ScienceDirect

Biomedical Signal Processing and Control
Volume 43, May 2018, Pages 31-40

An evolutionary programming approach for securing medical images using watermarking scheme in invariant discrete wavelet transformation

Y. Gangadhar [a], V.S. Giridhar Akula [b], P. Chenna Reddy [c]

Show more

Outline | Share | Cite

https://doi.org/10.1016/j.bspc.2018.02.007

Highlights

- The proposed watermarking scheme utilized improved discrete wavelet transformation (IDWT) to retrieve the invariant wavelet domain.
- The entropy mechanism is used to identify the suitable region for insertion of watermark. This will improve the imperceptibility and robustness of the watermarking procedure.
- The scaling factors such as PSNR and NC are considered for evaluation of the proposed method and the Particle Swarm Optimization is employed to optimize the scaling factors.

Abstract

The importance of digital images in the field of health care made major impact in the recent years. There is need for protecting the medical images from unauthorized usage and watermarking serves well in this situations. Digital medical Image watermarking is the procedure of protecting the medical image content by inserting the watermark into it. The major objective of the image watermarking technique is to develop an algorithm with high imperceptibility. To achieve this, this paper proposed the image watermarking algorithm in wavelet transformation (IDWT) using the singular value decomposition (SVD) and particle swarm optimization (PSO). The improved DWT is applied to the medical image to retrieve the invariant wavelet domain. The watermark is inserted in to the selected region by modifying the values of the coefficients in the image using threshold function. The scaling factors are optimized using the PSO algorithm. The performance of the proposed model is evaluated using the existing schemes similar to the properties of the proposed model. The normalized coefficient (NC) and Peak Signal to Noise Ratio (PSNR) is considered to evaluate the similarity between the medical image and watermarked medical image. The proposed algorithm showed improved performance in terms of imperceptibility and robustness.

Previous Next

Keywords

Watermarking; Scalability; Particle swarm optimization; Authentication; Normalized coefficient

An enhanced time efficient technique for image watermarking using ant colony optimization and light gradient boosting algorithm

2022, Journal of King Saud University - Computer and Information Sciences

> *Citation Excerpt :*
>
> ...Despite these advantages, the major limitation is large memory requirements to store the observational data. Gangadhar et al. (2018) and Makbol et al. (2017), they proposed an image watermarking wavelet transformation method using SVD and particle swarm optimization for addressing multi scaling factors in image watermarking. Both of these approaches are robust and imperceptible against most of the attacks....

Show abstract

Robust SVD-based schemes for medical image watermarking

2021, Microprocessors and Microsystems

Show abstract

A DWT-SVD based adaptive color multi-watermarking scheme for copyright protection using AMEF and PSO-GWO

2021, Expert Systems with Applications

Show abstract

DCT & DWT based watermarking scheme for medical information security

2021, Biomedical Signal Processing and Control

Show abstract

Double-encrypted watermarking algorithm based on cosine transform and fractional Fourier transform in invariant wavelet domain

2021, Information Sciences

Show abstract

View all citing articles on Scopus

View full text

ACCENT JOURNAL OF ECONOMICS ECOLOGY & ENGINEERING
Peer Reviewed and Refereed Journal IMPACT FACTOR: 2.104(INTERNATIONAL JOURNAL)
Vol. 02, Issue 12, December 2017 Available Online: www.ajeee.co.in/index.php/AJEEE

CONCEPTUAL RESEARCH BASED ON CONVERGENCE REGION WITH AN INCREASING POLYNOMIAL UNDER WINDOWED FIR FILTER USED SOFTWARE TECHNIQUE

Mrs. I. Swapna
Assoc. Prof., Computer Science Engg., Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India
Mrs. K. Indumathi
Asst. Prof., Computer Science Engg., Princeton Institute of Engg. and Technology For Womens, Hyderabad, Telangana, India

Abstract- This work developed a control algorithm for dynamical systems to high performance manner, in a way to produce an optimum output applying a modification in digital filters, capable of increasing the convergence zone within the desired cut -off frequency. Such task focused on consistently improving the challenge present in digital filters, which are time-invariant linear systems that are able to modify connected input signal characteristics, where only a specific signal component of the frequency is able to reach the filter output. In dynamic systems, digital filters are applied to optimize system measurements with respect to performance and stability. This work, through C and C# coding demonstrates a modification to windowed low-pass filters within the π sample space. The π sample space is divided, and small parts of the equation are added into a polynomial of degree n; this technique removes unwanted frequency components in small angular frequency windows, causing acceleration of the signal with respect to the windowed low-pass filter.
Keywords: Control Algorithm, Software Development.

1. INTRODUCTION

The unceasing challenge to improve digital signals accuracy and performance requires a software and processing time capabilities that are met only by costly hardware employment. Therefore, it brings several practical financial business limitations to most of industries from telecommunications, to cars, to machines present manufacturing in industrial site and any other system that demands digital signal processing within better boundaries and in less time. This work shows a software-based control algorithm solution that can be implemented requiring low- cost hardware and that can be embedded to almost every device with a digital filter that processes signals aimed to increase precision, reduce processing time and increase productivity with a 50% improvement in the cut-off frequency convergence in FIR filter type low pass. This algorithm

creates, to the best of our knowledge, a comprehensive new solution that can be applied to solve, in a satisfactory manner, the defies that lie ahead the digital signal processing task, i.e. filters. The work was developed using C low-level programming language and C# to computationally achieve the objective. It is alto interesting to point out that using this programmable technique an increase of 48.8% in standard deviation gain.

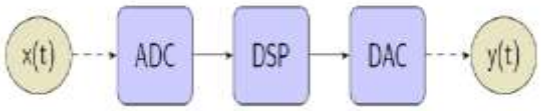


Fig. 1 Architecture of a digital filter

Fig. 2 Summary of the architecture of a digital filter

Continuous- or discrete-time signals can assume any amplitude value within finite or infinite space (i.e., they are continuous with respect to the amplitude values). Digital signals are discrete with respect to both time and amplitude. Thus, it can assume values within a finite set of possible values (Avenhaus, 1972).

Signals can be deterministic or random; any signal that can be specified by a mathematical equation, data table or well-defined rule is called a deterministic signal. However, in practical applications, signals cannot be accurately represented by mathematical equations or complex descriptions. This behavior indicates signals that are unpredictable in time, which are called random signals (Belevitch, 1968).

2. SAMPLING THEOREM

In general, discrete-time signals can be conceived in different ways. The most common and applicable way is to carry out a representation of the continuous-time signals. This occurs when digital signal processing is carried out through a sequence obtained within a sample space. Within this sample space, readings are performed (i.e., the sample acquisition); the quantity of samples, based on the frequency that the signal resonates at, determines the precision and repeatability of its reconstitution. Accordingly, in a sample space, we obtain a sequence x[n] that is obtained from continuous-time signal (Bomar et al., 1997).

To carry out such a process, it is necessary to implement an ADC converter. An ADC converter is a very important element: it

samples and quantizes the values of a continuous- time signal (TAGHOUTI, 2010). Accordingly, it is necessary for evaluating parameters, such as the quantization of the output, linearity, resolution and sampling frequency. During ADC conversion, it is necessary to choose a discrete number of samples from the continuous signal to be processed.

The main problem in this field is the choice of the number of samples; a reduced number of samples different from the demand may result in a distorted representation of the signal (Boyd and Vandenberghe, 2004). Accordingly, criterion when choosing the reconstitution frequency can be determined by using the Nyquist-Shannon theorem, where the sampling frequency is at least twice the fundamental frequency of the discrete-time signal. In practical terms, due to the sampling time (Senthilkum and Natarajan, 2008), a frequency that extrapolates the fundamental frequency of the signal is often applied, thus generating points between smaller intervals and ensuring a reliable reconstitution (Burrus and Parks, 1970).

2.1 Digital Filters

A discrete-time system is mathematically defined as the execution of a transformation that maps an input sequence x[n] into an output sequence y[n] (PANICH, 2010). During digital signal processing, this procedure is generally intended for the manipulation of a signal; as an example, one can apply a system for checking weight in a dynamic form, where the variable that is important to the system is the weight, which is a DC component represented by a load cell. However, such acquisition requires the removal of unwanted components, such as vibrations generated by motors, rollers, bearings and conveyors, as well as electrical and electromagnetic noise that is present in the process (Butterweck, 1975).

3 FIR FILTERS

The architecture of an FIR filter (finite impulse response filter) (AMIN, 2011) has a general and regular behavior, since its coefficients are defined. These coefficients are defined by the choice of behavior required for the process or application. In a measurement system, as mentioned above, the DC component is interesting for the weight reconstitution: it allows low-pass type filters to be applicable, where the pass-band is limited as a loworder frequency that tends towards the DC level (with a frequency equal to 0) (Butterweck et al., 1984). The architecture of an FIR filter can be seen in Fig. 3.

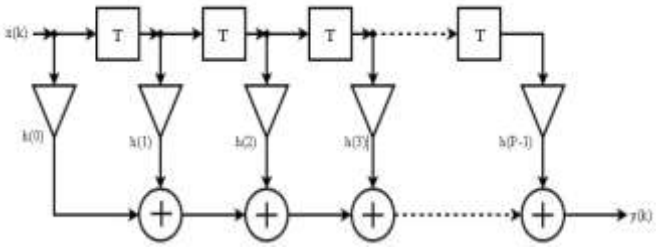


Fig. 3 Architecture of an FIR filter

FIR filters can implement different functions by simply changing their coefficients and performing as low-pass, high-pass, band-pass or band-stop filters. For practical applications, filters do not have ideal characteristics, and their responses may contain ripples in a certain transition band. Accordingly, it can be said that even with the implementation of filters, an ideal response is not obtained when analyzing their spectra

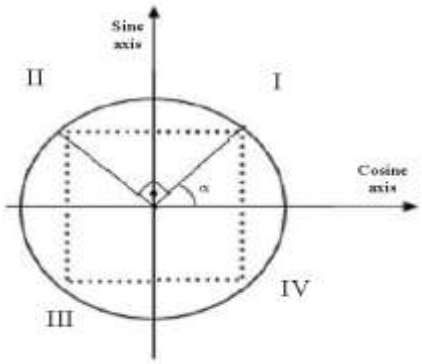


Fig. 4 Full 2radian spectrum

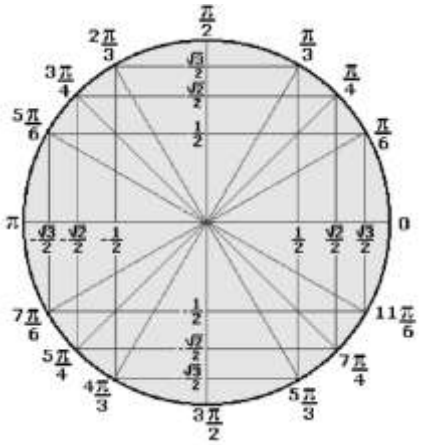


Fig. 5 Full 2radian spectrum divided into smaller points

4 IMPLEMENTATION AND RESULTS

For development and execution of this work, the following software and equipment were used: the Visual Studio compiler (C# platform), a library with the purpose of mathematical/graphical development, and proofing by comparing the state-of-the-art techniques available (i.e., Hamming, Hann and Blackman)

with the methods proposed in this study. For the application of the Visual Studio compiler with the DSPLab library, a tool is developed that is capable of carrying out digital filters, which provides a greater number of tests and comparisons by applying deterministic signals that have control of the following parameters:

a. Analog source
    a. Sine
b. Amplitude (V)
c. Signal frequency (Hz)
d. Sampling frequency (Hz)
e. Digital analog converter resolution (bits)
f. Level (Vpp)
g. Choice of digital filter (e.g., a state-of-the-art filter or a filter with application of the polynomial)
- Hamming-windowed low-pass filter
- Hann-windowed low-pass filter
- Blackman-windowed low-pass filter

h. Selection of the cutoff frequency applied to the digital filter
i. Digital filter dimension (M)
j. Visualization of the response in the time domain
k. Visualization of the response in the frequency domain.

5. CONCLUSION

Based on the results obtained, the behavior of signals in the time domain and the frequency domain there is a possibility of reducing the group delay (Oppenheim and Schafer, 2010), once the zone of convergence is increased, allowing the reduction of taps (Oppenheim and Schafer, 2010). This feature is of paramount importance, reducing computational effort as well as obtaining tangible values more quickly. In this way, it allows the increase of operation speed in dynamic systems. And, for the three proposed tests, i.e., Hamming window, Hann window and Blackman window, it is possible to observe the change in response in both the time domain and the frequency domain with a 50% gain in the frequency domain. For the Hamming and Blackman windows, it is possible to observe attenuation of the response by rejecting the unwanted frequency more efficiently. In the frequency domain, the best slope for the cut-off frequency in the first conduction lobe can be observed. Additionally, in these cases, windows behave with a larger spectrum and thus demonstrate the largest number of stable samples. In the case of the Hann window, the response to the frequency domain is more efficient, with the first driving lobe sloping the cut-off frequency more accurately. However, due to the gain, we obtain a greater amplitude than the state-of-the-art response for the time domain. The spectrum response was also shown to be more efficient by demonstrating an increased number of stable samples. With

respect to the behavior of the poles and the zeros, an interesting characteristic observed is the inclination of the poles to always tend towards the unit radius (independent of the number of M coefficients). This fact indicates an improved response with respect to the target (i.e., reduced distortion). It is still necessary to analyze practical tests with the proposed case studies in this study by checking samples and calculating averages and standard deviations to verify whether the polynomial shows improved efficiency. In practical cases, implemented in checkweigher with mass 36.2g with filter implemented in art state obtains standard deviation of 0.2696, with polynomial for the standard deviation of 0.1318.

This factor represents an improvement of 48.88%. With speeds until 200 packages per minute in a belt with 250 mm of length. It is also necessary to test other windows in future studies, as well as other features (e.g., changing the filter type). With these tests, the efficiency of other applications could be determined, such as digital TV, aerospace studies, image segmentation, and other applications (i.e., any application that uses digital filters). An interesting topic to be developed in future studies is the implementation of a "Code Generator" with the "IPT_Filter_Design" tool, which could export coefficients together with the First-In-First-Out (FIFO) structure for application in industrial processes by using a Programmable Logic Controller (PLC) or microprocessor.

REFERENCES

1. Adams, J.W. and A.N. Willson Jr., 1983. Anew approach to FIR digital filters with fewer multipliers and reduced sensitivity. IEEE Trans. Circuits Syst., CAS-30: 277-83. DOI: 10.1109/TCS.1983.1085356
2. Adams, J.W. and A.N. Willson Jr., 1984. Some efficient digital prefilter structures. IEEE Trans. Circuits Syst., CAS-31: 260-5. DOI: 10.1109/TCS.1984.1085492
3. Ahmed, N., T. Natarajan and K.R. Rao, 1974. Discrete cosine transform. IEEE Trans. Computers, C-23: 90-3. DOI: 10.1109/T-C.1974.223784
4. Akansu, A.N. and M.J. Medley, 1999. Wavelets, Subband and Block Transforms in Communications and Multimedia. Boston, MA: Kluwer Academic Publishers.
5. AMIN, 2011. Hardware approach of a multipurpose finite impulse response filter for real-time filtering applications. Am. J. Applied Sci., 12: 1272-1281. DOI: 10.3844/ajassp.2011.1272.1281
6. Antoniou, A. and M.G. Rezk, 1977. Digital filters synthesis using concept of generalize dimmitance converter. IEEE Trans. Circuits Syst., CAS-27: 1184-94. DOI: 10.1109/TCS.1980.1084766
7. Antoniou, A., 1982. Accelerated procedure for the design of equiripple nonrecursive digital filters. IEE Proceedings – Part G, 129: 1-10. DOI: 10.1049/ip-g-1.1982.0001
8. Antoniou, A., 1993. Digital Filters: Analysis, Design and Applications, 2nd Edn., New York, NY: McGraw-Hill.

9. Antoniou, A., 2006. Digital Signal Processing: Signals, Systems, and Filters. In: Practical Optimization: Algorithms and Engineering Applications New York, Antoniou, A. and W.S. Lu (Eds.), McGraw- Hill, New York.
10. Avenhaus, E., 1972. On the design of digital filters with coefficients of limited word length. IEEE Trans. Audio Electroacoustics, 20: 206-12.
11. Bauer, P.H. and J. Wang, 1993. Limit cycle bounds for floating point implementations of second-order recursive digital filters. IEEE Transactions Circuits Systems II: Analog and Digital Signal Processing, 40: 493-501. DOI: 10.1109/82.242338
12. Belevitch, V., 1968. Classical Network Theory. San Francisco, CA: Holden-Day.
13. Benvenuto, N., L.E. Franks and F.S. Hill, Jr., 1984. On the design of FIR filters with power-of-two coefficients. IEEE Trans. Communications, 32: 1299-307. DOI: 10.1109/TCOM.1984.1096001
14. Bimbi Jr. S., F. Agenor de Toledo, R. Ronaldo and V. Chaves de Oliveira, 2016a. Distortion reduction in FIR filters by approximation through window factor on function coefficients. Set Int. J. Broadcast Eng., 2: 1-9. DOI: 10.18580/setijbe.2016.3
15. Bimbi Jr. S., F. Agenor de Toledo, R. Ronaldo and V. Chaves de Oliveira, 2016b. Application of Distortion Reduction in FIR Filters in Dynamic Systems through Computational Methods. Set Int. J. Broadcast Eng., 2: 2446-9432. DOI: 10.18580/setijbe.2016.1
16. Bomar, B.W. and R.D. Joseph, 1987. Calculation of L∞ norms in second-order state-space digital filter sections. IEEE Trans. Circuits Syst., 34: 983-4. DOI: 10.1109/TCS.1987.1086231
17. Bomar, B.W., 1989. On the design of second-order statespace digital filter sections. IEEE Trans. Circuits Syst., 36: 542-52. DOI: 10.1007/978-1-4615-6199-6
18. Bomar, B.W., L.M. Smith and R.D. Joseph, 1997. Roundoff noise analysis of state-space digital filters implemented on floating-point digital signal processors. IEEE Trans. Circuits Systems II: Analog and Digital Signal Processing, 44: 952-5. DOI: 10.1109/82.644048
19. Boyd, S. and L. Vandenberghe, 2004. Convex Optimization. Cambridge, UK: Cambridge University Press. Bracewell, R. N. (1984). The fast Hartley transform. Proceedings IEEE, 72, 1010-18.
20. Burrus, C.S. and T.W. Parks, 1970. Time domain design of recursive digital filters. IEEE Transactions Audio Electroacoustics, 20: 137-41. DOI: 10.1109/TAU.1970.1162093
21. Butterweck, H.J., 1975. Suppression of parasitic oscillations in second-order digital filters by means of a controlled- rounding arithmetic. Archiv Elektrotechnik und Ubertragungstechnik, 29: 371-4.
22. Butterweck, H.J., van Meer, A.C.P. and G. Verkroost, 1984. New second-order digital filter sections without limit cycles. IEEE Trans. Circuits Syst., 31: 141-6. DOI: 10.1109/TCS.1984.1085477
23. Cabezas, J.C.E. and P.S.R. Diniz, 1990. FIR filters using interpolated prefilters and equalizers. IEEE Trans. Circuits Syst., 37: 17-23. DOI: 10.1109/31.45687
24. Oppenheim, A.V. and R.W. Schafer, 2010. Discrete- Time Signal Processing, 3rd Edn., Georgia: Pearson, pp: 1120.
25. PANICH, 2010. Indirect Kalman filter in mobile robot application. J. Mathematics Statistics, 6: 381-384. DOI: 10.3844/jmssp.2010.381.384

26. Senthilkum, A. and A.M. Natarajan, 2008. FPGA Implementation of power aware FIR filter using reduced transition pipelined variable precision gating. J. Computer Sci., 4: 87-94. DOI: 10.3844/jcssp.2008.87.94

27. TAGHOUTI, 2010. How to find wave-scattering parameters from the causal bond graph model of a high frequency filter. Am. J. Applied Sci., 7: 702-710. DOI: 10.3844/ajassp.2010.702.710

Vol.02, Issue 08, August 2017, ISSN -2456-1037 (INTERNATIONAL JOURNAL)

PROPERTIES AND CONCEPTS FOR NONLINEAR EQUATIONS USING DECOMPOSITION TECHNIQUE

G. Kavya
Asst. Prof, Deptt. of H & S, Princeton College Of Engineering and Technology for Women, Hyderabad, Telangana, India
G. Ram Narasaih
Asst. Prof, Deptt. of H & S, Princeton College Of Engineering and Technology for Women, Hyderabad, Telangana, India

Abstract. A systematic way is presented for the construction of multi-step iterative method with frozen Jacobian. The inclusion of an auxiliary function is discussed. The presented analysis shows that how to incorporate auxiliary function in a way that we can keep the order of convergence and computational cost of Newton multi-step method. The auxiliary function provides us the way to overcome the singularity and ill-conditioning of the Jacobian. The order of convergence of proposed *p*-step iterative method is *p* + 1. Only one Jacobian inversion in the form of LU-factorization is required for a single iteration of the iterative method and in this way, it ofiers an eficient scheme. For the construction of our proposed iterative method, we used a decomposition technique that naturally provides difierent iterative schemes. We also computed the computational convergence order that confirms the claimed theoretical order of convergence. The developed iterative scheme is applied to large scale problems, and numerical results show that our iterative scheme is promising.

Keywords: Systems of nonlinear equations, decomposition, order of convergence, higher order methods, computational efficiency.

1. INTRODUCTION

Nature is nonlinear, and that is why we find a large class of nonlinear problems in difierent disciplines of science, engineering, and technology. Most of the nonlinear phenomena are modeled in the form of nonlinear ordinary and partial difierential equations. The discretization of nonlinear ordinary and partial difierential equations provides the system of nonlinear equations. But many real-world scenarios can be modeled in the form nonlinear algebraic system of equations. So constructing eficient iterative algorithms for solving system of nonlinear equations is an efiective area of research. Let $\mathbf{F}(\mathbf{x}) = [F_1(\mathbf{x}), F_1(\mathbf{x}), \cdots, F_n(\mathbf{x})]^T = \mathbf{0}$ be a system of nonlinear equations, where $\mathbf{x} = [x_1, x_2, \cdots, x_n]^T$ and 0 is a column vector of zeros of size *n*. When we talk aboutto find simple zeros of system of nonlinear

equations, the first classical iterative method that comes into mind is the Newton-Raphson method [1, 2] that can be written as.

$$\begin{cases} x_0 = \text{initial guess} \\ F'(x_k)\,\phi = F(x_k) \\ x_{k+1} = x_k - \phi, \quad k = 0, 1, 2 \cdots . \end{cases}$$

The implementation of Newton method requires the non-singularity of Jacobian $\mathbf{F}'(fi)$ during iteration and, of course, the ill-conditioning of Jacobian also afiects the convergence. Recently, to improve the order of convergence of Newton method[1, 2], Gutirrez[8] and Sharma [20] proposed more robust and efficient methods. In reference [21], a new class of order five method has been proposed. Recently, some researchers have reported higher order class of multi-step iterative method[3{6] for solving system of nonlinear equations. The multi-step iterative method has the benefit that they utilize the LU factorization information of Jacobian and solve the involved system of linear equations repeatedly and provides a high order of convergence with less number of function evaluations. However, the proposed higher-order iterative methods are futile unless they have low computational cost. Therefore, the aim of developing new algorithms is to achieve as high as possible convergence order requiring as small as possible the evaluations of functions, derivativesand matrix inversions. Our work is a generalization of [7] to higher dimensions, i.e., systems of nonlinear equations. In the next section, we will describe our approach in more details.

The paper is organized as follows: Iterative methods for solving system of nonlinear equations are proposed in Section 2. In Section 3, convergence analysis is given. Finally, the results of numerical experiments of the proposed algorithm are reported in Section 4, and conclusions can get in Section 5.

2. ITERATIVE METHODS

The main aim of this section is to give our method. To obtain high order iterative methods for the system of nonlinear equations, we generalize [7]. Assume that is an initial guess in the vicinity of a root of the system of nonlinear equations. Let $G : \mathbb{R}^n \to \mathbb{R}^n$ be an

auxiliary function such that

$$\begin{cases} \mathbf{F}(\mathbf{x}) \odot \mathbf{G}(\mathbf{x}) = \mathbf{0} \text{ or} \\ F_i(\mathbf{x})\, G_i(\mathbf{x}) = 0, \quad i = 1, 2, \cdots, n, \end{cases}$$

Algorithm 2.1

Given x0(which can be computed by (21)), we can get the approximate solution xk+1 by the following way

$$[[\nabla F_i(\mathbf{x}_k)\, G_i(\mathbf{x}_k) + F_i(\mathbf{x}_k) \nabla G_i(\mathbf{x}_k)]^T]_{i=1}^n (\mathbf{x}_{k+1} - \mathbf{x}_k) = -[F_i(\mathbf{x}_k)\, G_i(\mathbf{x}_k)]_{i=1}^n,$$

for all $k = 0, 1, 2, \cdots$. For $m = 1$, the approximation becomes

$$\begin{aligned} \mathbf{x} \approx W_1 = \mathbf{x}_0 + \mathbf{x}_1 = \boldsymbol{\gamma} - [[\nabla F_i(\boldsymbol{\gamma})\, G_i(\boldsymbol{\gamma}) + F_i(\boldsymbol{\gamma}) \nabla G_i(\boldsymbol{\gamma})]^T]_{i=1}^n{}^{-1} [F_i(\boldsymbol{\gamma})\, G_i(\boldsymbol{\gamma})]_{i=1}^n \\ - [[\nabla F_i(\boldsymbol{\gamma})\, G_i(\boldsymbol{\gamma}) + F_i(\boldsymbol{\gamma}) \nabla G_i(\boldsymbol{\gamma})]^T]_{i=1}^n{}^{-1} [F_i(\mathbf{x}_0) G_i(\boldsymbol{\gamma})]_{i=1}^n. \end{aligned} \quad (22)$$

By (22), we can deduce the following two-step iterative method.

3. CONVERGENCE ANALYSIS

The convergence proofs of multi-step iterative with frozen Jacobian can be find in [3, 25]. In the following section, we will only show that, our prosed multi-step iterative schemes can be written in frozen Jacobian form. Once we have shown, we enjoy the convergence proofs from [3, 25]. We define a new function **Q**(Θ; **x**) with help of an auxiliary function **G**(Θ); such that **Q**(Θ; **x**) = diag (**G**(Θ))**F**(**x**), where diag(Θ) is the diagonal matrix. The first order Frfiechet derivative of **Q**(**x** Θ **x**) can be computed as

$$\begin{aligned} \mathbf{Q}'(\mathbf{x}, \mathbf{x}) &= \operatorname{diag}(\mathbf{G}(\mathbf{x}))\, \mathbf{F}'(\mathbf{x}) + \operatorname{diag}(\mathbf{F}(\mathbf{x}))\, \mathbf{G}'(\mathbf{x}) \\ &= \operatorname{diag}(\mathbf{G}(\mathbf{x})) \left(\mathbf{F}'(\mathbf{x}) + \operatorname{diag}(\mathbf{G}(\mathbf{x}))^{-1} \operatorname{diag}(\mathbf{F}(\mathbf{x}_k))\, \mathbf{G}'(\mathbf{x}) \right). \end{aligned} \quad (24)$$

Using Newton method to solve $\mathbf{Q}(\mathbf{x}, \mathbf{x}) = \mathbf{0}$, we state

$$\begin{aligned} \mathbf{x}_{k+1} &= \mathbf{x}_k - \mathbf{Q}'(\mathbf{x}_k, \mathbf{x}_k)^{-1}\, \mathbf{Q}(\mathbf{x}_k, \mathbf{x}_k) \\ &= \mathbf{x}_k - \left(\left(\mathbf{F}'(\mathbf{x}_k) + \operatorname{diag}(\mathbf{G}(\mathbf{x}_k))^{-1} \operatorname{diag}(\mathbf{F}(\mathbf{x}_k))\, \mathbf{G}'(\mathbf{x}_k) \right) \right)^{-1} \\ &\quad (\operatorname{diag}(\mathbf{G}(\mathbf{x}_k)))^{-1}\, \mathbf{Q}(\mathbf{x}_k, \mathbf{x}_k). \end{aligned} \quad (25)$$

Since $(\operatorname{diag}(\mathbf{G}(\mathbf{x})))^{-1}\, \mathbf{Q}(\mathbf{x}, \mathbf{x}) = (\operatorname{diag}(\mathbf{G}(\mathbf{x})))^{-1}\, diag(\mathbf{G}(\mathbf{x}))\, \mathbf{F}(\mathbf{x}) = \mathbf{F}(\mathbf{x})$, (25) can be written as

$$\mathbf{x}_{k+1} = \mathbf{x}_k - \left(\left(\mathbf{F}'(\mathbf{x}_k) + \operatorname{diag}(\mathbf{G}(\mathbf{x}_k))^{-1} \operatorname{diag}(\mathbf{F}(\mathbf{x}_k))\, \mathbf{G}'(\mathbf{x}) \right) \right)^{-1} \mathbf{F}(\mathbf{x}_k). \quad (26)$$

Choice of **G**(*fi*) is free, However, **G**(*fi*) and determinant of its first order Frfiechet derivative do not vanish during the course of iterative process. We can choose **G**(**x**) = $exp^{(-\boldsymbol{\alpha} \odot \mathbf{x})}$, where $\boldsymbol{\alpha} = [\alpha_1, \alpha_2, \cdots, \alpha_n]^T$. The Frfiechet derivative of **G**(**x**) is **G**′(**x**) = $-\text{diag}(\boldsymbol{\alpha})\,\text{diag}(\mathbf{G}(\mathbf{x}))$, ; and (26) can be written as

$$\mathbf{x}_{k+1} = \mathbf{x}_k - \left(\left(\mathbf{F}'(\mathbf{x}_k) - \text{diag}(\mathbf{G}(\mathbf{x}_k))^{-1}\,\text{diag}(\mathbf{G}(\mathbf{x}_k))\,\text{diag}(\boldsymbol{\alpha})\,\text{diag}(\mathbf{F}(\mathbf{x}_k))\right)\right)^{-1}\mathbf{F}(\mathbf{x}_k)$$

$$\mathbf{x}_{k+1} = \mathbf{x}_k - \left(\left(\mathbf{F}'(\mathbf{x}_k) - \text{diag}(\boldsymbol{\alpha} \odot \mathbf{F}(\mathbf{x}_k))\right)\right)^{-1}\mathbf{F}(\mathbf{x}_k). \tag{32}$$

Notice that the iterative schemes (29) and (30) correspond to Algorithm 2.2 and Algorithm 2.3.

4. CONCLUSION

The proposed frozen Jacobian multi-step iterative method is obtained via the generalization of article [7]. The classical Newton frozen Jacobian p-step iterative method [3, 25] has convergence order at least *p* + 1. We introduce an additive term in the frozen Jacobian in a way that we keep the computational cost and convergence order of Newton multi-step iterative method. The inclusion of auxiliary function benefits us in two ways, first remove the issue of Jacobian singularity and second provides a fast reduction in the solution error. We have shown that the difierent choices of the auxiliary function can provide us better accuracy and in some cases, we attain a very high order of convergence. The claimed theoretical order of convergences is confirmed by computing the computational order of convergences.

