sorts of impedance signs via 15 sorts of signs, which join novel 5 sorts of obstruction & 10 combination obstruction among each 2 of cause 5 sorts of impedance.

### 3.2 CNN Structure

The complete CNN arrangement we recycled consumes 15 sheets, which encompass 3 obscurity sheets, 2 assembling sheets, 4 bursting related layers & 4 group normalization layers. Principle sheet is data layer, last sheet is yield layer, second, and third sheet & fifth sheet remain convolution layers. Fourth & sixth

sheet remain pooling layers. Seventh, ninth, eleventh & thirteenth layers remain full related layers. Eighth, tenth, twelfth & fourth layers remain bunch standardization (BN) layers.

**Figure 4 CNN structure**



## CONCLUSION

At present time, novel procedure is proposed reliant against DEEP LEARNING for impedance affirmation against satellite correspondence verbalization. Result of this figuring reveals that our procedure reliant against DEEP LEARNING can achieve shocking execution & has a transcendent energy among instability of JNR. Regardless of way that this methodology has high exactness, multifaceted design of this count is moreover astoundingly high. Future work resolve focus against diminishing multifaceted idea of estimation while keeping precision.

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# CLUSTERING BASED FEATURES SELECTION ALGORITHM

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## ABSTRACT

Identifying a subset of the most valuable features that gives the same results as the whole collection of features is what feature selection entails. A feature selection algorithm can be assessed in terms of both efficiency and efficacy. While efficiency refers to the amount of time it takes to locate a subset of features, effectiveness refers to the subset's quality. This work proposes and experimentally evaluates a fast clustering-based feature selection method (FAST) based on these criteria. The FAST algorithm is split into two parts. Graph-theoretic clustering methods are used to partition characteristics into clusters in the initial stage. Because the properties in various clusters are relatively independent, FAST's clustering-based technique is likely to produce a subset of valuable and independent features. We use the efficient minimum-spanning tree (MST) clustering method to assure FAST's efficiency.

## INTRODUCTION

In general, data mining (also known as data or knowledge discovery) is the act of examining data from various angles and synthesising it into meaningful information - information that may be utilised to boost revenue, reduce costs, or do both. Data mining software is one of several analytical techniques available for data analysis. It enables users to study data from a variety of perspectives, categorise it, and describe the links discovered. Data mining is the process of identifying patterns or connections between dozens of fields in huge relational databases. While large-scale information technology has developed separate transaction and analytical systems, data mining bridges the gap. Based on open-ended user queries, data mining software examines linkages and patterns in stored transaction data. Statistical, machine learning, and neural networks are all examples of analytical software. In most cases, one of four sorts of relationships is desired:

**Classes:** Data is organised into specified groupings using stored data. A restaurant chain, for example, may use consumer purchase data to figure out when clients come in and what they usually order. By offering this information might be used to drive traffic.

**Clusters:** Information is sorted into clusters based on logical correlations or consumer preferences. Data can be mined to find market categories or consumer affinities, for example.

**Associations:** Data can be mined to discover relationships. Associative mining is demonstrated by the beer-diaper example.

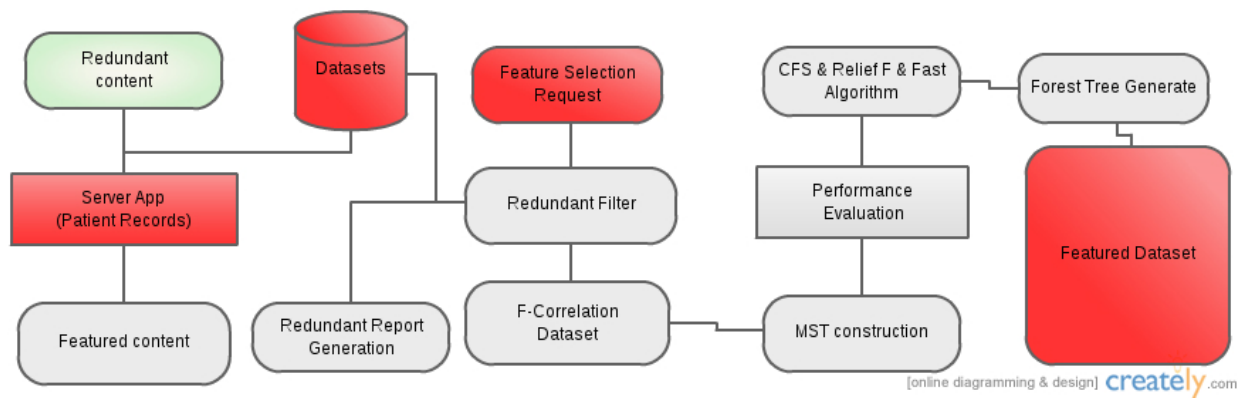
**Sequential patterns:** Data is mined to predict patterns and trends in behaviour. For example, based on a consumer's purchases of sleeping bags and hiking shoes, an outdoor equipment merchant may anticipate the possibility of a backpack being purchased.

## LITERATURE SURVEY

This paper describes efficient methods for exact and approximate implementation of the MINFEATURES bias, which prefers consistent hypotheses definable over as few features as possible. This bias is useful for learning domains where many irrelevant features are present in the training data. We first introduce FOCUS-2, a new algorithm that exactly implements the MINFEATURES bias. This algorithm is empirically shown to be substantially faster than the FOCUS algorithm. We then introduce the Mutual-Information-Greedy, SimpleGreedy and Weighted-Greedy algorithms, which apply efficient heuristics for approximating the MINFEATURES bias. These algorithms employ greedy heuristics that trade optimality for computational efficiency. Experimental studies show that the learning performance of ID3 is greatly improved when these algorithms are used to preprocess the training data by eliminating the irrelevant features from ID3's consideration.

## METHODOLOGY

The practise of detecting and deleting as many unnecessary and redundant characteristics as possible is referred to as feature subset selection. This is due to the fact that irrelevant characteristics do not add to predictive accuracy, and redundant features do not result in a stronger predictor because they supply information that is already included in other features (s). Some feature subset selection algorithms can effectively delete unnecessary features while failing to handle redundant features, while others can effectively eliminate irrelevant features while taking care of duplicate features. The second group includes our proposed FAST algorithm. Feature subset selection research has traditionally focused on finding relevant characteristics. Relief is a well-known example, which weights each feature based on its ability to identify instances under various targets using a distance-based criteria function. Relief, on the other hand, fails to remove redundant features because two predictive but highly associated features are likely to be equally weighted. Relief-F improves on Relief by allowing it to function with noisy and incomplete data sets as well as multiclass problems, but it still lacks the ability to detect redundant features. Figure 1 shows the architecture of the proposed work.



**Figure 1: Proposed system Work Flow**

### THE BENEFITS OF THE PROPOSED SYSTEM INCLUDE:

Good feature subsets have traits that are highly correlated (predictive of) the class but uncorrelated (not predictive of) one another.

- Get a decent feature subset by efficiently and effectively dealing with both irrelevant and duplicated features.
- By picking only a small percentage of the original characteristics, all six techniques accomplish significant dimensionality reduction.
- The Friedman test's null hypothesis is that all feature selection techniques are equal in terms of runtime.

### RESULT AND DISCUSSION

The efficiency and effectiveness of the FAST algorithm are evaluated through an empirical study. Extensive experiments are carried out to compare FAST and several representative feature selection algorithms, namely, FCBF, ReliefF, CFS, Consist, and FOCUS-SF, with respect to four types of well-known classifiers, namely, the probabilitybased Naive Bayes, the tree-based C4.5, the instance-based IB1, and the rule-based RIPPER before and after feature selection. The results, on 35 publicly available real-world high-dimensional image, microarray, and text data, demonstrate that the FAST not only produces smaller subsets of features but also improves the performances of the four types of classifiers.

The screenshot shows a web browser window titled "Server Form" with a background of binary code. The form is titled "Patient Records" and contains the following fields:

- DataSet Selection :** A dropdown menu with "dataset-1" selected.
- First Name :** A text input field containing "kannan".
- Sex :** Radio buttons for "male" (selected) and "Female".
- Year of Birth :** A text input field containing "23-01-1987".
- Age on Admission :** A text input field containing "26".
- Residence :** A text input field containing "Chennai".
- Admitting doctor :** A text input field containing "kumar".
- Disease :** A text input field containing "Diabetes".
- Disease Group:** A text input field containing "Diabetes".
- Date of Discharge:** A text input field containing "23-01-2013".
- Disease outcome :** A text input field containing "normal".
- Submit** button at the bottom.

Figure 2: Feature selection of the patient

## CONCLUSION:

We describe an unique clustering-based feature subset selection approach for high-dimensional data in this work. 1) eliminating irrelevant features, 2) creating a minimal spanning tree from relative ones, and 3) splitting the MST and picking representative features are all part of the process. A cluster is made up of features in the proposed algorithm. The dimensionality is greatly decreased because each cluster is handled as a single feature. A cluster is made up of features in the proposed algorithm. The dimensionality is greatly decreased because each cluster is handled as a single feature. On 35 publicly available image, microarray, and text data, we compared the performance of the proposed algorithm with that of the five well-known feature selection algorithms FCBF, ReliefF, CFS, Consist, and FOCUS-SF in four different aspects: proportion of selected features, runtime, classification accuracy of a given classifier, and the Win/Draw/Loss record.



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# Public Key Image Encryption for Secured Image Transmission

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## Abstract

For diverse uses, numerous sorts of photographs are communicated through the Internet. Typically, these photographs include personal or private information. As a result, maintaining image secrecy, integrity, authentication, and nonrepudiation throughout transmission is critical. These highly secret data can be changed by an unauthorised individual during data transmissions, resulting in insecurity for the sender. Recent improvements in audio-visual systems and network architecture have made it easier to send and receive multimedia over the internet, while also increasing the security requirements for multimedia data. Extrinsic methods like watermarking are used in traditional visual content security solutions. Extrinsic data communication, on the other hand, isn't always possible. As a result, to overcome the watermarking problem, forensic methodologies based on Public Key Image Encryption are being developed. Many well-known picture source encoders' visual cryptography is used as proof in source coding, which is a typical stage in natural image capture.

## 1. Introduction

Traditional forensic technologies protect multimedia data by using proactive and additive approaches to hide extra information in the original signal. For example, by inserting a digital watermark into the image at the moment of capture, the concept of a trustworthy camera was proposed to make the trustworthiness of digital images accountable.

Changes in the digital watermark can be used to track down any subsequent picture manipulation. In traitor-tracing digital fingerprinting, user identifying information is included in each distributed copy to identify the matched user and find the source of the illicit copies.

When it comes to implementing content protection, extrinsic approaches are typically ineffectual. On the other hand, each copy of multimedia data has its own capture, processing, and transmission technique. To ensure that multimedia data is handled solely for the intended purposes, the data route must be validated by identifying each step: collection, source coding, channel coding, transmission, and any other possible user path.

Extrinsic procedures are employed to protect multimedia content, whereas intrinsic fingerprint analysis is utilised to protect it. Extrinsic multimedia protection entails embedding an additive signal into the picture prior to distribution and making it available to the forensic detector, whereas intrinsic-fingerprint forensics employs the received image in raw format as the forensic detector's only input.

There is some literature dedicated to defining the unique features of each sort of image processing, such as resampling, unusual noise patterns, copy and paste, double compression, and so on. By looking for discrepancies in images, higher order statistics like the bispectrum and bicoherence were utilised to discover contrast shifts like gamma correction and other nonlinear processes.

During the previous several decades, the fast convergence of multimedia signal processing, communications, and networking technologies has sped up the interchange of digital multimedia data and permitted widespread digital media dissemination. Digital photos have been used extensively in news reporting, insurance claim inquiry, criminal investigation, and a number of other purposes.

## 2. Literature survey

Differential image encoders employ spatial filtering to remove redundancy between pixels. This method is still in use today, as seen by video Interframe prediction and lossless JPEG. As a consequence, our forensic system combines all three source coding approaches to form a core technology, as shown in the two diagrams above.

Digital grayscale photos with an eight-bit per pixel resolution were used in this investigation. On the basis of a test image, we develop an iterative source coder identification and verification approach. The first step in the identification process is to see if the image was preprocessed before being compressed.

Then, in the test picture, locate the trace of each feasible source coding scheme and compute its similarity measure (that is, the likelihood that the test image was compressed using this source coding scheme). Then, select the one with the highest similarity score and compute the coding parameters.

Consequently, we exclude this input scheme from our search region, select another proposal with the next highest similarity measure, and continue the classification and parameter estimation operations until we find a solution that fulfils the stopping criteria. The system shows the error message "No source coding scheme identified" if we search the whole list of image coding schemes and none of them pass the verification phase.

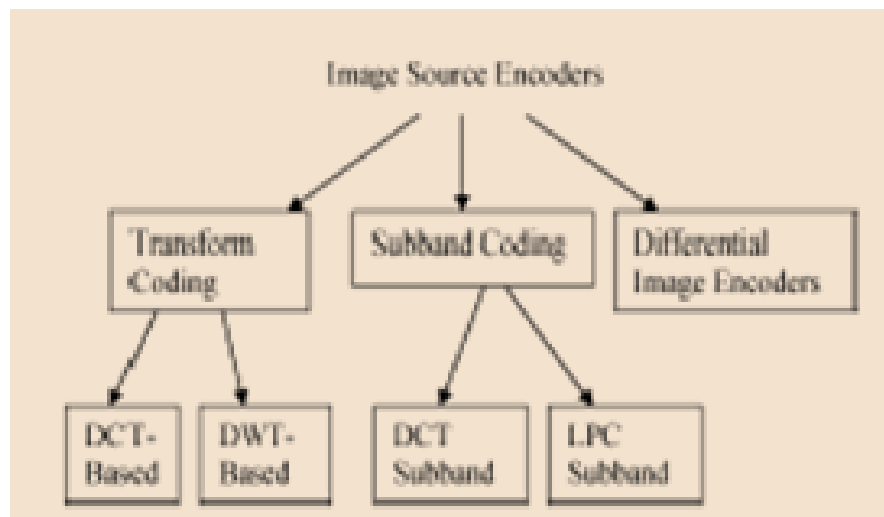
Inconsistency in lighting conditions, geometry invariants, and consistency of camera properties were also proposed for detecting picture alteration. Wavelet-based features were utilised in previous studies to detect photo alteration. Physics-based aspects were created to distinguish photographic images from computer graphics. In order to identify the source of a photograph, pixel flaws and image sensor noise were used to uniquely identify the source camera.

In the absence of the original image, we may use non-intrusive forensic analysis to detect the type of processing module, offering some confidence in subsequent image analysis. The primary purpose of this research is to propose a forensic technique that uses intrinsic fingerprints to detect traces and identify the history of coding operations done on digital images.

### 3. Methodology

We must first handle any image preparation before we can begin the forensic method. Preprocessing detection is an obvious and crucial first step, since any mistakes here might invalidate all subsequent tests. The most common method of image preprocessing is block processing, which is what we'll look at today. Existing work in block processing measurement is not suited to addressing this difficulty due to significant assumptions made about the input data.

The contents of multimedia material must be safeguarded when sent via networks. Extrinsic methods, such as watermarking, are used in image content security strategies. If any preprocessing, such as blocking, was performed prior to compression, what the coding scheme parameters are, and how confident we are in the detection and estimation findings.



**Fig.1 Tree-structure of the image coding forensics system.**

When inverse quantization, the quantized coefficients are increased by the quantization step size. As a result, we may observe peaks in the histogram at step size multiples and zeros everywhere. Consider employing an integrated DWT programmer owing to the truncation and rounding impacts created during reconstruction, as indicated by each embedded coder's algorithm determines the order in which the zero trees are accessed and the coefficients are transmitted.

This study's test images are all digital grayscale photos with an eight-bit per pixel resolution. Based on a test image, we develop an iterative source coder identification and verification approach. The first step in recognising a photograph is determining if it was preprocessed before compression. Then, in the test image, locate the trace of each feasible source coding scheme and compute its similarity measure (that is, the likelihood that the test image was compressed using this source coding scheme).

The forensic detector may then utilise the intrinsic fingerprint of each image source encoder as evidence to figure out which type of source encoder was used after establishing the block size. This section investigates the inherent fingerprints of subband coding, transform coding, and differential image coding. We utilise a similarity measure to evaluate the possibility that this encoder has been used by analysing its fingerprint.

DCT-based data compression is frequently a block-based image analysis approach in which the entire image is divided into non-overlapping blocks of the same size (for example, 8-by-8 in JPEG base-line) and each block is individually edited and compressed. DWT-based source coding approaches generally consider the entire picture as a single block, whereas wavelet transform and decompose it into numerous frequency bands with varied statistics.

The existence of histogram peaks, which is an intrinsic fingerprint of transform coding, is a substantial difference between the transform coefficient histograms of transform-compressed and non-transform compressed pictures, and we'd want to use a distance metric to characterise this difference. Our goal is to compare the observed picture's transform coefficient histogram to the nontransform compressed image's transform coefficient histogram.

#### 4. Result and discussion

Because residues are quantized in the integer DCT domain, if we compute the residue correctly, we should receive the same histogram peaks as transform coding. Furthermore, the decrypted picture's boundary pixel may be exposed to linear filters to reduce the blocking effect, changing the value of reference samples in the decoded image.

Finally, think about integrating a DWT programmer. Each embedded coder has its own mechanism for determining how to visit the zero trees and convey the coefficients. Because the coefficient values are bitplane encoded, the transform coefficient histogram of the previously compressed picture will contain peaks at the required reconstruction values as well, but not necessarily equally spaced. The coefficient histogram of an SPIHT-coded picture in the level-4 LH subband with a bit rate of 1.0 bit per pixel is shown in the figure above.

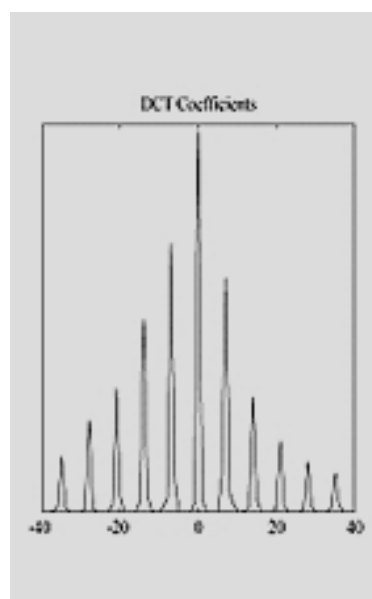
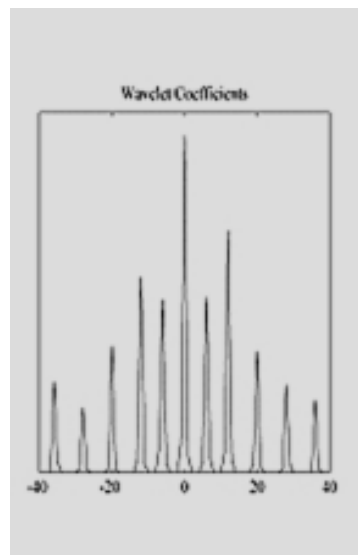


Fig.2 DCT coefficient histogram



**Fig.3 Wavelet coefficient histogram**

## 5. Conclusion

We provide a forensic methodology based on Public Key Image Encryption for identifying the compression method used to compress a digital image, as well as parameter estimates and a confidence measure for the projected coding scheme. Our forensic detector requires no information other than the decoded image at the receiver since we examine and probe the unique Public Key Image Encryption of the image source encoder embedded in the received picture.

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# Robust Auto White Balance System for Real-Time Video Capturing

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## Abstract

To match the brightness of the scene, the Auto White Balance system of a video camera selects the optimum aperture size, gain setting, and exposure length. Although CMOS (Complementary metal oxide semiconductor) technology has enabled techniques such as automated white balance and automatic exposure, sophisticated systems to quickly determine the right exposure when users change the scene are absent. The problem becomes more serious when sections of the recorded video frame are overexposed or underexposed. The suggested system includes a robust AWB approach for real-time video capture. This includes a well-designed control flow as well as some heuristic approaches for changing exposure and evaluating scene brightness. To produce a more accurate estimation of scene brightness, the system adaptively selects appropriate sensor operational modes. Devices to detect moving objects and fluorescent light flicker are also included in the auto exposure system. The dependable AWB system works well in a range of situations and helps to improve the quality of recorded footage.

## Introduction

The video colour representation is described by the name of the colour model. In NTSC television, YIQ was utilised. It closely resembles the YUV system used in NTSC and PAL television, as well as the YDbDr scheme used by SECAM. The amount of unique colours that a pixel may represent is determined by the number of bits in the pixel (bpp). Chroma subsampling (e.g. 4:4:4, 4:2:2, 4:2:0/4:1:1) is a typical approach to minimise the amount of bits per pixel in digital video.

However video system was originally developed for cathode ray tube (CRT) television sets, several alternative technologies for video display devices have subsequently been constructed. The first usable video tape recorder (VTR) was created by an Ampex research team led by Charles Ginsburg.

PAL (Europe, Asia, Australia, and other parts of the world) and SECAM (France, Russia, parts of Africa, and other parts of the world) standards provide 25 frames per second, whereas NTSC (USA, Canada, Japan, and other parts of the world) specifies 29.97 frames per second. Film is shot at a slower frame rate of 24photograms/s, which makes converting a cinematic motion image to video significantly more difficult. A frame rate of roughly fifteen frames per second is required to create the appearance of a moving image. PAL video format, is typically stated as 576i50, where 576 denotes the total number of horizontal scan lines, I denotes interlacing, and 50 denotes 50 fields (half-frames) per second. When producing a natively progressive broadcast or recorded signal, both the stationary and moving sections of the image have optimal spatial resolution.

## Literature Survey

Understanding the capture, processing, and presentation of colour pictures necessitates knowledge of numerous fields, including image generation, radiometry, colorimetry, psychophysics, and colour reproduction, which are not covered in typical engineering training. Nonetheless, with the advancement of sensor, computing, and display technology, engineers now regularly deal with components of colour imaging, some more frequently than others. This paper is meant for engineers and scientists as an introduction to colour imaging science. It will be valuable for people who are about to enter or are currently working in the field of colour imaging, as well as those in other fields who would benefit from learning the fundamental processes of colour imaging.

This study describes a sophisticated video camera system with robust automated focus (AF), automatic exposure (AE), and automatic white-balance (AWB) management. Even when the scene is obstructed by high light intensity, the suggested AF algorithm determines the right movement direction of the lens and recognises the accurate in-focus condition. The experimental findings show that the suggested system can be a viable alternative to existing systems that use the hill-climbing approach.

For digital still cameras, the suggested method provides rapid and precise auto-exposure capabilities. The number of preview frames and the exposure error are both within 3.5 frames and 3.92 percent under typical lighting circumstances. The number of preview frames and the exposure inaccuracy are both within 8.8 frames and 6.56 percent under high contrast lighting situations. Furthermore, it provides reliable detection for both backlit and excessively frontlit settings at the same time, resulting in optimal exposures to the main object.

This article describes the design and hardware implementation of a video camera with a CMOS sensor that includes a module that combines the functionalities of automated white balancing (AWB) and automatic exposure management (AEC). The capability is provided by the use of dynamic control of sensor registers via the I2C sensor interface. A field programmable gate array is used to process picture data (FPGA). A combined AWB/AEC module with a gate count of 10k can be constructed. The findings show that the integrated video camera provides the needed functionality with a quick response time.



## Methodology

Formal measures like as PSNR can be used to assess video quality, while subjective video quality can be assessed by expert observation. A video processing system's subjective video quality can be assessed as follows:

- Select the video sequences to be tested (the SRC).
- Select the system's parameters for evaluation (the HRC).
- Select a test technique for presenting video sequences to experts and collecting their feedback.
- Invite a significant number of specialists, preferably at least 15, to the meeting.
- Carry out the tests.
- Calculate the average scores for each HRC based on the assessments of the experts.

The ITU-T guideline BT.500 discusses a variety of subjective video quality methods. The Double Stimulus Impairment Scale is an example of a standardised procedure (DSIS). Each expert in DSIS watches a reference video that isn't impaired before watching an impaired version of the same film. The expert then assigns a rating to the impaired video, ranging from "impairments are imperceptible" to "impairments are extremely unpleasant."

## VIDEO COMPRESSION METHOD (DIGITAL ONLY)

Video streams are compressed using a variety of techniques. Uncompressed video streams are inefficient due to spatial and temporal redundancy in visual data. Spatial redundancy is minimised in general by detecting changes between regions of a single frame; this process is known as intraframe compression and is closely connected to picture compression. Interframe compression, which includes motion correction and other approaches, can also minimise temporal redundancy by capturing variations across frames. MPEG-2, which is used for DVD, Blu-ray, and satellite television, and MPEG-4, which is used for AVCHD, mobile phones (3GP), and the Internet, are the most prevalent current standards.

## BIT RATE (DIGITAL ONLY)

The bit rate of a video stream is a measurement of the information content rate. The bit per second (bit/s or bps) or Megabits per second (Mbit/s) unit is used to measure it. Video quality is improved with a greater bit rate. VideoCD, for example, has a lesser data rate of around 1 Mbit/s than DVD, which has a maximum bit rate of 10.08 Mbit/s for video. With a bit rate of around 20 Mbit/s, HD (High Definition Digital Video and Television) offers an even greater quality. Variable bit rate (VBR) is a technique for maximising visual video quality while reducing bit rate. A variable bit rate consumes more bits on rapid motion sequences than it does on slow motion pictures of same duration while maintaining a consistent visual quality. When the available bandwidth is fixed, such as in videoconferencing transmitted on fixed bandwidth channels, a Constant Bit Rate (CBR) must be employed for real-time and non-buffered video streaming.

## SCREENCAST

A screen cast, also known as a video screen capture, is a digital recording of a computer screen output that typically includes audio commentary. Screencast is similar to the related phrase screenshot; although a screenshot is a snapshot of a computer screen, a screen cast is basically a video of the changes on a computer screen over time, augmented by voice commentary. Screencasts may be used to show and teach how to use software applications. Making a screencast is a great way for software engineers to showcase their work.

Educators can also utilise screencasts as a way to incorporate technology into the classroom. On an interactive whiteboard, students may capture video and audio as they illustrate the right technique for solving an issue. Screencasts are also beneficial to regular programme users: They assist in the submission of bug reports by replacing possibly ambiguous textual explanations with screencasts; they assist in demonstrating others how to do a task in a specific software environment.

### Result and discussion

The installation of product software, as the final link in the software production deployment chain, is a huge cost challenge. The Implementation process is divided into four stages: Discovery, System Development, User Acceptance Testing, and Production Rollout. It's easy to become overwhelmed by sophisticated marketing presentations, especially when the sales team is discussing topics that most consumers don't fully comprehend.

These phases of deployment are intended to give clients with a smooth transition from an existing electronic or paper-based system to Sigmund while ensuring that the software accounts for all elements of the client's activities. The Sigmund project team, which includes personnel with clinical, billing, and operations experience, is prepared to oversee the full process, from system requirements collection through implementation.

### Fig.1 Applying Frame grabber Technique

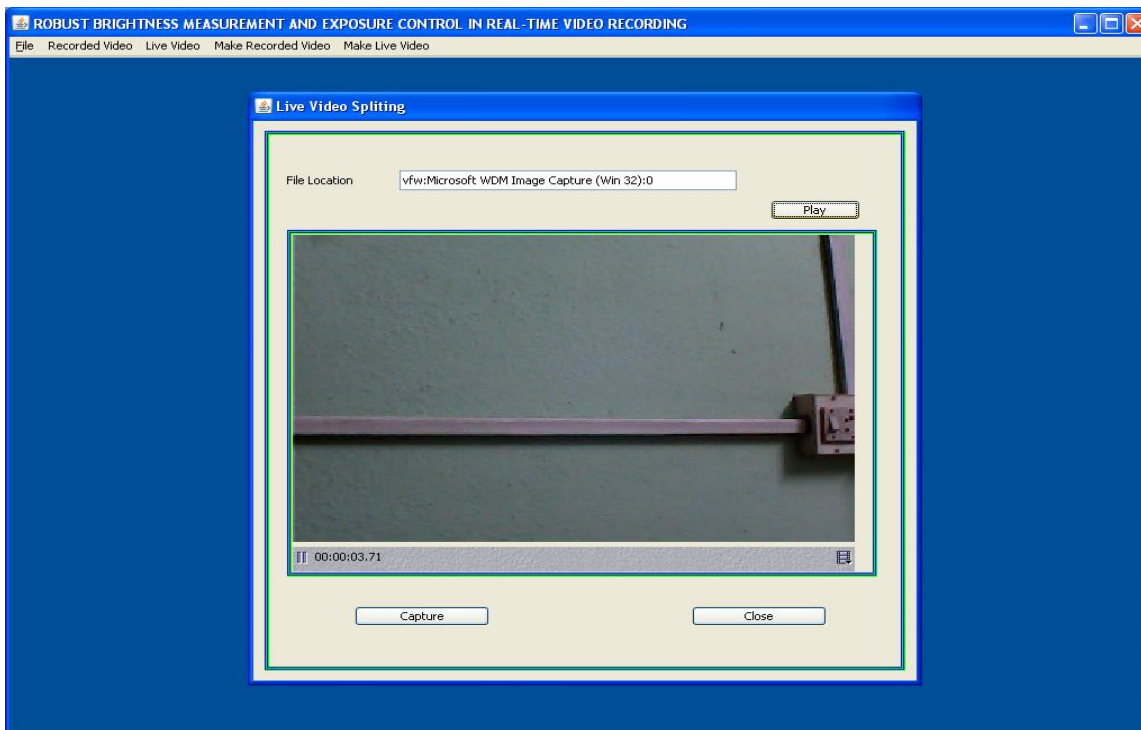
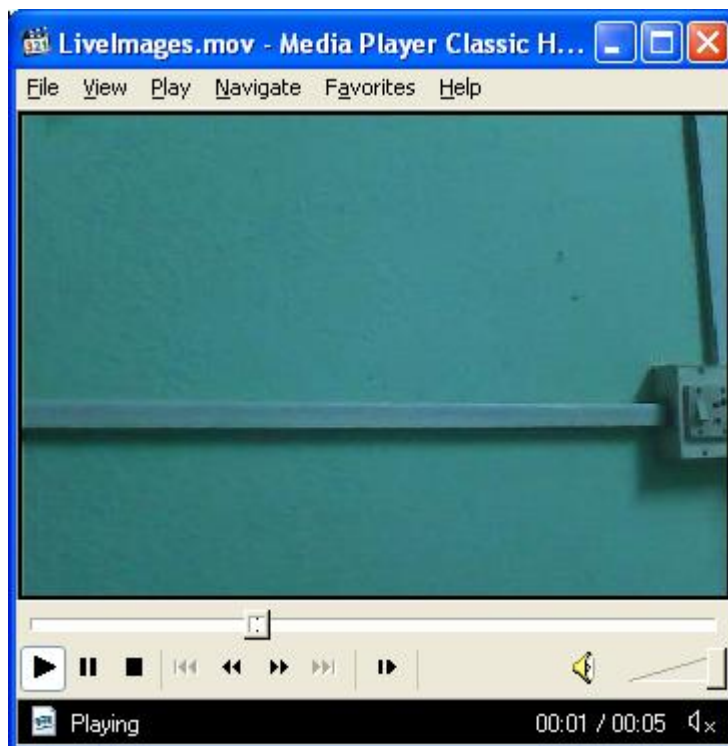
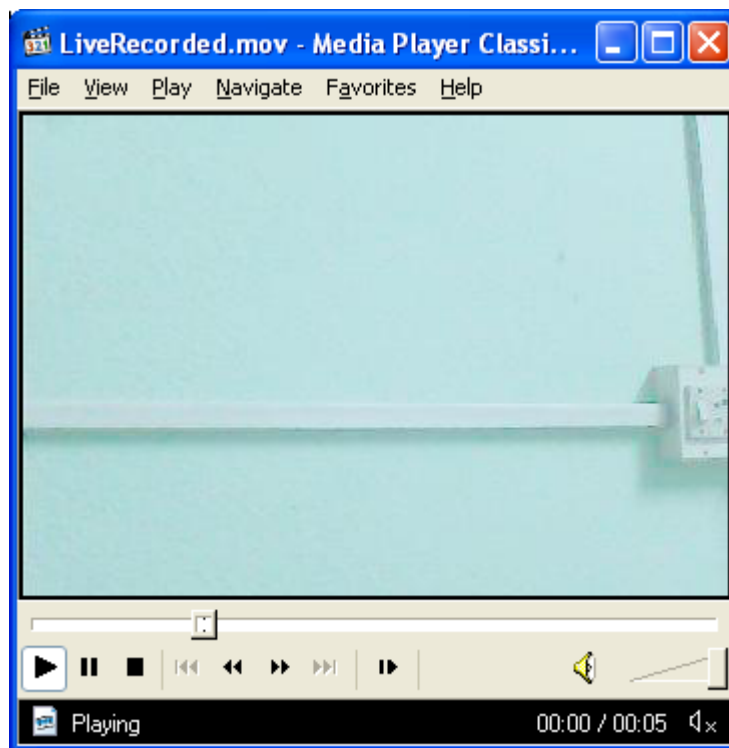


Fig.2 Playing Original Live Video



**Fig.3 Playing Enhanced Live Video**

## Conclusion

The video quality of a real-time video recording system is strongly dependent on the accuracy of scene brightness measurement as well as the speed of exposure adjustment. A comprehensive AWB system with more exact scene brightness estimations and high speed exposure adjustment has been provided. The accuracy of brightness measurement has been substantially improved by adaptively selecting the sensor's subsampling modes and applying histogram analysis to further improve brightness measurement accuracy. As a consequence of a more exact evaluation of scene brightness, the speed and precision of exposure adjustment have been enhanced.

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# Secured Digital Image Transmission via Intrinsic Fingerprint

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## Abstract

Recent advancements in multimedia processing and network technology have improved the distribution and sharing of multimedia via networks while increasing the security requirements of multimedia material. Extrinsic techniques, such as watermarking, are used in traditional picture content protection schemes. Extrinsic content protection, on the other hand, is not always practicable. As a result, forensic methods based on intrinsic fingerprints are being developed to overcome the watermarking problem. The distinct intrinsic fingerprint of many prominent picture source encoders is used as evidence in source coding, which is a typical stage in natural image capture.

## Introduction

The rapid convergence of multimedia signal processing, communications, and networking technologies has expedited the exchange of digital multimedia data and enabled ubiquitous digital media distribution during the last few decades. News reporting, insurance claim investigation, criminal investigation, and a variety of other applications have all made extensive use of digital photographs.

Individuals can, for example, use popular picture editing software like Adobe Photoshop to access, replicate, or change information outside the limits and conditions agreed upon due to the digital nature of information. As a result, the conventional belief that a photograph communicates the truth is weakened in the case of digital photos, raising serious concerns regarding the image's validity and authenticity. Image forensics allows you to check the legitimacy of digital photographs and confirm their provenance.

Traditional forensic tools safeguard multimedia material by concealing additional information in the original signal via proactive and additive methods. The notion of a trustworthy camera, for example, was offered to make the trustworthiness of digital photos responsible by embedding a digital watermark into the image at the time of capture.

Changes in the digital watermark can be used to identify any later alteration of the image. Similar identity information is encoded in each spread copy in traitor-tracing digital fingerprinting to identify the



matching user and locate the source of the unlawful copies. However, they require that all camera manufacturers agree on a single standard, and implementing such extrinsic safety systems may be too expensive and unfeasible for some real-world applications.

Extrinsic measures are frequently ineffective in enforcing content protection. Each copy of multimedia data, on the other hand, has an own acquisition, processing, and transmission procedure. To guarantee that multimedia data is handled by the proper organisations for the intended objectives exclusively, the data route must be validated by identifying each of the steps: collection, source coding, channel coding, transmission, and any other possible user processing.

## Literature survey

The most extensively used picture encoding systems today are those based on the discrete cosine transform (DCT), such as JPEG. DWT-based encoders, such as JPEG2000 and SPIHT, are also commonly employed in current picture source coding, and they may be thought of as specific realisations of sub band encoders with similar inherent fingerprints.

To make our system more broad, we need to look at the common inherent fingerprint of sub band coding. Spatial filtering is used by differential image encoders to eliminate redundancy between pixels. As may be seen in video Interframe prediction and lossless JPEG, this technology is still in use today. As a result, our forensic system integrates these three source coding techniques to give a core technology, as illustrated in the two figures above, which explain the suggested system model.

The test pictures utilised in this study are all digital grayscale images with an eight-bit per pixel resolution. We create an iterative source coder identification and verification technique based on a test picture. The first stage in the identifying procedure is to determine whether the picture was preprocessed before compression. After that, look for each possible source coding scheme's trace in the test picture and compute its similarity measure (that is, the likelihood that the test image was compressed using this source coding scheme). Then choose the one with the best similarity score and calculate the coding parameters.

If we choose the relevant information classification method and properly assess all of the coding specifications during the classification process, then we can compress and decompress the input test image using the chosen source coding systems and the approximated specifications, and the outcome will be similar to the training images except for calculation errors. When the difference between and is less than a certain threshold, we halt the search and report the system's confidence measure.

However, we remove this input schemes from our search area, choose another proposal with the next greatest similarity measure, and continue the classification and parameter estimation procedures until we discover a solution that meets the stopping requirements. If we search through the whole list of image coding schemes and none of them pass the verification step, the system displays the error message "No source coding scheme discovered."

## Methodology

To begin the forensic procedure, we must first handle any picture preparation. Preprocessing detection is a clear and critical initial step, because any errors here might invalidate all future tests. Block processing is the most frequent type of picture preprocessing, and it's what we'll be looking at today. Due to substantial assumptions made about the input data, existing work in block processing measurement is not adapted to solve this challenge.

## Intrinsic Fingerprint Analysis

Blocking elements can occur as a consequence of coarse quantization of different blocks in either the spatial or transform domains. Because quantization is conducted on each block independently, a boundary will appear between the blocks as an abrupt shift in the luminance value. This artefact is unlikely to emerge in an original, unquantized image since natural images, on the whole, exhibit smooth variations.

The existence of block artifacts should be shown by the gradient magnitude picture, which takes into account the luminance discontinuities occurring across block borders. As a result, we anticipate to observe peaks at each block boundary point after computing the gradient magnitude of each row and column in a block-processed picture. These peaks can be shown further by aggregating the gradient magnitudes of all rows (or columns) simultaneously.

## Intrinsic Fingerprint Analysis of Source Encoders

After determining the block size, the forensic detector may begin to establish which type of source encoder was used by using the intrinsic fingerprint of each image source encoder as evidence. The intrinsic fingerprints of sub band coding, transform coding, and differential image coding are examined in this section. We analyse the inherent fingerprint of each encoder and create a similarity metric to estimate the likelihood that this encoder has been used.

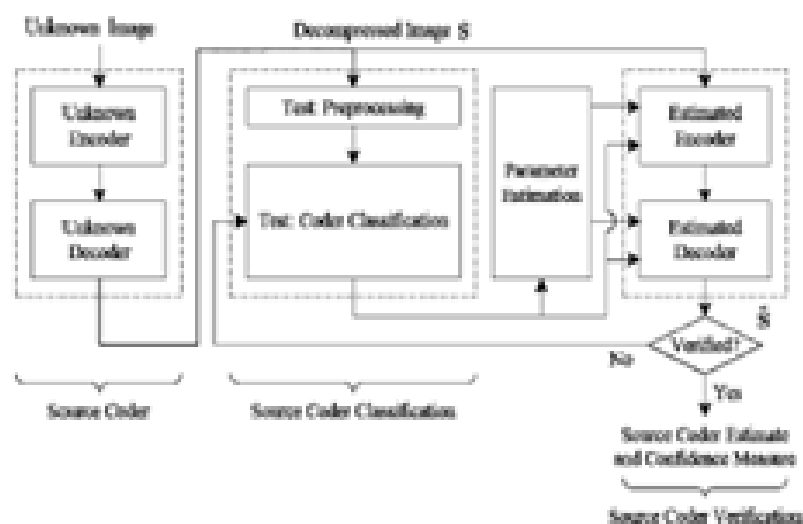


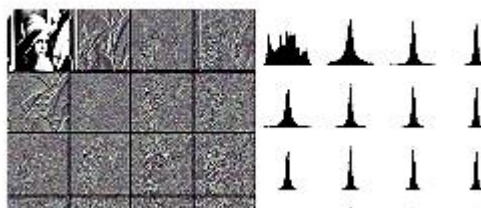
Fig.1 Overview of the proposed system



## Transform Coding

DCT-based data compression is often a block-based image analysis method in which the entire picture is split into non-overlapping blocks of the same size (for example, 8-by-8 in JPEG base-line) and each block is modified and compressed independently. While DWT-based source coding techniques frequently treat the entire image as a single block, wavelet transform it and decompose it into multiple frequency bands with varying statistics.

We use insights from, which interpreted each 8-by-8 block of transform coefficients in a DCT-block coder as a 64-subband decomposition of the original 8-by-8 image block, to unify the transformation methods of DCT coders with embedded DWT. To put it another way, we regard all (0, 0) coefficients as a subband, then all (0, 1) coefficients as another subband, and so on.



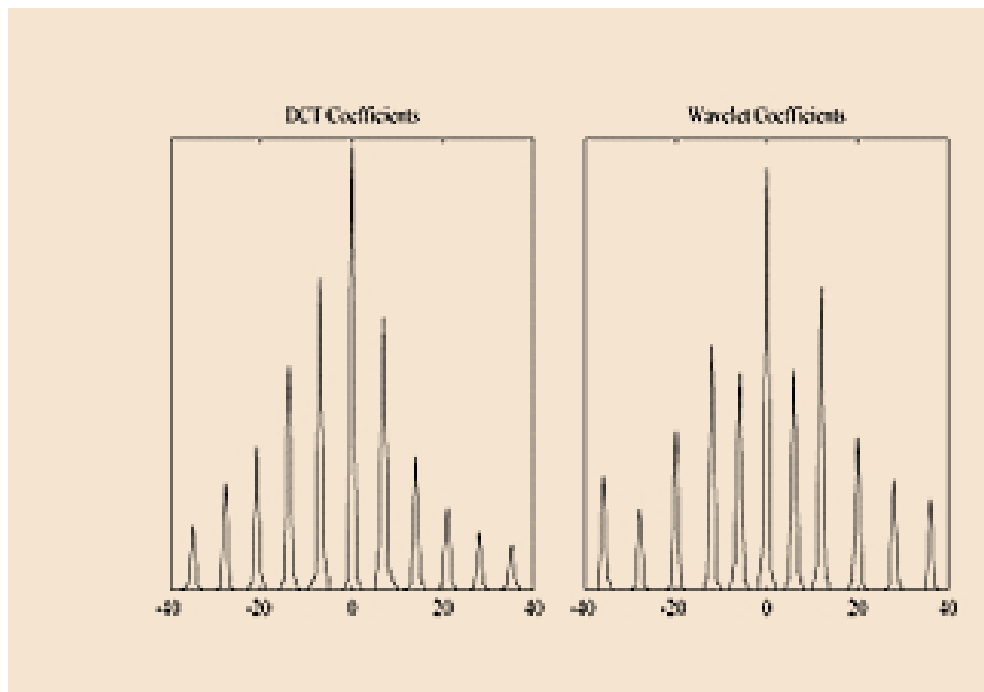
**Fig. 2 Left: Reorganization of 4-by-4 DCT coefficients into subbands. Right: Histograms for each coefficient subband**

A discrete cosine modification with a block size of 4 was performed to the original uncompressed picture in the above fig. All of the DCT coefficients for the same frequency are aggregated into a single subband, which is then tiled together.

## Result and discussion

Let's start with a DCT block coder. The DCT coefficients are discretized during the quantization process. The quantized coefficients are multiplied by the quantization step size during the inverse quantization process. As a result, we should expect to see peaks in the histogram at step size multiples and zeros everywhere. However, as pointed out by, because of the truncation and rounding effects generated by reconstruction.

Consider an integrated DWT coder next. Each embedded coder has its own method for determining how the zero trees are visited and the coefficients are communicated. Because the coefficient values are bitplane encoded, the previously compressed image's transform coefficient histogram will likewise have peaks at the prescribed reconstruction values, but not necessarily evenly spaced. The graphic above depicts the coefficient histogram of an SPIHT-coded image with a bit rate of 1.0 bit per pixel in the level-4 LH subband.



**Fig. 3 Example coefficient histograms of two images previously compressed with different schemes.**

## Conclusion

In this research, we offer a forensic approach based on intrinsic fingerprints to identify the compression method used to compress a digital picture, as well as estimation of all parameters and a confidence measure for the predicted coding scheme. Because we explore and probe the unique intrinsic fingerprint of the image source encoder encoded in the received picture, our forensic detector requires no information other than the decoded image at the receiver. Our image source coding forensic detector can determine the proper image encoder among transform-based encoders, subband encoders, and DPCM encoders with a probability of greater than 90% when PSNR dB by using the inherent fingerprint of each source encoder. Even with a PSNR of 40 dB, the chance of successful estimate remains around 80%.

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# A NOVEL 64 BIT MULTIPLIER DESIGN USING MULTIBIT FLIP FLOP BASED SHIFT REGISTER AND CARRY SAVE ADDER

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## Abstract

We propose a quick however vitality proficient estimated multiplier. The substantial check part of the duplication is erased, which improves speed and vitality utilization at a little blunder rate. The proposed approach applies both to marked and unsigned augmentation. We have indicated a 64-bit multiplier plan and usage utilizing multi-bit flip flop and carry save adder. As the quantity of bits expands, the extra circuits become increasingly mind bogging and the speed diminishes. Our proposed framework utilizes 64-bit numbers and leads to 128-bit, which is for bigger applications. The proposed add-on multiplier conservation, the proposed multiplier proficiency is evaluated by contrasting execution and the presentation of various surmised and exact products utilizing diverse structure parameters. The proposed algorithm of this plan examination of the deferral and the region with Xilinx 14.2.

**Keywords:** Multiplier, Multi bit flip flop, CLAA, CSLA, CSA, Shift register.

## 1. Introduction

The computerized architect should concentrate on numerous models, for example, circuit speed, power utilization, space and expenses. When planning advanced circuits, essential estimations, for example, mix and multiplying are the most significant upgrades. Our structure centers around duplicating twofold numbers for bigger applications. A tale moving toward a multiplier in [1]. The principle thought of this multiplier is to the most significant bits of the multiplier utilizing the specific radix-4 Booth encoding and moving toward the staying high spiral microproduct, which creates from the less significant bits, utilizing an expected logarithmic multiplier. encode Information way cutting innovation acquainted with lessen the general unpredictability of the proposed multiplier gadgets. The multiplier is unable regarding precision and plan effectiveness [1].

Another rough multiplier is proposed, which can decrease the unpredictability of augmentation while improving the zone and vitality execution by OR and entryways. So as to surmised the adequacy of the proposed multiplier, the plan parameters are contrasted and the specific multiplier and the as of late proposed estimated structures [2]. The four plans are from around 15-4 blower. Around 16-16 piece products are structured utilizing proposed blowers 15-4 [3]. Surmised augmentations furnish preferred execution over definite increase with a trade off of mistake rate. Furthermore, the creators accomplished a high pass rate and an ordinary blunder separation esteem for products planned utilizing an exceptionally little proposed 15-4 blower. The proposed numerous defeat is around equivalent to the specific products [3]. Broad research writing shows that the sorts of duplicating and adder contribute less to vitality reserve funds and the manner by which the sort of rationale is assuming a significant job in vitality arrangement [4].

Another methodology technique to ascertain  $\log_2 N$  productively. This strategy is structured by two improved logics, ILM-EA and ILM-AA. The two structures are extremely exact and have littler MRED values contrasted with other logarithmic plans in writing. At long last, The JPEG Image was viewed as a pressure application, which the proposed plans show the highest caliber of picture yield than different structures [5]. [6] Implement a logarithm structure with successful equipment with less ports in LOD, supplanting the need developer with coding and planning another ton change with less stages and improved inside structure. The changed structure comprises of basic circles. They have been assimilated that devour improved benefits as far as timing, involved region and authority. The composite outcomes reason that the logarithm's stock multiplier shows a 14.02% change in vitality and a 5.61% change in the region for a 16-piece structure.

Two inexact identifier (LOD) plans and assessed snake (to abridge two log frameworks) that can be utilized to improve the equipment productivity of the logarithm multiplier proposed in [7]. The first LOD configuration utilizes one fixed an incentive to rough the less significant bits (LSBs). For  $d = 16$ , this structure lessens equipment costs by 19.91% looked at customary 32-piece Mitchell multiplier and with 15.19% contrasted with late plan in the writing [7].

A vitality sparing and territory sparing multiplier where input coefficients are cut at various lengths,  $t$  and  $h$ , and afterward adjusted to the closest individual numbers to limit the mistake brought about by the proposed cut off procedure in [8]. The proposed multiplier was adaptable and surpassed different difficulties as far as speed, space and vitality. All things considered, improves vitality utilization 95% contrasted with the specific Wallace multiplier.

consuming 85% less space. Inertness and vitality utilization were improved in the scope of 4%-41% and 89%-97%, separately, contrasted with the specific duplication rate. Contrasted with the specific multiplier, the speed, zone and vitality enhancements of the proposed multiplier turned out to be better with expanded multiplier width. This is because of the straightforward and adaptable level of figuring of the proposed multiplier. Additionally, the high goals of the proposed multiplier is a decent alternative to abuse in picture handling and order applications [8].

A financially savvy way to deal with the logarithm of ordinary neural systems (CN) proposed in [9], where two multipliers are associated with multipliers to address the blunder. The proposed logarithm accomplishes a low and unprejudiced normal mistake, while equipment costs are altogether decreased by utilizing the cut away Mitchell multiplier and moving toward the blunder states of the principal stage. The proposed structure has defective attributes appropriate for the finishes of the neural system, and investigations on CNN today show that the proposed multiplier doesn't cause a critical crumbling in exactness contrasted with precise increase [9].

Record multiplier plans are adjustable dependent on the Mitchell calculation that can give a lot of vitality to the CNs. The low-power execution of the Mitchell multiplier was made with improved LOD square and C1-based change sum computations, just as enhancement of the unscrambling iterator and the presentation of a zero discovery unit to improve CNN's exhibition in [10].

Five products are thought about dependent on space, speed, power utilization, and circuit intricacy examinations dependent on surface, speed, power utilization, and circuit multifaceted nature. On the above conversation we reason that the exhibit multiplier has the easiest circuit contrasted with different difficulties and the little zone required, with a low speed dependent on change and the expansion of a calculation, it devours high vitality. On an examination conversation talked about on modification tree multiplier Wallace who has fast and has numerous advantages [11].

The report introduced new plans for both redundant and non-repeated logarithms. The non-monotonic LU approach, referred to as ALM-LOA, ALM-MAA3 and ALM-SOA, uses three types of off-base shift register for expanding. A cut-out double logarithm connector (TBLC) with no loss of accuracy is used in the ALM-SOA structure. Adders1 and Adder2 are also used in the TBLC and STD, while Adder3 uses LOA and MAA3 to increase the precision of the Lu method. Virtually every text has been broken down using distinctive measurements with blunder. It has just been shown to be more precise than the usual LU and ILMs, for example, that use a good number of off base bits. The proposed IALMs can include NMED (up to 12 percent), change and standard PDP (up to 37 percent) bits (12).

The proposed Radix-4 Booth Wallace multiplier dependent on GDI shows better outcomes in low force, territory care and postpone execution in [13]. The enhancement will be more up not or bits. Likewise, this kind of multiplier will be successful for multiplying the bit marked [13].

Around there vlsi configuration is one of the significant issues that should be tended to. To arrive at the decreased zone are examined various sorts of flip tumbles and pink enlistment. The slightest bit flip failure and multi-bit flip lemon are performed to accomplish less utilization of the zone. [14] An alternate size balance recording is performed with a multi-face flop bit [14].

Tetris was effectively planned as a layout for the advancement of other optical control frameworks in [15]. Multi-bit face-flop innovation is utilized to lessen power utilization and the watch cradle territory in part of the Tetris game framework. Reenactment results demonstrate that Multi-bit Flip-Flops is a profoundly successful and viable approach to make low-control and decrease the clock organize [15]. A definite investigation shows the advantages and difficulties that mbff brings to low-vitality structures in [16].

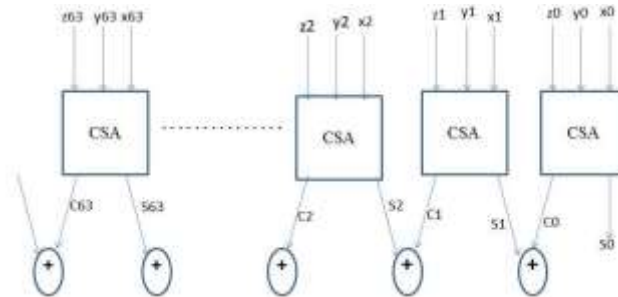
A NVFF multi-bit dependent on NAND-like spintronics memory, which was utilized for the quick and low force switch proposed in [17]. This structure indicated fast eradicating forms (0.5 ns), programming ( $\star$ 1.6 ns) and sensors (200 ps). The deviated change to the customary STT composing system can be defeated since the switch was just actualized from AP to State P, which additionally spares power exchanging and disentangles the composing circuit.

The augmentation procedure requires including and changing over bits. Given these two procedures, we planned a 64-piece multiplier utilizing convey spare viper and move register. In this article, we indicated a correlation of duplication calculations dependent on schedule. Contrasted with convey look forward snake (CLAA) and convey select viper (CSLA), convey spare snake multiplier (CSA) indicated that the CSA-based multiplier was quicker than the two different products.

The move register is a significant advanced structure square. It has a huge volume of utilizations. Records are frequently used to briefly store the double data showed in the yield. move registers are legitimate sorts utilized predominantly to store and move computerized information. The essential stockpiling components are flip lemon. Most records use D-flip failures as a result of its effortlessness. Broad research writing shows that the sorts of duplicating and adder contribute less to vitality investment funds and a way which the sort of rationale is assuming a significant job in vitality sparing [18].

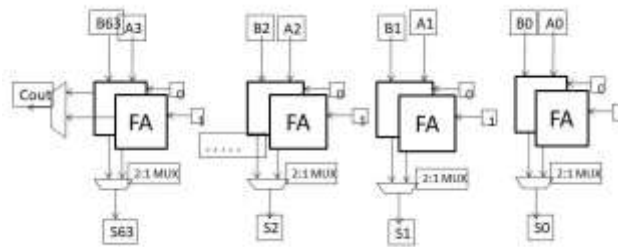
**2. Adders**

The additional saving of the carriage can further reduce the timing performance. This save carry will be first ignored and only sum taken into account [20]. Carry vipers save does not have more difficulty, as the adder selects and looks ahead. We have therefore used the carry save adder to enforce the 64-bit multiplier. Although large numbers of records are required for the carriages to be stored separately, their output can be beneficial. The main advantage of saving is that the addition of three bits is possible simultaneously. But we do not think of multi-operator redundant addition in our architecture. The third bit is considered null. The carry save adder block chart is shown in Figure 1.



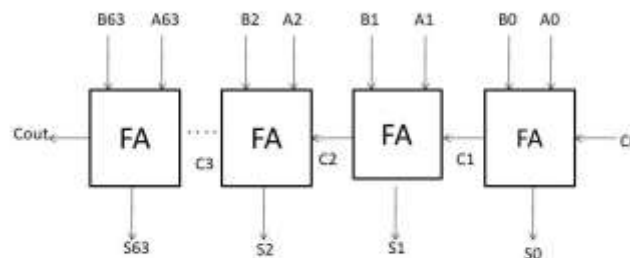
**Fig.1.** Carry save adder

The chosen viper is a variation from the forward look adder in which we have to choose the vial as 0 again and again, and then you choose the vial as 1. The additional operation is then performed for both cases and the output is given to the 2:1 multiplexer. Finally, the only production is received. We must not wait until the earlier addition results are reached in the next stage [19]. The select adder is shown in Figure 2. The output multiplexer equations for sum and carry



**Fig.2.** Carry select adder

The multiplexer is supplied with these two SUMs. In this case, it is not necessary to wait for the last stage to perform the operation. Thus, it reduces the time it takes to make the addition. Over time, we see a substantial improvement. Carry adder, without delay, looks all the carrier equal. We need additional circuits to do this. These additional circuits and capacity components require an additional area to looking forward and the strength used throughout the high circuit. The accompanying comparisons illustrate the future of the carry. The block diagram [18] is illustrated in Figure 3.

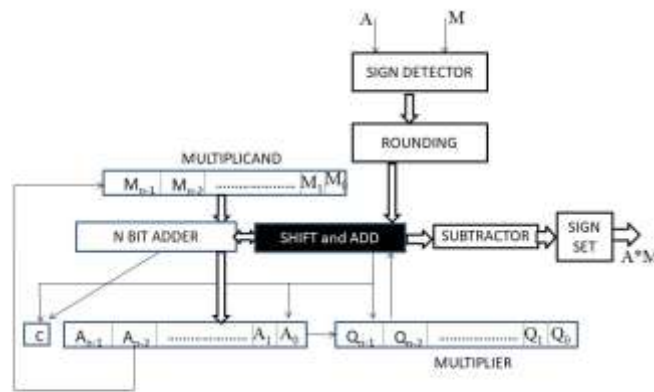


**Fig.3.** Carry look ahead adder

**3. Multiplication Algorithm**

Enable 128 sizes of the product. The number and the multiplier is 64 bits. Empty the largest half of the record label. Maintain the multiplier at the minimum half of the product record. The steps below are 64 times repeated.

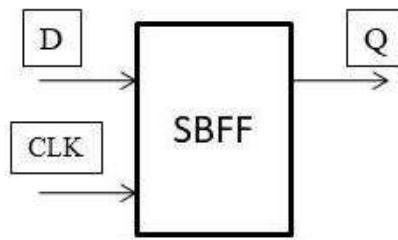
- If the lowest product record component is 1, add to the main product report half a multiplication.
- Move slightly to the right (ignore the turning bit) contents of the recording object.
- Main part of the Register [21 , 22, 23] shifts in capacity. Figure 4 shows the multiplication algorithm.



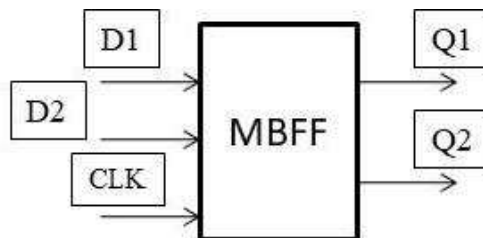
**Fig. 4.** Multiplication algorithm

Here is the important problem of converting bits. We suggest recording the shift using multiple bit flip flops. Rounding is also done before multiplication and this multiplier also focuses on the number marker. Generally to store bit memory elements are locked and flip flops. Here in our proposed system, flip flops store multiple bits. The diagram of the pink record, the serial in the progressive series appears in Figure 5. When you have a high time clock in the positive trigger edge, the edge that triggers d-flip flop output is given the input value and it takes the input value if the clock is low in the negative edge. Under the clock pulse integration technology the multi-bit Flip Flop functions. Figure 6, which shows a negative border effect that leads to D flip flop, is a time chart for a multibit flip flop

- The first and second quarters are initially expected to be high, d1 and D2 to be low and the average (CLK) to be low.
- D1 and D2, meaning Q1 and Q2, both are small on the negative pulse edge of the first hour.
- D1 and D2, meaning Q1 and Q2 are also high in the second negative direction of the watch.
- The high D rating, Q1 and Q2 are high at the edge of passive pulse transmission for the second hour.
- The same goes on ...