REFERENCES

1. J. M. Ortega, W. C. Rheinboldt, Iterative Solution of Nonlinear Equations in Several Variables, Academic Press, NewYork, 1970.
2. C. T. Kelley, Solving Nonlinear Equations with Newtons Method, SIAM, Philadelphia, 2003.
3. F. Ahmad, E. Tohidi, J. A. Carrasco, A parameterized multi-step Newton method for solving systems of nonlinear equations. Numerical Algorithms, (2015), 1017-1398.
4. F. Ahmad, E. Tohidi, M. Z. Ullah, J. A. Carrasco, Higher order multi-step Jarratt-like method for solving systems of nonlinear equations: Application to PDEs and ODEs, Computers & Mathematics with Applications, 70 (4) (2015), 624-636. http://dx.doi.org/10.1016/j.camwa.2015.05.012.
5. M. Z. Ullah, S. Serra-Capizzano, F. Ahmad, An eficient multi-step iterative method for computing the numerical solution of systems of nonlinear equations associated with ODEs, Applied Mathematics and Computation, 250 (2015), 249-259. http://dx.doi.org/10.1016/j.amc.2014.10.103.
6. E. S. Alaidarous, M. Z. Ullah, F. Ahmad, A.S. Al-Fhaid, An Eficient Higher-Order Quasilinearization Method for Solving Nonlinear BVPs ,Journal of Applied Mathematics, vol. 2013 (2013), Article ID 259371, 11 pages.
7. F. Ahmed Shah, M, Aslam Noor, Some numerical methods for solving

nonlinear equations by using decomposition technique, Appl. Math. Comput. 251 (2015) 378-386.

8. J. M. Gutirrez, M. A. Hernndez, A family of Chebyshev-Halley type methods in banach spaces. Bull. Aust. Math. Soc. 55 (1997) 113-130.
9. M. Palacios, Kepler equation and accelerated Newton method, J. Comput. Appl. Math. 138 (2002) 335-346.
10. S. Amat, S. Busquier, J. M. Gutierrez, Geometrical constructions of iterative functions to solve nonlinear equations. J. Comput. Appl. Math. 157 (2003) 197-205.
11. M. Frontini, E. Sormani, Some variant of Newtons method with third-order convergence, Appl. Math. Comput. 140 (2003) 419-426.
12. M. Frontini, E. Sormani, Third-order methods from quadrature formulae for solving systems of nonlinear equations, Appl. Math. Comput. 149 (2004) 771-782.
13. H. H. H. Homeier, A modified Newton method with cubic convergence: the multivariable case. J. Comput. Appl. Math. 169 (2004) 161-169.
14. M.T. Darvishi, A. Barati, A fourth-order method from quadrature formulae to solve systems of nonlinear equations. Appl. Math. Comput. 188 (2007) 257-261.
15. A. Cordero, J.R. Torregrosa, Variants of Newtons method using fifth-order quadrature formulas. Appl. Math. Comput. 190 (2007) 686-698.
16. M. A. Noor, M. Waseem, Some iterative methods for solving a system of nonlinear equations. Comput. Math. Appl. 57 (2009) 101-106.
17. M. Grau-Sanchez, A. Grau, M. Noguera, Ostrowski type methods for solving systems of nonlinear equations. Appl. Math. Comput. 218 (2011) 2377-2385.
18. J.A. Ezquerro, M.Grau-Sanchez, A. Grau, M.A. Hernandez, M. Noguera, N. omero, On iterative methods with accelerated convergence for solving systems of nonlinear equations, J. Optim. Theory Appl. 151 (2011) 163-174.
19. A. Cordero, J.L. Hueso, E. Martinez, J.R. Torregrosa, Increasing the convergence order of an iterative method for nonlinear systems, Appl. Math. Lett. 25 (2012) 2369-2374.
20. J.R. Sharma, R.K. Guha, R. Sharma, An eficient fourth order weighted-Newton method for systems of nonlinear equations, Numer. Algorithms 62 (2013) 307-323.
21. X Xiao,H Yin, A new class of methods with higher order of convergence for solving systems of nonlinear equations, Appl. Math. Comput. 264 (2015) 300-309.
22. E. D. Dolan and J. J. Morfie, Benchmarking optimization software with performance profiles, Mathematical Programming, 91(2002), 201-213.
23. V. Daftardar-Gejji, H. Jafari, An iterative method for solving nonlinear functional equations. J. Math. Anal. Appl. 316 (2006) 753-763.
24. J. H. He, Variational iteration method-some recent results and new interpretations. J. Comput. Appl. Math. 207 (2007) 3-17.
25. Sergio Amat, Sonia Busquier, ngela Grau, Miquel Grau-Sanchez, Maximum efficiency for a family of Newtonlike methods with frozen derivatives and some applications. Applied Mathematics and Computation 219 (2013) 7954-7963.
26. Xinyuan Wu, Note on the improvement of Newtons method for system of nonlinear equations. Applied Mathematics and Computation 189 (2007) 1476-1479.

Vol.02, Issue 08, August 2017, ISSN -2456-1037 (INTERNATIONAL JOURNAL)

FUZZY LOGIC BASED SPEED CONTROL OF BLDC MOTOR : AN ANALYTICAL STUDY

Dr. Ajmera Krishnamurthy
Associate Professor, ECE, Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India
Vidya Nagapuri
Assistant Professor, ECE, Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India

Abstract:- This work proposes a specific controller for Brushless DC motor and a comparative study has been reviewed with intelligent controllers like fuzzy logic controllers and Adaptive Neuron Fuzzy Inference system. A detailed analysis is done through simulation using Mat lab Simulink tool. The performance of Brushless DC motor is analysed and the dynamic characteristics of the motor is also observed .The system control parameters like peak overshoot, undershoot, rise time recovery time and steady state error are measured and their results are compared with the ANFIS and Fuzzy controllers. To validate the performance of the controller different conditions and loading criteria has been done.

Keywords:- Brushless DC (BLDC) motor, Adaptive Neuron Fuzzy Inference system (ANFIS), Fuzzy Tuned PID.

1. INTRODUCTION

Brushless DC motors are the best choice for different applications using motors where compactness and weight plays an important role. There are two categories of permanent magnet Brushless DC motor based upon the waveform obtained from the EMF equation called as brushless AC (BLAC) and brushless DC (BLDC) motors. The advantages of BLDC motors over conventional brushed DC motors and induction motors are low cost, reliable, easy control, good speed versus torque characteristics, dynamic response is high, efficiency is high, operating life is more, noiseless operation and wide range of speed. Since the BLDC motors are having number of advantages, these motors are widely used in many applications.

The Brushless dc motor provides the commutation operation, which controlled by the controllers. Because of the sectional structure of the controller mechanism, while the motor rotates, the current that is passing through the rotor windings also changes which creates some problems in brushless dc motors. Therefore, the function of the brush collector mechanism carried out by the controller. The various varieties of control schemes used

in BLDC motor are Proportional Integral Derivate (PID), Non-Adaptive Fuzzy logic controller (FLC) and Adaptive fuzzy logic controller. Fuzzy logic can considered as a mathematical theory and artificial intelligence used to simulate the human approach in the solution of various problems by using an approximate reasoning to relate data sets and to make decisions. It has been seen that compared to other classical controllers, fuzzy controllers are more reliable to plant parameter changes.

An Adaptive Neuron-fuzzy Inference system or adaptive network-based fuzzy inference system (ANFIS) is a category of artificial neural network that is using Takagi-Surgeon fuzzy inference system. ANFIS is the combination of both neural networks and fuzzy logic principles therefore; it integrates the benefits of both the soft computing techniques. Inference system consists of a set of fuzzy IF-THEN rules, which have the learning capability that is used to approximate functions, which are nonlinear. Since the performance of ANFIS is considered to be better it is also called as a universal estimator. For obtaining better results using the ANFIS, the controller can be optimized using the parameters obtained genetic algorithm. The organization of the paper is as follows: A Brushless DC motor is developed and its performance is improved by using adaptive Neuron Fuzzy Inference system (ANFIS).

2. CONSTRUCTION AND WORKING PRINCIPLE

Brushless dc motors belong to the category of synchronous motors. A BLDC motor uses electronic commutation using rotor position feedback and finds when to switch the current. These motors do not have slip as found in other induction motors.

2.1 Hall Sensors

To measure the rotor position, Hall Effect sensors are used. These sensors mounted in the motor senses the rotor position and communicate this signal to the electronic controller unit to rotate the motor at the right time and direction. The magnetic field is provided by the permanent magnet operates the Hall Effect sensors. These Hall Effect sensors also known as magnetic sensors decide when the motor should be operated to make the magnets move in the right direction. Depending on the combination of sensors and signal level, the commutation sequence will be formed.

3. THEORY OF OPERATION

Electric switches are used in brushless dc motor for commutation so that the motor runs continuously. Commutation provided by the brushless dc

motor depends on the feedback obtained from the rotor position which decides when to on the switches so as to create high torque. The accurate position is detected using a position sensor. The most commonly used position sensor is the Hall sensor. Almost all brushless dc motors have Hall sensors positioned in into the stator.

3.1 Mathematical Model Of Bldc Motor Drive

As the name implies, in brushless dc motor brushes are absent and therefore in this motor, electronic commutation is implemented by means of a drive amplifier that makes the switches to transfer current in the windings with respect to the feedback obtained from the rotor position. With this concept , the brushless dc motor can be can be said as equivalent to a commentator motor in which the conductors remain stationary and the magnet will be rotating.

3.2 Adaptive Neuron-Fuzzy Inference System (ANFIS) Based Controller

The general structure of ANFIS controller consists of the FIS block and the network block. The block consists of four main blocks and they are fuzzification, knowledge base, inference and defuzzification. The network block consists of five layers of processes. Layer 1 has input variables, which represents the membership functions in which triangular or bell shaped membership functions are commonly used. The function of layer 2 is to check the weights of each membership functions and receives the values from the first layer. The main function of layer 3 or rule layer is to perform the matching between the fuzzy rules. In addition, this layer calculates the activation function of each rule. The function of layer four is to obtain the defuzzified output. The function of the final layer or the output layer is to get the summed output of all the outputs coming from the previous layer, which results in a crisp value. The systems are modelled using Takagi-Surgeon (T-S) type systems and it should possess the following properties.

Firstly it must be a first order or zero order TS type system. The output obtained should be a single output using weighted average defuzzification method. The membership functions considered at the output should be of same type and it can be either a linear or a constant value. In addition, it should not possess rule sharing. This means that the same output membership function should not be shared by different rules. The number of output membership functions must be equal to the number of rules for each rule. The weight considered should be unity. For tuning, the ANFIS structure by automatic means least-square estimation and

the back propagation algorithm are used. Since this method is flexible, this ANFIS structure can be used for many control applications.

3.3 Modelling Of BLDC Motor

The brushless dc motor consists of a rotor with permanent magnets and three stator windings. Because of high resistivity of both magnets, rotor induced currents are neglected. The system is modelled base on the assumptions that the rotor induced currents and the iron and stray losses are neglected. The motor model was considered highly flexible because the modelling of brushless dc motor is done using the conventional modelling equations. The equations are derived based on the dynamic equivalent of the motor. It is also assumed that the resistances of all the windings are equal and there is no variation in the rotor reluctance.

4. FUZZY LOGIC CONTROLLER FOR BLDC MOTOR

Nowadays fuzzy logic have gained more interest in control applications. Fuzzy logic controller can be used for modelling non-linear systems. One of the main advantages of fuzzy logic controller its adaptive characteristics so that it is able to achieve robust performance to system having parameters variation with uncertainty and disturbances in load. Unlike conventional systems that are expressed in mathematical equations, Fuzzy logic systems are expressed using linguistic variables. The fuzzy logic controller performs fuzzification, fuzzification inference and defuzzification. The major function of the fuzzy logic is to scale the error speed obtained from PI controller.

4.1 Development of Simulink Model and Training of Anfis Controller Using Matlab:

Simulink model for the control of BLDC motor drive has been developed in MATLAB environment using the appropriate toolboxes. Below figure shows the Simulink model of the proposed controller. The Simulink model consists of DC supply, PWM inverter, motor measurement system, ANFIS controller, switching logic circuit and BLDC motor. The DC supply input is given to PWM inverter and output of the inverter is fed to the BLDC motor. Rotor position and speed are sensed by hall sensor and taco-generator model. The output of the taco generator is compared with reference speed error is obtained by differentiating the speed error. The speed error and the rate of change of speed error are given as input to the ANFIS speed controller.

5 SIMULINK MODEL FOR FUZZY LOGIC

Fuzzy logic Toolbox software is designed to work in Simulink environment. After creating the fuzzy system using the GUI tools

the system is embedded directly into a simulation. The ANFIS controller network is trained in off-line using MATLAB Simulink toolbox. The result of Fuzzy tuned PID controller is collected as the training data set. The input and output data obtained are modified into desired data based upon the desired output. The desired output will be trained using the function "ANFIS" in the MATLAB toolbox. From the training, a fuzzy inference system with adjusted membership functions has been obtained.

6 RESULTS

In this paper, for generating the initial membership function and for creating the input output training data sets the grid partitioning clustering methods are used. In this grid partitioning technique, each input variable exclusively determines the number of rules. In this system, two inputs and seven membership functions are considered, so that there are 49 if then rules. Hybrid learning algorithm is used which combines the effect of gradient descent and least square estimation for obtaining the parameters necessary for ANFIS. In each iteration there will be a forward and backward pass sequence. During forward pass, after giving an input data, the node outputs are updated every layer by layer until the final layer was reached. This process is repeated for all training input-output data sets, and then the resulting parameters are identified by least squares estimation. During backward pass, the derivative of the error signals with respect to each node propagates from the output towards the input. Finally, the gradient vector is accumulated for each training input-output data set.

At the end of the backward pass for all training data sets, the parameters are updated by gradient descent method. After the parameters updating are completed, proper set of membership function and rule base are selected for fuzzy inference system. After the rules are selected the firing of the control signal required to obtain the optimal output. To start simulations, first step is the identification process, i.e., the dynamic process of finding the input – output relations for a system.. To prevent the system from saturation condition, the input – output data set is processed through closed loop using fuzzy tuned PID controller. ANFIS based identifier has two inputs which are functions of the error signal and rate of change of error of the BLDC motor.

7 CONCLUSION

In this paper, a detailed analysis of brushless DC drive system has been performed by using fuzzy logic controller and Adaptive

Neuron-fuzzy Inference system (ANFIS) based controller. For the speed control of PMBLDC motor drive and analysis of results of the performance a fuzzy logic controller (FLC) has been employed. This paper explains the modelling and simulation of the complete drive system. Effectiveness of the model is obtained by the prediction of performance over a wide range of operating conditions. The simulation model which is implemented under MATLAB/ Simulink environment effectively considers the dynamic characteristics of the brushless dc motor. Furthermore, the control algorithms, FLC and ANFIS have been compared by using the developed model. It is seen that the desired real speed and torque values could be reached in a short time by ANFIS controller and comparison paved better result for rise time and setting time. The results show that the performance of the motor is improved by using FLC and ANFIS.

REFERENCES

1. G. Sakthival, T. S. Anandhi and S. P. Natarajan, "Real time implementation of DSP based Fuzzy logic controller for speed control of BLDC motor,"Int.Jou.Comp.App.vol.10, no.8.2010
2. K. Naga Sujatha, K. Vaisakh and Anand. G," Artificial Intelligence based speed control of brushless DC motor", IEEE trans.vol.10, no.4, 2010
3. Yen-Shin Lai, Yong- kai Lin," A unified approach to zero-crossing point detection of back EMF for brushless DC motor drives without current and hall sensors", IEEE Trans, Power Electron, vol. 26.no 6,2011.
4. Salih Baris Ozturk, Hamid A, Toliyatcai," Direct torque and indirect flux control of brushless DC motor", IEEE ASME Trans, Mech, 16, 2011.
5. Nikola Anand Sathyan, Youngjoo Milivojevic, Mahesh Lee," An FPGA-based novel digital PWM control scheme for BLDC motor drives", IEEE Trans.Ind.Electron.vol.56,no 6,2009.
6. M. R. Alizaedehpahlavani, M. Barakat," Comparison between fuzzy and adaptive fuzzy controllers for BLDC motors", IEEE trans.ppo1-08.2011.

Vol.02, Issue 08, August 2017, ISSN -2456-1037 (INTERNATIONAL JOURNAL)

AN ANALYTICAL BEHEAVIOUR OF ELECTRICAL DETECTION IN FERROMAGNET-SEMICONDUCTOR DEVICES

G.Sandya Rani
Assistant Professor, EEE, Princeton College of Engineering and Technology for Women, Hyderabad, Telangana, India
P.Pramada Kumari
Assistant Professor, EEE, Princeton College of Engineering and Technology for Women, Hyderabad, Telangana, India

A longstanding objective for exploration previously, semi conductor spintronics may be the capacity with inject modulate, also identify electron turn on a single device. A basic model comprises of a parallel semiconductor channel with two ferromagnetic contacts, a standout amongst which serves as a sourball for spin-polarized electrons and the other likewise an identifier in view of partake) energizes practically equivalent to metallic frameworks, two essential criteria have risen to demonstrating electrical identification for turn transport those main will be the estimation for an non-equilibrium turn number utilizing an “non-local” ferromagnetic identifier through which no accuse present flows. The possibility at the identification cathode if a chance to be touchy of the relative magnetizations of the identifier and the sourball electrodes, a property alluded should likewise that spin-valve impact a second also additional.

Thorough test may be the presence from securing a handle effect, which will be the regulation furthermore, concealment of the turn valve sign because of precession and rephrasing done a transverse attractive field 5, 8. Here we report card on the perception of both the turn valve also Hanley impacts to parallel units comprising about epitaxial Schottky tunnel boundary. Contacts on an n-doped GaAs channel that reliance looking into transverse attractive. Field, temperature, what’s more contact detachment are previously, beneficial assertion for a model incorporating turn float Furthermore dissemination turn transport may be distinguished for both directions about present stream through the sourball cathode.

Those sign of the electrical. Identification indicator is discovered with shift for that infusion present furthermore may be associated with those turn polarization in the GaAs channel confirmed by optical estimations. These effects thusly exhibit a completely electrical plan for turn injection; transport furthermore identification in a parallel semiconductor gadget. A schematic of the turn transport gadgets

Vol.02, Issue 08, August 2017, ISSN -2456-1037 (INTERNATIONAL JOURNAL)

utilized to these examinations may be indicated to the ferromagnetic-semiconductor (FS) gadgets need aid created starting with epitaxial. Fe/GaAs (100) hetero structures 9,10 the semiconductor channel will be an daintily n-doped GaAs player (n = 2 – 4 × 1016 cm-3, 2500 nm thick), what's more a scotty tunnel boundary may be framed at those interface between those fe (5 nm thick) and the GaAs Eventually Tom's perusing developing a doped (~ 5 × 1018 cm-3) GaAs move layer.

That vicinity of the Schottky tunnel obstructions considers effective electrical turn infusion what's more identification standards. Photolithography furthermore carving systems is used to define the channel furthermore with design those five fee electrodes, which bring ostensible extents from claiming 10 μm × 50 μm. The three national contacts bring a centre-to-centre dividing from claiming 12 μm, and the two wind contacts would 160 μm from the three focal contacts. Those attractive not difficult axes of the fe contacts need aid along those GaAs direction, which is parallel of the long axes of the contacts. Estimations once gadgets created from three diverse hetero structures, indicated A, B, also C, will a chance to be examined in this paper. The channel doping confirmed by H estimations toward 10 k are n =3. 5 × 1016 cm-3, 2.0 × 1016 cm-3, Also 2.5 × 1016 cm-3 for A, B, furthermore c separately.

That elucidation about electrical turn transport estimations camwood a chance to be muddled by magneto resistance in the electrodes, nearby effects, what's more other outward commitments of the signal. A “non-local” measurement minimizes these foundation impacts by setting a turn identification cathode outside the way of the charge current. That geometry will be indicated for spin-polarized electrons need aid injected under the GaAs channel toward. Contact what’s more stream towards contact a, same time those voltage Vde is measured the middle of contacts despite electrons stream from c with a, those non-equilibrium turn polarization over. GaAs, spoke to by the purple arrows on might diffuse previously, whichever heading starting with the sourball.

The turn polarization PGaAs brings about an electrochemical possibility distinction to the two turn states in the channel, prompting an transform done Vde the point when the charge about d may be switched from antiparallel on c's of the parallel setup. PGaAs during contact e, which will be 160 μm away, is dependably zero, thus the charge from claiming does not influence the estimation. The spin-valve estimation will be conveyed crazy toward clearing the attractive field along the attractive simple hub furthermore searching for a change. Over voltage through the limited field run in which contacts

Vol.02, Issue 08, August 2017, ISSN -2456-1037 (INTERNATIONAL JOURNAL)

furthermore d need aid antiparallel estimations from claiming Vde need aid demonstrated in the top banana board from claiming an field clear in present Iac = 1. 0 mama (electrons streaming from c's will an) in t = 50 k that crude information indicated over.

Those top banana board incorporate a counterbalance V0 = -30 227 mv (much bigger over those spin-dependent effects) coming about because of spreading of the accuse current in the GaAs channel and also foundation commitments that need aid straight furthermore quadratic on attractive field the foundation is fitted what's more subtracted starting with those crude data, yielding those curves demonstrated in the base board. Those two square hops for an extent of 16. 8 ± 0. 2 μV happen in the. Field run in which the magnetizations about contacts c what's more dare antiparallel. The information about those presence from securing an parallel turn valve impact those understanding from claiming spin-valve estimations once FS units in the two-terminal geometry need been subject should challenge, and past non-local measurements have not watched clear exchanging marks for example, the individuals in the greater part importantly,.

However, past estimations ahead FS gadgets have not showed precession of the turn the middle of those hotspot what's more identification electrodes those simplest show fate for this property may be those Handle effect in which those attractive field-dependence of the non-local. Voltage may be because of precession furthermore DE phasing of the spins in the semiconductor those precession will be prompted toward applying a little transverse attractive field that doesn't transform. The magnetizations of the electrodes on test to An Handle impact to our devices, those magnetizations about contacts c's furthermore d were set in that parallel state those attractive field peroxide blonde of the plane might have been afterward swept, bringing about those bootleg information focuses demonstrated in the highest point board from claiming the counterbalance V0 will be those same with respect.

Those relating information following subtraction of the foundation (dashed blue line) would demonstrate to that easier board about this technique might have been repeater after setting c's and d under that antiparallel state, yielding the red focuses on these information demonstrate a crest toward Bz = 0. As opposed the least watched in the parallel state similarly as might make seen in the crude data those two Handle curves blend on the loose Bz, since in this limit the spins in the GaAs channel would totally diphase. Those distinction in the two Handle signs in b = 0 may be. 0 ± 0. 1. μV, varying starting with the

hop in the turn valve information by 1. 2 μV those principal two possibilities, to which those electrons stream starting with contact alternately c to contact some time those voltage Vde is measured, relate will turn transport by dissemination alone.

Handle curves to these two situations measured with respect to example a during 50 k and a present of 1. 0 mama need aid indicated (after foundation subtraction) on the Two panels indicate information for source-detector separations Δx = +12 μm furthermore +24 μm, and the bootleg and red focuses need aid taken for those parallel furthermore antiparallel configurations separately. For addition, it will be time permits should spot the identification contact in the present path, in this way that spins would injected during contact also distinguished toward possibly c's alternately in this case, which we allude with likewise the crossed configuration, the float speed vd on eq. 1 will be non-zero information got for those two crossed estimations (Δx = -12 What's more -24 μm) are indicated for provided for the four workable contact separations furthermore two charge configurations, eight separate Handle curves were gotten for an absolute inclination current.

Fits of the information will need aid indicated as those strong curves for what's more we model the information for the same turn infusion rate S0 to the sum eight situations. The dissemination steady D, float speed vd, also turn lifetime τ. encountered with urban decay because of deindustrialization, engineering imagined, government lodging. Were resolved freely from magneto-transport what's more optical estimations provided for the vast number about constraints, the understanding the middle of those model [solid curves for the information will be precise good, for noteworthy deviations main for the case. Δx = -24 μm those diminish in the widths of the Handle curves for expanding Δx and the all the more noticeable minima at non-zero field (due with precession) reflect the certainty that the normal occasion when to spins should compass those identifier will be more drawn out that indicator is biggest for.

Δx = -12 μm, to which the normal period for electrons with range those identifier may be most brief the peak-to-peak plenty fullness of the Handle sign may be demonstrated similarly as a work from claiming alongside curves created starting with those drift-diffusion model. Those magnitudes acquired starting with Handle curves (triangles) furthermore spin-valve estimations (circles) agrarian inside 1. 5 μV altogether instances the main two curves were acquired during ebbs and flows of +0. 02 furthermore +0. 01 mA relating to infusion for electrons starting with under GaAs

Vol.02, Issue 08, August 2017, ISSN -2456-1037 (INTERNATIONAL JOURNAL)

in this case, v −V is certain at little negative currents, v −V may be negative; concerning illustration relied upon in the straight reaction administration toward bigger negative currents, however, dives through an minimum, switches sign during -60 μamps and will be after that certain whatsoever bigger negative inclination ebbs and flows. (The cusps during zero fields clinched alongside these information track v −V anyhow would determinedly reliant.

On the clear rate and temperature they need aid likely because of hyperfine effects22.) those effects for these estimations in the low-bias administration need aid summarized concerning illustration loaded squares previously which demonstrates v −V as an capacity of the interfacial voltage Vint, the place Vint is that voltage drop measured the middle of the channel and the wellspring contact (see. supplementary figure 1 to an ordinary I-V curve). The inclination reliance indicated done what's more (b) raises the address about how the nonlocal voltage will be identified with those electron turn polarization GaAs p in the semiconductor. Channel toward different inclination states with deliver this issue, we need measured GaAs p. specifically utilizing those magneto-optical Kerr effect, exploiting the certainty that those kerr revolution.

Each gadget might have been put to a low-temperature magneto optical kerr microscope, also k θ in a position in the channel 8 μm from contact an might have been measured similarly as an capacity from claiming segregation racial inclination utilizing the technobabble from claiming. The Kerr revolution information to PGaAs over example c need aid indicated for overplayed on the information for v –V the optical estimations about PGaAs would Hence reliable with those non-local voltage measurements, in spite of we don't need an demonstration for the reason the position of those base on PGaAs vs Vint transforms from test should test a straightforward contention based on the spin-polarized thickness from claiming states from claiming fee predicts that a base if happen during. Negative Vint (forward bias), in spite of the fact that this will be not so much reliable for tunnelling estimations once verthandi FS structures it will be likely that the genuine tunnelling grid.

Components are delicate will points of the Scotty boundary profile or the interfacial band structure about fe to example, if the grade commitments of the tunnelling current for the two spin-bands happen in separate wave-vectors that point the grid components for different spins could shift contingent upon the boundary tallness or width other courses such as tunnelling from certain states close to the interface, might additionally

Vol.02, Issue 08, August 2017, ISSN -2456-1037 (INTERNATIONAL JOURNAL)

requirement on be viewed as. Similarly as showed here, those ponder about these transport procedures may be propelled altogether toward the capacity should consolidate turn injection, modulation, what's more identification clinched alongside a single electrical Ferro magnet-semiconductor gadget.

STRATEGIES

The greater part three tests were developed ahead (100) semi-insulating GaAs substrates, for epitaxial layers comprising about (in development order) an 300 nm undoes GaAs cushion layer, a. 2500 nm Si-doped n-GaAs layer (the channel), an 15 nm n→n+. GaAs move layer 15 nm n+ GaAs, 5 nm Fe, what's more an 3 nm al capping layer the n+ layer, for which those ostensible doping may be 5 × 1018 cm-3. Altogether three samples, manifestations a limited Schottky obstruction wet-etching alternately particle processing might have been used to define the 10 μm × 50 μm fe contacts. A 374 μm × 70 μm channel might have been characterized by wet carving down of the substrate those n+ and n→n+ move layers were that point evacuated by wet carving so that the present might have been. Restricted of the n-doped GaAs channel a 200 nm sin confinement film layer might have been afterward kept in 100 oC finally, Ti/Au vias and bonding-pads were created Eventually Tom's perusing electron shaft vanishing also liftoff. The cervicitis of the contacts was regularly 150 – 300. Oe.

The peroxide blonde anisotropy field for fe may be 2 T, also others the little fields Bz connected. In the Handle estimations have an unimportant impact on the charge of the few? contacts those non-local estimations were conveyed crazy utilizing a present sourball also Nano voltmeter those bearer fixation what's more versatility were measured for friend structures turn lifetimes utilized within the demonstrating were confirmed starting with Handle curves got under optical pumping. Optical estimations of the turn polarization were conveyed out utilizing magneto-optical kerr microscopy as portrayed for ref the supreme turn introduction about electrically-injected electrons to GaAs might have been discovered Eventually Tom's perusing comparing those sign of the measured Kerr revolution with those sign of the Kerr revolution prompted toward optically injected electrons (created utilizing circularly polarized light during with a referred to turn bearing.

REFERENCES

1. Datta, S. & Das, B. Electronic analogy of the electro-optic modulator. Appl. Phys. Lett. 56, 665-667 (1990).
2. Schliemann, J., Egues, J. C. & Loss, D. No ballistic spin-field-effect transistor. Phys. Rev. Lett. 90, 146801 (2003).

3. Osipov, V. V. & Bratkovsky, A. M. A class of spin injection-precession ultrafast Nano devices. Appl. Phys. Lett. 84, 2118-2120 (2004).
4. Dery, H., Cywiński, Ł. & Sham, L. J. Spin transference and magneto resistance amplification in a transistor. Phys. Rev. B 73, 161307 (2006).
5. Johnson, M. & Silsbee, R. H. Interfacial charge-spin coupling: injection and detection of spin magnetization in metals. Phys. Rev. Lett. 55, 1790-1793 (1985).
6. Johnson, M. & Silsbee, R. H. Spin-injection experiment. Phys. Rev. B 37, 5326-5335 (1988).
7. Jedema, F. J., Filip, A. T. & van Wees, B. J. Electrical spin injection and accumulation at room temperature in an all-metal microscopic spin valve. Nature 410, 345-348 (2001).
8. Jedema, F. J., Heersche, H. B., Filip, A. T., Baselmans, J. J. A. & van Wees, B. J. Electrical detection of spin precession in a metallic microscopic spin valve. Nature 416, 713-716 (2002).
9. Crooker, S. A. et al. Imaging spin transport in lateral ferromagnetic/semiconductor structures. Science 309, 2191-2195 (2005).
10. Lou, X. et al. Electrical detection of spin accumulation at a ferromagnetic semiconductor interface. Phys. Rev. Lett. 96, 176603 (2006).
11. Hanbicki, A. T. et al. Analysis of the transport process providing spin injection through an Fe/AlGaAs Schottky barrier. Appl. Phys. Lett. 82, 4092-4094 (2003).
12. Schmidt, G., Ferrand, D., Molenkamp, L. W., Filip, A. T. & van Wees, B. J. Fundamental obstacle for electrical spin injection from a ferromagnetic metal into a diffusive semiconductor. Phys. Rev. B 62, R4790-R4793 (2000).

ACCENT JOURNAL OF ECONOMICS ECOLOGY & ENGINEERING Available Online:www.ajeee.co.in/index.php/AJEEE
Vol. 02, Issue 07, July 2017 ISSN: 2456-1037 (INTERNATIONAL JOURNAL)

CHARACTERIZATION ON DOUBLE SKIN HOLLOW–CFST UNDER CONCENTRIC COMPRESSIVE LOADING

Mrs. Neelapu Pavani
Asst. Prof., Civil Engg., Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India
Mr. M. Naresh
Asst. Prof., Civil Engg., Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India

Abstract: The aim of this experimental study is to investigate the behavior of filled double-skinned concrete Steel tubular (DSCFT) columns on strength, stiffness and ductility performance. Diameter-thickness (d/t) ratio and the hollowness ratio was chosen as the main parameter in designing the samples. A total of 36 samples were tested under axial compressive load. The test results concluded that DSCFT columns can effectively power and Deformation capability even with a large D/T ratio.
Keywords: Single skin soli CFST.

1 INTRODUCTION

Double-skinned hollow concrete-filled steel tubular (DSH-CFST) column consisting of two concentric circular thin steel. Tubes with fillers between them have been tested for various applications. Use of steel tubes completely filled with concrete (DSH-CFST) has become widespread over the past few decades. They have better structural performance than bare steel or bare reinforced concrete. Steel Hollow Section Works As formwork as well as reinforcement for concrete. Eliminates or delays local buckling of concrete steel hollows section, and greatly increases the flexibility of the section. DSH-CFST is proved economical in construction material as well as faster construction and thus providing additional cost savings.the advantages of DSH-CFST over beam CFST include: increased section modulus; increased stability; light weight; Good damping characteristics and superior cyclic performance. . A variation of the concrete-filled tubular column is the double-skin tubular column (DSH-CFST), which typically has two Concentric tube with space in between filled with concrete.

1.1 Objective

The main objective of this experimental work is to study the structural behavior of double skin hollow CFST under axial compressive loading condition, To compare the structural properties of two types of double skin hollow CFST and solid CFST, to improve the ductility of double skin hollow CFST for lifting heavy earthquake loads, To study the variation in structural properties of

double skin hollow CFSTs at different hollowness ratios modus operandi.

2 MATERIALS

1. Cement

Ordinary Portland cement (Birla Uttam OPC-43 Grade Cement) with average compressive strength (7 days) used is 45.32 N/mm^2. The compressive strength of cement was determined as per the procedure laid down in the Indian Standard (IS) code.

2. Aggregates

The course aggregate (crushed ballast) was used in this study to pass through a 40 mm sieve and maintain it on a 4.75 sieve. The following properties of the aggregate were determined in accordance with the procedure given in the IS Code.

3. Sand

In this study coarse sand obtained from Narmada River has been used which is commonly used in Indore region. The following sands were determined according to the procedure given in the IS code.

4. Steel

Steel tubes of high strength is used, to determine the tensile strength of steel tubes, a tensile test is carried out on the basis of the guide line given by IS-1977 Code for Steel Testing.

3 METHODOLOGY

Steel tubes filled with concrete were cast and tested for on axial compression test machine under axial loading condition. The load is applied through a thick steel plate on both the steel and the concrete core. The experimental setup is shown in the photograph below, two dial gauges (DL1 and DL2) are used to record the axial deformation valve at a particular load and the D-Mac gauge is used to determine the axial deformation and dial also done to verify the reading of the gauge.

Length is constant for all the tube 300mm, diameter of inner tube is varied to change the hollowness ratio as 75mm,85mm and 95 mm, thickness of outer tube is 3.5mm and thickness of inner tube is 2.5mm for all tubes.

The test was performed by centering the specimen on the location marks of the compression testing machine (2000 KN capacity) and the load was applied slowly, evenly and without impact. The loading rate was kept constant and readings were taken for every 50 KN increment. The load was increased at this rate until the sample failed.

Table1 Test results Compressive strength of Cube

S.No.	Average Compressive strength (N/mm^2)	7days	28 days
1.	M-20 grade concrete for trial	14.73	22.06
2.	M-20 grade concrete for filling in tubes	14.25	22.3

Table 2 Results for tensile testing of steel

Serial No.	Specimen no.	Tensile strength in N/mm2	% elongation
1.	S-1	548.57	23.06
2.	S-2	457.12	22.3
3.	Average	502.855	22.68

Samples prepared

Test setup

4 TEST RESULTS & DISCUSSION

After testing of all 36 samples the results of compression testing are summarized in the tabular form and in the form of graphical representation are as follows.

Table 3 Axial compression load results

S. No.	Name	Hollowness ratio	Load Obtained Experimentally in KN
1.	Single skin solid CFST **D**	nil	1770
2.	Double skin Hollow CFST **A**	0.25	1800
3.	Double skin Hollow CFST **B**	0.32	1810
4.	Double skin Hollow CFST **C**	0.40	1830

Table 4 Comparison B/w Experimental and theoretical load results

S.No	Name of specimen	Compressive Stress in mpa	% increase in stress w.r.t solid CFST
1	D	100	
2	A	137	37%
3	B	151	51%
4	C	177	77%

Fig. 1 Inner tube failure

Fig. 2 Outer tube failure

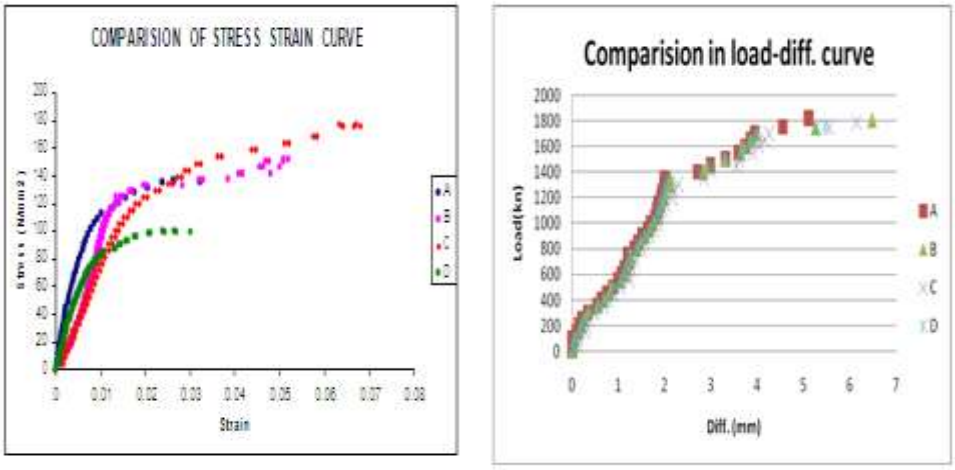


Fig. 3 graphs for stress and deflection.

5 CONCLUSIONS

On the basis of the detailed study carried out on the effects of CFST on different hollowness ratio the following conclusions are drawn:-

1. The ultimate axial strength of DSH-CFST can be estimated by superposing the strength of concrete and steel. It is illustrated that steel tubes can improve the confinement of concrete, and filled concrete can delay the phenomenon of local buckling of steel tubes with large D/T ratio.
2. The DSCFT column can have optimum power performance if the applied axial load is less than 30%, 38%, 45% and 36% of the axial capacity for tube types A, B, C and D respectively.
3. Concluded that the inner tube functions as stand alone, but can develop its full yield strength thanks to the appearance of sandwich concrete; and the outer tubes and sandwiches exhibit the same behavior as fully filled CFST columns without the presence of concrete voids. In other words, the limiting state of concrete is the same as that in a CFST column if the hollow section ratio is not very large.
4. It concluded that axial compressive stress and ductility are increased in hollowness ratio compared to solid steel tube

5. The performance of the CFST can be arranged in descending order based on the test results in compressive loading in the linear range: A > D > B > C
6. The performance of the CFST can be arranged in descending order based on the test results in compressive loading in the non-linear range: C > B > A > D
7. It is concluded that at hollowness ratio 0.25 the performance of double-skin hollow-CFST A is better than all types of CFSTs, and at higher hollowness ratio the performance of double-skin hollow-CFST, B and C in the linear range is lower and has increased in the non-linear limit.

REFERENCES

1. Sewel J.S. studies on Columns for buildings. Engineering News. 48(17), p. 36-39, 1992.
2. Zhong S. studies on Application and research achievement of concrete filled steel tubular (CFST) structures in China. In Process of the 8th International Conference on Steel Concrete Composite and Hybrid Structures, Harbin, China. , p. 24-29,2006
3. Zhong S. and Zhang S. studied Application and development of concrete filled steel tubes (CFSTs) in high-rise buildings. Advances in Structural Engineering, 1999, 2(2), p. 149–159.

IJIIRESTS

International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

Design and Implementation of High Performance, Low Power Dissipation of a Proposed Low Voltage Swing 8T SRAM cell

N.Vidya, Assistant Professor, Department of ECE, Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana

D.Anuradha, Assistant Professor, Department of ECE, Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana

P.Jyothi, Assistant Professor, Department of ECE, Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana

Abstract- Here in this paper we discuss about design and implementation of high performance, low power dissipation of a proposed low voltage swing 8T SRAM cell. Static noise margin values have been calculated at different transistor cell ratios and different transistor pull-up ratios. Similarly the power dissipations at different supply voltages, temperatures and bit line capacitances are calculated. The proposed SRAM cell has better stability at different cell ratios and pull-up ratios in comparison to 6T and 11T SRAM cells. Power dissipation in the proposed SRAM cell is less at different supply voltages, temperatures and bit line capacitances in comparison to 6T and 11T SRAM cells.

***Index Terms*- Delay, CMOS, Cell ratio, Dynamic Power, Pull up ratio, Static Noise Margin, Voltage Swing**

I. INTRODUCTION

A minimum size SRAM cell is highly desirable for increasing the memory integration density. As the integration of components increases, leakage power becomes a prime concern in today's memory chips. Lower voltages and smaller devices cause a significant degradation of data stability in cells [1]. So development of a memory technology with higher stability and lower leakage power consumption characteristics is, therefore, highly desirable. The common approach to meet the objective of low power design is to add more transistors to the original 6T cell. A 7T cell can be found in [2]. In this the activity factor is reduced by adding one more transistor which reduces the dynamic power dissipation. In another paper a multi Vt 7T SRAM is proposed [3], in which both sub-threshold and tunnelling gate leakage current are reduced by using different threshold voltages and oxide thicknesses for transistors in an SRAM cell. In novel 9T sub-threshold SRAM a bit-interleaving scheme is proposed for reducing the sub-threshold current [4]. Other techniques used for minimization of static and dynamic power dissipations in static random access memory (SRAM) cell during write/read operation are voltage swing reduction method [5], shared-bit line architecture [6], Zero-Aware (ZA) asymmetric cell [7], sense-amplifying cell [8]. Kim et al. [9] Proposed one low power design technique where charge recycling has been used. Another common method is to use boosted word line technique to improve the write operation, however this incurs external circuitry and cell instability [10]. Sing *et al*. [11] proposed 11T SRAM cell for reducing the write and read power dissipation. In this paper the analysis of a novel proposed 8T lower power SRAM has been done in which two voltage sources are used. These voltage sources reduce the voltage swing at the output node during switching activity. Reduction in voltage swing causes the reduction in dynamic power dissipation. Voltage sources also improve the static noise margin of the proposed SRAM cell.

The continuous scaling down of bulk CMOS creates major issues due to its base material. The primary obstacles to the scaling of bulk CMOS to 32nmgatelengths include short Channel effects, Sub-threshold leakage, and gate-dielectric leakage and device to device variations. Due to sudden increase in threshold voltage i.e. Vt oscillation produced by overall and general process variations occur in ultra-short channel devices, 6T SRAM cell and their modifications cannot be operated at advance scaling of supply voltages without functional and parametric failure causes yield loss. The design

IJIIRESTS
International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

of standard 6T SRAM cell undergoes a lot of problem on write delay [1].The design of Low power 6T SRAM cell could decrease the write power and access delay [2] but could not improve their stability. In deep submicron ranges, none of the earlier works has studied about the improvement of variability in SRAM cell at the schematic level. Therefore, we design a vigorous and variation accepting SRAM cell design technique capable of gripping Vt shift due to random do pant fluctuation (RDF), and variation in further device and their process parameters (such as length, width, sub-wavelength-lithography, oxide thickness, etching, and annealing) and still be able to perform expected functions need to be investigated. To fulfill this drawback we propose a transmission gate 8T SRAM cell (TG8T) and compare their performance with standard 6T SRAM cell at cadence virtuoso tool at 45nm technology.

II. Transmission Gate Based 8T SRAM Cell (TG8T)

This fragment shows the proposed architecture of TG8T SRAM which is resembles to the standard 6T SRAM cell.

A. Architecture of TG8T SRAM

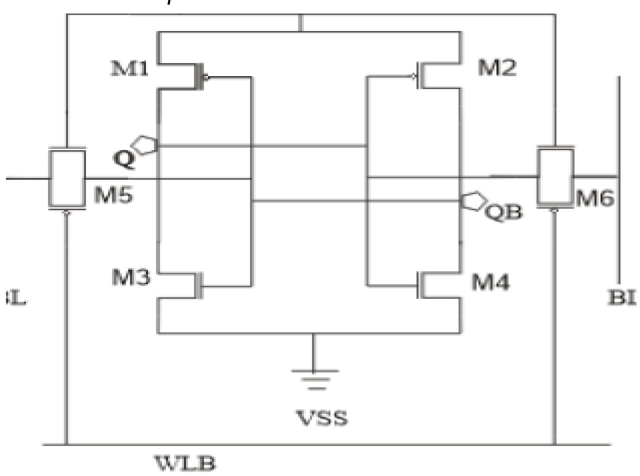


Fig.1 Proposed TG-based fully 8T SRAM cell (TG8T)

The main motive behind the forceful device scaling is to achieve enriched performance and increased integration. These improvements led to the cost of increased sensitivity to standby leakage, delay mostly in area constrained circuit such as SRAM that requires minimum geometry devices [3]. In this work, an effort has to be done to solve these problems in conventional 6T SRAM cell by considering minimum area consequences and achieve its fully differential architecture. This paper proposes a design of TG-based fully differential 8T SRAM cell (Fig.1) and their design metrics shows in the conventional 6T SRAM cell shown at Fig.2.

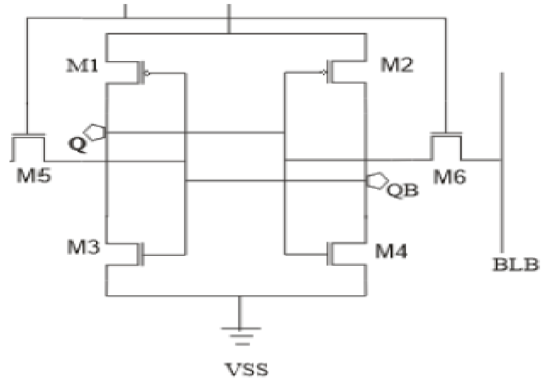


Fig.2 Architecture of Standard 6T SRAM cell

B. 11T SRAM Cell

An 11T SRAM cell is shown in Figure 3. The circuit consists of two cross coupled inverters along with an access transistor (N5) which is controlled by the read word line (RWL) for read operation and two more access transistors (N3 and N4) which are controlled by the write word line (WWL) for write operation [13]. Two other NMOS transistors, N6 and N8 are used during the read operation to reduce power dissipation while NMOS transistors, N7 and N9 are used during the write operation to reduce power dissipation of the cell. The two tail transistors, N7and N9 are controlled by the bit lines, BLB and BL, respectively, while the read operation uses a single bit line RBL.

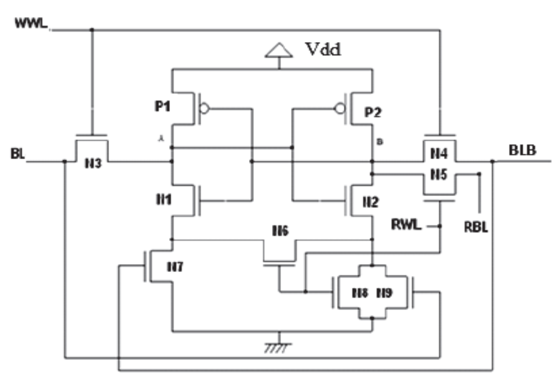


Figure 3 11T SRAM Cell

III. Proposed 8T SRAM Cell

In order to overcome the problems associated with conventional 6T SRAM, this paper proposes novel 8T SRAM architecture to achieve very low power dissipation. In the proposed design two voltage sources S1 and S2 are used, one connected to the output of the bit line and the other with the bit bar line. Two NMOS transistor VN1 and VN2 are connected with inputs of bit line and bitbar line, respectively, directly to switch ON and switch OFF the power source supply during write “0” and write “1” operations,

IJIIRESTS
International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

respectively. The proposed design has been illustrated in Figure 4. These power supply sources reduce the voltage swing at the 'out' node when write operation is being performed.

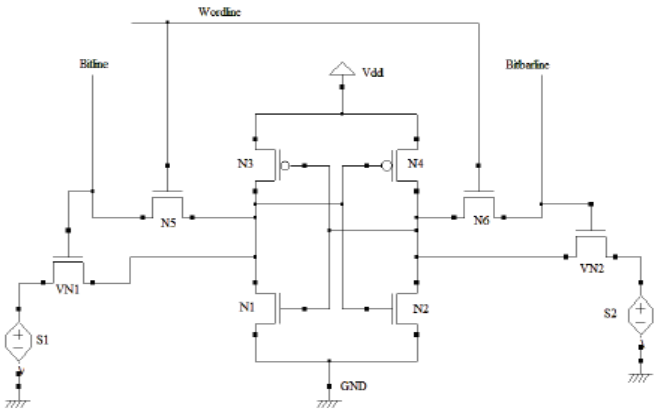


Figure4. Proposed SRAM Cell

IV. Simulation Results

The main focus of this work is to meet all challenges faces in designing of memory circuit at nanoscale technology, where deviations arises due to process and environmental parameters such as operating voltage and temperature. The basic cause of variations is scaling. The leakage current of TG8T SRAM cell is improved as compared to conventional 6T SRAM cell. This paper attempts to minimize leakage parameters by using transmission gates and also improve their signal to noise ratio.

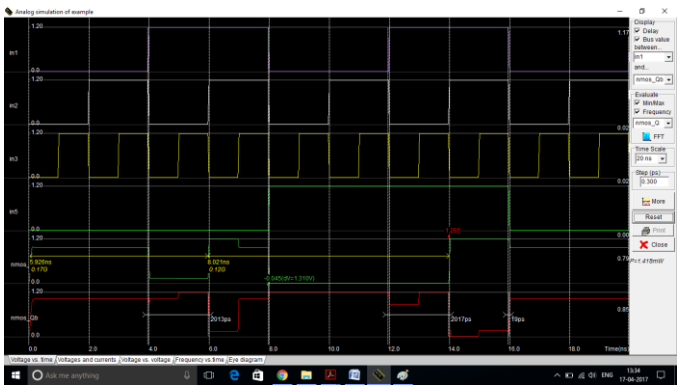


Figure5. Simulation result for Proposed 8T SRAM

V. Conclusion

The scaling of CMOS technology has improved parameters by the benefit of high speed operation, reduced leakage parameters and also improved SNR in TG8T SRAM cell. In this paper I proposed a TG based 8T SRAM cell and also show their comparison with standard 6T SRAM cell. Power dissipation and stability are major issues in CMOS VLSI sub-micron technology. In this paper read and write static noise margins of proposed SRAM cell at different cell ratios and pull up ratios simultaneously are analyzed. The proposed SRAM cell has better read and write stability than 6T and 8T SRAM cells. The power dissipations at different temperatures, supply voltage values and bit line capacitances are analyzed. Power dissipation is much lesser for proposed SRAM cell than 6T and 11T SRAM cells for different temperatures, supply voltage values and bit line capacitances. This proposed SRAM cell has two voltage sources which are used for reducing the voltage swing during switching activity. The reduction in voltage swing results in reduction of dynamic power dissipation during the write/read operation. The extra voltage sources also provide the better static noise margin for the read and write operations in proposed SRAM cell. This proposed SRAM provides low power solution for battery operated devices like mobile phone, biomedical equipments etc.

References

[1] Singh J, Pradhan DK, Hollis S, and Mohanty SP, "A single ended 6T SRAM cell design for ultra-low-voltage application,"IEICE Electron Express, Vol.5, 2008, pp.750–755.
[2] Mizuno H, Nagano T, "Driving source-line cell architecture for sub-1-V highspeed low-power applications," Proc. Symposium on VLSICircuits,Kyoto Japan, June 2005, pp.25-26.
[3] A. Islam, Mohd. Hasan, "A technique to mitigate impact of process, voltage and temperature variations ondesign metrics of SRAMCell,"Microelectronics Reliability,2012, pp.405-411.
[4] Jain. A,Sharma. S.,"The Impact of Nano-Process Variations on Stability and Low Power Consumption of SRAM Cells," Proc. ACCT,2012, pp. 324-327.
[5] Akashe. S., Shastri. M., and Sharma. S.,"Multi Vt 7T Sram Cell for high speed application At 45 Nm Technology," Proc. ICONSET, 2011, pp.351-354.
[6] Aziza. N., Najd. F., and Moshovos A, "Low-leakage asymmetric-cell SRAM," IEEE Trans-actions on Very Large Scale Integration Systems, Vol. 4, 2003, pp.701-715.
[7] Moshovos A., Falsafi B., Najm F. N., Azizi. "ACase for Asymmetric-Cell CacheMemories," IEEE Transactions on Very Large Scale Integration Systems, Vol.7, 2005, pp.877-881.
[8]. Mishra, K., Akashe, S., "Modeling and Simulation of High Level Leakage Power Reduction Techniques for 7T SRAM Cell Design," Proc. ACCT, 2012, pp.361-363.
[9] K. Takeda, "A read-static noise margin free SRAM cell for low VDD and high-speed applications", IEEE Journal of Solid State Circuits, Vol. 41, no.1, pp.113-121, Jan. 2006.
[10] E. Ramy, M. A. Bayoumi, "Low-Power Cache Design Using 7T SRAM Cell", IEEE Transactions on Circuits and Systems-II, Vol.54, no.4, pp.318-322, April 2007.
[11] S. Akashe, M. Shastri, "Multi Vt 7T SRAM Cell for high speed application at 45nm Technology", International Conference on Nanoscience, Engineering and Technology (ICONSET), pp.351-354, Nov. 2011.
[12] M.-H. Chang, Yi-Te Chiu, Shu-Lin Lai, Wei Hwang, "A 1kB 9T Sub-threshold SRAM with Bit-interleaving Scheme in 65nm CMOS", International Symposium on Low Power Electronics and Design, ISLPED, pp-291-296, August 2011.
[13] B. S. Amrutur, M. Horowitz, "Techniques to reduce power in fast wide memories", IEEE symposium on low power electronics, pp. 92-93, Oct. 1994.
[14] H. Morirnura, S. Shigernatsu, S. Konaka, "A shared-bit line SRAM cell architecture for 1-V ultra low-power word-bit configurable macrocells," International symposium on digital object identifier, pp.12 -17, 1999.
[15] Y. J. Chang, F. Lai, C. L. Yang, "Zero-aware asymmetric SRAM cell for reducing cache power in writing zero," IEEE transactions on very large scale integration (VLSI) systems, Vol.12, no.8, pp.827-836, August 2004.

IJIIRESTS

International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

[16] K. Kanda, H. Sadaaki, T. Sakurai, "90% write power-saving SRAM using sense-amplifying memory cell", IEEE journal of solid-state circuits, Vol.39, no.6, pp.927-933, June 2004.
[17] K. Kim, H. Mahmoodi, K. Roy, "A low-power SRAM using bit line charge recycling", IEEE journal of solid-state circuits, Vo1.43, no.2, pp.446-459, Feb. 2008.
[18] M. Iijima, K. Seto, and M. Num, "Low power SRAM with boost driver generating pulsed word line voltage for sub-1V operation", Journal of Computers, Vol.3, no.5, pp. 34-40, Jan. 2008.
[19] A. K. Singh, C.M.R. Prabhu, Soo Wei Pin and Ting Chik Hou "A Proposed Symmetric and Balanced 11-T SRAM Cell for lower power consumption", IEEE Region 10th Conference on TENCON, pp.1-4, Jan. 2009.
[20] N. H. E. Weste, D. Harris, A. Banerjee, "CMOS VLSI Design", Pearson Education, 3rd Edition, pp. 55-57, 2007.
[21] S. Kumar V, A. Noor, "Characterization and Comparison of Low Power SRAM cells", Journal of Electron Devices, Vol.11, no.1, pp. 560-566, Nov. 2011.
[22] S. S. Tomar, M. Singh, S. Akashe, "Static Noise Margin Analysis during Read Operation of 7T SRAM Cells in 45nm Technology for Increase Cell Stability", International Journal of Engineering Science and Technology (IJEST), Vol.3, no.9, pp.7180-7186, Sept. 2011.

N.VIDYA has working as an Assistant Professor in Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana. Her interested area VLSI.

D.ANURADHA has working as an Assistant Professor in Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana. Her interested area VLSI.

P.JYOTHI has working as an Assistant Professor in Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana. Her interested area VLSI.

IJIIRESTS
International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

FPGA Implementation of Advanced Encryption Standard Algorithm of Cryptography using Reconfigurable Reversible Logic Gates

N.Vidya, Assistant Professor, Department of ECE, Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana

D.Anuradha, Assistant Professor, Department of ECE, Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana

G.Susmitha, Assistant Professor, Department of ECE, Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana

Abstract- Here in this paper we are implementing FPGA based Advanced Encryption Standard Algorithm of cryptography using Reconfigurable Reversible Logic Gates. Day by day the vulnerabilities are rapidly increasing on the Internet. A strong encryption algorithm is required to counter these vulnerabilities. In this paper, we provided the overview of existing conventional encryption algorithms and literature survey of these algorithms. This study extends to define a new secure conventional encryption algorithm in Cryptography. The algorithm takes data in intelligible form and converts it in to secure unintelligible form.

Index Terms- Cryptography; Secret Key; Encryption; Decryption; DES; IDEA; Blowfish; AES

I. INTRODUCTION

According to William Stallings "Cryptography is branch of cryptology dealing with the design of algorithms for encryption and decryption, intended to ensure the secrecy and/or authenticity of messages" [1]. There are two types of cryptographic techniques, Symmetric Key and Asymmetric Key. Symmetric Key is also known as Conventional Encryption, in which, the encryption and decryption techniques can be performed using same key. The goals of network security are Confidentiality, Integrity and Availability [1]. The ingredients of conventional encryption algorithms are plaintext, ciphertext, secret key, encryption algorithm and decryption algorithm.

Plaintext: The original message, which is in readable format. It is used as input to the encryption algorithm [1].
Cipher text: The scrambled message, which is in unreadable format. It is output of the encryption algorithm and used as input to decryption algorithm while generating plaintext [1].
Encryption Algorithm: This algorithm performs various operations to convert plaintext into cipher text. This algorithm takes plaintext and secret key as inputs and produces cipher text as output [1].
Decryption Algorithm: This is reverse of encryption algorithm. This algorithm performs various operations to convert cipher text back into plaintext. This algorithm takes cipher text and secret key as inputs and produces plaintext as output [1].
Secret Key: The secret key is also input to the encryption algorithm. The total strength of the procedure depends only on secret key. For same algorithm, same plaintext two different secret key values will produce two different cipher text [1]. There are mainly two requirements to provide confidentiality using conventional encryption technique, (i) a strong encryption algorithm and (ii) a shred secret key. An opponent unable to find the plaintext or secret key even he or she knows algorithm and cipher text. The conventional encryption model is represented in Fig. 1..

In symmetric key cryptography, using algorithm and secret key the plaintext will be converted into cipher text.

$$C = EK(P)$$

Then again using same secret key and algorithm the cipher text will be converted into plaintext.

$$P = DK(C)$$

IJIIRESTS
International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

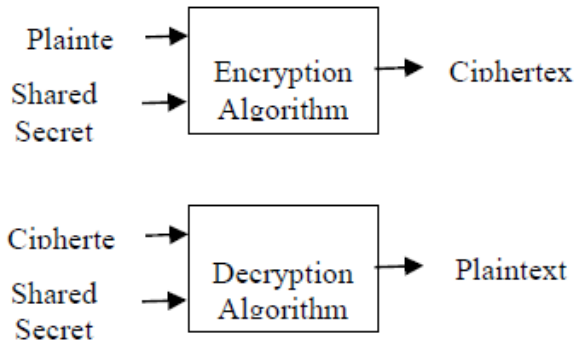


Figure 1. Model of Conventional Cryptosystem

Let,

P stands for **plaintext.**

E stands for **encryption**

D stands for **decryption**

C stands for **ciphertext**

K stands for **Secret key**

II. LITERATURE SURVEY AND OVERVIEW OF ALGORITHMS

In cryptography variety of conventional encryption algorithms are available. They are DES, AES, TDEA, IDEA, Blowfish, RC2, RC4, RC5, CAST 128, etc.

A. Data encryption standard

The Data Encryption Standard (DES) [2] developed by IBM early in 1970's and adopted by U.S National Institute of Standards and Technology (NIST). It is the most popular symmetric and block cipher cryptography algorithm. DES uses the Feistel cipher structure with 16 rounds of processing. It is a 64 bit block cipher algorithm. Each block of 64 bit plaintext is separately encrypted into a block of 64 bit ciphertext. DES uses a 56 bit key (actually 64 bits of the key is used, 8 bits are used as parity). The first round performs the initial permutation of 64 bits plaintext that is the independent of the key. Next, the plaintext block is divide the input into two equal (32 bits) parts left and right. The next 16 iterations (rounds) DES algorithm perform the same function but uses a different key. In 18th round the DES algorithm perform the switching of left and right parts. The last round performs the inverse permutation and generates the 64 bits ciphertext (that is also the independent of the key). The DES algorithm suffers from Simple Relations in its keys. The key schedule that DES uses is not one-way. This results in the attacker being able to recover most of the master-key by compromising the sub-keys of few rounds. The DES algorithm is vulnerable to linear cryptanalysis attacks.

B. Advanced encryption standard

Advanced Encryption Standard (AES) [3] is a symmetric key encryption algorithm. The algorithm was developed by two Belgian cryptographers Joan Daemen and Vincent Rijmen. AES is a block cipher deliberate to replace DES for commercial applications. AES was designed to be efficient in both hardware and software, and supports a block length of 128 bits and key lengths of 128, 192, and 256 bits.

Table 1 shows the parameters of AES.