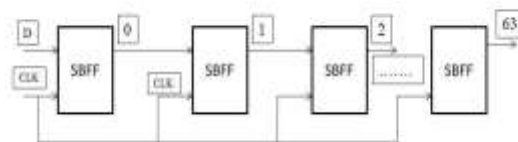


(a)

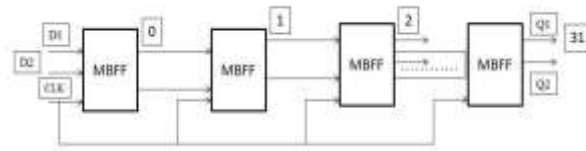


(b)

**Fig. 5.** (a) Single bit flip flop (b) Multi bit flip flop

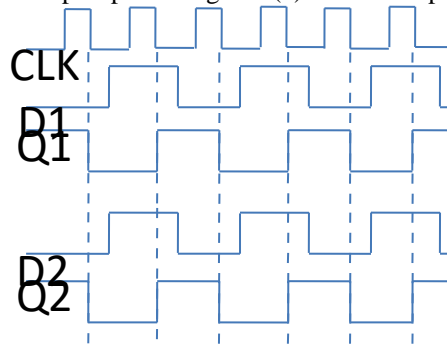


(a)



(b)

**Fig. 6.** (a) Single bit flip flop shift register (b)Multi bit flip flop shift register



**Fig.7.** Timing diagram for multi bit flip flop

**4. Simulation Results**

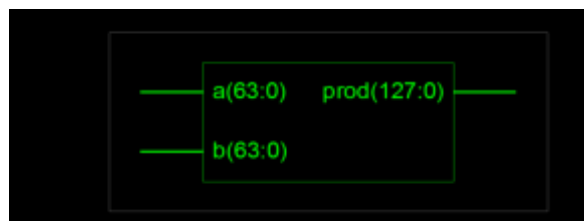
64-bit multiplier analysis was performed based on a carry save adder with the multi-bit flip flop move registry. The architecture is conceived in version 14.2 of xilinx ISE. In the following figures, the results are presented. The flip, multibit and move registers display in Figure 5, Figure 6. Illustration 7 is the flip flop time chart. Table 1 presents clear multiplier timing details. The waveforms for the three different platforms are shown in Figure 8. The RTL graph for the proposed multiplier is shown in Fig 9(a) and (b).



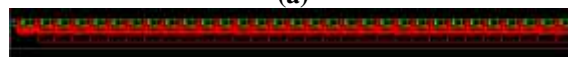
**Fig. 8.** Waveforms generated

**Table 1.** Timing Analysis

	CLAA	CSLA	CSA
TIME (ns)	21.1	18.2	3.4



(a)



(b)

**Fig.. 9.** RTL views for carry save adder based multiplier



## 5. Conclusion

This paper shows a design and implementation of a 64-bit multiplier with various adders. To simulate and synthesize the multiplier, the VHDL language is used. The overall design speed was enhanced by using the carrying save adder. We showed that, compared to the CLAA, the proposed multiplier increased its speed by 77 percent and the CSLA by 69 percent. A quick hitch can improve the multiplier's efficiency significantly. The multiplier's speed based on the carrying save adder is high. Although the area increases by using the carry save adder, the speed performance is negligible. This paper presents the 64-bit multiplier built and implemented with various adders. To model and synthesize a multiplier, the VHDL language is used. The use of carry save adder increases the overall design speed. We showed that the multiplier proposed increased its speed by 77% in comparison with CLAA and 69% in comparison with CSLA. A rapid snake can improve performance dramatically. Double speed based on carry save adder. over all speed. Although the area increases with carry save adder, the speed is negligible.

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# SMART PARKING IN VEHICULAR ENVIRONMENTS USING ZIGBEE IEEE 802.15.4 AND RF TRANSMITTER

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**Abstract:** In this work we propose a smart parking technique in heavy traffic environments using ZigBee wireless transmission module. The major problem in transportation systems is that the controlling of the traffic in cross roads. Smart car parking technique finds a solution using the ZigBee technology. ZigBee technology is a low data rate, low power consumption, low cost; wireless networking protocol targeted towards automation and remote control applications. ZigBee, Depending on the RF (Radio Frequency) environment and the power output consumption required for a given application, and will operate in the RF. The power consumption and transition delay are the main advantages when compared to the other wireless technologies like WIFI, Blue tooth, etc...

**Key words:** Zigbee, smart parking, 8051, RF Module.

## I. INTRODUCTION

With fast development of economy in India, the demand of electricity is higher and higher, and the problem between lag of construction of network and inadequacy of transmission capacity becomes increasingly prominent. A system for the intensive use of parking spaces proposed in [1]. It is an automated system based on monitoring the situation in parking places using a mobile camera set equipped with data storage and means for data transfer to the central database. The data is evaluated in a suitable GIS-based software according to parking rules. It is this evaluation that is a critical part of the whole system. In practice, there have been cases where a complaint was sent to municipal police on parking rules violation, which was not fully justified. Therefore, the further development of the described system will be aimed at improving the evaluation process in order to minimize unauthorized cases. Detailed information about the parking system is very well presented on the web or in the form of a smartphone application [1].

The system in [2] consists of hardware components and software modules which closely interact with each other. Using this system, drivers of cars can park quickly, and will save fuel, time and money. The experimental result shows very fast runtime and high success rate. This approach can save billions of wasted dollars in the US alone. The saved fuel, time and money can be reapplied in more productive places. By causality, it will help the environment as well. In this era of rapid urbanization, designing the city system modern and systematic by maintaining everything is a major challenge. Under the pressure

of increasing population, Dhaka is becoming tougher to change. Proposed solution is to keep the city parking system as a fully automated and additionally use garage management controllers system so that user can get parking facilities with the android application as well as without android application [3]. Proposed a new VANET-based smart parking scheme (SPARK) for large parking lots in [4]. With SPARK scheme, RSUs installed across a parking lot can surveil the whole parking lot, and provide three convenient services for drivers: 1) real-time parking navigation; 2) intelligent anti-theft protection; and 3) friendly parking information dissemination. In addition, the SPARK scheme also provides conditional privacy preservation for OBUs. Extensive simulations have also been conducted to demonstrate that the SPARK scheme can efficiently reduce the searching time delay for an available parking space, and subsequently save the fuels and driver's parking time. A wireless personal area network (WPAN) is meant to span a small area such as a private home or an individual workspace. It is used to communicate over a relatively short distance. The specification does not preclude longer ranges being achieved with the trade-off of a lower data rate [5][6].

In contrast to other network types, there is little to no need for infrastructure with a WPAN. Ad-hoc networking is one of the key concepts in WPANs. This allows devices to be part of the network temporarily; they can join and leave at will. This works well for mobile devices like PDAs, laptops and phones. Some of the protocols employing WPAN include Bluetooth, ZigBee, Ultra-wideband (UWB) and IrDA. Each of these is optimized for particular applications or domains. ZigBee, with its sleepy, battery-powered end devices, is a perfect fit for wireless sensors. Typical ZigBee application domains include: agricultural, building and industrial automation, home control, medical monitoring, security and, lest we take ourselves too seriously, toys, toys and more toys [5].

Wireless local area networks (WLANs) are meant to span a relatively small area, e.g., a house, a building, or a college campus. WLANs are becoming more prevalent as costs come down and standards improve. A WLAN can be an extension of a wired local area network (LAN), its access point connected to a LAN technology such as Ethernet. A popular protocol for WLAN is 802.11, also known as Wi-Fi. Among all of the wireless networks ZigBee gained It's renewed interest because of less complexity and usage of power.

The main problem in traffic areas is the parking the vehicles by searching an exact place to park the vehicle. The aim of this paper is to solve this problem in highly traffic affected areas. Equipping vehicles with various on-board sensors and implementing vehicle-to-vehicle (V2V) communication will allow for large-scale sensing, decision, and control actions in support of these goals. The parking process can be a straightforward and non-stop process. From the point of management's view, Smart Parking is an intelligent parking system. The parking process can be modeled as birth-death stochastic process and the prediction of revenues can be made [6].

## II. PROPOSED SYSTEM

The smart vehicle parking is a tremendous technology in automobile field. Our proposed system is a smart vehicle parking using ZigBee module. The figure 1 shows the Proposed smart vehicle parking system.

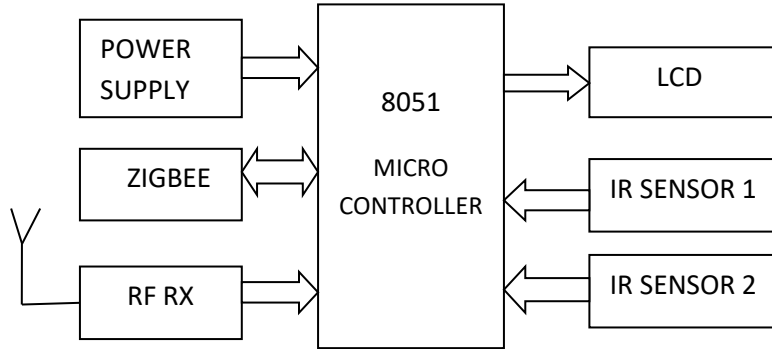


Figure 1 (a)

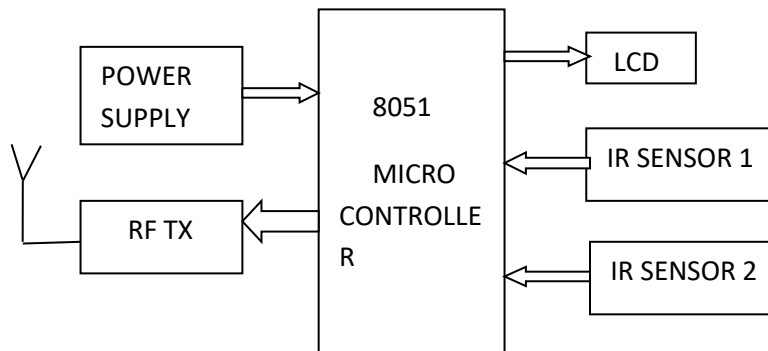


Figure 1(b)

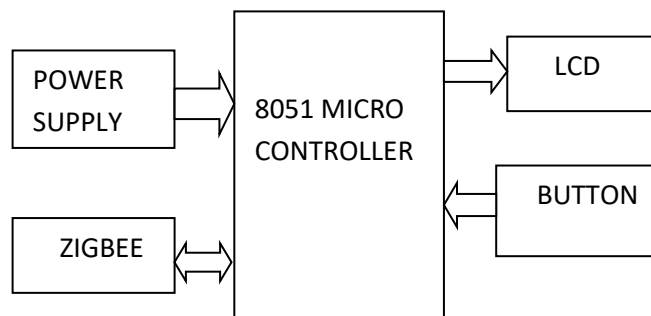


Figure 1(c)

The proposed system contains three modules which are shown in figure 1. The vehicle section shown in figure 1(c), contains a switch, ZIGBEE module and LCD. The vehicle section is kept in the vehicle, when the person in the vehicle wants to know the information about the free parking slots then he will press the button in the vehicle then a missed call goes to the ZIGBEE section in the first section shown in figure 1(a) about the free parking space from the ZIGBEE in the vehicle section. Then on receiving the message from vehicle section, the parking space for the vehicle whether it is empty or full is checked with IR sensors and sends an SMS to the vehicle section regarding the space. This is received by ZIGBEE and displayed on the LCD like section 1 is available. When section 1 is not empty then it takes the information about the second section using RF communication Shown in Figure 1 (b). We have RF TX in section 2 and RF RX in section 1. The information about the space in section 2 is continuously given to the RX section whether empty or full. If it is empty or full then this information is given to the vehicle section by section 1 using ZIGBEE.

### III. 8051 MICRO CONTROLLER

Microcontroller manufacturers have been competing for a long time for attracting choosy customers and every couple of days a new chip with a higher operating frequency, more memory and upgraded A/D converters appeared on the market.

The whole story has its beginnings in the far 80s when Intel launched the first series of microcontrollers called the MCS 051. Even though these microcontrollers had quite modest features in comparison to the new ones, they conquered the world very soon and became a standard for what nowadays is called the microcontroller.

Besides, the software has been developed in great extend in the meantime, and it simply was not profitable to change anything in the microcontroller's basic core.

The 8051 microcontroller has nothing impressive in appearance:

- 4 Kb of ROM is not much at all.
- 128b of RAM (including SFRs) satisfies the user's basic needs.
- 4 ports having in total of 32 input/output lines are in most cases sufficient to make all necessary connections to peripheral environment.

The whole configuration is obviously thought of as to satisfy the needs of most programmers working on development of automation devices.

### IV. ZIGBEE and IEEE802.15.4

ZigBee technology is a low data rate, low power consumption, low cost, wireless networking protocol targeted towards automation and remote control applications. IEEE 802.15.4 committee started working on a low data rate standard a short while later. Then the ZigBee Alliance and the IEEE decided to join forces and ZigBee is the commercial name for this technology ZigBee is expected to provide low cost and low power connectivity for equipment that needs battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. In addition,

ZigBee can be implemented in mesh networks larger than is possible with Bluetooth. ZigBee compliant wireless devices are expected to transmit 10-100 meters, depending on the RF environment and the power output consumption required for a given application, and will operate in the RF worldwide (2.4GHz global, 915MHz Americas or 868 MHz Europe). The data rate is 250kbps at 2.4GHz, 40kbps at 915MHz and 20kbps at 868MHz. IEEE and ZigBee Alliance have been working closely to specify the entire protocol stack. IEEE 802.15.4 focuses on the specification of the lower two layers of the protocol(physical and data link layer). On the other hand, ZigBee Alliance aims to provide the upper layers of the protocol stack(from network to the application layer) for interoperable data networking, security services and a range of wireless home and building control solutions, provide interoperability compliance testing, marketing of the standard, advanced engineering for the evolution of the standard. This will assure consumers to buy products from different manufacturers with confidence that the products will work together. IEEE 802.15.4 is now detailing the specification of PHY and MAC by offering building blocks for different types of networking known as "star, mesh, and cluster tree". Network routing schemes are designed to ensure power conservation, and low latency through guaranteed time slots. A unique feature of ZigBee network layer is communication redundancy eliminating "single point of failure" in mesh networks. Key features of PHY include energy and link quality detection, clear channel assessment for improved coexistence with other wireless networks [7].



Figure 2 ZigBee module

## V. RADIO FREQUENCY SIGNALS

Radio frequency communication signals are engineered to trade off efficient use of the electromagnetic (EM) spectrum with the complexity and performance of the RF hardware required to process them. The process of converting baseband (or low-frequency) information to RF is called modulation of which there are two types: analog and digital modulation. In analog modulation, the RF signal has a continuous range of values; in digital modulation, the output has a number of prescribed discrete states. There are just a few modulation schemes that achieve the optimum trade-offs of spectral

efficiency and ease of use with hardware complexity [8][9]. The figure 3 represents the hard ware modules of RF Transmitter and Receiver.



Figure 3 RF Transmitter and Receiver modules

## VI. RESULTS

Figure 4 shows the kit photographs of the proposed system.







Figure 4. Kit Photographs.

## VII. CONCLUSION

We have designed a smart car vehicle parking system using ZigBee 802.15.4, 8051 advanced micro controller and RF module. This architecture is faster and power consumption is very less than the other wireless technologies. This can implement in the future cars and can be avoid the traffic problems in the heavy parking areas like shopping malls, theatres, and etc.. other busy areas.

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# IMAGE SEGMENTATION BASED ON EDGE DETECTION AND ENHANCEMENT BASED ON EECS ALGORITHM

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## **Abstract**

*Digital images are typically used to bring information from or a user scene in the form of visual perspectives. Imaging methods are therefore very important for assets to restore the degradation of the information disseminated in the viewer or a computer for further testing. There are a wide range of technical and engineering claims to make visual information. Examples of this include tomography and medical diagnosis of reconnaissance images and exploration for remote sensing resources on Earth. Engineering applications of images are even more diversified. For example, imaging technology is used in ferrography to monitor machine health conditions during operation. Furthermore, image processing techniques can be employed in infrared imageries.*

*Medical image processing is a regularly growing and dynamic territory with applications connecting into our regular daily existence, for example, solution, space investigation, observation, validation, mechanized industry review and numerous more zones. For the medical diagnosis segmentation of image plays a vital role. My research since 7 years mainly focuses on segmentation of medical microscopy images. Applications includes brain tumor , leaf disease identification, Mammography etc. I want to introduce a method which is very advanced and accurate for Segmentation based on EECS algorithm. This technique focuses mainly on pre- processing, Edge detection, Enhancement, Thresholding, Feature extraction, Clustering using advanced fuzzy K-means algorithm. Pre-processing will be done first for filtering, after filtering edge detection is applied to the image, then after image will be enhanced, next thresholding will divide the exact object at a particular point in the image. Later feature will be extracted and advance fuzzy K-means clustering will be applied for the segmentation. Due to this technique when compared with other techniques like c-means clustering the time has decreased up to 71% and efficiency of the particular object detection increased more than 22%.*

**Keywords:** *EECS algorithm, Segmentation, Medical Image Processing, K-Means Clustering, Edge Detection, Image enhancement.*

## **INTRODUCTION**

Digital images are typically used to bring information from or a user scene in the form of visual perspectives. Imaging methods are therefore very important for assets to restore the degradation of the information disseminated in the viewer or a computer for further testing. There are a wide range of technical and engineering claims to make visual information. Examples of this include tomography and medical diagnosis of reconnaissance images and exploration for remote sensing resources on Earth. Engineering applications of images are even more diversified. For example, imaging technology is used in

ferrography to monitor machine health conditions during operation [3]. Furthermore, image processing techniques can be employed in infrared imageries [4]. In addition, vision is used in the identification and tracking of objects [5,6].

The image enhancement Problem was aimed at preserving or improving the edges of objects in the figure [7]. The color saturation work is performed first, and then the edge is preserved. Another method using morphological filters to improve the edges for increased sharpness on resultant image [8] is proposed. The Problem with improving contrast was also approached by adopting a bloc-based improvement strategy [9, 10]. These localized improvement approaches may be more complex for these applications compared to the global method of equalisation histogram. Histogramic image enhancement algorithms are often classified in the statistical and global approach [11]. Essentially, equating attempts to re-map the intensity or other image color of the channel to a certain probability density. In most cases, in order to obtain the highest information content from the output image, the target density must be uniform. It has been noted that direct application of this program may introduce some unwanted artifacts; Therefore, alternative implementation procedures are proposed and advanced [12].

In the case of histogram offsetting implementation, there are different methods that can be retrieved. For example, empirically specific changes can be used [13, 14]. On the other hand, it is usually a challenge to achieve the required optimum setting parameters. To this end, an unfurnished method is created [15]. In this way, the coefficient for a change of power law is determined using the average intensity of the image. The output image, while corrected to the average intensity of the supplied image, cannot provide an attractive perception of a human seer. Another method is built to improve an input image and to maintain the same output average light [16]. Since this algorithm is directed to a flatter mapping density, the complete brightness level is not fully used to convey the information of the scene. At the same time, it acknowledges that the single density of the target will change the average brightness in half of the permitted levels and, if no agreement is reached on the average intensity of the original image, undesirable artifacts will appear. The researchers then started looking for procedures that would keep the original mean light [17]. In the original work, the pixels are isolated to a lower group in accordance with their means that the values in light. The two sub-images are applied to a uniform density. It also emphasized that it means to remain with some extent. However, a perfect retention of the mean value is not possible even for the image of symnof intensity density.

An attempt was made to reduce the variances between input and improved image media brightness. The input image is first separated by the average light, and then the tops of the input image histograms are trimmed using the median of each subframe [18]. Although the average brightness error could shrink, there was no fixed justification for selecting the median value as the clipping limit. A method of limiting the scope was later developed [19]. Instead of aligning the image to cover the entire allowable brightness, the narrow limits are emitted for brightness, so that the resulting brightness was approximate to the original image. An alternative method introduced a weighted sum method that would solve the average brightness problem [12]. Lower and higher intensity pixel groups were created based on the average brightness value. Unlike other methods, tiated group groups were aggregated with supplementary groups and then weighed to create an enhanced image. However, since weighting factors are not always feasible, the requirement to perfectly minimise the average brightness error was relaxed to compensate for the possible weights. A variation of the histogram trimming principle [20] was further proposed. The clipping Limit was specified as the minimum value for the histogram, median, and mean

values. When working in it, there is a potential problem when the median is very low and provides a low cropping size, the pixel functions with the corresponding subgroup can be destroyed. Based on the available methods, a comparative evaluation of the commonly used color space of color images was performed [21]. The work of reporting suggested that when leveling the histogram, a green color space is used, where this channel approximates the brightness of the image.

In addition to separating the image into high and low brightness sub-images as aforementioned, contrast enhancement could also be accomplished by modifying and specifying a target density profile in histogram equalization. For instance, the input histogram was smoothed using an intensity-based window width [22]. Additionally, you can extend the policies that are listed in it to return the brightness of the output image that is adjusted to the input image. This work proposes a new way to reduce the difficulties encountered in areas that occur in the doors and in the dispensing departments. Based on the ratio of half the maximum strength, the target histogram shows the square surface balance above the desired middle level. The input image is then corrected to ensure that the average brightness is close to the input image.

## METHODOLOGY

### A. K-MEANS ALGORITHM

Here we discuss clearly about the basic structure of K-means clustering. Let  $A = \{a_i | i=1, \dots, f\}$  be attributes of  $f$ -dimensional vectors and  $X = \{x_i | i=1, \dots, N\}$  be each data of  $A$ . K-means clusters which  $X$  is  $SK = \{S_i | i=1, \dots, k\}$  where  $M = \{M = 1, n(S_i), \dots, J\}$   $S_i$  members, where  $n(s_i)$  is number of members for  $s_i$ . Each cluster has cluster center of  $C = \{c_i | i=1, \dots, k\}$ . The following steps will be involved in the K-means clustering algorithm [20-21]

1. Generate the random starting points with centroids  $C$ .
2. By utilizing the Euclidean separation discover the separation  $d$  between  $X$  to  $C$ .
3. Ascertain the base  $d(x_i, C)$  from the partition of  $x_i$  for  $i=1 \dots N$  into.
4. Ascertain the new centre  $c_i$  for  $i=1 \dots k$  characterized as:

$$C_i = \frac{1}{n_i} \sum_{j=1}^{n(s_i)} m_{ij} \in s_i$$

5. Rehash the procedure stage 2 until the point that all centroids are concurrent.

The centroids, in case if they do not change their position then they will be said as converged in a particular cycle. It additionally may stop in the  $t$  emphasis with a threshold  $\epsilon$  if those positions have been refreshed by the separation underneath  $\epsilon$ :

$$\left| \frac{c^t - c^{t-1}}{c^t} \right| < \epsilon$$

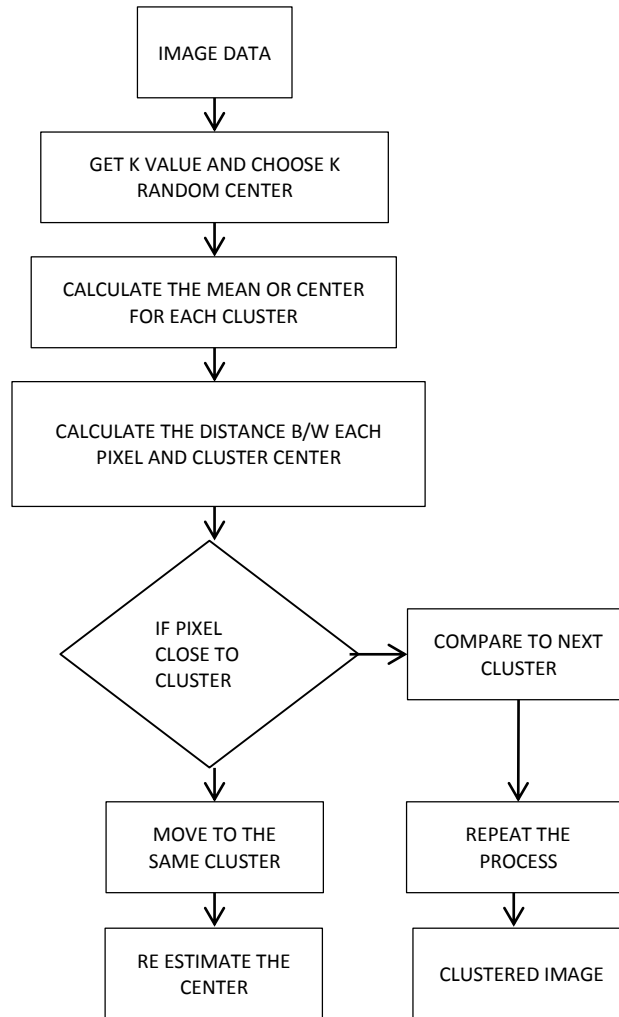


Fig. 2. K –means clustering algorithm

### B. FUZZY C-MEANS CLUSTERING

Fuzzy logic to process data through partial membership in reflection is a method of each pixel value. Fuzzy membership in the set value is 0 1 ranges. The fuzzy cluster basically allows a multi-value logical values, such as the intermediate I. E., a member of the same member can be set in fuzzy sets blurred picture. Full membership, non-membership is between any bad transfer. An image of a fosaniss function, in the form of a Buddha-figure and also a membership in information to define. The membership function that is involved includes three main primary attributes. They have support, restrictions. The core member is set to be completely opaque. The subscription is supported by a non-intermediate or partial subscription, and is a border that is set to value between 0 and 1 [23].

Obscure logic, fuzzy clusters, in each cluster location entirely, just one degree from a cluster. The cluster is on the periphery of the cluster, with fewer points than points. Each point  $x$  is given status as we are in the  $k$ th cluster  $uk(x)$  digital head. The contribution coefficient for any given  $x$  1 is usually clear:

$$\forall x \left( \sum_{k=1}^{\text{num. clusters}} u_k(x) = 1 \right).$$

Fuzzy c-means clustering, which kantroad all points with a cluster of his degree of leverage over it, means:

$$\text{center}_k = \frac{\sum_x u_k(x)^m x}{\sum_x u_k(x)^m}.$$

The distance to the cluster center is related to the inverse state:

$$u_k(x) = \frac{1}{d(\text{center}_k, x)},$$

Then coefficients is a true parameter to fosified distribution  $> 1$  So their is 1.

$$u_k(x) = \frac{1}{\sum_j \left( \frac{d(\text{center}_k, x)}{d(\text{center}_j, x)} \right)^{2/(m-1)}}.$$

The equivalent of 2 m for coefficients to equal their money to 1 along a linear normalizing. When 1 m is close, and the cluster closest to the center at this point is much more weighted than others, and it is similar to the K-means algorithm.

Fuzzy c-means the algorithm K-means that is similar to the algorithm:

- Select the number of clusters.
- Clusters assigned to go to each endpoint are Lakki coefficients.
- Repeat algorithm (that is, the change of the threshold of coefficients sensitivity between two atrance is from someone else): • Calculate kanterwads for each cluster using the formula above.
- Using the formula above, calculate their coefficients for each location in the clusters.

Intra-cluster analytics K-means are less than the algorithm, however there are problems, in the same way that there is at least one local minimum depending on weights and the initial selection of results. In a more orderly way, the statistics algorithms Mksmyzaon expect some of the following to be views: Partial membership in classes. They know they've given precedence to properties and simple fuzzy-C-means.

## I. PROPOSED SEGMENTATION METHOD

Here in this section we proposed that our hybrid fuzzy K-means cluster acronym (AFKM). First, what the average used for preprocessing will be to remove from digital photos using filter noise and improve image quality. The product of the first phase will then be able to identify the margins of the image, and then it's K-i.e. the Segmented generated mines of the cluster: image. Now, the fuzzy cluster signaling accuracy and precise detection of the cancer of the capsule will be applied to the product of MR images

with the improve K-roots. Size of the tumor will be detected. The algorithm that steps up for the proposed system is shown in the diagram of a block.

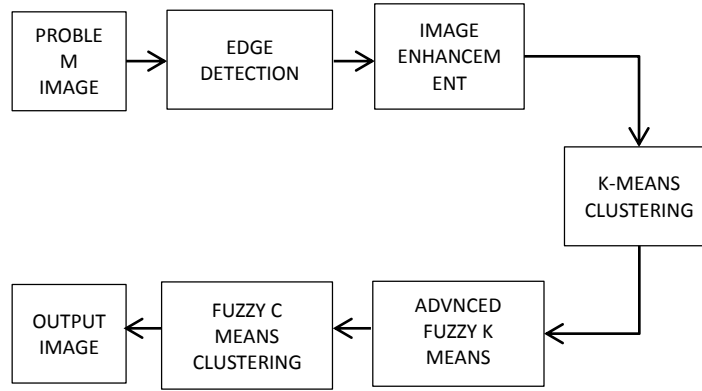


Fig. 3. Proposed system block diagram

## II. SIMULATION RESULTS

Simulation has been done in Matlab. Fig. 4 represents the edges found in the image, Fig. 5 shows the original image and Fig. 6, Fig. 7, Fig 8 shows the segmented images of K-means clustering, Fuzzy C-means clustering and proposed segmented method.

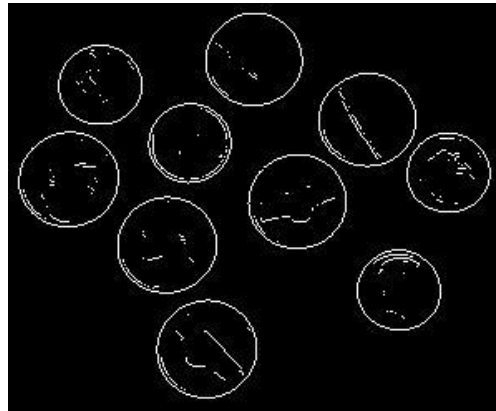


Fig. 4. Edges detection



TABLE I. COMPARISON WITH OTHER METHODS

S.NO.	SEGMENTATION METHOD	TIME(Sec)
1	K-MEANS CLUSTERING	3.625
2	FUZZY C-MEANS CLUSTERING	4.0625
3	AFKM ALGORITHM	2.8433
4	EELCS ALGORITHM	1.0692

Above table I shows the comparison results with K-means clustering and C-Means clustering, which have produced the better results in terms of time.

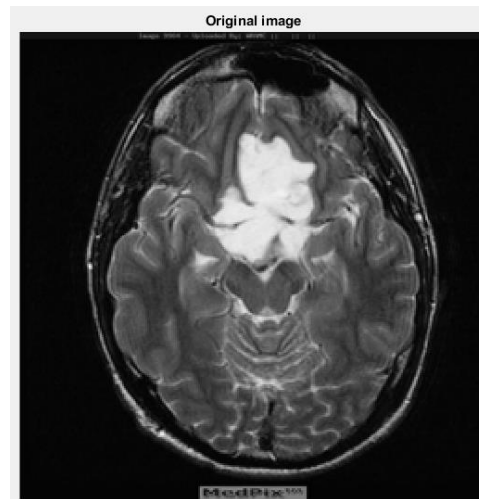


Fig. 5. Original image

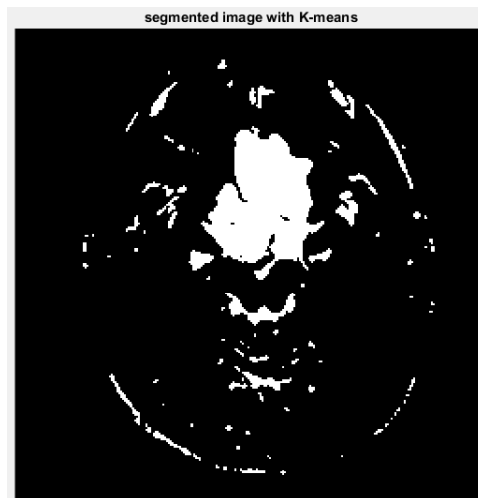


Fig. 6. Segmented image with K-means clustering

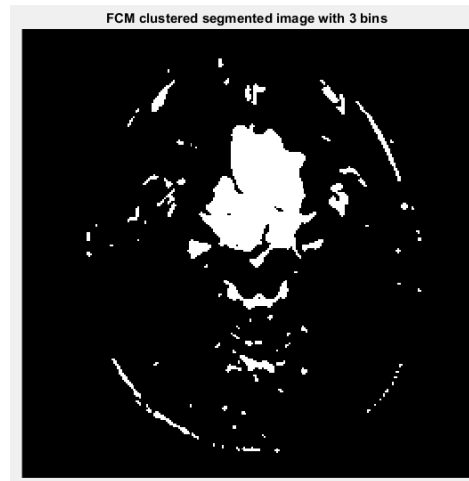


Fig. 7. Segmented image with Fuzzy C-means clustering

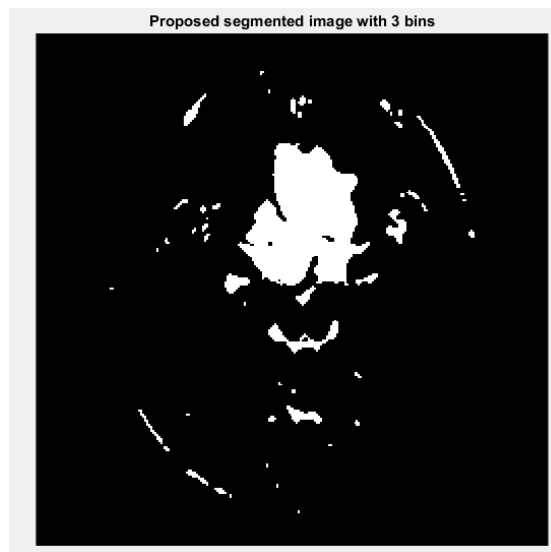


Fig. 8. Segmented image with Proposed Structure algorithm

## CONCLUSION

An approach had been presented in this paper that directly specifies a profile for histogram equalization-based image contrast enhancement. The proposed method makes use of a linear adjustment of the target histogram taking into account to minimize the difference between the mean brightness between the input and enhanced image. This method removes the need to separate the image into sub-groups and simplifies the equalization process to a single run. Furthermore, a rationalized choice of threshold was formulated where a balancing condition was met. Thus, fulfilling the requirement for minimum input-output brightness error. Experiments on a large data set of natural images reveals that although there is no single technique that can perform best in all performance criteria.

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# Application of Internet of Things and Solutions Analysis

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**Abstract**—IoT (Internet of Things) Solutions will be explained and explored to illustrate the business goal. The topology of the key components is extracted from any information available about the solution. These components are presented in two diagrams, one of which illustrates the cardinality of the association between the components. The second diagram shows how the data flows between the components. The vocabulary used when discussing software architectural styles contain components and connectors, hence the choice of identifying this for each solution and displaying it in diagrams.

**Keywords**—Actuators, Communication network, Transport layer security, RFID, SIOT, Neural sensors, Mobile Cloud Computing, preprocessing, Homeseer, RFID, Array of Things (AoT).

## I. INTRODUCTION

Firstly the IoT Solutions will be explained and explored to illustrate the business goal. The topology of the key components is extracted from any information available about the solution. These components are presented in two diagrams, one of which illustrates the cardinality of the association between the components. The second diagram shows how the data flows between the components. The vocabulary used when discussing software architectural styles contain components and connectors, hence the choice of identifying this for each solution and displaying it in diagrams.

The very first diagram displays the cardinalities of interaction between the parts (Cardinality diagram). A one-to-many link suggests that one example of a part is going to communicate with one or maybe more instances of another component. For each of these interactions we have to determine the scale, as it is able to reveal whether scalability is actually essential for the answer and therefore which software architectural styles could be used. Also provided in the diagram is actually the location of the information storage as well as the application logic.

The next diagram contains arrows indicating the flow of messages between components (message flow diagram). Within this diagram we're attracted to possibly the flow of information which is calculated from the sensors or maybe command emails which are sent to actuators. Note that not all messages between all elements are actually illustrated, as this's out of range. Both diagrams also indicate which components contain sensors and/or actuators. The remedies are actually grouped by their respective IoT Domains. The rest of this particular appendix has an evaluation of the remedies. [6][7]

## II. APPLICATIONS OF IOT

### A. Connected home

1) *Nest Thermostat*: The Nest thermostat is actually a smart thermostat which tries to study the daily routine of yours for temperature changes in the house of yours. When it learns this, it is going to apply these changes instantly without the user having to think about it. The end user also can replace the heat in their house via the Nest app or perhaps via the thermostat directly. Information regarding the Nest Thermostat was discovered on the Nest Home page Nest, the specialized specification page and the NEST developer documentation page. [1]

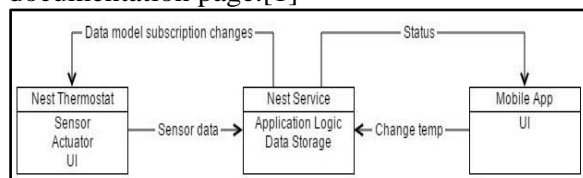


Figure 1: Nest Thermostat message flow diagram

2) *Homeseer*: The Homeseer is a comprehensive bundle for home automation. Instead of paying attention on one specific feature of the connected home domain, homeseer offers automation for lights, energy, water, security, locks, temperature, video and sound. A huge selling point because of this remedy is they promise not to save private user info in the cloud. Information regarding the Homeseer was discovered on the home page as well as the developer support page.

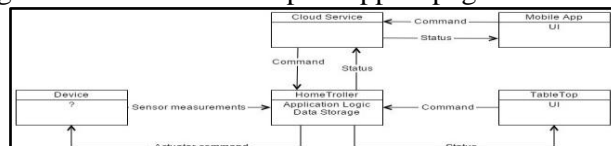


Figure 2: Homeseer message flow diagram

3) *Smart Things*: Smart Things also provides a smart house environment. The primary nodes are actually the Smart Things Hub and the Smart Things app. Like the Homeseer, the scale of the solution may be as large as the user needs it to be. The largest difference being which Smart Things has a cloud service which has the information gathered by the Smart Things program and also has application logic to come up with the product work. Another distinction is the fact that it mainly will depend on third party products as the amount of Actuators and smartthings sensors are limited. Information regarding the Smart Things answer was discovered on the home page and the Developer Documentation page.

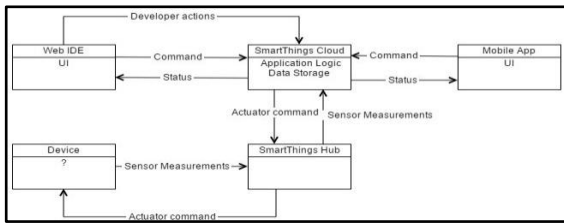


Figure 3: Smart Things message flow diagram

**B) ConnectedBody**

1) *Angel Wristband*: The Angel Wristband has 3 sensors that could monitor the wellbeing of the user. It really works with a range of physical fitness and wellness tracker mobile applications. There's an SDK in order to create for the Angel Wristband and extract the health metrics, device information, the Raw Waveform as well as to configure the alarm clock and that is also contained in the band. Information regarding the Angel Wristband was discovered on the house page8 and the SDK GitHub page.[5]

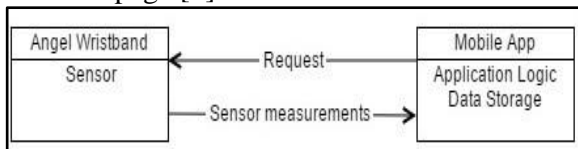


Figure 4: Angel Wristband message flow diagram

2) *Nymi Wristband*: The Nymi band makes use of the user's unique heart signature to authenticate them to a method or perhaps device. A good example of a possible application is actually logging into a computer or even gaining access to an area using the Nymi band. The company provides a developer kit for the platform. Information regarding the Angel Wristband was discovered on the home page, the Nymi SDK page and a whitepaper.



Figure 5: Nymi Wristband message flow diagram

3) *Zebra Motion works*: The Zebra motionworks solution utilizes a set of Zebra receivers (RFID) to go along with the motions of NFL players that each have an RFID transmitter tag placed inside the shoulder pads of theirs. The program measures precise location measurements of the players to give real time stats. The mentors are able to utilize the motion information to change their algorithms and tactics can aggregate player's stats and display them real time for fans to develop a deeper experience. Information regarding the Zebra Motionworks was discovered on the homepage.

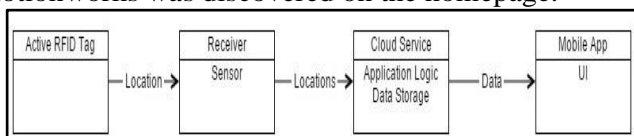


Figure 6: Zebra Motion works message flow diagram

**C) ConnectedRetail**

1) *Scanalytics floor sensors*: Scanalytics floor sensors extend the floor with receptors that evaluate exactly how folks walk on the floor. This information could be utilized to analyze customer behavior in a department store. The store may then alter the arrangements of the things for sale to better emphasize the most popular products. One of the selling points of the scanalytics floor sensor is actually it doesn't collect private info. Individuals add to the information anonymously. Information regarding the Zebra Motionworks was discovered on the homepage. I tried to access the SDK though I haven't got a reply from Scanalytics.

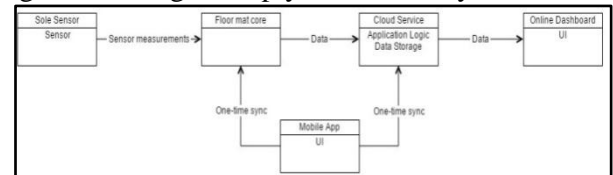


Figure 7: Scanalytics message flow diagram

2) *S5 Electronic Shelf labels*: The S5 Electronic Shelf labels will be positioned in stores to be able to keep costs of items up to date. Transmitters called T3 are actually positioned around the shop to develop a network to be able to drive the prices from the management application to the S5 shelf labels. Information regarding the S5 Electronic Shelf labels was discovered on the home page

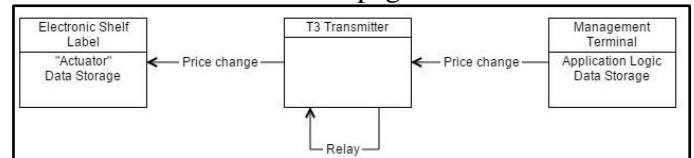


Figure 8: S5 Electronic Shelf labels message flow diagram

**D) ConnectedTransportation**

1) *WeatherCloud*: In an effort to provide much better weather and road quality info, the WeatherCloud solution places multiple sensors inside and outside of an automobile. These sensors measure precipitation fee and kind, road conditions, pavement temperature, ambient temperature, dew point, ambient lighting, slip/grip of tires and vehicle dynamics. This information is then aggregated by an on board Smart Hub which drives it to the Cloud. The resulting information on the Cloud is actually sent to driver's cell phones or maybe navigation screens or perhaps could be seen through the WeatherCloud desktop application. Information regarding the Weather Cloud was discovered on the homepage.

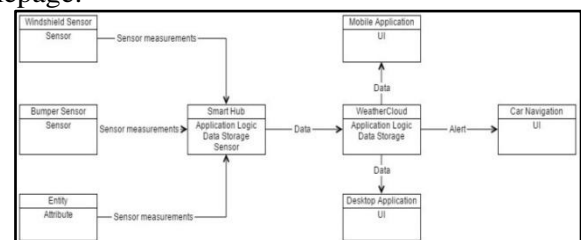


Figure 9: WeatherCloud message flow diagram

2) *Truvolo Connected Car Solution*: The Truvolo Connected Car Solution is a comprehensive solution for vehicle connectivity and data management. It includes sensors for various vehicle parameters and a central processing unit that communicates with a cloud service and a mobile application. The solution is designed to provide real-time data and insights to drivers and fleet managers.

will provide an automobile connectivity by plugging a tiny unit (Truvolo Drive) into the On board diagnostics (OBD) port of the automobile, which relays info about the automobile via a mobile phone to the Cloud which could then be seen by an internet dashboard. The information on the dashboard shows exactly how much gasoline is used, just how secure the automobile is being pushed and monitors the condition of the automobile and provides an alert in case the automobile has to be maintained. All automobiles of a home may be handled by the dashboard. Information regarding the Truvolo Connected Car Solution was discovered on the home page.

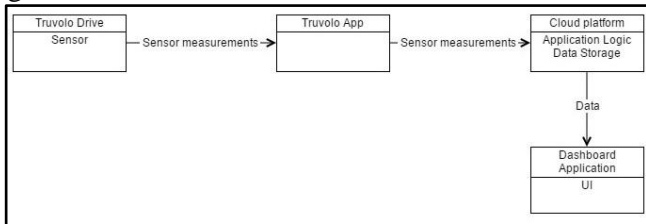


Figure 10: Truvolo message flow diagram

3) Veniam Vehicular Networking: Marketed as "The Internet of Moving Things", this IoT solution turns vehicles into WiFi hotspots. This networking may be viewed as a means to offer pervasive Internet and hence support the IoT by offering access to the Internet for products. The main reason why Veniam is also regarded as an IoT Solution is actually since it also gathers info about the location of the automobile. The connected vehicles act as a sensor for the city, providing info that is important to enhance fleet management, security and operations.

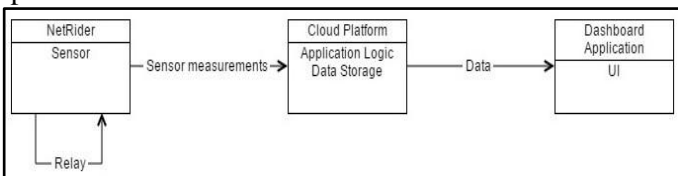


Figure 11: Veniam Vehicular networking message flow diagram

E) SmartCity

1) Bitlock Bicycle Lock: Bitlock is actually a bicycle lock that unlocks when a smartphone containing the most appropriate key is actually in proximity to it. The program also recalls the previous location of interaction with Bitlock and will demonstrate a history of usage. Access to the bicycle may also be shared with other people of the app. The digital key is actually discussed between the mobile phones; therefore the Bitlock itself just must have the correct element to be opened. It doesn't have to be hooked up to the Internet. Information regarding the Bitlock was discovered on the home page.

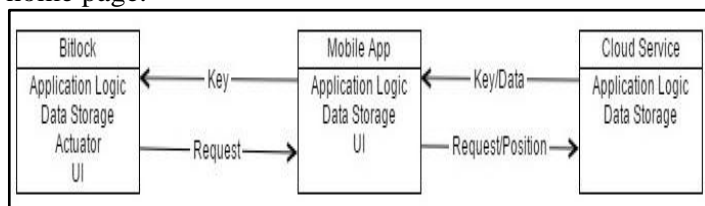


Figure 12: Bitlock message flow diagram

2) Array of Things: The Array of Things (AoT) is actually a wise city IoT solution where a lot of sensors are actually positioned around the city. The sensors around Chicago at the second collect real time info about this data and the city is actually posted on an open data source for researchers as well as the public to make use of. Factors as temperature, carbon monoxide, light, humidity, nitrogen dioxide and vibrations to name just a few. The solution promises not to gather some private information. Information regarding the Array of Things was discovered on the home page and the Waggle home page, and that is the platform the AoT is actually based on.

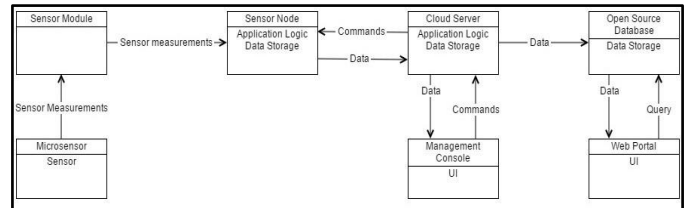


Figure 13: Array of Things message flow diagram

3) Enevo Waste Collection: The Enevo waste collection solution also links the city by measuring just how full trash containers are actually so that garbage trucks are able to enhance the routes of theirs. The option promises to give as much as fifty % in immediate cost savings. It'll also make the city look and feel cleaner, as waste containers are not as likely to be complete and optimized routes are able to lead to fewer garbage trucks on the street. Information regarding Enevo Waste Collection was discovered on the homepage.[8]

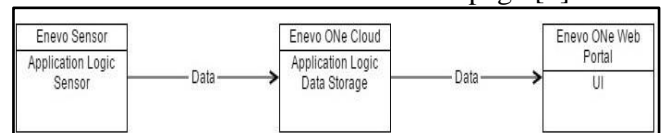


Figure 14: Enevo Waste Collection message flow diagram

f) Industrial Application

1) Farmobile Fleet Management: The Farmobile Simplicity PUC is actually a fleet management system for farms. It collects information to produce a digital farm record and also shows info about the motion of farm vehicles in mobile app or a web. The devices called PUC are actually installed on a farm car like a tractor and hook up to the Cloud. This information is actually gathered for archive but also for analysis. Farmobile also manages a cellular data plan for that answer. Information regarding the Farmobile PUC Fleet Management was discovered on the home page.

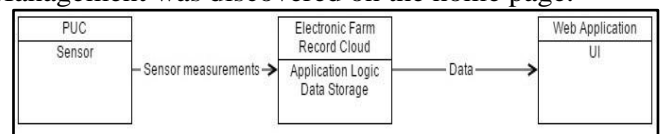


Figure 15: Farmobile message flow diagram

2) Condeco Workspace Occupancy Sensors: The Condeco Workspace Occupancy Sensor is actually a sensor which reports to the Cloud the way in which a workspace is actually occupied. According to this

information, the business is able to decide exactly how to more effectively make use of the workspace. The occupancy sensors push the information of theirs to a Cloud service. This information could be seen via mobile application or a web. The software allows for numerous ways to see the information. The owners of the system can then decide themselves exactly how to better use workspaces, you will find no actuators in this particular product. Information regarding the Condeco Workspace Occupancy Sensors was discovered on the home page.

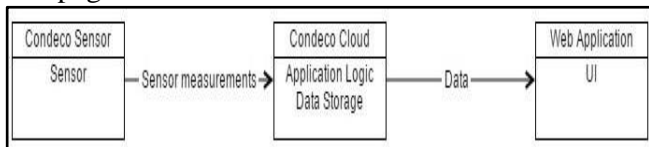


Figure 16: Condeco Workspace Occupancy cardinality diagram

iii) DAQRI Smart Helmet: Created especially for manufacturing applications, the DAQRI smart helmet utilizes an array of sensors, cameras and augmented reality to link your work environment by simply being there. The cameras recognize the equipment in the work environment of yours and publish the state of the equipment online. Other customers that are also using the helmet within this atmosphere is able to make use of this information. The whole landscape of the work environment of yours is collaboratively mapped by all smart helmets. The Helmet also offers a display which shows the wearer what his job goals are actually for the day, that are given by a main server running the DAQRI application. Information regarding the DAQRI Smart Helmet was discovered on the home page.[3,4]

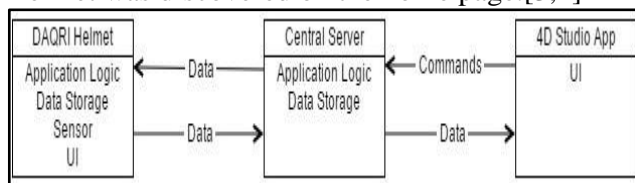


Figure 17: DAQRI message flow diagram

### III. Quality Attributes analysis

This section offers an analysis quality attributes in the Internet of Things depending on the treatments explored. It'll also be found that not all of these quality characteristics are actually a high priority in the truth, since there is actually such a great assortment of solutions.

- **Interoperability.** The solutions that were explored exhibit different levels of interoperability with many other ways. The one real instance of interoperability between various ways in the dataset examined is actually in the connected home domain. The remedies in other domains provide the chance of interoperability for the future. There's also a team of remedies that at the moment don't point out the ability to speak with other ways at all. The SmartThings solution achieves interoperability by having SmartApps run in the Cloud which understands the various kinds of third party devices. Owners can also create their own SmartApps.

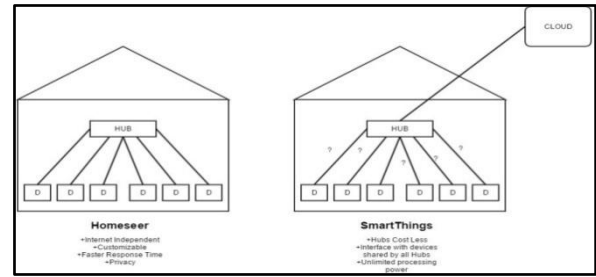


Figure 18: Homeseer VS. SmartThings Interoperability

Both fixes provide a "Hub" which functions as a main communication point between the equipment inside the home environment. Figure 18 illustrates these 2 methods. The distinction between these 2 treatments is actually the location of the logic required to recognize the interaction with the equipment. This logic is necessary to reach semantic interoper power between the many products inside a smart house. For the Homeseer, the logic is actually put in the Hub itself, while for the SmartThings solution this logic is actually located in the SmartServices level in the SmartThings Cloud. The SmartThings Hub merely relays the interaction to the Cloud.

This style choice has impact on the system on levels that are various. The interoperability between products in the Homeseer solution is actually Internet independent, the hub is actually customizable can react more quickly and is a lot more privacy friendly. The SmartThings Hub on the other hand shares the intelligence with any other hubs linked to the Cloud, which makes it easier to add brand new intelligence to interface to products to all hubs at one time. Since the logic is actually put in the Cloud, the computation power isn't restricted by the hardware on the hub. Last but not least, as the hub just functions as a gateway between equipment and also the Cloud, it could be assumed that the SmartThings hub costs much less to make than the Homeseer hub. Both of these connected home solutions offer interoperability via the IFTTT webser vice. IFTTT is actually a webservice which allows users to link up 2 services by a conditional declaration called recipes. If a particular state occurs, for instance a SmartThings motion sensor picks up a little movement, then the IFTTT webservice is able to send a message to a Phillips Hue bridge to switch all of the lights on. These "If This Then That" recipes may be utilized for interoperability between fixes, so long as the IFTTT is actually granted permission to speak with them. A reason why this's a good feature is actually since it enables individuals that are not programmers to produce recipes that provide for interoperability as well as autonomous behavior.

Lastly, there's a team of remedies which don't interoperate with another solution. This supports the statement that interoperability with various ways isn't essential for most IoT Solutions. There are several remedies which may not wish to be available due to security, security and privacy reasons. They may develop an interconnected network of items with a select few remedies in the long term, but not in such an open fashion as some other IoT solutions.

A good example is actually the DAQRI smart helmet that is an augmented reality based helmet which can map an industrial setting while receiving work goals for the work day. The helmet contains



processing power to recognize its surroundings and assist the employees with their daily routines while trying to keep the state of the devices in an industrial workplace synced with a data type on a main server. Some possible reasons why interoperability is not essential for this particular remedy is actually since it manage a great deal of information that is private and the information it measures is quite intricate, making it difficult for another system to realize. It might also be argued that such a program would probably evolve itself if much more function is actually required rather than relying on many other remedies, since it's such a complex and specific solution.[10][12]

To summarize, the coming levels of interoperability between solutions had been determined for current IoT Solutions:

- **Hub/Gateway:** The Hub/Gateway middleware node contains the logic to achieve semantic interoperability between devices.
- **Cloud:** The Cloud component contains the logic to achieve semantic interoperability between devices.
- **Third Party Service:** A Third party service is used as a mediator between two IoT solutions.
- **SDK:** An SDK is available to develop for the platform.
- **Open Database:** The data measured by the IoT Solution is available to other systems.
- **No Interoperability:** The solution currently does not support interoperability with other systems
- **Evolvability.** Although not a lot of information is available about the modularity of the software in IoT Solutions, one thing that is important for the IoT with respect to evolvability is the ability to push software updates to a node via the network.

Several fixes have quite slim edges, which include just sensors that push the information of theirs to the cloud. All of the application logic for these kinds of treatments is actually this centrally located in the Cloud. What this means for evolvability is the fact that the program just has to be updated in one location to evolve the system. This way, the evolution of the method is much more quickly controlled, which is also among the attributes we identified for evolvability. When the expertise is actually distributed amongst nodes at the edge of the network, these updates have to be propagated to all of these nodes. Furthermore, if the edges are much less wise, they're much more easily replaceable with respect to cost in case of theft or harm. This means the exchangeability is actually enhanced in such a scenario, allowing for brand new variations of sensors to be deployed a lot more easily. Figure 19 illustrates this difference.

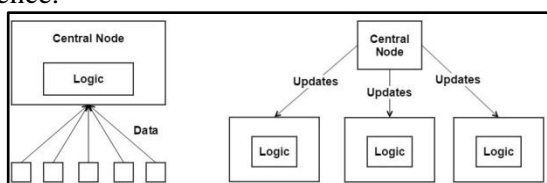


Figure 19: Centralization vs. Decentralization for Evolvability

Having a centralized intelligence also has an impact on evolvability with respect to interoperability. If there's an atmosphere where the selection of heterogeneous devices is actually more likely to boost at a quick speed, having a centralized intelligence means only updating

one node in the network with the logic to speak with these brand new products. If the advantage of the network is actually responsible for the interoperability, these updates will have to be pressed to these nodes. These nodes are also bound by their hardware capacity, which is actually in many instances very limited.

The preference for which sort of formula to create, centralized or perhaps decentralized with respect to evolvability, is dependent on the anticipated price of selection and change of nodes at the edge. If both are actually high, a centralized remedy could be the most desirable option. Nevertheless, if this's not the case and changes are actually occasional, then having more logic at the edge of the network also brings benefits including availability and performance.

- **Performance** As previously stated, decentralization of the method is able to result in an increase in performance as a result of low latency. One half of the treatments examined rely completely on a centralized intelligence which is often a Cloud component. This may suggest that for these remedies, low latency isn't the highest priority. For a number of these devices, the idea of having information "eventually consistent", i.e. measured information from the real world is ultimately synced to its digital counterpart or maybe the shift to the digital counterpart is eventually propagated to the advantage node and then altered in the real world, is actually good enough. In an environment like a connected home, there's a reliable Internet connection and the products are actually stationary. This combination helps make it possible to attain fairly good performance even though every one of the logic is actually in the Cloud. Take another planet where the connectivity may be unstable and the nodes are continuously in motion, and suddenly having logic closer to the edge is able to have a huge influence on performance, particularly if the unit is able to sense, process and then give feedback to the user without actually requiring a connection. The DAQRI smart helmet is actually a good example of a smart device at the edge of the network.

- **Scalability** For the vast majority of the methods analyzed (eleven out of eighteen), the remedies have a Cloud component which all equipment and users speak with. For these methods nothing much more can be said other than the "Cloud servers have to be scalable". The simple fact that the Cloud is actually scalable is actually a safe assumption to make, however having an architecture which requires less scaling decreases costs. By the estimation of mine, the Cloud server which would have to be most scalable out of the systems evaluated is actually the SmartThings Cloud. Each device inside a household is going to communicate with this Cloud component, albeit indirectly via the SmartThings Hub.

Several fixes have much less of a scalability issue if either the selection of number or maybe devices of owners is fixed. For the Zebra Motionworks instance, the amount of products is actually fixed, because there's

a fixed amount of NFL athletes allowed to play on the area in the process. The amount of RFID readers positioned around the stadium is also fixed. The S5 Electronic Shelf answer is actually an example where the amount of owners is actually fixed. The amount of shelf labels may possibly improve significantly if the market expands or maybe gives a new branch, but there's surely a fixed (or perhaps quite small) selection of administrators which manages the product. There are a variety of fixes where scalability doesn't play a role. Take for instance the Angel or perhaps the Nymi wristband. They speak with one to a couple of uses at a time via Bluetooth. In this particular situation both the amount of devices and users is actually fixed. The Nomi Brickstream live team argues that their method is much more scalable because intelligence is actually put in the advantage device, which happens to be a camera. It is then easier to add numerous nodes as each of them do their own computations and don't result in much stress on the main server. This's particularly crucial when the main server isn't always in the Cloud but maybe a private data server.

The following statements can be made regarding scalability:

- Decentralization is good for scalability, especially if the central node is not a Cloud component, as the logic in the edge of the network decreases the workload for the central node.
- Some systems have a fixed number of devices or fixed number of users, making scalability less of a priority.
- Some solutions do not need to scale at all.
- Scalability in the IoT becomes more interesting when interoperability between solutions come into play.
- **Accessibility** A primary reason a remedy may become unavailable in the IoT is actually whether the battery of the equipment at the edge run out. The majority of the
- respect to privacy because of the technology used. Another example is actually the Array of Things, which also makes claims not to collect private information of individuals in the city. They do however measure mobile device signals to present an estimation of just how busy particular part of the city is actually. One interesting IoT Solution with respect to privacy is actually the Homeseer. The Homeseer continues to be the privacy friendly substitute for the Smart Things, simply because the private information is still not saved in the Cloud. The Cloud is just used as a router between the mobile app and the Homeseer Hub. From this we are able to conclude that decentralizing data storage is able to offer much more privacy, since most of the information is actually kept on a neighborhood community. There's no guarantee however that no information at all is actually kept on the Homeseer Cloud router, which makes privacy such a hard issue. Nevertheless, trusting companies with information without getting a full guarantee what's done with it's always been a privacy problem even before the IoT.[9]

remedies analyzed either plugs in to a power outlet or even has very long battery life. Probably The shortest battery life among the remedies is the fact that of the DAQRI smart helmet, that is estimated at 1 day. The accessibility of answers in the IoT may also be influenced by connectivity issues. One way this's managed is by enabling the unit to keep the measurements of its locally and publish them when a sure link has been started. This's how the Farmobile solution handles this particular issue, where connectivity in the farm lands might be restricted. This connectivity issue is managed by the DAQRI smart helmet by enabling the unit itself to process the data of its locally and put it, allowing for the vast majority of the performance to remain publicly available.

• **Protection.** It's difficult to say something about security measures that the IoT Solutions consumption, since they're typically not open about this particular. This's to be anticipated as making the protection protocols used public will allow it to be a lot easier for an attacker to begin an attack.

• **Privacy.** The IoT solutions exhibit many ways to provide privacy. One of the ways is through information minimization, exactly where the remedies say just to gather information which is required. A good example is the Nomi Brickstream living, which happens to be a digital camera which is able to find faces so that a retailer could be counted the number of folks walk in and from the shop. Nevertheless, they claim not to truly save the faces which are found on camera. The Scanalytics floor sensors have the same goal as the Nomi, except that they just measure action on the floor, which is actually certain to be anonymous. While both devices most likely provide the exact same amount of privacy for the same objective, the Scanalytics floor sensors offer a feeling of trustability with

#### IV CONCLUSION

A good example of an IoT solution was privacy plays no role is actually the Zebra movement works. The information which is actually being gathered will be the game behavior of NFL players on the field. This's info that's currently available to other individuals attending the game or even watching at your home.

Taking look at several of the privacy statements made by fixes, one that stood out is actually the Nymi band. For this particular answer, Privacy by Design was used. Privacy by Design contains seven goals to be able to ensure privacy in systems. These are the following:

- **Proactive not Reactive:** Anticipate and prevent privacy-invasive events before they happen.
- **Privacy as the Default Setting:** Maximum degree of privacy should be the default setting. Users don't have to do anything to ensure their privacy.
- **Privacy Embedded into Design:** Privacy should be an integral part of the architecture and not an after-the-fact add-on.
- **Full Functionality:** Instead of considering trade-offs such as privacy vs. functionality, the system

should be designed in a win-win manner where both can be achieved.

- **End-to-End Security:** Privacy by Design extends throughout the lifecycle of the data collected, where at the end the data is securely destroyed
- **Visibility and Transparency:** Privacy is individually verifiable to all stakeholders.
- **Respect for User Privacy:** Design of a system should be user-centric with the privacy of the user always in mind.

While it's possible to attain much more performance while maintaining privacy in the IoT, it's more difficult to make certain owners that the situation continues to be privacy friendly after such a connection has been created with another program. Take for instance the Homeseer once more, where in the past it wasn't likely for the system to be privacy unfriendly due to the technology and style options used, specifically Internet dependent and no Cloud component. The brand new version of the Homeseer can still work in a privacy friendly manner, the way it's more difficult for subscribers to believe in that. This's exactly where visibility and transparency play a job, allowing specific people to confirm for them.

What we have learned about Privacy in the IoT Reality is the following [2]:

- Decentralization of data storage is deemed privacy friendly.
- Privacy is promised by assuring the user that onl y necessary data is gathered and not personal data (data minimization).
- There is a trade-off between Privacy and Functionality in the IoT.
- There are some solutions where privacy does not play a role at all because of the nature of the data being gathered and processed.[11]

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# Collection of thoughts using Text Evidence

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## Abstract

We prescribe learning the term contained in this thing with a specific feeling. presented word inserting learning calculations as a rule as it utilized words, but disregard enthusiastic messages. Since the words with comparative settings but inverse feeling extremity are connected to neighboring word vectors such as great or awful, a wistful examination is tricky. This issue is managed by scrambling data with content sentiments (e.g. sentences and words) at the side word settings in outstanding inserting. The near neighbors in space of feeling are related in a pioneering manner, integrating proof of meaning and degree of feeling. We create neuro networks with evolving loss roles to reliably interpret the embedded feeling and instantly gather broad texts with emoticon-like signals. Sentiment integration can actually be used in a variety of sentiment analyzes without a plug-in as word-features. We use inbuilt stimuli to understand words, to recognize the sentence of emotions and to create lexicons of emotions. Experimental results show that emotions are regularly incorporated into several benchmarking data sets. This work provides information on neural networks design in other natural ways for the study of word embedding.

## Keywords:

## 1. INTRODUCTION

WORD interpretation attempts to reflect facets of the meaning of the word. Of example, "cell phone" description should reflect the fact that cell phones are electrical devices, include the battery and computer, are able to talk to others, etc[1]. Text interpretation is a vital module in a lot of accepted language processing systems, the most commonly referred to as the simple text computing unit. A direct way forward is to view each word as a single hot matrix; with only one dimension and the length of a vocabulary 1 with all other sections is 0. One hot word representation, however, encodes only the words ' indexes in a language but does not absorb the rich relation of the lexicon. Most studies represent a continuous, poorly dimensioned and reevaluated vector for each term in solving this problem often referred to as word embedding. Current embedded learning strategies are based largely on a distributive assumption [9] whereby words with similar grammatical uses as well as semanticist In the area of integration, concepts like "hostel" and "motel," are translated into adjacent vectors. Because word embedding captures sentimentonal similarities between words[3], it is used as inputs or add-ons for several natural language processing tasks, including machine translations. Although the context-based word embedding has been successful in a number of NLP jobs[10] that they are not sufficiently effective if applied directly to feeling analysis, a research field aimed at extracting, analyzing and

organizing the feelings / opinions of the text (e.g. thumbs up or thumbs down). The most serious problem with contextual learning algorithms is that they model only meanings of words but overlook the feelings of the word. This means that in the embedding space in near vectors terms of opposite polarity, such as good and bad, are represented. This is important as both word shave similar uses and grammar positions are important for some functions, such as post-tagging. Yet, because they have different feeling marks, it becomes a disaster in sentiment analysis.

## 2. DESIGN AND DESIGN OUTPUT

### 2.1 INPUT DESIGN:

Input design is the user's link to the information system. This requires the establishment of processes for data collection. These actions can be carried out by testing the computer to decrypt data from records or scans placing the information directly into the program. This is important because transaction data are stored in a useable manner for analysis[2]. The input architecture emphasizes feedback control, error reduction, the avoidance of delay, the avoidance of further steps and the simplification of the procedure. The data entry is structured so that anonymity is protected in a safe and easy manner. The following things were considered by Input Design:

- The results what input should be provided?
  - Completion or coding of the data?
  - The input dialog that leads the operating staff.
  - Methods and steps to follow when error occur for prepare input validations.
1. The method of translating a user-oriented data definition to a computer-based system is the Data Design process. This development is necessary if data input process errors are to be avoided and for the management to be able to get proper information from the computerized system.
  2. Large volumes of data can be managed with user-friendly data entry screens. The aim is to promote and prevent input design errors in the data entry. The panel of the data input is designed to perform both manipulations. This offers archive watching tools as well.
  3. The authenticity shall be verified if the details are entered. With the help of cameras, data can be accessed. Suitable notifications are given as So the consumer isn't in maize immediately. The interface architecture is therefore aimed at creating a conveniently followed feedback style.

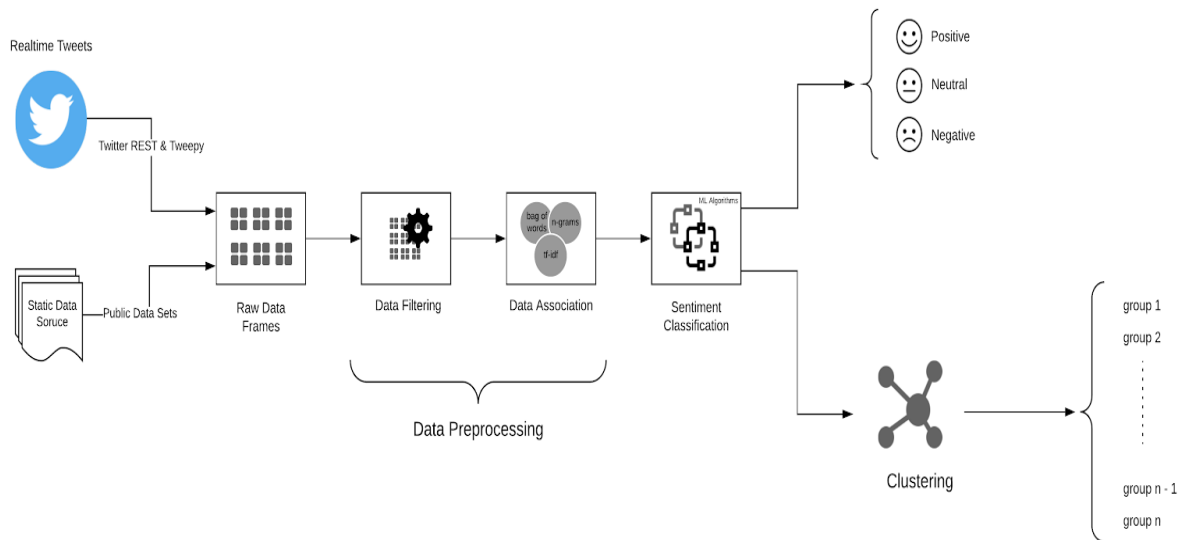
### 2.2 OUTPUT DESIGN

A quality performance satisfies the end user's expectations and clearly displays the details. In any processing system tests, consumers and other processes are represented by outputs. In the production configuration the material is replaced and the hard copy output is calculated[3][4]. It is the user's main and most direct source information. Efficient and clever performance architecture strengthens partnerships with the system to help users decide show in fig1.

1. Computer outputs should be organized and well thought out. And well thought out. To ensure that every element is designed, the right output must be developed to make it easy

and effective for people to find the system. When analyzing computer output, the specific output needed to meet the needs should be identified.

2. Use information sharing approaches.
3. Build papers, records, or other forms containing system-generated information.
4. One or more of the above goals must be met in the production form of an information system.
  - Convey historical activity, current status or —the future projections.
  - Signals key events, openings, problems or warnings.
  - Operation cause.
  - Complete a count.



**Figure 1: Input and Output Design of Sentimental Analysis**

### 3. STUDY OF THE SYSTEM

Existing embedding approaches to learning are largely based on distributional premises that their expressions are represented by their meanings. As a consequence, words with similar grammar and semitone meaning like "hotel" and "motel" are laid down in the embedding space in the neighboring vectors. Because word embedding catches semantic similarity between words, it has been used for a wide range of natural language processing tasks as inputs or additional word features. A log bilinear language model is presented by Minch and Hinton[5]. With the rating-type hinge loss feature, Clobber and Weston train word embedding to replace the median term within a window by the chosen randomly. Continuous word bag (CBOW) and continuous skip-grams are introduced by Mikonos, and the tool kit is released. Based on its context words integration, the CBOW model predicts the current word and In the current word incrustation, Skip-Gram predicts the terms. The main problem with contextual learning algorithms is that they

only model word meanings but ignore information about text-related sensations. In the embedding region in close vectors, opposite terms, including good and bad polarity, are represented.

- The major problem of context-based learning algorithms is that they only form meanings of words but ignore information about texts. Conditions that have opposite polarity are converted into closely integrated vectors, like good and bad[10]. Algorithms usually use the existing word embedding only language contexts, but they ignore text emotions.
- TO We empirically test the feasibility of feeling embedding in three sentiment analysis tasks.
- Comparison of feeling standard with benchmark emotion lexicon allows us to see if feeling embedding is useful for finding correlations between feeling terms[6].
- Taxes and tweets help us to understand if feeling inclusion is beneficial in catching discrimination and anticipate the feeling in the letter.
- Taxes and comments
- Creating a feeling lexicon is useful to test how embedding feelings will enhance the lexical tasks needed to identify similarities among verbs.
- Experimental results demonstrate that emotions are reliably incorporated into the context-based term and produce up-to-date output with a variety of benchmarks.

#### 4. FLOW DATA DIAGRAM

1.DFD is also called the bubble representation. It's just a graphical formality. serve as a systematic representation for the system entry data, different processing of these data and the system output data[7].

2. One of the most common modeling tools is the data flow diagram (DFD). The device elements are modeled. This is the system operation, process data, an External agent interacting with the system and the system information flow in fig 2.

3. DFD reveals how the knowledge flows across the system and how a sequence of transformations modifies it. It is an information flow analysis technique.The transformations used as the data passes between inputs and outputs.

4. Bubble map is also known as DFD. A DFD can be used in any abstraction level to describe a device. DFD can be separated into gradual information flow and practical description stages.

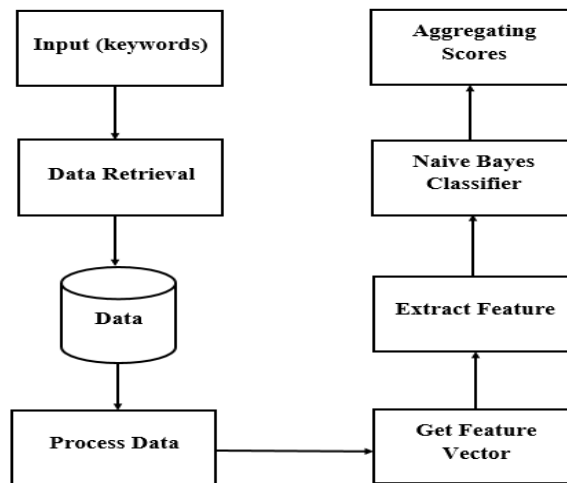


Figure 2 : Flow Data Diagram of Sentimental Analysis

#### 4.1 ARCHITECTURE

1. Provide users with an intuitive and ready-to-use vocabulary of visual modeling to create and share functional models shown in fig 3.
2. Offer methods of extension and differentiation to expand core concepts.
3. Regardless of different programming and development languages.
4. Offer a formal framework for understanding the language of modeling.

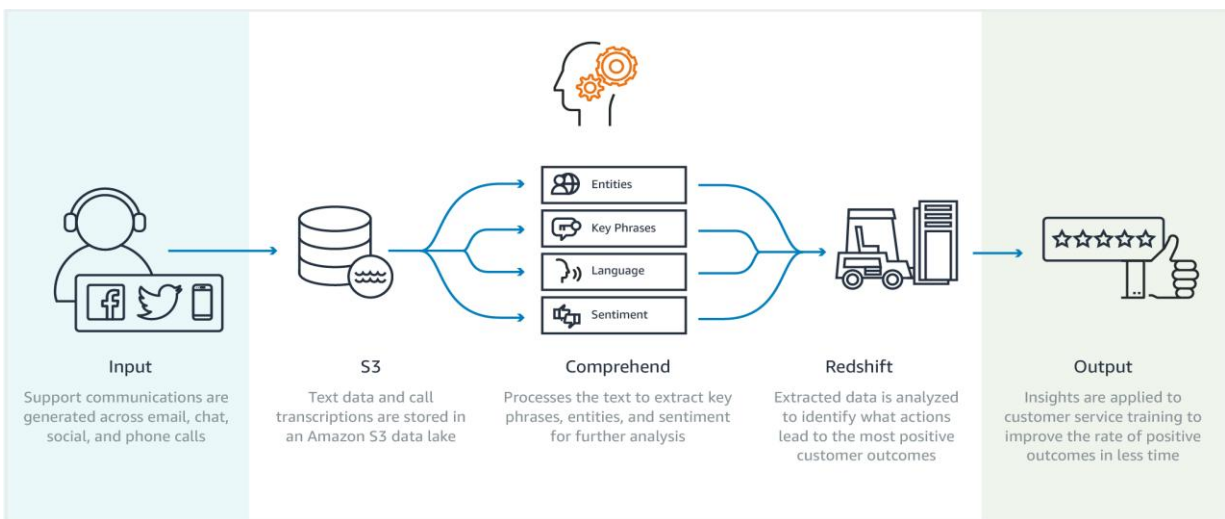


Figure 3: UML Architecture of Sentimental Analysis

5. Promote OO instruments market growth.
6. Support concepts such as collaborations, frames, patterns and components at the higher level development levels.



## 4.2 ACTIVITY DIAGRAM:

Operation diagrams reflect workflows for step-by-step operations and behavior assisted by preference, iteration and competition. Event diagrams for defining the business and operating component workflows in a program can be used in the Unified Modeling Language. The total control flow is shown in fig 4 the activity diagram.

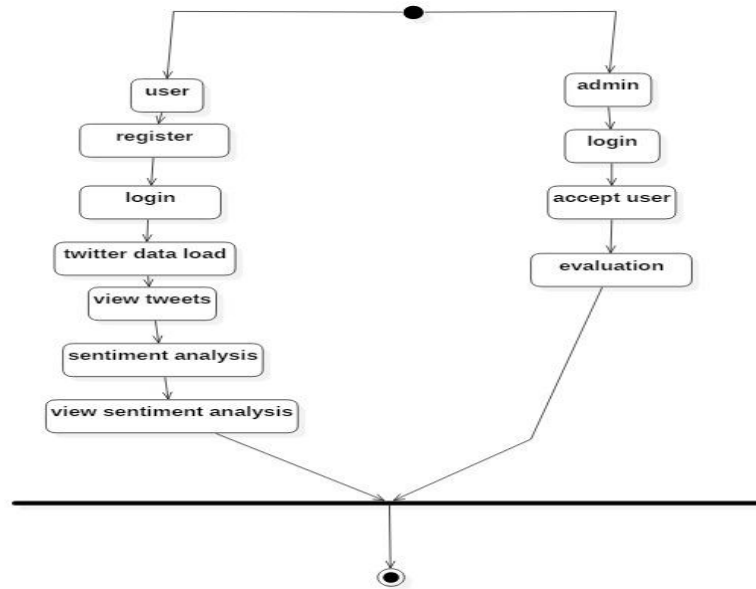


Figure 4: Activity Diagram of Sentimental Analysis

## 5. SYSTEM TESTING

The test is supposed to detect errors. Any flaws or shortcomings in the work product can be checked. This allows the operation of components, sub-assemblies, assemblies and/or finished items to be tested[8]. It is the technological process that ensures that the system fulfills its specifications and consumer expectations. There are different types of examinations. The specific test criteria are discussed by all test forms.

## 6. CONCLUSION

We are studying sentiment-specific embedding of words (also called embedding feeling) in this article. Unlike most studies outgoing which encrypt word only contexts in word embedding, we facilitate the ability of word integration to capture similitude's in terms of feeling semantics. The words in the feeling space, with similar backgrounds but opposite feelings, can therefore be separated from polarity marks like "good" and "bad." We are implementing Several neural networks encode context and level of sensation information in a unified manner simultaneously in word embedding. Three tasks of feeling analysis empirically test the effectiveness of

sentiment embedding. With the analysis of feelings at word level, we show that feelings are useful in the discovery of similarities of feelings between words. In the grouping of sentences, emotions are included in the avoidance of the thoughts of sentences. discriminative characteristics. In lexical tasks like building lexicons for sentiment, feeling embedding is useful to measure the similarities of words. The best performer on all three tasks is hybrid versions, which capture both meaning and feeling information.

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# Color Image Enhancement with Brightness Preservation Using A Histogram Specification Approach

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## Abstract:

Improving image quality is a fundamental requirement before pictorial information can be used in several real-time and manufacturing applications. For precise duplicate of the scene data, degradations ensuing in the contrast of loss should be corrected when effective histogram equalization is often used. In addition, it is also necessary to maintain the brightness of corrected image to truly represent the landscape properties. In this task, a strategy is suggested to specify an appropriate histogram profile so that the values of the image intensity are adjusted in accordance with, and the output brightness is kept close to the input image. Precisely, the equalization shape is shaped by discovery of a harmonising control threshold by mixing rectangular and triangle sections. These trials are performed using a large number of images in natural colors and compared to other available image improvement methods based on histogram. The results show that the suggested strategy will be able to achieve a wide range of performance goals, including content information, with color quality.

**Keywords:** Image enhancement, Histogram, Brightness preservation.

## INTRODUCTION

Digital images are common means to carry the information from or of a scene to the user in terms of visual perceptions. Image processing techniques are therefore indispensable assets to restore degradations of the information conveyed to a viewer or a computer for further analysis. There is a wide range of scientific and engineering applications that require visual information. Examples include medical diagnosis of tomography scout images and uses in remote sensing of the earth for resource exploration [1,2]. Engineering applications of images are even more diversified. For example, imaging technology is used in ferrography to [9,10]. These localized enhancement approaches could be more complicated in their implementations when comparing to the class of global histogram equalization

monitor machine health conditions during operation [3]. Furthermore, image processing techniques can be employed in infrared imageries [4]. In addition, vision is used in the identification and tracking of objects [5,6]. The problem of image enhancement had been tackled with focus on the preservation or enhancement of object edges in the image [7]. A color saturation boost operation is first carried out and then rectified for edge preservation. Another method was proposed which employs a morphological filter to enhance edges for an increased sharpness on the resultant image [8]. The contrast enhancement problem was also approached adopting a block-based enhancement strategy [ methods. Image enhancement algorithms based on histogram equalization are often categorized as a statistical and global approach [11].

equalization attempts to re-map the intensity or other image color channels to a specified probability density. In most cases, in order to obtain the highest information content from the output image, the target density has to be uniform. It had been observed that a direct application of this scheme might introduce some undesirable artifacts; hence, alternative implementation procedures are being proposed and advanced [12]. In the context of histogram equalization implementation, there are various approaches that can be taken. For instance, empirically determined transformations can be applied [13,14]. On the other hand, it is generally a challenge to obtain the required optimal parameter settings. To this end, a non-parametric method was developed [15]. In that method, the coefficient of a modification power law was determined using the mean image intensity. The output image, while corrected to the mean intensity of the given image, may not provide an appealing perception to a human viewer. Another method was developed to enhance an input image and to maintain the same output average brightness [16]. Since that algorithm had targeted at a flattest mapping density, the complete brightness level was not fully used to convey scene information. Histogram equalization toward a uniform density, on the other hand, is able to make use of all available brightness level to represent the information captured in the image and the measured entropy would be maximized. However, it is also recognized that the uniform target density would change the average brightness to the middle of the permitted levels and when not agreeing with the mean intensity value of original image, undesirable artifacts would appear. Researchers then began to seek for techniques that preserve the original mean brightness [17]. In that original work, pixels were separated to a lower and a higher group according to their mean brightness values. The two sub-images were evaluation of commonly used color spaces for color images was conducted [21]. The work reported there suggested utilizing the green color space during histogram equalization where this channel is a close

then equalized to a uniform density. It was also pointed out that the mean value was preserved to a certain degree. However, a perfect maintenance of mean value is not feasible even for input images of symmetrical intensity density. Variations or improvement were attempted to minimize the discrepancy between the input and enhanced image mean brightness. The input image was first separated using the mean brightness and then peaks in the input image histogram were clipped using the median of each sub-image [18]. Although the mean brightness error could be reduced, there was no solid rationale for the choice of the median value as the clipping limit. A range limitation approach was later developed [19]. Instead of equalizing the image to cover the entire allowed brightness, narrower bounds on the brightness were derived such that the resultant brightness was driven closer to that of the original image. An alternative method had adopted the weighted sum approach to tackle the mean brightness preservation problem [12]. Lower and higher intensity pixel groups were formed on the basis of the mean brightness value. Unlike the other methods, equalized groups were aggregated with the complementary groups and then weighted to produce an enhanced image. However, due to the fact that weighting factors are not always feasible, the requirement for perfect minimization of mean brightness error was relaxed to cope with feasible weights. A variation on the histogram clipping principle was further suggested [20]. The clipping limit was set as the minimum value of the histogram, median and mean. In the work therein, a potential problem exists when the median value is very low and gives a low clipping magnitude, features of pixels with the corresponding sub-group may be destroyed. Based on the available methods, a comparative

approximation to the image brightness. In addition to separating the image into high and low brightness sub-images as aforementioned, contrast enhancement could also be accomplished by modifying and

target density profile in histogram equalization. For instance, the input histogram was smoothed using an intensity-based window width [22]. The strategy reported therein can be further extended to return an output image brightness which is adjusted to that of the input image. In this work, a new method is proposed to reduce the difficulties encountered in choosing a proper sub-image division threshold. First, the mean brightness of the input image is calculated. Then depending on its magnitude as compared to half of the maximum intensity, a target histogram that balances the histogram areas over the desired mean is specified. The input image is then equalized, guaranteeing a mean brightness close to the input image. Histogram equalization for brightness preservation While attempts had been made to restore image contrasts from Degraded sources, researchers had paid attention to drawbacks found on the histogram equalization method where the resultant mean brightness is deviated from the input image. This effect gives rise to loss of a true representation of the scene and often causes artifacts as observed by human viewers. A class of techniques to maintain the brightness was then developed. Their salient features are reviewed below.

## METHODOLOGY

### Conventional Histogram Equalization

Let an input image be given as  $I = \{I(u, v)\} \in [0, L - 1]$ , where  $(u, v)$  is the pixel coordinate and  $I(u, v) \in \mathbb{Z}$  is the pixel intensity or brightness ranging from 0 to  $L - 1$ . For an 8-bit digital image,  $L = 2^8 = 256$ . The image resolution is  $U \times V$  width-by-height and  $u = 1, \dots, U$ ,  $v = 1, \dots, V$ . A histogram is formed and then normalized to Give the probability density, from

$$I_{\min} = I_m - \Delta I$$

$$I_{\max} = I_m + \Delta I,$$

$$\Delta I = \min(I_m, 2 \times I_m - (L - 1)).$$

gathering the number of pixels  $n(i)$  that have intensity value  $i$ , that is [11]

$$h(i) = \frac{n(i)}{UV}.$$

A cumulative distribution function is formed from

$$c(i) = \sum_{j=0}^i h(j),$$

Where  $\sum_i c(i) = 1$ . The enhanced image contains pixels whose values are modified according to

$$I_{enh}(i) = (L - 1) \times c(i),$$

assuming that the desired minimum and maximum intensities are 0 and  $L - 1$ . The probability density would obey a uniform distribution and the mean intensity becomes  $(L - 1)/2$ . This differs from the original image and is generally considered undesirable.

### Truncated Histogram Equalization

If the enhancement objectives are to increase the image contrast and to maintain the resultant mean brightness, then it is possible to truncate the range of intensities used in the equalization process [23]. Let the mean brightness  $I_m$  be

$$I_m = \frac{1}{UV} \sum_{u,v} I(u, v), \quad I_m \in \mathbb{Z},$$

then a range  $I_{\min} \sim I_{\max}$  is determined from

Furthermore, the whole image is equalized within the range  $I_{\min} \sim I_{\max}$  using the transformation

$$I_{enh}(i) = I_{\min} + (I_{\max} - I_{\min}) \times c(i).$$

Because it is permitted that  $I_{min} > 0$  and  $I_{max} < L - 1$  the equalization range is said to be truncated. Furthermore, since all pixel intensities are confined in the symmetric range about  $I_{max}$ , brightness maintenance can be achieved. However, due to the limited range, the output image contrast may be below a desired level.

Other than specification approach solely focusing on improving image contrast using histogram equalization while maintaining the output mean brightness that is closer to the input image, a pipelined procedure is

developed to full fill these objectives. The motivation is three-fold. Firstly, an increase in image contrast is required. Secondly, the output mean brightness should be made close to the original value. Finally, over-enhancement has to be reduced and without reducing its colourfulness and saturation for color input images. The first two objectives can be accomplished by adopting the histogram specification strategy. The third objective is achieved by incorporating a dynamic range stretching operation in a pre-processing stage. A block diagram of the proposed histogram specification approach is shown in fig. 1

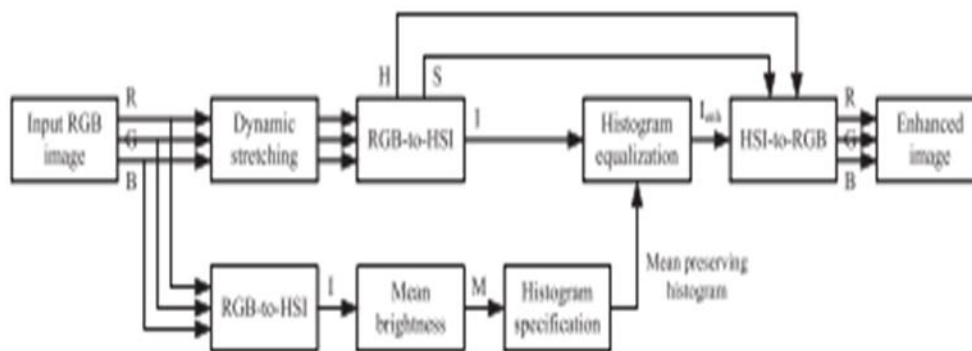


Fig. 1 Proposed block diagram for brightness preserving histogram equalization

approach

### Dynamic-range Stretching

Given a color image in the conventional red-green-blue (RGB) format, the color may not be in an ideal condition and degradation may be caused by illumination color casts. While stretching individual color channels, the color content is distributed across the allowable magnitude ranges. Thus, a dynamic range stretching in all color components provides a restoration of color degradations. We have the stretched color channels obtained from

The input image is applied to an RGB-to-HSI convertor. The output of the converter also contains three channels which are the hue (H), saturation (S) and intensity (I). They are more suitable to describe the perception perceived by a human viewer. In particular,

$$C(u, v) \leftarrow \frac{C(u, v) - C_{min}}{C_{max} - C_{min}},$$

Where  $C \in \{R, G, B\}$  denotes the color channels.  $C_{min}$  and  $C_{max}$  are the permitted minimum and maximum values. The result after dynamic range stretching ensures that most of the allowed color magnitudes are covered. However, it is noted that stretching changes the mean brightness from the original image.

### Histogram specification for mean brightness preservation

the I-channel is the brightness as regarded by the viewer. From the I-channel, the reference mean brightness is calculated as

$$M = I_m = \frac{1}{UV} \sum_{u,v} I(u, v).$$

This mean value is then applied to derive the specified profile in the form of a histogram used in the equalization process.

**Case A: target mean brightness greater than half-max Intensity**

Consider a given input image converted to the HSI format and the I-channel is extracted to obtain the mean brightness. In Fig. 2(a), for example, the mean brightness  $M$  is greater than half-max intensity  $(L - 1)/2$

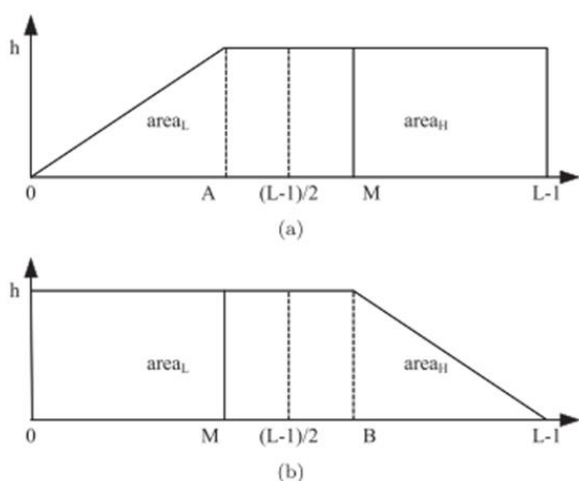


Fig. 2 Histogram profile specified according to mean brightness (a) mean brightness greater than half-max intensity (b) mean brightness less than half-max intensity

In order to increase the mean brightness of the lower intensity group pixels, an inclined profile starting from the control point  $A$  and reduces to zero intensity is suggested. By the principle of center moment, the lower and higher areas divided by the mean value should be balanced. The areas are

$$\begin{aligned} \text{area}_L &= hM - \frac{hA}{2} \\ \text{area}_H &= h(L - 1 - M). \end{aligned}$$

Then the balance condition requires

$$\text{area}_L = \text{area}_H \Rightarrow hM - \frac{hA}{2} = h(L - 1 - M).$$

After some calculation, we have a profile control point  $A$  given by

$$A = 2(2M - (L - 1)).$$

Consider, when  $A = 0$ , we have a complete uniform density. This situation corresponds to

$$M = \frac{L - 1}{2} |_{A=0}$$

Which is the lower bound of the case considered here. On the other hand, when  $A = L - 1$ , then

$$M = \frac{3(L - 1)}{4} |_{A=L-1}.$$

This occurs when the profile becomes a triangle. For input mean brightness greater than this value, the constructed profile is not able to drive the mean brightness to its required value. However, for image mean brightness above this limit, the image can be considered as over-exposed

**Case B: target mean brightness less than half-max intensity**

The situation of this case is depicted in Fig. 2(b). Now the areas of the low and high sub-image on the histogram are

$$area_L = hM$$

$$area_H = h(L - 1 - M) - \frac{h(L - 1 - B)}{2}.$$

The balanced condition requires

$$area_L = area_H \Rightarrow hM = h(L - 1 - M) - \frac{h(L - 1 - B)}{2}.$$

The control point B becomes

$$B = 4M - (L - 1).$$

When  $B = 0$ , we have a triangular profile and the resultant mean value is

$$M = \frac{L - 1}{4} |_{B=0}.$$

This corresponds to the bound where below which a match of input-output mean brightness cannot be established. However, for images whose mean intensity is so low may be regarded as not intelligible. When  $B = L - 1$ , then

$$M = \frac{L - 1}{2} |_{B=L-1}.$$

Which equals to the half maximum intensity range as expected

### Final Process

Depending on the characteristics of the input image, one of the above profiles is generated. The other source to the equalization stage is the I-channel converted from the range stretched RGB channels.

Let the profile generated be  $h_A(i)$  or  $h_B(i)$ , which confirms to the specification either case A or B. For case A,  $M > (L - 1)/2$

$$h_A(i) = \begin{cases} i, & 0 \leq i < A \\ A, & A \leq i < L \end{cases}.$$

The specified histogram further normalized giving

$$h_A(i) \leftarrow \frac{h_A(i)}{\sum_{i=0}^{L-1} h_A(i)}.$$

For case B,  $M < (L - 1)/2$  then

$$h_B(i) = \begin{cases} B, & 0 \leq i < B \\ L - 1 - B, & B \leq i < L \end{cases}.$$

After normalization, the histogram becomes

$$h_B(i) \leftarrow \frac{h_B(i)}{\sum_{i=0}^{L-1} h_B(i)}.$$

The specified histogram is employed in the equalization process for the I-channel. We have the enhanced image given by

$$I_{enh}(u, v) = (L - 1) \times c(i),$$

where

$$c(i) = \begin{cases} \sum_{j=0}^i h_A(j), & M > (L - 1)/2 \\ \sum_{j=0}^i h_B(j), & M < (L - 1)/2 \end{cases}$$

After the equalization, the output is combined with the hue (H) and saturation display, (S) signals and re-converted back to the RGB format for storage or transmission [11].



## RESULTS

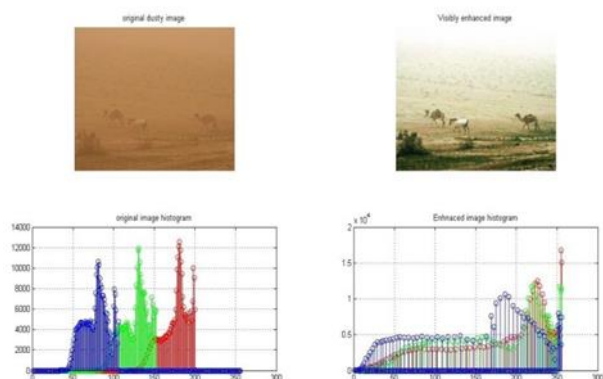


Figure 3 : enhanced image

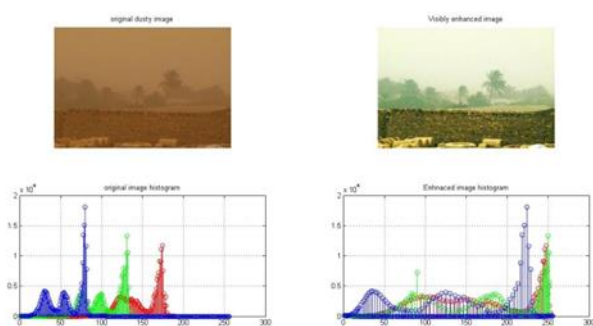


Figure 4 : enhanced image

## CONCLUSION

An approach had been presented in this paper that directly specifies a profile for histogram equalization-based image contrast enhancement. The proposed method makes use of a linear adjustment of the target histogram taking into account to minimize the difference between the mean brightness between the input and enhanced image. This method removes the need to separate the image into sub-groups and simplifies the equalization process to a single run. Furthermore, a rationalized choice of threshold was formulated where a balancing condition was met. Thus, fulfilling the requirement for minimum input-output brightness error. The process was integrated into a pipelined framework that catered for mitigating

colourfulness and saturation reductions. Experiments on a large data set of natural images reveals that although there is no single technique that can perform best in all performance criteria, results had shown that the technique developed in this work is able to provide color image enhancement that is both qualitatively and quantitatively satisfactory.

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## GENERATING CLOUD MONITORS FROM MODELS TO SECURE CLOUDS

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### ABSTRACT:

Authorization is an important security concern in cloud computing environments. It aims at regulating an access of the users to system resources. A large number of resources associated with REST APIs typical in cloud make an implementation of security requirements challenging and error-prone. To alleviate this problem, in this paper we propose an implementation of security cloud monitor. We rely on model-driven approach to represent the functional and security requirements. Models are then used to generate cloud monitors. The cloud monitors contain contracts used to automatically verify the implementation. We use Django web framework to implement cloud monitor and OpenStack to validate our implementation.

**Keywords:** UML diagram, dataset, scientific program, provenance.

### 1. INTRODUCTION

Open source cloud frameworks allow their customers to build their own private Infrastructure as a Service (IaaS). IaaS provides Virtual Machines (VMs) under the pay-per-use business model. The source code of Open Source (OS) clouds is distributed publicly. Moreover, often software is developed in a collaborative manner that makes it a subject of frequent updates. These updates might introduce or remove a variety of features and hence, violate the security properties of the previous releases. Assuring the security of opensource clouds is an important concern for cloud providers. Often open source clouds use REST architectural style to offer their APIs. REST offers a different architectural style to invoke remote services in contrast to contemporary SOAP-based services. Its different architectural style motivates the need to develop novel design and security assurance methodologies to handle

its stateless protocol for developing stateful services. Stateful services can have different states that a service must go through during its lifecycle. It requires a certain sequence of method invocations that must be followed in order to fulfil the functionality a service promises to deliver to its users. In this work, we propose a methodology that consists of creating a (stateful) wrapper that emulates the usage scenarios and contains an explicit representation of security and functional requirements as contracts. We adopt a model-driven approach – Security and Rest compliant UML Models (SecReUM) – that builds on the theory presented in [22] to create a security-validating wrapper. We define the structural interface of a REST API using UML class diagram. The usage scenarios – the dynamic behaviours – are represented as state diagrams. These models lead to RESTful interfaces, which will be the behaviour of operations of

preconditions and post conditions and also facilitate the specification of the authentication mechanism. In this work, we demonstrate how to generate contracts defining the security properties as pre- and post-conditions using these models and implement them as a wrapper for the cloud implementation. The approach is implemented as a wrapper in Django Web Framework for the Keystone component of OpenStack. OpenStack is an open-source software platform for cloud computing that offers REST interfaces to provide IaaS (Infrastructure as a Service) Keystone offers identity service in OpenStack for authentication and authorization.

## 2. LITERATURE SURVEY

Here let us consider a volume resource that is offered by the Cinder API of OpenStack [8]. Cinder is one of the services that is a part of the modular architecture of OpenStack. It provides storage resources (volume) to the end users, which can be consumed by the virtual servers [8]. A volume is a detachable block storage device that acts like a hard disk. Cinder API exposes the volume resource via (`{projectid}/volumes/`). Any user of the project (e.g., project administrator, service architect or business analyst) with the right credentials can invoke the GET method on volume to learn its details. However, only the project administrator and service architect can update the existing volumes or add new volumes, and only the project administrator can delete a volume. To offer scalability, REST advocates the stateless interaction between the components. This allows the REST services to cater to a large number of clients. Without storing the state between the requests, the server frees resources rather quickly that ensures system scalability.

However, to construct the advanced scenarios using a stateless protocol, we should enforce a certain sequence of steps to be followed. Hence, we can treat such a behavior as a stateful one, where the response to a method invocation depends on the state of the resource. For example, a POST request from the authorized user on the volumes resource would create a new volume resource if the project has not exceeded its share of the allowed volumes, otherwise it will not be created. Similarly, a DELETE request on the volume resource by an authorized user would delete the volume if it is not attached to any instance, otherwise it would be ignored. The security requirements combined with the functional requirements specifying the conditions under which a method can be invoked and its expected output result in a large volume of information. Moreover, such information should be defined for each resource, which becomes overwhelming for any cloud developer. In addition, if an API is developed in a distributed manner, i.e., by several developers working on implementing different parts of API, then the design errors and inconsistencies become inevitable. Therefore, we should propose an automated approach that would facilitate implementing correct security policies for each resource of the system and assure that the right users have an access to the right resources.

## 3. RELATED STUDY

. A cloud developer uses IaaS to develop a private cloud for her/his organization that would be used by different cloud users within the organization. In some cases, this private cloud may be implemented by a group of developers working collaboratively on different machines. The REST API provided by

develop the private cloud according to the specification document and required security policy. The cloud monitor is implemented on top of the private cloud. The main original components of our work are highlighted as grey boxes in Figure 1. The security analyst develops the required design models based on the specification document and security policies. These models define the behavioral interface for the private cloud and specify its functional and security requirements. In addition, our design models define all the information required to build the stateful scenarios using REST as the underlying stateless architecture. In our approach, the construction of the design models serves several purposes:

- 1) The models specify the system from different viewpoints and hence, the security analysts can choose to specify in detail only those part of the system that they consider to be critical;
- 2) The models provide a graphical representation of the expected behavior of the system with the contracts, which can be communicated with a relative ease compared to the textual specifications;
- 3) The models serve as the specification document and facilitate reusability;
- 4) They are used to generate code skeletons with the integrated behavioral and security contracts; and finally,
- 5) We can use several existing model-based testing approaches to facilitate functional and security testing of private clouds. We build on our partial code-generation tool that is capable of generating the code skeletons from the design models. We extend this work by targeting the security requirements, i.e., the access rights over

the resources, and propose an automated approach to representation the security requirements in the code. The generated code skeletons are then completed by the developer with the desired implementation of the methods.

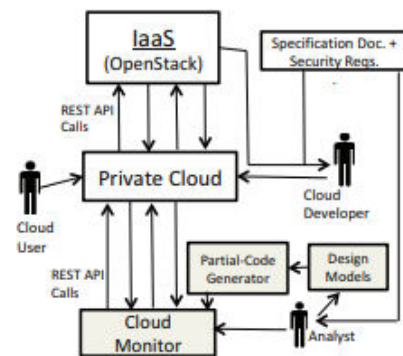


Fig.3.1. Architecture of the Cloud Monitoring Framework.

## 4. PROPOSED SYSTEM

The projects are created by the cloud administrator using Keystone and users or user groups are assigned the roles in these projects. It defines the access rights of the cloud users in the project. A volume can be created, if the project has not exceeded its quota of the permitted volumes and a user is authorized to create a volume in the project. Similarly, a volume can be deleted, if the user of the service is authorized to do so, and the volume is not attached to any instance, i.e., its status is not in-use. We represent the behavioral interface of the REST API by a UML state-machine. Figure 3 (right) shows an excerpt from the behavioral interface of Cinder API for a project. It contains the information about the methods, which a user can invoke on the volume resource and the invocation conditions. In the example shown, at any given time a project can be one of three states. A project initially

volumes attached to it. A volume is added to the project by the POST request. The request method can only be triggered, if the user belongs to the user group admin or member. As a result, the project transits to the project with volume and not full quota state. The subsequent POST requests on the project will keep it either in the same state or transfer to the project with volume and full quota state, depending on the guard conditions. The DELETE method can only be invoked, if the status of the volume is not in-use and user belongs to the user group admin. The change of the project state depends on the guard conditions. We define the invariant of a state using OCL as a boolean expression over the addressable resources. In this way, the stateless nature of REST remains uncompromised because no hidden information about the state of the service gets stored between the method calls.

## AUTHENTICATION:

Authorization in OpenStack, and other open source clouds is based on RBAC model. In RBAC, the access rights of a user are defined by his/her role. We assume that the information about the roles and the corresponding access rights to the resources is well-defined and available for the cloud developer and security analyst. In the current industrial practice, this information is usually given in a tabular format. We specify this information as the guards in the OCL format, which makes it amenable to an automated translation into the method contracts. In the behavioural model, each method should be labeled with a corresponding security requirement represented as a comment on a transition or state, as shown in Figure 3. When a state or transition with the requirement annotation is traversed, we get an indication

which security requirement is met. This provides traceability of security requirements during the validation phase.

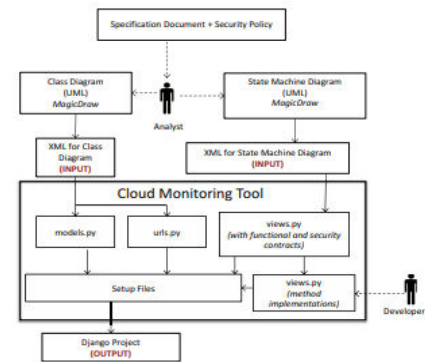


Fig.3.2. Cloud Monitor.

The current implementation continues our work on developing the wrapper. It focuses on validation of the authorization policy and its implementation in the cloud environment. The main steps in our implementation are as follows:

- We look for the resources in the class diagram to implement database tables in models.py. For each resource we create a table in the database, and analyze its associations to define their relationships with their keys. This creates a local copy of the resource structures as required by our monitor.
- urls.py contains the relative URLs of each resource and ways to access their respective views. This information is fully defined in the class diagram. By traversing the tags on the associations between the resources, we compose the paths of each resource. We always start from the corresponding collection, especially if we are referencing an item in the collection.
- The views.py file contains the main functionality of the system, i.e., the code that will run when accessing a resource through its URL according to the request (GET, PUT, POST or DELETE). These concepts are defined in the state machine diagram. The views.py is done in four steps:

- 1) Add information regarding the permitted methods over the resources;
- 2) Extract the functional contracts from the behavioral model as explained in section V and add them to the appropriate views;
- 3) Add the authorization information from the guards into the appropriate views;
- 4) Read security requirements from the comments on the transitions and add them as the corresponding variables in the code.

## 5. CONCLUSION

In this paper, we have presented an approach and associated tool for monitoring security in cloud. We have relied on the model-driven approach to design APIs that exhibit REST interface features. The cloud monitors, generated from the models, enable an automated contract-based verification of correctness of functional and security requirements, which are implemented by a private cloud infrastructure. The proposed semi-automated approach aimed at helping the cloud developers and security experts to identify the security loopholes in the implementation by relying on modelling rather than manual code inspection or testing. It helps to spot the errors that might be exploited in data breaches or privilege escalation attacks. Since open source cloud frameworks usually undergo frequent changes, the automated nature of our approach allows the developers to relatively easily check whether functional and security requirements have been preserved in new releases.

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## Improved Session Based Password Security System

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### ABSTRACT

Traditionally people use textual passwords as a security but these passwords get affected to the various attacks like dictionary attack, shoulder surfing, etc. After the period, graphical passwords are coming to the existence but the graphical passwords have some own disadvantages such as they require more time to authenticate. Hence, This paper has taken a review of session password technique in which the password is used only once for each and when session will end the password is not useful. The proposed session password scheme uses Text session password. The session password scheme uses pair-based authentication scheme. Textual passwords generally used for login authentication. Graphical password is introduced exactly opposite technique to textual passwords. As most users are well known about textual passwords than pure graphical passwords. Shoulder-surfing is an attack where an attacker can capture a password by direct show or by listening the authentication session password. Session password can use only once because every time a new password will generate. Session Password supports Pair based scheme which is secure and more efficient. In this paper, it is proposed an improved text-based shoulder surfing resistant scheme by using pair based scheme is used for alphabet, digit, symbols where session password will form at every session or transaction using virtual shuffling keyboard. The user can easily and efficiently login to the system. Proposed system analyzes the security and usability of the proposed scheme, and shows the support of the scheme to shoulder surfing attack.

**Key words:** Pair based scheme, Secret Key, Shoulder-Surfing Attack, Virtual Keyboard.

### 1. INTRODUCTION

Internet usage in the present day scenario is more abundant. Today for authentication, user name and password is used basically, hence the security must be provided in order to prevent hackers from accessing the data present in account of particulars. Phishing is a type of attack in which the attacker attempts to acquire the person's information such as user-id,

password, pin no, etc. by showing the user to believe that he is communicating with a trustworthy person. The users would normally receive a phishing email with a link and if user clicked that link, it will take them to a fake web site which could add malicious programs into the user's compute. Sometimes a phishing email can ask the users to provide their account details to carry verification purpose. So, it is necessary that the authentication should secure to protect user accounts.

The common technique used for authentication is textual password technique. The vulnerabilities of this type of technique is dictionary attack, social engineering and shoulder surfing attack, A Dictionary Attack is a technique for defeating with authentication mechanism by trying to determine or generate its decryption key to enter into once account. It is such method in which there is breaking to a password protected system by systematic manner by entering every word in a dictionary as password and in Shoulder Surfing, the hacker tries to look over persons shoulder to catch password. This is an attack in which an observer try to watch the keyboard entries to learn password characters entered by the user. Shoulder surfing could be carried out in a number of ways. As the keyboard is openly displayed on the screen of computer, it makes very easy to observe the key entered by person. Shoulder surfing is possible by watching the keyboard entry from some distance or by recording complete process through CCTV camera or by taking screen shots of keys pressed by person. The shoulder surfing attack mainly happened at public places or on public systems because login process can be monitored by many people and system is not completely in user control. It is observed that graphical passwords are predictable, a serious problem specifically related with text-based password. To avoid the problem of password stealing when logging by keyboard, several password based sites like banks sites provide a virtual keyboard option to enter passwords. It is an on-screen keyboard that helps users to enter their passwords by mouse click, which avoids the use of keyboard. But, it is not compulsory to users to use virtual keyboard. It is simple to see onscreen password entry than the entry by a normal keyboard. Particularly when online banking operations are performed at public places like Internet cafe, computer centers at colleges, etc.

Specifically, graphical passwords are introduced as a substitute to the textual passwords technique.

passwords are easy to remember than textual passwords. Also it is difficult to formulate automated attack on graphical passwords. But, most of the existing graphical password authentication techniques are suffering through shoulder-surfing attack, a known attack where an observer catches the password by recording the session of authentication or by direct surveillance. Also, Graphical password Authentication is more costly than the textual passwords.

There are many drawbacks associated with the textual passwords such as brute-force and dictionary attacks. Similarly, graphical passwords can be affected by shoulder-surfing attack and it is expensive to implement. For this purpose, the use of both the textual and graphical password techniques is better. This paper proposed, authentication technique called as pair-based authentication scheme for generating the session passwords.

In this paper, session based authentication scheme is proposed. This scheme authenticates the user by session passwords by using pair based scheme. Session passwords are passwords that are used for only one transaction. Once the session is terminated, the session password is not useful. For every login process, users have to enter different passwords. The session passwords provide better security against shoulder surfing attack as password changes according to each transaction.

## 2. RELATED WORK

Dhamija and Perrig proposed a graphical authentication technique, where the user has to select some images from a set of random pictures when user is going to register and then at the time of login user must have to select the same sequence of images which he has pre-defined at the time of registration. But this technique is vulnerable to shoulder surfing attack. The advantage of this technique is that, though the average time taken to login to the system is much longer than that of the regular approach, it has very low rate of failure.

Real User Corporation has developed Pass face technique, where the user observes nine faces grid display and have to select one face previously chosen by the user. Then, user recognizes it and clicks anywhere on the known face. Same procedure is repeated for several round of time. In this technique, the user chooses four human face images as the password and from eight decoy images, user has to select their pass images. As user has selected four images it is followed for complete four times.

Again one approach is proposed which is named as colour keyboard implementation, where alphabets and numbers of keyboard are given with different colours. After the user click, all keys on the keyboard shuffles every time. Here, user has to note down particular position of key before pressing desired key. Then a button named 'Hide Keys' have to be pressed, which will hide all characters from the keys and empty keys

will be displayed before user. Then user has to click on that key which has the desired key earlier. For which the user can make use of key colour for remembering it.

Another approach, is based on tracking user's eye movement for determination of the shape to be conceived based on the movements. As finally the shape which is constructed is compared with the shape present in the database to perform authentication. But, in this way shows many drawbacks. A new technique called "Draw-a-Secret" (DAS) is proposed by Jermyn *et al.*, where the user have to re-draw the predefined picture on a 2D grid. Authentication is possible only when drawing will touch the same grids in particular same sequence. This technique of authentication is vulnerable to shoulder surfing attack. Another technique, in which user has to draw signature by using mouse, this technique is developed by Syukri. It has two stages such as initially registration and then verification. When user is registering, user must draw his signature and then afterwards user will be verified only by matching the previous defined signature. The disadvantage of this technique is that, many of people are not so much familiar with handling mouse properly; hence it may be difficult to draw the signature in same perimeter.

Haichang *et al* proposed new scheme, where the user have to draw a curve across their password images orderly, here user do not have to click on images which is predefined as his passwords. For mobile devices, Jansen proposed a graphical password scheme. When user is creating password, he must select a theme consist of photos and set a sequence of pictures as his password. When authenticating, user must recognize the images in the same order. Every image is assigned with numerical value, thus the sequence of the chosen images will create a password. But the number of images is limited to 30, the password space is small. All above Systems were defined just for security but all they had some disadvantages and they can be easily cracked by different techniques. According to Syukri, the accuracy of the original user is also very important, otherwise system may show original user as a fake user, because drawing the signature by using mouse is very difficult and the possibility of showing Difference in signature. So after studying all previous related works, it motivates us to work on system for security of user login information and authentication.

## 3. PROPOSED WORK

The general technique which is used earlier is a Textual password technique which has its own drawbacks. The new technique is proposed which is called as biometric system. This graphical password technique avoid shoulder surfing attack in Textual passwords but this technique also followed by some limitations and disadvantages like time consuming for Authentication and expensive in nature. So, we proposed new password authentication technique is Session password using virtual keyboard. In which new scheme is ~~used~~ which is

called as Pair-based Authentication scheme. It gives options for user to select the password as alphanumeric grid.

In this paper, the main objective is to avoid shoulder surfing attack using pair based scheme which will generate session password for the particular session or transaction where there will be virtual keyboard which will shuffle at every another transaction accordingly. At the time of registration user have to submit password. Particularly the length of the password is 8 and it can be named as secret key. The secret key consists of even or odd number of characters. Then next stage is the login phase, when the user enters his username as an interface, the 6 x 6 grid display of row and column size screened before user. The grid display consists of alphabets and numbers. These are sequentially placed on the grid at every cell and this interface changes every time according to every transaction. According to pair based scheme, user have taken first letter from his registered password as row wise and second letter as column wise and then the intersection which will form will be the part of session password.. As each and every time the keyboard will shuffle, the session password will also change and hence automatically security is getting to login.

1	9	J	R	H	7
0	K	A	W	Q	J
3	B	O	C	P	6
L	Z	4	S	T	2
M	Y	I	D	5	F
8	X	N	V	U	E

Figure 1: 6x6 Grid Display

In the proposed scheme, when new user want to register, then new user can register by filling the data such as username, his E- mail address, birth date, gender, local address, city, mobile number first name, last name etc. In textual password scheme passwords should be easy to remember and then easy to cracked. But, in pair-based scheme, the password guessing is not easy. So it tends to security. Also, this technique is easy to use to the user. Suppose the password of user is ARCHIT then at the time of login, 6 X 6 grid display on the screen will be place and have to select first row having A and select alphabet having R and then where they intersect click on W .In same way, take all the letters in pair and find intersect and click on the respective intersect sequentially. If the password is correct, the user will enter into the system. The grid size can be increased to include alphabet and digits in the Password.

1	9	J	R	H	7
0	K	A	W	Q	J
3	B	O	C	P	6
L	Z	4	S	T	2
M	Y	I	D	5	F
8	X	N	V	U	E

Figure 2: Pair Based Scheme

The session password of this process will be WP5. Hence according to Pair based scheme, there is resistant to the shoulder surfing attack, and because the registered password like ARCHIT is not necessary to enter at the time of login, as at every transaction there should be new session password as there is virtual shuffling keyboard. After this transaction the virtual keyboard will shuffle and hence there will be new session password for every transaction.

#### 4. ADVANTAGES

1. More Complexity to hack: This technique has session password scheme due to what every transaction is performed with other session password, hence hacking to the user account is very hard.
2. Shuffling of keyboard: Due to this facility of shuffling keyboard, there should be new session password at every transaction and hence less chances of shoulder surfing attack.
3. More Secured: In pair-based scheme password guessing is not easy to do. So it is more secure.

#### 5. CONCLUSION

There are many techniques which are proposed for preventing shoulder surfing attack. Among all proposed techniques the session based password scheme using shuffling keyboard with Pair Based method is more effective and secure to shoulder surfing attack, as this technique is providing a particular session password for every session or transaction Also, it is easy to use and handle, hence in near future , this technique has scope to use in many fields for the security purpose.