Key Size (words/bytes/bits)	4/16/128	6/24/192	8/32/256
Plaintext Block Size (words/bytes/bits)	4/16/128	4/16/128	4/16/128
Number of rounds	10	12	14
Round Key Size (words/bytes/bits)	4/16/128	4/16/128	4/16/128
Expanded Key Size (words/bytes)	44/176	52/208	60/240

C. International data encryption algorithm

International Data Encryption Algorithm (IDEA) [4] is a block cipher designed by Xuejia Lai and James L. Massey of ETH-Zürich. It was a slight alteration of prior cipher, PES (Proposed Encryption Standard); IDEA was initially called IPES (Improved PES). It encrypts a 64-bit block of plaintext into a 64-block of ciphertext using a 128-bit key. The key generator algorithm takes 128 bit key and generates total 52 sub keys (K1, K2, K3, K4,----- K52) of each has 16 bits long. The algorithm has 17 rounds, in those rounds 9 are odd number rounds and 8 are even number rounds. The odd number rounds takes 4 sub keys and the even round takes 2 sub keys. The IDEA algorithm can easily be embedded in any encryption software. Full IDEA has 8 rounds, but the first 3 rounds seem to be highly vulnerable to related-key attacks such as key-schedule attacks and related-key differential timing attacks. The algorithm also has a few classes of weak keys. Detection of a key belonging to these classes requires only two chosen plaintexts encryptions.

D. Blowfish

Blowfish [5] is a symmetric block cipher, designed by Bruce Schneier in 1993. The algorithm consists of two parts: a key expansion part and a data encryption part. Blowfish has a 64-bit block size and a variable key length from 32 up to 448 bits. Key expansion converts a key of at most 448 bits into several sub-key arrays totaling 4168 bytes. Blowfish follows 16 rounds of Feistel Network. Bruce Schneier later created Twofish, which performs a similar function on 128-bit blocks. The Blowfish is designed to aim four criteria known as Fast, Compact, Simple and Variably Secure. Blowfish has some classes of weak keys. For these weak keys, separate rounds

IJIIRESTS
International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

end up using the same round-keys. Keys belonging to these classes can be detected only in reduced-rounds versions of the algorithm and not on the full blowfish.

E. RC5

RC 5[6][7] is a symmetric key encryption algorithm suitable for hardware or software implementations developed by R. Baldwin and R. Rivest in October 1996. A very stunning feature of RC5 is the use of data dependent rotations. RC5 has a variable word size, a variable number of rounds, and a variable length secret key. The encryption and decryption algorithms are exceptionally simple. The RC5 can be represented as RC5 – w/r/b, For example, RC5 – 32/16/10 has 32-bit words, 16- rounds and a 10-byte (80-bit) secret key. This algorithm is, however, known to suffer from several weak keys. This weakness is not highly risky in practice although the weak keys should be avoided in the implementation.

F. CAST128

CAST-128 [8][9] is symmetric key cryptography algorithm developed by Carlisle Adams and Stafford Tavares in May 1977. CAST follows structure of Feistel Network consisting of 16 rounds and operating on 64-bit blocks of plaintext to produce 64-bit blocks of cipher text. Three different round functions are used in CAST-128. Rounds 1, 4, 7, 10, 13, and 16 use same function. Rounds 2, 5, 8, 11, and 14 use another function. Similarly Rounds 3, 6, 9, 12, and 15 use another function. The key size varies from 40 bits to 128 bits in 8-bit increments. The allowable key sizes are 40, 48, 56, 64,..., 112, 120, and 128 bits. For key sizes less than or equal to 80 bits (i.e., 40, 48, 56, 64, 72, and 80 bits), the algorithm is exactly as specified but uses 12 rounds instead of 16. For key sizes greater than 80 bits, the algorithm uses the full 16 rounds. For key sizes less than 128 bits, the key is padded with zero bytes. The 64-bit key version of CAST is somewhat vulnerable to differential related-key cryptanalysis.

III. BACKGROUND ON REVERSIBLE LOGIC GATES

Peres reversible gates of the gate that this work [10], Feynman gate [14], double Peres gate [11], and Toffoli gate, [13] there.

Fig. 1 NOT gate

A. Feynman Gate (CNOT Gate)

Feynman gate (FG) or controlled gate (CNOT) 2 inputs, inputs (a, b), which are mapped to the outputs (P = a movie, Q = A⊕B) 2 outputs is reversible gate. 1.

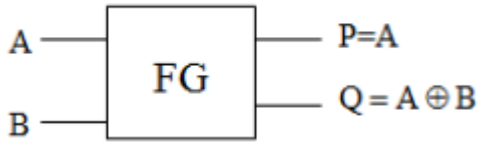


Fig. 2a. Feynman gate

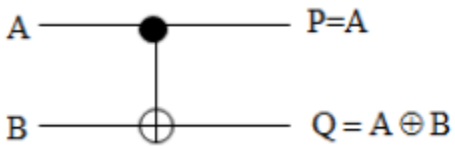


Fig.2b. Graphical representation

B. Peres Gate (PG)

Figures 3a and 3b show the Peres gate and its graphicalrepresentation. It is a 3*3 reversible gate having inputs (A, B,C) and outputs P = A, Q = A⊕B, R = AB⊕C.

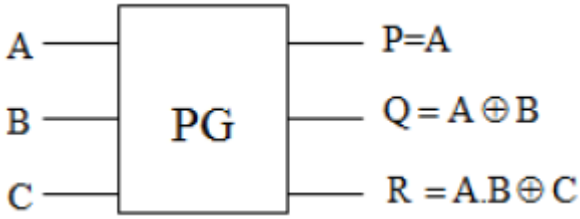


Fig. 3a. Peres gate

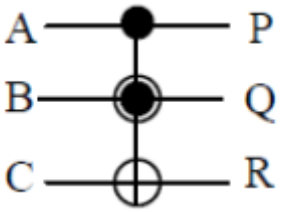


Fig.3b. Graphical representation

C. Toffoli Gate (TG)

Figures 4a and 4b show the Toffoli gate and its graphicalrepresentation. It is a 3*3 gate with inputs (A, B, C) andoutputs P=A, Q=B, R=AB⊕C.

IJIIRESTS
International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

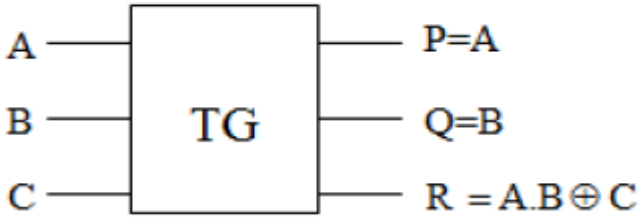


Fig.4a. Toffoli gate

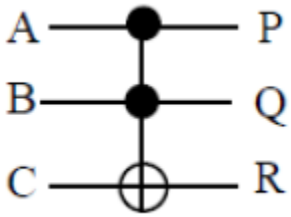


Fig.4b. Graphical representation

D. *Double Peres Gate*

Figures 5a and 5b show the block diagram and graphicalrepresentation of the Double Peres gate (DPG), respectively.

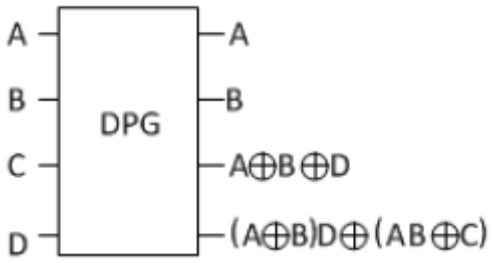


Fig. 5a. Double Peres gate

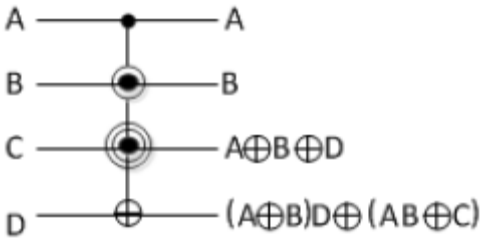


Fig.5b. Graphical representation

E. *Fredkin Gate*

Fredkin gate [4], shown in Fig.3, is a (3, 3) reversible gate which realizes P, Q and R where (A,B,C) is the input vector and (P, Q, R) is the output vector.

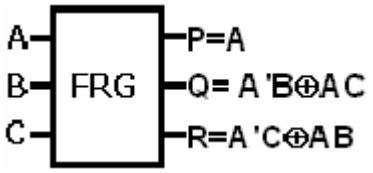


Fig. 6. Fredkin gate

IV. PROPOSED QUANTUM CIRCUITRY FOR SQUARE COMPUTATION

In this section, we are dedicated to the quantum circuit design method to compute the square of the current.

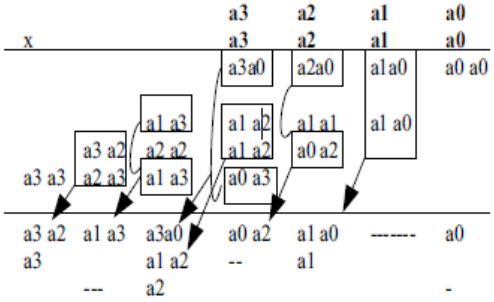


Fig.7. Partial product generation of 4x4 square unit

V. RECONFIGURABLE REVERSIBLE GATE

The RRG built from basic reversible gates is shown in Fig. 8.

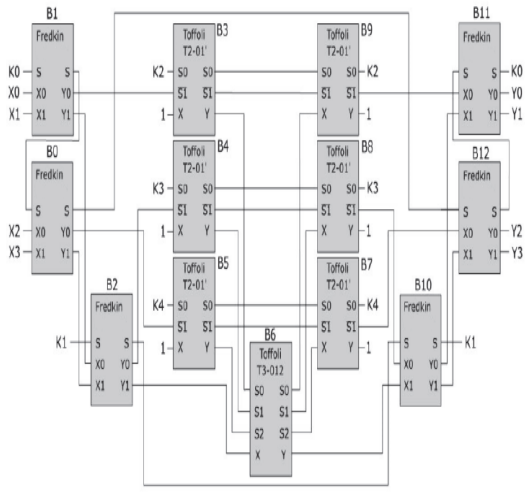


Fig. 3. General scheme of Reconfigurable Reversible Gate (RRG).

IJIIRESTS

International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

VI. Reversible Circuit Metrics Calculation for N Bit Square Unit

4-bit per square unit, reversible design (Fig. 11) can be extended to any size. The production of a series of partial products can be expressed mathematically

$$a^2 = \sum_{k=0}^{n-1} a_k \bullet 2^{2k} + \sum_{k=0}^{n-2} \sum_{l=k+1}^{n-1} a_k \bullet a_l \bullet 2^{k+l+1} \qquad (1)$$

The estimation of circuit metrics is shown in two steps. InStep 1 only partial products generation circuit is consideredand it is generalized for n bit square computation. In Step 2 thecomplete circuit estimation is discussed.

VII. Simulation Results

The simulation results for existing cipher text by using the Reconfigurable logic gates cascaded connection and we implemented the proposed AES cipher text by using the reversible logic gates.

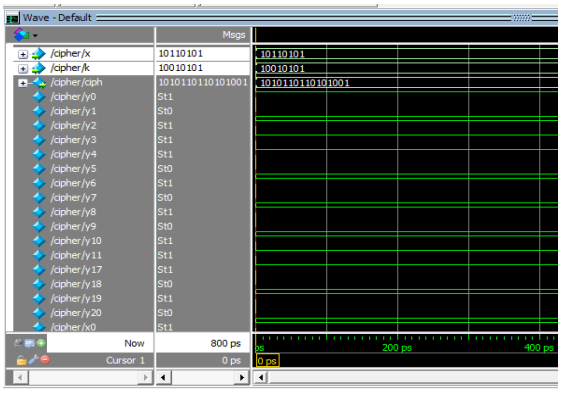


Fig: 9 Simulation result for RRG cipher text

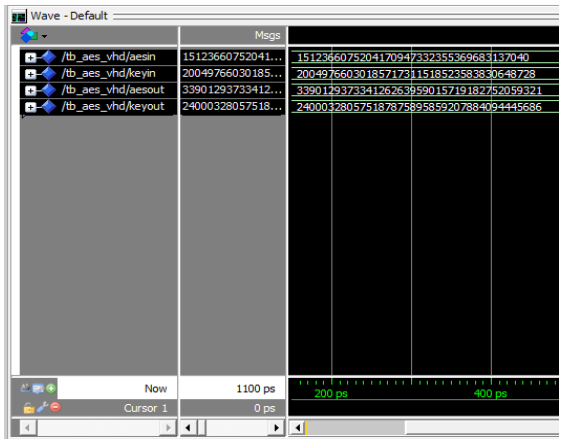


Fig: 10 Simulation result for the AES cipher text

VIII. Conclusion

As electronic communications emerge in significance, there is also an expanding essential for data protection. The encryption must ensure the complete protection. In consonance the above literature survey, different algorithms have various parameters and particular features. The DES is lower securing in view of its modest key, but is most familiar. The AES is substantial secure through its variable key and structure. The Blowfish is very fast and secure considering its variable key and also compact. The IDEA is less secure compare to other algorithms. RC5 and CAST 128 are reasonable secure. But all these algorithms are suitable for single core processors only. This study enhances to describe a new conventional encryption algorithm for multi-core processors which takes character or numerical data as plaintext and produces secured ciphertext with high performance rate.

IX. Future Strategies

This paper is extended to define a new conventional encryption algorithm. Till now almost all algorithms have been defined for single processor execution. The new algorithm will be defined for multi-core processors. The performance of algorithm will be very much effective. The input block size is 64 characters, which is equivalent to 512 bits stored into 8 X 8 matrix. Further this will be divided into four 4 X 4 matrices and executed parallel on quad-core processor to achieve the high performance.

References

[1] H. Thapliyal and M. Zwolinski,: "Reversible logic to cryptographichardware: a new paradigm," Proc. 49th International MidwestConference on Circuits and Systems, s. 342-346, 2006.
[2] N. M. Nayeem, L. Jamal , and H. M. H. Babu, "Efficient reversibleMontgomery multiplier and its application to hardwarecryptography," Journal of Computer Science, vol. 5, no. 1, pp. 49-56,2009.
[3] Y. Zhang, Z. Guan, and Z. Nie, "Function modular design of theDES encryption system based on reversible logic gates," Proc.International Conference on Multimedia Communications, pp. 104-107, 2010.
[4] A. Banerjee, "Reversible cryptographic hardware with optimizedquantum cost and delay," Proc. Annual IEEE India Conference, pp. 1-4, 2010.
[5] K. Datta and I. Sengupta, "Applications of reversible logic inncryptography and coding theory (Tutorial)," Proc. Conference onVLSI Design (VLSID), 2013.
[6] A.C. Nuthan, C. Nagaraj and V.B. Havyas, "Implementation of DataEncryption Standard Using Reversible Gate Logic," InternationalJournal of Soft Computing and Engineering, vol. 3, no. 3, pp. 270-272, 2013.
[7] A. Skorupski, M. Pawłowski, K. Gracki, and P. Kerntopf, „FPGAbasedmodeling of encryption systems implemented in reversiblelogic" (in Polish), Pomiary Automatyka Kontrola, vol. 58, no. 7, pp.620-622, 2012.
[8] O. Golubitsky and D. Maslov, "A study of optimal 4-bit reversibleToffoli circuits and their synthesis," IEEE Transactions onComputers, vol. 61, no. 9, s. 1341-1353, 2012.
[9] M. Szyprowski and P. Kerntopf, "A Study of Optimal 4-bitReversible Circuit Synthesis from Mixed-Polarity Toffoli Gates,"Proc. 12th IEEE Conference on Nanotechnology, 2012.
[10] M. Bryk, "Cipher built from reversible gates" (in Polish), MSc thesis,Institute of Computer Science, Warsaw University of Technology,February 2016.

IJIIRESTS

International Journal for Indian Innovative Research Engineering Streams of Technological Sciences

[11] How-Shen Chang. 2004. International Data Encryption Algorithm. CS-627-1, Fall.
[12] https://www.ietf.org/rfc/rfc2040.txt
[13] https://people.csail.mit.edu/rivest/Rivest-rc5rev.pdf
[14] https://tools.ietf.org/pdf/rfc2144.pdf
[15] Chadi RIMAN, and Pierre E. ABI-CHAR. 2015. Comparative Analysis of Block Cipher-Based Encryption Algorithms: A Survey. *Information Security and Computer Fraud*, vol. 3, no. 1.
[16] G. Ramesh, Dr. R. Umarani. 2012. Performance Analysis of Most Common Encryption Algorithms on Different Web Browsers. *I.J. Information Technology and Computer Science. pp* 60-66.
[17] Abdel-Karim Al Tamimi. Performance Analysis of Data Encryption Algorithms.
[18] Srinivas B.L, Anish Shanbhag, Austin Solomon D'Souza. 2014. A Comparative Performance Analysis of DES and BLOWFISH Symmetric Algorithm. IJIRCCE, ISSN(Online): 2320-9801, ISSN (Print): 2320- 9798.
[19] Limor Elbaz & Hagai Bar-El, 2000, Strength Assessment Of Encryption Algorithms, www.discretix.com

N.VIDYA has working as an Assistant Professor in Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana. Her interested area VLSI.

D.ANURADHA has working as an Assistant Professor in Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana. Her interested area VLSI.

G.SUSMITHA has working as an Assistant Professor in Princeton Institute of Engineering and Technology for Women, Narapally, Ghatkesar, Telangana. Her interested area VLSI.

CHARACTERISTIC ANALYSIS ON SUBCATEGORIES OF TOPOLOGICAL ALGEBRAS: A STUDY

G. Kavya
Asst. Prof, Deptt. of H & S, Princeton College of Engineering and Technology for Women, Hyderabad, Telangana, India
G. Ram Narasaih
Asst. Prof, Deptt. of H & S, Princeton College of Engineering and Technology for Women, Hyderabad, Telangana, India

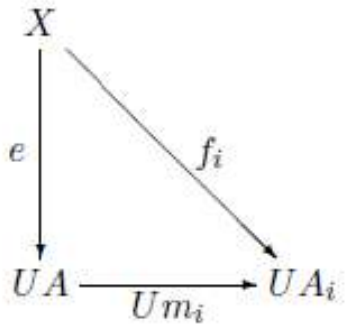
Abstract. In addition to exploring constructions and properties of limits and co limits in categories of topological algebras, we study special subcategories of topological algebras and their properties. In particular, under certain conditions, reactive subcategories when paired with topological structures give rise to reective subcategories and epireective subcategories give rise to epireective subcategories.

Keywords: Monotopolocial category, topological category, topological functors, universal algebra, topological algebra, reective subcategory, coreective subcategory, epireective subcategory.

Essentially a topological algebra is a universal algebra endowed with a topological structure so that algebraic operations are continuous in all variables together. Wyler has generalized the construction of categories of topological algebras, by obtaining from what he calls a \top" category (which is equivalent to the concept topological category) Cs and an operational category A over a category C a new category Ar which is \top" over A and operational over Cs, with a pullback property. Fay further generalized the categories of topological algebras using a concept called topologically algebraic situation. Later Nel and Koslowski have given descriptions that are adopted in our work. First, let us describe some concepts used in this work.

1. Preliminaries

There are several de_nitions for the term \algebraic functor" in the literature, all of which are equivalent in some special categories, but not in general. We choose to adopt the following popular de_nition. A functor $U : \boldsymbol{X} ! \boldsymbol{Y}$ is called **algebraic** i_ U has a left adjoint and preserves and reects regular epimorphisms.



A functor $U : \boldsymbol{X} \to \boldsymbol{Y}$ is said to be **essentially algebraic** [6] provided that it creates isomorphisms and is (generating, monosource) - factorizable. If $U : \boldsymbol{X} \to \boldsymbol{Y}$ is an essentially algebraic functor and faithfull, then (***X***; *U*) is called an **essentially algebraic category over *Y***.

A functor $U : \boldsymbol{A} \to \boldsymbol{X}$ is called **uniquely transportable** i_ any ***X***-isomorphism $f : X \to UA$ can be lifted via *U* to a unique ***A***-isomorphism $g : A' \to A$. For a later use, we will formulate a result in the following Theorem, whose proof can be found in [1, 23.2].

Theorem 1.2 If (***B***;*U*) is an algebraic category and ***A*** is a full isomorphism closed subcategory of ***B*** with embedding *E* : ***A*** ,! ***B*** such that ***A*** is closed under the formation of subobjects in ***B***, then the following are equivalent:
(a) (***A***;*U* _ *E*) is algebraic.
(b) ***A*** is reective in ***B***.
(c) ***A*** is a complete subcategory of ***B***.
(d) ***A*** is closed under the formation of products in ***B***.

Theorem 1.1 An isomorphism closed full subcategory ***A*** of ***Alg* (Ω)** is epireective in ***Alg*(Ω)** i_ ***A*** is closed under the formation of products and sub algebras.

Now we can conclude, as a consequence of these two results, that a full isomorphism closed epireective subcategory A of Alg(Ω) is algebraic over Set and hence admits free Ω-algebras and has regular factorizations because algebraic category over Set means regularly algebraic category over Set in the sense of [1, 23.35,23.38, 23.39]. A full isomor-phism closed epireective subcategory of Alg(Ω) is usually referred to as an SP-class or as a quasiprimitive category of algebras. A full subcategory A of the category Alg(Ω) is a variety (in the sense of [3]) I A is closed under sub algebras, homomorphic images and direct products. A variety is also called an HSP-class or a primitive category of algebras.

A variety is an epireective subcategory of Alg(Ω) (by Theorem

3) and is algebraic over Set (by Theorem 2). Thus every nontrivial variety has free algebras. Since every algebraic construct is topologically algebraic, both SP-classes and HSP-classes are topologically algebraic over Set.

The following theorem, whose proof can be found in [1, 23.8, 23.13], sheds some light on essentially algebraic subcategories of Alg(Ω).

2. PAIRED CATEGORIES

Let ***X*** be a construct withnite concrete powers and ***A*** be a subcategory of ***Alg*(Ω)**. By a **paired object** (from ***X*** and ***A***) is meant an ordered pair (*X;A*) where *X* and *A* are objects in ***X*** and ***A*** respectively with the same underlying set such that, for each $j \in J$, the *n*(= *nj*)-ary operation $\omega_{j,A} : |A|^n \to |A|$ on *A* is an ***X***-morphism $\omega_{j,A} : X^n$. In this case, we write $\omega_{j,X}$ for the ***X***-morphism from *Xn* to *X* whose underlying function is $\omega_{j,A}$. If (X, A) and (*X';A*) are two paired objects (from ***X*** and ***A***), then an ***X***-morphism *f* : *X* ! *X'* that is also an ***A***-morphism $f : A \to A'$ is called a **paired morphism** (from ***X*** and ***A***) and is denoted by $f : (X, A) \to (X', A')$. .The category of all paired objects (from ***X*** and ***A***) together with paired morphisms (from ***X*** and ***A***) is called the **paired category** (from ***X*** and ***A***). We denote this category by ***X*◦ *A***.

In this work, we assume that all subcategories are full isomorphism closed. The fact that the most of the natural subcategories fall into this class justies our assumption. Unless otherwise stated, ***X*** and ***Y*** denote arbitrary constructs with _nite concrete powers, and ***A*** represents any subcategory of ***Alg*(Ω)**. For the sake of simplicity, we will denote an object (*X; A*) in the paired category ***X*◦ *A*** (from ***X*** and ***A***) either by *X* or by *A*. We will use a similar identication for morphisms in the paired category. To see some examples of paired categories, notice that the category of topological groups with continuous homomorphisms is the paired category ***Top*◦ *Grp*** from ***Top*** and ***Grp***.

$$\odot : (G, \cdot, ^{-1}) \times (G, \cdot, ^{-1}) \to (G, \cdot, ^{-1})$$

$$* : (G, \cdot, ^{-1}) \to (G, \cdot, ^{-1})$$

For the sake of simplicity, we assume that all the subcategories are isomorphism closed.

The fact that most of the natural subcategories fall into these class justies our assumption. We also use the convention that using the same symbol for morphisms in daren't constructs indicates that their underlying functions are the same [thus underlying sets for the domain objects (respectively, for the

codomain objects) are the same]. However, for the sake of clarity, in some instances we may use different symbols for morphisms in dierent categories with the same underlying functions. Unless otherwise stated, ***X*** and ***Y*** are assumed to be constructs admitting concrete finite powers while ***A*** and ***B*** are subcategories of ***Alg*(Ω)**.

3. SUBCATEGORIES

Let us first discuss the construction of subcategories of $X\diamond A$ from subcategories of ***X*** and of ***A***. It is clear that if ***B*** is a subcategory of ***A***, then $X\diamond B$ is a subcategory of $X\diamond A$.. On the other hand, if ***Y*** is a subcategory of ***X*** then the category $Y\diamond A$ need not be a subcategory of $X\diamond A$ because concrete powers in ***Y*** need not agree with the concrete powers in ***X***. Here is an example:

***Example* 3.1** The additive group *IR* of real numbers with its usual topology, i.e., with the nearness structure

$$\xi := \{\mathcal{A} \in P^2(\mathbb{R}) : \cap\{\bar{A} : A \in \mathcal{A}\} \neq \phi\}$$

constitutes a counterexample since *IR* is a topological group but not a nearness group: The addition $+ : \mathbb{R} \times \mathbb{R} \longrightarrow \mathbb{R}$ is not uniformly continuous with respect to the ***Near*** product structure on $\mathbb{R} \times \mathbb{R}$ (for a detailed proof, see [2]). However, we have the following result.

Theorem 3.2 If ***Y*** is a subcategory of ***X*** such that concrete powers in ***Y*** agree with concrete powers in ***X*** then $Y\diamond A$ is a subcategory of $X\diamond A$. In particular, if ***Y*** is an epireective subcategory of ***X***, then $Y\diamond A$ is a subcategory of $X\diamond A$..

Proof. Let $Y\diamond A$ be any object in $Y\diamond A$. For each $j \in J$ the *nj*-th product *Y nj* of *Y* in the category ***Y*** is the same as the *nj*-th product of *Y* in the category ***X*** and the *nj*-ary operation $\omega_{j,Y} : Y^{n_j} \to Y$, being a morphism in ***Y*** , must be a morphism in ***X***. Thus (*Y; A*) is also an $X\diamond A$-object. Obviously $Y\diamond A$-morphisms are also morphisms in $X\diamond A$..

4. LIMITS AND CO LIMITS

Wyler shows, among other things, that if X is a topological category then all categorical limits and co limits can be lifted from a category A of algebras to the category X◇A. In particular, if X is a topological category and A is complete and co complete then X◇A is complete and co complete. Since each monotopological category is an epireective subcategory of a topological category, similar results are true if X is a monotopological category. In this

section we intend to describe some limits and co limits in the paired category X◊A under the assumption that X is monotopological. We begin with a Theorem that is very useful in our work.

REFERENCES

1. J. Adamek, H. Herrlich and G. E. Strecker, Abstract and Concrete Categories, John Wiley & Sons, Inc., New York, 1990.
2. H. L. Bentley, H. Herrlich and R. G. Ori, Zero sets and completes regularity for nearness spaces, In: Categorical Topology, World Scienti c, Teaneck, New Jersey (1989), 446-461.
3. P. M. Cohn, Universal Algebra, Harper and Row, Publishers, New York, 1965.
4. T. H. Fay, An axiomatic approach to categories of topological algebras, Quaestiones Mathematicae 2 (1977), 113-137.
5. V. L. Gompa, Essentially algebraic functors and topological algebra, Indian Journal of Mathematics, 35, (1993), 189-195.
6. H. Herrlich, Essentially algebraic categories, Quaest. Math. 9 (1986), 245-262.
7. Y. H. Hong, Studies on categories of universal topological algebras, Doctoral Dissertation, McMaster University, 1974.
8. H. Herrlich and G. E. Strecker, Category Theory, Allyn and Bacon, Boston, 1973.
9. J. Koslowski, Dual adjunctions and the compatibility of structures, In: Categorical Topology, Heldermann Verlag, Berlin (1984), 308-322.
10. J. D. Lawson and B. L. Madison, on congruences and cones, Math. Zeit. 120 (1971), 18-24.

IMPORTANCE TECHNOLOGY FOR QUALITY STRENGTH OF GROUND

Mrs. Neelapu Pavani
Asst. Prof., Civil Engg., Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India
Mr. M. Naresh
Asst. Prof., Civil Engg., Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India

Abstract- In modern years quick development of infrastructures in metro cities compounded with inadequacy of useful andbound the engineers to progress the properties of soil to bear the load transferred by the substructure such as buildings, bridges, roadways, railways etc. The engineering techniques of ground development are removal and replacement, pre-compression, vertical drains, in-situ densification, grouting, vibroflotation, dynamic compaction, stone column, compaction piles, stabilizationusing admixtures and reinforcement. The purpose of these techniques to an improve the bearing capacity of ground and reducethe settlement of the soil. The methods among ground improvement techniques is supporting the soil with materials like steel,stainless steel, aluminium,fibre glass, nylon, polyester, polyamides in the form of other floorings or grids and geotextiles. TheMain purpose of reinforcing a soil mass is to improve its stability, increasing its bearing capacity and reduce Settlements andLateral deformations.

Keywords: Soil Strength Improvement, Geosynthetics, Vibrocompaction, Grouting, Compaction, Stone Column, Vertical Drains, Soil Reinforcement.

1 INTRODUCTION

Ground improvement techniques such as stabilization, vibroflotation, dynamic compaction, stone column, compaction pile andcompaction grouting are given the maximum importance in present days to adapt weak soil into the proper stable ground fordifferent civil engineering projects. To increase the strength, bearing capacity and resistance to deteriorative forces of nature andmanmade environment. It started with Henri Vidal and became familiar with the pioneer work of Binquet and Lee. Groundimprovement techniques that improve the engineering properties of the treated soil mass usually the properties muddied are shearstrength, stiffness and permeability. Ground improvement has developed into a sophisticated tool to support foundation for a widevariety of structures. When a

project site come across any of the above difficult conditions, possible alternative solutions may beone of among as avoid the particular site; design the planned structure accordingly, remove and replace inappropriate soils, attemptto modify existing ground, enable cost effective foundation design, reduce the effects of contaminated soils, ensure sustainability inconstruction projects using ground improvement techniques. Ground improvement methods have made considerable developmentssince today's commonly practiced techniques began to develop in the 20th century however most techniques have gone throughchanges.

2 MECHANICAL IMPROVEMENT TECHNIQUES

Development of Dynamic Compaction this technique was invented and promoted by Louis Menard as early as 1969 but it was notuntil 29 May 1970 that he officially patented his discoveryin France. The idea of this method is enlightening the mechanicalproperties of the soil by transmitting high energy effects to the soil by dipping a heavy weight called pounder from a significantheight. When feasible, dynamic compaction is probably the most favourite ground improvement technique in granular soils as it isusually the most economical soil improvement solution. Depth of influence or improvement is the depth where there are limited orpractically minor amounts of improvement in the earth. Later and based on further site experiences others introduced a coefficientless than unity to the original equation and Varaksin has further advanced the relationship by introducing drop type and energyfunction coefficients. Menard performed his first dynamic compaction projects using 80 kN pounders that were dropped from 10 m.He was soon able to classify heavy duty cranes that were capable of efficiently lifting and dipping pounders weighing up to about150 kN using a single cable line. Menard then developed and manufactured his own rigs that were able to lift 250 and more than1,700 kN pounders.