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## A SYSTEMATIC REVIEW AND THEORETICAL STUDY FOR MECHANICAL PROPERTIES OF SOME INDIAN WOODS

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**Abstract–** The paper reports an investigation of mechanical properties of Indian woods of various species having a place with various herbal families. Rigidity and pressure qualities were estimated at ordinary dried condition. A critical variety in mechanical properties is seen regarding every species as well as same types of same organic family. Large scale and miniature organized varieties in wood have been broke down based on variety in above boundaries.

**Keywords:** Indian woods, Tensile strength, pressure strength, microstructure variety.

### 1. INTRODUCTION

Wood is an incredibly flexible material with a large number of physical and mechanical properties among the numerous types of wood. It is likewise a sustainable asset with a remarkable solidarity to-weight proportion. Wood and wood items possess a significant spot in designing Wood is a beneficial development material in light of the fact that the energy prerequisites of wood for creating a usable final result are a lot of lower than those of cutthroat materials, like steel, cement, or plastic. Be that as it may, the trial distinguishing proof and the insightful demonstrating of mechanical way of behaving of wood stays an open issue, because

of its regular inconstancy, in homogeneity and anisotropy. Wood as lengthy been perceived as an orthotropic material [1], with an inside structure, which is portrayed by the presence of three commonly opposite planes of balance. Those planes are characterized by the longitudinal heading (L) along the filaments, the outspread bearing (R) towards yearly rings and distracting course (T) to the yearly rings. To completely describe the mechanical way of behaving of wood it is important to know the pressure strain connections alluded to the LRT reference outline. The mechanical tests are the best way to acquire such information; however a few



troubles emerge in making the right exploratory estimation, especially those unsettling the distinguishing proof of extreme burdens. A critical issue with displaying trees can emerge when the mechanical and actual properties of dry wood tests are utilized [2-4]. This inadequacy can be particularly significant when models depend on the thickness explicit solidness of wood to gauge the greatest level to which a tree can develop before it flexibly clasps under its own weight. Thickness explicit solidness is the Young's versatile modulus,  $E$ , of a material standardized as for the thickness,  $q$ , of the material (for example  $E/p$ ). Youthful versatile modulus is a proportion of the solidness of a material [4, 6]. For fake materials like steel, the mathematical worth of  $E$  is a consistent. Be that as it may, for plant tissues like wood, this boundary is referred to fluctuate mathematically as a component of tissue dampness content.

## 2. MATERIAL AND METHODS

Different wood logs are gathered having a place with various organic families from better places at ordinary dried condition for present examination.

A Universal Testing Machine is utilized to concentrate on the rigidity and pressure qualities. The UTM is a modernized servo controlled tractable, pressure testing machine with ostensible

burdens from 20kg to 100 ton. The UTM framework contains a modern electronic control unit with an impeccably paired servo controlled twin screw drive load outline. The heap outline including the test region is made of the fixed lower crosshead hard chromed 2 screws and 2 aide bars and a moving upper cross head. The heap cell which is straightforwardly appended to the upper cross head praises the incredibly inflexible burden outline. Example holds are not simply embellishment, rather they perform one of the main capabilities in material testing methods. Example grasps, utilizing different cinching standards, are accessible to guarantee ideal holding of each and every sort of example. Test length, crosshead speed, taking care of test boundaries and review and printing the outcomes accomplished legitimately entering into the simple to utilize control sheet.

## 3. RESULTS AND DISCUSSION

Table 1 presents the information on the mechanical properties, for example, rigidity and pressure strength of twenty Indian wood species taking 5 examples of each in ordinary dried condition. It is obvious from the information mechanical properties are shifting from one example to another having a place with same and Different organic families.



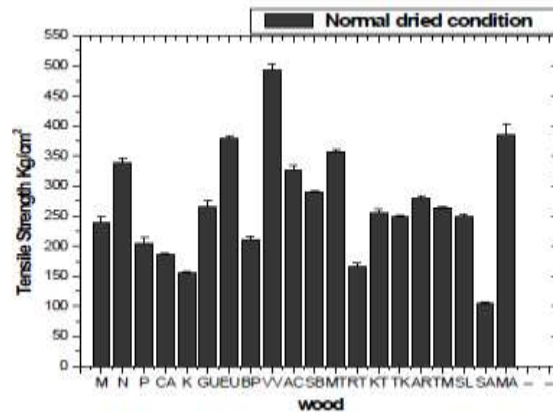
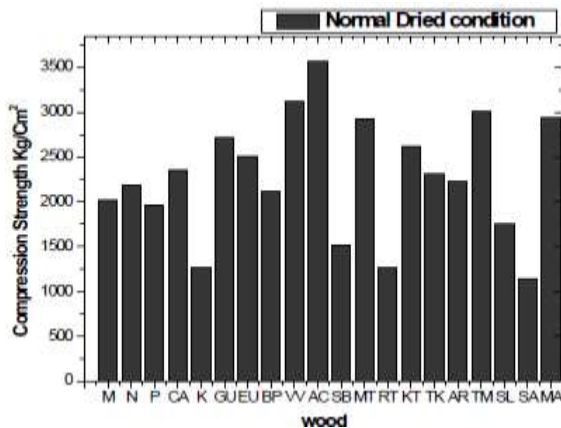
Rigidity and pressure strength connected with thickness, wood test with high thickness shows high mechanical strength. This might be credited to the supramolecular engineering of the phone wall with its unique compound arrangement additionally here assumes a significant part. The variety of rigidity of wood lined up with the grain relies on the strength of the strands and is impacted not just by the nature and aspects of the wood components yet in addition by their game plan. It is most noteworthy in straight grained examples with thick-walled strands. The microfibril point (MFA) can likewise pronouncedly affect the diminished modulus [11-12]. Interestingly, cell wall hardness is by all accounts

unfeeling toward MFA, which prompted the end that hardness is more an element of lattice. The mechanical properties represented by hemicelluloses and lignin or on the other hand hardness of cellulose shift close to nothing, with respect to its direction. The information on compressive strength of various woods shows the term grain incorporates both the heading of the strands and the surface of the wood, for example the size and course of action of the cell structures. Rigidity addresses the protection from powers attempting to pull the fiber structure separated and compressive present's protection from pressing or squashing powers both equal and opposite to the grain.

**Table 1 Data on mechanical properties of different Indian woods**

Name of the wood	Botanical family	Density (gm/cm <sup>3</sup> )	Tensile strength (Kg/cm <sup>2</sup> )	Compression Strength (Kg/cm <sup>2</sup> )
Mango (M)	Anacardiaceae	0.66±0.02	240.15±10.11	2026.30
Neem(N)	Meliaceae	0.81±0.10	338.62±8.67	2182.90
Peepal (P)	Moraceae	0.63±0.01	205.55±8.98	1962.50
Casuarina (CA)	Casuarinaceae	0.72±0.07	185.27±3.15	2361.10
Curry Tree (K)	Rutaceae	0.42± 0.10	156.93±1.15	1263.15
Guava (GU)	Myrtaceae	0.79±0.06	265.12±9.67	2711.20
Eucalyptus (EU)	Myrtaceae	0.83±0.04	379.64±2.67	2501.34
Black Plum (BP)	Myrtaceae	0.71±0.07	211.11±5.91	2121.90
Velvet mestique (VV)	Mimosoideae	0.84±0.12	494.13±8.73	3125.12
Acacia (AC)	Mimosoideae	0.75±0.17	326.20±8.42	3563.21
Subabul (SB)	Mimosoideae	0.53±0.04	289.35±2.74	1513.04
Madhras Thorn (MT)	Mimosoideae	1.1±0.110	356.50±4.31	2920.60
Rain tree (RT)	Mimosoideae	0.48±0.06	165.77±5.84	1268.70
Kadam Tree (KT)	Rubiaceae	0.72±0.11	256.08±5.45	2616.30
Teak (TK)	Lamiaceae	0.71±0.04	250.00±1.95	2312.14
Arjun tree (AR)	Combretaceae	0.82±0.03	279.89±4.35	2233.33
Tamarind tree (TM)	Fabaceae	0.78±0.18	262.91±2.79	3012.10
Sal tree (SL)	Dipterocarpaceae	0.66±0.15	249.48±3.39	1754.40
Sugar-apple (SA)	Annonaceae	0.47±0.07	105.66±2.10	1136.40
Mammee apple (MA)	Sapotaceae	1.12±0.11	384.77±19.7	2933.70





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## IOT & DNA BASED ENCRYPTION IMAGING TECHNIQUE: A REVIEW

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**Abstract** - The Internet of Things (IoT) being a promising technology of the future is expected to connect billions of devices. The increased rate of communication is able to generate mountains of data but the security of data can be a threat in itself. The devices in the architecture are essentially smaller in size and low powered. Conventional encryption algorithms are generally computationally expensive due to their complexity and requires many rounds to encrypt, essentially wasting the constrained energy of the gadgets. However, less complex algorithms may compromise the desired integrity. In this Paper we propose a light weight encryption algorithm named as Secure IoT (SIT).

### 1 INTRODUCTION

The Internet of Things (IoT) is turning out to be an emerging discussion in the field of research and practical implementation in the recent years. IoT is a model that includes ordinary entities with the capability to sense and communicate with fellow devices using Internet [18]. As the broadband Internet is now generally accessible and its cost of connectivity is also reduced, more gadgets and sensors are getting connected to it. Such conditions are providing suitable ground for the growth of IoT. As there is a great deal of complexities around the IoT, since we wish to approach every object from anywhere in the world. The sophisticated chips and

sensors are embedded in the physical things that surround us, each transmitting valuable data. The process of sharing such large amount of data begins with the devices within themselves which must securely communicate with the IoT platform. This platform integrates the data from many devices and apply analytics to share the most valuable data with the applications. The IoT is taking the conventional internet, sensor network and mobile network to another level as everything will be connected to the internet. A matter of concern that must be kept under consideration is to ensure the issues related to confidentiality, data integrity and authenticity that will emerge on



account of security and privacy [19].

### A. APPLICATIONS OF IOT:

With the passage of time, more and more devices are getting connected to the Internet. The houses are soon to be equipped with smart locks [18], the personal computer, laptops, tablets, smart phones, smart TVs, video game consoles even the refrigerators and air conditioners have the capability to communicate over Internet. This trend is extending outwards and it is estimated that by the year there will be over 50 billion objects connected to the Internet [21]. The earth will be blanketed with millions of sensors gathering information from physical objects and will upload it to the Internet. It is suggested that application of IoT is yet in the early stage but is beginning to evolve rapidly. An overview of IoT in building automation system is given. It is suggested that various industries have a growing interest towards use of IoT. Various applications of IoT in healthcare industries are discussed and the improvement opportunities in healthcare brought in by IoT will be enormous. It has been predicted that IoT will contribute in the making the mining production safer and the forecasting of disaster will be made possible. It is expected that IoT will transform the automobile services and transportation systems. As more

physical objects will be equipped with sensors and RFID tags transportation companies will be able to track and monitor the object movement from origin to destination, thus IoT shows promising nature in the logistics industry as well. With so many applications eyeing to adapt the technology with the intentions to contribute in the growth of economy, health care facility, transportation and a better life style for the public, IoT must offer adequate security to their data to encourage the adaptation process.

### 2 EVALUATION PARAMETERS

To test the security strength of the proposed technique, the algorithm will be evaluated on the basis of the following criterion. Key sensitivity, effect of cipher on the entropy, histogram and correlation of the image. The algorithm will be tested for computational resource utilization and computational complexity. For this we will observe the memory utilization and total computational time utilized by the algorithm for the key generation, encryption and decryption.

**1)Key Sensitivity:** An encryption algorithm must be sensitive to the key. It means that the algorithm must not retrieve the original data if the key has even a minute difference from the original key. Avalanche test will be used to evaluate the amount of alterations occurred in the cipher text by



changing one bit of the key or plain text. According to Strict Avalanche Criterion SAC [22] if 50% of the bits are changed due to one bit change, the test is considered to be perfect. To visually observe this effect, we will decrypt the image with a key that has a difference of only one bit from the correct key.

**2) Execution Time:** One of the fundamental parameter for the evaluation of the algorithm is the amount of time it takes to encode and decode a particular data. The proposed technique is for the IoT environment, must consume minimal time and offer considerable security.

**3) Memory Utilization:** Memory utilization is a major concern in resource constrain IoT devices. An encryption algorithm is composed of several computational rounds that may occupy significant memory making it unsuitable to be utilized in IoT. Therefore; the proposed algorithm is evaluated in terms of its memory utilization. Smaller amount of memory engagement will be favorable for its deployment in IoT.

**4) Image Histogram:** A method to observe visual effect of the cipher is to encrypt an image with the proposed algorithm and observe the randomness it produces in the image. To evaluate the generated randomness, histogram of the

image is calculated. A uniform histogram after encryption depicts appreciable security.

**5) Image Entropy:** The encryption algorithm adds extra information to the data so as to make it difficult for the intruder to differentiate between the original information and the one added by the algorithm. We measure the amount of information in terms of entropy, therefore it can be said that higher the entropy better is the performance of security algorithm.

**6) Correlation:** The correlation between two values is a statistical relationship that depicts the dependency of one value on another. Data points that hold substantial dependency has a significant correlation value. A good cipher is expected to remove the dependency of the cipher text from the original message. Therefore; no information can be extracted from the cipher alone and no relationship can be drawn between the plain text and cipher text. This criterion is best explained by Shannon in his communication theory of secrecy systems [23].

### 3 CURRENT STATE OF LITERATURE

Today is the era of digital communication. Security and privacy is important for communication. Cryptography is a



process, well known for hiding the message. Its known as time back. Steganography is derived from two words, stegano means secret and graphy means secret writing. In this paper, we are discussing only about steganography using DNA. Adleman is known to be the father of DNA computation [1]. He has done chemical reactions and shown how DNAs can be used for computations. We are going to discuss about the works Done using theoretical DNA computing. Catherine Taylor [2], proposed an idea in which information is encoded into DNA strands, and then converted into microdots. A microdot is a highly reduced photograph of a typewritten page. Developed DNA based doubly stegano graphic method. First done DNA encryption and then reduced it to a microdot. Simple substitution cipher is used for encryption. Because of the huge possibilities of DNA nucleotides, it acts as a complex background for storing secret message. Random key is used for encryption. Disadvantage is its Expensive. Andre Leier et.al. [3] proposed cryptography using DNA binary strands. They proposed two different DNA based cryptographic techniques. In method 1, initially mix the binary encoded plaintext with dummy strands in equimolar

decryption is done using Polymerase Chain reaction (PCR). In method 2, encryption is same as before. Here they used gel image of dummy pool as the key. Decryption is done by graphical method. Method 2 has the advantage of easy encryption, but resolution of gel is a problem. Jiechen [4], used the random nature of DNA for making the cryptographic system unbreakable. Here they used carbon nanotubes as a medium for message transmission. Plaintext messages are converted to cipher text by adding message with one time pads. Here DNA sequences act as one time pads. But this method is expensive. Pak chung wong et.al [5], proposed an idea of DNA memory prototype. Today, we use magnetic media and silicon chips to store our data. All these storage media can easily be destroyed by people or natural disasters. So, they proposed an alternate storage mechanism. Here they initially Encode meaningful information as artificial DNA sequences. Then transform the sequences to living organisms, allow the organism to grow and multiply. Extract the information back from organisms. Success of this method depends on finding good storage medium to ensure adequate protection for the encoded DNA strands. Host with embedded information must be able to grow and multiply. Advantage is that it has enormous potential capacity. Disadvantage is



that mutation of organism may affect the integrity of embedded messages [7].monica Borda [8], published a paper on DNA secret writing. Steganography using DNA hybridization has five steps, plaintext message given in ASCII is converted to binary. Evaluate required length for DNA OTP. If each bit is encoded with 10 nucleotide, OTP of length $>10*n$ . The encrypted message is placed between two primers hidden in a microdot, Perform decryption using PCR. Qiang Zhang et.al. [9], published a paper on Image encryption using DNA addition combining with chaotic maps. Here initially encode the original image to obtain DNA sequence matrix. Divide this matrix to equal blocks and then carry out DNA sequence addition operation. Find the DNA sequence complement using 2D logistic maps. Decryption done as reverse of above. Deepak Kumar [10], proposed the idea of secret data writing using, DNA sequences. Here DNA OTP method is used for defining the new security algorithm. DNA coding is necessary because we cannot process the DNA molecules as in form of alphabets, so change alphabets to ASCII. Almost same as Monica Borda's algorithm. Amal Khalifa [11], proposed a steganography algorithm to exchange data secretly. Its implemented in mainly 2 levels. In first level, encryption is done using DNA based play fair cipher. In

second level, encrypted message is hidden to some reference DNA using substitution. The performance of presented algorithm is also analyzed with respect to robustness against attacks as well as hiding capacity. Sheena Anees [12], proposed highly secure DNA based audio steganography. Here a highly secure method to hide the messages, is proposed. Prasenjit Das [14], proposed DNA based image steganography. Proposed algorithm uses images as primary cover media for message transfer between two interested parties. Fasila K.A. et al [15], proposed the idea of multi phase crypto system. Here a hybrid cryptography based on RGB colors is proposed. Convert the plaintext to matrix form, pass it through a number of manipulation steps. Security is further enhanced by using a strong key which is encapsulated using DNA steganography method. Sreeja C.S et al [16], proposed a DNA symmetric algorithm based on the pseudo DNA cryptography and central dogma of molecular biology. The suggested algorithm uses splicing and padding techniques along with complementary rules which make the algorithm more secure as it's an additional layer of security than conventional cryptography techniques. Shweta et al [17], proposed paper on cascaded DNA cryptography and steganography. Initially it performs DNA



cryptography and then its hidden in a random frame of video.

#### 4 CONCLUSION

In this paper we reviewed a light weight encryption algorithm named as Secure IoT (SIT). This method has various advantages like speed, minimal storage requirements and minimal power requirements. We surveyed number of research article and decided to analyze DNA based encryption imaging technique.

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## CONCEPTUAL RESEARCH ON ENGLISH LITERATURE: A STUDY

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**Abstract-** Showing English has turned into a significant need for creating regions in Asian nations because of globalization. The broadly useful of this paper is to examine the issues related with the original propensity of showing English for Asian instructive framework. This paper examines the prerequisites of instructive framework in Asia for showing English just as on the method of preparing English material abilities. It likewise talks about the capability and improvement of instructors' capacity to show writing which assists them with changing the instructive framework guaranteeing that reviews are more pleasant. The current review presents different patterns in English writing that could be utilized by both the instructors and the understudies.

### 1. RATIONALE

Work of Asian understudies has been characterized by the development of the economy through different ways like innovation, direction, testing and standard. It has been proposed that to protect the norm of human asset in proficient courses like innovative schooling there is a requirement for a great deal of focus. This would thusly bring about instruction framework for mechanical examinations coming to more up to date statures.

In the creating scene, English has arisen as a fundamental language to learn and been a typical device to convey on the planet. English is an excellent

language for articulation one's own sentiments and innovative utilization. The utilization of writing in such manner might assist work with increasing the general order over the language which might be reflected in specialized use.

Instructing of English is a developing field in the preparation schooling of Asian understudies. The essentialness of English educating for Asian understudies concerning accomplishment of objectives set by authoritative just as authorized certifications has been examined and is frequently connected to the learning result of the understudies. In emerging





nations like China and India, public level perceived associations battle to carry out normal, open and precise accreditation models, which has been an issue of English instructing for splendid understudies. Finding the odds of two-sided acknowledgment and relocation of understudies would help for global acknowledgment. In this way, English instructors and analysts should meet with new directions and show English in an unexpected way. Innovation understudies prepared well with proficient utilization of English in schools can be an expert in innovation.

## 2. TEACHING MULTICULTURAL LITERATURE IN ENGLISH LANGUAGE

Instructors need bountiful capability on scholarly speculations notwithstanding the perusing strategies when they give address about multicultural writing in English language classes. However they follow old style, new analysis, fanciful and prototype, the formalist, feminish or per user reaction strategies for scholarly investigation in their multicultural writing perusing, they ought to have information, for instance, on postcolonial analysis when they manage Eurocentric tendencies.

Deficient information on hypothetical settings between English educators' leads their

understudies to concentrate on the vague portrayals of social gatherings indiscreetly while they read. Along these lines, interpreting multicultural writing with postcolonial scholarly hypothesis will uphold the understudies to consider the issues in Eurocentric outlines of improvement. As indicated by Mingshui (2002), we need to take multicultural writing to make the specialists in that theme rather than just passing on data. He demonstrates that "when utilizing multicultural writing in the educational plan, move from illuminating to engaging understudies. To engage understudies is to assist them with fostering the capacity to distinguish, basically investigate, and even make a move to tackle issues identified with social contrasts." (p. xviii)

Understudies could effectively respond to the issues of multicultural writing because of change from illuminating to qualifying the understudies. Understudies can comprehend the ideas by proper clarifications. For instance, postcolonial abstract hypothesis can be instructed by clarifying the relationship among postcolonial and multicultural literary works, which are firmly related however they are the equivalent totally. Multicultural writing incorporates world literary works (meant or initially in



English) like migrant writing, ethnic (or minority) writing, and Native writing, while postcolonial writing is characterized unequivocally as "composing by those people groups some time ago colonized by Britain, however a lot of what it manages is of interest and importance to nations colonized by other European forces, for example, France, Portugal, and Spain" (Ashcroft et al., 1989).

### 3. REQUIREMENTS OF ASIAN STUDENTS' EDUCATION FOR ENGLISH TEACHING

Worldwide Technology Excellence states three significant focuses as follows. To start with, understudies assume a critical part to determine worldwide issues like consistent development and wellbeing; and so on second, understudies need to work together in the different areas on the planet in view of globalization of innovation.

Third, Government, industry, institute and other innovation based affiliations need to function collectively to give preparing to worldwide understudies. Preparing given by the business would be more helpful to the understudies. Worldwide review must be led on existing innovation training framework, which would demand the significance of English in schooling and future vocations of

the understudies and increment the necessities of English instructing in Asia. It is likewise perceived that any further improvement in specialized training in English is reliant upon the understudy order over the English language. Such an order over the language is conceivable just when there is order over English writing.

### 4. IMPROVEMENT OF ENGLISH APPLICABLE SKILLS

In the current situation, English educating ought to foster the capacity of the understudies in tuning in, talking, perusing, composing and interpreting. Asian understudies' schooling offers diverse new freedoms and styles to instructors and understudies. Creating abilities, which need English capability, would be useful for understudies especially in worldwide organizations. These abilities can be advanced while empowering educating of writing considering a reasonable yield. Learning and applying educational innovation and new applications through English appropriate abilities acquires better helpful openings for progression the world. Work place requests English talking projects and abilities. Thus, we need to upgrade the perusing abilities of understudies through empowering them to peruse more English traditional and present day writing which



would work on their jargon and communicated in English abilities. Words and expressions utilized in day to day existence can be improved by speaking with English speakers in local language. English show and verse perusing would help further developing listening abilities. Composing short sections all alone and afterward extended articles with the utilization of perusing materials help for composing abilities. Interpretation of vernacular writing into English can likewise be polished to further develop order over the English language

## 5. COMBINATION OF PROFESSIONAL KNOWLEDGE

Aside from giving fundamental preparing, understudies must be prepared to utilize unknown dialect to execute in proficient abilities, instructing and different applications. This could be accomplished by showing understudies in the ongoing climate like requesting that they partake in verse understanding rivalries, sort out plays to rehearse their language abilities. By this, understudies would acquire specialized information on English language. Following this active preparing for their work and understanding proficient information also can be made conceivable if innovation understudies are approached to go work in their industry.

Furthermore, they would know about the work space, critical thinking strategies, collaborations with senior and senior understudies and cooperation. Proficient information with English instructing gets more significance in Asian understudies' schooling and is valued by ventures.

## 6. TRAINING ABILITY OF SELF-LEARNING

Learning is a ceaseless interaction in life to refresh our insight to comprehend the cutting edge innovations and satisfy the age related needs. We would have the option to prepare understudies to be innovative and for nonstop development. Self-acquiring and long-life mastering abilities are significant for the two educators and understudies. Individuals who don't refreshed their abilities and information would be outdated and lose their positions. Along these lines, we need to master new abilities and information to keep us refreshed.

Learning should proceed subsequent to leaving homeroom too. We have different assets to peruse like proficient magazines, diaries, papers, web, and in-administration preparing programs. Joining to the associations and partaking in the meetings would get to know ongoing turns of events. Web, distance instruction, e-learning and air-class would give expansive



and diverse learning. Self-acquiring builds our insight and abilities anyplace whenever and is a useful life-long learning technique.

## 7. CONCLUSION

Writing is vital for English projects directed in a large portion of the non-English talking nations. Yet, instructors over those nations deal with issue in writing based educating of English. A not very many totally ready educational programs with supporting materials are the primary issue with instructors in language study hall. Numerous educators carry out writing in the study hall with no information or preparing around there. The educator assumes a critical part in writing based instructing of English. While picking abstract substance for homeroom educating, many factors, for example, language expertise of the understudies, interests, age, sex, and so forth must be considered to supply with right materials to keep away from understudies getting exhausted.

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## AN APPLICATION FOR MECHANICAL DESIGN FIXATION FOR MECHANICAL ENGINEERING STUDENT

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**Abstract-** A central issue in designing schooling relates to plan obsession, which obstructs the origination of clever thoughts. The term plan obsession alludes to the creator's hesitance (or failure, at times) to consider various techniques to form and settle a plan need. The plan obsession peculiarity seriously restricts imagination and results in common plan arrangements. The essential goal of this paper is to associate the impact of the Indian designing training with the degree of plan obsession in the designing understudies of various disciplines. This work gives a more profound comprehension of the plan obsession peculiarity by laying out a calculated system for the plan cycle in view of the hypotheses of information portrayal in mental science. It can give significant experiences that will assist understudies with defeating the antagonistic impacts of obsession.

**Keywords:** Design obsession, Engineering instruction, Cognitive science, Conceptual plan.

### 1 INTRODUCTION

As per Hershberger [1], "All that is consumed and enlisted to you adds to the assortment of thoughts put away in the memory: a kind of library that you can counsel at whatever point an issue emerges. Thus, basically the more you have seen, experienced, and consumed, the more perspectives you will have." This statement is valid in the field of designing plan, where the field has transformed from a plan scratch to a plan through-combination mentality, where fashioners change, join, or adjust components of past or existing

plans to blend novel ideas [2, 3]. Nonetheless, the utilization of past plans can unfavorably influence the plan cycle as plan obsession [4], a possibly restricting adherence to existing plans. The data that planners "assimilate and enroll" to them can possibly focus them during the plan cycle and result in absence of development. As the development is vital to progress in this economy, we should figure out how to oversee plan obsession actually. The most important phase in overseeing obsession understands what



various exercises mean for plan obsession during the plan cycle. It is noted in the writing that obsession happens across various degrees of ability [5] and settings [6]. The comprehension can prompt advancement of viable item improvement strategies and helping techniques to decrease obsession impacts. The examination detailed in this paper gives the impacts of plan obsession in Indian designing understudies the two seniors and green beans.

## 2 LITERATURE REVIEW

The field of configuration has investigated numerous formal and heuristic ways to deal with plan refinement, assembling, age, and calculation [7-9]. The clear techniques research in plan describes the normal perspective followed by people in tackling a plan task. In this manner, it is a use of standards of mental brain research, to plan. The elucidating research includes understanding how the originators see the issues and the strong assertions, find (intelligent fixes, assess plans, and decide.

In this field, specialists enthusiastically sought after mental based plan obsession research and conceptually characterized as hindrances to arrangement in view of genuine and seen requirements [4, 10, 11].

Dahl and Moreau [12] exhibited that subjects presented to inside space models utilized less

out-of-area similarities in creating arrangements and that the creativity of the arrangements delivered expanded moderately when subjects were urged to utilize relationships widely and given no model arrangements. Swamp et al. [13] found that inside area models made subjects be one-sided toward creating arrangements with comparative elements to those tracked down in the models. A typical and frequently remarked upon type of obsession is untimely obligation to a specific issue arrangement. Thus, the architects quit chasing after the quest for elective arrangements. This untimely responsibility along these lines brings about less arrangements. These discoveries demonstrate that any investigation with openness to an inside space model preceding ideation can cause obsession. The obsession is manifest as less arrangements and the presence of highlights from the models in the arrangements [14].

## 3 MEASURING DESIGN FIXATION

Plan obsession is the originators' hesitance to consider numerous procedures to form and tackle a plan issue. The objective of the trial is to assess the impacts of obsession with senior scholarly designing understudies and designing first year recruits. To answer this exploration issue, three mental abilities, viz., familiarity, adaptability, and



innovation, and three plan boundaries, viz., meeting the purpose, effortlessness, and easy to understand, are distinguished and are estimated from the drawings given by the members to the plan task. The measurement for different boundaries is given in Table 1. The members were

partitioned into two gatherings - an obsession bunch where the members were presented to a model plan arrangement and a benchmark group to whom just an issue proclamation is given with no model arrangement. Control bunch is utilized to lay out the pattern.

**Table 1 Metrics for measuring design fixation skills**

Cognitive skill	Definition	Metric
Fluency	Ability to generate many solutions consistently	Quantity of ideas generated
Flexibility	Ability to explore design space in many directions	Variety of ideas generated
Originality	Ability to generate unexpected solutions; think out of box	Originality of ideas generated

### 3.1 Design Task

Participants in both groups were presented the design task of “design a toy for a blind child of age group 3 to 7 years.” The design task is a real existing problem. Participants were provided a paper, pen, pencil, and eraser to sketch their designs. They worked on the design task individually, not in teams. Participants had 45 min to generate as many ideas as possible. After the completion of the task, participants were given 30 min to answer a questionnaire to help analyze their perceptions.

The toy for blind child problem puts most participants in the familiar domain of toys and unfamiliar domain of blindness. While the task requires minimal technical knowledge (application of

scientific and mathematical principles), it uses the design skill set such as understanding the need and synthesizing alternative solutions which is common to creative problem solving in many domains. The task engages by providing autonomy, mastery, and purpose. Participants can design their solutions that reflect their values, views, and interests (autonomy); show creativity (mastery); and cherish results (purpose). Hence, the design has the intrinsic motivation for engagement. A diverse set of available solutions can satisfy the task.

The participants are told that the goal of the experiment is to generate as many solutions to the design problem as possible,





where a prize will be given to participants with the greatest number of solutions. This prize is an extrinsic motivation for participants to devote serious effort to the design activity.

### 3.2 Control Group

Members in the benchmark group are given the plan issue. They are not furnished with any model arrangement or elective portrayal of the plan issue. A bunch of 150 designing understudies is taken to lead the errand. Of them 75 are into the benchmark group and the leftover into the obsession bunch.

## 4 RESULTS AND DISCUSSION

Information from the plan arrangements and polls is gathered together, and a couple of significant ends have been made in simultaneousness with the measurements of the trial. Normal scores of mental abilities procured by understudies.

Following are the couple of consequences of the examination:

- Scholarly first year recruits plans are more unique than those of senior designing understudy whose plans are less familiar and adaptable which upholds our theory 1.
- Plans of mechanical designing understudies are undeniably more familiar, adaptable, and unique than those of senior designing understudies, supporting theory 2.

- Senior understudies are more acquainted with the plan task given to them than green beans understudies. Aside from the graphical portrayal, this outcome can likewise be upheld by the logical end from the above assertions, which show that as understudies are monitoring issues in the general public, they begin thinking systematically to settle them and subsequently knew about the undertaking given to them somewhat.
- The typical scores procured by first year recruits and seniors of both control and obsession bunches in view of the plan boundaries. It is obvious from the outcomes that rookies show preferred generally execution over seniors in satisfying the plan boundaries.

## 5 CONCLUSION

The exploratory outcomes show that first year recruits designing understudies display less indications of obsession contrasted with seniors. These outcomes feature a prompt requirement for changing the helping worldview for designing training to build the accentuation on development and imagination in the educational plan to keep the understudies serious in the worldwide economy. The outcomes likewise show contrasts in the degree of obsession in view of the discipline



and distinguish mechanical designing understudies are displaying greater adaptability. The paper additionally suggests that designing staff be aware of obsession and its antagonistic impacts and teach understudies. Over the long haul, as teachers, we should reflect and reformulate the educational program to offset basic comprehension with the need to encourage inventive reasoning abilities so the cutting edge creators investigate plans as well as blend imaginative arrangements.

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## IMPLEMENTATION AND ANALYTICAL BEHAVIOUR FOR ELECTRICAL CONDUCTION IN CANINE PULMONARY VEINS: A REVIEW

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**Background-** Paroxysmal atrial fibrillation clinched alongside patients will be often initiated by foci in the pulmonary veins. That component about these initiating arrhythmias will be obscure. The point about this investigation might have been will figure out electrophysiological aspects of canine pulmonary veins that might predispose should initiating arrhythmias.

**Techniques and Results-** Extracellular recordings were gotten starting with the luminal side from claiming 9 pulmonary veins done. Langendorff-perfused canine hearts following those veins were chiselled from the separated conclusion of the osmium. Pulmonary veins were paced toward the distal end, the osmium, also a middle of the road site.

**Conclusions-** Zones from claiming actuation delay were watched over canine pulmonary veins also associated for unexpected transforms for fascicle introduction this structural engineering of bulky sleeves in the pulmonary veins might encourage reentry furthermore arrhythmias connected with ectopic movement.

**Keywords:** fibrillation, veins, mapping, electrophysiology.

### 1 TECHNIQUES

Estimations were constructed for isolated, blood-perf used hearts acquired starting with 6 full grown mutt pooches (2 will 4 a considerable length of time old for Possibly sex and. Weighing 20 will 30 kg). Methods conformed with regulate.

#### 1.1 Preparation about Hearts

Those techniques from claiming preparation what's more perfusion about disconnected hearts need

been depicted elsewhere. Briefly, after profound anaesthesia, that heart might have been excised and the aortic roots annulated will tolerance langendorff perfusion. Hearts were perfused (flow 200 should 300 mL/min) for a mixture about blood (50%) what's more tirade's result?

#### 1.2 Extracellular Recordings

Mapping of the extracellular electrical activity of the pulmonary



veins was performed in 6 canine hearts. Pulmonary veins were incised from the distal end to the osmium, spread open with the inner surface facing upward, and pinned to a silicon rubber support. Then, electrical stimulation was performed, and unipolar recordings were made from the luminal side of the pulmonary veins with a multitier-

### 1.3 Trichrome staining

Grid electrode that harboured 247 terminals (silver wires, diameter 100  $\mu$ m, arranged in a 1913 matrix at inter electrode distances of 300  $\mu$ m). The multielectrode was mounted in a micromanipulator. Corners of the electrode were marked with fine pins in the tissue recordings were obtained during sinus rhythm, during stimulation at a basic cycle length (BCL) of 500 ms, and after premature stimuli. The latter were delivered every eighth beat at coupling intervals ranging from 400 ms down to the refractory period in steps of 10 ms. Electrograms were amplified 40 times (noise level 3 V, peak to peak), band pass filtered (0.1 to 500 Hz), and digitized at 16 bits.

Analysis was performed with MatLab software (The Math Works Inc). The point of maximal negative  $dV/dt$  for each electrogram was selected as the time of local activation. To check for local deflections, we determined the Palladian by subtracting the electrogram recorded at an

electrode and the weighted sum of signals recorded at adjacent electrodes.

## 2 INCITEMENT PROTOCOL

Recordings with that 247-point multi electrode were settled on throughout. Pacing from that right chamber furthermore destinations in the pulmonary veins: the osmium, the distal end, also an intermediate site the multielectrode. Might have been put at 2 positions: one oxtail and the different during those distal wind for those pulmonary veins bipolar pacing electrodes comprised about 2 silver wires (diameter 0.1 mm, interelectrode separation 0.2 mm) disconnected but at the tips boost quality. Might have been 2 times present threshold, furthermore pulse width might have been 1 ms.

### 2.1 Intracellular Recordings

On 4 hearts, microelectrodes were impaled toward 3 different levels of the pulmonary veins toward locales on a line along those veins: the osmium, those distal end, what's more a middle of the road site. Qualities of the movement potentials were resolved throughout incitement in a BCL of 500 ms. to study the defencelessness to postpone after depolarization, blast. Pacing might have been connected to 10 seconds during a cycle length for 250 ms after 50  $\mu$ g about nor epinephrine furthermore 50 of obtain were



included consecutively of the perforate movement potential span might have been computed. At half of the maximal plenty fullness a result it may be not time permits to accomplish stable microelectrode. Impalements done blood-perf used mammalian hearts owing on energetic cardio vascular contractions, 1 with 2g about dactyl monoxides might have been included of the perforate to hose cardiovascular contractions dactyl monoxides in the focus of 10 to 20 mol/L need a markedly negative inotropic impact any way need minimal impact on the movement potential.

## 2.2 Histological Examination

Histology might have been performed looking into canine hearts haphazardly chose from the individuals previously, which extracellular pulmonary vein mapping might have been performed. Pins were swapped Eventually Tom's perusing India ink markers; furthermore veins were transformed to schedule histology. Serial segments were slicing parallel of the long hub of the veins also peroxide blonde of the Vistula vulgaris divider each tenth area might have been mounted for glass slides also Stained for an altered mason's trachoma technobabble India ink markers encouraged ID number of the mapped region. Those primary introduction from claiming motet packs on the luminal part of the

veins might have been recreated manually with respect to scaled diagrams with the ink markers similarly as reference focuses ranges without myosit is were noted.

## 2.3 Measurable Examination

Outcomes are communicated as mean SD imply values were compared toward 2 tests comes about were viewed as huge In P 0. 05.

## 2.4 Outcomes Histology

Know veins demonstrated tantamount course of action of the segments of the visual vulgaris wall, i.e., endothelium, media, bulky sleeve also adventitia sleeves about myocardial unit's comparable will striated. Atrial mystic was placed between those networking also adventitial. Layers of the visual vulgaris divider the networking might have been thin going from 0. 1 on 0. 3 mm thick, also comprised about stringy. Also flexible tissue furthermore smooth muscle cell phones those myocardial sleeves were thickest near the Ostia, measuring 0. 5 to 0. 8 mm previously, thickness, at the decreased also disappeared at the lung hila. The peripheral layer, that adventitia, basically comprised fibrous, elastic, what's more greasy tissues its thickness differed considerably; however it might have been for the most part more terrific over that of the networking and the myocardial



sleeve together. Territories for short fibres turned in blended directions.

### 3 ELECTROPHYSIOLOGICAL FURTHERMORE HISTOLOGICAL CONNECTION

Zones about actuation delay what's more conduction square in the actuation maps were by and large identified with sudden passing transforms previously, fibre bearing with quantify those connection between electrophysiological. Furthermore histological data, we resolved the change to fibre heading alternately composition at those zones about conduction delay in the heading from claiming wave-front proliferation.

Four classes were distinguished:

1. Fibre revolution  $30^\circ$ ,
2. Fibre revolution between  $30^\circ$  and  $60^\circ$ ,
3. Fibre revolution  $60^\circ$ , furthermore,
4. Transform.

Will blend fibre heading that period of the zones about delay furthermore the intend delay along the Zones expanded with the measure from claiming fibre revolution on the whole pulmonary veins Zones of Delay the place fibres changed will a blended composition uncovered bring down Qualities to both those period of the zone and the mean quality from claiming Delay. A sample of the connection the middle of electro physiological also

histological aspects may be provided for done this indicates actuation examples recorded close to those osmium from claiming.

#### 3.1 Microelectrode Recordings

Indicates the aspects about movement potentials recorded Clinched alongside 35 phones in the pulmonary veins about canine hearts (left second rate good mediocre good predominant and furthermore left predominant. The movement potential upstrokes were fast (mean 114 V/s) and required extensive amplitudes (mean 96 mV). There might have been a propensity (P0. 06) to shorter movement potential durations (62 versus 46 ms) and slower upstroke velocities (122 versus 99 V/s) toward that distal wind over toward that osmium in spite of this distinction neglected will compass factual hugeness two diverse sorts from claiming movement potentials were observed: movement.

Potentials for different plateau (48%) what's more triangular activity potentials without a plateau (52%). Statistically there might have been no contrast done movement potential setup between osmium and apex, in spite of the fact that information recommended an inclination to movement potentials without a plateau toward that summit. None of the units impaled demonstrated at whatever diastolic depolarization blast pacing of the



pulmonary veins or norepinephrine or obtain didn't prepare after depolarization's.

#### 4. CLINICAL MEANINGS FURTHERMORE IMPEDIMENTS

Electro grams recorded clinched alongside our creature model are comparative on the individuals recorded to patients with solitary paroxysmal atrial fibrillation likewise exhibited. Eventually Tom's perusing however, we utilized typical canine hearts, and you quit offering on that one might conjecture that done age-old also ailing atria with greatly moderate also divided conduction because of no uniform anisotropy, arrhythmogenicity might be favouring. Expanded anisotropy might encourage re-entry be that as it additionally influences those start of a propagating wave from an.

Ectopic keep tabs in canine hearts in the display study, those electrophysiological and histological aspects didn't contrast around those veins contemplated however, diameters of the good mediocre pulmonary. Veins were as well little furthermore myocardial sleeves as well short should.

#### 5. CONCLUSIONS

Electrophysiological dissection indicates that zones from claiming actuation. Delay correlating with histological evaluation from claiming myofibril. Course of

action and conveyance need aid noticeable done canine pulmonary. Veins What's more recommend that micro re-entry might happen or push the passageway from claiming actuation starting with a central sourball. In spite of the fact that. We didn't see complete re-entry circuits, re-entry might be foreseen will happen under obsessive conditions, clinched alongside which anisotropy may be required with make all the more maintained no proof for abnormal automaticity alternately triggered action might have been watched.

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## **SMART PARKING IN VEHICULAR ENVIRONMENTS USING ZIGBEE IEEE 802.15.4 AND RF TRANSMITTER**

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**Abstract:** In this work we propose a smart parking technique in heavy traffic environments using ZigBee wireless transmission module. The major problem in transportation systems is that the controlling of the traffic in cross roads. Smart car parking technique finds a solution using the ZigBee technology. ZigBee technology is a low data rate, low power consumption, low cost; wireless networking protocol targeted towards automation and remote control applications. ZigBee, Depending on the RF (Radio Frequency) environment and the power output consumption required for a given application, and will operate in the RF. The power consumption and transition delay are the main advantages when compared to the other wireless technologies like WIFI, Blue tooth, etc...

**Key words:** Zigbee, smart parking, 8051, RF Module.

### **I. INTRODUCTION**

With fast development of economy in India, the demand of electricity is higher and higher, and the problem between lag of construction of network and inadequacy of transmission capacity becomes increasingly prominent. A system for the intensive use of parking spaces proposed in [1]. It is an automated system based on monitoring the situation in parking places using a mobile camera set equipped with data storage and means for data transfer to the central database. The data is evaluated in a suitable GIS-based software according to parking rules. It is this evaluation that is a critical part of the whole system. In practice, there have been cases where a complaint was sent to municipal police on parking rules violation, which was not fully justified. Therefore, the further development of the described system will be aimed at improving the evaluation process in order to minimize unauthorized cases. Detailed information about the parking system is very well presented on the web or in the form of a smartphone application [1].

The system in [2] consists of hardware components and software modules which closely interact with each other. Using this system, drivers of cars can park quickly, and will save fuel, time and money. The experimental result shows very fast runtime and high success rate. This approach can save billions of wasted dollars in the US alone. The saved fuel, time and money can be reapplied in more productive places. By causality, it will help the environment as well. In this era of rapid urbanization, designing the city system modern and systematic by maintaining everything is a major challenge. Under the pressure

of increasing population, Dhaka is becoming tougher to change. Proposed solution is to keep the city parking system as a fully automated and additionally use garage management controllers system so that user can get parking facilities with the android application as well as without android application [3]. Proposed a new VANET-based smart parking scheme (SPARK) for large parking lots in [4]. With SPARK scheme, RSUs installed across a parking lot can surveil the whole parking lot, and provide three convenient services for drivers: 1) real-time parking navigation; 2) intelligent anti-theft protection; and 3) friendly parking information dissemination. In addition, the SPARK scheme also provides conditional privacy preservation for OBUs. Extensive simulations have also been conducted to demonstrate that the SPARK scheme can efficiently reduce the searching time delay for an available parking space, and subsequently save the fuels and driver's parking time. A wireless personal area network (WPAN) is meant to span a small area such as a private home or an individual workspace. It is used to communicate over a relatively short distance. The specification does not preclude longer ranges being achieved with the trade-off of a lower data rate [5][6].

In contrast to other network types, there is little to no need for infrastructure with a WPAN. Ad-hoc networking is one of the key concepts in WPANs. This allows devices to be part of the network temporarily; they can join and leave at will. This works well for mobile devices like PDAs, laptops and phones. Some of the protocols employing WPAN include Bluetooth, ZigBee, Ultra-wideband (UWB) and IrDA. Each of these is optimized for particular applications or domains. ZigBee, with its sleepy, battery-powered end devices, is a perfect fit for wireless sensors. Typical ZigBee application domains include: agricultural, building and industrial automation, home control, medical monitoring, security and, lest we take ourselves too seriously, toys, toys and more toys [5].

Wireless local area networks (WLANs) are meant to span a relatively small area, e.g., a house, a building, or a college campus. WLANs are becoming more prevalent as costs come down and standards improve. A WLAN can be an extension of a wired local area network (LAN), its access point connected to a LAN technology such as Ethernet. A popular protocol for WLAN is 802.11, also known as Wi-Fi. Among all of the wireless networks ZigBee gained It's renewed interest because of less complexity and usage of power.

The main problem in traffic areas is the parking the vehicles by searching an exact place to park the vehicle. The aim of this paper is to solve this problem in highly traffic affected areas. Equipping vehicles with various on-board sensors and implementing vehicle-to-vehicle (V2V) communication will allow for large-scale sensing, decision, and control actions in support of these goals. The parking process can be a straightforward and non-stop process. From the point of management's view, Smart Parking is an intelligent parking system. The parking process can be modeled as birth-death stochastic process and the prediction of revenues can be made [6].

## II. PROPOSED SYSTEM

The smart vehicle parking is a tremendous technology in automobile field. Our proposed system is a smart vehicle parking using ZigBee module. The figure 1 shows the Proposed smart vehicle parking system.

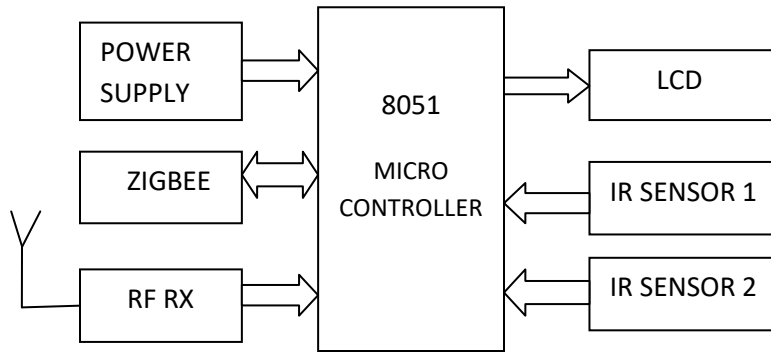


Figure 1 (a)

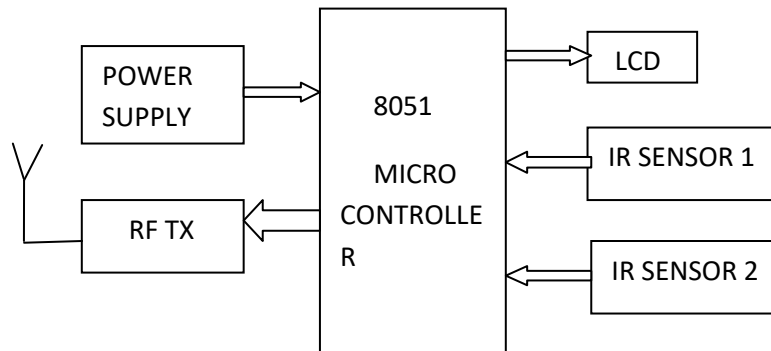


Figure 1(b)

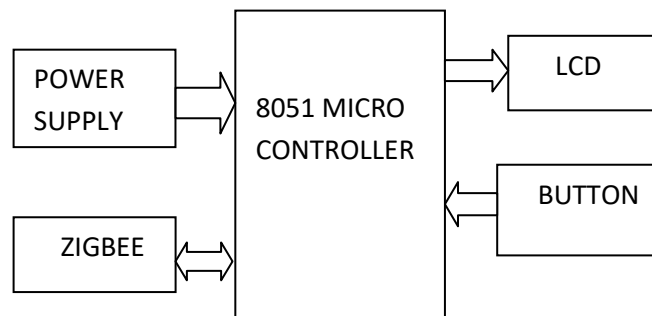


Figure 1(c)

The proposed system contains three modules which are shown in figure 1. The vehicle section shown in figure 1(c), contains a switch, ZIGBEE module and LCD. The vehicle section is kept in the vehicle, when the person in the vehicle wants to know the information about the free parking slots then he will press the button in the vehicle then a missed call goes to the ZIGBEE section in the first section shown in figure 1(a) about the free parking space from the ZIGBEE in the vehicle section. Then on receiving the message from vehicle section, the parking space for the vehicle whether it is empty or full is checked with IR sensors and sends an SMS to the vehicle section regarding the space. This is received by ZIGBEE and displayed on the LCD like section 1 is available. When section 1 is not empty then it takes the information about the second section using RF communication Shown in Figure 1 (b). We have RF TX in section 2 and RF RX in section 1. The information about the space in section 2 is continuously given to the RX section whether empty or full. If it is empty or full then this information is given to the vehicle section by section 1 using ZIGBEE.

### **III. 8051 MICRO CONTROLLER**

Microcontroller manufacturers have been competing for a long time for attracting choosy customers and every couple of days a new chip with a higher operating frequency, more memory and upgraded A/D converters appeared on the market.

The whole story has its beginnings in the far 80s when Intel launched the first series of microcontrollers called the MCS 051. Even though these microcontrollers had quite modest features in comparison to the new ones, they conquered the world very soon and became a standard for what nowadays is called the microcontroller.

Besides, the software has been developed in great extend in the meantime, and it simply was not profitable to change anything in the microcontroller's basic core.

The 8051 microcontroller has nothing impressive in appearance:

- 4 Kb of ROM is not much at all.
- 128b of RAM (including SFRs) satisfies the user's basic needs.
- 4 ports having in total of 32 input/output lines are in most cases sufficient to make all necessary connections to peripheral environment.

The whole configuration is obviously thought of as to satisfy the needs of most programmers working on development of automation devices.

### **IV. ZIGBEE and IEEE802.15.4**

ZigBee technology is a low data rate, low power consumption, low cost, wireless networking protocol targeted towards automation and remote control applications. IEEE 802.15.4 committee started working on a low data rate standard a short while later. Then the ZigBee Alliance and the IEEE decided to join forces and ZigBee is the commercial name for this technology ZigBee is expected to provide low cost and low power connectivity for equipment that needs battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. In addition,

ZigBee can be implemented in mesh networks larger than is possible with Bluetooth. ZigBee compliant wireless devices are expected to transmit 10-100 meters, depending on the RF environment and the power output consumption required for a given application, and will operate in the RF worldwide (2.4GHz global, 915MHz Americas or 868 MHz Europe). The data rate is 250kbps at 2.4GHz, 40kbps at 915MHz and 20kbps at 868MHz. IEEE and ZigBee Alliance have been working closely to specify the entire protocol stack. IEEE 802.15.4 focuses on the specification of the lower two layers of the protocol(physical and data link layer). On the other hand, ZigBee Alliance aims to provide the upper layers of the protocol stack(from network to the application layer) for interoperable data networking, security services and a range of wireless home and building control solutions, provide interoperability compliance testing, marketing of the standard, advanced engineering for the evolution of the standard. This will assure consumers to buy products from different manufacturers with confidence that the products will work together. IEEE 802.15.4 is now detailing the specification of PHY and MAC by offering building blocks for different types of networking known as "star, mesh, and cluster tree". Network routing schemes are designed to ensure power conservation, and low latency through guaranteed time slots. A unique feature of ZigBee network layer is communication redundancy eliminating "single point of failure" in mesh networks. Key features of PHY include energy and link quality detection, clear channel assessment for improved coexistence with other wireless networks [7].



Figure 2 ZigBee module

## V. RADIO FREQUENCY SIGNALS

Radio frequency communication signals are engineered to trade off efficient use of the electromagnetic (EM) spectrum with the complexity and performance of the RF hardware required to process them. The process of converting baseband (or low-frequency) information to RF is called modulation of which there are two types: analog and digital modulation. In analog modulation, the RF signal has a continuous range of values; in digital modulation, the output has a number of prescribed discrete states. There are just a few modulation schemes that achieve the optimum trade-offs of spectral

efficiency and ease of use with hardware complexity [8][9]. The figure 3 represents the hard ware modules of RF Transmitter and Receiver.



Figure 3 RF Transmitter and Receiver modules

## VI. RESULTS

Figure 4 shows the kit photographs of the proposed system.

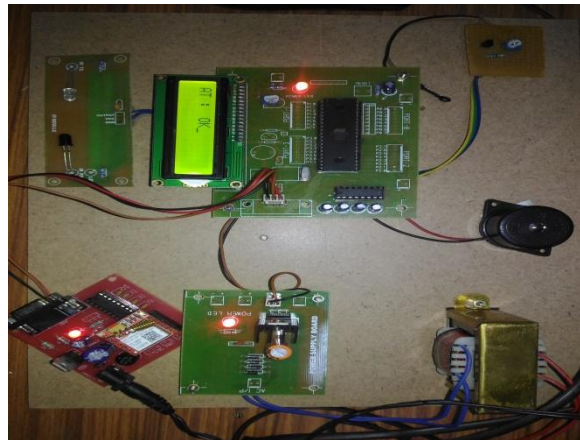




Figure 4. Kit Photographs.

## VII. CONCLUSION

We have designed a smart car vehicle parking system using ZigBee 802.15.4, 8051 advanced micro controller and RF module. This architecture is faster and power consumption is very less than the other wireless technologies. This can implement in the future cars and can be avoid the traffic problems in the heavy parking areas like shopping malls, theatres, and etc.. other busy areas.

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## MACHINE LEARNING FOR EFFICIENT ASSESSMENT AND PREDICTION OF HUMAN PERFORMANCE IN COLLABORATIVE LEARNING ENVIRONMENTS

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**ABSTRACT:** The objective of this work is to propose a machine learning-based methodology system architecture and algorithms to find patterns of learning, interaction, and relationship and effective assessment for a complex system involving massive data that could be obtained from a proposed collaborative learning environment (CLE). Collaborative learning may take place between dyads or larger team members to find solutions for real-time events or problems, and to discuss concepts or interactions during situational judgment tasks (SJT). Modeling a collaborative, networked system that involves multimodal data presents many challenges. This paper focuses on proposing a Machine Learning - (ML)-based system architecture to promote understanding of the behaviors, group dynamics, and interactions in the CLE. Our framework integrates techniques from computational psychometrics (CP) and deep learning models that include the utilization of convolutional neural networks (CNNs) for feature extraction, skill identification, and pattern recognition. Our framework also identifies the behavioral components at a micro level, and can help us model behaviors of a group involved in learning.

**Keywords:** Machine Learning, Collaborative Learning, Deep Learning, Computational Psychometrics, Skills, Human Behavior

### I. Introduction

Collaborative learning methods have been implemented broadly by organizations at all stages, as research recommends that active human involvement in cohesive and micro group communications is critical for effective learning [1]. In current research, an important line of inquiry focuses on finding accurate evidence and valid assessment of these micro-level interactions which supports collaborative learning. Even though there is a long practice of

using mathematical models for modeling human behavior, Cipresso (2015) [2] introduced a computational psychometrics-based method for modeling characteristics of real behavior. Cipresso's [2] article provides us with a way to extract dynamic interaction features from multimodal data for modeling and analyzing actual situations. In this paper, we propose a three-stage method to explore and study collaborative group behaviors. The first stage integrates and processes multimodal data obtained in a collaborative learning environment

(CLE) that includes sensor input, audio, video, eye tracking, facial expressions, movement, posture, gestures, and behavioral interaction log data. The second stage performs feature extraction and cloud computation using computational psychometrics (CP) and convolutional neural network (CNN)-based deep learning for skill, pattern, and trend identification. Finally, the third stage uses the parameters measured in the previous two stages to understand and model group interactions, competencies, and collaborative behavior at a micro-level. The third stage uses machine learning for effective assessment and visualization of group dynamics such as correctly assessing the increase in the groups' level of shared understanding of different perspectives, and ability to clarify misconceptions. This paper is an extension of our ongoing work [3], [4] and here we present details regarding the ML architecture for dataintensive computing and efficient assessment. Our paper is organized as follows: in Section II we briefly discuss our related work on ML for multi-modal human interaction analytics. In Section III we discuss a three-stage architecture for large-scale CLE and the layout of the functional components. Based on the architecture discussed in section III, preliminary experimentation analysis is discussed in Section IV. In Section V we discuss scalable applications of our framework for nextgeneration collaborative learning and assessment systems, as well as for the Department of Homeland Security (DHS) and the Department of Defense (DoD). Section VI concludes with directions for future work.

## II. Related work

In the past few years, the Artificial Intelligence (AI) and Machine Learning (ML) communities have been putting their efforts into presenting and publishing advanced methods for processing and analyzing human behavior related multi-modal data. Due to page limitations, it is not possible to cover and cite all of these works, but we will provide brief highlights regarding our own work. In our most recent work, Chopade et al [3], [4], [5], presented a framework which incorporates computational psychometrics (CP), Artificial Intelligence (AI), and a Machine Learning (ML)- based system architecture, methodology, and related algorithms to find patterns of interactions, learning, team relationships, and effective teamwork assessment of collaborative problem solving (CPS) and a collaborative learning environment (CLE). Khan [6] presented an approach which uses multimodal telemetry data for two pilot studies from the domains of collaborative learning and illustrated a framework to analyze participant behavior patterns through temporal dynamics. Polyak et al. [7], [8] presented the application of CP for the measurement of CPS skills. They performed machine learning analysis on actual behavioral and post-game studies data. Their CPS game tasks were designed and developed based on the psychometric principles of Evidence-Centered Design (ECD) which are associated with ACT's Holistic Framework (HF) [9]. In their experiment, they performed a cluster analysis on participants' sub-skill performance scores and configurations of particular dialog responses obtained from participants' gameplay data. In this paper, we extend the foundation laid out in our recent work to implement

for effective assessment of teamwork skills. The next sections discuss in detail, the threestage architecture for data-intensive computing and efficient assessment.

### III. Methodology

Massive data-intensive, high-performance, scalable computing is transforming our capabilities to gather and analyze data in different forms. This may lead to new inventions and discoveries in education, science, and technology. This may also impact learning and assessment (LAS) platforms. Data-intensive computing changes our thinking about education, science, and technology, by accelerating an ability to perform advanced data collection and computing [10]. Data-intensive scalable computing has a high potential for unique applications. This will be more challenging when we need to scale up the platform to handle large-scale datasets (Terabyte, Petabyte, Zettabyte scale). Recent improvements in computing have led to substantial progress towards the visualization capabilities of such data. Data analytics and visualization will serve as a vital tool for the validation of expected results by accurately identifying patterns and relationships in data. Visualization may play an essential role in understanding the big picture in group interactions within the CLE and may assist in detecting hidden factors. Convolutional Neural Network (CNN) and one of its approaches – deep learning (DL) may require the use of a highly efficient Graphical Processing Unit (GPU) implementation or for training on multiple GPUs [11], [12], [13] or for applications of this architecture to substantial learning populations. Fig. 1 shows a possible

arrangement of components for machine learning (ML) based data-intensive computing and efficient assessment. Some of the components are listed here: A. Data Integration and Processing B. Massive data intensive CNN (deep learning) based cloud computing and Computational Psychometrics (CP) C. Effective Assessment (EA) A. Data Integration and Processing Establishing identities from vast volumes of CLE interaction multimodal data obtained from different sources is an essential task of data analytics and computation architectures. Large amounts of CLE multimodal interaction data that provide the identities of humans, machines, sensors, etc. collected from different sources will be processed through a set of solutions built upon the Hadoop data analytics platform. This arrangement considers the individual's identity, such as username, email, real name, gender, eye color, fingerprints and user's input data such as eye tracking and models of behavior [16]. A data cluster would enable massive data integration, processing, and performing of such tasks as data collection, information extraction, and storing large-size distributed datasets for longterm access. Data collection is an essential phase of acquiring data from multiple sources, categorizing it, and passing it to the next stage in the process as shown in Fig. 1. Data on humans, machines, and other entities can be categorized as structured or unstructured and incorporated into a distributed Hadoop infrastructure. B. Massive data intensive CNN (deep learning) based cloud computing and Computational Psychometrics (CP) Once data has been categorized (as described in part 'A'), we can use a computation cluster to analyze the data on a cloud platform to understand

individual and group abilities. We plan to use Python/R to run deep learning in the cloud using ACT's enterprise learning analytics platform (LEAP). We plan to deploy a feature extraction algorithm including CNN based deep learning for skill, pattern, trend identification, and for achieving state-of-the-art accuracy in feature classification. We plan to update this network structure over time to make this a dynamic system.

**Cloud computing moves computation closer to the data:** The main advantage to this process is that this approach is scalable to hundreds of computing nodes, each providing at least a modest performance. Data-intensive cloud computing platform consists of 3 layers, i.e., map/reduce on top of Hadoop, HPC (high-performance computing) infrastructure for massive data processing and CNN deep learning-based cloud computing. For HPC, we use a method for dynamic partitioning of processes. Network updater adds new network specific data entries under the situation of any real-time events such as changes in the team and their activities. Computational Psychometrics (CP): Collaborative problem solving (CPS) is identified as cross-cutting capabilities which is part of ACT's Holistic Framework [9]- a comprehensive description of the knowledge and 21st-century skills individuals need to know and be able to succeed at school and work. Advanced development in computational techniques and analytical tools has produced new pathways in CPS research. Simultaneously, psychometrics researchers started developing assessments using advanced computational techniques and analytical tools which have emerged as a novel interdisciplinary field of prominent research called, "Computational

Psychometrics (CP)". CP is a new area of learning and assessment (LAS) research, which consist of data-driven machine learning and information querying computer science methods, theory-driven psychometrics, and stochastic theory – all used in order to measure learner's latent abilities in real time. As shown in Fig. 1, computation cluster integrates CP and CLE components.

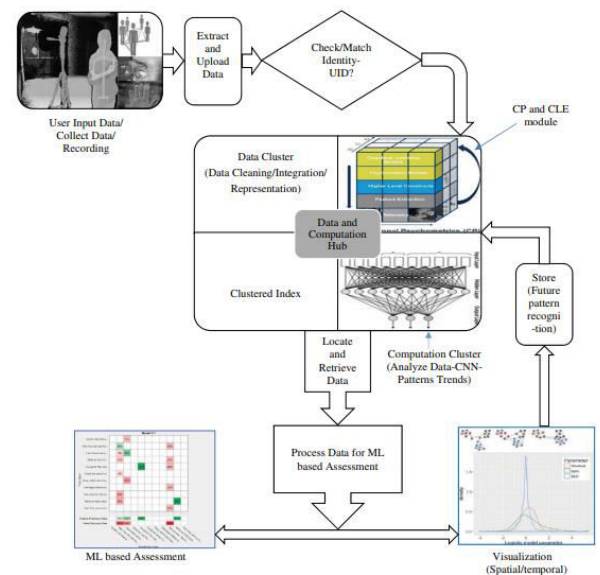


Figure 1: Framework for ML based data intensive computing and efficient assessment.

**Effective Assessment (EA):** The effective assessment (EA) module locates and retrieves data after the computation is finished using the CNN and CP modules illustrated in section II-B. The CNN and CP modules carry out feature extraction, model training, and pattern identification from two player dyadic gameplay logs and behavioral data. Through effective assessment, we aim to analyze human behavior as it relates to specific situations in the game, to detect the dynamics of group behavior, such as shared understanding and engagement at the micro level. For achieving our goals, the

EA module identifies/detects clusters of interactions, and abilities based on degree, connected components, and it performs collaborative learning skill analysis i.e., whether there is any change (increase) in group understanding for a given problem or situation. For example, it carries out real-time regular and critical event/person analyses such as situational data processing and real-time data correlation (correlation of skills, attainment level between groups). Using machine learning, we analyze collaborative learning network attributes such as users (nodes), interactions (links, weighted flow), knowledge (skills/abilities), local and global system parameters (engagement, shared understanding), behaviors, group density, and cluster formation and centrality. The EA module also performs predictive decision-making based on group behaviors. This module stores future patterns which can be used for any exploratory analytics and effective visualization of past and present group interactions and relative performance. Biometric data is analyzed for biometric database matching and for biometric image processing. Biometric data are unique physical characteristics such as face, eye tracking/ iris, and fingerprints, which can be used for automated recognition. Based on the three-stage architecture discussed in this section, section-IV demonstrates preliminary experimentation analysis.

## IV. PRELIMINARY EXPERIMENTATION ANALYSIS

In this section, we demonstrate some of the preliminary experimentation steps. The study participants play, 'Crisis in Space (CIS)' a collaborative problem solving web-based game published by GlassLab, Inc., a non-profit

organization located in Redwood City, California. CIS is a two player (dyadic) CPS game, played in a collaborative learning environment (CLE), in separate rooms communicating via Skype, and if they so choose, with the chat mechanism within the game. The setup for the rooms will be identical. They will include a laptop with Tobii software installed, an external monitor with the Tobii eye tracking unit mounted below the screen, with a webcam (with internal microphone) mounted above the screen. A wireless keyboard and mouse will also be connected to the laptop. As shown in Fig. 2, this study focused on collecting the following: game log data, user eye tracking, and user portrait video/audio, chat logs (conversation flow), behavioral expressions, object clicks, time in-game & between games. Our objective is to use this CPS human-human (HH) game log-data for team interaction analysis and for finding teamwork skill evidence based on the CPS construct.

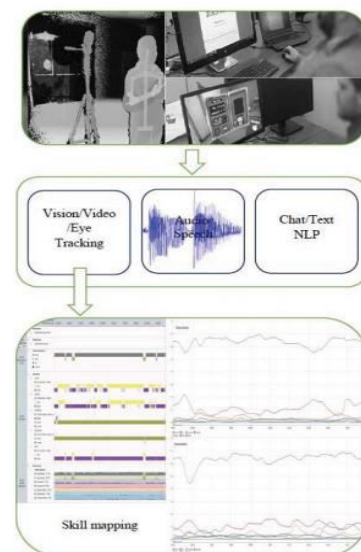


Figure 2: CLE multi-modal data analytics and skill mapping process

As illustrated in Fig. 2, from two-player dyadic CPS game interactions, we extract four types of data files: video, eye tracking, audio, and chat/text. We then use all these source files for identity matching or for naming convention purposes. Then we perform CNN-based machine learning analysis for feature extraction, correlation, and pattern identification. We processed video files through Noldus Facereader and observer analysis which produces different behavioral markers and emotional states for dyadic gameplay (third block in Fig. 2). We also performed in-depth learning analysis using fine-grained data obtained from numerical and behavioral analysis with the MATLAB Statistics and Machine Learning Toolbox. Later, we used these behavioral markers and emotional states for CPS teamwork skill mapping.

## V. SCALABLE APPLICATIONS

Our ML-based data-intensive computing framework has wide-ranging scalable applications including next-generation collaborative learning and assessment systems, DHS, DefenseArmy, Airforce, Navy soldiers/Team training, and development. U.S. Army is considering learner and team-centric training, which will allow the development of mission-capable militaries, and organized teams to handle (win) in complex situations.

## VI. CONCLUSIONS AND FUTURE WORK

In this paper, we presented a machine learning (ML)-based system architecture to identify evidence about teamwork skills from the behavior, group dynamics, and interactions in the CLE. We developed a three-stage robust architecture for data intensive computing and

efficient assessment of teamwork CPS skills. In our future work, we will attempt to build text-based Natural Language Processing (NLP) / Machine Learning (ML) models to identify or classify various performances of CPS sub-skills from the chat logs, audio/video interactions data collected throughout the study. Additional feature extraction that may be used during this phase will be implemented for CNN based pattern identification. The knowledge gained in developing this baseline model will represent significant guidance for proceeding phases and potential studies to follow.

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## GRID-CONNECTED WIND-SOLAR COGENERATION USING BACK-TO-BACK VOLTAGE-SOURCE CONVERTERS

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### ABSTRACT:

*This project introduces a new topology, yet simple and efficient, for a grid-connected wind-solar cogeneration system. A permanent magnet synchronous generator-based full-scale wind turbine is interconnected to the utility-grid via back-to-back voltage-source converters (VSCs). The dc-link capacitor has been utilized to directly interface a photovoltaic solar generator. No dc/dc conversion stages are required, and hence, the hybrid system is simple and efficient. Moreover, the proposed topology features an independent maximum power point tracking for both the wind and the solar generators to maximize the extraction of the renewable energy. The regulation of the VSCs is achieved via the vector control in the rotating reference frame. The detailed small-signal models for the system components are developed to characterize the overall stability. The influence of the utility-grid faults on the performance of the proposed system is also investigated. Nonlinear time-domain simulation results under different operating conditions are presented to validate the effectiveness of the proposed topology.*

*Keywords: VSC, VSI, PI controller, Power quality.*

### 1. INTRODUCTION:

The wind generator sector sustaining this power resource as a mainstream



renewable energy, with affordable prices in \$/ kWh when as compared to standard nonrenewable fuel source nuclear power plant. This advancement is because of the development in electric generators and also power electronic devices. The major concern with renewable resource is that the power is not constantly readily available when it is required. With the boost of power manufacturing of renewable energies, energy combination has actually been created and also carried out as well as power digital inverters are utilized to regulate active/reactive power, regularity, and also to sustain grid voltage throughout mistakes and also voltage droops. Numerous control techniques have actually been presented in the literary works for wind generator in standalone as well as grid linked systems [5] The device side controllers are created to remove optimal power factor from wind

utilizing hill-climbing control, fuzzy-based, and also flexible controllers [7], a lot of the moment based upon field-oriented or vector control strategy. The grid side controllers are developed to make certain energetic as well as responsive power is provided to the grid In order to enable the academic structure, various power concepts have actually been suggested and also applied in electric power systems to evaluate present as well as voltage elements, such as the rapid power (PQ) concept for a three-phase system made by Akagi. In PQ concept, the three-phase is changed right into a two-phase referral structure in order to draw out energetic as well as responsive parts in a streamlined way. A three-phase power concept in a more comprehensive point of view has actually been presented, referred to as the conventional power concept (CPT), where the present and also voltage elements are obtained in the

three-phase kind, without calling for any kind of reference-frame change. The efficiency of these concepts has actually been contrasted.

This task suggests a control framework in three-phase 4 cord systems that give even more capability to the grid-side converter of a wind generator system making use of the CPT as a choice to creating various present referrals for discerning disruptions payment, where both solitary- and also three-phase lots are fed. Three-phase, four-wire inverters have actually been recognized making use of standard three-leg converters with "split capacitor" or four-leg converters. In a three-leg standard converter, the air conditioner neutral cable is straight linked to the electric omphalos of the dc bus. In four-leg converter, the air conditioning neutral cable link is offered with the 4th button leg. The

"four-leg" converter geography has far better controllability compared to the "split-capacitor" converter geography [7] The taken into consideration system includes solitary- as well as three-phase direct and also nonlinear (well balanced as well as out of balance) tons. The CPT is made use of to recognize as well as to evaluate the quantity of repellent, responsive, out of balance, and also nonlinear features of a certain tons under various supply voltages problem for four-wire system.

## 2. RELATED STUDY:

A solar photovoltaic (PV)-battery energy storage based microgrid with a multifunctional voltage source converter (VSC) is presented in this article. The maximum power extraction from a PV array, reactive power compensation, harmonics mitigation, balancing of grid currents and seamless transition from grid connected (GC) mode to standalone

(SA) mode and vice versa, are performed in this system. Whenever the grid fails, this system operates in SA mode automatically, thereby without causing any interruption in supplying the load. Similarly, it automatically shifts to the GC mode, when the grid is restored. The VSC functions in current control for GC mode, and it operates in voltage control for SA mode of operation. This system is capable of extracting the maximum power from the solar PV array irrespective it is operating in the GC mode or SA mode.

### 3. PROPOSED METHODOLOGY:

The proposed topology features an independent maximum power point tracking for both the wind and the solar generators to maximize the extraction of the renewable energy. The regulation of the VSCs is achieved via the vector control in the rotating reference frame. The detailed small-

signal models for the system components are developed to characterize the overall stability. The influence of the utility-grid faults on the performance of the proposed system is also investigated. Nonlinear time-domain simulation results under different operating conditions are presented to validate the effectiveness of the proposed topology.

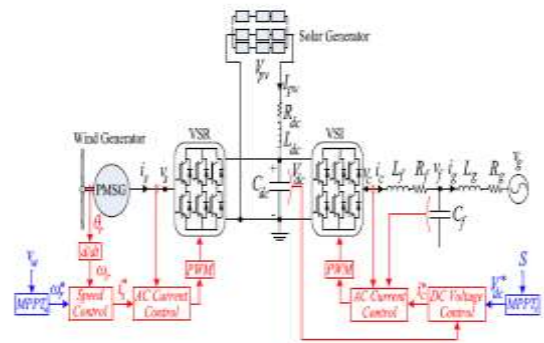


Fig.3.1. Block diagram.

### 4. SIMULATION RESULTS:

The hybrid wind-solar systems in highlights the efficient integration of the renewable energy resources with the minimal utilization of power electronic conversion stages.

However, these systems are proposed for specific off-grid applications. Up to the authors' best knowledge, the combination of the grid-connected wind-solar systems has been mainly addressed. The system in comprises a BtB VSCs to interface the solar and wind generators to the utility-grid. On the machine-side-VSC, the dc-link voltage is regulated to the maximum power-point tracking (MPPT) value of the PV panel by an outer loop Proportional-and-Integral (PI) dc voltage controller. The reference values of the machine-side currents are calculated using the synchronous detection method, and a hysteresis current controller is utilized for the regulation. On the grid-side- VSC, a hysteresis grid-current controller is used to inject the total currents to the utility-grid. In spite of the potential benefits of the proposed system in, the following challenges are noted;

- 1) The MPPT of either the PV and wind power involves the operation of both VSCs, which in some cases might decrease the system reliability and increase the losses. For instance, if the wind velocity is lower than the cut-off speed of the wind turbine, i.e., no wind power, the machine-side VSC may be unable to track the solar PV MPPT dc-link voltage.
- 2) The dc-link voltage is regulated from the machine-side, and there is no a direct regulation on the speed of the wind turbine, i.e., a servo operation.
- 3) The machine and grid-side currents are controlled using hysteresis controllers resulting in a variable switching frequency and higher harmonic contents.

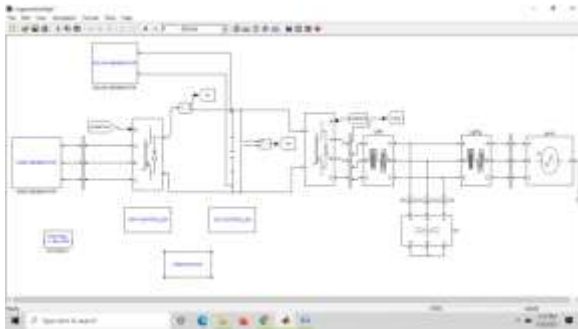


Fig.5.1. Proposed system model.



Fig.5.2. Wind power generation

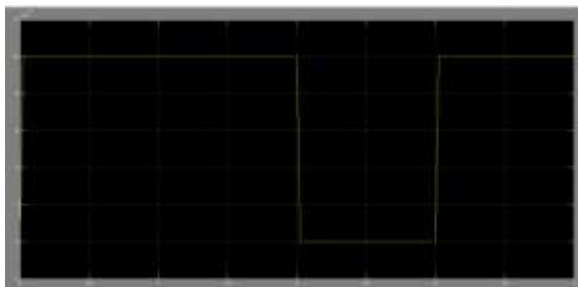


Fig.5.3. PV power at solar panel.



Fig.5.4. Fault applied indication time.

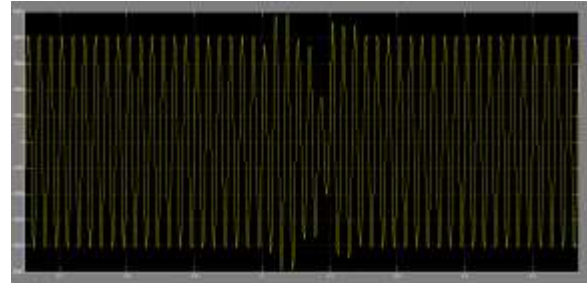


Fig.5.5. Fault applied at grid indication.

## 5. CONCLUSION:

This paper has presented the combination of the wind and solar systems using vector-controlled grid-connected B to B VSCs. The VSR at the wind generator side is responsible for extracting the maximum wind power following the wind velocity variations. On the utility-grid side, the roles of the VSI are to extract the maximum PV power from the PV generator, achieve the balance between the input and output powers across the dc-link capacitor, and to maintain a unity PCC voltage under different modes of operation. A small-signal linearization analysis has been

conducted where the entire state-space model is developed to investigate the system stability. The proposed system features the following advantages; 1) the increased reliability and efficiency due to the combined wind and solar generators. 2) the independent MPPT extraction as the VSR and VSI are solely responsible for extracting the wind and PV powers, respectively. 3) the regulation of the dc-link voltage under all operating conditions is maintained by the VSI and hence a better damped performance is yielded. 4) simple system structure and controllers design. 5) fault-ride through can be achieved using existing protection schemes. A well-damped performance and an efficient operation have been revealed from the time-domain simulations results under the Matlab/Simulink environment under different operational scenarios.

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**NAGELLY SUSMITHA, M.NAVYA, ENGUR MANISHA, E.PRIYANKA, M.SANTHOSH KUMAR**



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## PERFORMANCE ANALYSIS FOR SINGLE-STAGE BUCK-BOOST INVERTER

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### ABSTRACT:

A buck-boost ac-ac converter with inverting and non-inverting operations is proposed. The non-inverting operation activity can be utilized to remunerate voltage hang, and altering activity can be utilized to repay voltage swell. Along these lines, the proposed converter as a unique voltage restorer is equipped for making up for both voltage hang and swell in a wide range. Its essential exchanging cell is a unidirectional buck circuit, inferable from which it has no shoot-through concerns. It accomplishes safe substitution without utilizing RC snubbers or delicate recompense techniques. Further, it tends to be actualized with power MOSFETs without their body diodes directing, and for current freewheeling outside diodes of good converse recuperation highlights can be utilized to limit the opposite recuperation issues and significant.

**Keywords:** *snubber, inverter, MATLAB, RES network.*

### 1. INTRODUCTION

The Switched mode chopper is the power electronic circuits which alter electrical voltage into another level by switching action. The types of dc-dc converter are buck converter; boost converter, buck-boost converter and cuk converter. A BBC yields a voltage which can be either higher or lower than the contributed voltage. The yield voltage polarity is opposite to that of the supply voltage. This converter is also called as inverting regulator. This BBC can operate with high efficiency than other single-stage converter. The buck-boost converter can either be step up or step down chopper. In this converter, it is trouble-free to execute output short-circuit protection. The isolation

is prepared in the PFC stage for some multistage power electronics applications. The foremost negative aspect of boost converter is it cannot limit the inrush output current. The BBC PFC gives high efficiency and limits the contributed voltage range for better performance requirement. The PFC cell is worn to lessen intermediate bus voltage. SCR is compact and posses high consistency and has very low loss. Due to this, useful features they are universally employed for all high power controlled devices. It is an oldest member of the thyristor family and it is a solid state device, their characteristic is similar to thyatron tube. For large current applications, thyristors need better cooling and it would be achieved with great extent by installing

huge amount of heat sinks. Due to this, the rating of SCR has drastically improved since its introduction in 1957. A SCR with voltage evaluation of 10KV and RMS current rating of 3000A. Along with the power usage capacity of 30MW are available. The yield voltage polarity provided by this regulator is reversed. Under a liability condition of the transistor, the  $di/dt$  of the fault current is restricted by the inductor  $L$  and will be  $V_s/L$ . The voltage produced by this converter is higher in scale than the input voltage. The properties of BBC are steady-stage voltage conversion ratio, the nature of input and output current, and the quality of output voltage ripple. The imperative property is the frequency reaction of the duty cycle to output voltage relocates function. The steady state process of this converter is continuous and discontinuous. The yield current of this converter power stage is discontinuous or pulsating as the output diode only conducts during a part of switching cycle.

## 2. LITERATURE SURVEY

For development of intensity quality utilizing DVR, the converter which are commonly utilized are the dc-air conditioning power changes by utilizing thyristor power regulators, which utilize the stage point or fundamental cycle control on input dc voltage, to get the ideal yield air conditioning voltage. Notwithstanding, the conspicuous hindrances of thyristor regulators, for example, low force factor, enormous all out consonant bending in source current and lower proficiency, have restricted their utilization. In this paper, a novel double buck-help air conditioning air conditioning converter is proposed. It joined the tasks of non-altering buck and upsetting buck support converters in a single structure. Like the buck converter, it has a non-altering buck activity, and like a transforming buck-support converter, it has an upsetting buck-help activity. Also, it has an additional activity, wherein the yield voltage higher or lower than the info voltage that is in-eliminate or of-stage with the information voltage can be acquired. Accordingly, the proposed converter can repay both voltage list and swell when utilized in a DVR. The fundamental unit of the proposed converter is a unidirectional buck circuit; hence it has no short out and open-circuit issues. It has no recompense issues, and doesn't need lossy snubbers and additionally delicate replacement techniques for activity. Further, it can use MOSFETs without their body diodes directing and without invert recuperation issues and important misfortunes. A buck-help air conditioning

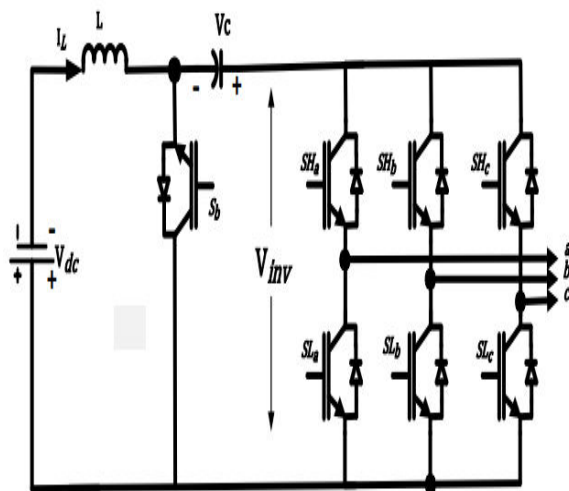


Fig.1.1. Proposed model.

air conditioning converter with modifying and non transforming tasks is proposed. It repays both the voltage hang and swell when utilized as a unique voltage restorer. It's essential exchanging cell is a unidirectional buck circuit, attributable to which it has no shoot through concerns. It accomplishes safe recompense without utilizing RC snubbers or delicate substitution procedures. Further, it very well may be executed with power MOSFETs without their body diodes leading, and for current freewheeling outside diodes of good opposite recuperation highlights can be utilized to limit the converse recuperation issues and applicable misfortune. The itemized hypothetical investigation and exploratory consequences of a 300-W model converter are given.

### 3. RELATED STUDY

Recently, the installation of a Photovoltaic (PV) system has increased significantly. Mainly the PV system consists of PV module, Inverter, and the AC grid. The inverter is the interface unit between the PV module and the AC grid the most challenging in PV system is the inverter. The inverter can be divided into two main categories from point of view the power stage: single stage and two stages. The two-stage inverter can be implemented cascading, the first stage DC-DC converter to perform step up the PV voltage to reach the grid level and extract the maximum power from PV a decoupling capacitor between the first stage and the second stage is used to provide the power decoupling, the second stage DC-AC inverter that injects the

current into the grid [1]. The main drawback of the two-stage is a high cost due to the component count. Therefore the main challenging is to implement single stage inverter and reducing the cost [2][3]. A single stage inverter called Z source inverter (ZSI) was introduced in [4]. ZSI topology was designed to merge the DC-DC converter and DC-AC inverter in a single stage. This topology has the ability to step up the input voltage and execute the power conversion, however, the boosting factor has limitation. From point of view the boosting factor, much research improves the conversion ratio by adding an extra element to overcome this problem such as qZSI, SLZSI, SL-qZSI [5]. However, all these topologies have a large number of passive elements which add more size and cost. In [6], proposed a single stage inverter single phase inverter which used the full bridge and two diodes connected together with one inductor. Recently, with the same circuit in [7], the three-phase inverter was proposed in [8], which called Split Source inverter (SSI). SSI topology has some merits such as lower passive element compared to Z- source inverter, however, SSI allow high diode commutations and used extra three diodes. In improved the performance of SSI by replacing the diodes with active switches. The author mentioned the buck-boost inverter circuit. The author indicated that from B4 can extract B6 to perform three-phase inverter from single-phase inverter. However, buck boost inverter (BBI) topology needs more investigation on the operation modes.

## 4. PROPOSED SYSTEM

The BBC PFC consists of input filter, a MOSFET switch, BBC, and RL load. For each switching cycle, the capacitor supplies a load current. The filter connected at the input consists of combination of inductor and capacitor which gives an effective output. For this analysis n-channel MOSFET is used and pulse is given to gate terminal. The advantages of using n-channel MOSFET is its lower ON state resistance. In continuous mode of operation, for each switching sequence, the current flows through inductor; but in discontinuous mode of operation, there won't be any current in both inductors. The inductor L3 cannot be a PFC cell since it does not contribute to the cell electrically. The BBC gives negative polarity output with esteem to the input terminal.

**MODE-1:** During mode-1 switch M1 is in ON state and the input ac voltage applied is larger than the intermediate bus voltage and the output voltage. The voltage gets step down in the output voltage due to buck-boost converter. When switch is in ON condition, diode D5 starts to conduct and inductor connected parallel to this diode gets charged linearly. The output capacitor C4 delivers power to the RL load. If load current is less than the critical rate, the inductor current will be zero for the portion of switching cycle. In BBC PFC system, if inductor current drops to zero, it stops the operation and remains until next switching begins. The duration of ON state is  $T_{on}=D \cdot T_s$ . In this mode, diode D5 gets

reverse biased thus the output circuit is isolated.

### SIMULATION RESULTS:

The DC voltage, current, DC-link voltage and the grid current, waveforms are illustrated in Fig. 3: Fig. respectively. From the simulation result, the average inductor current is 5.3A as shown in Fig. The capacitor voltage is settling at 410V. It's worth to note that the capacitor has peak-peak ripple less than 1% for 47uF, this allows using film capacitor which extends the lifetime. The output power of the inverter is supplying grid 110 V rms with 1.85 A rms current as shown in below Fig. The inverter voltage and voltage levels is illustrated. The voltage stress for each switch is equal to the inverter voltage as fig 5.2. for the inverter voltage with peak voltage 410V.

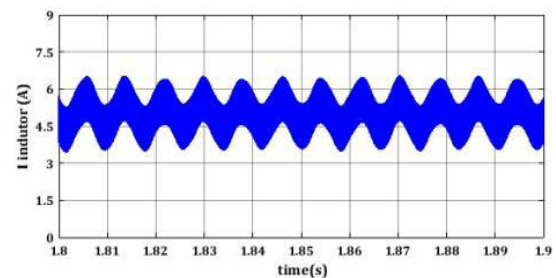


Fig.4.1. The inductor current waveform.

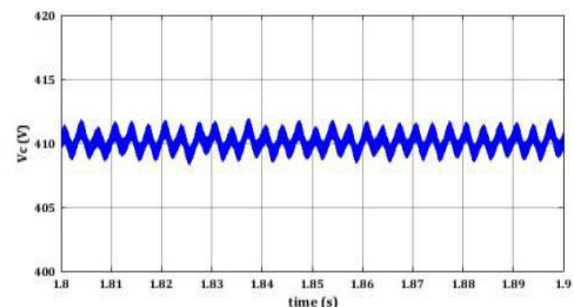
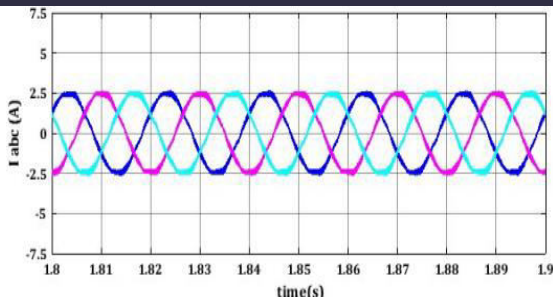


Fig.4.2. The capacitor voltage waveform.



**Fig.4.3. The three phase current waveform.**

## 5. CONCLUSION

Analysis for BBI topology is presented in this paper. The paper discussed the operation modes and DC-AC inversion including the conversion ratio and the device stress. Simulation results of the inverter have been conducted. The principal waveforms of the inverter were investigated to validate the performance of the BBI inverter. One of the most important advantage in this topology is lower passive element is employed to achieve step-up voltage and the DC -AC conversion to feed the grid.

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## POWER FLOW AND STABILITY ANALYSES OF A MULTIFUNCTIONAL DISTRIBUTED GENERATION SYSTEM INTEGRATING A PHOTOVOLTAIC SYSTEM WITH UNIFIED POWER QUALITY CONDITIONER

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### ABSTRACT:

*This paper presents detailed studies involving sizing, stability analysis, and power flow through the series and parallel power converters in a multifunctional three-phase distributed generation (DG) system composed of a single-stage photovoltaic (PV) system integrated into a unified power quality conditioner (UPQC). The UPQC operates as a bidirectional interface when the DG system is placed between the grid and either generic loads or ac microgrid. In the grid-connected mode, the DG system performs active power-line conditioning, while injecting the energy produced by the PV array into the grid. In islanded operation, the system can act as ac grid forming via a parallel inverter, whether there is the presence of an energy storage system. A complete study involving the power flow through the PV-UPQC is mandatory to achieve the overall understanding of the system operation and designing the power converters properly. For this purpose, sizing curves are presented and discussed. Furthermore, two strategies aimed at limiting and/or decreasing the power processed by the series and parallel inverters are presented and discussed in detail. Both simulation and experimental results are presented to evaluate the static and dynamic performances of the PV-UPQC system operating grid connected and grid islanded.*

**Keywords:** PV UPQC, grid, inverter, PI controller, Power quality.

### 1. INTRODUCTION:

Distributed generation (DG) systems based on renewable energy sources (RES) are currently emerging as an alternative for large and decentralized conventional power plants connected to long power transmission/distribution networks [1]. DG systems based on RES can be added to new electric power systems (EPS) to meet increasing power demands, reduce power transport costs, improve system reliability due to increased demand, and reduce harmful environmental impacts caused by pollutant sources of energy, such as oil, coal, and natural gas. Given the low environmental impact and abundance, primary RES, such as solar and wind, have been widely used in the scenario involving the proliferation of DG systems. In particular, the power generation by means of photovoltaic (PV) systems connected to the utility grid deserves special attention, since they can involve small-, medium-, and

large-scale power generation systems. PV systems, when connected to the single-phase or three phase EPS, have the purpose of injecting into the grid the energy coming from PV arrays, which can consist of one or more series- or parallel-connected solar panels. Once the PV array generates energy in the form of dc current, an inverter stage is required, i.e., it is necessary to use at least one power converter between the PV array and the grid [4]–[11]. In contrast, when the voltage in the dc bus of the PV array is not high enough to supply the dc bus of the inverter stage, a boost dc–dc converter must be used. Thus, the PV systems can be classified as single- or double-stage power conversion systems. In the single-stage PV system, maximum power point tracking (MPPT) is necessarily performed by the dc–ac converter [9], [10], while in the double-stage PV system, this task is usually performed



by a boost dc–dc converter [4]. Regardless of the PV system topology, the power balance between the PV system and the power grid is performed by the inverter dc-bus voltage control. In other words, the dc-bus voltage controller must increase or decrease the amplitude of the inverter sinusoidal current references to ensure that the power generated by the PV array is equal to the power injected into the grid plus the system losses, so that the power balance is maintained. The functionalities of PV systems can be highlighted in several applications. This happens because, besides injecting active power into the grid, PV systems can simultaneously perform some type of power-line conditioning and subsequently improve power quality (PQ) indicators, which are related to the following indexes [2]: line utilization factor [power factor (PF) and fundamental PF], harmonic

pollution factor, and load unbalance factor.

PV systems have acted similarly as parallel active power filters (P-APF), compensating for reactive power, as well as suppressing current harmonics generated by nonlinear loads. In PV systems have been employed to operate integrated with unified power quality conditioners (UPQC).

Although the main role of UPQC systems is performing series–parallel compensation, so that they can simultaneously act as series APF, compensating for mains voltages, as well as acting as P-APF, compensating the load currents, in experimental results of the single-stage PV system integrated with UPQC performs only the function of a dynamic voltage restorer. In this case, only the disturbances of the grid voltages are compensated. A double-stage PV system integrated with the UPQC, named SPV-UPQC-P, has been

evaluated only through computer simulations. However, this system only compensates reactive power of the load and unbalances of the grid voltage. Thus, the suppression of grid voltage as well as load current harmonics has not been taken into account. Another application in which the PV system is integrated with the UPQC is presented. In this application, the system can operate as a grid forming in an ac microgrid, since different types of DG sources (PV, wind, and others), as well as energy storage systems, can be used as grid-forming units in an islanded microgrid. However, transients/disturbances could be observed in the voltages that fed the load when the system was transferred from the grid-connected operation mode to the grid-islanded operation mode. This happens because the parallel converter of the UPQC needs to change its control mode from current source to voltage source. The

same effect occurs when the system returns to operate in the grid-connected mode, because the parallel converter must be controlled again as the current source.

## 2. RELATED STUDY:

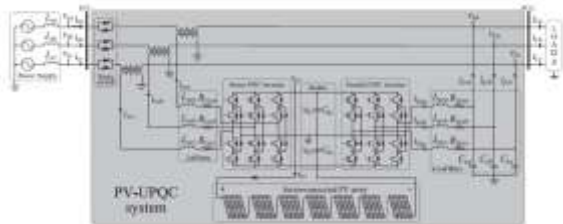
The input currents of the PV-UPQC system are controlled to be synchronized with grid voltages. These currents are controlled by a series converter, so that the series converter behaves like a balanced sinusoidal current source. Consequently, a high impedance path for the load harmonic currents is created between grid and load, meaning that the series converter behaves like a harmonic isolator. Since the grid currents are sinusoidal and in phase with the grid voltages, there is no flow of reactive power and harmonics in the grid (PCC1). Thus, a high PF is obtained in addition to the compensation of load unbalance. The dc-bus voltage controller adjusts the amplitude of grid currents, so that the

power flow balance involving the grid, the PV system, and the load is reached. Moreover, the compensated grid currents can be in phase or in phase opposition with the grid voltages, as discussed in detail in the next section.

The output voltages of the PV-UPQC system are also controlled to be synchronized and in phase with the grid voltages. The respective voltages are controlled by a parallel converter, i.e., the parallel converter behaves like a voltage sinusoidal source. Thus, a low impedance path for the load harmonic currents is created to facilitate the flow of these currents through the parallel converter. Since the system output voltages are controlled to be sinusoidal, balanced, and regulated, any disturbance present in the grid, such as voltage harmonics, voltage unbalances, and voltage sags/swells will appear across the terminals of the series coupling transformers.

The compensation strategy used in the PV-UPQC system is known as a dual compensation strategy and it is described in detail, where are discussed the advantages over conventional compensation strategies used to control most UPQCs presented in the literature.

In this paper, the algorithms used to generate the references of the grid currents (series NPC inverter), output voltages (parallel NPC inverter), and dc-bus voltage (MPPT-P&O) are implemented in the synchronous reference frame (SRF), as shown in Fig. These respective algorithms, the mathematical modeling of converters, the voltage controllers (parallel inverter and dc bus), as well as the current controllers (series inverter), are presented in detail. The phase-locked loop scheme, which is used for the synchronization and the utility phase-angle detection, is presented.



**Fig.2.1. Block diagram.**

### 3. PROPOSED METHODOLOGY:

The multi functionality of the PV-UPQC system can be highlighted by its number of operating modes (OPMs), described as follows.

1) *OPM 1*: In OPM 1, the PV-UPQC system is connected to the grid without the connected load. In this case, all the power generated by the PV system is injected into the grid (operating as a conventional DG system).

2) *OPM 2*: In OPM 2, the PV-UPQC system is connected to the grid with the connected load and without power generation from the PV array. In this case, the system only performs power-line conditioning since it operates as a conventional UPQC (grid-supporting [19]).

3) *OPM 3*: In OPM 3, the PV-UPQC system is connected to the power grid with both load and power generation from the PV array. In this case, the system performs power line conditioning and supplies power to the grid/load. If the power generated by the PV system is greater than the energy demanded by the load, the energy surplus is injected into the grid. If it is lower, all the generated energy is sent to the load (grid feeding and grid supporting [19]).

4) *OPM 4*: In OPM 4, the PV-UPQC system is disconnected from the grid (islanded operation mode) with both the load connected to the PCC2 (see Fig. 1) and the power generation by the PV array. In this case, the operation of the series converter is inhibited and the load is fed by the power produced from the PV array through the voltage controlled parallel converter. For a given application, the system can act as

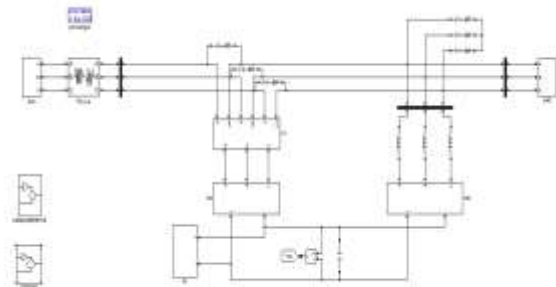
a grid forming [19], provided that a storage energy system being present.

5) *OPM 5*: In *OPM 5*, the PV-UPQC system is disconnected from the grid (islanded operation mode) with both the load connected to the PCC2 and the power generation by the PV array. In this case, operation of the series converter is inhibited and the load is fed by the current-controlled parallel converter (grid feeding [19]). This operation mode is not addressed in this paper.

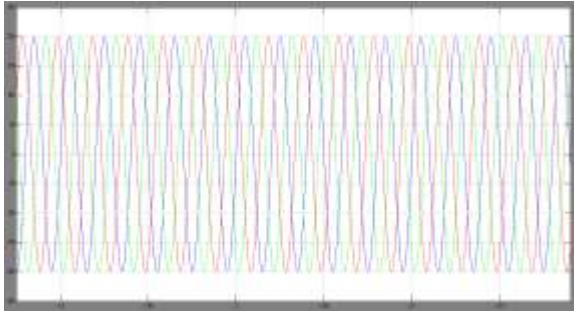
#### 4. SIMULATION RESULTS:

It is also observed that there is some flow of active power ( $P_{Bdc}$ ) from the grid to the dc bus via a parallel converter, to compensate losses in the system involving the passive elements and the power switches of the NPC inverters. Fig. shows the voltage and current waveforms. As can be noted, the parallel converter fed the load with regulated, balanced, and sinusoidal

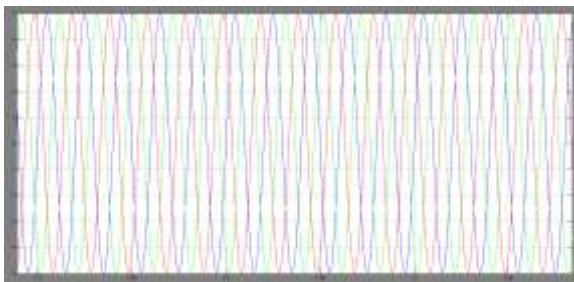
voltages. Moreover, the difference between input and output voltages appears across the terminals of the series coupling transformers. Finally, it is observed that the grid currents are sinusoidal and are in phase with their respective voltages, that is, the harmonic components of the load currents flow through the parallel converter rather than through the grid. In Fig. 12, the results of the PV-UPQC system operating in *OPM 3* ( $P_{pv} > P_L$  and  $V_s \approx V_L$ ) are shown, that is, in addition to active series and parallel power-line conditioning, the PV system injects active power into the grid.



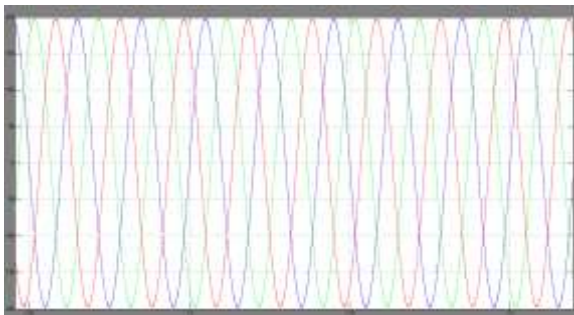
**Fig.4.1. Proposed system.**



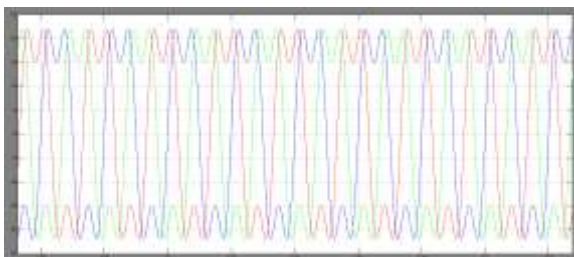
**Fig.4.2. Grid voltage.**



**Fig.4.3. Grid currents.**



**Fig.4.4. Load voltage.**



**Fig.4.5. Parallel converter currents.**



**Fig.4.6. DC link power.**

## 5. CONCLUSION:

This paper presented detailed studies involving the power flow and stability analysis of a multifunctional PV-DG system integrated with a UPQC, which was entirely based on the adopted dual compensation strategy and distinct operation modes.

With respect to the study of the power flow, several mathematical equations and extensive normalized curves involving the apparent power of both series and parallel converters were presented, as well as detailed analyses of the active power flowing through the PV-UPQC system. This study emerges as an important methodology for properly sizing the power

converters, taking into account not only the influence of some existing disturbances in the grid voltages, as well as the nonlinear characteristics of the load, but also the maximum power generated by the PV array. Furthermore, two strategies aimed at limiting and/or decreasing the power rating of the UPQC inverters were presented and discussed.

For the system stability analysis, the variations in both load currents and grid voltages were considered as disturbances. Such analysis showed that, with the adopted voltage and current controllers, the system stability is always ensured, even for distinct grid impedance characteristics.

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Title: **POWER QUALITY ANALYSIS OF PHASE CONTROLLED BIDIRECTIONAL AND UNIDIRECTIONAL AC VOLTAGE CONTROLLERS AND THEIR IMPACTS ON INPUT POWER SYSTEM**

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Paper Authors

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## POWER QUALITY ANALYSIS OF PHASE CONTROLLED BIDIRECTIONAL AND UNIDIRECTIONAL AC VOLTAGE CONTROLLERS AND THEIR IMPACTS ON INPUT POWER SYSTEM

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### ABSTRACT:

Power factor correction (PFC) is a mandatory functionality of electronic products in the industrial and commercial market in order to mitigate grid harmonics to improve power quality. Since the load characteristics of most PFC applications such as home appliances, battery chargers, switched mode power supplies and other digital products support unidirectional power flow, the general ac-dc boost converter is considered a popular topology. It is one of the low cost, simple methodologies and their performance is well proven. Maintaining dc-link voltage constantly inside the system in order to feed loads at different power ratings is the main task. Active power filters (APF) is another approach capable of improving grid power quality to control input current with a pure sinusoidal waveform in phase with input voltage. Unlike PFC circuits, the APF is a system in itself which provides compensation of harmonics and reactive power in order to reduce undesirable effects from non-linear loads and uncontrolled passive loads in power systems. The paper introduces a versatile method for mitigating grid power quality using unidirectional ac – dc boost converter. The additional focus of this paper is to measure the quantity of input current distortions by the unidirectional ac – dc boost converter used for supplying active power to the load and reactive power. By using this method, the amount of reactive power injected due to input current distortion from an individual converter to the grid should be restricted.

**Keywords:** PFC, Active power, current distortion, AC –DC boost converter.

### 1. INTRODUCTION

In AC voltage controllers, voltage sag may occur due to the change in loads which may affect domestic, industrial and commercial customers [6]. Now days, certain devices are developed which are having built-in power controllers to improve the efficiency and to provide uninterruptable supply to the systems [7]. The ac voltage controllers can

be configured as single phase controllers for low power domestic applications or three phase controllers for industrial loads. In AC voltage regulator, switching operations generate harmonics and nonlinearities which are harmful for electrical networks and degrade the performance of the system. Harmonics are frequencies present in the

system other than fundamental frequencies. The most common effects of harmonics include distortion in supply voltage, supply side power factor, heating of conductors, overloading of transformers and errors in energy meters [8]. The study of these harmonics is essential because it degrades the performance of machines [9]. To examine the effects of harmonics on power quality factor, researchers are working on converter topologies to improve the efficiency of converters [10]. In this work, the behaviour of distortions at the single phase input power supply using unidirectional and bidirectional controllers is investigated under resistive and inductive loads. Since most of the loads are RL type, hence during analysis and design of ac voltage regulators, RL load is considered.

## **2. LITERATURE SURVEY**

Reactive power compensation is important not only for power system stability but also efficient use of the power transmitted through the electric grid. Although many power electronics based technologies such as flexible alternating current transmission systems and active power filters have emerged to overcome the shortcomings of traditional passive shunt compensation methods, they may not be the best solution for improvement of power quality of an entire power system due to high capital and operating costs, as well as additional inherent power losses. In this paper, reactive power capabilities of existing aggregated unidirectional converters is investigated and a cost effective solution for reactive power

compensation through control and integration strategies for unidirectional in residential distributed power systems is proposed. Usually, unidirectional power factor correction converters are utilized in many commercial applications such as laundry machines, air conditioners, and battery chargers as front end circuitry in order to minimize the effects of harmonic distortion and poor power factor caused by their respective nonlinear loads. Since these converters are found everywhere, they have great potential as reactive power resources in distribution level power systems if they possess reactive power compensation functionality. Ultimately, residential power systems will possess the ability to act as large reactive power compensators, resulting in more efficient and stable electric power distribution system. Traditional reactive power compensation methods include rotating synchronous condensers and fixed or mechanically switched capacitors or inductors. However, there are limitations in both dynamic and steady state performance, because these methods use mechanical devices with little or no high-speed controllability. In addition, these mechanical devices cannot be switched frequently due to their low durability. To overcome the demerits of traditional technologies, several power electronics based technologies have been developed to enhance the controllability and power transfer capability in transmission and distribution systems.

### 3. RELATED STUDY

Loads such as induction motors, heating furnaces, pumps, blowers and driller machines need variable ac supply. The conversion of fixed AC supply to variable AC can be done by autotransformers but they have more power losses, heating, reduced system efficiency, high cost and also occupy more space. AC voltage controller converts fixed AC to variable AC by varying the supply of gate currents without changing the frequency. This conversion with the advent of power electronic devices such as MOSFETs, IGCTs, MCTs, SCRs, GTOs, etc. is made efficient and accurate. There are various techniques to control the output AC supply like phase angle control, integral cycle control. Phase controlled AC voltage controllers are having various applications like speed control of motors, transformer tap changing, industrial and domestic heating, induction heating and AC magnet controls. To find better economical solutions, the demands of power quality mitigation have continuously encouraged power electronics engineers to include HCC and RPC capabilities in power converters typically used for renewable energy conversion systems such as wind turbines, photovoltaic (PV) and fuel cell systems. These may have HCC and RPC functionalities as ancillary services, usually typical of converters capable of bidirectional power flow. As power converters for renewable energy sources become more popular in ac power systems, the potential for HCC and RPC will greatly increase, as these control schemes

can be employed in existing topologies without hardware changes, while simultaneously sending generated energy back to the grid [6]. Despite the increased utility and cost savings, the number of renewable power converters capable of fulfilling these functions is still limited.

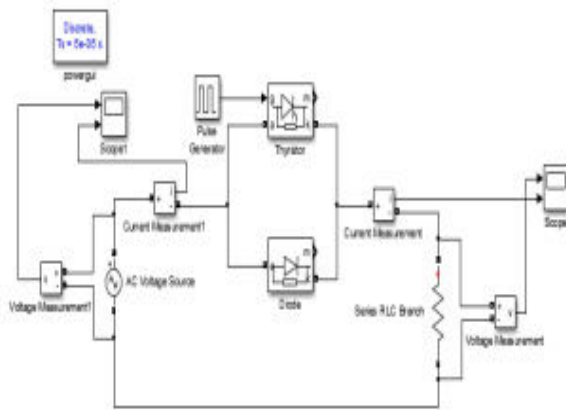
### 4. PROPOSED SYSTEM

In high-power applications, ac–dc converters based on the concept of multipulse, namely, 12, 18, 24, 30, 36, 48 pulses are used to reduce the harmonics in ac supply currents. These are named as multipulse converters. They use either a diode bridge or thyristor bridge and a special arrangement of magnetics through transformers and tapped inductors. Therefore, the last category is multipulse converters with unidirectional and bidirectional power flow. One of the important reasons for such an extensive development in ac–dc converters is due to self-commutating devices. At low power rating, MOSFETs are used with unsurpassed performance because of their high switching rate with negligible losses. At medium power rating, an IGBT is considered an ideal device for such converters with PWM technology. At a higher power rating, a GTO is normally used with self-commutating and reverse voltage-blocking capabilities at only a few kilohertz switching frequency. A number of manufacturers are developing an intelligent power module (IPM) with several devices to give a cost effectiveness and compact size to the IPQCs. Another breakthrough in IPQCs has been because of fast response Hall-effect voltage and current

sensors, and isolation amplifiers normally required for the feedback used in the control of these ac–dc converters result in a high level of dynamic and steady-state performance. Many manufacturers, such as ABB, LEM, HEME, Analog Devices, and others are offering the sensors at competitively low prices.

### SIMULATION RESULTS:

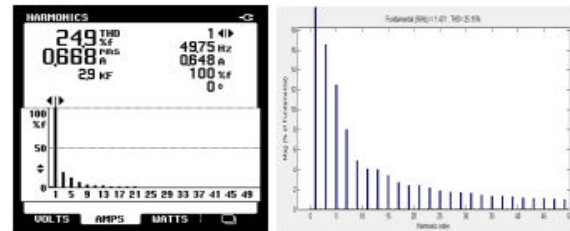
The simulation model of bidirectional AC voltage controller. It should be noted that the fundamental frequency is of 50 Hz while the load resistance of 182  $\Omega$  is taken. Resistive-Inductive load is also simulated having inductance of 280  $\mu$ H. Smaller value of inductance is chosen, as the thyristor may fail to commute for having very large inductance, which in turn will be a full sine wave at the load.



**Fig.4.1. Simulation model of Unidirectional AC Voltage Controller with R load.**

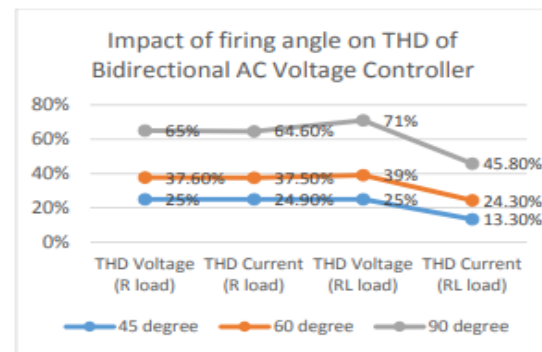
The harmonic distortions injected by power electronic switching devices in converters cause line losses, damage the equipment, increase power costs and waste energy. Hence the analyzation of these

harmonics is of great concern to the researchers, as they produce undesirable effects in the power system.



**Fig.4.2. Experimental and simulated output current %THD of bidirectional AC voltage controller with R load**

By fft analysis of output voltage and current waveforms of bidirectional AC voltage controller, it was found that these waveforms have half-wave symmetry and no dc component. Due to this, these full wave AC voltage controllers are preferred for motor applications. The given depicts the change in the percentage of total harmonic distortions at different firing angles. It is clearly shown that as we increase the firing angle, the THD is also increased. In order to have better system quality, smaller firing angle is preferable.



**Fig.4.3. Comparative THD of bidirectional and unidirectional AC voltage controllers at different firing angles.**

IPQC technology has developed to a mature level and is employed in widespread applications in fraction of kilowatt to megawatt converter systems such as UPSs, ac–dc–ac links, BESSs, ASDs, etc. However, there are new developments in IPQCs for further improvements in their performance. The new trends are improved control algorithms and soft-switching techniques to reduce switching losses in IPQCs even at high switching frequency, to enhance the dynamic response, and to reduce the size of energy storage elements (filters at input and output, high-frequency transformers). The new developments toward single-stage conversion have resulted in increased efficiency, reduced size, high reliability, and compactness of IPQCs. Sensor reduction has also revolutionized the IPQC technology to reduce their cost and enhance their reliability. Novel configurations in autotransformers for multipulse converters have resulted in their reduced size, cost, rating, weight, and losses. The new approaches in multilevel converters are offering high efficiency, reduced stress on devices, and a low level of high-frequency noise. The further improvement in solid-state device technology in terms of low conduction losses, higher permissible switching frequency, ease in gating process, and new devices, especially low voltage drop and reduced switching losses, will give a real boost for IPQCs in low-voltage dc power applications. The multiple device integration into a single power module as a cell for direct use as a configuration of IPQCs will result in size reduction,

increased efficiency, and low-cost option. The sensors, control, gating, and protection integration in the IPM will provide a new direction in the development of IPQCs. Dedicated processors and ASICs development for IPQCs are also expected in the near future to reduce their cost, provide ease in control, and result in compact and efficient ac–dc conversion.

## 5. CONCLUSION

It can be concluded that as we increase the firing angle, the total harmonic distortions are increased. Hence, the smaller the firing angle, the less would be THD and the better would be performance of power system. It was observed that the nonlinearities and distortions, generated by converter, directly affect the input system and disturb the performance of input network. This is the reason, many industries give separate supply to such converters in order to isolate other loads from being disturbed. Moreover, in bidirectional AC voltage controller, half wave symmetry was followed i.e. only odd harmonics were present in the configurations. While in case of unidirectional, half wave symmetry was not found and we noticed both even and odd harmonics in the results. Even harmonics are not suitable for motor applications as they may cause disturbances. That's why bidirectional AC voltage controller is being preferred for electrical drives, AC motors and power systems. On other hand, unidirectional AC voltage controller is being preferred for welding, heating and melting applications.

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Paper Authors

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## PREDICTING AND DEFINING B2B SALES SUCCESS WITH MACHINE LEARNING

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### ABSTRACT:

Business to Business (B2B) sales forecast can be described as a decision-making process, which is based on past data (internal and external), formalized rules, subjective judgment, and tacit organizational knowledge. Its consequences are measured in profit and loss. The research focus of this paper is aimed to narrow the gap between planned and realized performance, introducing a novel model based on machine learning techniques. Preliminary results of machine learning model performance are presented, with focus on distilled visualizations that create powerful, yet human comprehensible and actionable insights, enabling positive climate for reflection and contributing to continuous organizational learning.

**Keywords:** B2B, internal external storage, reflections, security services.

### 1. INTRODUCTION

The paper and packaging company that provided the data for this research has a long history of sales expertise. This expertise is captured predominantly in the intuition of sales representatives, many of whom have worked in the industry for 20 years or more. Intuition is not easy to record and disseminate across an entire sales force, however, and thus one of the company's most valuable resources is inaccessible to the broader organization. As a result, the company tasked this team with extracting the most important factors in driving sales success and modeling win propensities using data from their customer relationship management (CRM) system. Most prior work in this space has been performed by private companies, both those that have developed proprietary technologies for internal use and those that sell B2B services related to predictive

sales modeling. As a result, research in the field is typically unavailable to the public. Some examples include Implitis a company recently acquired by Salesforce.com that focuses on data automation and predictive modelling and Insight Squared, which sells software that includes a capability to forecast sales outcomes. The academic work that does exist either is related to forecasting aggregate sales instead of scoring opportunity level propensity, or is based on custom algorithms that fall outside the standard tools used by data scientists in industry. The earliest relevant publication dates only to 2015, in which a joint team from Chinese and US universities employed a two-dimensional Hawkes Process model on seller-lead interactions to score win propensity. Other relevant research has centered on applying highly accurate machine learning algorithms based on sales pipeline data to integrate the insights they produce into an organization's



practices, and explaining the output of black-box machine learning models. Considering the lack of visibility into work predicting sales outcome propensity, this research serves to create an initial baseline of understanding on the subject. This project applies and compares several well-known methods for classifying and scoring propensities, a majority of which fall into the category of decision tree modeling.

## 2. LITERATURE SURVEY

The learning is characterized by the change of behavior as a result of an individual and/or group exposure to experience (Kljajić Borštnar et al., 2011). Two types of learning are distinguished: the single-loop and the double-loop learning (Argyris, 1996; DiBella and Nevis, 1998; Gephart, Marsick, Mark, VanBuren and Spiro, 1996, Nonaka and Takeuchi, 1995). The double-loop learning refers to not just changing the behavior in order to achieve the stated goal (single loop), but changing mental models, visions and beliefs, and therefore organizational knowledge. With the proposed approach we build a foundation to achieve the double-loop learning – as a basis to establish new premises (i.e. paradigms, schemes, mental models or perspectives), with potential to override existing ones (Nonaka and Takeuchi, 1995). Same authors are fully aware that an effort to question and rebuild existing perspectives, interpretation of frameworks or decision premises can be very difficult to implement in an organization; it requires persistent activities. Organizational learning presents ongoing effort of creating organizational knowledge. Team learning, personal mastery and mental models principles (Senge, 1990) are built-in into organizational knowledge. In this paper we propose a

classification model, which builds on insights from B2B sales professionals. Insights are presented in a form of sales history described with features reflecting attributes of sales process and B2B relationships (Bohanec et al., 2015). Machine learning techniques are applied to build the classification model, which is capable to classify future, unseen sales opportunities. The classification model represents the organizational knowledge which is presented and visualized in a human comprehensible form to support the double-loop learning process within an organization. Our aim is to investigate whether it is possible to develop such a model, based on B2B sales history, which supports process of forecasting and transparent reasoning.