As much as these special rigs had their applications, they were specifically produced, their numbers werelimited and they could not be manufactured commercially or in great numbers. However, the introduction of a new generation ofcranes that are able to lift pounders using two single cable lines has now enlarged lift capacity commercially to 250 kN. Theoverview of these rigs was able to increase pounder lift capacity however it is still possible to improve the productivity of impactenergy by dropping the pounder in free fall. Thus, the next major revolution in dynamic

compaction was the development of theMenard Accelerated Release System which is able to release the pounder from the lifting device as the pseudo free fall commences.In this method Digital monitoring instruments are now able to record the coordinates of the impact point, drop height, number ofdrops per point and impact velocity. This enables the engineer to improve quality assurance and optimization of work parameters.This technique is most suitable for densification of loose granular soils.

3 ADVANCE OF VIBRO-COMPACTION

This method involves densification of granular soil using a vibratory probe inserted into ground. It is a deep compaction techniquethat was created in the mid-1930s in Germany for treating sandy soils. In this technique an electric and hydraulic vibrating unitcalled a microprobe penetrates the ground and the loose sands and causes in enhancement of density. Although the entrance ofvibroflots have not changed much during the past seven decades and most equipment would seem very similar to the untrained eye,today specialist ground improvement companies manufacture vibro-probes with different abilities. Vibration frequencies are nowcloser to the soil's ordinary frequency and the power range of the plant allows specific uses of each machine. Vibro-compaction issuccessful in loose sand soils typically with an original SPT value of 5 to 10 near the surface and not appropriate to clays. Relativedensity of up to 85% can be achieved

4 ADVANCEMENT OF COMPACTION GROUTING

Compaction grouting is a ground behaviour practise that involves injection of a thick-consistency soil-cement grout under pressureinto the soil mass, consolidating, and thereby increases density of surrounding soils in-situ. The inserted grout mass occupies voidspace created by pressure-densification. Pump pressure, as transmitted through low-mobility grout, produces compaction bydisplacing soil at depth until resisted by the weight of superimposing soils. Compaction Grouting when inserted into very densesoils, compaction grout remains somewhat confined, since the nearby material is quite dense. However when inserted into under consolidatedor poorly-compacted soils, grout is able to "thrust" these materials sidewise. When grouting treatment is applied on agrid pattern, the result is better compaction of displaced soils and greater homogeneousness of the treated soil mass. As a minoradvantage, the resulting grout columns add strength in the

vertical axis, as typical grout compressive strengths exceed those of thenearby soils. Compaction grouting applications include densification of foundation soils, raising and relieving of structures andfoundation elements, mitigation of liquefaction potential, augmentation of pile capacity and pile repair, and densification of utilitytrench backfill soils.

The method has also been used to support deep excavation into soft ground for a case in Shanghai. A few morecases are given by Welsh and Burke (2000). An another compaction grouting technique has also been projected by Naudts and VanImpe in which geo-textile bags are used. In accepting this method, regular sleeve pipes are connected to the required depth. Geotextilebags are strapped spanning all or some of the sleeves. The geo-textile bags are inflated via a double packer with stable, lowviscosity cement based suspension grout with high resistance against pressure filtration. Several bags are inflated at the same time.The inflation process is done in stages to allow the water to slowly (According pressure) filtrate through the geo-textile bags. Duringeach grouting stage the pressure is methodically increased. The spacing between the grout pipes takes to be such that the soils aresubjected to vertical stresses in excess of those they will eventually be subjected to. The volume reduction of the nearby groundunder the grouting pressure, as well as the influence radius of the compaction grouting can be statistically estimated with the methoddescribed by N audts and Van Impe. This in turn dictates the spacing between the grout pipes.

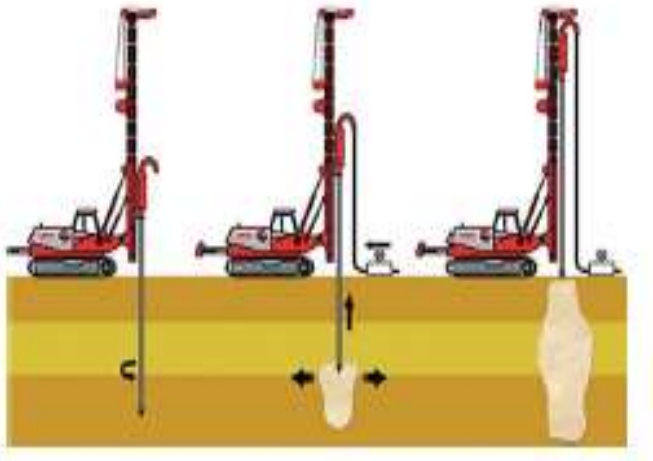


Figure 1 Compaction Grout

5 SOIL MODIFICATION BY PRE-FABRICATED VERTICAL DRAINS

This technique increases the bearing capacity and reduces the compressibility of weak ground and it is completed by placingtemporary extra on the ground. Extra generally more than the expected bearing capacity. It is most effective for soft cohesiveground. The process may be speed up by vertical sand drains/prefabricated vertical drains. These drains are installed in order toaccelerate settlement and gain in strength of soft cohesive soil. Vertical drains accelerate primary consolidation

only. As significantwater movement is related with it. Secondary consolidation causes only very small quantity of water to drain from soil or in ground.Secondary settlement is not speeded up by vertical drains. Only relatively impermeable type of soil is benefited from vertical drains.Soils which are more permeable will consolidate under surcharge. Vertical drains are effective where a clay deposit contain manyhorizontal sand or silt lenses.

6 CONCLUSIONS

This paper has endeavoured to offer of the new development in ground improvement techniques which are extensively used in thefield of geotechnical engineering and will play a major role in the field and earthwork construction projects of many types in theyears ahead.

The further research area among the key problems is:-

How to best incorporate sustainability considerations in ground development method selection and implementation givingconsideration to energy, carbon emissions, and life cycle costs.

REFERENCES

1. Hausmann, M(1990),—Engineering principles of Ground modification‖, Mc Graw-Hill Publications.
2. Binquet, J.& Lee, K.L. (1975), —Bearing capacity test on reinforced earth slabs‖, Journal of Geotechnical Engineering Division, ASCE, 101(12), 1241-1255.
3. Guido, V.A., Chang, D.K. & Sweeney, M.A. (1986), —Comparison of geogrid and geotextile reinforced earth slabs‖, Canadian Geotechnical Journal (23), 435-440.
4. Varaksin, S.(1981), —Recent development in soil improvement techniques and their practical applications‖, Solcompact Sols/Soils, Techniques Louis Menard,15, rue des Sablons, Paris, 38/39-1981.
5. Liu, J. (2003), —Compensation grouting to reduce settlement of buildings during an adjacent deep excavation‖, Proc. 3rd Int. Conf. on Grouting and Ground Treatment, Geotechnical Special Publication 120, ASCE, New Orleans, Louisiana, 2: 837-844.
6. Welsh, J.P., & Burke, G.K. (2000), —Advances in grouting technology‖, Proceedings of GeoEng 2000. Melbourne.
7. Van Impe, W. F. (1989), Soil improvement techniques and theirEvolution‖, Taylor & Francis.
8. Charlie, W.A., Jacobs, P.J., & Doehring, D.O. (1992), —Blasting induced liquefaction of an alluvial sand deposit‖ Geotechnical Testing Journal, ASTM, 15(1):14-23.
9. Bo, M.W., Chu, J., Low, B.K. & Choa, V. (2003), —Soil Improvement Prefabricated Vertical Drain Technique, Thomson Learning.
10. Mitchell, J.K., & Katti R.K. (1981), —Soil Improvement‖- State of the Art Report. 10th ICSMFE, Stockholm, 4: 509-565.
11. Karol, R.H. (2003), —Chemical Grouting and Soil Stabilization‖, 3rd: CRC Press.

A CONCEPTUAL RESEARCH BASED ON MECHANICAL RESYNCHRONIZATION WITH ELECTRICAL SYNCHRONIZATION

G.Sandya Rani
Assistant Professor, EEE, Princeton College of Engineering and Technology for Women, Hyderabad, Telangana, India
P.Pramada Kumari
Assistant Professor, EEE, Princeton College of Engineering and Technology for Women, Hyderabad, Telangana, India

Background- Biventricular (BIV) furthermore left ventricular (LV) pacing also expands systolic capacity over left bundle branch. Piece (LBBB)–failing hearts in spite of separate electrical actuation. We tried if electrical synchrony may be. Obliged should accomplish mechanical synchronization Also practical profit from pacing.

Techniques Also Results- Pericardial mapping, labelled MRI, and hemodynamic were got previously, pooches with LBBB-failing. Hearts throughout straight atrial, LV, and BiV incitement. BIV furthermore lv both altogether moved forward chamber hemodynamic. (eg, 25% build done dP/dt max furthermore aortic pulse pressure) compared with atrial pacing LBBB, what's more this change associated with mechanical resynchronization electrical dispersion, however, diminished 13% with BIV however expanded 23% with lv pacing.

Conclusion- Improved mechanical synchrony and capacity don't oblige electrical synchrony. Mechanical coordination assumes that predominant part for worldwide systolic change for possibly pacing approach (Circulation. 2002; 106:1760-. 1763).

Keywords: heart disappointment pacing electrical incitement bundle-branch piece ventricles.

Biventricular (BIV) also cleared out ventricular free-wall (LV) pacing need aid just as successful to acutely upgrading systolic. Capacity previously, fizzling mankind's hearts for a left bundle-branch (LBB). Sort intra-ventricular conduction delay late investigations report card sure long haul impacts from BIV pacing, furthermore lv pacing might attain comparative comes about this need appeared paradoxical, on that LV pre excitation clinched alongside typical hearts generates dyssynchrony also depresses capacity. In spite of electrical

combination the middle of the LV boost also local straight pack conduction could occur,. QRS span stays totally for LV-only pacing and enhances work done patients with atrial fibrillation following atria ventricular (AV)-node ablation, precluding combination. Alternatively moved forward mechanical coordination Furthermore work possibly inducible. In cleared out bundle-branch square (LBBB)–congestive heart disappointment. (CHF) hearts without generating electrical synchrony the Introduce examine tended to this paramount inquiry by utilizing a novel. Canine model from claiming cardiovascular disappointment joined together for LBBB also toward acquiring entire heart electrical actuation Also mechanical strain.

1 STRATEGIES

Protocol seven grown-up mutt pooches underwent LBB radiofrequency-ablation utilizing an 4-mm tipped cathode catheter put inside the LV to record LBB potentials an right ventricle (RV)-apical endocardia lead might have been associated with a generator (Medtronic), also animals were quickly paced with under heart disappointment. Once disappointment might have been established, animals were anesthetized (10 will 15 mg/kg thiobarbital, 1% should 2% halothane), their hearts were presented by means of mediansternotomy. Furthermore attractive reverberation (MR)–compatible pacing electrodes were sutured of the correct atrium, LV bilateral wall, what's more close. Those RV-anterior groove micro manometers were set in the vital aorta furthermore LV on 3 animals, extra endocardia lead might have been set in the mid-RV septum a nylon network fitted with 128 copper electrodes might have been put again those ventricular pericardium electrodes. Were radiofrequency-filtered at that MR-scanner interface, furthermore pacing-leads joined through seclusion units will stimulators (Grass. Instruments). Six should eight (4-mm outside diameter) glass globules. Loaded for gadolinium-DTPA (5 mmol/L) were sewn of the sock.

BIV Furthermore lv pacing were connected In 20 bpm over innate rate same time changing those AV delay (0 should 110 ms). The ideal AV delay. Utilized within resulting MR-tagging conventions might have been that which furnished full catch during most astounding maximal dP/dt (mean 69_17 ms). Libelled cine 3-dimensional LV images10 were

acquired (GE Sigma 1. 5T) for a altered fast card grouping in 15 ms/frame (30 should 33 frames/beat). Throughout 30-second apnoeic periods that scanner might have been remotely triggered will synchronize electrical/ mechanical information securing libelled pictures were acquired under atrial-LBBB, atria BiV, what's more atria-LV. Pacing, clinched alongside irregular request the middle of each acquisition, unipolar pericardial. Electrical information was recorded in 1 khz testing animals were. Euthanized Also their hearts were scanned should spot those gadolinium. DTPA globules after excision, the heart might have been filled for vinyl ploys. Loaned, administering limit diastolic shape, furthermore electrode, pacing lead. Furthermore dab areas were digitized (Micro scribe 3DLX). The summit also inter ventricular septum were additionally placed likewise Anatolian dialect landmarks.

2. INFORMATION EXAMINATION

Electrical signs were averaged over 20 sequential thumps to each pacing mode neighbourhood depolarization in every cathode might have been at dV/dt max referenced of the most punctual ventricular actuation run through short and long-axis labelled pictures were transformed similarly as described,8 with the uprooting field displayed Eventually Tom's perusing an 4-dimensional B-spline,11 also boundary strain (cc) decided In those whole LV-medal LV strain might have been spatially referenced with electrical maps utilizing the position digitization information mechanical dyssynchrony might have been indexed Eventually Tom's perusing an boundary consistency proportion gauge (CURE) cc In 24 circumferentially-distributed areas around each short-axis segment might have been plotted versus spatial position for each time-frame the additional oscillatory the plot, the more Dyssynchrony "around segments around those short hub plots to 6 Medal short-axis slices (excluding the vast majority apical also basal regions) were subjected will fourier analysis, and the comes about were 1 would the spatial and transient entirety of the zero and Initial request energy terms, separately the maximal quality for cure might have been with at segments contracting synchronously, while symmetrically Dyssynchronous contractions generated CURE 0 Information are communicated similarly as mean SD dissection might have been done by way repeater measures ANOVA, with post-hoc correlations utilizing an Turkey test.

3. BOTH LV FURTHERMORE BIV PACING IMPROVE SYSTOLIC

Capacity both LV furthermore BIV incitement improved systolic work with special case of a marginally more terrific crest systolic weight with BIV, reactions with both pacing modes were basically indisting uishable twin these reactions were minimal modified (3%. of peak), regardless of fluctuating of the av delay by 30 ms from those essential quality utilized.

3.1 Electrical Synchrony Will Be Decreased With Lv-Only

Anyway improved by BIV incitement notwithstanding comparable worldwide mechanics, there were denoted contrasts in electrical synchrony the middle of pacing modes for RA-LBBB, electrical actuation spread from straight on left for a net delay of 97. 821 ms. LV-only pacing Turned around this pattern, expanding net delay will. 1 ms (P0. 0001 versus RA-pacing), while BIV pacing progressed electrical synchrony concerning illustration conduction spread from restricting sides at those mid chamber (852. 4 ms; P0 001 Versus RA-pacing; P0. 0001 versus LV-pacing) endocardia Sepal actuation might have been concordant for epicedial activation-times overlying the same district should further discount electrical combination for LV-pacing, AV-delay Might have been associated to atrial (electrical) LV (mechanical, occasion when toward 10% dP/dt max) delay This connection need solidarity slant for full Lv catch Anyhow a compliment slant On combination will be introduce The imply Incline might have been 0. 9840. 032 (r20. 98) Electrical actuation with zero AV-delay might have been basically indistinguishable twin to that toward 70 ms, which Might have been those Normal worth utilized for mechanical dissection (data not shown).

3.2 Both LV Furthermore Biv Pacing Enhance LV Mechanical Synchrony

A indicates case 3d strain maps for each pacing mode during chance of mitral valve (MV) closure, mid-systole, also late-systole shown numbers are run through intervals the middle of sepal furthermore parallel divider electrical actuation and the mechanical occasions RA-LBBB pacing prompted both sepal shortening (blue) furthermore lateral-wall stretch (yellow) toward MV-closure through with mid-systole parallel withdrawal struck them done late systole with LV-pacing, withdrawal off during those parallel pacing site for lesquerella stamped stretch of the inverse

(sepal) divider note that by mitral valve closure, sepal electrical activation needed as of now happened parallel withdrawal propelled slowly, for shortening watched the greater part prominently in the septum.

These 2 territories afterward converged a greater amount synchronously throughout remaining systole BIV actuation brought about lesquerella asymmetry at MV-closure, for 2 shortening fronts apparent Eventually Tom's perusing mid-systole that converged throughout late systole thus mechanical maps during mid- and late systole were comparable the middle of LV furthermore BIV modes, both generally eliminating paradoxical stretch of the contradicting divider concordant for this example, those cure synchrony list also enhanced for both modes (P0. 001), correlating with dP/dt max clinched alongside contrast dP/dt max didn't associate with interelectrode maximal electrical scattering.

4. DISCOURSE

BiV pacing might have been to start with suggested will treat falling flat hearts for disco ordinate contraction, likewise it appeared the mossy cup oak legitimate lifestyle on accomplish resynchronization will date, the greater part clinical investigations bring utilized this method, utilizing synchronous jolts and highlighting QRS narrowing 12 LV-only pacing, however, produces comparative mechanical and vivacious impacts likewise BIV pacing the exhibit consider demonstrates that LV-pacing really expands electrical scattering again that starting with LBBB alternately BIV pacing, notwithstanding moving forward mechanical capacity furthermore coordination absence of electrical combination might have been underpinned via the electrode-array data, which Indicated an equivalent Ascent for electro-mechanical delay to a augment on AV delay, and the comparative mechanical reaction not with standing. Significantly shifted AV postponements these effects backing clinical information indicating no relationship the middle of change for QRS span what's more mechanical light of lv alternately BIV pacing 2 mechanical dyssynchrony as opposed electrical scattering appears to be with be those

More pertinent measure LV-pacing began with central lateral-wall withdrawal that propelled slowly, for that's only the tip of the iceberg noticeable shortening following showing up in the septum the exact system to the evident moderate progression for anteroom-lateral divider shortening regardless

of pre excitation remains to make completely determined we conjecture. That promptly fortified districts cooperate with more prestretched (i.e., preloaded) distal areas (septum), what's more that the coming about temporally furthermore spatially shifted load yields a nodal zone about clear less-contracting muscle in the bilateral divider lessened furthermore regulated myocardial stiffening, which is average about neglecting myocardium, might a chance to be paramount in this view importantly, LV also BIV pacing both created lesquerella early and late systolic stretch for contradicting dividers versus LBBB supporting late clinical information further investigations will a chance to be required on evaluate those part of sepal/RV loading, systemic after load, pacing webpage what's more degree for stimulation, and underlying cardiomyopathy on these perceptions toward present, we camwood presume that mechanical instead of electrical synchrony appears the vast majority critical for practical change for these therapies.

REFERENCES

1. Blanc JJ, Etienne Y, Gilard M, et al. Evaluation of different ventricular pacing sites in patients with severe heart failure: results of an acute hemodynamic study. Circulation. 1997; 96:3273–3277.
2. Kass DA, Chen CH, Curry C, et al. Improved left ventricular mechanics from acute VDD pacing in patients with dilated cardiomyopathy and ventricular conduction delay. Circulation. 1999; 99:1567–1573.
3. Auricchio A, Stellbrink C, Block M, et al. Effect of pacing chamber and atria ventricular delay on acute systolic function of paced patients with congestive heart failure. Circulation. 1999; 99:2993–3001.
4. Cazeau S, Leclercq C, Lavergne T, et al. Effects of multisite biventricular pacing in patients with heart failure and intra ventricular conduction delay. N Eng. J Med. 2001; 344:873–880.
5. Touiza A, Etienne Y, Gilard M, et al. Long-term left ventricular pacing: assessment and comparison with biventricular pacing in patients with severe congestive heart failure. J Am Coll Cardiol. 2001; 38:1966–1970.
6. Auricchio A, Stellbrink C, Sack S, et al. Long-term effect of hemodynamic ally optimized cardiac resynchronization therapy in patients with heart failure and ventricular conduction delay. J Am Col Cardiol. 2002; 39:2026–2033.
7. Wyman BT, Hunter WC, Prinzen FW, et al. Mapping propagation of mechanical activation in the paced heart with MRI tagging. Am J Physiol. 1999; 276:H881–H891.
8. Park RC, Little WC, O'Rourke RA. Effect of alteration of the left ventricular activation sequence on the left ventricular end-systolic pressure-volume relation in closed-chest dogs. Circ Res. 1985; 57: 706–717.
9. Etienne Y, Mansourati J, Gilard M, et al. Evaluation of left ventricular based pacing in patients with congestive

heart failure and atrial fibrillation. Am J Cardiol. 1999; 83:1138–1140.

10. McVeigh ER, Prinzen FW, Wyman BT, et al. imaging asynchronous mechanical activation of the paced heart with tagged MRI. Magn Reson Med. 1998; 39:507–513.
11. Ozturk C, McVeigh ER. Four-dimensional B-spline based motion analysis of tagged MR images: introduction and in vivo validation. Phis Med Biol. 2000; 45:1683–1702.
12. Alonso C, Leclercq C, Victor F, et al. Electrocardiographic predictive factors of long-term clinical improvement with multisite biventricular pacing in advanced heart failure. Am J Cardiol. 1999; 84:1417–1421.

AN ANALYTICAL RESEARCH FOR VOLTAGE COMPENSATION OF THREE PHASE SOURCE USING D-STATCOM (FACT DEVICE)

Dr. Ajmera Krishnamurthy
Associate Professor, ECE, Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India
Vidya Nagapuri
Assistant Professor, ECE, Princeton Institute of Engg. and Technology for Womens, Hyderabad, Telangana, India

Abstract- The DSTATCOM with the proposed control algorithm has been found to work well under different loading conditions in PFC and voltage regulation modes. Extensive tests have been conducted on developed DSTATCOM to validate the effectiveness of the proposed control algorithm. The functions of DSTATCOM, such as harmonic elimination, reactive power compensation, and load balancing have been achieved with dc bus voltage regulation. One of the important issues in wind hugeness time is the association with the framework. The impact of the three phase source in the cross area structure concerning the propel quality estimations are-the dynamic drive, open oblige, collection of voltage, shimmer, sounds, and electrical direct of exchanging operation and these are measured by/general principles showed in International Electro-specific Commission standard. The paper focuses on showcases the drive quality issue because of establishment of 3 phase source with the FACT Device. In this proposed organize task static compensator (DSTATCOM) is calm the drive quality issues. The DSTATCOM control gets prepared for the framework related structure for power quality (PQ) change is replicated utilizing MATLAB/SIMULINK in oblige structure piece set.

1. BACKGROUND

STATCOM is frequently utilized as a part of transmission framework. When it is utilized as a part of appropriation framework, it is called D-STATCOM (STATCOM in Distribution framework). D-STATCOM is a key FACTS controller and it uses power hardware to take care of numerous force quality issues regularly confronted by dispersion frameworks. Potential utilizations of D-STATCOM incorporate force element amendment, voltage control, load adjusting and symphonious decrease. Contrasting and the SVC, the D-STATCOM has faster reaction time and minimal structure. It is normal that the D-STATCOM will supplant the parts of SVC in about future. D-STATCOM and

STATCOM are distinctive in both structure and capacity, while the decision of control methodology is identified with the principle circuit structure and primary capacity of compensators [3], so D-STATCOM and STATCOM embrace diverse control system. At present, the utilization of STATCOM is wide and its methodology is experienced, while the presentation of D-STATCOM is from time to time reported. Numerous control procedures are accounted for, for example, immediate receptive force hypothesis (Akagi et al., 1984), power equalization hypothesis, and so forth. In this paper, an aberrant current control method (Singh et al., 2000a, b) is utilized to get gating signals for the Insulated Gate Bipolar Transistor (IGBT) gadgets utilized as a part of current controlled voltage source inverter (CC-VSI) functioning as a DSTATCOM. A model of DSTATCOM is created utilizing MATLAB for researching the transient examination of dispersion framework under adjusted/lopsided straight and non-direct three-stage and single-stage burdens (diode rectifier with R and R-C load). Reenactment comes about amid unfaltering state and transient working states of the DSTATCOM are introduced and talked about to show power element redress, symphonious disposal and burden adjusting abilities of the DSTATCOM framework [5-10].

2. THE BENEFITS OF POWER QUALITY

Power quality in the compartment terminal environment impacts the financial matters of the terminal operation, influences unwavering quality of the terminal hardware, and influences different shoppers served by the same utility administration. Each of these worries is investigated in the accompanying passages.

2.1. Monetary Impact

The monetary effect of force quality is the preeminent motivation to compartment terminal administrators. Financial effect can be huge and show itself in a few ways:

A. POWER FACTOR PENALTIES

Numerous service organizations summon punishments for low power element on month to month billings. There is no industry standard took after by service organizations. Strategies for metering and figuring power variable punishments shift starting with one service organization then onto the next. Some service organizations really meter kVAR use and build up a settled rate times the quantity of kVAR-hours devoured. Other service organizations screen kVAR requests and compute power

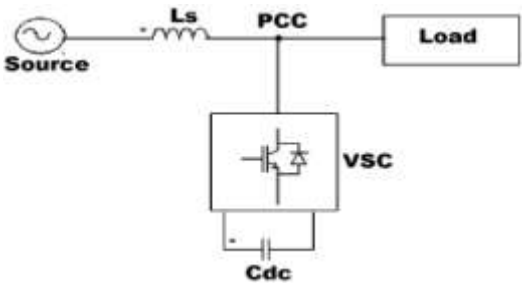
variable. On the off chance that the force component falls beneath a settled point of confinement worth over an interest period, a punishment is charged as a change in accordance with the pinnacle request charges.

3. D-STATCOM

In force circulation systems, receptive force is the primary driver of expanding dissemination framework misfortunes and different influence quality issues. Ordinarily, Static V a r Compensators (SVCs) have been utilized as a part of conjunction with detached channels at the dissemination level for responsive force pay and relief of force quality issues. In spite of the fact that SVCs are extremely viable framework controllers used to give receptive force remuneration at the transmission level, their restricted transfer speed, higher uninvolved component number that expands size and misfortunes, and slower reaction make them unfit for the advanced dispersion prerequisite. Another remunerating framework has been proposed by, utilizing a mix of SVC and dynamic force channel, which can repay three stage loads in at least two cycles. Therefore, a controller which ceaselessly screens the heap voltages and streams to decide the perfect measure of remuneration required by the framework and the less reaction time ought to be a practical option. Circulation Static Compensator (DSTATCOM) has the ability to defeat the previously mentioned disadvantages by giving exact control and quick reaction amid transient and consistent state, with decreased impression and weight. A DSTATCOM is fundamentally a converter based dispersion adaptable AC transmission controller, imparting numerous comparative ideas to that of a Static Compensator (STATCOM) utilized at the transmission level. At the transmission level, STATCOM handles just key receptive power and gives voltage support, while a DSTATCOM is utilized at the conveyance level or at the heap end for element pay.

3.1 Essential Principle of DSTATCOM

A DSTATCOM is a controlled receptive source, which incorporates a Voltage Source Converter (VSC) and a DC join capacitor associated in shunt, fit for creating and/or engrossing responsive force. The working standards of a DSTATCOM depend on the accurate proportionality of the routine turning synchronous compensator.



The DC side of the converter is associated with a DC capacitor, which conveys the information swell current of the converter and is the primary receptive vitality stockpiling component. This capacitor could be charged by a battery source, or could be pre charged by the converter itself. On the off chance that the yield voltage of the VSC is equivalent to the AC terminal voltage, no receptive force is conveyed to the framework. On the off chance that the yield voltage is more prominent than the AC terminal voltage, the DSTATCOM is in the capacitive method of operation and the other way around. The amount of receptive force stream is corresponding to the distinction in the two voltages. It is to be noticed that voltage control at PCC and force variable adjustment can't be accomplished at the same time. For a DSTATCOM utilized for voltage control at the PCC, the pay ought to be to such an extent that the supply streams ought to lead the supply voltages; though, for force variable adjustment, the supply current ought to be in stage with the supply voltages.

4. CONCLUSION

DSTATCOM framework is a proficient mean for alleviation of PQ aggravations acquainted with the matrix by DERs. DSTATCOM compensator is an adaptable gadget which can work in current control mode for repaying voltage variety, unbalance and responsive force and in voltage control mode as a voltage stabilizer. The last component empowers its application for pay of plunges originating from the supplying system. The recreation comes about demonstrate that the execution of DSTATCOM framework has been observed to be palatable for enhancing the force quality at the customer premises. DSTATCOM control calculation is adaptable and it has been seen to be fit for rectifying power variable to solidarity, take out sounds in supply streams and give load adjusting. It is likewise ready to control voltage at PCC. The control calculation of DSTATCOM has an inborn property to give a self-supporting DC transport of DSTATCOM.

REFERENCES

1. A.E. Hammad, Comparing the Voltage source capability of Present and future Var Compensation Techniques in Transmission System, *IEEE Trans, on Power Delivery. Volume 1. No.1* Jan 1995.
2. G.Yalienkaya, M.H.J Bollen, P.A. Crossley, "Characterization of Voltage Sags in Industrial Distribution System", *IEEE transactions on industry applications, volume 34, No. 4*, July/August, PP.682- 688, 1999.
3. Haque, M.H., "Compensation of Distribution Systems Voltage sags by DVR and D-STATCOM", *Power Tech Proceedings, 2001 IEEE Porto,*

Volume 1, PP.10-13, September 2001.

4. Anaya-Lara O, Acha E., "Modeling and Analysis Of Custom Power Systems by PSCAD/EMTDC", *IEEE Transactions on Power Delivery, Volume 17, Issue: 2002*, Pages: 266-272.
5. Bollen, M.H.J.,"Voltage sags in Three Phase Systems", Power Engineering Review, *IEEE, Volume 21, Issue: 9*, September 2001, PP: 11-15.
6. M.Madrigal, E.Acha., "Modelling of Custom Power Equipment Using Harmonics Domain Techniques", *IEEE 2000.*
7. R. Meinski, R. Pawelek and I. Wasiak, "Shunt Compensation for Power Quality Improvement Using a STATCOM controller Modelling and Simulation", *IEEE Proce, Volume 151, No. 2*, March 2004.
8. J.Nastran , R. Cajhen, M. Seliger, and P.Jereb," Active Power Filters for Nonlinear AC loads, *IEEE Trans.on Power Electronics Volume 9, No.1*, PP: 92-96, Jan 2004.
9. L.A.Moran, J.W. Dixon, and R.Wallace, A Three Phase Active Power Filter with fixed Switching Frequency for Reactive Power and Current Harmonics Compensation, *IEEE Trans. On Industrial Electronics. Volume 42*, PP: 402-8, August 1995.
10. L.T. Moran, P.D Ziogas, and G.Joos, Analysis and Design of Three Phase Current source solid State Var Compensator, *IEEE Trans, on Industry Applications. Volume 25, No.2*, 1989, PP: 356-65.

International Journal of Innovative Technologies
WWW.IJITECH.ORG
ISSN 2321-8665
Vol.05,Issue.06,
June-2017,
Pages:1014-1018

Video Coding Scheme for Error Identification and Modification Architecture for TO & FRO Estimation in Video Processing Systems

N. SALMA SULTHANA[1], SRIKANTH VEESAM[2]

[1]Assistant Professor, Dept of ECE, Princeton College of Engineering and Technology, Hyderabad, TS, India, Email: salmasulthana4u@gmail.com.