Machine learning (ML) in our context is interpreted as an acquisition of structural descriptions from examples (Witten, Eibe and Hall, 2011). The fact that it leverages different models and algorithms to approximate complex theories which are difficult to be exactly represented with other mathematical tools, connects it to the field of artificial intelligence. ML has been successfully applied in different fields, e.g. medical diagnostics, spam filtering, OCR, internet browsers etc. (Liao, Chu and Hsiao, 2012; Ngai et al., 2009; Bose and Mahapatra, 2001). ML techniques take training data set to learn relationships needed to categorize new, yet unseen, objects to target categories (Witten et al., 2011; Robnik-Šikonja and Kononenko, 2008). Some classification models produced are able to explain their decisions, which can help in better adoption of ML techniques in practice due to participant's faster understanding of ML insights (Robnik-

Šikonja and Kononenko, 2008; Collopy, Adya and Armstrong, 2006).

### 3. RELATED STUDY

The data for this project were sourced from the company's Salesforce.com customer relationship management system (SFDC). SFDC is a software-as-a-service application that allows sales teams to record details about customer relationships and sales opportunities as they move through the sales pipeline. The data included a static snapshot of details on sales employees, customer accounts and account histories, individual customer opportunities, sales representative activities, and contact information. Some inputs in the system were automatically generated and easily readable by machine. For others, sales representatives entered customer information manually, either via restrictive forms of entry such as a drop-down list or numeric field, or freeform, in a text field or uploaded as an attachment. To clean the data and cut out inessential information prior to modeling, the team first filtered out all entries created before Apr. 1, 2016 when the system was formally launched for the company<sup>1</sup>. Variables with a high percentage of null values were then excluded to ensure a sufficient sample size. The remaining variables were further screened based on potential importance determined by conversations between the team and key company stakeholders. Additionally, data exploration resulted in several opportunities for feature engineering and custom variables to capture potential influence not captured in the default fields. The following are several examples of custom fields generated:

1. Fields Completed — count of the number of fields completed in one record.

2. Task Count — count of the number of tasks for the customer account associated with an opportunity.

3. Age-related variables — analyzes the impact from the age of opportunities. a. Open Time — the duration that an opportunity remained open in the system. b. Last Action time — the duration from when an opportunity was created to the time of last activity on that opportunity c. Valid Open Time — a Boolean variable that equals 1 for opportunities with positive Open Time and 0 for the remaining opportunities. After a number of iterations between modeling and feature engineering, the final master table used in this analysis included 15 variables and was built on the opportunity-level. Account information related to each customer and custom variables from other tables were also merged into this set. Each observation on this master table and on previous table iterations were considered to be individual sales opportunities described by a number of features and associated variable values. Opportunities could be considered synonymous with sales “deals” and originally included both open and closed opportunities before being filtered to maintain only closed. Each variable corresponded to a filled or calculated field in the SFDC system, characterizing the opportunity's duration, type, amount, or any other information.

### 4. PROPOSED SYSTEM

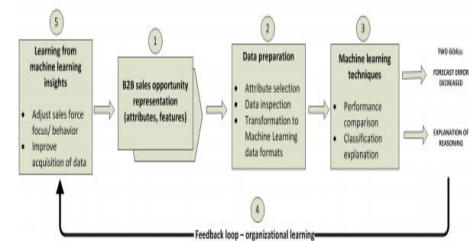
The research team employed several well-known classification models to extract important features from the data, in addition to calculating the win/loss propensity for each opportunity record. With the goal of modeling opportunity probability, the team chose different supervised machine learning models. The team chose different supervised machine learning models.

learning algorithms that fit these criteria: Logistic Regression, Decision Tree, Random Forest, and XGBoost. In each of these supervised algorithms, the classifier was pre-defined with an iterative variable selection process. A classification model was then built with a training set split from the master table and used to predict win propensities examined by the actual win or loss of the opportunities in the testing set built from the remainder of observations. Variable selection was a critical component of this project. As previously stated, variables came directly from the SFDC system and went through a series of data processing steps. The main purpose of this research was to interpret features that gave the most useful information in terms of win propensity prediction accuracy. Both the quality and quantity of variables significantly affected the accuracy and efficiency of all algorithms. An important consideration about the current data was the widely varying quality of variable inputs. This issue created constraints on the algorithm-generated selection results. Therefore, the variable selection process also involved constant communication and validation between the team and company. The four algorithms used in this research are briefly described below:

- Multiple Logistic Regression — a generalized linear model (GLM) that describes the relationship between a binary dependent variable and more than one predictor.
- Decision Tree — a non-parametric algorithm that makes sequential, hierarchical decisions about the outcomes based on the predictors.
- Random Forest — an ensemble algorithm that constructs a multitude of decision trees and outputs the mode of the classes, correcting the overfitting habit of decision trees.

- XGBoost — an implementation of gradient boosted decision trees that minimize the loss when producing an ensemble of weak decision trees. The metrics for evaluating the models comprised the following:

1. Accuracy—the percentage of correctly predicted opportunities over the total number of opportunities. Outputs were given in confusion matrices that illustrated a more detailed level of accuracies: a. Precision — the percentage of correctly predicted won opportunities over the total number of predicted won opportunities. b. Recall — the percentage of correctly predicted won opportunities over the total number of actual won opportunities.
2. Access to variable importance — certain algorithms provided information to evaluate the importance of variables included in the model. The metric used was “percentage increased Mean-squared-error (%IncMSE)”, which implied the loss of accuracy if a certain variable was missing in the model.
3. Efficiency — resources used to build the model including time, memory, and complexity.



However, the random forest model not only exhibited exceptional accuracy, but also provided importance’s at the variable level. Because of a requirement for dummy variables, the XGBoost model output importances for every possible value of all categorical variables, producing a very high number of importances that was much less easy to read and interpret on for the company. The random forest model output in

every metric except run time, which was over 30 minutes for the full model. By creating individual models at the division level, however, this was improved to a manageable 77.87 seconds for all divisions combined. Based on these results, random forest was selected as the optimal model to provide insights to the company. A division-level model not only improved model performance, but was critically important in deriving insights for the company. Within the organization, different divisions exhibit significant differences in client profiles, processes, and use of the SFDC system. By creating a model for each division, recommendations could be tailored to each business unit individually. Additionally, it was determined that two models should be created for each division, one incorporating "meta variables"—or variables describing the data itself more than the sales opportunity2—and one excluding them. This resulted in models with very different accuracies and variable importance's, but allowed for the isolation of variables useful for prediction in contrast to those more informative of how the system is used.

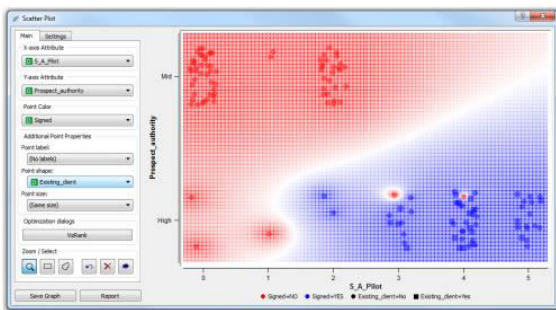


Fig.4.1. Variable importances.

## 5. CONCLUSION

Despite initial inconsistencies in the data, overall accuracy appeared promising and indicated further improvements could be made

with better data quality and quantity, more feature related investigation and tuning, or perhaps different methods such as neural nets. The analysis also uncovered new insights into what is important regarding sales success. But new insights are often accompanied by new questions: For instance, what kinds of data need to be captured to improve the model's predictive capabilities? How does the culture need to change to improve data capture? This cascade is to be expected, as the broader project lends itself to being a heavily iterative process. There may appear to be a seemingly infinite pool of potential next steps to take in this case. With this in mind, there are a few the team would recommend as the most prudent to consider. Currently, the company could feasibly use the non-meta-variable model to attempt prediction on opportunities in progress for those divisions where accuracy is adequate. To better achieve the objective of predicting open opportunities, it would be prudent to capture and model how opportunity fields change over time, perhaps via periodic snapshots. This way, the company would be able to make predictions at different stages in the opportunity lifecycle. Another important application of these kinds of prediction models is to assist in determining where to invest sales time and resources for business planning optimization. Predictions from accurate models are also worth rolling up into aggregate sales forecasts and adjusting existing "bottom-up" methods.

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Title: **RECOMMENDER SYSTEM WITH ARTIFICIAL INTELLIGENCE FOR FITNESS ASSISTANCE SYSTEM**

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## RECOMMENDER SYSTEM WITH ARTIFICIAL INTELLIGENCE FOR FITNESS ASSISTANCE SYSTEM

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**ABSTRACT:** This paper proposes a recommender framework (RS) to help the wellness help framework (FAS) with computerized reasoning. The RS is applied to make these proposals for the apprentices and existing clients. The objective of the paper plans to build up a RS that has a capacity to learn, examine, anticipate, and make these proposals just as convey to human through AI. Counterfeit Neural Network and Logistic Regression have been utilized to anticipate an appropriate exercise for every tenderfoot. Also, the specialists created with fortification learning capacity of Soar design help the individuals select their exercise dependent on their condition. Through the test result, the viability of the utility application is approved.

### INTRODUCTION

The RS is known as a part of information filtering system which helps the users seek the prediction of rating or preference that users would give to an item or service recommendations [1]. Currently, the RS has been upgraded with the several machine learning algorithms to provide users with the suggestion for their purposes in [2] or build the framework for RS as shown in [3]. In the fitness field, recent studies have focused on developing the RS to user with a wearable device and recording data in real-time. A fitness assistant framework is developed to smartly track and identify user's activity based on contextual interpretation in [4-5]. Moreover, RS has been approached for a runner, which is described in [6]. The purpose of this study is to design the RS that will suggest personalized workout to the users and predict the plan for doing exercise in future. In the proposed RS, we use machine

learning algorithms on activity data to build a predictive module in the basic training layer (BTL) that classify the user's activity in their workout. In addition, we also build the trainer agent (TA) with Soar architecture and machine learning algorithm to reflect the prediction of BTL for suggesting the several workouts to help users select the suitable workout fitting well with their exercise plan.

### I. RELATED REVIEW

The FAS is the system designed to support users doing exercise with two motors (called fitness assistance equipment, FAE) used to support lifting the weight of exercise instead of the traditional method. The structure of FAS is shown in Fig. 1. As shown in Fig. 1, in order to control the FAE, there is an embedded controller built with microcontroller to control the speed of two motors. In FAS, proposed RS is added to predict appropriate workouts



for users and transfer a control commands to embedded controller conducting the FAE. The proposed RS used in FAS is a system combined with artificial intelligence (AI) packages, which plays a role as a professional trainer to give the training instructions of workout for users based on predictability and data analysis to provide the appropriate suggestions according to user's condition. Machine learning algorithms help RS improve the ability of learning, identifying and acquiring knowledge from the real workout data. Particularly, it supports FAS to perform the simulation of exercise for each user's requirements.

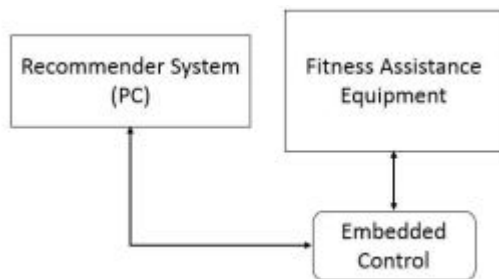


Figure 1: Structure of fitness assistance system

The structure of RS employed in FAS is illustrated in Fig. 2. In order to build the RS with AI, some machine learning algorithms have been applied to predict and give the workout recommendation. As shown in Fig 2, the structure of RS is composed of two modules: basic training layer (BTL) and trainer agent (TA), where BTL is built with Artificial Neural Network (ANN) and Logistic Regression (LR). Data classification is the core component of this module. In the current implementation, the main task of this module aims to predict and give the suggestions of workout for beginners based on their initial information.

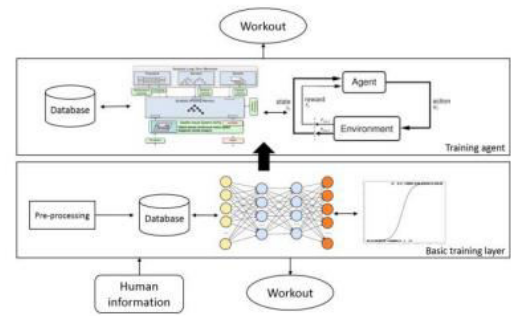


Figure 2: Recommender system architecture

After then, the result of suggestions from the BTL will be stored and updated with the new data into the database. TA is the module integrated with Soar and Reinforcement Learning (RL) to suggest the several recommendations based on some supposed rules with the reference result from BTL. We define some rules with reference conditions in Table I for Soar agent and through RL algorithm to suggest the various recommendations at the same time. Hence, users select the appropriate workout based on the overall assessment given by this module. The profile of workout also changes to suit each specific user.

## II. METHODOLOGY IMPLEMENTED

In order to build the proposed RS, we proceed to collect individual data several volunteers to generate the dataset for training, including men and women. We assume that the patterns of volunteers are considered as standard data to predict and generate the suggestion for the beginner using the FAS to get the workout in the first time. To generate user's profile, format of user's input data includes gender, age, height, weight, type of exercise, and one-repetition maximum (1-RM). The output suggestions are exercise weight, repetition, and break time for each suggested set. Furthermore, the output suggestions are exercise weight, repetition, and break time for each suggested set.

parameters of the input value are 1-RM index. In weight training, 1-RM is the maximum amount of force that can be generated in one maximal contraction [7]. It can be used for determining an individual's maximum force, or as an upper limit in order to figure out the desired "load" for an exercise. A. Workout properties determination As mentioned above, the RS needs user's profile as an input information of RS to compare with its database, then predict and generate the recommendation workouts that take following attributes On the other hand, we assume that the purpose of doing exercise, i.e., diet or muscle up, needs to be evaluated based on the 1-RM index by the supposed rules shown in Table I, as shown in [8]. The users will be checked for their 1-RM index before using the FAS for each workout. As can be seen from Table I, 1-RM indices are set up each purpose of doing exercise as below

**TABLE 1: GUIDELINE FOR 1-RM INDEX**

Purpose	1-RM (%)	Repetition	Set	Break
Diet	<67	~ 20	1	<4mins
		~17	2	<4mins
		~15	3	<4mins
Muscle up	67~85	~15	1	<4mins
		~13	2	<4mins
		~11	3	<4mins

This module is responsible for training dataset to predict and suggest an appropriate type of workout for the beginner, which is ANN and LR. The combination between ANN and LR allows the implementation of the analysis and prediction of average result based on the sample patterns. With LR, hypothesis function  $H(X)$  is described as below.

To combine with ANN, Rectifier Linear Unit (ReLU) is applied to train the user profile data for better prediction and recommendations. We

defined seven hidden layers to train the user profile data with each weight and bias for each hidden layer. Fig. 3 shows the training process with user's profile data. In order to train the user's profile data with ReLU, the hypothesis function  $H(x)$  can be attained by calculating with weight and bias for each layer, as presented in the following

In BTL, ANN creates the neural network with several hidden layers with the input values as mentioned in Section III. It converts the inputs for the next layers. Then the outputs are the workout parameters, including weight of exercise, repetition, and break time for three sets. LR is applied to classifying the suggestion result based on the relationship between input and output. In BTL, ANN creates the neural network with several hidden layers with the input values as mentioned in Section III. It converts the inputs for the next layers. Then the outputs are the workout parameters, including weight of exercise, repetition, and break time for three sets. LR is applied to classifying the suggestion result based on the relationship between input and output.

Soar agent with RL is applied to suggest the workout plan recommendation to user based on the reference result from the BTL as mentioned above. With the predictive recommendation from BTL, features of Soar agent aims to recommend the several particular workouts for the existing member that can select the exercise time, type of exercise, repetition and set. Soar agent plays a role of the professional trainer for users. To provide the recommendations, we designed the trainer agent with RL algorithm based on epsilon value in order to compare the highest epsilon score in the environment

method [9]. The final recommendation will be selected by the highest epsilon score corresponding to a suggestion.

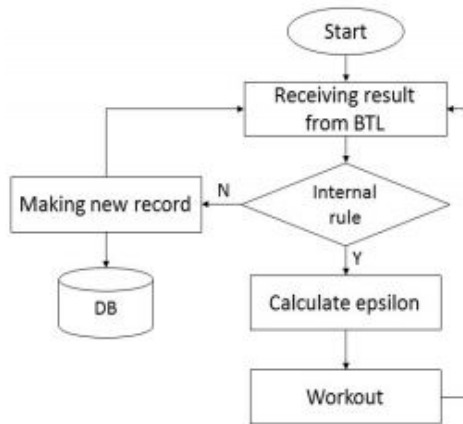


Figure 3: Block diagram of TA to suggest the workout

To perform a suggestion of workout plan, based on the first workout from BTL, TA implements the comparison with the assumed rules that we build for Soar architecture. Fig. 3 shows a process of using TA for making a workout evaluation for each user with its accuracy and suitability.

### III. EXPERIMENT RESULT

For validating the performance of the proposed RS that is discussed in this paper, we experimentally evaluated with four volunteers as the beginners of FAS. Since the present FAS has not been completely finished its functions, we have just implemented the experiment with the BTL for predicting and suggesting the workout plan for four new beginners. The experimental evaluation of TA in our proposed RS will be discussed in future work. A. Experimental setup before using the proposed RS, we collect the 1-RM indices of each

volunteer to determine their maximum power. For our experiments, we used the dataset collected by the several volunteers mentioned. The data were collected with some information format, i.e., gender, age, height, weight, type of exercise, and 1-RM, and purpose of diet or muscle up. The 1-RM index is calculated for the experimental users with their purpose. Once the 1-RM is calculated and stored as input to the BTL, experiments were carried out for the sample records of dataset to create the database for training with AI algorithm. Also, the supposed rules in Table I will be used with TA for evaluation of workout.

On the other hand, in order to prove the accuracy of prediction with BTL of the proposed RS in this paper, we show the result of cost values when training the dataset with the output parameters of workout such as weight, number of repetition, and break time, the cost value is very low, which means the training dataset gets the high accuracy.

### IV. CONCLUSION

In this study, we proposed RS for fitness assistance system and a novel method for fitness workout recommendation with artificial intelligence algorithms. We developed a system with several machine learning algorithms to predict and train data to give the suggestion for the fitness workout. The ANN with LR implements the prediction of workout parameters with the best accuracy. The proposed RS is expected to give better recommendation for user to do exercise. Table IV illustrates the result of User#1 with the purpose of muscle up between suggested workout and the supposed rules. As can be seen in Table IV, the exercise weight for User #1 is in the

supposed rule. In the meanwhile, the repetition and break time also approach the values within the range of the assumed rule as shown in Table I. As future work of this study, we plan to focus on improving the TA module in the proposed RS with Soar agent by designing the RL algorithm to recommend several workouts for existing member's average selection. TA will be developed in future work for improving its features to calculate the epsilon value of epsilon-greedy method, and validate the suggested workout for approaching the suitable workout plan to the users. Consequently, the proposed RS will play a role of the professional trainer for user in future.

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## REDUCING HARMONICS IN MICRO GRID DISTRIBUTION SYSTEM USING APF

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### ABSTRACT:

*Three-phase four-wire (3P4W) electrical distribution systems are extensively utilized in commercial and industrial sectors. These electrical distribution systems are facing severe power quality issues such as current harmonics, reactive power, and load unbalancing, excessive neutral current. This paper presents the analysis, design and digital simulation of a hysteresis current controller (HCC) based active power filter (APF) to improve the power quality in a 3P4W electrical distribution system. In the present work APF is implemented with a 4-leg voltage source inverter (VSI) which is connected in shunt to the 3P4W electrical distribution system. The VSI switching signals are generated through a hysteresis current controller (HCC), which has good current tracking accuracy, unconditioned stability and easy implementation. The proposed HCC based APF compensates current harmonics, reactive power, and load unbalancing and neutral current in 3P4W electric distribution system feeding nonlinear and unbalanced loads.*

*Keywords: HCC, Active power filter, PI controller, Power quality.*

### 1. INTRODUCTION:

The Power Quality issue is defined as “any occurrence manifested in voltage,

current, or frequency deviations that results in breakdown, upset, failure, or misoperation of enduse equipment.”

Power electronic devices are highly nonlinear though efficient, cheap and very flexible. From the supply they absorb reactive power and harmonic currents [10]. Waveform distortions will occur because of power quality pollutions. Waveform distortions results in power loss, poor system efficiency, interference with communication lines, over heating of distribution transformers, increased rms value of supply current [3]. Passive filters and active filters are the devices used for controlling harmonic distortion. Passive filters are effective and very cheap for the elimination of harmonics. But it has a drawback of resonance, fixed compensation and they are large in size also [10]. Active power filters (APF) has a remarkable progress on analysis and design and cost effective solution. Active power filters are liable to harmonic and reactive power compensation. These are more flexible, smaller in size and

have a better dynamic performance than passive filters. Different order harmonics are suppressed by the active power filters simultaneously [6],[3]. The major parts of the active power filters are a controller that generates compensating signals and three phase inverter for injecting the compensating currents [2]. Most of the pollution issues created in power systems are due to the non-linear characteristics and fast switching of power electronic equipment. Efficiency and cost are considered today almost at the same level. Active power filters have been used over the years to solve these problems to improve power quality [10]. Depending on the required application or electrical problem to be solved, active power filters can be implemented as shunt type, series type, or shunt-series type filters. These filters can also be combined with passive filters to create hybrid power filters. Among which shunt active

power filter is used to eliminate load current harmonics and reactive power compensation. Generation of reference currents are accomplished in many ways like frequency domain and in time domain. For the reference signal generation synchronous reference frame based algorithm is used [11]. And for the gating signals of the inverter reference currents and the actual filter currents are compared [5]. Harmonic distortion is one of the major problem frequently encountered. The power quality problems in the power supply are caused by the highly non-linear characteristic based loads. Hence, there is a need to reduce the total harmonic distortion below 5% as specified in IEEE 519-1992 harmonic standard [10]. To compensate the dominant current harmonics shunt active power filters are preferable. The shunt active power filter, with a selfcontrolled dc bus, has a similar

topology like a static compensator (STATCOM) used for reactive power compensation in power systems. Shunt active power filters injects compensating currents equal but opposite to the load currents to compensate the load current harmonics. The shunt APF acts as a current source injecting the harmonic components generated by the load. PI adaptive controlled shunt active power filter is the efficient approach for the harmonics and reactive power compensation of a nonlinear load. Wide acceptance of PI logic controllers owe to easy implementation and fast response [4]. The advantage of PI control is that it is based on linguistic variables and does not require a mathematical model of the system. The main focus of this paper is to reduce the THD as low as possible that is below 5%. The work is simulated in MATLAB/SIMULINK. Total Harmonic Distortion is

calculated using FFT analysis on source current.

## 2. RELATED STUDY:

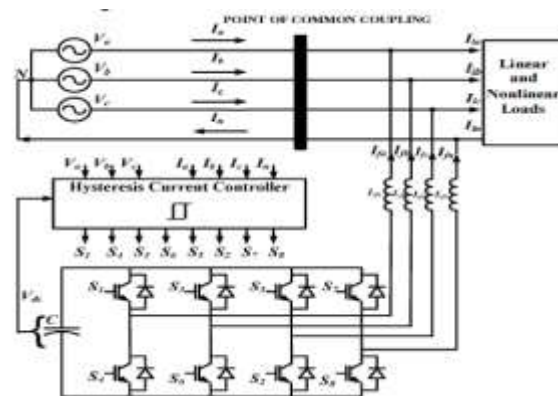
The implementation of Active Filters in this modern electronic age has become an increasingly essential element to the power network. With advancements in technology since the early eighties and significant trends of power electronic devices among consumers and industry, utilities are continually pressured in providing a quality and reliable supply. Power electronic devices [2] such as computers, printers, faxes, fluorescent lighting and most other office equipment all create harmonics. These types of devices are commonly classified collectively as 'nonlinear loads'. Nonlinear loads create harmonics by drawing current in abrupt short pulses rather than in a smooth sinusoidal manner. The major issues associated with the supply of

harmonics to nonlinear loads are severe overheating and insulation damage. Increased operating temperatures of generators and transformers degrade the insulation material of its windings. If this heating were continued to the point at which the insulation fails, a flashover may occur should it be combined with leakage current from its conductors. This would permanently damage the device and result in loss of generation causing widespread blackouts. One solution to this foreseeable problem is to install active filters for each nonlinear load in the power system network. Although presently very uneconomical, the installation of active filters proves indispensable for solving power quality [1][2] problems in distribution networks such as harmonic current compensation, reactive current compensation, voltage sag compensation, voltage flicker



compensation and negative phase sequence current compensation. Ultimately, this would ensure a polluted free system with increased reliability and quality. Shunt active filters are widely accepted and dominant filter of choice in most industrial processes. The shunt APF structure is an attractive solution to harmonic current problems based on Voltage Source Inverter (VSI). The APF is connected at the point of common coupling in parallel and is fed from the mains [10]. The focus of the shunt active filter is to supply opposing harmonic current to the nonlinear load results in a net content. Then the supply signals remain purely fundamental [7]. Shunt active power filters also have the benefit of contributing to reactive power and balancing of three-phase currents. Several shunt active filters can be combined together for an increased

power ratings to withstand higher currents.



**Fig.2.1. Model diagram.**

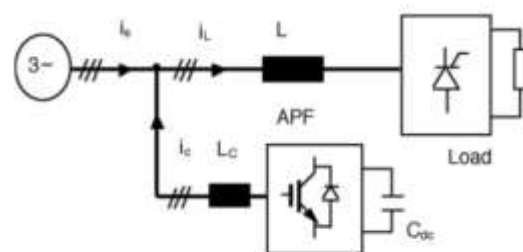
### 3. PROPOSED METHODOLOGY:

Three-phase four-wire loads are also known to suffer from the problem of neutral current due to nonlinearity and unbalance present in the system. This may produce large amount of neutral current which consists of triple harmonics. The neutral current may cause overloading of the distribution system and causes additional heat losses, which may be dangerous and poses a serious threat to the connected equipment. A four-leg VSC is used for neutral current compensation in

addition to mitigate the current harmonics with other reported advantages. Additionally, the flexible operation of the system depends upon implementation of the various control strategies. The response of these controllers to the unbalance and dynamic conditions is slow.

In a modern power system, increasing of loads and nonlinear equipment's have been demanding the compensation of the disturbances caused for them. These non-linear loads may cause poor power factor and high degree of harmonics. Active power filter (APF) can solve problems of harmonic and reactive power simultaneously. APF's consisting of voltage source inverters and a dc capacitor have been researched and developed for improving the power factor and stability of transmission systems. APF have the ability to adjust the amplitude of the synthesized ac

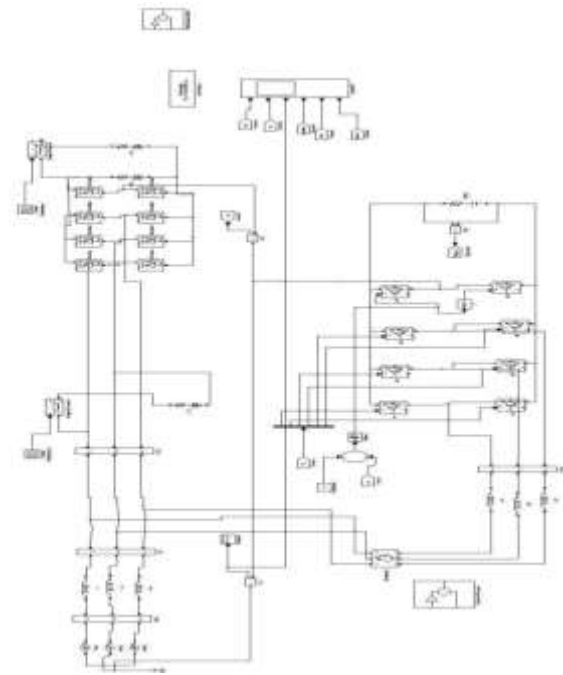
voltage of the inverters by means of pulse width modulation or by control of the dc-link voltage, thus drawing either leading or lagging reactive power from the supply. APF's are an up-to-date solution to power quality problems. Shunt APF's allows the compensation of current harmonics and unbalance, together with power factor correction, and can be a much better solution than conventional approach (capacitors and passive filters). The simplest method of eliminating line current harmonics and improving the system power factor is to use passive LC filters. However, bulk passive components, series and parallel resonance and a fixed compensation characteristic are the main drawbacks of passive LC filters.



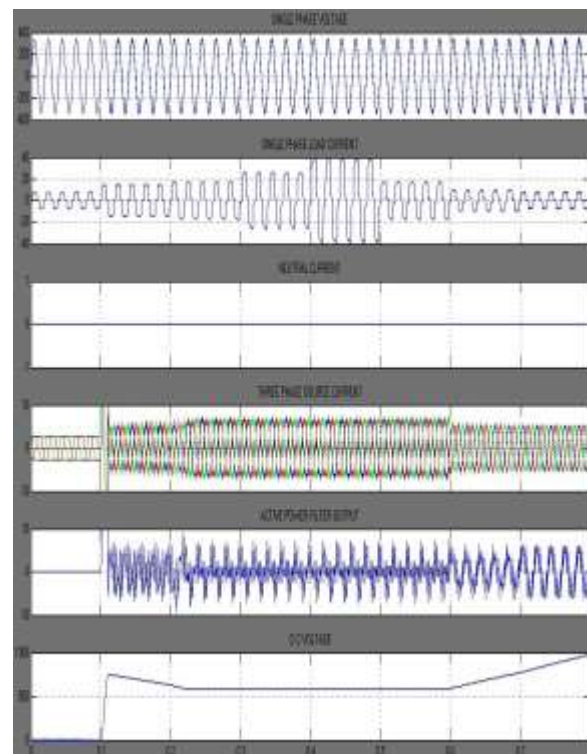
**Fig3.1. Active filter model.**

#### 4. SIMULATION RESULTS:

The dc-voltage converter is controlled with a traditional PI controller. This is an important issue in the evaluation, since the cost function (6) is designed using only current references, in order to avoid the use of weighting factors. Generally, these weighting factors are obtained experimentally, and they are not well defined when different operating conditions are required. Additionally, the slow dynamic response of the voltage across the electrolytic capacitor does not affect the current transient response. For this reason, the PI controller represents a simple and effective alternative for the dc-voltage control.



**Fig.4.1. Simulation circuit.**



## Fig.4.2. Simulation circuit OUTPUT

results.

### 5. CONCLUSION:

This paper has described the shunt APF to improve the power quality at the point of common coupling (PCC) for a 3P4W electrical distribution system. The current harmonics, current unbalance and load reactive power, due to unbalanced and nonlinear load connected to the PCC, are compensated efficiently such that the source side currents are always maintained as balanced and sinusoidal at unity power factor. Furthermore, the load neutral current is prevented from flowing into the source side by compensating it locally from the fourth leg of the VSI. The % THD of the source current after compensation is 4.56%, hence the proposed shunt APF is found efficient to meet recommended standards of IEEE 519-1992 for harmonic levels.

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Title: **RESEARCH ON APPLICATION OF ARTIFICIAL INTELLIGENCE IN MEDICAL EDUCATION**

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## RESEARCH ON APPLICATION OF ARTIFICIAL INTELLIGENCE IN MEDICAL EDUCATION

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**Abstract:** With the headway of science and innovation, the use of computerized reasoning is of extraordinary criticalness in different fields, and it has been an immense main thrust in the improvement of an ever increasing number of fields. Through examination on the utilization of computerized reasoning in distance clinical instructing, virtual request, distance schooling the board, training video recording, and so on, this article presumes that man-made brainpower can expand the effectiveness of clinical educating, improve visual utility, and think more like human, subsequently it can more readily serve the individuals. The application impacts of computerized reasoning in the field of clinical schooling, particularly for the improvement of the general nature of clinical understudies, give a lot of motivation to the utilizations of man-made consciousness in clinical training.

**Keywords:** Artificial Intelligence; Medical Education; Application Research

### I. Introduction

As humans place great hopes on artificial intelligence, artificial intelligence can have bright prospects, and it may be applied to all aspects of our lives to improve the overall standard of living of all of us. With the development of artificial intelligence technology, scientists have gradually applied artificial intelligence technology to the teaching field, and quite good results have been achieved. Therefore, the development and progress in artificial intelligence, combined with teaching, will be an excellent new teaching method.

Artificial intelligence is a new science that emerged in the middle of the 20th century. This science mainly belongs to computer science [2], but it covers information science, linguistics, psychology, philosophy, mathematics, and many

other disciplines. It is a discipline that has strong comprehensiveness. Artificial intelligence mainly uses computer systems to simulate human thinking activities. This discipline has a wide research scope and it has also been applied in many aspects [3]. Because artificial intelligence has wide research fields, it is also a very challenging science category requiring scientists to have a strong knowledge base in all aspects. At present [4], the research of artificial intelligence is closely related to the current needs of human beings. The research on artificial intelligence technology has also evolved with the changes of the times, so that the artificial intelligence technology can be applied to more meaningful things. The main goal of artificial intelligence is to require computers to have “abilities to acquire and learn knowledge”, “abilities to process information”,



“abilities to understand language”, “the ability to infer and search automatically”, and abilities in many other aspects[5]. B. Research Content of Artificial Intelligence In terms of research objects, artificial intelligence can be divided into three different areas. The first one is the ability of “natural language processing” and to write computer programs that can be read and spoken. The second one is to develop a machine that has sensitive sensory, and can simulate human hearing and vision and distinguish different environments automatically. The third type is an R&D expert system that uses a computer to simulate an expert’s behavior. In terms of the research nature of artificial intelligence, it can be divided into two aspects: theory and engineering. Theoretical research is the continuous development and expansion of artificial intelligence theory. Engineering research is to design and develop corresponding products. These two aspects are closely connected and indivisible. Theoretical research provides a theoretical basis for engineering research; engineering research applies theoretical research to practice. C. Technical Features of Artificial Intelligence Artificial intelligence has the following technical characteristics: search ability, knowledge expression function, reasoning ability, abstraction ability, speech recognition ability, ability to process fuzzy information. These five points have basically made it possible for artificial intelligence to simply simulate human thinking.

**Application of Artificial Intelligence in Medical Education:** In the past decade, the application of artificial intelligence has solved or partially solved many challenges in the education field, including language processing,

reasoning, planning and cognitive modeling. Artificial intelligence provides students with more opportunities to participate in a digital and dynamic way. These opportunities are often not found in outdated textbooks or the fixed environment of the classroom. Through this collaborative learning method, each student has the potential to advance others, and can accelerate the exploration of new learning and the creation of innovative technologies. Four applications are provided below to illustrate how artificial intelligence can be applied to medical education. A. Virtual Inquiry System DxR Clinician is an online virtual patient system that uses artificial intelligence technology specifically for teaching hospitals, medical colleges, and residents. The system is widely used in education and clinical thinking evaluation of medical students. The software collects hundreds of real patient data and is compiled by experts and artificial intelligence as specific cases. These cases cover a wide range of clinical issues. Medical students make diagnoses through inquiry, simulated physical examinations, and supplementary examinations of virtual patients to diagnose and provide treatment plans. For teachers, DxR Clinician can be used as a useful analysis tool to help teachers understand students’ behavior and adjust courses through appraisal results. For students, they can quickly develop clinical problem solving skills. By interacting with the cases, students can learn a lot about important disease diagnosis. At the same time, the system can identify mistakes that students make in the process of case analysis, conducts deep learning and analysis, and help students solve these problems. One kind of computer software that has similar function with DxR Clinician is called Intelligent Tutor System. It can



track the learner's "psychological steps" in the process of solving problems to diagnose the wrong concepts and estimate the learners' understanding extent of the field. The Intelligent Tutor System can also provide learners with timely guidance, feedback and explanation, and can promote learners' learning behaviors such as self-regulation, self-monitoring and self-explaining.

**B. Medical Distance Learning**

Distance education is a kind of teaching method that is not limited by time and space and can realize real-time on-line and off-line teaching. Learning, communication and sharing can be conducted through web-based teaching methods such as microblogging; virtual simulation training, mobile ward round in clinical practice teaching and mobile nursing play an important role in medical teaching, especially virtual simulation teaching technology has gained more in-depth and extensive application; the development of remote transmission technology of imaging and pathological films, instant transfer technology, all online storage technology, active monitoring and self-healing technology, integrated platform technology, three-dimensional post-processing, computer-aided diagnosis, and medical imaging real-time conferencing technology have had a profound impact on the teaching methods; regional Picture Archiving and Communication System (PACS) and regional pathology platform. In the aspects of continuing medical education, China has adopted a dual approval system for institutions and projects. At present, 50 state-level continuing medical education project bases have been approved, and more than 4,000 state-level continuing medical education projects have been newly announced every year. Since the exploration of distance continuing medical education in 1996, the Ministry of Health has

successively approved shuangwei net, haoyisheng net, China Stomatology net, Shanghai Zhongshan Hospital, West China Medical Center and Medical Network College of Peking University to carry out distance medical education and assess these institutions in 2006 and 2011. Each year, more than 1500 experts participate in distance continuing medical education covering 20 secondary disciplines and 74 tertiary disciplines. The number of certifications issued by state-level continuing medical education projects in the aforementioned distance learning institutions from 2000 to 2010 is approximately 3 million. This is four times that of the traditional method of education in the same period.

## II. Influence of Artificial Intelligence Technology on the Management of Distance Medical Education

Through modern information technology, data centers, teaching resources library, cloud platform, are constructed for students recruiting, training process management and evaluation, which can improve the efficiency and service level of continuing medical education management. In the sharing management of the base, institutional management, trainees, project management, evaluation, credit management and teaching content, modern information technology can be applied, such as the establishment of a continuing education object database, covering the basic information of each student, learning processes and evaluation conditions, and the establishment of a national continuing medical education base and institutional management information system. In 2005, online reporting, online assessment and online publication of national continuing medical education projects were implemented.

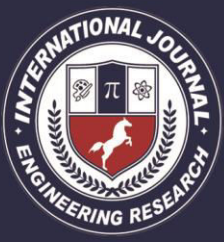
residency training, in the process of students' recruitment, announcement, acceptance, teachers' teaching and courses set-up, the common parts can be exchanged and coordinated through the computer system. Among base hospitals, health administrative departments, clinical teachers and departments, the same information can be transmitted through information means (web pages, mobile phones). Synchronizing courses through computer information systems can achieve data exchange, information sharing and business collaboration among different courses. D. Recording teachers' teaching videos According to the requirements for the construction of excellent courses, excellent courses related to medical professions need to be recorded. Leaders and keynote teachers of the excellent course construction team discussed the shooting of classroom teaching videos together with the professional staff of the College Information Technology Center. Before shooting, the shooting plan and shooting process are formulated. All the staffs pay attention to the details during the shooting. After the post-processing and production process, various excellent courses were successfully completed, and the teacher's classroom teaching video was photographed and produced. Combining the construction of all kinds of medical specialty courses, the staffs of the information technology center help the lecturers of the excellent course construction project team to record classroom teaching videos. After skilled editing by the information technology center staffs, courses are recorded as CDs for students to watch repeatedly. It can help students further understand what they did not understand in class and cultivate students' self-learning ability.

### III. Conclusion and Prospects

The essence of education is accumulation and inheritance, inheriting the knowledge accumulated by the predecessors to future generations and encouraging them to innovate through educational means. The fundamental of artificial intelligence technology is to accumulate knowledge through machine learning, artificial neural network, data mining and other methods. Through decision supports, the expert system spreads knowledge and applies it. This article analyzes the changes in the way that artificial intelligence technology modifies traditional medical education. A key way that artificial intelligence affects medical education is to support personalized learning, help students at different levels, and provide help and support when teachers and students need it. Artificial intelligence can not only help teachers and students design courses that meet their needs, but also can focus on student performance and alert teachers when problems may arise, helping teachers improve teaching methods. Artificial intelligence will change the role of teachers. Teachers will supplement artificial intelligence courses to provide students with interpersonal interaction and practical experience. Using artificial intelligence systems, students can learn anytime, anywhere, and some classroom teaching can be substituted by these programs.

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Title: **SELF-LEARNING AND EFFICIENT HEALTH-STATUS ANALYSIS FOR A CORE ROUTER SYSTEM**

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## SELF-LEARNING AND EFFICIENT HEALTH-STATUS ANALYSIS FOR A CORE ROUTER SYSTEM

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**Abstract:** The health status of core router systems needs to be analyzed efficiently in order to ensure high reliability and timely error recovery. Although a large amount operational data is collected from core routers, due to high computational complexity and expensive labor cost, only a small part of this data is labeled by experts. The lack of labels is an impediment towards the adoption of supervised learning. We present an iterative selflearning procedure for assessing the health status of a core router. This procedure first computes a representative feature matrix to capture different characteristics of time-series data. Not only statistical-modeling-based features are computed from three general categories, but also a recurrent neural network-based autoencoder is utilized to capture a wider range of hidden patterns. Moreover, both minimum-redundancy-maximum-relevance (mRMR) method and fully-connected feedforward autoencoder are applied to further reduce dimensionality of extracted feature matrix. Hierarchical clustering is then utilized to infer labels for the unlabeled dataset. Finally, a classifier is built and iteratively updated using both labeled and unlabeled dataset. Field data collected from a set of commercial core routers are used to experimentally validate the proposed health-status analyzer. The experimental results show that the proposed feature-based selflearning health analyzer achieves higher precision and recall than the traditional supervised health analyzer as well the currently deployed rule-based health analyzer. Moreover, it achieves better performance than the three anomaly detection baseline methods under the transformed binary classification scenario.

**Index Terms:** Feature extraction and selection, auto-encoder, self-learning health-status analysis, time-series analysis, machinelearning techniques, and core router systems.

### I. INTRODUCTION

The core network, also referred to as the network backbone, is responsible for the transfer of a large amount of traffic in a reliable and timely manner. The network devices (such as routers) used in the core network are complex hardware/software systems that are vulnerable to hard-to-detect/hard-to-recover errors [1]. Consider a multi-card chassis system, which is a widely used architecture in core routers. A range

of failures can occur in such a complex system:

- Hardware failures: A multi-card chassis system can have tens of separate cards, and each card can have hundreds of components. Since each component consists of hundreds of advanced chips, each chip in turn has hundreds of I/Os and millions of logic gates, and the operating frequency of chips and I/Os are now in the GHz range [2] [3], the number of incorrect hardware behaviors can be very high.

Moreover, in such a complex system, whenever a hardware failure occurs, it is difficult for debug technicians to accurately identify the root cause of this failure and take effective corrective actions [4] [5] [6]. • Software failures: Since the throughput of modern multicard chassis system is approaching Tbps levels, failures caused by subtle interactions between parallel applications have become more frequent [5] [7]. Traditional reactive fault tolerance aims at repair after failures occur [7]. However, this approach needs to spend a significant amount of time to identify and repair faults, which can stall system operation. System specifications require nonstop utilization (i.e., 99.999% uptime) of core routers deployed in the network backbone [1]. Proactive fault tolerance is more promising because it takes preventive action before a failure occurs [7]. The state of the system is monitored in a real-time manner. When system degradation is determined via health assessment, proactive repair actions such as job migration can be executed to avoid errors, thereby ensuring the non-stop system utilization [8] [9] [10]. The effectiveness of proactive fault-tolerance solutions depends on whether the health status of core routers can be accurately identified in a timely manner [11] [12]. However, little research has focused thus far on analyzing the long-term health status in a high-performance communication system. Therefore, in this paper, we present the design of an efficient self-learning health analyzer that can be applied to a commercial core router system. We evaluate this method using field data collected from a set of commercial core routers.

## II. RELATED REVIEW

A common way to identify a system's health status is to feed its features to an anomaly

detector to see whether any data points are statistical outliers. Anomaly detection has been widely used in domains such as intrusion detection and fraud detection [14] [15]. Three types of techniques have been studied in the literature to detect anomalies in time-series data [14]. Unsupervised distance-based anomaly detection utilizes a distance measure between a pair of time-series instances to represent the similarity between these two timeseries. Window-based anomaly detection divides time-series instances into overlapping windows. Anomaly scores are first calculated per window, and then aggregated for comparison with a predefined threshold. In supervised prediction-based anomaly detection, a machine-learning-based predictive model is first learned from historical logs. Next, predicted values are obtained by feeding test data to this predictive model. The predicted values are then compared with the actual measured data points. The accumulated difference between these predicted and the actual observations is defined as the anomaly score for each test time-series instance. Recently, a hybrid anomaly detector has been proposed in [16] to overcome the drawback that a single class of anomaly detection methods is effective for only specific types of time-series. However, a time-series-based anomaly detector is not adequate to obtain the health status of monitored core routers. First, an anomaly detector can only provide information about the anomalous points; patterns before or after anomalies are not revealed, which may also be necessary for predicting failures. Second, an anomaly detector can provide little useful information if no anomalies are identified. However, learning different normal patterns is also important because it can reveal a healthy a core router system is and how to perform a task

scenarios can affect the system. Therefore, a health-status analyzer is needed for core router systems. For example, when an anomaly detector triggers an alarm for overheating of boards, it neither reveals root causes nor gives any advance warning about the consequences of this event. In contrast, a health-status analyzer not only tracks how a system gradually entered this overheating state, but also predicts how the system will be affected by this anomalous behavior. The design of a health-status analyzer is more difficult than the implementation of an anomaly detector because: (1) Anomaly detection is unsupervised while health analyzer requires fully-labeled data. However, the volume of operational data collected from commercial core routers can reach TB levels, making it infeasible for experts to label the data manually; (2) Classifying complex time-series data is harder than detecting anomalous time-series data because subtle differences between a pair of time series must also be identified by the classifier. Although a symbol-based health analyzer for core routers was recently proposed [17], it still requires fully-labeled data during its training phase. Data instances are considered as being labeled only after the expert team has determined their normal/abnormal conditions, which is difficult to obtain in the early stages of monitoring. Moreover, although symbolization can reduce the time cost as well as the storage requirement, some critical local information may be lost during symbolization. Therefore, in this work, we use feature extraction and selection techniques as well as a deep-learning-based autoencoder to characterize complex time series. A self-learning approach is then implemented to analyze the health status of core routers using partially labeled data.

### III. Methodology

#### Feature-Based Self-Learning Health Analysis:

The key idea in the proposed method (Fig. 2) is that instead of directly analyzing the health status from a large volume of raw time series data, we first extract and select a set of features that capture the characteristics of high-dimensional time series. The notation of a feature in this paper is different from the definition of a feature in previous work, where features refer to the temporal measurements of different monitored items (variables) in core routers. The “features” in this work are defined as metrics calculated from the raw time series of the variables, and they represent various local and global characteristics of the time series. The steps involved in our procedure are as follows:

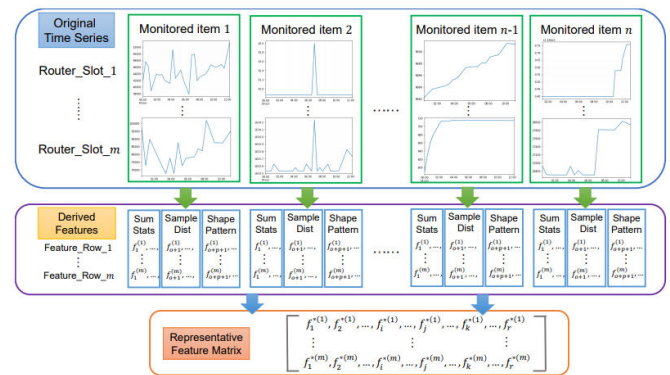


Figure 1: Illustration of feature extraction and selection

Feature extraction and selection: Since each feature is a low-dimensional measurable characteristic of the time series, extracting and selecting a set of representative features provides a more complete understanding of the time series. This component takes a set of clean and aligned time series as input, and outputs a representative feature matrix to the self-learning component. (2) Expert identification: This component is maintained and updated by an expert team. The experts first identify

number of time series instances using historical warning logs and their rule tables. This set of labels then serves as the initial label vector to the self-learning component. During the self-learning procedure, newly updated labels are also fed to this component for checking. (3) Self-learning component: This component consists of two parts—clustering and classification. The objective of clustering is to increase the number of labeled instances. Since similar instances are grouped together after clustering, the label value of labeled instances can be propagated to unlabeled instances within the same cluster. The classification part is used to identify the health status of the system by iteratively learning a model from partially labeled data.

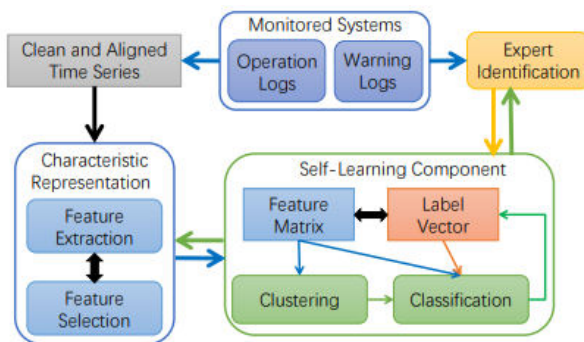


Figure 2: An illustration of the proposed feature-based and self-learning health status analyzer.

**Feature Extraction and Selection:** Assume that  $m$  router slots are monitored, where each router slot has  $n$  monitored items across the temporal domain. Therefore, a total of  $m \times n$  time-series instances are collected in the original dataset:  $n \times D = d(1) 1, d(1) 2, \dots, d(1) n, d(2) 1, \dots, d(2) n, \dots, d(m) 1, \dots, d(m) n$ , where  $d(i) j$  represents the time series sequence extracted from the  $j$ th monitored item in the router slot  $i$ :  $d(i) j = \{t1, t2, \dots, tv\}$ , where  $v$  is the number of time points in  $d(i) j$ . A set of

feature metrics  $F = \{F1, F2, \dots, Fu\}$  is then computed using  $d(i) j$  to capture various characteristics of this time-series sequence. Specifically, three types of feature metrics [19] are considered:

### Auto-encoder-based Feature Learning:

Feature extraction and selection step described above suffers from two limitations. First, we have observed from our experiment that even after the mRMR-based feature selection, the number of features is still much larger than the number of available instances, making it difficult for some types of classifiers to be effective. Moreover, some of the previously extracted features are sparse, making it possible to further compress the feature matrix without significant information loss. Second, such a feature extraction step is ad hoc and depends on the experience of experts. Although various characteristics of time series have been extracted, it is hard to ascertain whether the extracted features are sufficient to cover most characteristics of the time-series data. It is possible that some critical characteristics are missed. Therefore, in this paper, the LSTM-based auto-encoder is utilized to capture a wider range of hidden patterns. These new approaches are more general and they better match realistic scenarios.

The traditional artificial neural network (ANN) is a supervised machine learning method that is widely used for pattern classification and related problems. The autoencoder is an unsupervised variant of ANN for learning an efficient representation (encoding) of a set of data. As shown in Figure 5, the simplest form of an autoencoder is a threelayer feedforward artificial neural network. It consists of an input layer, an output layer and a hidden layer.



arranged in layers, and weighted connections link the neurons in different layers. An autoencoder network can be generally divided into two parts: the encoder that compresses the data from input layer into a short code and the decoder that uncompresses that code and produces a reconstruction in the output layer. Therefore, the objective of an autoencoder is to learn a reduced but meaningful representation that can reconstruct the original data as much as possible. The behavior of an autoencoder depends on both the weights (synaptic strength of neuron connections) and the transfer function (input-output function of neurons).

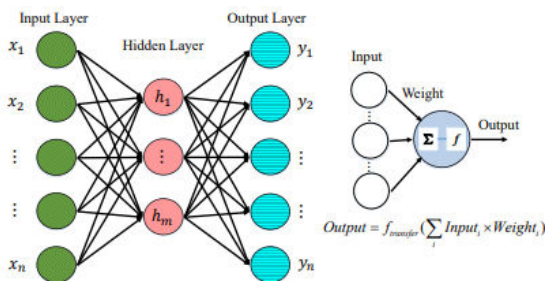


Figure 3: An example of a three-layer autoencoder

Traditional fully-connected feed-forward neural network are not suitable for encoding/decoding time-series data in an autoencoder because of the non-stationary dynamics/patterns within the temporal ordering of the input. Instead, the recurrent neural network (RNN) is promising because it maintains an internal state of the network via a directed cycle of connection between neurons, which allows it to exhibit dynamic temporal behavior [25]. In addition, the hidden state in RNNs is shared over time and thus can contain information from an arbitrarily long window. The Long Short Term Memory (LSTM) serves as the RNN architecture used in autoencoder because it explicitly introduces a

memory unit, called the cell, into the network so that long-term historical information can be recalled as needed [26]. As shown in Figure 6, the original feed-forward neural network encoder and decoder are now replaced by multiple LSTM cells. In this framework, the input time-series data are first fed to LSTM encoder cells step-by-step. An encoded representation is then learned from hidden states or outputs of these LSTM cells. This compressed representation is then fed as inputs to the LSTM decoder cells, generating the output time series that closely matches the original input data

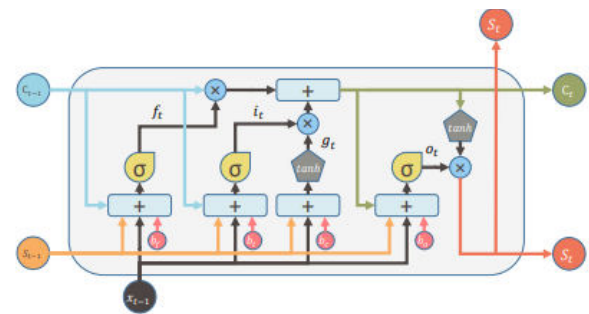


Figure 4: Illustration of the Long Short Term Memory (LSTM) method

**Self-learning for Health Analysis:** After the feature matrix has been obtained from the original high-dimensional time-series data, it is fed to the self-learning component to train a model for health-status analysis. Since the input data are partially labeled, the learned model and the labeled set are updated iteratively, as shown in Figure 8. Step 1: Initially, the input data consist of the labeled set  $L = L_0$  and the unlabeled set  $U = U_0$ . The percentage of unlabeled data is then calculated:  $rU = \frac{|U|}{|L|+|U|}$ . If  $rU$  is larger than a predefined threshold  $\alpha$ , the amount of labeled data is insufficient and a clustering process is initiated.

is needed to enrich the labeled set. Otherwise, the input data are directly fed to the classifier learning component (Step 3) Step 2: Clustering is performed to propagate labels between similar instances. Specifically, hierarchical agglomerative clustering (HAC) with link constraints [27] is applied to the input data (LUU), generating a set of clusters  $C = \{c1, c2, \dots, ch\}$ . Each cluster  $c_i$  can contain both labeled and unlabeled instances. The label value of a labeled instance in  $c_i$  is then propagated to its neighboring unlabeled instances in  $c_i$ ;  $U_{c_i}$  is used to denote such a set of unlabeled instances that are now labeled by cluster  $c_i$ . A set of unlabeled instances is formed:  $UC = U_{c1} \cup U_{c2} \cup \dots \cup U_{ch}$ . The original labeled and unlabeled sets are thus updated accordingly:  $L = LU \cup UC$ ,  $U = U - UC$ .

main processing unit (MPU), line processing units (LPUs), switch fabric units (SFUs), etc. Also, different types of interface and protocols are supported. A total of 40 core routers were monitored in real time in the field by a distributed agent-based system. A total of 450 multivariate time-series instances were collected over 60 days of operation. Each timeseries instance has 10 monitored items (variables) and 2880 time points. The feature extraction component is then applied to the collected data to extract a wide range of characteristics. The information regarding features extracted from univariate time series is shown in Table I. A total of 623 features are extracted for each univariate time-series instance. Since each instance in 450 time series has 10 variables, a  $450 \times 6230$  raw feature matrix is formed after feature extraction.

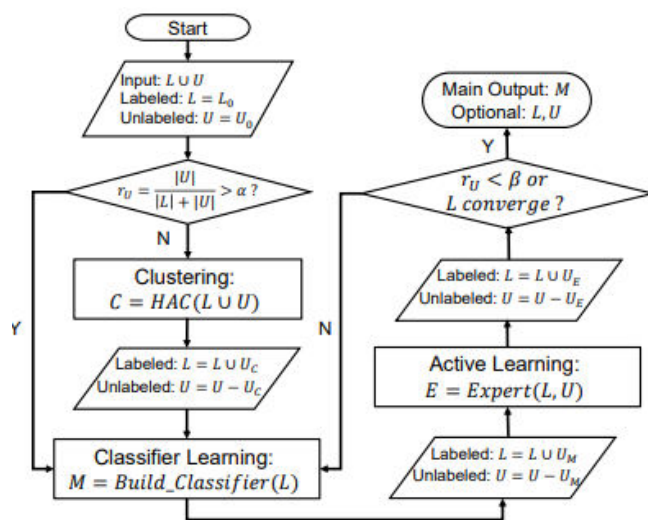


Figure 5: The computation flow of the self-learning component

## EXPERIMENTS AND RESULTS

We carried out experiments using the “NE40E” core router product. The details of this core router are shown in Figure 10. It consists of a number of different functional units, such as the

Number of Slots	22 slots: 2 MPUs (1:1 backup), 4 SFUs (3+1 backup), 16 LPUs
Environment	0°C to 45°C
Power Consumption	9040W (480G)
Interface type	100GE/40GE, GE/FE, ...
Software Version	V8
Supported Protocols	IPv4, IPv6, MPLS, ...



Figure 5: Description of the commercial core router used in our experiments.

Without any loss of generality, six labels were defined in our work to represent the overall health status of experimental core routers: (1) Class 0: the system is running in a healthy manner without any obvious abnormal operations (8 out of 450 instances); (2) Class 1: the system is running normally with some minor suspect characteristics (7 instances); (3) Class 2: the system is in relatively good condition with some anomalies (10 instances); (4) Class 3: the system is in a suspect unhealthy (8

instances); (5) Class 4: the system's performance and efficiency are severely affected by critical faulty components (11 instances); (6) Class 5: the system is encountering severe health problems that prevent it from continuing most normal operations (13 instances). The remaining 393 instances are all unlabeled data. An example of these six health labels used in our experiments is shown in Figure 5. We can see that the number of matched abnormal patterns increases while the number of matched normal patterns decreases from "Health Level 0" to "Health Level 5". Note that with the improvement of experts' experience, a larger number of categorical labels or even continuous metric values can be used in the future to define the overall system health status in a more comprehensive way.

## IV. CONCLUSION

We have presented a feature-based self-learning health analyzer for a complex core router system. First, both the statistical-modeling-based feature extraction and auto-encoder based feature learning have been utilized to capture different characteristics of time-series data. Next, in the self-learning framework, the model for health analysis is iteratively updated using both labeled and unlabeled data. The effectiveness of the health analyzer has been validated using a comprehensive set of field data collected from a set of commercial core routers.

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Title: **SENTIMENTAL ANALYSIS OF BOOK REVIEWS USING UNSUPERVISED SEMANTIC ORIENTATION AND SUPERVISED MACHINE LEARNING APPROACHES**

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## SENTIMENTAL ANALYSIS OF BOOK REVIEWS USING UNSUPERVISED SEMANTIC ORIENTATION AND SUPERVISED MACHINE LEARNING APPROACHES

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**ABSTRACT:** Sentimental analysis aims at identifying the opinions of various users. This paper presents my research work on the application of sentimental analysis on book reviews. I have applied both unsupervised (Semantic Orientation - Pointwise Mutual Information - Information Retrieval) and supervised (Support Vector Machine and Naïve Bayes) machine learning approaches on two openly available book review datasets from GoodReads and Amazon. The comparative analysis of the approaches on the datasets indicates that unsupervised approach performs better on GoodReads dataset with an accuracy of 73.23% whereas supervised approach gives better results on Amazon dataset with Naïve Bayes giving the maximum accuracy which ranges from 73.72% to 74.73% in the case of 5-folds and 10-folds respectively.

**Keywords:** Book reviews, Sentimental analysis, Support Vector Machine, Naïve Bayes, Unsupervised approach

### I. INTRODUCTION

The advent of internet and technology has facilitated the users with a higher access to web applications through smart devices and mobile phones thus improving product rating system immensely. Now, a customer can become an active user by giving reviews about different products/services which may be useful to other potential customers. But, there are hundreds, thousands or even more product/service related reviews available on the web and reading all those available reviews is a very tedious and taxing task for the customer [1]. Therefore, there is a need gap for apt techniques which automatically summarize these reviews into a positive or a negative category to give useful information to the user. This task of

classification of reviews by identifying the opinions of various users is formally known as Opinion Mining or Sentimental Analysis [2]. Sentimental analysis may be defined as the classification of a text or document into a positive or a negative class by judging the connotation contained in the text. A positive opinion expressing text is assigned a positive label whereas a negative label denotes a negative opinion [1]. Any objective opinion would be assigned a neutral label. It is observed that significant work has been done in the domain of product reviews [4], [5], movie reviews [1], [2], [7], restaurant reviews [14], blog posts [7] etc. to identify their sentiments but comparatively very less work has been done in the domain of book reviews [6]. In this paper targets sentimental analysis of book

domain. Researchers have explored various sentimental analysis techniques such as:- i) Supervised approaches like Support Vector Machine (SVM) [1], [2], [4], [5], [8], Naïve Bayes (NB) [1], [2], [4], [5], Random Forest (RF) [5], Maximum Entropy (ME) [4] etc. and ii) Unsupervised approaches like Semantic Orientation - Pointwise Mutual Information - Information Retrieval (SO-PMI-IR) [1], [2], [3], [6], [9], [10], SentiWordNet (SWN) [2], [7] etc. Among the above-mentioned techniques, I have chosen SOPMI-IR technique which computes the polarity of reviews by extracting the opinionated words from the reviews using Part-of-Speech (POS) tagging, evaluating their Semantic Orientations (SO) and then aggregating these SO scores to decide the overall class of the review [9]. I have taken two datasets from GoodReads [11] and Amazon book reviews [12]. Further, the results are compared with NB and SVM techniques. These techniques are the most popular ones for sentimental analysis [13]. The results show that unsupervised approach performs better on GoodReads dataset whereas supervised approach gives better results on Amazon book reviews with NB giving the maximum accuracy. The rest of the paper has been organized as follows. Section II consists of literature review and the methodologies used have been described in Section III. The experimental setup has been presented in Section IV whereas Section V presents the results. Section VI includes the conclusion and future work.

## II. LITERATURE REVIEW

Several algorithms have been applied in the field of sentimental analysis over the past few years [13]. Peter D. Turney [9] proposed an unsupervised approach of SO-PMIIR to

categorize reviews as thumbs-up (positive) or thumbsdown (negative). The observed accuracy varied from 66% for movie reviews to 84% for automobile reviews. V K Singh et al [3] also used SO-PMI-IR to mine the students' opinion regarding different subjects by collecting feedback from them in textual format. P Walia et al [1] explored unsupervised (SO-PMI-IR) as well as supervised approach (NB and SVM) for sentimental analysis of movie reviews. The results showed that SOPMI-IR gave the best accuracy and NB outperformed SVM. V K Singh et al [2] also explored SWN technique along with NB, SVM, and SO-PMI-IR on movie reviews. Xing Fang and Justin Zhan [5] proposed a new feature vector generation algorithm to perform sentiment polarity categorization of product reviews (beauty, books, home, and electronics) obtained from amazon.com. T. K. Shivaprasad and J. Shetty [4] presented the taxonomy of various sentimental analysis algorithms. They explored NB, SVM and ME based supervised approaches on reviews from sports, electronics, and computer. Rodrigo Moraes et al [8] studied the performance of SVM and artificial neural network (ANN) on book dataset and mentioned the scope of sentimental analysis in the book domain. The related work discussed above has been summarized in table I. As evident from the table, NB, SVM, and SO-PMIIR are the most promising techniques in the field of sentimental analysis.

## METHODOLOGIES USED

The complete process of sentimental analysis followed in this research has been shown in fig 1. As shown in fig 1, the first step is dataset preparation in which blank and unreadable reviews are removed from the

processed reviews are extracted to text files. Then, in the second step, two supervised approaches namely, NB and SVM and an unsupervised approach namely, SO-PMI-IR have been used for sentiment classification which are discussed below. Fig 1. Sentimental analysis process

**A. SUPERVISED APPROACH**

A supervised learning approach is the process of an algorithm learning from a training data and then performing the required classification on the test dataset.

1. Naive Bayes Approach NB classifies the text statistically. It can be applied to perform sentimental categorization of textual reviews into one of the two classes, either positive or negative. Deciding whether some particular kind of words will express opinions more concretely or all the words in the textual review should be considered as features like in a normal classification problem [1] is an important issue here. Naïve Bayes is a type of Bayes theorem probabilistic learning method as given in eq 1.

$$P(C/D) \propto P(C) \prod_{1 \leq k \leq n} P(t_k/C) \quad (1)$$

The statistical pattern in which the words/terms occur in a document helps in text categorization. These selected words are often termed as features. Most of the researchers suggested that adjectives or adverbs are good sentiments expressing words, therefore, selecting words with these tags could be a good choice of features for classifying documents into negative or positive classes [9]. Bernoulli and multinomial NB are two popular type of NB approaches. Multinomial NB not only considers the absence or presence of a word/term in the document but also takes into account the number of times it is present in the document as an indicator for a specific class. Whereas Bernoulli NB does not consider the frequency of a word in the document, it only considers the

absence or presence of the word. I have applied multinomial NB. 2. Support Vector Machine SVM is a classifier based on vector space model which converts strings/documents into feature vectors before classification. It tries to find the largest margin between two classes. The aim is to find an optimal hyperplane which is a dividing region between two classes that is away from all the training elements (text documents in this case) as far as possible. A margin of the classifier is evaluated by the distance of the nearest data point from the decision surface [8]. These divider points are called as support vectors. More is the margin, less is the uncertainty in the classification of classes. This maximization is achieved by SVM. Fig 2 shows an SVM classification model [15]. Here, '+' and 'o' are two separate classes. A, B, and C are hyperplanes. Since the distance of all the training points is largest from A thus A provides the best separation.

**UNSUPERVISED APPROACH**

An unsupervised approach overcomes the disadvantage of the supervised approach as it does not need any prior labeling of training dataset to perform the classification. I have applied SO-PMI-IR technique for classifying reviews. It consists of three steps: - i) Extraction of phrases using pos (part-of-speech) tagging: - All the words in a document do not express opinions, therefore, only opinion expressing words are extracted. For this work, I have used adjectives [1]. ii) Calculating the semantic orientation of these phrases: - The SO of all the extracted phrases within a document is calculated using PMI as given in the eq 2.

$$PMI(\text{Phrase}_1, \text{Phrase}_2) = \log \left\{ \frac{\text{Prob}(\text{Phrase}_1 \Delta \text{Phrase}_2)}{\text{Prob}(\text{Phrase}_1) \cdot \text{Prob}(\text{Phrase}_2)} \right\} \quad (2)$$

Here  $\text{Prob}(\text{Phrase}_1 \Delta \text{Phrase}_2)$  is the co-occurrence probability of the two phrases.

Prob(Phrase1).Prob(Phrase2) computes the probability that two phrases co-occur if they are statistically independent. The ratio between  $\frac{\text{Prob(Phrase1} \Delta \text{Phrase2)}}{\text{Prob(Phrase1).Prob(Phrase2)}}$  and  $\frac{\text{Prob(Phrase1).Prob(Phrase2)}}{\text{Prob(Phrase1).Prob(Phrase2)}}$  measures the statistical independence between these two phrases. Moreover, the log of this ratio computes the amount of information about the presence of phrase1 when we observe phrase2 or vice versa [9]. Thus, SO of a complete phrase can be evaluated as illustrated in the eq. 3,  $\text{SO}(\text{Phrase}) = \text{PMI}(\text{Phrase, "excellent"}) - \text{PMI}(\text{Phrase, "poor"})$  (3) Where,  $\text{PMI}(\text{phrase, "excellent"})$  gives the relationship of the phrase with excellent (a positive standard word) and  $\text{PMI}(\text{phrase, "poor"})$  gives the relationship of the phrase with poor (a negative standard word) [9]. Negation of an adjective (words like not bad, not interesting etc.) is handled by negating the semantic orientation of an adjective preceded by a 'not' (E.g. if SO value of excellent is 0.67 then if preceded by not it becomes -0.67). I have calculated SO scores of phrases using python. iii) Classifying the class of the document: -This step calculates the overall SO of the review by taking the aggregation of the SO scores of individual phrases making up the document. Aggregation scheme used can be a sum, max, min or any other function. A review is assigned a positive or a negative label by comparing the aggregated SO value with a fixed threshold. I have used sum as an aggregate function. If the sum is greater than 0, the review is assigned a positive label otherwise a negative label.

## V. RESULTS

This section shows the detailed discussion of the results obtained. I conducted experiments on both datasets. Table II shows the computed results of the NB, SVM and SOPMI-IR

approaches on GoodReads reviews and Table III shows the computed results of these techniques on the Amazon book reviews.

The unsupervised approach gives better results than supervised approach on GoodReads dataset with an average accuracy of 73.23%. The unsupervised approach did not give satisfactory results on Amazon book reviews; the reason for this may be due to the fact that it contains short one-lined phrases thus few opinions containing words might be present for extraction.

## VI. CONCLUSION AND FUTURE WORK

This work focuses on the sentimental analysis of book reviews using both supervised and unsupervised approaches. For this purpose, I have applied the popularly used techniques namely NB, SVM and SO-PMI-IR on two datasets from GoodReads and Amazon. The results show that unsupervised algorithms gave better results when the dataset contains long phrases whereas supervised algorithms give higher accuracy on the dataset containing short one-lined reviews. Adjectives have been used in this research. Adverbs are the words that modify the adjectives, therefore, extraction of adverbs along with adjectives or using some other pattern of phrase extraction remains a future work. Also, further pre-processing of the dataset may also help.

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Title: **SIMULATION OF SINGLE PHASE CASCADED H-BRIDGE MULTILEVEL INVERTERS & THD ANALYSIS**

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## **SIMULATION OF SINGLE PHASE CASCADED H-BRIDGE MULTILEVEL INVERTERS & THD ANALYSIS**

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### **ABSTRACT:**

This paper present the different levels of cascaded H-bridge inverters and the minimization of total harmonic distortion by increasing levels. Selective Harmonic Elimination technique is used as a switching scheme. The analysis of three, five and seven level cascaded H-bridge inverter simulation work is done by using the MATLAB software and experimental results have been presented to validate the theory. The simulation results show the improvement of output voltage waveform and reduction of the THD by increasing the levels in inverter

**Keywords:** *Multi level inverter, THD, H bridge inverter.*

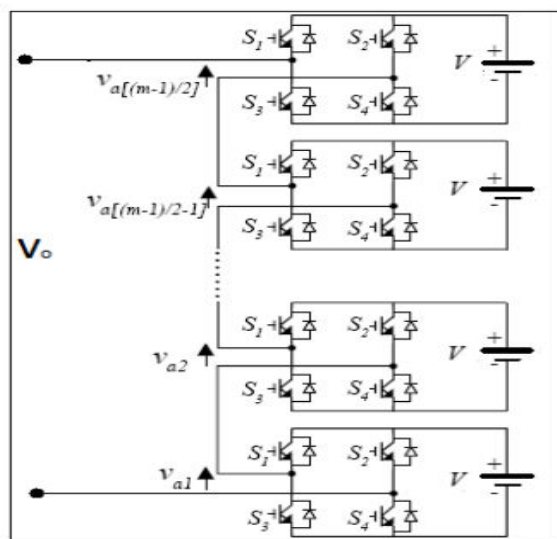
### **1. INTRODUCTION**

Multilevel inverters have ability to generate low switching frequency high quality output waveforms with several high voltages and higher power applications. The general structure of the multilevel converter is to synthesize a sinusoidal voltage from several level of voltages [1][2]. The multilevel inverter has overcome the limitations of conventional two level voltage converters. The advantages of multilevel inverter are higher power quality, lower switching losses, low electromagnetic interference and higher voltage capability. There are mainly three types of multilevel inverter topologies used- (1) Diode clamp multilevel inverter (DCMI),(2) Flying capacitor multilevel inverter(FCMI) and (3) Cascade multilevel inverter (CHB)[3].Harmonic problems in multilevel inverter is the most important one with distress the output voltage and

increased level of switching strategy. There are numerous methods like (SPWM) Sinusoidal Pulse Width Modulation, (MCPWM) Multi-Carrier Pulse Width Modulation and (SHE-PWM) Selective Harmonic Elimination Pulse Width Modulation are implemented for harmonic elimination in multilevel inverter. (MCPWM)Multi-Carrier Pulse Width Modulation strategies is widely used, because it can be easily implemented to low voltage modules. Normally MCPWM can be categorized as Level Shifted PWM (LS-PWM) and Phase Shifted PWM (PS-PWM) methods.(LS-PWM) Level Shifted PWM is characterized into three i.e. Phase Disposition Technique (PD) ,Phase Opposition Disposition Technique (POD) and Alternative Phase Opposition Disposition Technique (APOD). For

systems where high switching efficiency is needed, it is desirable to keep the switching frequency much lower. In this state, another approach is to choose the switching angle in such a way that a desired fundamental output is generated and chosen harmonics of the fundamental voltage are suppressed, this is called as harmonic elimination or programmed harmonic elimination to eliminate specific harmonics[4]. The characteristic of the SHEPWM method is that the waveform analysis is performed by using Fourier theory. The sets of non-linear transcendental equations are derived, and the solution is obtained by using an iterative method.

comprehensive review of a recently proposed multilevel inverter is presented by KK Gupta. This paper presented the topology comprises of floating input dc sources connected in opposite polarities through power switches. The structure requires lesser active switches as compared with conventional cascaded H- bridge topology with much reduced switching losses. The topology is analyzed for both symmetric and asymmetric source configurations. Also, a new algorithm for asymmetric source configuration suitable for CCSMLI is proposed. ( K.K. Gupta et al 2013 ).



**Fig.1.1 broad-spectrum diagram of cascaded H-bridge ML.**

## 2. LITERATURE SURVEY

A brief overview of earlier investigation carried out on cascaded multilevel H- bridge inverter employing transformer is presented in this paper. a) A

The need for the step up transformer can be surpassed by using multilevel inverter. MI also reduces harmonics produced by inverter. The key features of multilevel inverters are as follows [7]: 1. The output voltage and power increases with numbers of level. 2. The harmonic proportion is inversely proportional to number of level and hence requirement of filter decreases. 3. The harmonic can be formerly selected for elimination as higher voltage levels have more free switching-angles. . 4. Switching devices are having capacity of Static and dynamic voltage sharing. Clamping diodes or capacitors structures are helping for same. 5. Voltage-sharing problems is not faced by the switching device. In present scenario, Modern electronics sensitive equipments used in power systems are prominent reason for emerging severe power quality issues. Low system efficiency and poor power factor are due non-linearity issues of power

system, so the power quality researchers are attracted to the concept of multilevel inverter. Multilevel Inverters are having some advantages which are helpful to deal with harmonic distortion issue. The "multilevel" terms starts from 3 levels and as per requirement no. of voltage levels can be retrieve as shown in fig (1). [8] This paper mainly focuses on Simulation results of threelevel, five-level and seven-level Single Phase Cascaded HBridge Multilevel Inverters and their THD values.

### 3. RELATED STUDY

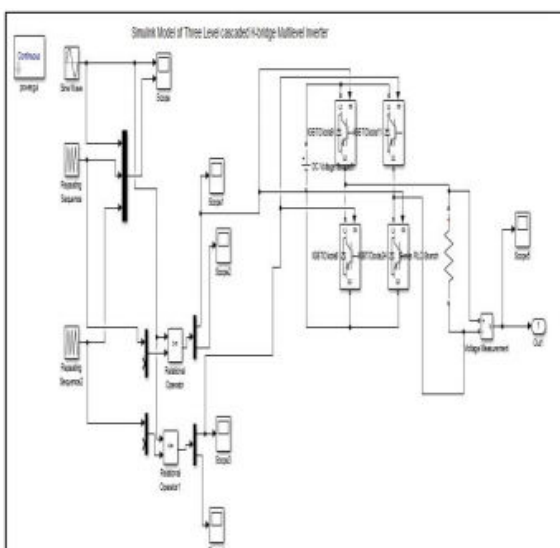
In power electronics and drive industries, inverters have established as key component and its different topologies are playing important role for motor controlling and power systems [1]. Reduced harmonic contents and high power are necessity of AC drives, so multi-inverters system is capable for AC drives [4]. Multilevel inverters have been mostly used in medium or high power system applications, such as static reactive power compensation and adjustable-speed drives [7]. A multilevel inverter has benefit of achieving high power ratings. It also facilitates the use of renewable energy sources. Multilevel inverter system can be combined with non- conventional energy sources such as photovoltaic, wind, and fuel cells for a high power application [8]. The output voltage or a current waveform obtained through modern converters should be quality waveform with minimum of ripple content. Switching losses and constraints of the power device ratings are two main reasons for limitations of use of

traditional Two level inverters in high power applications.[6].The combination of power switches like IGBT MOSFET in series or parallel can be used to obtain the power handling voltages and currents. Under normal operating conditions also THD levels produce by The conventional two level inverters is around 60%. Harmonics created by it has undesirable effects 978-1-5386-5743-0/18/\$31.00©2018 IEEE .It leads to further losses and other power quality issues too on the AC drives and utilities. Enhanced power aspect, Minimum switching losses, improved electro-magnetic compatibility and elevated voltage capability are gained from power conversion achieved through multilevel voltage steps. The multilevel inverters study is fascinating research area due to these benefits.

### 4. CASCADED H-BRIDGE MULTILEVEL INVERTER

The multilevel inverter topologies for high power – medium voltage energy control is proposed by Jose Rodriguez. This paper presented the most important topologies like diode – clamped inverter (neutral point clamped), capacitor clamped (flying capacitor) and cascaded multi cell with separate DC sources. Emerging topologies like asymmetric hybrid cells, soft – switched multi level inverters, control and modulation methods for the family of converters, namely multi level sinusoidal pulse width modulation, multilevel selective harmonic elimination, and space- vector modulation were analyzed.

A new modified hybrid H – bridge multilevel inverter with lesser number of switches compared to conventional multilevel inverter is proposed. Reduction in number of switches reduces the switching losses and improve the efficiency. 3-level configuration will give three stairs in output waveform of voltage of single phase inverter. Each part comprises single H bridge unit. They are connected to each other in series combination. The voltage levels are obtained as per switching of IGBTs. Three level arrangement comprises of one H-bridge one DC source. With help of simulation carried in Matlab; we are trying to obtain stair case waveform of 3 steps.

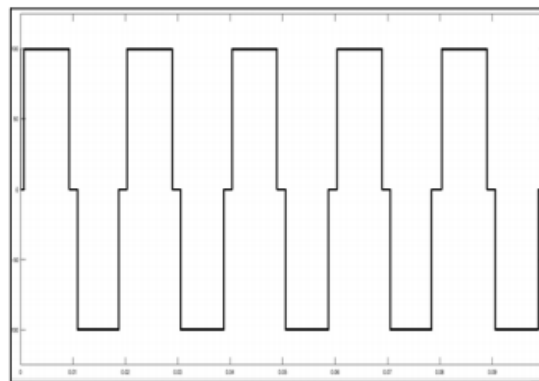


**Fig.4.1. Simulink Model of Three Level cascaded H-bridge Multilevel Inverter.**

### SIMULATION RESULTS:

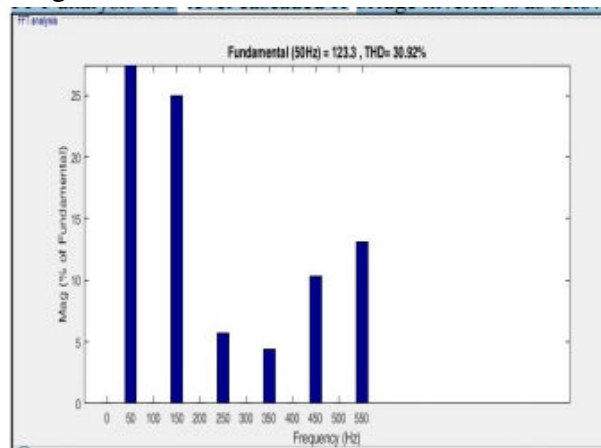
A-Single phase Three level H Bridge Multilevel Inverter Voltages of different levels are analyzed and for calculation of harmonics, help of FFT analysis is taken and

THD is determined and presented in figures below:



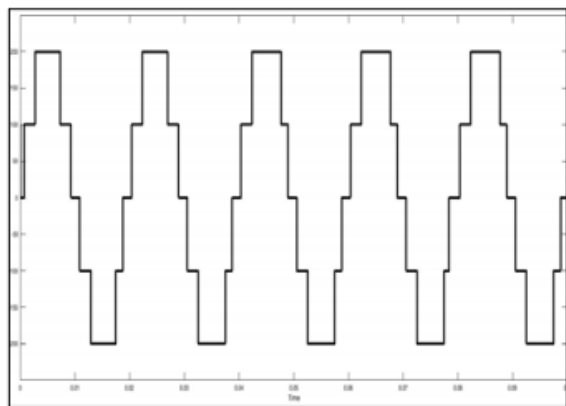
**Fig.4.2. 3LEVEL Output.**

Stair case waveform is achieved with 3 different voltage values as +Vd, 0,-Vd. It is examined from waveforms that it is giving outcome of voltage values of 100V, 0V,-100V. FFT analysis of 3-level cascaded H-bridge inverter is as below



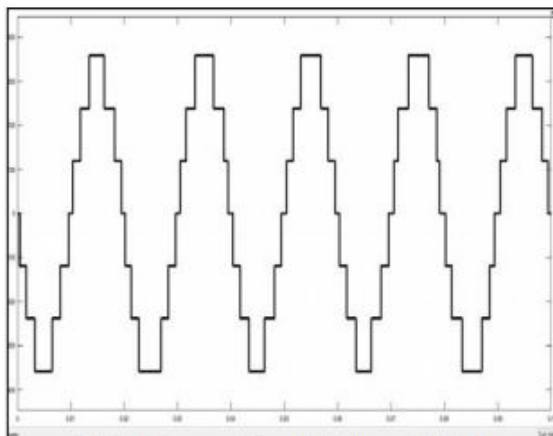
**Fig.4.3. Fast Fourier Transform analysis of Three level H-Bridge MI.**

Similarly for Five level H-bridge MI, output waveform is obtained in form of Stair case as shown in simulation results of fig.4. It is examined from waveforms that it is giving outcome of voltage values of 200V, 100V, 0V,-100V,-200V.



**Fig.4.4. 5 LEVEL output voltages.**

Similarly for Seven level H-bridges MI, output waveform is obtained in form of Stair case as shown in simulation results of fig. It can be seen from waveform that it is giving results of voltage values of 300V,200V, 100V, 0V,-100V,-200V,- 300V



**Fig.4.5. Voltage waveform of 7-level cascaded H-bridge MI.**

## 5. CONCLUSION

Single Phase Three level, Five level and Seven level Cascaded H-bridge Multilevel Inverter are simulated in Matlab R2016 Version 9.0.0. In Cascaded H-Bridge MI, Higher levels of voltages be capable of obtaining with less number of components and with better results as compared to other types of multilevel inverter. Stair case

waveforms results are obtained as per expectation. FFT results of three-level, five-level & seven-level Multilevel Inverter gives Total Harmonic Distortion of three configuration mentioned in fig 10. As number of levels of configuration increases, THD decreases with big percentage difference as displayed in fig 2. Advanced levels of structures can be preferred which gives good power quality with less THD.

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## IMAGE ENHANCEMENT FOR BRAIN TUMOR DETECTION WITH FILTRATION TECHNIQUE IN MEDICAL IMAGING

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**Abstract:** Segmentation is a process of partitioning the image into several objects. It plays a vital role in many fields such as satellite, remote sensing, object identification, face tracking and most importantly in medical field. In radiology, magnetic resonance imaging (MRI) is used to investigate the human body processes and functions of organisms. In hospitals, this technique has been using widely for medical diagnosis, to find the disease stage and follow-up without exposure to ionizing radiation. Here in this, we proposed a novel MR brain image segmentation method for detecting the tumor with improved performance over conventional segmentation techniques such as fuzzy c means (FCM), K-means and even that of manual segmentation in terms of precision time and accuracy. Simulation performance shows that the proposed scheme has performed superior to the existing segmentation methods. Image enhancement will be done before the segmentation.

**Keywords:** Segmentation, Enhancement, MATLAB, Filtering, Brain Tumor.

### I. INTRODUCTION

Brain tumor is a gathering (or mass) of unwanted or unusual brain cells. Cancer is caused by tumor, which in result a foremost cause of death and also accounts for about 13% of all deaths in the world. The incidence of cancer is growing at a dangerous pace around the world. Therefore, it is very important to detect tumors in the first phase. On radiology, great knowledge and hand on experience is required to identify specific tumors in medical diagnosis. MRI, the major flexible diagnostic imaging method is capable of displaying a variety of parameters in the living body and providing outstanding spatial resolution. There are numerous steps in magnetic resonance imaging (i.e. MRI). Segmentation is taken as a necessary but difficult step in the categorization and analysis of the categorization. Therefore, it is extremely important that the MRI images are properly divided before asking the computer for an accurate diagnosis. This review provides a synopsis of medical image analysis based on magnetic resonance imaging (MRI) for brain tumor learning's.

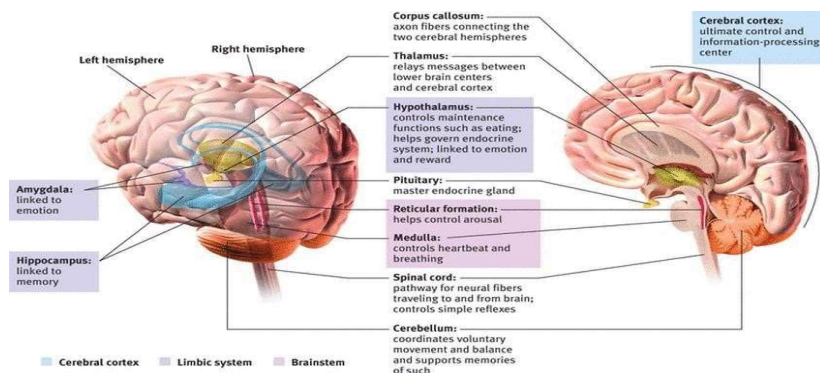
The brain and spinal cord (central nervous system (CNS)) together control the physical and mental functions of our body. Normally, our brain consists of three main parts:

1. Cerebrum. It controls thinking, learning, debugging, emotions, speech, reading, writing and volunteering.
2. Cerebellum It controls movement, balance and money.
3. Brain. It connects the brain to the spinal cord and regulates the vital functions of the human body, such as motor, sensory path, heart, reservoir, and reflection [1].

The brain is made up of 2 types of tissue, that is, white matter (WM) and gray matter (GM). The gray matter consists of neuronal and glial cells, also called neuroglia or glial, that regulate brain activity and basal nuclei, which are dark brown nuclei in the white matter(WM). Here, Basal nuclei contains: putamen, caudate nucleus, claustrum and pallidum. The white matter fibers contain several elongated letters connecting the brain brains to other areas of the brain. Brain's left and right hemispheres are linked to the corpus colosom, which is a white matter fiber's thick band. The cerebellum and the brain both have a very thin outer cortex composed of gray matter, internal white matter, and dark people in the brown matter. The spinal cord is at the bottom of the brain. There are three structures: the middle brain, the pons and the medulla oblontata [2].

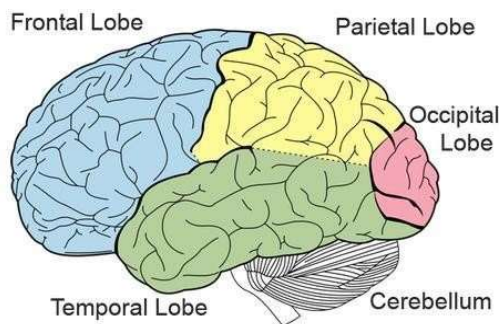
The brain also holds CSF(cerebrospinal fluid), which is made of salts, enzymes, white blood cells and glucose. This fluid flows through the canals (ventricles) near about the brain and spinal cord to

keep it safe from injury. There is also another tissue called meninges, which covers the brain and spinal cord [2].



**Fig. 1 Structure of Brain and its Functions.**


Figure 1 [3] illustrate the anatomy of the brain. It includes the brainstem and brain. It is associated to movements, thoughts and conscious sensations. Also, it consists of 2 halves, the left hemisphere and the right hemisphere. Everyone controls the contrary side of the body. In addition, every hemisphere is separated into four lobes: the temporal, parietal, occipital lobes, and frontal, as illustrated in FIG. 2 [3].



**Fig. 2 Lobes of Human Brain**

The functions of the lobe are:

- 1st frontal lobe. This lie behind the forehead is part of the cerebral cortex. It is contained in the movements of speech and muscles as well as in plans and decisions.
2. Occipital lobes. This lie behind the head is part of the cerebral cortex. These include areas that retrieve information from the bulletin board.
3. Periallappen. It is a part of the cerebral cortex that is at the top and back of the head. It receives a sensory input for the touch and the position of the body.
4. Temporal lobes. It is a part of the cerebral cortex that is located approximately above the ear. This includes all information from the listening area, mainly the opposite ear [3].

**Arunava De et. al. [1]** showed a new segmentation method for lesion detection in brain's MRI. In this proposed method, first multimodal MR images are denoised using NLM filter. Second, MR images are segmented using a new partitioned clustering technique with GSPSO algorithm. The key feature of GSPSO algorithm is that different particle updates their velocities using different velocity update rules evolved by GS algorithm. This trademark about GSPSO algorithm prompts better investigation of the quest space over PSO. Finally, those lesions would concentrated starting with the fragmented MR pictures. The analysis outcomes for quantitative estimation indices from claiming division exhibits that those suggested strategy performs superior to PSO built system. This worth of effort camwood a chance to be further stretched out with the consolidation from claiming diverse separation measures like part separation measure and so on. In the suggested CGSPSO algorithm. Force inhomogeneity crosswise over those MR pictures impact the division and also less greatness identification. Therefore, the suggested system could make further enhanced with  Pincer Principal

**Tapas Si et. al. [2]** proposed a segmentation method of brain MRI for detection of lesion or tumor in brain. DWT-based soft-thresholding technique is used to de-noise the MRIs and IIHs in the images are removed. De-noised and IIH corrected images are sharpened using DWT. After that, histogram analysis of sharpened images are carried out in order to predict the number of thresholds present in the images. Entropy expansion is finished utilizing GS will get a situated from claiming thresholds to every picture Furthermore impostor lesions or tumors are concentrated starting with MRI utilizing chose edge from the previously stated set for thresholds which may be the result of the entropy expansion methodology. GS may be utilized Similarly as optimizer in this paper inasmuch as GS will be for the most part utilized as PC program generator. As opposed to histogram dissection for the prediction of number for thresholds, programmed determination about number about thresholds camwood make utilized Previously, entropy expansion methodology utilizing evolutionary calculations. Future meets expectations are guided towards change in commotion removal, IIH revision Furthermore utilization of other meta-heuristics for entropy expansion. The suggested system camwood a chance to be connected to illness analysis to expansive reach about human organs in particular brain, lymph nodes, and so forth.

**Anup Kumar Bhattacharjee et. al. [3]** proposes Grammatical Swarm based segmentation methodology for lesion detection in MR image of brain. First, MR images are denied using median filter. Grammatical Swarm based hard-clustering algorithm is used to segment the de-noised images. Thresholding is performed to get region of interest containing lesion. Finally, the lesions are extracted from the region of interests using connected component labeling algorithm. The recommended technique is connected on six Axial-T2 MR pictures. A similar examine will be constructed for PSO, K-Means Also FCM based techniques. Both qualitative Furthermore quantitative dissection of the test come about exhibits that those recommended division technique performs superior to different routines. Those suggested division procedure camwood make further progressed Eventually Tom's perusing uprooting force in homogeneities in the MR pictures. In the recommended methodology, grouping about pictures are conveyed crazy utilizing predefined group numbers provided for unequivocally. Programmed grouping with Grammatical swarm will make formed clinched alongside future will recognize those number for groups naturally in the MR pictures.

**Bansibadan Majiet. al. [4]** discussed how registration of progressively transmitted and received MR image with lesions can be carried out. Registration is followed by fusion of progressively received images which reconstruct the clustered view of the actual segmented MR image with lesion. We bring utilized An characteristic based system for characteristic identification What's more matching in this suggested strategy. This system for progressive transmission might discover use in the therapeutic analysis What's more medicine from claiming disease patients.

**Ankita Mitra et. al. [5]** proposed premature convergence in PSO is taken care using the concept of HPSOWM. The proposed method is very useful in diagnosis and treatment of MR images with lesions. The proposed method of preprocessing and subsequent method of change detection can be very helpful in detecting changes in MR images during the course of treatment. Whatever change in the tolerant state might be recognized effectively utilizing this system for change identification. Distinctive streamlining calculations might make utilized What's more An similar contemplate of the effects might make constructed in the analysis What's more medicine for lesions done an expansive extend about human organ.

## II. PROPOSED METHODOLOGY LOCATING BOUNDING BOXES ON 2D MR SLICES

This differs from most of the previously proposed change detection methods, as we consider this change as a global change based on the region, different from most techniques that consider change as a local change from pixel to pixel. the region of "change" in the test image and all other intracranial tissues with the exception of tumors or edema are considered a region without change.

### LOGIC

The basic principle of FBB: a change detection principle in which a change range (D) is detected in a test image (I) with respect to a reference image (R).

SYMMETRY AXIS (X image size, Y energy function)

In FBB, after the axis of symmetry has been found on an axial MR layer, the right (or left) half provides as a reference image  $R$  the left (or right) half serves as a test image  $I$  [6][7].

It uses a new weighting function that can identify the change range  $D$  with two very fast searches - one in the vertical direction of the image and the other in the horizontal direction.

The region of change  $D$  is limited to a rectangle parallel to the axis, which essentially aims to rewrite the anomaly.

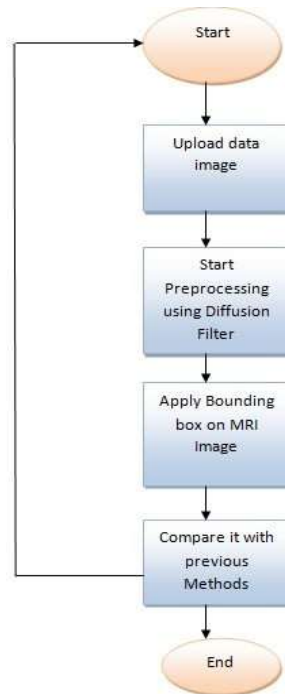


Figure 3 Proposed Methodology

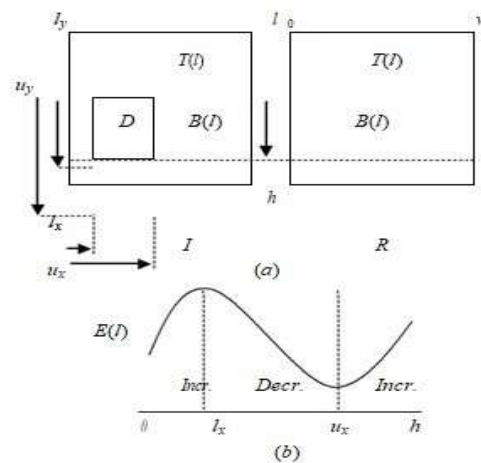


Fig. 4 (a) Finding anomaly  $D$  from test image  $I$  using reference image  $R$ . 1(b): Energy function plot

Brain tumor is a fatal disease that can not be reliably detected without MRI. The project attempts to detect by MRI image using MATLAB simulation if the patient's brain has a tumor or not [8][9].

To open the way for the morphological operation on the MRI image, the image was first filtered using an anisotropic scattering filter to reduce the contrast between the successive pixels. Subsequently, the image was resized and the use of a threshold image was manually converted to a black and white image. This primary filter filters out plausible sites for the presence of tumors. Morphological operations were performed on this semi-processed image and information was obtained on the firmness and the plausible area. A minimum value of these two signs was

determined from the statistical average of various MRI images containing a tumor. Then it was used to deliver the final result of recognition[10-13].

Although this simulation routine can provide a correct result most of the time, it fails if the tumor size is too small or the tumor is hollow. The broader goal of the project is to create a database of 2D images of the tumor from MRI images taken from different angles of a particular human and to analyze them to show the exact 3D location of the tumor. To do this, detection and segmentation of 2D tumors have been developed with greater precision, so that 3D detection can be more reliable.

Anisotropic diffusion

$$J(u) = \int G(|\nabla u|^2) dx. \quad (1)$$

Where  $g(s) = G(s^2)$  is the diffusivity function or the edge stop function. When such an anisotropic diffusion equation is applied to eliminate the noise, it usually blurs certain characteristics due to the inconsistent edge.

### III. SIMULATION RESULTS

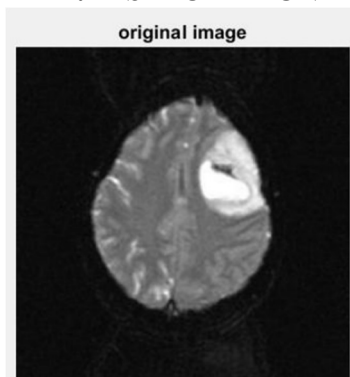


Figure 5 Original Image

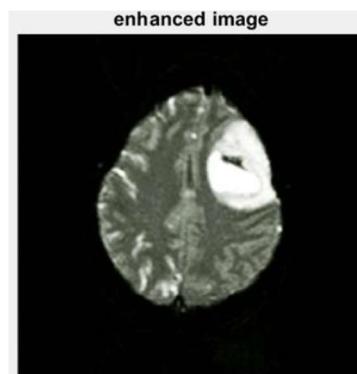
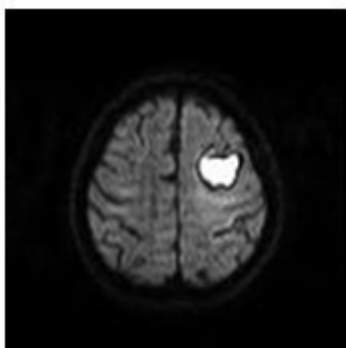


Figure 6 Enhanced Image



(a)



(b)

Fig 5. (a) Original Image (b) Segmented Image

### IV. CONCLUSION

Here in this, we had proposed a novel MR brain image segmentation for detecting the tumor with improved accuracy and reduced computational time. This deals with the new hybrid clustering algorithm for reducing the computational time and binarization method to calculate the area in terms of based on the typography and digital imaging units. We compared the simulation results with the existing algorithms with the proposed algorithm and calculated the CPU computational time. Finally, the proposed algorithm has performed far better than the existing algorithms with reduced computational time.

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**Abstract**—Tumor is an abandoned development of tissues in any part of the body. Tumors have different treatment for different characteristics of tissues. Brain tumor is a very serious and dangerous, as we know. In developed countries most Research shows that due to the inaccurate detection of tumor many people have died. Normally, CT scan or MRI images will be used for the detection of tumor. In this research, we want to introduce a method which is very advanced and accurate for brain tumor detection based on a new structure algorithm. This technique focuses mainly on pre-processing, Edge detection, segmentation, Feature extraction. Pre-processing will be done first for filtering, after filtering edge detection is applied to the image, then after advanced fuzzy K-means (AFKM) clustering algorithm is used for the segmentation process. Finally thresholding will extract the tumor at a particular point in the image. This technique is very suitable for segmentation with exactness when we compare with the manual segmentation. In addition, it also shrinks the time for examination.

**Key Words**—Segmentation, Structure Algorithm, K-Means algorithm, C-Means algorithm, Feature extraction, fuzzy K-Means clustering, edge detection, Brain tumor

## I. INTRODUCTION

This process is an important technique in maximum image signaling algorithms. If you look at these different areas, the picture is digitally divided. Many image signaling techniques are developed by researchers who develop those photos, and are formed as easy to judge by Swash. Parallel algorithms in these serial processors have trouble with the approach. It's a new paper literature review of the main image signaling techniques link algorithms on hardware devices and want to continue.

Tracking and linking cells [1], it's clear that the discussion of the tracks is based on the Viterbi algorithm, is in [2]. Different cell signaling techniques discussed [3]-[5]. Can use the time lapse microscopy value and extract [6], to quantify many different aspects of cell behavior such as [7] [8], (cell division) and Mitosis Apoptosis (cell death), and the migration is important in the study of cancer Morfalwaji [12] [13] ], Ambreognisas [14], [15], stem cell [16]-[18], and many other aspects of cell and developmental biology. [9] In the opening works [14] The cell broadcast microscopy, and the pictures were seen in the appropriate spaces, taking advantage of hand sketch or situations in which the main unit of interest in a plane taped record properties was continually in the same place. Today, a wide number of available supporting microscope strategy is required, as these phones may identify an opportunity for the cors and four fluorescent proteins or color, plus skkisanace for the use of 2-D or 3-D images of the-camera to record the indent A chance. The manual can be done by test run and can be used by the big most difficult, must reproduce, even as often as these discoveries are the appeal by the representative who can make these four subjective wishes. For these reasons, the surgery will be conducted on a large scale or on the Robotheid semi Robotheid system of interest. In the survey of different algorithms [19] explicitly stated. Medical surveillance, search, authorization, a process image area, machine-driven business review and a number of areas with plenty of our daily life, like the ever growing tide of applications and dynamic location. It is also recognized as a completely different image and objects for the request. In this way, a common purpose applications are run on a PC that is often simple, however, due to subsequent constraints on different memory and blond prefer devices, the time is not validated.

Application specific hardware implementation provides a software system, vast large implementation, than that. As VLSI(very large scale integrated) has become a high-count hard

execution technology to implement a beautiful hardware systems and the implementation of the equality death penalty creates the maximum fallback Pipelining algorithms in time.

2 types of technologies are available for hardware design. Jointly application specific integrated circuits (which are the Isaas devices program), such as the design of digital signal processors, are described in full custom hardware (10) and field program Gateway Arrays (FPGA's). The full custom design offers the highest performance, Isak Kompaniss, with extremely high cost of development and so on. During design and design Isak Plus cannot be modified in too much. Isak Design in high volume industrial applications.

The chip fabric created around makes it problem. There are 10 types of hardware devices and a PC between design and display, according to Isak. 10 Dedicated laptop computer, C or the assembly code for best display, usually with this program. It is a very complex picture for the scientific discipline of nature, which is in the process of intensive tasks. Hardware design electronic retention, but less often than the will to learn that design curve of an alternate route is higher on a FPGA technology such as equality and pipelining such as hardware design techniques, which is the design of dedicated DSP capability Not. Image processing Rikonforabla on algorithms for the market value of hardware downtime, allowing faster and simpler debugging and verification of Potting complex. So the system implementing the real time image processing alternative is FPGAs.

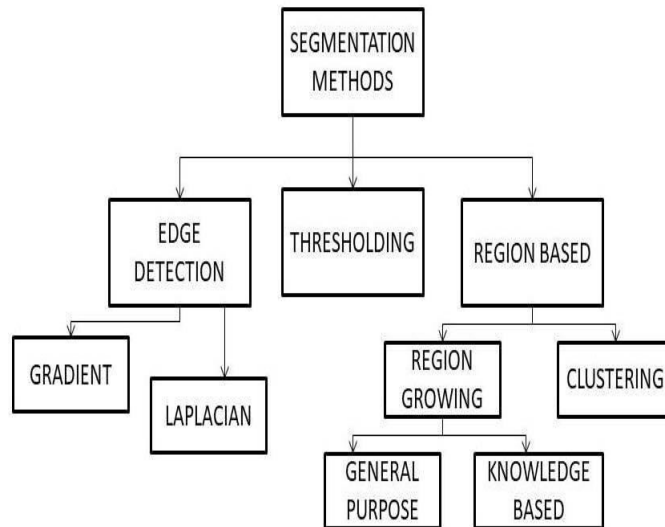


Fig. 1. Segmentation methods

## II. METHODOLOGY

### A. K-MEANS ALGORITHM

Here we discuss clearly about the basic structure of K-means clustering. Let  $A = \{a_i | i=1, \dots, f\}$  be attributes of  $f$ -dimensional vectors and  $X = \{x_i | i=1, \dots, N\}$  be each data of  $A$ . K-means clusters which  $X$  is  $S_k = \{S_i | 1 \leq i \leq k\}$  where  $M$  is  $m_i \in X = \{M = 1, n(S_i), \dots, J\}$   $S_i$  members, where  $n(S_i)$  is number of members for  $S_i$ . Each cluster has cluster center of  $C = \{c_i | i=1, \dots, k\}$ . The following steps will be involved in the K-means clustering algorithm [20-21]

1. Generate the random starting points with centroids  $C$ .
2. By utilizing the Euclidean separation discover the separation  $d$  between  $X$  to  $C$ .
3. Ascertain the base  $d(x_i, C)$  from the partition of  $x_i$  for  $i=1 \dots N$  into.
4. Ascertain the new centre  $c_i$  for  $i=1 \dots k$  characterized as:



$$C_i = \dots$$

5. Refresh the procedure stage 2 until the point that all centroids are concurrent.

The centroids, in case if they do not change their position then they will be said as converged in a particular cycle. It additionally may stop in the t emphasis with a threshold  $\epsilon$  if those positions have been refreshed by the separation underneath  $\epsilon$ :

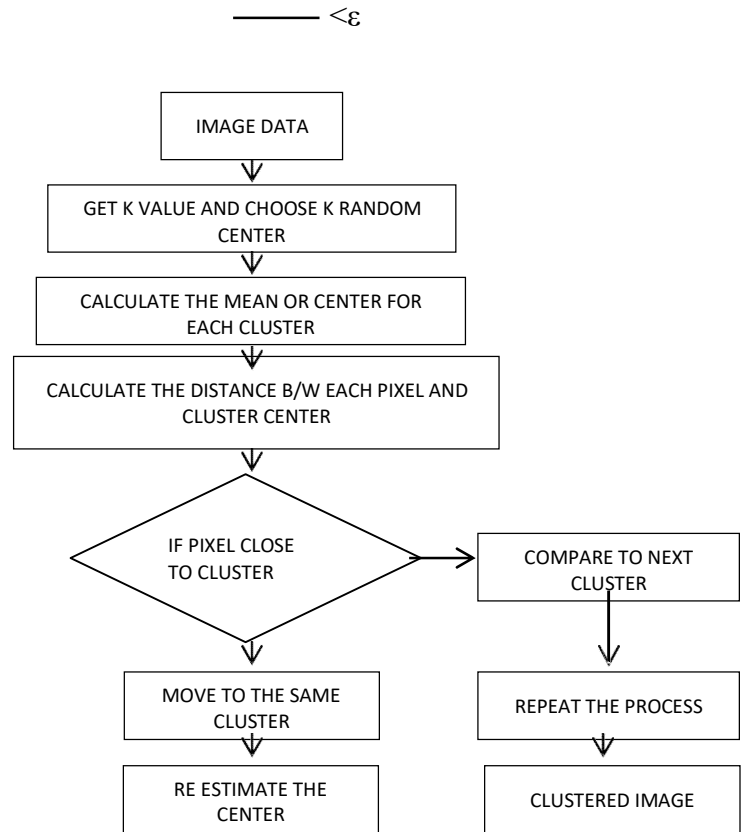


Fig. 2. K –means clustering algorithm

**B. FUZZY C-MEANS CLUSTERING**

Fuzzy logic to process data through partial membership in reflection is a method of each pixel value. Fuzzy membership in the set value is 0 1 ranges. The fuzzy cluster basically allows a multi-value logical values, such as the intermediate I. E., a member of the same member can be set in fuzzy sets blurred picture. Full membership, non-membership is between any bad transfer. An image of a fosaniss function, in the form of a Buddha-figure and also a membership in information to define. The membership function that is involved includes three main primary attributes. They have support, restrictions. The core member is set to be completely opaque. The subscription is supported by a non-intermediate or partial subscription, and is a border that is set to value between 0 and 1 [23].

Obscure logic, fuzzy clusters, in each cluster location entirely, just one degree from a cluster. The cluster is on the periphery of the cluster, with fewer points than points. Each point x is given status as we are in the cluster digital head. The contribution coefficient for any given x 1 is usually clear:

$$\forall x \left( \sum_{k=1}^{\text{num. clusters}} u_k(x) = 1 \right).$$

Fuzzy c-means clustering, which kantroad all points with a cluster of his degree of leverage over it, means:

$$\text{center}_k = \frac{\sum_x u_k(x)^m x}{\sum_x u_k(x)^m}$$

The distance to the cluster center is related to the inverse state:

$$u_k(x) = \frac{1}{d(\text{center}_k, x)^2}$$

Then coefficients is a true parameter to fosified distribution > 1 So their

is 1.

$$u_k(x) = \frac{1}{\sum_j \left( \frac{d(\text{center}_k, x)}{d(\text{center}_j, x)} \right)^{2/(m-1)}}$$

The equivalent of 2 m for coefficients to equal their money to 1 along a linear normalizing. When 1 m is close, and the cluster closest to the center at this point is much more weighted than others, and it is similar to the K-means algorithm.

Fuzzy c-means the algorithm K-means that is similar to the algorithm:

- Select the number of clusters.
- Clusters assigned to go to each endpoint are Lakki coefficients.
- Repeat algorithm (that is, the change of the threshold of coefficients sensitivity between two atratance is from someone else): • Calculate kanterwads for each cluster using the formula above.
- Using the formula above, calculate their coefficients for each location in the clusters.

Intra-cluster analytics K-means are less than the algorithm, however there are problems, in the same way that there is at least one local minimum depending on weights and the initial selection of results. In a more orderly way, the statistics algorithms Mksmyzaon expect some of the following to be views: Partial membership in classes. They know they've given precedence to properties and simple fuzzy-C-means.

### III. PROPOSED SEGMENTATION METHOD

Here in this section we proposed that our hybrid fuzzy K-means cluster acronym (AFKM). First, what the average used for preprocessing will be to remove from digital photos using filter noise and improve image quality. The product of the first phase will then be able to identify the margins of the image, and then it's K-i.e. the Segmented generated mines of the cluster: image. Now, the fuzzy cluster signaling accuracy and precise detection of the cancer of the capsule will be applied to the product of MR images with the improve K-roots. Size of the tumor will be detected. The algorithm that steps up for the proposed system is shown in the diagram of a block.

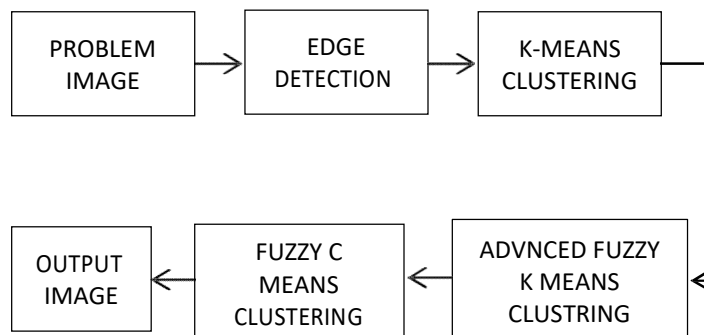


Fig. 3. Proposed system block diagram

IV. SIMULATION RESULTS

Simulation has been done in Matlab. Fig. 4 represents the edges found in the image, Fig. 5 shows the original image and Fig. 6, Fig. 7, Fig 8 shows the segmented images of K-means clustering, Fuzzy C-means clustering and proposed segmented method.

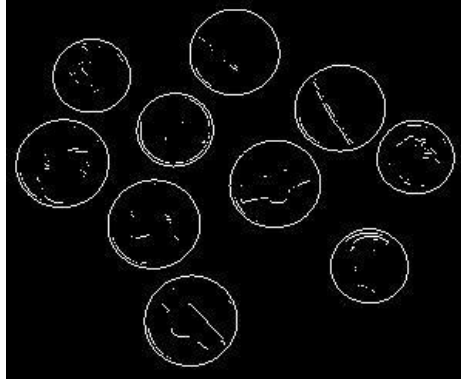


Fig. 4. Edges detection

TABLE I. COMPARISON WITH OTHER METHODS

S.NO.	SEGMENTATION METHOD	TIME(Sec)
1	K-MEANS CLUSTERING	3.625
2	FUZZY C-MEANS CLUSTERING	4.0625
3	PROPOSED SEGMENTATION	2.8433

Above table I shows the comparison results with K-means clustering and C-Means clustering, which have produced the better results in terms of time.

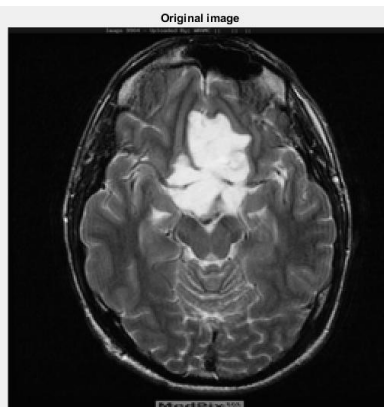
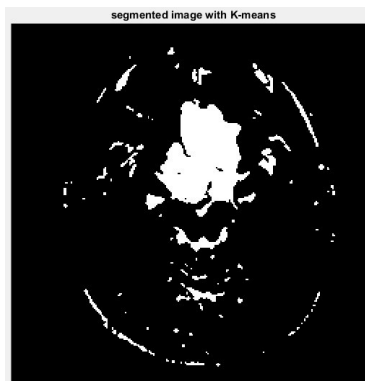


Fig. 5. Original image



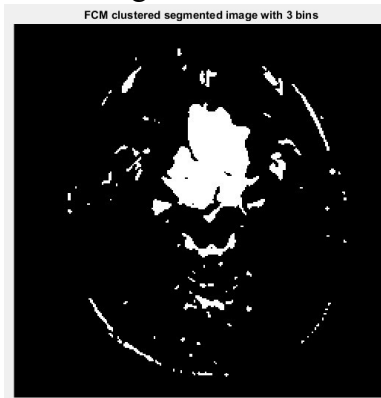


Fig. 5. Segmented image with Fuzzy C-means clustering

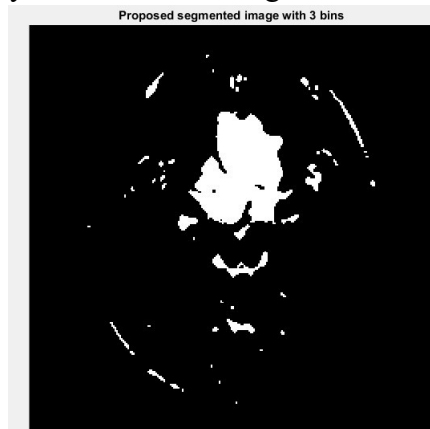


Fig. 5. Segmented image with Proposed Structure algorithm

## V. CONCLUSION

In this document we have designed an approach to image segmentation using the algorithm of a new structure for detecting brain tumors in which we segmented the tissues of the original paintings. The simulation results were compared with-means for clustering and fuzzy C-means clustering, which are well known and popular methods of segmentation of the image in terms of processor time and functions of the histogram. The proposed image segmentation approach showed better and much better performance than existing methods. In the future, we can increase accuracy and reduce computation time by considering optimal minimization of clusters.

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## THE CONSTRUCTION OF UNDERGRADUATE MACHINE LEARNING COURSE IN THE ARTIFICIAL INTELLIGENCE ERA

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**Abstract:** AI innovation has been incredibly evolved in the most recent decade, which makes man-made consciousness arrive at a progressive advancement and lets us truly see the capability of man-made brainpower in changing human existence. To improve the agreement and application capacity of man-made consciousness, doing the comparing AI course is of importance for the understudies during the undergrad period. This paper tests into the showing content, encouraging structure and different parts of the undergrad AI course dependent on this issue and proposes a training strategy driven by application situations to control the college understudies to comprehend the turn of events, current circumstance and boondocks innovation of AI. In the trial plan, the understudies' hypothetical information is completely thought of, the functional inquiries are improved, and the understudies' capacity to think and tackle issues is likewise raised, to lay a hypothetical and down to earth reason for additional investigation of AI.

### I. Introduction

With the prevalence and development of mobile internet, big data and large scale parallel computing and the reduction of computational cost, artificial intelligence has become an area with many practical applications and many hot research topics. Its application domains include pattern recognition, computer vision, natural language processing, data mining, business intelligence, unmanned driving and so on. With the development of artificial intelligence technology into all aspects of people's lives, its research prospects are more and more brilliant. In July 2017, the State Council announced a new generation of artificial intelligence strategic planning. And this plan proposed: as of 2020, China's artificial intelligence industry scale will

exceed 150 billion yuan, the relevant industry scale driven by this will be more than 1 trillion yuan; to 2030, China will reach a leading level in the world in terms of artificial intelligence theory, technology and overall application scale and China will become the world's main artificial intelligence innovation center with an artificial intelligent industry scale reaching more than 1 trillion yuan and a scale of the related industries driven reaching more than 10 trillion yuan [1]. Artificial intelligence market has been unprecedentedly active, as a result, Google, Facebook, Microsoft, Baidu, Ali, Tencent and other global IT giants are now regarding it as the breakthrough for the next generation of science and technology revolution, and are putting a lot of human and material resources to accelerate their deployments. The potential of artificial



intelligence technology is undoubtedly magnificent. As the most widely used technology possessing the highest theoretical research value in artificial intelligence, machine learning plays an important role in many fields, such as computer vision, pattern recognition, data mining, natural language processing, etc. [2]. The new generation of information technology represented by mobile Internet, large data and IoT technology is closely related to machine learning technology. Why does it need to set up the machine learning course? The ability to collect, store, manage and process data has been greatly improved in recent years, so it is urgent to need data analysis technology. Under this circumstance, machine learning is able to meet such needs of this era, so it becomes particularly important. Early machine learning courses are mainly set up for postgraduate students with majors of Computer and Artificial Intelligence. With the advent of the artificial intelligence and big data age, it is necessary to set up machine learning courses in undergraduates.