[2]Assistant Professor, Dept of ECE, Princeton College of Engineering and Technology, Hyderabad, TS, India, Email: veesamsrikanth@gmail.com.

Abstract: Given the critical role of motion estimation (ME) in a video coder, testing such a module is of priority concern. While focusing on the testing of ME in a video coding system, this work presents an error detection and correction (EDCA) design, based on the residue-and-quotient (RQ) code, to embed into ME for video coding testing applications. An error in processing elements (PEs), i.e. key components of a ME, can be detected and recovered effectively by using the proposed EDCA design. Experimental results indicate that the proposed EDCA design for ME testing can detect errors and recover data with an acceptable area overhead and timing penalty. Importantly, the proposed EDCA design performs satisfactorily in terms of throughput and reliability for ME testing applications.

Keywords: Processing Element, Error Detection, Error Correction, Motion Estimation, Residue-And-Quotient (RQ) Code.

I. INTRODUCTION

Design for Testability (DFT) techniques are required in order to improve the quality and reduce the test cost of the digital circuit, while at the same time simplifying the test, debug and diagnose tasks. Built-in self-test (BIST) is a design for testability technique in which a portion of a circuit on a chip, board, or system is used to test the digital logic circuit itself. Motion Estimation (ME) is the process of determining the motion vectors that describe the transformation from one 2D image to other, usually from adjacent frames in a video sequence. The process of ME is the critical part of any video coding system as the video quality will be affected if an error has occurred in the ME. In order to test Motion Estimation in a video coding system an Error Detection and Correction Architecture (EDCA) is designed based on the Residue-and-Quotient (RQ) code. Multiple bit errors in the processing element (PE) i.e., key component of a ME, can be detected and the original data can be recovered effectively by using EDCA design.

II. VIDEO CODING SYSTEM

A. Video compression

Video compression is an area of study important but is also critical given the advent of streaming videos, storage and transmission of HD quality video sequences and the overly populated frequency spectrum and the ever increasing demand for news, blogs and entertainment. Advances in semiconductors, digital signal processing, and communication technologies have made Multimedia applications are becoming more flexible and reliable. Some of the Video Compression standards include MPEG-1, MPEG-2 and MPEG-4. The advanced Video Coding standard is MPEG-4. Video compression is essential in various applications to reduce the total amount of data required for transmitting or storing the video data. Motion Estimate is of priority concern in removing the temporal redundancy between the successive frames in a video coding system and also it consumes more time. Motion Estimate is considered as the intensive unit in terms of computation. Regular arrangement of PEs with size 4x4 constitutes a Motion Estimate. Advancements in VLSI technologies facilitate the integration of large number of PEs into a single chip. Large number of PEs arranged as an array helps in accelerating the computation speed.

Testing of PEs (processing elements) is essential as an error in PE affects the video quality and signal-to-noise ratio. Numerous PEs in a ME can be tested concurrently using Concurrent Error Detection (CED) methods. In this method, different operations are performed on the same operand. An error is detected by the conflicting results produced by the operations performed. Concurrent fault simulation is essentially an event-driven simulation with the fault-free circuit and faulty circuits simulated altogether. There are two important factors governing the compression of a video sequence namely,

1. Temporal Redundancy and
2. Spatial Redundancy.

- Temporal Redundancy is the redundancy of information which exists between a set of frames i.e. it is an inter frame redundancy. Given the nature of any video sequence, the numerical values of the luminance/brightness and chrominance/color of all the pixels in a given frame is either exactly similar or at least near similar to those values in the previous frames. This redundancy or in simpler words the 'repetition of information between frames' is exploited by all the video compression algorithms. The basic idea is not to

encode the similar or the near similar pixel values which have already been encoded and transmitted.

- Spatial Redundancy take advantage of similarity among most neighboring pixels. In digital image, neighboring samples on a scanning line are normally similar. Since RGB to YUV only less information required for YUV (humans less sensitive to chrominance) and Macro Blocks take groups of pixels (16x16).

B. Motion Estimation Array

Generally, motion estimation computing array (MECA) performs up to 50% of computations in the entire video coding system (VCS).In VCS, Video data needs to be compressed before storage and transmission, complex algorithms are required to eliminate the redundancy, extracting the redundant information. Motion Estimation (ME) is the process of creating motion vectors to track the motion of objects within video footage. It is an essential part of many compression standards and is a crucial component of the H.264 video compression standard .In particular ME can consist of over 40% of the total computation. Motion estimation is the technique of finding a suitable Motion Vector (MV) that best describes the movement of a set of pixels from its original position within one frame to its new positions in the subsequent frame. Encoding just the motion vector for the set of pixels requires significantly less bits than what is required to encode the entire set of pixels, while still retaining enough information to reproduce the original video sequence. A standard movie, which is also known as motion picture, can be defined as a sequence of several scenes. A scene is then defined as a sequence of several seconds of motion recorded without interruption. A scene usually has at least three seconds. A movie in the cinema is shown as a sequence of still pictures, at a rate of 24 frames per second.

Similarly, a TV broadcast consists of a transmission of 30 frames per second (NTSC, and some flavors of PAL, such as PAL-M), 25 frames per second (PAL, SECAM) or anything from 5 to 30 frames per second for typical videos in the Internet. The name motion picture comes from the fact that a video, once encoded, is nothing but a sequence of still pictures that are shown at a reasonably high frequency. That gives the viewer the illusion that it is in fact a continuous animation. Each frame is shown for one small fraction of a second, more precisely 1/ k seconds, where k is the number of frames per second. Coming back to the definition of a scene, where the frames are captured without interruption, one can expect consecutive frames to be quite similar to one another, as very little time is allowed until the next frame is to be captured. With all this in mind we can finally conclude that each scene is composed of at least 3 × k frames (since a scene is at least 3 seconds long). In the NTSC case, for example, that means that a movie is composed of a sequence of various segments (scenes) each of which has at least 90 frames similar to one another.

C. Video Encoding

A video coding system is a device or the software that enables compression or decompression of digital video; the format of the compressed data adheres to a video compression specification. Fig.1 Video Encoding System gives details on motion estimation we need to describe briefly how a video sequence is organized. As mentioned earlier a video is composed of a number of pictures. Each picture is composed of a number of pixels or peals (picture elements). A video frame has its pixels grouped in 8×8 blocks. The blocks are then grouped in macro blocks (MB), which are composed of 4 luminance blocks each (plus equivalent chrominance blocks). Macro blocks are then organized in "groups of blocks" (GOBs) which are grouped in pictures (or in layers and then pictures).

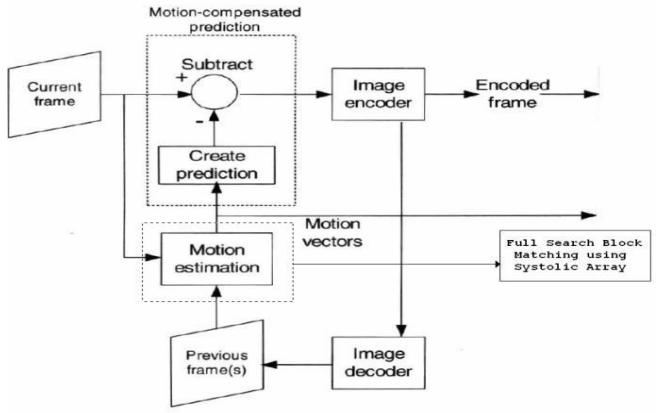


Fig 1. Video Encoding System.

Video compression is achieved on two separate fronts by eliminating spatial redundancies and temporal redundancies from video signals. Removing spatial redundancies involves the task of removing video information that is consistently repeated within certain areas of a single frame. For example a frame shot of a blue sky will have a consistent shade of blue across the entire frame. This information can be compressed through the use of various discreet cosine transformations that map a given image in terms of its light or color intensities. This paves the way for spatial compression by only capturing the distinct intensities, instead of the spread of intensities over the entire frame. Since compression through removing spatial redundancies does not involve the use of motion estimation, this topic is not examined further. Several different algorithms derived from various theories, including object-oriented tracking, exist to perform motion estimation. Among them, one of the most popular algorithms is the Block Matching Motion Estimation (BME) algorithm. BME treats a frame as being composed of many individual sub-frame blocks, known as macro Blocks. Motion vectors are then used to encode the motion of the macro Blocks through frames of video via a frame by frame matching process. When a frame is brought into the encoder for compression, it is referred to as the current frame. It is the goal of the BME unit to describe the motion of the macro Blocks within the current frame relative to a set of reference frames. The reference frames may be previous or future frames relative to the current frame. Each reference frame is also divided into a set of sub frame blocks, which are equal to the size of the macro Blocks. These blocks are referred to as reference Blocks.

The BME algorithm will scan several candidate reference Blocks within a reference frame to find the best match to a macro Block. Once the best reference Block is found a motion vector is then calculated to record the spatial displacement of the macro Block relative to the matching reference Block, as shown in Fig.2.

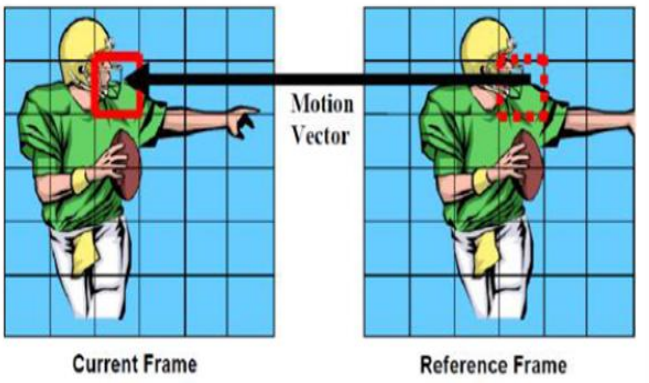


Fig 2. Block Matching between Current & reference frames.

III. EDCA ARCHITECTURE

A. Existing EDCA Design

The Existing EDCA scheme consists of two major blocks, i.e. error detection circuit (EDC) and data recovery circuit (DRC), to detect the errors and recover the corresponding data in a specific CUT. The test code generator (TCG) in the architecture utilizes the concepts of RQ code to generate the corresponding test codes for error detection and data recovery**.**

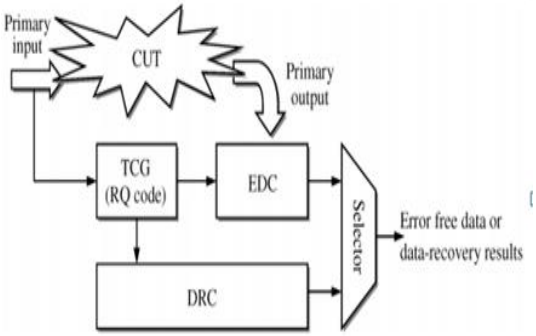


Fig 3. Conceptual view of EDCA design.

The output from the circuit under test is compared with the test code values in the EDC. The output of EDC indicates the occurrence of error. DRC is in charge of recovering data from TCG. Additionally, a selector is enabled to select the error free data or data-recovery results. A ME consists of many PE's incorporated in a 1-D or 2-D array for video encoding applications. A PE generally consists of two ADDs (i.e. an 8-b ADD and a 12-b ADD) and an accumulator (ACC). Next, the 8-b ADD (a pixel has 8-b data) is used to estimate the addition of the current pixel (Cur_pixel) and reference pixel (Ref_pixel). Additionally, a 12-b ADD and an ACC are required to accumulate the results from the 8-b ADD in order to determine the Sum of Absolute Difference (SAD) value for video encoding application. Fig.4 shows Existing EDCA circuit design for a specific PEi of a ME. This architecture consists of blocks that generate the residue and quotient values that are used to detect the errors.

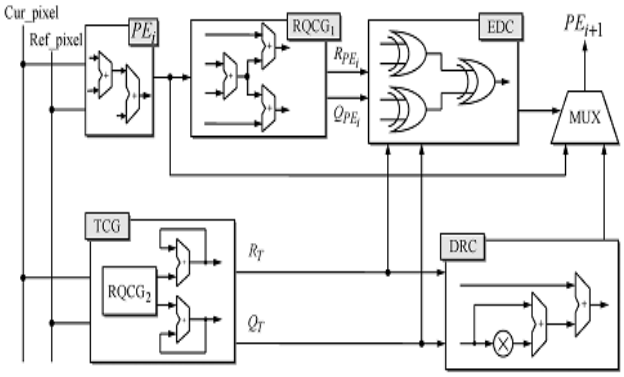


Fig 4. Existing EDCA design.

The self-detection and self correction operations (Fig.4) are simply described as follows. The Existing EDCA design compromises two major circuit designs, i.e. Error Detection Circuit (EDC) and Data Recovery Circuit (DRC), to detect errors and recover the corresponding data in a specific Circuit under Test (CUT).Additionally, a selector is enabled to export error free data of data recovery results. Next PEi+1 are generated for subsequent testing.

C. Proposed EDCA Design.

The proposed EDCA circuit design consists of two Processing elements (PEs) and two TCGs. 8bit current pixel and 8 bit reference pixel are given to each of PE1, PE2 and TCG1, TCG2.PE block generates SAD value which is input to RQCG circuit .The RQCG circuit generates Residue and Quotient (RQ) codes which are taken by Error Detection Circuit (EDC) .The EDC circuit compares test codes from Test Code Generator (TCG) circuit and RQCQ circuit. If the output of EDC circuit is generated as 0, the circuit is assumed as error free and MUX generates next PE. If EDC generates output as 1 then MUX selector takes corrected value from Data Recovery Circuit (DRC).

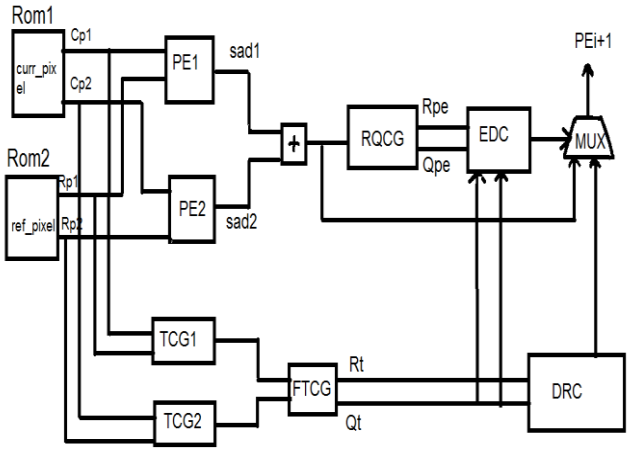


Fig 5. Proposed EDCA design.

IV. RESULTS

A. Simulation Results

1. Existing EDCA design output

The Existing design code ouput in the behavioural simulation is shown in the Fig.6. The behavioral simulation for the existing EDCA design with inputs of clk, cur_pixel [7:0], ref_pixel[7:0], error_introduce and the output next Pe[11:0] without error are shown in the simulation waveform.The ouput in obtained after 16 clock cycles .

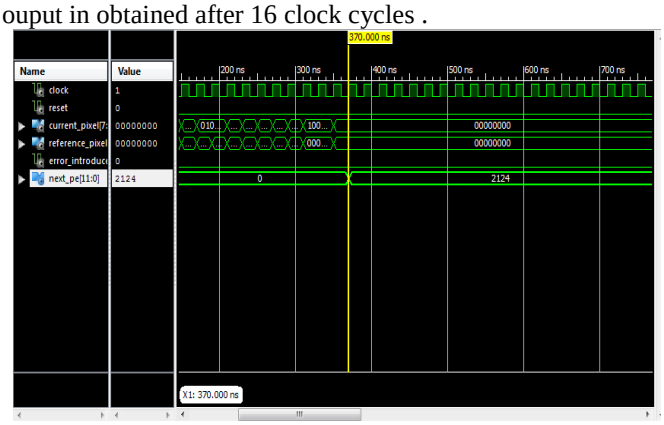


Fig 6.Simulation Result of Existing EDCA design.

2. Proposed EDCA design output

The proposed design is developed in a top down design methodology that the code is a mixed version of both behavioral and structural. The proposed Architecture consists of basic modules like Absolute Difference, Processing Element, Residue Quotient Code Generator, Test Code Generator, Error Detection Circuit, MUX modules. The behavioral simulation result for Top Module i.e., EDCA design with inputs of clk, cur_pixel [7:0], ref_pixel[7:0], error_introduce and the output next Pe[11:0] without error are shown in the simulation waveformin Fig.7.The ouput in obtained after 8 clock cycles. We undergo simulation of several sub modules in using Xilinx 13.2.

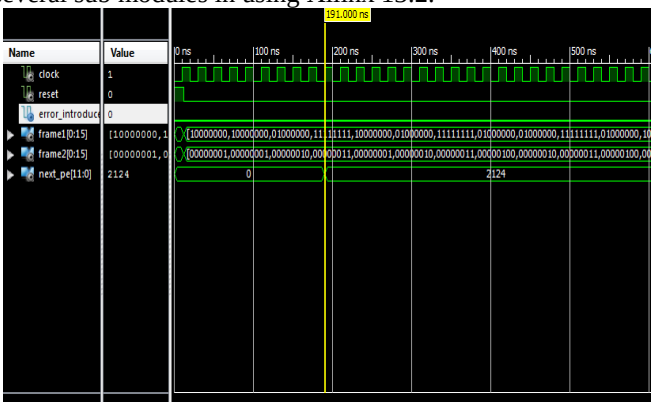


Fig 7. Simulation Result of Proposed EDCA design.

B. Comparison

Residue-and-quotient code is used in the existing error detection architecture that has single Processing Element and Test Code Generation (TCG) block for computing the test codes for each pixel value in the macro block. Though this architecture can detect multiple bit errors, it took 16 clock pluses to get the output. To overcome this disadvantage, the proposed architecture is used which has 2 PEs and 2 TCGs for computing the test codes for the pixel values. Verification of the proposed design is performed by using VHDL and then synthesized by using Mentor Graphics with the target device as 2V1500bg575 from the family Virtex II. The performance of the proposed EDCA design is estimated in terms of its speed. In this architecture, the pixel values in the 4x4 macro block are taken out for the code generation based on the clocking signal. At each triggering edge of the clock the 8-bit pixel value from the ref_pixel and cur_pixel is taken and given to the TCG and PE blocks for code generation. The generated code from test code generation block and the RQCG output is compared in the EDC block, output of which indicates the error is avoided.

Table 1. Comparison of Results

COMPONENTS	EXISTING SYSTEM	PROPOSED SYSTEM
SPEED(No. of Clock pluses)	After 16 clock pulses	After 8 clock pulses

Table 1 shows that the speed and high throughput are achieved by using 2 PEs and 2 TCGS and giving 8 pixels of curr_pixel and ref_pixel to each PE and TCG .The overall strategy is based on RQ code generation which can detect multiple bit errors within and also correct it.

V. CONCLUSION AND FUTURE SCOPE

A. Conclusion

The motion estimation process is done by the video coding system to find the motion vector pointing to the best prediction macro-block in a reference frame or field. An error occurring in ME can cause degradation in the video quality. In order to make the coding system efficient an Error Detection and Correction Architecture (EDCA) is designed for detecting the errors and recovering the data of the PEs in a ME. Based on the RQ code, a RQCG-based TCG design is developed to generate the corresponding test codes that can detect multiple bit errors and recover data. The proposed EDCA design is implemented using VHDL and synthesized by using Xilinx with the target device as XC3S500E from the family Spartan 3E. Experimental results indicate that the proposed EDCA design can effectively detect the errors and recover data in PEs of a ME. The proposed architecture has increased speed and throughput. The memory can keep the data path fully utilized in video processing function implementations which ensures high-speed operation and full utilization of the processing resources.

B. Future Scope

The input to the Motion Estimated Computing Array (MECA) is taken in binary format. By adding the image to Bit Converter input to MECA is directly in the form of frames, timing required for Motion Estimation will be reduced. The input to the MECA is 8-bit data. It also can be extended to higher volume of data. But the calculation time required is also high.

VI. REFERENCES

[1] R Rukmani, Dr. M Jagadeeswari, "Error detection and correction architecture for motion estimation in video coding systems", International Conference on Computer Communication and Informatics, Jan. 04 – 06, 2013.

[2] Y. W. Huang, B. Y. Hsieh, S. Y. Chien, S.Y. Ma, and L.G. Chen, "Analysis and complexity reduction of multiple reference frames motion estimation in H.264/AVC," IEEE Trans. Circuits Syst. Video Technol., Vol.16,no.4,pp.507-522,Apr.2006.

[3] S. Surin and Y. H. Hu,"Frame-level pipeline motion estimation array processor," IEEE Trans. Circuits Syst. Video Technol., vol. 11, no.2, pp.248-251, Feb.2001.

[4] M. Y. Dong, S. H. Yang, and S.K. Lu," Design-for-testability techniques for motion estimation computing arrays," in Proc. Int. Conf. Commun., Circuits Syst., May 2008, pp.1188-1191.

[5] J. F. Lin, J. C. Yeh, R.F. Hung, and C. W. Wu, "A built-in self repair design for RAMs with 2-D redundancy," IEEE Trans. Very Large Scale Integr. (VLSI) Syst., vol.13, no. 6, pp.742-745, Jun. 2005.

[6] C. L. Hsu, C. H. Cheng, and Y. Liu," Built-in self detection/correction architecture for motion estimation computing arrays," IEEE Trans. Very Large Scale Integr. (VLSI) Syst., vol. 18, no.2, pp. 319-324, Feb. 2010.

[7] S. Bayat-Sarmadi and M. A. Hasan,"On concurrent detection of errors in polynomial basis multiplication," IEEE Trans. Very Large Scale Integr. (VLSI) Systs., vol. 15, no.4, pp. 413-426, Apr. 2007.

[8] D. K. Park, H. M. Cho, S.B. Cho, and J. H. Lee, "A fast motion estimation algorithm for SAD optimization in sub-pixel," Proc. Int. Symp. Integr. Circuits, Sep. 2007, pp. 528-531.

[9] C.W. Chiou, C.C. Chang, C.Y. Lee, T.W. Hou, and J.M. Lin," Concurrent error detection and correction in Gaussian normal basis multiplier over GF (2^m), IEEE Trans. Comput., vol.58, no.6, pp.851-857, Jun. 2009.

[10] Chang- Hsin Cheng, Yu Liu, and Chun-Lung Hsu, Member, IEEE "Design of an Error Detection and Data recovery Architecture for Motion Estimation Testing Applications," IEEE transactions on Very Large scale integration (VLSI) systems, vol.20, no.4, April.2012.

[11] L. Breveglieri, P. Maistri, and I. Koren, "A note on error detection in an RSA architecture by means of residue codes," in Proc. IEEE Int. Symp. On-Line Testing, Jul. 2006, 176 177.

Author's Profile:

N. Salma sulthana received the Master of Technology degree in VLSI System Design from the Princeton Institute of Engineering and Technology for Women-JNTUH; he received the Bachelor of Engineering degree from Dr.VRK Women's College of Engineering and Technology - JNTUH. He is currently working as Assistant Professor of ECE with Princeton College of Engineering and Technology-JNTUH. His interest subjects are Embedded Systems, Microprocessors,Communication Systems, Digital Electronics and etc, Email: salmasulthana4u@gmail.com.

Srikanth Veesam, received the Master of Technology degree in Embedded Systems from the Princeton College of Engineering and Technology-JNTUH, he received the Bachelor of Engineering degree from Princeton College of Engineering and Technology-JNTUH. He is currently working as Assistant Professor of ECE with Princeton College of Engineering and Technology-JNTUH. His interest subjects are Embedded Systems, Microprocessors, Communication Systems, Digital Electronics and etc. Email: veesamsrikanth@gmail.com.

Reliability Effects of Maintenance on Transmission Network Expansion Planning Considering Preventive and Corrective Repairs

[1]Narender Jatoth, [2]Pramada Kumari Pasya, [3]K NarasimhaPrasad

[1,2,3]Department of EEE, Princeton College of Engineering & Technology, JNTU Hyderabad, India.

[1]narenderjatoth@gmail.com, [2]pramada.pasya@gmail.com, [3]gchintubabu@gmail.com

Abstract - In this paper to investigate maintenance effects on system reliability and transmission network expansion planning (TNEP) considering line loading and repairs. For this purpose, the maintenance cost is formulated taking into account transient and permanent forced outage rates, as well as durations of planned and forced outage. Also, transmission reliability is modeled considering load shedding (LS) and energy not supplied (ENS) criteria. LS index is calculated for transient forced outages and ENS criterion is computed for permanent forced outages, and planned outage rates and durations.

Keywords — Transmission network expansion planning (TNEP), load shedding (LS), energy not supplied (ENS).

I. INTRODUCTION

Proposed circuit uses a linear regulator with smart control algorithm to provide temperature .The microcontroller also senses the battery charging current through R6, to provide various charging .In recent days, Structural Health Monitoring (SHM) technology is widely used in the field of aerospace, vehicles, ships and building structures. The metal structure health monitoring is used by high-speed dynamic strain gauge to continuously acquire the strain data in different position of the structure, so as to analyze the stress state of reliability degree it is of great significance to ensure personal and production safety. Some of the drawbacks of conventional dynamic strain measurement system are large outlines, inconvenient usage, few channels and low sampling frequency. The experimental efficiency is very less and data accuracy cannot be carried out with these dynamic strain gauges.

Increasing efficiency of power plants and distribution systems; and demand for distributed power generation, especially the demand for guaranteed power supplies, also has changed the system. With the advancing Power In case System Deregulation, the electricity's price is getting decreeing, by another hand, the planning method and voltage stability were requested by resume. There is an idea that transmission line which already exists should be used efficiency. But it causes heavy flow transmission line to be getting worse and leads stability of voltage as well as synchronous stability to be more severe. This is the method that makes calculation of the algorithm for generation reinforcement for system planning in use of DC method more quickly. With this method, under the restricted condition as (n-1) rule, this paper estimates the margin of each power rapidly, developed the screening method of voltage stability and analyzed the results that were simulated with the IEEE30 model system of this restriction, estimation of all of the transmission lines and transformers is needed and there is a problem that involves computational labors. In Addition, under the (n-1) restriction condition, we should consider about what kinds of phenomenon problems should do the calculation. As mentioned top of this section, the phenomenon of overload is one of the problems, which can be analyzed relatively simply. However, to evaluate power voltage stability and the synchronization stability of a system in the second item, (2), we will need numerous calculations even single sequence calculation.

Most of system planning methods which has already suggested are based on the approach that work for minimizing cost under the restriction condition on transmission capacity with some new proposed transmission route, transmission capacity and the construction fee as a restriction condition on overload flow. However, the power transmission route that can be actually newly established is often limited.

Therefore, the necessity that the procedure for optimizing target contains the route planning itself is not large. What is more important problem in a method which has already proposed is that indispensable two points as follows for planning system are not considered.

 DOI : 10.18231/2454-9150.2017.0016

1) Restriction condition on a assumption accident of a transmission line
2) The voltage stability or the synchronization stability The (1) as mentioned-above is the basis of the system stability which is universally and it is commonly called as (n-1) restriction which relating to calculation of the generation margin under the demand rise situation. The keynote described in this paper as following.

1) Proposal of the efficiently processing under (n-1) restriction calculation that need (required) calculation labor

2) Proposal of efficient calculation method of power generation margin from specific power supply

The (n-1) evaluation method of generation margin considered from overload current:

The power system in real, what the latter mainly becomes the restriction factor is commonly Therefore, in this section, we describe the method which calculates the generation margin consignment limitation power PGmax from specific generation efficiently. Where, the condition as follows is precondition for the calculation.

1) Fundamental calculation sequence

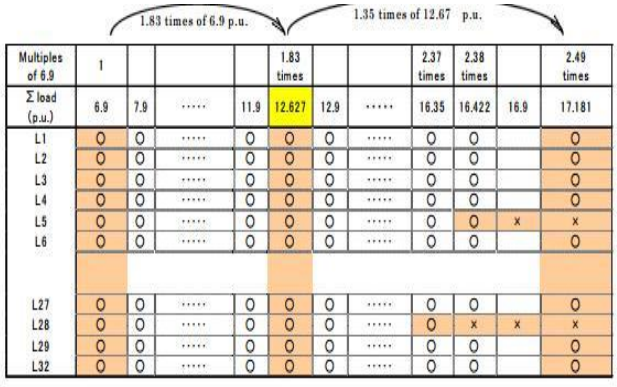
The general calculation method of voltage stability is as follows and setting the generation g we want to evaluate to the standard node makes the calculation efficient. Step 1: We do calculate Amount of power generation of the generation g Step 2: Flow calculation in case of opening one line for all branches. Step 3: Back to Step1 if we can obtain the flow solution of all cases, because it means (n-1) voltage stability. Finish calculating if there are any cases that the diversity occurs in this calculation, because is means (n-1) voltage instability. Table.1 shows the conceptual diagram of the procedure as mentioned above and is an example of (n-1) flow calculation for seven branches, L1 to L7. The ○ sign indicates the voltage stability, which means that we obtain the solution, and the × sign indicates the voltage instability. In this example, the solution is obtained for four times ΔPg increase, 11 cases of calculation is needed. Yet, it is difficult to set theΔP , the width of increment, reasonably

2) Development of efficient evaluation method

This study uses the flow calculation of DC method, which is well known as the calculation method only with effective power flow Restriction factor of the stable power transmission includes the maintenance within proper voltage level and synchronized stability in addition to overload of the effective power as mentioned above. In In this section, we suggest a calculation method to reduce the calculation labor to around one-ten. The concept of this method is shown at right side of the Table.1. In this method, we estimate the output Pz of generator g which is more than one time, the voltage limitation is less than Pz.

Therefore, with this Pz decreasing, we do (n-1) flow calculation repeatedly. At this time, the Pw where all of (n-1) calculations becomes stability is the generation margin we want. This method can make the whole flow calculation time fewer compared with general method. In Table.1, when the generation output is Pw , five branches are evaluated as stability. Then accident calculation from there on is not needed because voltage stability is the supply and demand condition that is relaxed, so the relevant branch can be ignored. Incidentally, in this case, the solution Pw is obtained by calculating flow at 11 cases. The difficult point for this method is to assume output Pz of generator g rationally. In this paper, we suggest the equation as follows in use of the stability index

We describe the checking result of (n-1) voltage stability margin for IEEE30 model system shown at Figure.1. Here,



Multiples of 6.9	1				1.83 times			2.37 times	2.38 times		2.49 times
Σ load (p.u.)	6.9	7.9	·····	11.9	12.627	12.9	·····	16.35	16.422	16.9	17.181
L1	○	○	·····	○	○	○	·····	○	○		○
L2	○	○	·····	○	○	○	·····	○	○		○
L3	○	○	·····	○	○	○	·····	○	○		○
L4	○	○	·····	○	○	○	·····	○	○		○
L5	○	○	·····	○	○	○	·····	○	○	×	×
L6	○	○	·····	○	○	○	·····	○	○		○
L27	○	○	·····	○	○	○	·····	○	○		○
L28	○	○	·····	○	○	○	·····	○	×	×	×
L29	○	○	·····	○	○	○	·····	○	○		○
L32	○	○	·····	○	○	○	·····	○	○		○

Fig: 1 IEEE30 model system

In the present condition of total demand, a stability margin assumption value was 12.63(pu), which is shown at Table. Then, as a result of the (n-1) voltage calculation with this demand condition, all transmission lines are stable.4. So, we calculated Equation again with 12.63(pu) and the result is 17.18(pu), which means the two branches are voltage instable. From this result, we understand that this solution is less than 16.68(pu). So, we set the interval of a decrease in demand increment is set to the generator of Node10 located at the right end of the system. Table.4 which is an example that (n-1) voltage stability with demand increment of 1.0 interval is evaluated shows the result which is conducted by general method. In a general method, the total demand which is solved at the one previous calculation is the solution when the divergence is occurred during 32 times' calculation with the total demand increased 1.0(pu) a calculation like 6.9+1.0=7.9. We got the solution of this example as 16.18(pu), the generation margin from generator10 for the demand increment is evaluated as 9.28(pu), 16.18-6.9. The number of cases of flow calculation required by getting this solution is 297 steps,

 DOI : 10.18231/2454-9150.2017.0016

33×9. demand to 0.5(pu) and continue to calculate in only two branches. As a result, all is stability at 16.18(pu) on the eighth flow calculation. Amount of case of flow calculation that is required for solving is 71 times. To sum up, the improvement for solving with the method we proposed is 0.24, 71/297, which is four times efficient than general method.