Machine Learning Is The Core Technology In The Era Of Artificial Intelligence: In recent years, with the rapid development of artificial intelligence technology, more and more artificial intelligence products have come into people's daily life, such as sweeping robot, educational robot, etc., which have brought great convenience to human life and made great contributions to the development of human society [3]. At present, the definition of artificial intelligence (AI) mainly refers to a discipline in which the computer program is applied for simulating some of human thought processes and intelligent behaviors and to produce a novel intelligent system that can respond in a way

similar to human's intelligence. It also refers to a scientific field focusing on whether such an intelligent system can be implemented and how to achieve it.

## II. RELATED REVIEW

Artificial intelligence development can be divided into three stages: the first stage is between the 1950s and 1960s, this artificial intelligence within this period mainly studies the inference and search domain, including how to use the search tree for the robot to plan its action process as well as the chess game inference; the second stage is between the 1980s to 1995, the artificial intelligence within this period mainly studies the representation of knowledge, i.e. how to describe the knowledge of a particular field as the information that computer can recognize and process, so as to build an expert system; the third stage is from 2000 to the present, machine learning has become the core of artificial intelligence research, i.e. how to let the machine learn through the artificial intelligence program, so as to make judgments. This stage of artificial intelligence is also defined as a discipline about knowledge [4], namely the technology about how to acquire and express the knowledge and convert it into practical applications. It is a discipline about studying how to make the computer simulate some of the human thinking processes and intelligent behaviors, including the principle of how to make the computer achieve intelligentization and how to manufacture computers with intelligence similar to that of human brain, so that the computer can be involved in a higher level of application. The basic pattern of artificial intelligence is to study the behavior and thinking



human beings and study how to acquire knowledge, express knowledge and use knowledge by taking the knowledge as the subject and the intelligent devices as carriers. B. What Is Machine Learning Machine learning refers to the computer's acquisition of a kind of ability to make predictive judgments and make the best decisions by analyzing and learning a large number of existing data. The representation algorithms include deep learning, artificial neural network, decision tree, enhancement algorithm and so on. The key way for computers to acquire artificial intelligence is machine learning. Nowadays, machine learning plays an important role in various fields of artificial intelligence. Whether in aspects of internet search, biometric identification, auto driving, Mars robot, or in American presidential election, military decision assistants and so on, basically, as long as there is a need for data analysis, machine learning can be used to play a role. Machine learning is a multi-disciplinary and interdisciplinary subject which has arisen in the past more than 20 years, involving probability theory, statistics, approximation theory, convex analysis, algorithmic complexity theory and many other disciplines [5]. The theory of machine learning is mainly about how to design and analyze some algorithms that enable the computer to "learn" automatically. That is, it is about the algorithm by which the computer can figure out the law from the data via automatic analysis, and then can use the law to predict for the unknown data. Definition 1: "Machine learning is a study of computer algorithms that can be automatically improved through experience". Definition 2: "Machine learning is a kind of science that allows a

computer to react correctly without the need to explicitly program in advance."

### III. TEACHING CONTENT DESIGN

Basic Ideas Machine learning is a multidisciplinary field involving computer science, statistics, intelligent science and other interdisciplinary areas, and is subject to a joint evolution with data mining, artificial intelligence and other subjects. The content of it may be overlapping with that of others, but it also has its own discipline characteristics and is constantly developing new theories and methods. Therefore, the teaching of machine learning course during undergraduate period should choose appropriate teaching contents and optimize them, so as to let the students understand the basic concept of machine learning, common machine learning model and common learning algorithms, and let them can use the key technology of machine learning to analyze practical problems and understand the current development of machine learning [6]. Considering the experimental teaching content, it will design corresponding application scenarios according to different machine learning methods, so as to let the student ponder and analyze questions in the application scenario and apply the learned methods to solve the problems, thus exercising their ability of independent thinking and practice. B. Theoretical Teaching Content Design 1) Overview on Machine Learning This paper introduces the related concepts and application scenarios of machine learning, and explains what machine learning is based on practical cases and how to learn it. The classification of machine learning algorithms is described and they can be divided into supervised and

unsupervised learning. Supervised learning involves statistical classification and regression analysis; unsupervised learning involves clustering and association rules. It introduces the implementation process of machine learning, that is, the feature extraction is firstly performed from the original sample set, and then the feature sample set is preprocessed to obtain the training set and the validation set. Next, the model is trained with the machine learning algorithm, and the validation set is used for evaluation purpose. 2) Deep learning the concept of deep learning is derived from the study on artificial neural networks, and its typical example is multilayer perceptron (MLP). Artificial neural Network (ANN) is a mathematical model for simulating the thinking mode of human brain, and perceptron is the first artificial neural network designed and implemented. The perceptron is a dichotomous linear classification model, whose input is the eigenvector of the instance and whose output is the class of the instance. This paper introduces the models of perceptron, then describes the learning strategy of the perceptron, especially the loss function, and finally introduces the original form and dual form of the perceptron learning algorithm, then proves the convergence of the algorithm.

K-nearest Neighbor Method K-nearest neighbor (k-NN) method is a kind of basic classification and regression method, which uses a method of measuring the distance between different feature values for classification. That is, given a training dataset, for the new input instance, the nearest k instances are found in the training data set. If the majority of these k instances belong to a class, then this input instance is classified into this class [7]. This part introduces the K-nearest

neighbor algorithm, model and three basic elements, including selection of k value, distance measurement and rules of classification decision. 4) Decision Tree Decision tree is a kind of inductive classification algorithm, which uses the learning of training set to excavate useful rules for predicting new sets [8]. This paper focuses on the application of decision tree for classification, and focuses on using the decision tree algorithm to represent the result of data classification in tree structure. This part introduces the basic concept and feature selection of the decision tree, and the generation algorithms of decision tree learning ID3 and C4.5 and pruning of decision tree. 5) Naive Bayes The classification algorithm based on Bayes theorem is called Bayes classifier algorithm, among which naive Bayesian classification is the simplest and most common method in Bayes classifier. The basic assumption of naive Bayes is that the attributes of the items to be sorted are independent of each other. The principle, processing flow, learning and classification and parameter estimation of the algorithm are introduced. 6) Support Vector Machine Support vector machines (SVM) are a dichotomous classification model. Its goal is to find a hyperplane, so that the hyperplane can be used to separate the two types of data points as many as possible, while the two types of data points being separated are farthest from the classification surface. This part introduces third class of support vector machines and kernel functions, including: linearly separable support vector machines, linear support vector machines and nonlinear support vector machines. 7) Boosting Method: AdaBoost Algorithm The boosting method is to improve the performance of classification by changing the weights of

training samples, learning multiple classifiers, and combining these classifiers linearly. This part introduces the basic idea of boosting method and the representative boosting algorithm AdaBoost, discusses why AdaBoost can improve the learning accuracy and introduces concrete examples. 8) Hidden Markov Model Hidden Markov model (HMM) is a statistical learning model which can be used in labeling problems and has been widely used in speech recognition, POS automatic tagging and other fields. This paper introduces the basic concept of the hidden Markov model, then introduces three questions in the hidden Markov model, and then introduces the corresponding three basic algorithms, namely probability calculation algorithm, learning algorithm and prediction algorithm. C. Experimental Design This course will help students understand the basic theory and methods of machine learning, and also will let them pay attention to the cultivation of their practical ability [9]. With the acquisition of theory part of knowledge, the students are able to solve some specific problems, which will enable them to deepen the understanding of the working principle of the algorithm in the problem-solving process, and will inspire their interest with the intervention of application scenario. Experimental language: Python. Experimental method: The teacher gives the general steps and data sets of the experiment. The experimental process is completed by the students and presented with an experimental report. 1) Using Perceptron for Classification Experiment content: present the original form and the dual form of the perceptual machine learning algorithm, and use it to classify the input data. 2) Using K-NN to Recognize Handwritten Numerals Experimental

content: the data set in the text of "Optical Recognition of Handwritten Digital Data Sets" is provided. In order to facilitate understanding, the image needs to convert into text format. It needs to design handwriting recognition system based on the K-nearest-neighbor classifier, and the recognition ability suitable for number 0-9 will be qualified. 3) Using Decision Tree to Predict Contact Lens' type Experiment content: by providing a text file of the contact lens' dataset and using ID3 algorithm to produce a decision tree, it can judge the type of lens that the patient needs to wear. 4) Using Naive Bayes to Filter Spam Letters Experiment content: by providing the text file of the mail data set and resolving the text file into the term vector, it can construct a test set and training set and a naive Bayes classifier which can filter the spam message is able to be trained. And it also needs to calculate the classification error rate. 5) Using SVM to Recognize Handwritten Numerals Experimental content: Using support vector machine algorithm to construct a handwritten numeral recognition system, the results will be compared with those of the Knearest neighbor algorithm.

## IV. TEACHING MEATHODS AND MEANS

Using Application Scenarios to Drive the Teaching For the development of machine learning theory and methods, the ultimate aim is to solve the practical problems in production and life. For example, in the first part of the theory teaching, i.e. the introduction of machine learning, it introduces the machine learning technology by the news in May, 2017: AlphaGo beats the World championship. It doesn't directly present the content of the



algorithms, because for undergraduates, it is a little difficult to understand these theories and may result in their psychological aversion for the relevant curriculum. According to the characteristics of undergraduates, it should increase the introduction of application scenarios suitable for machine learning technology, such as the industrial unmanned driving, artificial intelligence assistant, Taobao commodity recommendations, so that these students can be interested in the content of the course and their enthusiasm to participate in the curriculum can be enhanced. After this, the students are guided to analyze the questions in the corresponding scenario. By introducing the concept of related algorithms, giving the necessary derivation and proof for each algorithm and providing a simple example, the students will be easier to master the basic content of the method, understand the essence of the method and use the method accurately. For the relevant in-depth theories, they will be summarized, and the relevant reading materials and references will be provided to meet the needs of students for further study. 2) Improve Teaching Effect via Analysis and Discussion According to the teaching content, it can reasonably design questions about theoretical knowledge and case applications and provide references and learning materials, inspire these students to think and organize them to discuss, so as to promote their understanding of machine learning related technologies and cultivate their learning and thinking ability. Because there are more than one machine learning methods that can be used to solve questions about practical application, the students can be guided to think what algorithm can be selected. For example, after learning the algorithms of K-neighbor

algorithm and support vector machines, it can guide the students to compare these two methods through the experiment based on these two algorithms for handwritten numeral recognition and let them figure out whose effect is better and which is more efficient. Through the experiment reports, the students can be organized to participate in group discussion, thus deepening their understanding of practical questions and machine learning models and algorithms and exercising their ability to analyze and solve problems. The teaching means of this course includes two aspects: On one hand, online learning is recommended. It can create chatting groups with the topic of curriculum for students, so as to recommend them courseware, course videos, paper resources, data sets, open source toolbox and so on. In addition, the micro-blogging, MOOC and other emerging network platforms can be used to communicate with students, so as to provide them with more access pathways to information. On the other hand, offline classroom discussion is also recommended. It can exercise the students' independent pondering ability and encourage them to express their own opinions. By fully listening to the views of students, the scientific adjustment on the depth and breadth of teaching content can be made to ensure the quality of teaching.

## V. CONCLUSION

If the data are the carrier and the intelligence is the goal, then the machine learning is the technology, method and pathway for transformation from the data to the intelligence. Therefore, machine learning is the core of data science and the essence of modern artificial intelligence. In recent years, more and more

colleges and universities at home and abroad are developing specialized courses about machine learning for Computer, Software, Artificial Intelligence and other majors. The machine learning course for undergraduates introduces the basic concepts and methods of machine learning. The course uses the application scenario to drive the teaching practice, gradually helps the students to understand the basic theory of machine learning and simultaneously pays great attention to the training of practical ability. By introducing the common algorithms of machine learning, the course also needs to give necessary derivations and proofs for these algorithms and provide the matching experiments, so as to help the students to master the basic content of these algorithms, grasp the essence of these algorithms and use these algorithms correctly.

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Title: **TOWARD INTELLIGENT NETWORK OPTIMIZATION IN WIRELESS NETWORKING AN AUTO-LEARNING FRAMEWORK**

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## TOWARD INTELLIGENT NETWORK OPTIMIZATION IN WIRELESS NETWORKING AN AUTO-LEARNING FRAMEWORK

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**ABSTRACT:** In remote correspondence frameworks (WCSs), network enhancement issues (NOPs) assume a significant job in augmenting framework execution by setting fitting organization setups. When managing NOPs by utilizing ordinary enhancement techniques, there exist the accompanying three issues: human mediation, model deficiency, and high calculation unpredictability. In that capacity, in this article, we propose an auto-learning system to accomplish shrewd and programmed network advancement by utilizing AI (ML) strategies. We survey the essential ideas of ML, and propose their simple business models in WCSs, including programmed model development, experience replay, proficient experimentation, RL-driven gaming, unpredictability decrease, and arrangement suggestion. We trust these recommendations can give new bits of knowledge and inspiration in future exploration for managing NOPs in WCSs by utilizing ML methods.

### I. INTRODUCTION

In wireless communication systems (WCSs), network optimization problems (NOPs) have been extensively studied to maximize system performance by setting appropriate network configuration settings [1]. NOP contains a broad range of research aspects in wireless networking; typical applications include resource allocation and management, system parameter provision, task scheduling, and user quality of service (QoS) optimization. Figure 1 shows the basic process of solving a NOP in WCSs, which includes the following four steps. Data Collection: the collection of essential information of the system and the surrounding environment. The collected data can be channel state information (CSI), interference, noise, user location, spectrum and time slot occupations, and so on. Some QoS information, such as delay

and energy consumption rates and mobility state, can also be the input data to support the following optimization process. Model Construction: in which the expert constructs an optimization model that contains an objective function and several constraints. The objective of the optimization model can be throughput, spectrum utilization, user-perceived delay, energy consumption/gain, facility deploy (cment cost, and so on. Typically, model construction is conducted by using a mathematical formulation process, and experts are required to master the domain knowledge and theories involved in the model. Optimization: The most commonly used methodologies for solving optimization problems are mathematical derivation-based methods (DBMs) and heuristic algorithms. The former adopt a mathematical derivation process to find the solution, such as the Karush-Kuhn-Tucker (KKT) conditions,

and gradient descent methodologies. The latter adopt a heuristic neighborhood searching process to approach the optimal solution, including genetic algorithm, simulated annealing, particle swarm optimization, firefly algorithms, and so on. In general, DBMs are quite suitable for solving problems with explicit and convex objective functions, while heuristic algorithms do not require the derivatives of the objective functions, and are generally able to produce high-quality solutions for complex optimization problems if the optimization complexity is suitably high [2]. Besides the above two optimization methods, game theoretical techniques, including non-cooperative games, cooperative games, and Bayesian games, also have been successfully applied to solve the optimization problem by learning automatic configuration strategies from interactions with other functional nodes [3].

**Configuration:** With the optimization results, the system then reconfigures the settings of the system to improve the performance. Possible reconfigurations may include transmission power allocation, energy harvesting scheduling, routing decision, and spectrum resource allocation, to name a few. After configuration, the system then repeats the optimization process to keep the system in suitable working conditions. Although NOPs have been extensively studied in WCSs, existing optimization methodologies still face the following three dilemmas. **Human intervention:** The optimization models in NOPs are always constructed by experts with domain knowledge, and this knowledge-driven process is expensive and inefficient in practical implementations. If we can conduct the optimization operations automatically, network optimization will be easier to conduct in real world applications.

However, how to reduce human intervention in solving NOPs is still an unexplored field in WCSs. When the training data are not sufficient, the system may need to conduct a re-sampling process to collect more data. A data filtering process needs to be done since the quality of used data has critical influences on the performance of the obtained black-box model. The outliers, incomplete data, and repeating data will be abandoned or refined in data filtering process.

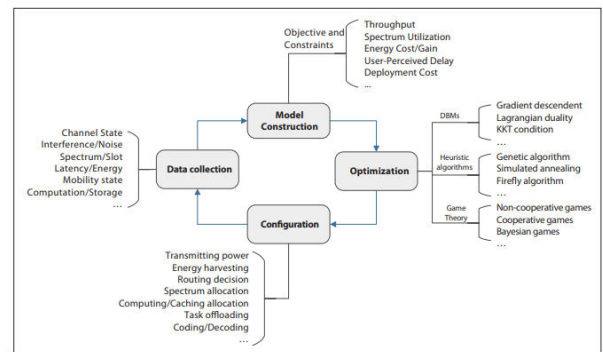


Figure 1: Workflow of network management in wireless communication systems.

**Auto-Learning Framework** As shown in Fig. 2, we propose ALF to achieve intelligent and automatic network optimization in WCSs. The basic workflow of ALF includes the following three steps. **Data Collection.** Collecting the experience data is the prerequisite for conducting ML-based models [6] and must be properly addressed. Besides the system and environment state information, in ALF the output solution data of an optimization process is also collected as historical experience. When the training data are not sufficient, the system may need to conduct a resampling process to collect more data. A data filtering process needs to be done since the quality of used data has a critical influence on the performance of the obtained blackbox model.



incomplete data, and repeating data are abandoned or refined in the data filtering process. Model Training. The model training process is conducted in an ML engine, in which different ML techniques are provided, including supervised learning, RL, and unsupervised learning. Their detailed application models are introduced in the following section. After training, a cross validation process needs to be conducted to test the performance of the obtained model. More specifically, when the learning problem is a regression problem, that is, outputs are continuous; the performance metric is the mean square error (MSE) between the predicted results and real outputs. When the outputs are discrete decisions, collecting a large number of data samples in a short time may be impractical for some systems with very high reconfiguration cost, such as the reconfiguration of virtualized network function resources in software defined WCSs.

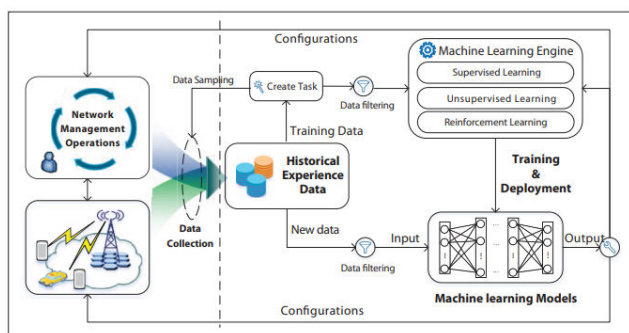


Figure 2: Auto-learning framework for dealing with NOPs in WCSs

Therefore, how to reduce training data samples is critical in automatic model construction-based NOPs the problem can be regarded as a classification problem, and the performance metric can be classification accuracy.

**Supervised Learning-Automatic Model Construction and Experience Replay:** With sufficient training data, a complex nonlinear mapping function from input data space to the output data space can be obtained by training a supervised learning model. Benefitting from this learning ability, supervised learning has been successfully applied in point-to-point learning tasks in communications systems, such as delay prediction, channel estimation, and signal detection. According to the amount of training samples, supervised learning can be divided into the following two categories: small-sample learning (SSL) and deep learning (DL). Possible choices for SSL include shallow neural networks, kernel-based methods, and ensemble learning methods. For DL, possible choices include deep belief networks, deep Boltzmann machines, and deep convolutional neural networks.

**Automatic Model Construction Model:** Supervised-learning-based black-box regression provides an effective way to solve the expensive human intervention and model invalidity problems. In situations when the explicit functions between the input and output are not available, but we have sufficient data samples that contain the inputs and outputs of the system, the mapping function can be trained by using a supervised regression technique. Given new input data, the target performance objective can be accurately predicted by using the previously obtained model. We propose to use supervised learning techniques to automatically conduct the model construction process in NOPs. As illustrated in Fig. 3a, in conventional NOPs, the mathematical optimization model is constructed by experts with domain knowledge. In ALF, we propose to use black-box learning

to automatically construct the optimization model, as shown in Fig. 3b. In the automatic model construction process, we can directly regress the objective function and constraints by using regression models. In the same way, the constraints can also be constructed. With the obtained model, a following heuristic algorithm can be used to solve the optimization model, since it just needs to know the objective response in each searching iteration. When the target function contains several independent parts, we can first train the independent mapping functions of these parts and then combine them into a unified one. For example, in mobile edge computing, the user-perceived delay mainly includes three parts: data transmission time, queuing time, and task execution time. In this scenario, we can build the optimization model by combining the three black-box delay time prediction models.

**Challenges:** The successful implementation of a supervised learning method requires a dataset with sufficient and reliable data samples to train the mapping model. In some tasks like network delay and energy consumption rate prediction, the data samples can be collected easily. However, collecting a large number of data samples in a short time may be impractical for some systems with very high reconfiguration cost, such as the reconfiguration of virtualized network function resources in software defined WCSs. Therefore, how to reduce training data samples is critical in automatic model construction-based NOPs.

**Unsupervised Learning: Complexity Reduction and Solution Recommendation** A clustering algorithm is one typical unsupervised learning method that aims to partition the data into several clusters with similar regional

distribution properties. The k-means algorithm is an efficient and effective clustering algorithm, and it can be used to solve most clustering problems [14]. Also, the similarity learning process used in k-nearest neighbor (k-NN) search can be used in finding recommended solutions. **Complexity Reduction Model:** It is recognized that increasing variable dimensions will greatly increase the complexity of the optimization process. We therefore discuss the potential of using clustering algorithms to reduce the complexity of NOPs with high-dimensional variables. As shown in Fig. 5, we can modify the original NOP into a hierarchical NOP problem to reduce the complexity by dividing the target high-dimensional variables into several clusters. First, a cluster-level optimization process is conducted; then variable-level optimization is executed within each cluster. In this way, since the cluster number and variable dimension of each cluster is much smaller than the original variable vector, the complexity of the optimization process can be greatly reduced. **Applications:** In applications like resource management with large numbers of variables, the optimization process can be an expensive task with high-dimensional target variables. In this situation, the model complexity can be relaxed by using a clustering process. The variable vector can be divided into several sub-vectors according to factors like throughput demand, channel states, computation demands, and data transmission amount. Some other factors, such as user priority, geographical position, and residual energy, also can be used as the features for clustering. In this way, optimization can be conducted at the cluster level and task level separately, and the complexity can be significantly reduced.

drawback of clustering-based hierarchical optimization is that the obtained results may suffer from a performance loss since the hierarchical optimization process is not the same as the original one, and cluster-optimal results are not equivalent to variable-optimal results. Therefore, how to reduce the performance loss in hierarchical optimization is a challenge for future work. Solution Recommendation Model: One can use a similarity measurement to find similar historical tasks, then directly combine the solution of this similar task as the solution of the new task. To realize similarity-based solution recommendation (SSR) in ALF, first we define the feature vector that is able to distinguish the differences of the tasks, and subsequently a k-NN searching process can be used to find the tasks with similar features. The k-NN algorithm is a well-known lazy learning method that searches the nearest instances according to similarity measurements, and it can be efficiently realized by using a kd-tree algorithm. We assume that the environment stays stable in a period of time. Given a new task, when the historical tasks with similar features are known, we can combine the solutions of these similar tasks and directly use the average result as the solution. Applications: Large-scale power allocation is usually a computation-intensive task due to the high dimension of the solution. If we have sufficient historical feature data, the SSR can be used to solve the real-time optimization problem. The feature data can be defined as a vector containing user geographic location and user terminal type. When the locations are close to each other, the corresponding CSI will be similar. In addition, when the user terminal type is the same, their antenna capacities will also be the same. In this way, the power assignments

will also be similar. Challenges: First, collecting user feature data may impose privacy concerns since the manager may want to collect sensitive information, such as geographic locations, user behaviors, and user preferences. Second, since SSR assumes that the environment stays static in a period of time, it is not able to deal with problems with dynamic or stochastic conditions. Third, the recommended solution is just an approximate version of the real one, and the corresponding performance will also not be optimal. Forth, the distribution of the collected data may not be evenly distributed. For some new tasks without a sufficiently close neighbor, SSR will fail to find reliable results.

## CONCLUSIONS

This article recalls the models of network optimization in WCSs and proposes an ALF that employs the advantages of powerful ML techniques to deal with the human intervention, model invalidity, and high complexity problems in conventional optimization models. We review the basic concepts of supervised learning, reinforcement learning, and unsupervised learning, and then propose several potential models to deal with NOPs, including automatic model construction, experience replay, efficient trial and error, RL-driven gaming, complexity reduction, and solution recommendation. We encourage readers to test and modify these proposals, and further design more new ML-based methods for dealing with NOPs in WCSs.

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Title: **VARIABLE STRENGTH COMBINATORIAL TEST DATA GENERATION USING ENHANCED BIRD SWARM ALGORITHM**

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Paper Authors

**K. SOWJANYA, KURIMILLA RAVALI, M. SUSHMITHA, V.SWATHI**



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## VARIABLE STRENGTH COMBINATORIAL TEST DATA GENERATION USING ENHANCED BIRD SWARM ALGORITHM

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**ABSTRACT:** Combinatorial analyzing is a productive black box-checking approach for the machine with numerous quantities of boundaries and their qualities. Be that as it may, for fundamentally blended and key component, combinatorial evaluating still claims high intricacy. Testing totally the middle a piece of those components for the most part is a type of arrangement and Variable strength combinatorial test information age (VS-CTDG) arises. In this assignment, improved feathered creature swarm calculation (EBSA), a form of fowl Swarm calculation (BSA), is employed into the issue besides, a looking at prerequisite decrease is proposed and makes EBSA extra suitable into VS-CTDG than at any other time. Through benchmarks, EBSA is demonstrated a successful strategy.

**Keywords:** VS-CTDG, EBSA, BSA, Swarm.

### I. INTRODUCTION

Software testing is associate degree approach that verifies the consistent between customers expect and code physical object and evaluates the inner correctness of software package. recorder testing that's inclined to code outer feature and white box testing that accustomed judge software inner correctness are presently 2 thought technologies within the fields of software testing. Combinatorial checking may be a reasonably recorder testing that uses sampling mechanism to extract partial test cases from complete test suites to sight code failures caused by parameters and their interactions from System underneath check (SUT). The idea of combinatorial testing is that system. Combinatorial testing knowledge generation that constructs optimum covering array may be an analysis stew in combinatorial testing. Though effectively reducing the amount of

check cases, combinatorial testing usually encounters downside on combination explosion, the big variety of combination of parameters and their price, once applied into real industry's software. In most situations, t-way combinatorial testing is effective and promising. But some key elements bestowed systems want be tested higher strength that is additionally known as VS-CTDG.

Combinatorial testing is an efficient recorder testing technique for the system with massive numbers of parameters and their values. Combinatorial checking could be a reasonably recorder testing that uses sampling mechanism to extract partial test cases from complete test suites to sight package failures caused by parameters and their interactions from system beneath test. Combinatorial testing data generation is interested in how to generate the optimal covering array, which

way parameter combinations, but also owns minimum coverage number, number of test case in optimal covering array. Therefore, these existing strategies often generate approximate optimal covering array for system under test (SUT) with multiple parameters with large value domain.

## II. RELATED WORK

Combinatorial Testing (CT) can sense failures caused by connections of limits in the Software under Test (SUT) with a covering array test suite generated by some sample tools. To ensure successful testing, system should apply CT wisely. This requires professional skill and good judgment in its application. The full strengths and weaknesses of CT need to be better understood. In this system, survey the state of the research of CT. In this, have collected over 90 key papers related to CT. We classify these into eight categories [9]. (1) Modeling (Model): Studies on finding the limits, values, and the inter-dealings of limits of SUT. (2) Test case generation (Gen): Works on processing a tiny test suite efficiently (3) Constraints (Constr.): Works on circumvent un-well test cases in test suite generation. (4) Failure characterization and diagnosis (Fault): Studies on fixing the detected faults. (5) Betterment of testing methods and the application of CT (App.): Works on experiments testing method for CT and generating the results of the CT application. (6) Arranging of test cases (Prior.): Works on series of test implementation to get faults as early as possible in the most low-cost way. (7) Metric (Metric): Studies on computing the mixture reporting of CT and the efficiency of error discovery. (8) Evaluation (Eval.): Studies on the unit to which CT adds to the perfection of software quality [8].

## III. Methodology

The System is based on Bird Swarm Algorithm [5]. Bird swarm algorithm (BSA) is a kind of swarm intelligent evolutionary algorithm, which simulates the foraging behavior of bird swarm in nature to solve optimization problems. It employs a group of birds as a candidate solution set, and each bird represents a position in the solution space. Updating the position is used to search the optimal solution through one of the three behaviors: foraging behavior, vigilance behavior and flight behavior. After that, there is a fitness function to estimate bird quality. When the algorithm is initialized, all birds are randomly distributed throughout the solution space. Each bird in bird swarm flies in the solution space according to one of the three behaviors, and gradually converges to the approximate or optimal solution of the problem. Assuming that the solution space of problem is a dimension real number space, each bird represents a position in the solution space, Note that BSA is originally used for optimization problems of real number space, but combinatorial test data generation is a discrete combinatorial optimization problem that each dimension of bird's position is an integer. Therefore, when updating the position of birds, the algorithm needs make round operations on computing results.

Problem is being solved using the Enhanced Bird Swarm Algorithm over Bird Swarm Algorithm for the combinatorial testing. Moreover a testing requirement reduction is proposed and makes EBSA more suitable into VS-CTDG than ever.

## PROPOSED METHODOLOGY

Enhanced bird swarm algorithm (EBSA), a variant of Bird Swarm algorithm (BSA), is utilized into the matter. Moreover, a testing demand reduction is projected and makes EBSA a lot of appropriate into VS-CTDG (check information Generation) than ever. Combinatorial strategy roughly is classified into 2 categories containing algebraically technique and computing approach, which incorporates one-test-at-a-time (OTAT), input parameter order (IPO), and search-based approach. The project in the main introduces search-based approach that's typically integrated with OTAT framework. The OTAT generates a test suit at a time consistent with greedy strategy to hide uncovered tuples as a lot of as doable till uncovered t-tuples are lined. Its input is System below check (SUT) and combinatorial strength and its output is covering array (CA).

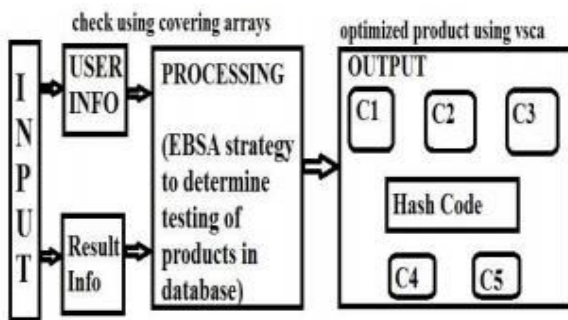


Figure 1: Architecture

The Input is being given as the user's info and the product info. Before processing it is check using covering array. EBSA strategy determines testing of products in database. Later the hash codes are produced. The system has five components namely Web Server with 2 configurations, Smart Phone with 2 configurations, Payment Server with 2,

Database with 3, and Brower with 3. Here components are viewed as factors and configurations as levels.

Advantages: It is simple to use. Variable strength combinatorial testing is more. Realistic technique. A new method called EBSA for adaptable forte. Combinatorial test data generation has been presented. EBSA, an improved version of BSA, has been evaluated. In this EBSA is an effective approach, especially in VSCA containing MCA.

ENHANCED BIRD SWARM ALGORITHM TEST CASES						
S.No	Web Server	Smart Device	Payment Server	Database	Brower	
1	1	1	1	1	1	
2	1	1	1	1	1	
3	1	1	1	1	1	
4	1	1	1	1	1	
5	1	1	1	1	1	
6	1	1	1	1	1	
7	1	1	1	1	1	
8	1	1	1	1	1	
9	1	1	1	1	1	
10	1	1	1	1	1	
11	1	1	1	1	1	
12	1	1	1	1	1	
13	1	1	1	1	1	
14	1	1	1	1	1	
15	1	1	1	1	1	
16	1	1	1	1	1	
17	1	1	1	1	1	
18	1	1	1	1	1	
19	1	1	1	1	1	
20	1	1	1	1	1	
21	1	1	1	1	1	
22	1	1	1	1	1	
23	1	1	1	1	1	
24	1	1	1	1	1	
25	1	1	1	1	1	
26	1	1	1	1	1	
27	1	1	1	1	1	
28	1	1	1	1	1	
29	1	1	1	1	1	
30	1	1	1	1	1	
31	1	1	1	1	1	
32	1	1	1	1	1	
33	1	1	1	1	1	
34	1	1	1	1	1	
35	1	1	1	1	1	
36	1	1	1	1	1	
37	1	1	1	1	1	
38	1	1	1	1	1	
39	1	1	1	1	1	
40	1	1	1	1	1	
41	1	1	1	1	1	
42	1	1	1	1	1	
43	1	1	1	1	1	
44	1	1	1	1	1	
45	1	1	1	1	1	
46	1	1	1	1	1	
47	1	1	1	1	1	
48	1	1	1	1	1	
49	1	1	1	1	1	
50	1	1	1	1	1	

Figure 2: EBSA Test Case Result

## CONCLUSION

We have tried to implement the Author "Lizhi cai, Yang Zhang and Weijia ji" of paper "Variable Strength Combinatorial Test Data Generation Using Enhanced Bird Swarm Algorithm" IEEE 2018. Variable strength combinatorial testing is a more realistic technique that uniform strength combinatorial testing. EBSA, and better variety of BSA, has been evaluated through benchmarks. Experimental results indicate EBSA is an effective approach, especially in VSCA containing MCA.

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Title: **VOLTAGE SAG COMPENSATION USING SYNCHRONOUSLY REFERENCE FRAME THEORY BASED DYNAMIC VOLTAGE RESTORER**

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Paper Authors

**V.SHAILAJA, M.SAHITHYA, A.MANISHA, G.AMRUTHA, P.PRAMADA KUMARI**



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## VOLTAGE SAG COMPENSATION USING SYNCHRONOUSLY REFERENCE FRAME THEORY BASED DYNAMIC VOLTAGE RESTORER

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### ABSTRACT:

This research checks out using superconducting magnetic and also battery crossbreed power storage space to make up grid voltage changes. The superconducting magnetic power storage space system has actually been imitated by a high-current inductor to examine a system utilizing both SMES and also battery power storage space experimentally. The style of the research laboratory model is explained carefully, which includes a series-connected 3 stage voltage resource inverter utilized to control air conditioner voltage, and also 2 bidirectional dc/dc converters made use of to regulate power storage space system fee and also discharge. "DC bus degree signaling" and also "voltage droop control" have actually been made use of to instantly manage power from the magnetic power storage space system throughout short-duration, high-power voltage droops, while the battery is utilized to offer power throughout longer term, low-power under voltages.

**Keywords:** SMES, Ultra capacitor, Battery energy storage system, high voltage, sag and swell.

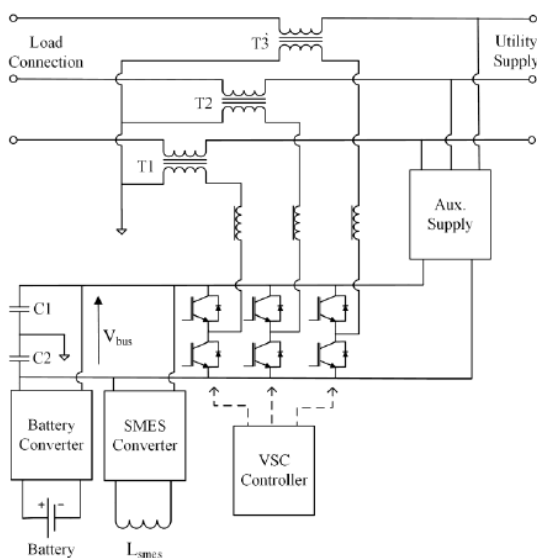
### 1. INTRODUCTION:

Power top quality problems are split right into 2 groups' voltage high quality as well as regularity top quality. Voltage top quality problems are associated with voltage droop, voltage swell, under voltage as well as over voltage while regularity top quality concerns are connected with harmonics and also transients. Among one of the most important power top quality problems is voltage droop which is take place as a result of its use of voltage delicate tools. It has actually made industrials refines much more vulnerable to provide voltage droops [1] The

DVR gadget includes 5 major areas; (i) Energy Storage Unit: It is in charge of power storage space in DC kind. Flywheels, lead acid batteries, Superconducting Magnetic Energy Storage (SMES) as well as Super-Capacitors could be utilized as power storage space gadgets, the quotes of the regular power effectiveness of 4 power storage space innovation. Electric power storage space gadgets come under indirect power storage space classifications. The kept power is reconverted back to electric power, when a supply of electric power is needed, it is hard to shop as well as

reconvert huge quantity of power. Numerous power storage space gadgets are currently utilized for voltage droop payment in the DVR system. Electric power storage space gadgets are extremely capacitor, superconducting magnetic power storage space (SMES) and so on. Dynamic voltage repair (DVR) is an approach of conquering voltage droops that happen in electric power circulation. These are an issue since spikes eat power as well as droops minimize effectiveness of some tools. DVR conserves power with voltage shots that could impact the stage as well as wave-shape of the power being provided. Instruments for DVR consist of fixed var gadgets, which are collection payment gadgets that make use of voltage resource converters (VSC).

power materials (UPS), shunt attached compensators, or vibrant voltage conservator (DVR) systems. Faucet transforming transformers have actually been revealed to deal with a slow-moving feedback time and also could just outcome distinct voltage degrees. UPS systems give the full voltage waveform throughout a power failing as well as could verify expensive as well as unneeded in case of partial voltage droops. A DVR is a collection attached tool with the ability of voltage settlement with quick reaction time by infusing a voltage in collection with the supply. DVR systems could be independent using power from the Grid to alleviate disruptions. Conversely, DVR systems could make use of power storage space to give power throughout settlement such as capacitors for temporary storage space or batteries for longer-term storage space. The fundamental concept of the vibrant voltage conservator is to infuse a voltage of called for size as well as regularity, to ensure that it could bring back the lots side voltage to the preferred amplitude as well as waveform also when the resource voltage is out of balance or altered. Typically, it utilizes a gateway shut off thyristor (GTO) strong state power digital buttons in a pulse size regulated (PWM) inverter framework.



**Fig.1.1. Model diagram.**

## 2. PREVIOUS STUDY:

Supply voltage could be secured by faucet transforming transformers, uninterruptable

## 3. PROPOSED SYSTEM:

This job takes a look at making use of superconducting magnetic and also battery crossbreed power storage space to make up grid voltage Fluctuations. The superconducting magnetic power storage

space system (SMES) has actually been mimicked by a high-current inductor to explore a system using both SMES and also battery power storage space experimentally. The style of the lab model is defined carefully, which includes a series-connected 3 stage voltage resource inverter made use of to control air conditioner voltage, as well as 2 bidirectional dc/dc converters utilized to regulate power storage space system fee and also Discharge. "DC bus degree signalling" and also "voltage droop control" have actually been utilized to immediately regulate power from the magnetic power storage space system throughout short-duration, high-power voltage droops, while the battery is utilized to give power throughout longer term, low-power under voltages. Power storage space system hybridization is revealed to be useful by minimizing battery top power need compared to a battery-only system, and also by boosting lasting voltage assistance capacity compared to an SMES-only system. Subsequently, the SMES/battery crossbreed vibrant voltage conservator could sustain both temporary high-power voltage droops and also lasting under voltages with substantially lowered superconducting product expense compared to an SMES-based system.

#### 4. SIMULATION RESULTS:

Temporary voltage settlement alone could not suffice to safeguard delicate tons as both long-lasting and also temporary voltage security has actually been revealed to offer an issue for lots of customers. Consequently,

this research study takes into consideration making use of SMES/battery crossbreed power storage space to make up lengthy as well as temporary voltage variations. Wong et al. have actually additionally taken into consideration a SMES/battery crossbreed as well as revealed it is sensible for smoothing of renewable resource generator result power as well as could lead to lowered power storage space system ability and also extended battery life. Li et al. have actually revealed that a SMES/battery power storage space system could boost battery life time in electrical buses.

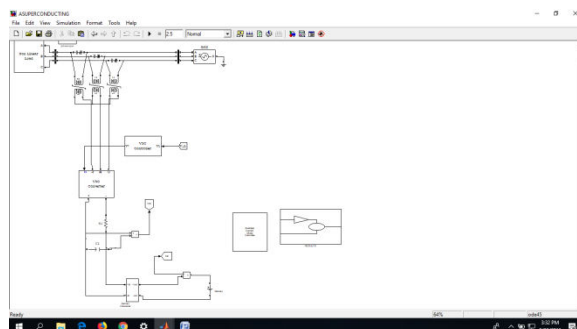


Fig.4.1. Simulation circuit.

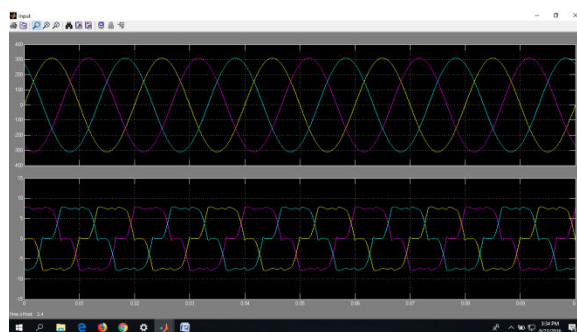
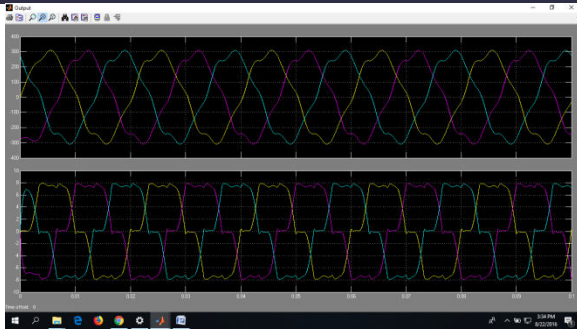
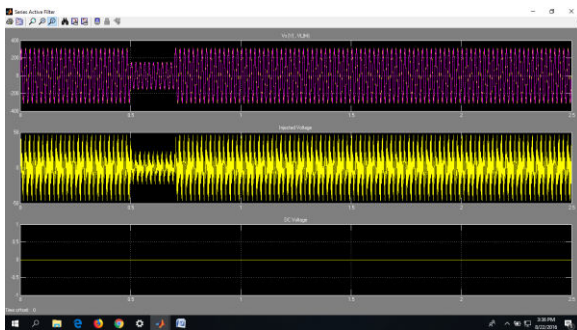


Fig.4.2. Grid side voltage and current.



**Fig.4.3. Load side voltage and currents.**



**Fig.4.3. Voltage disturbances.**

## 5. CONCLUSION:

The efficiency and unique crossbreed DVR system geography has actually been evaluated experimentally as well as revealed to properly supply voltage payment for temporary droops as well as long-lasting under-voltages. A model system has actually been established which shows an efficient technique of interfacing SMES and also battery power storage space systems to sustain a 3 stage lots. The system has actually been revealed to autonomously prioritise using the temporary power storage space system to sustain the tons throughout deep, temporary voltage droops and also a battery for reduced deepness, lasting under-voltages. This could have advantages in regards to enhanced voltage assistance

ability and also decreased expenses compared to a SMES-based system. Fringe benefits consist of lowered battery power ranking demand and also an anticipated renovation in battery life compared to a battery-only system because of decreased battery power biking as well as optimal discharge power

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Title: **WEAKLY-SUPERVISED DEEP EMBEDDING FOR PRODUCT REVIEW SENTIMENT ANALYSIS**

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Paper Authors

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## WEAKLY-SUPERVISED DEEP EMBEDDING FOR PRODUCT REVIEW SENTIMENT ANALYSIS

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**Abstract:** Sentiment analysis is one of the key challenges for mining online user generated content. In this work, we focus on customer reviews which are an important form of opinionated content. The goal is to identify each sentence's semantic orientation (e.g. positive or negative) of a review. Traditional sentiment classification methods often involve substantial human efforts, e.g. lexicon construction, feature engineering. In recent years, deep learning has emerged as an effective means for solving sentiment classification problems. A neural network intrinsically learns a useful representation automatically without human efforts. However, the success of deep learning highly relies on the availability of large-scale training data. In this paper, we propose a novel deep learning framework for review sentiment classification which employs prevalently available ratings as weak supervision signals. The framework consists of two steps: (1) learn a high level representation (embedding space) which captures the general sentiment distribution of sentences through rating information; (2) add a classification layer on top of the embedding layer and use labeled sentences for supervised fine-tuning. Experiments on review data obtained from Amazon show the efficacy of our method and its superiority over baseline methods.

### I. INTRODUCTION

With the booming of Web 2.0 and e-commerce, more and more people start consuming online and leave comments about their purchase experiences on merchant/review Websites. These opinionated contents are valuable resources both to future customers for decision-making and to merchants for improving their products and/or service. However, as the volume of reviews grows rapidly, people have to face a severe information overload problem. To alleviate this problem, many opinion mining techniques have been proposed, e.g. opinion summarization [Hu and Liu, 2004; Ding et al., 2008], comparative analysis [Liu et al., 2005]

and opinion polling [Zhu et al., 2011]. A key component for these opinion mining techniques is a sentiment classifier for natural sentences. Popular sentiment classification methods generally fall into two categories: (1) lexicon-based methods and (2) machine learning methods. Lexicon-based methods [Turney, 2002; Hu and Liu, 2004; Ding et al., 2008] typically take the tack of first constructing a sentiment lexicon of opinion words (e.g. "good", "bad"), and then design classification rules based on appeared opinion words and prior syntactic knowledge. Despite effectiveness, this kind of methods require substantial efforts in lexicon construction and rule design. Furthermore, lexicon-based

well handle implicit opinions, i.e. objective statements such as “I bought the mattress a week ago, and a valley appeared today”. As pointed out in [Feldman, 2013], this is also an important form of opinions. Factual information is usually more helpful than subjective feelings. Lexicon-based methods can only deal with implicit opinions in an ad-hoc way [Zhang and Liu, 2011]. A pioneering work [Pang et al., 2002] for machine learning based sentiment classification applied standard machine learning algorithms (e.g. Support Vector Machines) to the problem. After that, most research in this direction revolved around feature engineering for better classification performance. Different kinds of features have been explored, e.g. n-grams [Dave et al., 2003], Part-of-speech (POS) information and syntactic relations [Mullen and Collier, 2004], etc. Feature engineering also costs a lot of human efforts, and a feature set suitable for one domain may not generate good performance for other domains [Pang and Lee, 2008]. In recent years, deep learning has emerged as an effective means for solving sentiment classification problems [Glorot et al., 2011; Kim, 2014; Tang et al., 2015; Socher et al., 2011; 2013]. A deep neural network intrinsically learns a high level representation of the data [Bengio et al., 2013], thus avoiding laborious work such as feature engineering. A second advantage is that deep models have exponentially stronger expressive power than shallow models. However, the success of deep learning heavily relies on the availability of large-scale training data [Bengio et al., 2013; Bengio, 2009]. Constructing large-scale labeled training datasets for sentence level sentiment classification is still very laborious. Fortunately, most merchant/review Websites allow customers to summarize their opinions by an

overall rating score (typically in 5-stars scale). Ratings reflect the overall sentiment of customer reviews and have already been exploited for sentiment analysis [Maas et al., 2011; Qu et al., 2012]. Nevertheless, review ratings are not reliable labels for the constituent sentences, e.g. a 5-stars review can contain negative sentences and we may also see positive words occasionally in 1-star reviews. An example is shown in Figure 1. Therefore, treating binarized ratings as sentiment labels could confuse a sentiment classifier for review sentences. In this work, we propose a novel deep learning framework for review sentence sentiment classification. The framework leverages weak supervision signals provided by review ratings to train deep neural networks. For example, with 5-stars scale we can deem ratings above/below 3-stars as positive/negative weak labels respectively. It consists of two steps. In the first step, rather than predicting sentiment labels directly, we try to learn an embedding space (a high level layer in the neural network) which reflects the general sentiment distribution of sentences, from a large number of weakly labeled sentences. That is, we force sentences with the same weak labels to be near each other, while sentences with different weak labels are kept away from one another. To reduce the impact of sentences with rating-inconsistent orientation (hereafter called wrong-labeled sentences), we propose to penalize the relative distances among sentences in the embedding space through a ranking loss. In the second step, a classification layer is added on top of the embedding layer, and we use labeled sentences to fine-tune the deep network. Regarding the network, we adopt Convolutional Neural Network (CNN) as the basis structure since it achieved good performance.

sentiment classification [Kim, 2014]. We further customize it by taking aspect information (e.g. screen of cell phones) as an additional context input. The framework is dubbed Weakly-supervised Deep Embedding (WDE). Although we adopt CNN in this paper, WDE also has the potential to work with other types of neural networks. To verify the effectiveness of WDE, we collect reviews from Amazon.com to form a weakly labeled set of 1.1M sentences and a manually labeled set of 11,754 sentences. Experimental results show that WDE is effective and outperforms baselines methods.

## II. RELATED WORK

Sentiment analysis is a long standing research topic. Readers can refer to [Liu, 2012] for a recent survey. Sentiment classification is one of the key tasks in sentiment analysis and can be roughly categorized as document level, sentence level and aspect level. Our work falls into the last category since we consider aspect information. In the next we review two subtopics closely related to our work.

### Deep Learning for Sentiment Classification:

In recent years, deep learning has received more and more attention in the sentiment analysis community. Researchers have explored different deep models for sentiment classification. Glorot et al. used stacked denoising auto-encoder to train review representation in an unsupervised fashion, in order to address the domain adaptation problem of sentiment classification [Glorot et al., 2011]. Socher et al. [Socher et al., 2011; 2012; 2013] proposed a series of Recursive Neural Network (RecNN) models for sentiment classification. These methods learn vector representations of variable-length sentences through compositional computation

recursively. Kim investigated using CNN for sentence sentiment classification and found it outperformed RecNN [Kim, 2014]. A variant CNN with dynamic k-max pooling and multiple convolutional layers was proposed in [Kalchbrenner et al., 2014]. Researchers have also investigated using sequential models such as Recurrent Neural Network (RNN) and Long Short Term Memory (LSTM) for sentiment classification [Tang et al., 2015]. However, none of the above works tried to use review ratings to train deep sentiment classifiers for sentences. This is not a trivial problem since ratings are too noisy to be used directly as sentence labels (see Section 3 and experiments for discussions of this issue). To our knowledge, The WDE framework is the first attempt to make use of rating information for training deep sentence sentiment classifiers. Note that although we choose CNN as the deep model due to its competitive performance on sentiment classification [Kim, 2014], the idea of WDE could also be applied to other types of deep models. The major contribution of this work is a weakly supervised deep learning framework, rather than specific deep models.

### Exploiting Ratings in Sentiment Classification:

Rating information has been exploited in sentiment classification. Qu et al. incorporated ratings as weak labels in a probabilistic framework for sentence level sentiment classification [Qu et al., 2012]. However, their method still required careful feature design and relied on base predictors. While our method automatically learns a meaningful sentence representation for sentiment classification. Tackström and McDonald used conditional random fields to combine review level and sentence level sentiment labels for sentence sentiment classification.

This method also required feature engineering. Maas et al. [Maas et al., 2011] proposed to learn sentiment-bearing word vectors by incorporating rating information in a probabilistic model. For sentiment classification, they simply averaged the word vectors of a document as its representation. A similar work is [Tang et al., 2014], which developed a variant of the C&W neural model [Collobert et al., 2011] for learning sentiment-bearing word vectors from weak tweet labels derived from emoticons. The tweet representation was obtained by min, max and avg pooling on word vectors. Although this kind of methods can generate sentence representations automatically, the representations were derived by simple pooling of the learned word vectors. In comparison, our method generates a sentence representation by feeding word vectors through an expressive deep neural network. Moreover, we directly optimize sentence representation, rather than word vectors. We take the above two methods as baselines in experiments.

### III. METHODOLOGY

**Weakly-supervised Deep Embedding:** The classic deep learning methods take an “unsupervised training then supervised fine-tuning” scheme, where restricted Boltzmann machines (RBM) or auto-encoders are used to pre-train network parameters from large quantities of unlabeled data [Bengio, 2009]. This works well when the data distribution is correlated with label prediction [Bengio, 2009]. Nevertheless, in sentiment analysis the word co-occurrence information is usually not well correlated with sentiment prediction [Maas et al., 2011], which motivates us to exploit large-

scale rating data for training deep sentiment classifiers.

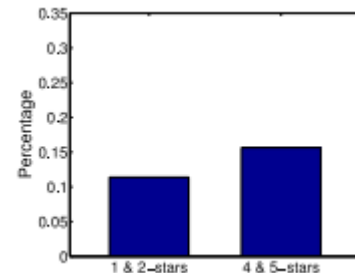


Figure 1: Percentages of wrong-labeled sentences by ratings in our labeled review dataset. The overall percentage is 13.4%.

However, ratings are noisy labels for review sentences and would mislead classifier training if directly used in supervised training. In this paper, we adopt a simple rule to assign weak labels to sentences with 5-stars rating scale:  $\hat{s} = \rightarrow$  pos, if  $s$  is in a 4 or 5-stars review neg, if  $s$  is in a 1 or 2-stars review, (1) where  $\hat{s}$  denotes the weak sentiment label of sentence  $s$ . Figure 2 shows the percentages of wrong-labeled sentences by  $\hat{s}$ , estimated in our labeled review dataset (detailed description of the dataset is in Section 4.1). We can see the noise level is moderate but not ignorable. The general idea behind WDE is that we use large quantities of weakly labeled sentences to train a good embedding space so that a linear classifier would suffice to accurately make sentiment predictions. Here good embedding means in the space sentences with the same sentiment labels are close to one another, while those with different labels are kept away from each other. In the following, we first present the network architecture, and then discuss how to train it with largescale rating data, followed by supervised fine-tuning on labeled sentences.

**Network Architecture:** The network architecture, depicted in Figure 3, is a variant of the CNNs described in [Collobert et al., 2011; Kim, 2014]. In what follows, we use upper case bold letters such as  $W$  to denote matrices and lower case bold letters such as  $x$  to denote column vectors. The  $i$ -th element in vector  $x$  is denoted by  $x(i)$ .

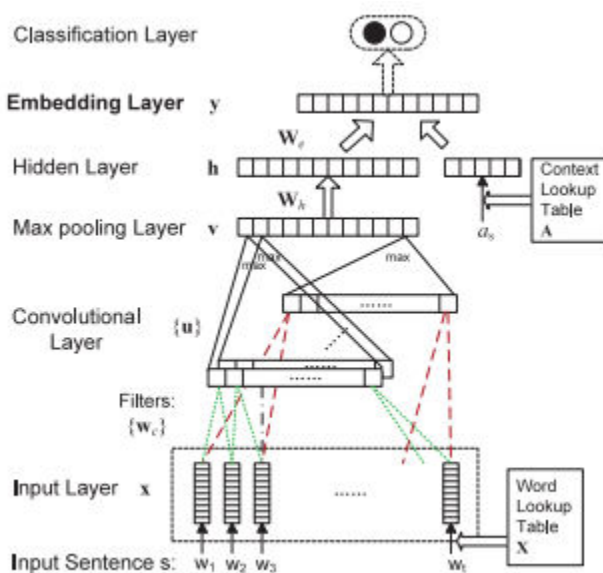


Figure 2: The CNN network architecture for sentence sentiment classification.

**Input Layer:** An input sentence of length  $t$  is a word sequence  $s = \langle w_1 w_2 \dots w_t \rangle$ . Each word  $w$  in the vocabulary is described by a word vector  $x$ . Let  $k$  be the length of  $x$  and  $n$  be the total number of words in the vocabulary. The trainable word lookup table  $X$  is then a  $k \rightarrow n$  matrix with word vectors as its columns. The input layer simply maps  $s = \langle w_1 w_2 \dots w_t \rangle$  to its corresponding word vector representation  $\langle x_1 x_2 \dots x_t \rangle$ . The lookup table is initialized using the publicly available 300-dimensional word vectors trained on 100 billion words from Google News by word2vec [Mikolov et al., 2013]. Out-of-sample words are initialized

randomly. **Convolutional Layer and Max pooling Layer:** The convolutional layer applies a set of filters on the sentence. Each filter  $w$  of size  $h$  is applied to a window of  $h$  words to produce a local feature value.

This pooling scheme keeps the most important indicator of a feature and naturally leads to a fixed-length vector output  $v$  at the max pooling layer. A filter with window size  $h$  is intrinsically a feature extractor which performs “feature selection” from the  $h$ -gram features of a sentence. When the input  $h$ -gram matches its  $w$ , we will obtain a high feature value, indicating this  $h$ -gram activates the feature. This resembles the traditional feature selection in sentiment classification [Pang and Lee, 2008], but is done automatically by the network. Since traditional machine learning based methods often exploit unigrams, bigrams and trigrams [Pang and Lee, 2008], we also employ filters with different window sizes, i.e.  $h = 1, 2, 3$ .

**Hidden Layer and Embedding Layer:** The fixed-length feature vector  $v$  is then fed to the fully connected hidden layer and embedding layer to extract nonlinear higher level features.

The embedding layer gets its input from two sources: the output of the hidden layer  $h$ , and context vector as of sentence  $s$ . A context vector is the semantic representation of an aspect that customers can comment on with respect to a sort of entities. For instance, battery life is an aspect for cell phones. The motivation for incorporating aspect information as the context of a sentence is that similar comments in different contexts could be of opposite orientations, e.g. “the screen is big” vs. “the size is big”. Context vectors of all aspects are initialized using the context lookup table  $A$  (as

**Supervised Fine-tuning:** After obtaining a good enough sentence representation by the embedding layer, we add a classification layer on the top (Figure 3) to further train the network using labeled sentences. The classification layer simply performs standard affine transformation of the embedding layer output  $y$  and then applies a softmax activation function [Bishop, 2006] to the result for label prediction. In this work, we focus on binary sentiment prediction (i.e. positive or negative) since we only consider sentences which comment on specific aspects of an entity. These kinds of sentences hardly contain neutral sentences. Nevertheless, WDE could also be adapted to multi-class prediction problems. For binary prediction, the classification layer is equivalent to a logistic regression model. We train the network using standard SGD, since AdaGrad can easily “forget” the prior model learned in the first phase.

**Varying the Size of Training Set:** Next we examine the impact of the size of labeled training data on each method’s performance. CNN-weak and Lexicon are not involved since they do not depend on labeled training data. We randomly select  $d\%$  training data to train the classifiers and test them on the test set, with  $d$  ranging from 10 to 90. For each  $d$ , we generate the training set 30 times and the averaged performance is reported. Figure 5 shows the results. We can see that as the number of available training instances decreases, the performance of CNNrand, NBSVM and SVM drops faster than that of WDE, SSWE and SentiWV. This should be because the latter methods have gained prior knowledge about the sentiment distribution through pre-training, though with different capabilities. With 10% training set (nearly 600 instances), WDE can

still achieve around 80% accuracy on the test set. According to t-test, WDE significantly outperforms the other methods with  $p$ -value  $< 0.01$ .

## CONCLUSIONS

In this work we proposed a novel deep learning framework named Weakly-supervised Deep Embedding for review sentence sentiment classification. WDE trains deep neural networks by exploiting rating information of reviews which is prevalently available on many merchant/review Websites. The training is a 2-step procedure: first we learn an embedding space which tries to capture the sentiment distribution of sentences by penalizing relative distances among sentences according to weak labels inferred from ratings; then a softmax classifier is added on top of the embedding layer and we finetune the network by labeled data. Experiments on reviews collected from Amazon.com show that WDE is effective and outperforms baseline methods. For future work, we will investigate applying WDE on other types of deep networks and other problems involving weak labels.

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