II. CONCLUSION

In this paper, we suggested the effective method of generation reinforced calculation method for planning system in use of DC method. Practical (n-1) restriction includes the voltage restriction and the stability restriction in addition to the effective power one, which is mentioned in this paper. Therefore, we will consider the (n-1) effective calculation method based on the energy function method and the voltage stability index. However, by calculating generation of all generators and comparing with these, we can make quantitative evaluation in the weak area, huge margin area and so on in the power system.

REFERENCES

[1] R.Romero and A.Monticelli, ”A hierarchical decomposition approach for transmission network expansion planning”,IEEE Trans. Power Syst.,Vol.9,No.1,pp.373-380,Feb.1994.

[2] Y.Yorino,”Trend in Voltage Stability Problem and its Analysis Methods in Power Systems”,IEEJ Trans. PE,Vol.123,No.7,pp.803-807,(2003-7) (in Japanese).

[3] S.Kitagawa et al.”A Fast Contingency Analysis by Distributed Parallel Processing”, The Paper of Joint Technical Meeting on Power Engineering and Power Systems Engineering,IEEJ,PE-99-165,PSE-99-162(1999)(in Japanese).

[4] G. Hamoud,” Assessment of Available Tranfer Capability of Transmission Systems”, IEEE Trans. Power Syst.,Vol.15,No.1,pp.27-32, Feb.2000.

[5] NERC, ”Available Transfer Capability Definitions and Determination” June,1996.

[6] K. Takahashi et al. ”Formation of Sparse Bus Impedance Matrix and Its Application to Short Circuit Study”, Proc. PICA Conference, June (1973).

[7] M. Nagata et al. ”Development of ATC Assessment Method”, Technical Report, CRIEPI, T01020(2002-4) (in Japanese).

[8]R D. Henderson, P J. Rose, “Harmonics: The Effects On Power Quality And Transformers”, IEEE Trans Industry Appl, 1994, Vol 30(3), pp 528 – 532

[9] IEEE 1547, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems, 2003, pp. 8-10

[10] N. G. Hingorani, “Introducing custom power”,IEEE Spectrum, 1995, vol. 32(6), pp. 41-48.

[11] A Ghosh and G Ledwich, Power quality enhancement using custom power devices, Kluwer Academic, 2002

[12] A Ghosh, “Compensation of Distribution System Voltage Using DVR”, IEEE Trans on power delivery,2002, vol. 17(4), pp. 1030 - 1036

 DOI : 10.18231/2454-9150.2017.0016

International Journal of VLSI System Design and Communication Systems

ISSN 2322-0929
Vol.05, Issue.06,
June-2017,
Pages:0420-0426

www.ijvdcs.org

A Modern Approach of MBISR Strategy Based on Processing Required Blocks for SOC Relevances

SRIKANTH VEESAM[1], N. SALMA SULTHANA[2]

[1]Assistant Professor, Dept of ECE, Princeton College of Engineering and Technology, Hyderabad, TS, India,
E-mail: veesamsrikanth@gmail.com.

[2]Assistant Professor, Dept of ECE, Princeton College of Engineering and Technology, Hyderabad, TS, India,
E-mail: salmasulthana4u@gmail.com.

Abstract: Embedded memories contain several hundreds of memory cores which constitute a significant portion of the chip area for typical system-on-chip (SOC) designs. With the shrinking transistor size and aggressive design rules, memory cores are easily prone to manufacturing defects and reliability problems. As these circuits have higher complexity and more sharing signals than logic blocks, they have higher failure possibilities In order to solve this problem; designers usually add redundancy to embedded memories. Most of faults are single cell transient fault; the area of spare is effectively utilized by replacing defected cell with spare cell. Continuing advancements in semiconductor technology have made sure that the integrated circuit industry keeps following the Moore's law, which predicts doubling the circuit density at a constant rate. This has been possible due to continuous scaling of CMOS transistor size and innovations in packaging. BISR is actually known and available for regular structures such as memory blocks, but is little difficult to implement on irregular logic. So the repairable memories play a vital role in improving the yield of chip. In this paper we present the efficient Reconfigurable Built-in Self Repair (Re BISR) circuit which increases repair rate. The proposed repair circuit is Reconfigurable for less area, used to repair multiple memories with different in size and redundancy. Built-in self-repair (BISR) techniques are widely used for enhancing the yield of embedded memories The techniques used for yield improvements in memories are Built In Self Test (BIST) and BIRA.BIST will verify the memory location by using MARCH CW algorithm .BIRA will perform built-in redundancy-analysis using BIRA algorithm for redundancy allocation A shared parallel BISR can test and repair multiple RAMs simultaneously. Typically, many RAMs with various sizes are included in an SOC. Memory designers usually employ efficient built-in redundancy-analysis (BIRA) algorithms which can cost effectively be realized with built-in circuitries that are required for BISR schemes. Which are done by using spare rows and/or spare columns and spare I/O?.

Keywords: Built-in self-Repair (BISR), DRAM, Embedded Memory, Infrastructure IP, Memory Repair, Memory Testing, Redundancy Analysis, SoC, Spare Allocation, SRAM, Yield Improvement.

I. INTRODUCTION

With a trend of system-on-a-chip, a circuit or a system needs higher capacity of embedded memories. RAM is major component in present day SOC. When systems are fabricated in emerging nano-technologies it indicates a rising level of static and dynamic faults, due to new fault mechanisms Reliability is a key aspect of any SRAM chip. To detect the faults that can occur within a memory chip, extensive testing is carried out by both manufacturers and users of those chips. Fault detection in 3D memories is even more important due to additional processing involved in building a multilayered chip. Most of these techniques belong to the dedicated BISR scheme in which each memory has a self-contained BISR circuit, typically, the BISR circuit only represents a small portion of the corresponding memory area. However, it is common that there are several hundreds of memory cores in a complex SOC. If each memory core with redundancy has a dedicated BISR circuit, then area of the BISR will increase dramatically.Therefore,efficientyieldenhancement techniques for memory cores are essential. Built in self-repair (BISR) technique is a widely-used and efficient approach for the yield improvement of memory cores with redundancy. Although soft errors are less susceptible which affect the reliability of SRAM memory chips they are still a cause of concern These errors can occur due to excess variations in node voltages, resulting in flipping of the data stored in the cell .In 3D memory chips, integration can result in reduced lengths of global wires and increased lengths of local wires; resulting in increased chip density, better latency, wide bandwidth and lower power consumption.

II. BUILT IN SELF TEST (BIST)

A. Top level architecture

At the top level, the BISTR circuits together behave as a wrapper to the memory. Fig.2 below illustrates the direction of information flow in the system data, address, read strobe, write strobe, and block enable are input from a memory bus, to a multiplexer (MUX). The BIST also inputs its own

version of these signals to the MUX, with BIST block enable as the MUX control signal during a test, BIST is control; during writes it sends addresses and data to the memory and during reads it sends addresses to the memory and expected data to BISR. A memory failure is determined by BISR when its CAM overflows because too many repairs have been attempted MBIST is used to test the on chip memories. The block diagram of the proposed MBIST is shown in Fig.1 TPG is used to generate the test sequences which are applied to RAM during testing.

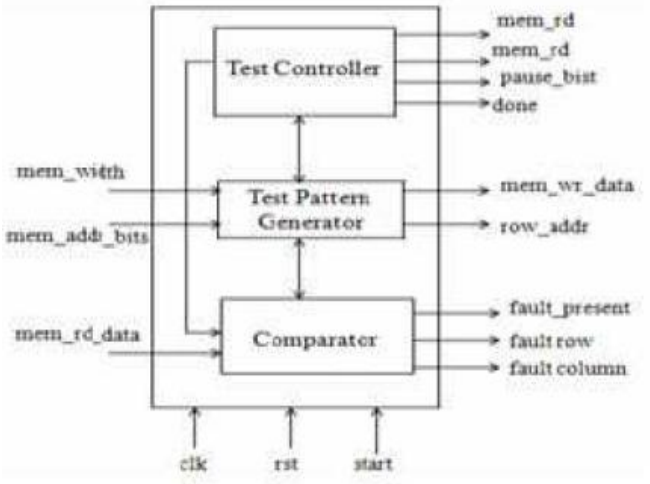


Fig 1. Block diagram of BIST.

Comparator is used to compare the output responses with the expected responses and decision is made whether the RAM is faulty or fault free. A controller is a hardware realization of a memory test algorithm, usually in the form of an FSM. The memory test algorithm here is Marching1/0 algorithm.

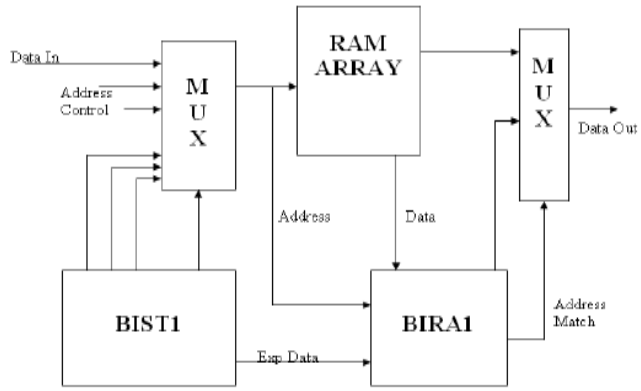


Fig.2. Top level architecture of BIST

B. Functionality of March CW Algorithm

This algorithm involves successive writing and reading of 0's and 1's into the RAM. The fault location details like fault present, fault row and fault column addresses are given at the output pins. The input pin start is made one when the BIST starts the testing process. The output pin done and progress are resulted to one and zero respectively, after the MBIST process is completed, so that the Re-BIRA circuit can start analysis. A March CW test consists of a finite sequence of March elements {↓↑w0; ↑(r0,w1); ↑ (r1,w0); ↓ (r0,w1); ↓ (r1,w0); ↓↑(r0)}. The finite state machine used to design the controller is shown in Fig.3. As shown below, the algorithm can be implemented using 7 state transitions (including initial state). In each of the states (except the initial state) either a 'read' operation or a 'write' operation or a combination of both will be taking place. The state machine is in the initial state (ME1) as long as the mode is zero. Once the mode becomes '1', it starts transiting from one state to the other. In ME1 state, '0' is written into each address location of the memory array starting from address 0.

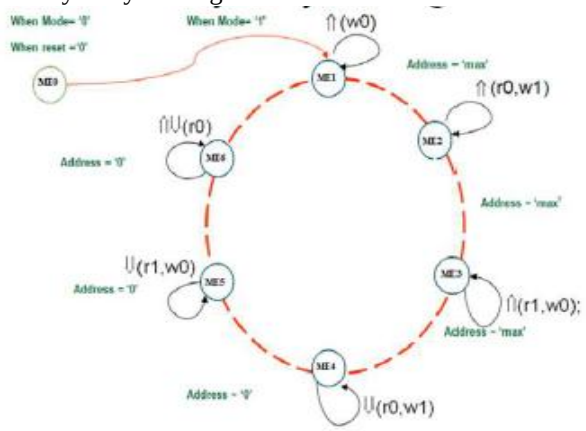


Fig 3. State diagram for March CW algorithm.

The March CW algorithm, and its modifications, is a popular algorithm for memory testing. This algorithm, which consists of 11 operations (11n), writes and reads words of 0s, followed by writing/reading words of 1s, in both descending and ascending address spaces. The original March CW algorithm consists of the following steps:

1. Write 0s to all locations starting at the lowest address (initialization).
2. Read 0 at lowest address, write 1 at lowest address, repeating this series of operations until reaching the highest address.
3. Read 1 at lowest address, write 0 at lowest address, repeating this series of operations until reaching the highest address.
4. Read 0 at highest address, write 1 at highest address, repeating this series of operations until reaching the lowest address.
5. Read 1 at highest address, write 0 at highest address, repeating this series of operations until reaching the lowest address.
6. Read 0 from the lowest address to the highest address.

In this type testing occurs simultaneously with normal functional operation. This form of testing is usually accomplished using coding technique or duplication or comparison. Once the address reaches its maximum value, the state gets transited to ME2. In ME2, the data written in ME1 (i.e., '0') is read from an address location and '1' is written immediately into that address. As and when the address reaches its maximum value, the state changes to ME3 in ME3, the data written in ME2 (i.e., '1') is read from an address location and '0' is written immediately into that

address. In states ME2 and ME3 the address is in incrementing order. The controller goes to ME4 after the address reaches its maximum value in ME3. From ME4 the address gets decremented from its maximum value. In ME4 and ME5, the operations are same as those in ME2 and ME3 respectively but the address is decrementing. The state transition takes place when the address reaches its minimum value in ME6, the data written during ME5 state (i.e., '0') is read from the memory array.

III. PROPOSED SYSTEM

Memory built-in self-repair (MBISR) is increasingly necessary for system-on-chip (SoC) and other highly integrated products, because embedded memories are occupying a significant amount of chip area (over 70% in many cases).Besides, memories are normally very dense and more susceptible to process variation and defects than logic circuits. As a result, embedding large memories without reparability in a SoC will likely result in a very low chip yield? Moreover, for faster yield ramp-up and shorter time two-volume, it is necessary to develop effective and efficient methodologies and tools such as memory test and repair, memory built-in self-test (MBIST) generator redundancy scheme evaluator, and even MBISR schemes. The need for MBISR generator follows naturally. Nevertheless, 2-D redundancy repair using general row and column spares (identifying a row/column cover in an optimal way) is an NP-complete problem there have been many MBISR architecture schemes reported recently, including even a commercial implementation. An optimal solution called comprehensive real-time exhaustive search test and analysis (CRESTA) is equipped with parallel exhaustive analyzers, which is an extreme case due to very high area overhead. To reduce hardware overhead and trades time with area heuristic redundancy analysis/allocation (RA) algorithms. Widely used to solve the NP-complete problem with reasonable time complexity, area, and repair rate. The tradeoff among repair rate, test time, and area is not straightforward.

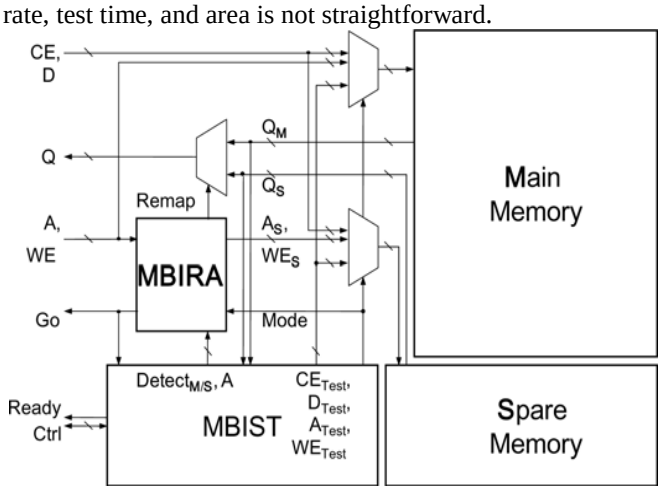


Fig 4. Proposed MBISR Scheme.

Examples can be found in. The spares are normally rows, columns, or words. However, as the size of the embedded static random access memory increases dramatically, recently, RA algorithms have been limited to dealing with row/column spares. We do need more sophisticated spares to improve the spare utilization and repair efficiency. Defects can span multiple circuit elements and have been shown to occur in clusters on wafers and semiconductor chips (defect clustering), and failures also occur in clusters (failure clustering) with spatial locality that results in serious yield loss.Therefore,there have been numerous studies considering clustered failure repair Moreover, cluster failures should be repaired together rather than individually, because individual spares are inefficient for clustered failures. However, it has been shown that the block redundancy, e.g., global spare row blocks constructed from several local spare rows, can repair a 17.6 μm×2.25 mm defect and 8% clustered failures effectively. Therefore, the spare row blocks are often seen in large-scale memories for repairing cluster failures. For embedded memory applications, spare memory cores generated from the same memory generator (compiler) as for the main memory is a more realistic and cheaper solution for many SoC integrators now. In this paper, we assume that the soft repair scheme is implemented. It is more cost-effective than hard repair when BIST is available for embedded memories.

We propose an MBISR generator called BRAINS+, which automatically generates register transfer level (RTL) MBISR circuits for embedded memories. BRAINS+ is extended from BRAINS, which is our MBIST circuit generator, i.e., the new features in this paper include the RA algorithm and automatic repair circuit generation. The MBISR circuit generated by BRAINS+ is based on an RA algorithm that enhances the essential spare pivoting (ESP) algorithm, with a more flexible spare architecture, which can conger the same spare to a row, a column, or a rectangle to fit failure patterns more efficiently. The proposed MBISR circuit is small, and it supports at-speed test without timing penalty during normal operation. As an example using a typical 0.13 μm complementary metal-oxide-semiconductor (CMOS) technology, the MBISR circuit can run at 333 MHz for a 512 Kb memory with four spare rows and/or columns, and the MBISR area overhead is only 0.36%. By the features of the low area overhead and zero test time penalties, the MBISR can easily be applied to multiple memories with a distributed RA scheme. Compared with recent papers, the proposed scheme reduces test time as well as area overhead under a reasonable repair rate.

IV. SIMULATION RESULTS

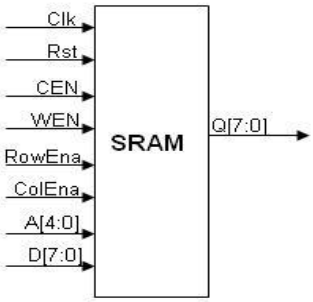


Fig5. Static Random Access Memory.

The block diagram of Memory is shown in Fig5. It consists of memory enable (CEN), memory write, address, data input, RowEna, ColEna as inputs and memory output Q as output.

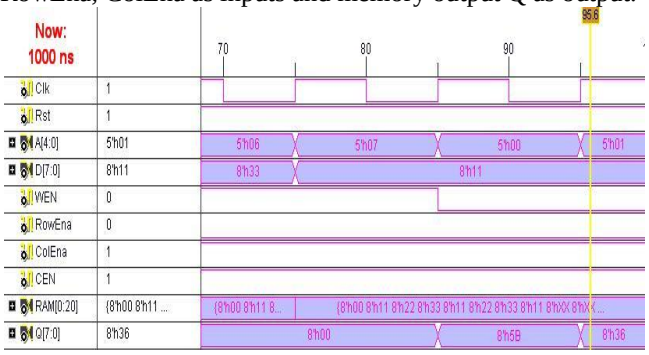


Fig6. Simulation Result for Static Random Access Memory.

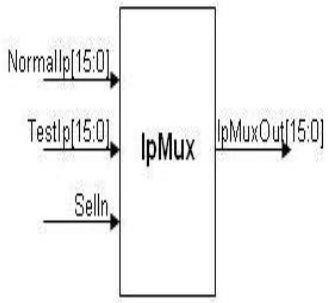


Fig7. Input Multiplexer.

The Input Multiplexer is consists of Normal input, Test input, selection input as inputs and Normal Input or test input as output depending on selection input.

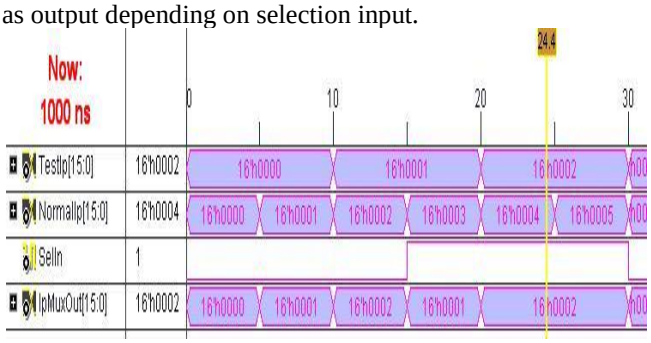


Fig8. Simulation Result for Input Multiplexer.

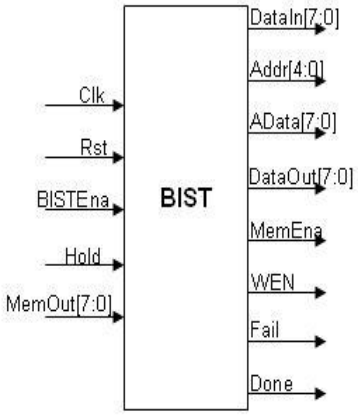


Fig9. Built In Self Test.

BIST is implemented using March CW Algorithm. This algorithm is implemented using FSM (Finite State Machine). This is used to detect the faulty locations in the Original Memory.

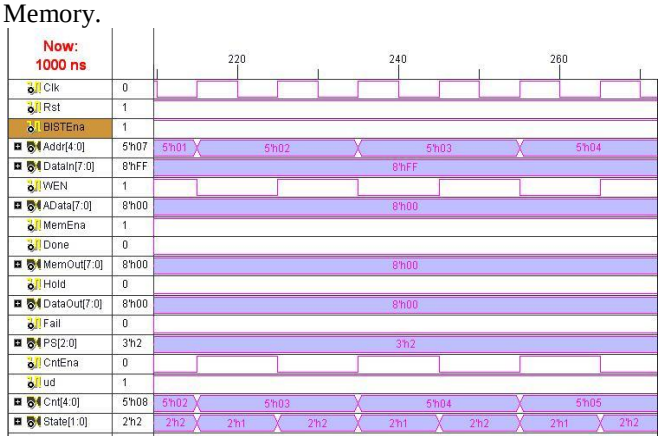


Fig10.Simulation Result for Built In Self Test.

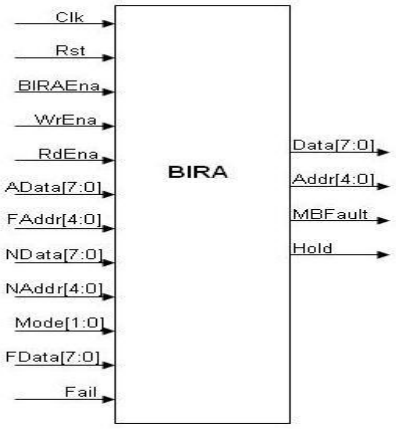


Fig11. Built In Redundancy Analysis.

BIRA uses ESP with threshold 2 and 4 pivoting spare elements. It works in two modes, those are Test and Normal Mode. In Test Mode it assigns spare element addresses to faulty locations. In Normal Mode it remaps the addresses. If WrEna is high if given address is faulty then it writes into the corresponding spare register. If RdEna is high if given address is faulty then it reads data from the corresponding spare register. If address is not faulty then it uses original memory.

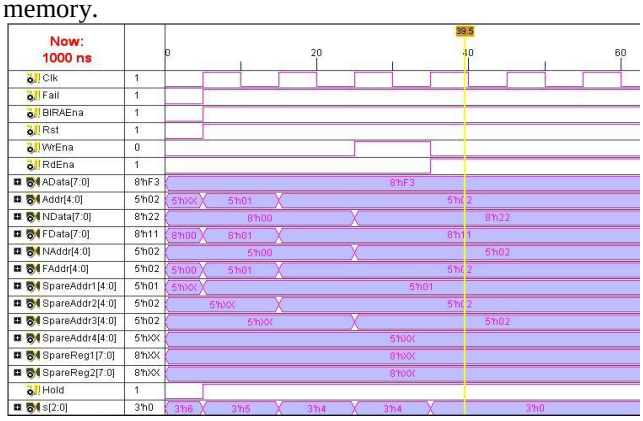


Fig12. Simulation Result for Built In Redundancy Analysis.

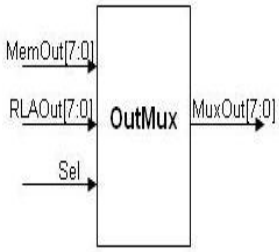


Fig13. Output Multiplexer.

The output multiplexer consists of inputs as Memory output, redundant logic array output, selection input. The output of output multiplexer consists of the output data.

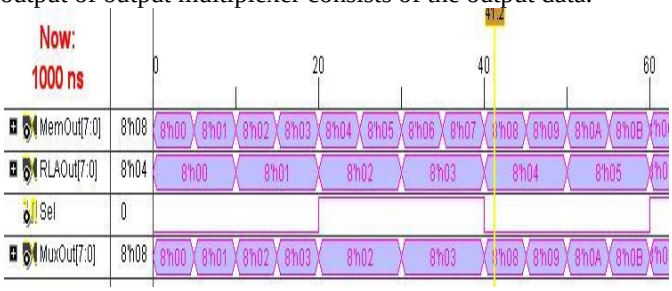


Fig14. Simulation Result for Output Multiplexer.

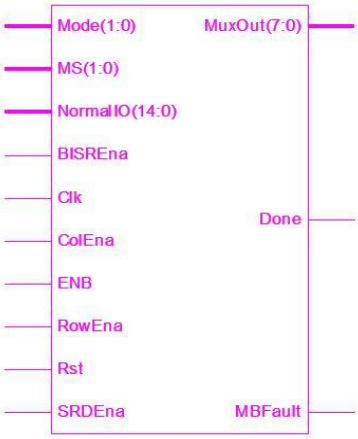


Fig15. RTL Schematic Diagrams

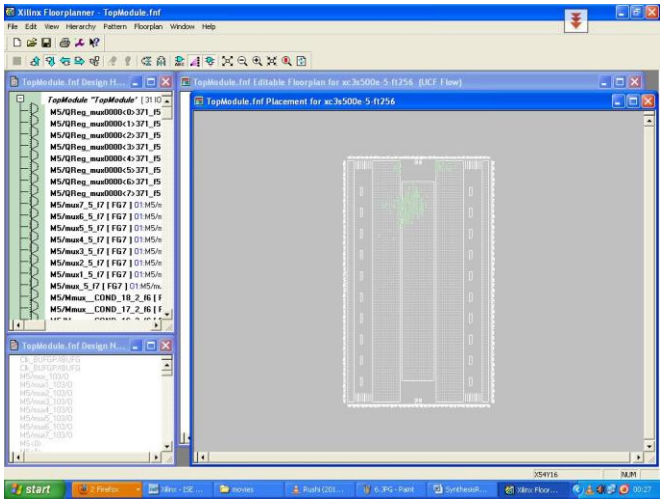


Fig16. Floor Plan Design of Top module1.

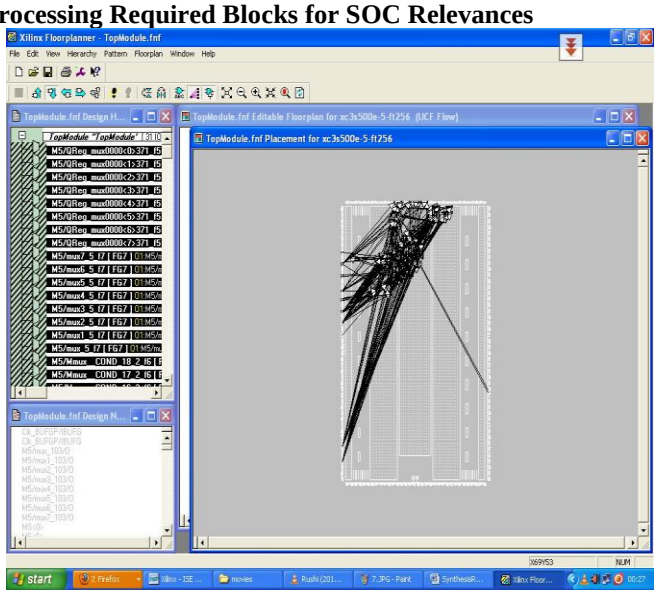


Fig17. Floor Plan Design of Top module2.

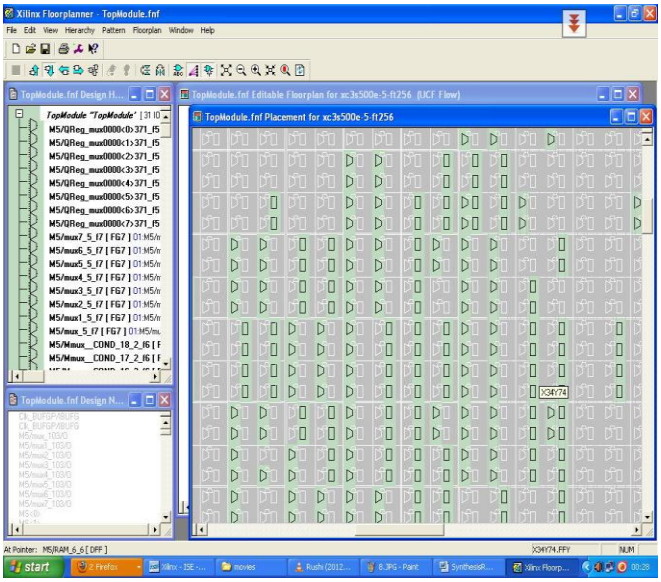


Fig18. Floor Plan Design of Top module3.

Compares the proposed spare pivoting scheme with the traditional ESP algorithm and row and column spare architecture, using the same 8 Kb spare memory for a 512 Kb memory under repair. With a typical 0.13 µm CMOS technology, the proposed scheme improves about 30% in silicon area, 10% in power, and 20% in critical path. Both MBIRA designs include the necessary comparison and multiplexing circuit to implement the repair scheme because of the limitation from the memory compiler. paths are in the test mode and they are almost the same, because the address comparisons dominate the timing and both hems compare row and column addresses for each spare. However, in the normal mode, the configurable spares reuse the same comparison circuit, but the traditional 2-D spares only need to compare either row or column address for each spare. Because address comparisons are done in parallel, the additional timing latency of the configurable spares is minor when the amount of spares is low, e.g., two to eight spares in

common cases. In the proposed scheme, only the size of the address-selection multiplexer doubles and an additional OR gate in the OR gate tree is added.

However, when the memory size quadruples, the MBISR only logarithmically adds 2 bits to the addresses. Therefore, the MBISR area overhead decreases about n/log n times when the memory size increases *n* times. In general, the address comparison circuits dominate the area of the MBISR. Therefore, the area is directly proportional to the amount of spares, the amount of configurable patterns, and the address length of the spare pattern, because all address bits of all configurable patterns of all spares need to be compared. The critical paths in Table I are almost the same, except for synthesis variations due to power and area constraints. CAM may be used in the MBISR for efficient address mapping. In a CAM-based MBISR called CRESTA, each of the parallel exhaustive analyzers is about half the size as that in the MBIRA of ESP for the same spare configuration. However, there are multiple copies of BIRA hardware in CRESTA for exhaustive search of all possible solutions, simultaneously. Therefore, the area ratio (ESP: CRESTA) is about 1: /2, where *r* and *c* are the numbers of the spare rows and columns, respectively, and indicates the number of all possible combinations of the given spare rows and columns (i.e., the number of all possible solutions, or the number of analyzers).

Based on this, we estimate the MBIRA area overhead of compares the proposed scheme with and two other recent papers and the proposed MBIRA can achieve at-speed repair without any test time overhead, whereas the other two schemes take longer time because of complex RA, especially when the number of defects and the number of total faults increase. The area of the proposed MBIRA is also smaller than others. Therefore, the proposed MBIRA has higher scalability to deal with more memories. The area of the ESP in the proposed scheme is smaller than those in, because the ESP is also included and is a simplified special case of the local-repair-most (LRM) algorithm and the must-repair algorithm compare the repair rates of the CSA using configurable spares, CRESTA, and the ESP using traditional row/column spares. The Monte-Carlo simulation runs 100 000 memory cases. Each memory is 2K × 512 with four 1×512 spare rows and four 1K×1 spare columns (segment) for traditional RAs. On the contrary, the CSA partitions the same total size of spare cells into six spare elements. Each element can be configured to 2 ×512, 1K×1, or 32 ×32. The amount of defects per memory is generated by the Poisson distribution with an average of two to six defects. The failure patterns with "1×" cluster magnification include 10% of faulty rows, 10% (r+c).

V. CONCLUSION AND FUTURE SCOPE

A. Conclusion

We Implemented an MBISR using BRAINS; the simulation results have shown that the MBISR architecture is successfully able to implement new test algorithms. It consists of mainly two modules MBIST to detect faulty locations and BIRA to remap the faulty locations with spare elements. MBIST is implemented using March CW Algorithm; BIRA is implemented using ESP with threshold 2 and 4 pivoting spare elements. The Synthesis Report, Map Report, RTL Schematics, Floor Plan Design are generated using Xilinx 9.1i. The simulation results are generated and verified.

B. Future Scope

The proposed MBISR architecture has been designed. In the experiment, we assume that the memory under test is single port. In future we can implement for multi port memories. The BIRA scheme can be modified such that it can be easily applied to multiple memories on a chip.

VI. REFERENCES

[1] Mincent Lee, Student Member, IEEE, Li-Ming Denq, and Cheng-Wen Wu, Fellow, IEEE, "A Memory Built-In Self-Repair Scheme Based on Configurable Spares", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, Vol. 30, No. 6, June 2011.

[2] L.-T. Wang, C.-W. Wu, and X. Wen, Design for Testability: VLSI Test Principles and Architectures. San Francisco, CA: Morgan Kaufmann, 2006.

[3] International Technology Roadmap for Semiconductors (ITRS), Semiconductor Industry Association, Sematech, Hsinchu, Taiwan, Dec. 2009.

[4] S.-Y. Kuo and W. K. Fuchs, "Efficient spare allocation in reconfigurable arrays," IEEE Des. Test Comput., vol. 4, no. 1, pp. 24–31, Feb. 1987.

[5] C. Cheng, C.-T. Huang, J.-R. Huang, C.-W. Wu, C.-J. Wey, and M.-C. Tsai, "BRAINS: A BIST compiler for embedded memories," in Proc. IEEE Int. Symp. DFT VLSI Syst., Oct. 2000, pp. 299–307.

[6] R.-F. Huang, J.-F. Li, J.-C. Yeh, and C.-W. Wu, "Raisin: Redundancy analysis algorithm simulation," IEEE Des. Test Comput., vol. 24, no. 4, pp. 386–396, Jul.–Aug. 2007.

[7] M.-S. Lee, L.-M. Denq, and C.-W. Wu, "BRAINS+: A memory built-in self-repair generator," in Proc. 1st VTTW, Jul. 2007, Paper 1.2.

[8] T. Kawagoe, J. Ohtani, M. Niiro, T. Ooishi, M. Hamada, and H. Hidaka, "A built-in self-repair analyzer (CRESTA) for embedded DRAMs," in Proc. ITC, 2000, pp. 567–574.

[9] X. Du, S. M. Reddy, W.-T. Cheng, J. Rayhawk, and N. Mukherjee, "At speed built-in self-repair analyzer for embedded word-oriented memories," in Proc. 17th Int. Conf. VLSI Des., 2004, pp. 895–900.

[10] P. Ohler, S. Hellebrand, and H. J. Wunderlich, "An integrated built-in test and repair approach for memories with 2-D redundancy," in Proc. 12th IEEE ETS, May 2007, pp. 91–96.

[11] J. Lee, K. Park, and S. Kang, "An area-efficient built-in redundancy analysis for embedded memories with optimal repair rate using 2-D redundancy," in Proc. ISOCC, 2009, pp. 353–356.

[12] S.-K. Lu and C.-H. Hsu, "Built-In self-repair for divided word line memory," in Proc. IEEE ISCAS, May 2001, pp. 13–16.

Authors Profile:

Srikanth Veesam received the Master of Technology degree in Embedded Systems from the Princeton College of Engineering and Technology-JNTUH, he received the Bachelor of Engineering degree from Princeton College of Engineering and Technology-JNTUH. He is currently working as Assistant Professor of ECE with Princeton College of Engineering and Technology-JNTUH. His interest subjects are Embedded Systems, Microprocessors, Communication Systems, Digital Electronics and etc, Email: veesamsrikanth@gmail.com.

N. Salma Sulthana received the Master of Technology degree in VLSI System Design from the Princeton Institute of Engineering and Technology For Women-JNTUH; he received the Bachelor of Engineering degree from Dr.VRK Women's College of Engineering and Technology -JNTUH. He is currently working as Assistant Professor of ECE with Princeton College of Engineering and Technology-JNTUH. His interest subjects are Embedded Systems, Microprocessors, Communication Systems, Digital Electronics and etc, Email: salmasulthana4u@gmail.com.

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 4, April 2017 ISSN No.- 9726-001X

LEACH BASED CLUSTERING BASED ON COGNITIVE SYSTEM

Dr. Rajeev Shrivastava
HOD, EC, Indur Institute of Engineering and Technology, Siddipet, Telangana

Abstract— In this paper, we examine the issue for how on bunch cognitive radio sensor hubs Previously, An progressive recurrence surroundings set Toward those elementary clients. We present cognitive drain (CogLEACH), which may be a spectrum-aware development of the low vitality versatile grouping progressive structure (LEACH) protocol. CogLEACH will be An fast, decentralized, spectrum-aware, What's more vitality productive grouping protocol to cognitive radio sensor networks. CogLEACH employments those amount about empty channels Similarly as a weight in the likelihood for every hub to turned a group head. We hint at that CogLEACH enhances the throughput Also lifetime of the organize contrasted with those standard drain protocol that is working in the same settings.

List Terms—clustering, cognitive radio,

I. INTRODUCTION

Because of those shortage of the accessible radio range and the quickly developing demand, cognitive radios risen Likewise an answer on increment radio range use. Cognitive radios consider the presence from claiming An auxiliary client (SU) framework that is opportunistically gaining entrance to the empty channels for An band initially authorized will an essential client (PU) framework [1].

The joining of cognitive radios with remote sensor Networks (WSN) may be acquainted to [2]. Done [2] writers distinguished that this joining Might bring about another standard for sensor networks correspondence. In this paradigm, hubs camwood speak (by tuning their radios on empty channels) through a collision-free band As opposed to conveying through those vigorously packed unlicensed groups. This new correspondence standard opens the entryway will another population for requisitions acquainted by creators to [2], For example,.

- media requisitions the place helter skelter transfer speed may be necessary.
- indoor sensing applications, the place unlicensed groups would regularly packed.
- Multi-class heterogeneous sensing applications, the place networks for separate targets exist together.

However, this integrative imposes another protocol configuration constraint: spectrum-awareness alongside those customary remote sensor system (WSN) protocol plan imperatives (e. G. Vitality What's more calculation constraints). Because of the vitality constraint of a sensor hub alongside its time permits operation done merciless environments, sensors would regularly deployed haphazardly with expansive number and manifestation a organize Previously, a ad-hoc way. Such a situation obliges an Vitality productive directing protocol that accounts for adaptability. Grouping may be demonstrated to accomplish such imperatives What's more for the most part enlarges the organize lifetime [3].

The coming about organize structure will be made of a two level hierarchy: group mind (CH) hubs and part hubs. Each part hub may be connected will a standout amongst those CH hubs as stated by application-specific targets (e. G. Base separation CH to decrease transmission force) bringing about An cluster-shaped system. Part hubs send their information to their comparing CH hubs As opposed to sending the information straightforwardly to the base station (BS) (i. E. Lessen correspondence energy). Subsequently, CH hubs send these packets of the bs Possibly for single-hop [4] or multi-hop [5].

In this paper, we present CogLEACH, which may be a probabilistic grouping algorithm that employments the amount from claiming empty channels Concerning illustration An weight in the likelihood about every hub to turned a group mind. CogLEACH performs grouping with least

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 4, April 2017 ISSN No.- 9726-001X

number for traded messages, helps distinctive organize and PU models, Furthermore accounts for organize versatility. CogLEACH is An spectrum-aware development of the legacy drain protocol that is acquainted On [4]. We show that CogLEACH enhances those throughput Also lifetime of the system contrasted with those standard drain protocol that is operating in the same settings.

This paper will be illustrated as takes after. Over area II, we study the related Examine fill in. Over segment III, we analytically present the CogLEACH Protocol. Over area IV, we describe our model parameters What's more assumptions, Furthermore assess the execution from claiming CogLEACH through escalated consideration Simulations. Finally, area v finishes up the paper.

II. BACKGROUND

Low vitality versatile grouping progression (LEACH) [4] may be recognized those build transport dispersed grouping plan to WSN. The operation for drain comprises about cycles, the place every cycle comprises from claiming n k rounds. Done drain each hub chooses its state (CH or part node) autonomously through the accompanying likelihood $P_i(t)$:

$$P_i(t) = \begin{cases} \frac{k}{N - k * (r \bmod \frac{N}{k})} & : C_i(t) = 1 \\ 0 & : C_i(t) = 0 \end{cases} \quad (1)$$

The place n means those aggregate number of nodes, k means the fancied amount about CHs (on average) for every round, r means the present round number, What's more $C_i(t)$ Will be an pointer work deciding if or not hub i need been An CH to those practically later r mod $(\frac{N}{K})$ rounds. This formula o $P_i(t)$ Supports that each hub will be chosen Likewise An CH once for every cycle for operation What's more In this way adjusting those load the middle of hubs Furthermore extending time of the principal hub demise. Drain demonstrates huge upgrades to base transmission vitality (MTE) routing, yet all the drain protocol is intended to An WSN working looking into an altered channel What's more Subsequently not appropriate to cognitive radio sensor organize (CRSN).

To [5], CH race will be In light of hubs lingering vitality Likewise an essential grouping parameter, Furthermore hub vicinity on its neighbors Likewise a auxiliary parameter. Mixture vitality productive disseminated (HEED) protocol reveals to huge upgrades will drain As far as lifetime and throughput, in any case it will be planned for settled channel settings What's more Subsequently not appropriate for CRSN.

III. COGLEACH PROTOCOL STRUCTURE

A. Primary User Activity Model

In this paper, we expect An Semi-Markov ON-OFF process, demonstrating those conduct technique of the PUs. Done Semi-Markov ON-OFF process, the movement of a PU ahead a provided for channel alternates between looking into state Also off state, the place the duration of the time span for

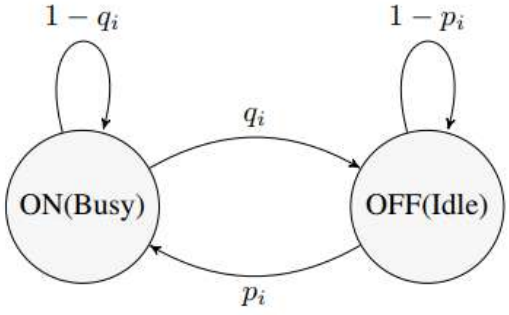


Fig. 1: Semi-Markov ON-OFF process

Every state may be a autonomous arbitrary variable. Over [8] the creators checked those legitimacy for demonstrating the long haul span about on and off intervals Likewise two free geometrically dispersed irregular variables for parameters qi Furthermore pi, respectively, Likewise indicated over fig. 1. Writers for [8] demonstrated that those stationary likelihood about unmoving pulley channel, pf , for An channel i is ascertained as takes after:.

$$p_f^i = \frac{q_i}{p_i + q_i} \quad (2)$$

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 4, April 2017 ISSN No.- 9726-001X

On [6], it is demonstrated that the likelihood for Hosting n unmoving pulley channels crazy of a set comprising of m channels belongs with a binomial dispersion.
:

$$Pr[N=n]=\binom{m}{n}p_f^n(1-p_f)^{m-n} \quad (3)$$

assuming that all channels have the same pf .

B. Network Model

The system comprises for n CRSN hubs that go about as An optional framework existing with p PUs operating in the same band In a situated c for orthogonal recurrence channels. We define impedance insurance range (IPR) to each dynamic PU Similarly as a territory circle every PU; no different radio inside those IPR of p Ui Might be tuned of the channel utilized Eventually Tom's perusing p Ui should keep away from impedance. Subsequently any CRSN inside the IPR about a dynamic p Ui will feeling the channel utilized by this PU as occupied channel. It ought a chance to be noted that those terms impedance security reach and scope reach need aid utilized interchangeably in this paper.

C. Spatial and Spectrum Similarity Models

We consider distinctive hub organization What's more operation situations in the setting from claiming spatial What's more range comparability. Eventually Tom's perusing spatial comparability we imply that know hubs exist inside dynamic PU frameworks. Toward range comparability we imply that every PU framework is displayed following a Semi-Markov ON-OFF methodology for the same qualities (i. E. Same pf) to every one channels. This arrangement may be critical Likewise it will empower us on recognizing those states under which An decentralization of our grouping algorithm will make workable.

D. CogLEACH Protocol

As shown in Section II, in the regular LEACH [4], Pi(t) is chosen such that E{#CHs} = k.
Therefore:

$$P_i(t)=\begin{cases}\dfrac{k}{N-k*(r \bmod \frac{N}{K})} & :C_i(t)=1\\ 0 & :C_i(t)=0\end{cases} \quad (4)$$

Right away we need to utilize the number for sensed unmoving pulley channels as An metric clinched alongside picking CHs. In hub i faculties additional unmoving pulley channels over hub j, hub i need finer chance will Figure as a relatable point channels with close-by nodes, which brings about An superior good fortune with setup a bunch with a as a relatable point channel.

Our objective may be to develop a new manifestation for Pi(t) such that:.

- E{#CHs} = k, and
- a node with higher number of idle channels is more likely to become a CH.

Let $P_i(t)=\min(k\alpha\frac{c_i}{m},1)$ where m denotes the total number of channels in the used band (i.e. |C|) and ci denotes number of idle channels available to node i.

We aim to make $E\{\#CHs\}=k$, but

$$E\{\#CHs\}=\sum_{i=1}^{N}P_i(t) \quad (5)$$

thus

$$k\alpha\frac{c_1+c_2+\ldots+c_N}{m}=k \quad (6)$$

that leads to:

$$\alpha=\frac{m}{c_1+c_2+\ldots+c_N} \quad (7)$$

thus

$$P_i(t)=\min(k\frac{c_i}{\sum_{j=1}^{N}c_j},1) \quad (8)$$

Now, our objective is to approximate the term $\sum_{j=1}^{N}c_j$ at each node, for each of the spatial and spectrum similarity models, so that each node can run the algorithm locally without the need of a central entity.

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 4, April 2017 ISSN No.- 9726-001X

1) For Spatial and Spectrum Similarity Model: Let N represents the total number of nodes. The number of channels that could be sensed idle by each node, belongs to a binomial distribution with mean μ = pf ∗ m, thus each node senses μ idle channels on average.

Phase 3: Cluster Formation

- Lesvos ni make a standout amongst the CHs of the present round Also ci be An subset for c Furthermore means those unmoving pulley recurrence channels sensed by hub ni clinched alongside period 1. Ni telecasts An CH provisional publication message including hub id al-adha and ci through the normal control channel (CCC). • Node nj with a subset of frequency channels Cj within the transmission range of ni and having one or more common frequency channels with n_i (i.e. $C_i \cap C_j \neq 0$) listen to CH Tentative Announcement message over the CCC. Node nj sends a Tentative Join Request message including the ID of its sensed idle channels C_j to the CH with the lowest communication cost (based on the received signal strength) over the CCC
- n_i i (the CH) records all tentative join requests initiated from other non-CH nodes along with the IDs of frequency channels that are included in the message. Afterwords, CH node decides to use a channel C_{i_q} out of its C_i subset where Ciq is the channel that the majority of requesting nodes has in common with ni. Subsequently, ni broadcasts CH Final Announcement with the ID of the selected channel over the CCC.
- different non-CH hubs (e. G. Nj) tune in with CH last publication Furthermore decide those CH with those most reduced correspondence cosset.
- the group mind hub sets dependent upon a TDMA calendar Also transmits this calendar of the hubs in the group.

Phase 4: Steady State Phase As presented for drain [4], the steady-state operation comprises from claiming frames, in which hubs send their information to their CH inside their allocated transmission opening. Concerning illustration a lot of people groups might utilize the same channel for their intra-cluster communications, every bunch employments a interesting regulate grouping spread range (DSSS) spreading code Concerning illustration presented clinched alongside [4].

Reiterate Following round time, grouping is triggered once more and periods 1-4 would re-initiated. Call pf1 (PU frameworks might need different pf. In this the event we ought characterize N1, N2, np each for its own pf), Furthermore N2 speaks to the disjoint subset about hubs that aren't inside the scope range of any PU framework., thus $p_{f_2} = 1.$

Tell those field a chance to be a square about side period equals with m meters, Furthermore zone equals on m ∗ m , and the number of PU frameworks make p.

Will estimated the summational haul of the changed type of Pi(t) we might characterize PU powerful range Similarly as the territory secured by the PU framework (with no intersections).

$$A_{eff} = P * (\pi r^2) \qquad (10)$$

It might a chance to be noted that over CogLEACH, we Accept those vicinity of a normal control channel (CCC) and system totally synchronization Along these lines that constantly on hubs execute CogLEACH at the same time. Ccc is regularly utilized On writing with encourage those return from claiming control messages the middle of hubs utilizing an altered channel (e. G. Ahead different band) that could make accessed Toward know hubs [8], [10].

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 4, April 2017 ISSN No.- 9726-001X

V. CONCLUSION

In this paper we present CogLEACH: An spectrum-aware and vitality productive grouping protocol to cognitive radio sensor networks. CogLEACH may be In light of the legacy drain protocol [4] Furthermore utilization the amount of empty channels Likewise a weight in the likelihood of each hub with get to be a group leader. The protocol will be demonstrated should fulfill remote senor networks set calculation What's more vitality imperatives Toward permitting each hub will select its part without the need for escalated consideration collaboration between hubs with setup the groups.

REFERENCES

1. S. Haykin, "Cognitive radio: brain-empowered wireless communications," IEEE Journal on Selected Areas in Communications, vol. 23, no. 2, pp. 201–220, 2005.
2. O. Akan, O. Karli, and O. Ergul, "Cognitive radio sensor networks," IEEE Network, vol. 23, no. 4, pp. 34–40, 2009.
3. Mamalis, D. Gavalas, C. Konstantopoulos, and G. Pantziou, "Clustering in wireless sensor networks," in RFID and Sensor Networks (Y. Zhang, L. T. Yang, and J. Chen, eds.), pp. 324–353, CRC Press, 2009.
4. W. Heinzelman, A. Chandrakasan, and H. Balakrishnan, "An application-specific protocol architecture for wireless microsensor networks," IEEE Transactions on Wireless Communications, vol. 1, no. 4, pp. 660–670, 2002.
5. O. Younis and S. Fahmy, "Heed: a hybrid, energy-efficient, distributed clustering approach for ad hoc sensor networks," IEEE Transactions on Mobile Computing, vol. 3, no. 4, pp. 366–379, 2004.
6. M. Bradonji and L. Lazos, "Graph-based criteria for spectrum-aware clustering in cognitive radio networks," Ad Hoc Networks, vol. 10, no. 1, pp. 75 – 94, 2012.
7. H. Zhang, Z. Zhang, H. Dai, R. Yin, and X. Chen, "Distributed spectrum-aware clustering in cognitive radio sensor networks," in Global Telecommunications Conference (GLOBECOM 2011), 2011 IEEE, pp. 1–6, 2011.
8. Motamedi and A. Bahai, "MAC protocol design for spectrum-agile wireless networks: Stochastic control approach," in 2nd IEEE International Symposium on New Frontiers in Dynamic Spectrum Access Networks, 2007. DySPAN 2007., pp. 448–451, 2007.
9. X. Li, D. Wang, J. McNair, and J. Chen, "Dynamic spectrum access with packet size adaptation and residual energy balancing for energy-constrained cognitive radio sensor networks," Journal of Network and Computer Applications, 2013.
10. G. Shah and O. Akan, "Spectrum-aware cluster-based routing for cognitive radio sensor networks," in IEEE International Conference on Communications (ICC) 2013, pp. 2885–2889, 2013.
11. G. Smaragdakis, I. Matta, and A. Bestavros, "SEP: A Stable Election Protocol for clustered heterogeneous wireless sensor networks," in Second International Workshop on Sensor and Actor Network Protocols and Applications (SANPA 2004), (Boston, MA), August 2004.

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 12, December 2017 ISSN No.- 9726-001X

A REVIEW ON THROUGHPUT MAXIMIZATION OF COGNITIVE RADIO FOR REMOTE SENSING NETWORK

Dr. Rajeev Shrivastava
HOD, EC, Indur Institute of Engineering and Technology, Siddipet, Telangana

Abstract:- Cognitive radio will be another standard about outlining remote correspondences frameworks which means on upgrade the use of the radio recurrence (RF) range for remote interchanges. Accessible range groups might change with diverse cognitive radio clients. It happens when the transmission range from claiming cognitive radio clients is bigger over or comparative to that about elementary client. At that point different cognitive radio clients might acquire diverse sensing effects since they need aid In different areas Furthermore separate affects around grade client frameworks. In place will make this testing adaptation, agreeable transfer channel need been acquainted Previously, a organize will improve the conclusion on wind throughput As far as control Furthermore data transfer capacity imperatives. Those suggested agreeable transfer assorted qualities strategy utilizes three sorts from claiming parallel end-to-end transmission situations including of direct, dual-hop, Furthermore transfer differing qualities transmission. Therefore, those Generally speaking end-to-end correspondence need been attained by the utilization about three sorts for channels involving four range groups.
Keywords—channel allocation, cognitive radio, agreeable relay,

1. INTRODUCTION:

Cognitive radio, which will be actualized In view of the software-defined radio, gives components to shrewdly range sensing, range management, range right for cognitive radio clients (e. G. Unlicensed users). “Cognitive radio will be a canny remote correspondence framework that is mindful from claiming its encompassing surroundings. This cognitive radio will take from nature's domain Also adjust its interior states on measurable varieties in the existing rf jolts Eventually Tom's perusing changing the transmission parameters (e. G. Recurrence band, regulation mode Furthermore transmit force) Previously, ongoing Also on-line way. ” a cognitive radio system empowers on establish correspondences "around cognitive radio nodes/users. Those correspondence parameters camwood make balanced as stated by progress in the environment, topology, operating conditions, or client prerequisites. The two principle destinations about cognitive radio are: (1) should attain Exceptionally dependable profoundly effective remote communications, and (2) will move forward those usage of the recurrence range.

Range sensing detects the accessibility from claiming range groups. Late investigations [6]–[8] have indicated that the accessible range groups might change for diverse cr clients. It happens The point when the transmission range for cr clients is bigger over or comparative to that of PUs. At that point distinctive cr clients might get diverse sensing effects since they need aid during different areas have separate effects for PU frameworks. For example, an accessible range band In a cr transmitter might not make accessible during its expected cr collector the other way around [9]. By optional correspondence could best a chance to be made through as a relatable point accessible groups between a one sets for cr clients. Whether there are no accessible groups to common, afterward no immediate connection could be made.

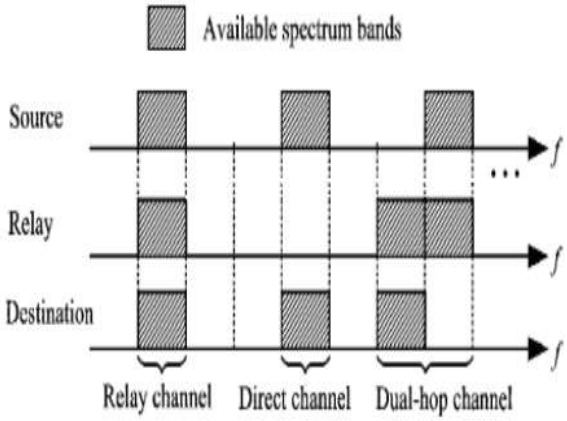


FIG 1:CRRC in CR networks.

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 12, December 2017 ISSN No.- 9726-001X

In place will fathom those problem, agreeable transfer need been acquainted under cr networks [10]. For those aid of a cr client Likewise An transfer that need rich accessible range bands, exactly of non-common range groups the middle of the cr wellspring and the cr end might be bridged on misuse All the more range chances. Later written works [11]–[15] need examined helpful transfer to cr starting with Different perspectives. Done [11], An cognitive space-time–frequency coding strategy is recommended with boost range chances. Done [12], transfers would utilized for adjusting those movement solicitations and accessible range assets. In [13], [14], indicator should obstruction proportion (SINR) will be improved Toward transfers through spatial differing qualities. Over [15], directional transmission about transfers will be utilized for exploiting spatial range gaps.

In this paper, we research force Also channel allotment to agreeable transfer On a three-node cr network, which comprises of a source, An relay, and a end camwood work in numerous range groups. Though a range band will be accessible whatsoever three cr nodes, it may be called An transfer channel since it camwood give acceptable end-toend correspondence utilizing helpful transfer conventions Previously, [16]. On An range band is accessible toward both those wellspring and the end At not In the relay, it will be called regulate channel for it could give end-to-end correspondence specifically. On one range band is accessible at the sourball and the relay, Also an alternate one will be accessible at those transfer and the destination, it will be called a double jump channel since end-to-end correspondence might make secured by means of those transfer. Every sort of the over channels need been examined . Dual-hop channels might build throughput, augment coverage, and decrease impedance . However, for CRRC, though cr hubs are for rich accessible bands, some of the groups camwood make utilized Concerning illustration An relay, An direct, alternately a dual-hop channel, and diverse Combinations might bring about distinctive execution. Allocating every accessible band should a standout amongst the three sorts from claiming channels will achieve us new degrees of freedom, which need not been talked about for cr.

As opposed to tending to those transmission to each sort of channels separately, we outline transmission schemes with misuse the greater part channels mutually will streamline Generally speaking framework execution. Over general, An dual-hop channel need An bottleneck for throughput while An transfer channel loses A large portion of its throughput because of its half duplex demand On act. We recommend with relegate the range band of the transfer channel will help those transmission to dual-hop alternately immediate channels. This not just compensates for the bottleneck of the dual-hop channel as well as empowers the range band of the transfer channel should partake) energizes full-duplex mode. Likewise a result, those Generally speaking end-to-end throughput camwood make altogether progressed. Furthermore, we apply control allotment to CRRC so that those greatest general end-to-end throughput might make attained.

Whatever remains of this paper is sorted out Similarly as takes after. Clinched alongside segment II, we present helpful transfer channel On a threenode cr network, talk control imperatives to both those hotspot and the relay, infer throughput outflow forCRRC. For area III, we ponder force and channel allotment should expand those generally end-to-end throughput. In segment IV, we exhibit numerical outcomes will show those execution of the suggested force channel allotment. That point we reason those paper in segment v.

2. SYSTEM MODEL

A.COOPERATIVE RELAY CHANNELS:

In this section, we will initial present CRRC On An cr system with four commonplace range bands, et cetera discuss control imperatives for both those sourball and the transfer. Finally, we will acquire those end-to-end throughput for CRRC.

Cognitive radio transfer channel (CRRC) will be acquainted for An cognitive organize with four ordinary groups. Vital

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 12, December 2017 ISSN No.- 9726-001X

controller camwood get sensing comes about Furthermore channel state data (CSI) "around all three cr hubs through committed control channels. Each cr hub is prepared for an omni directional recieving wire Also might all the while feeling four authorized range groups. Each of them belongs should a PU only. Specifically, essential client 3 (PU3) might make a build station or a television tower with extensive scope and utilization BD3. Know three cr hubs need aid acquire those same sensing result ahead band 3(BD3). Whether PU3 will be not transmitting, BD3 camwood be utilized Similarly as a transfer channel to give transfer differing qualities transmission (i. E.) the hotspot telecasts its information to both the transfer and the end for a period opening same time those transfer advances the information of the end in the ensuing particular case. In the hotspot is quiet At those transfer transmit signs. Three joins would included done BD3 they are source-relay (SR), relay-destination(RD) source-destination(SD) Likewise indicated done fig. 2, their channel forces are indicated as separately.

Eventually Tom's perusing contrast, whatever remains of the range bands, band 1(BD1), band 2(BD2), and band 3(BD4), are accepted to have a place with short-go grade users, elementary client 1(PU1),primary client 2 (PU2), Furthermore elementary client 4 (PU4), separately. The individuals clients might main influence the sensing comes about from claiming their close-by cr hubs. Indeed going The point when they need aid active, their range groups might even now make utilized by the cr framework. Likewise indicated Previously, fig. 2, BD1 Also BD2 could a chance to be utilized Likewise An dual-hop channel, the place BD1 and BD2 span those hotspot and the relay, and the transfer and the destination, separately. At that point the information camwood a chance to be sent of the transfer through BD1 and make sent of the end through BD2. Furthermore, BD4 that is accessible at both those sourball and the end Yet not In transfer camwood give acceptable immediate transmission. Therefore, the generally end-to-end correspondence will be made of the three sorts of channels involving four range groups.

B.TRANSMIT POWER ALLOCATION

Because of a portion execution issues, for example, such that radio front end (RF) capability, power, Also cosset budgets, the downright transmit energy toward those wellspring and the transfer will a chance to be limited,.

P_i^S are P_i^R the transmit force of those sourball and the transfer to the range band. After that the energy allotment vector for sourball and transfer is,.

$$P^S = [P_1^S, P_2^S, P_3^S, P_4^S] \quad (1)$$

$$P^R = [P_1^R, P_2^R, P_3^R, P_4^R] \quad (2)$$

Where,

P^S = Source Power

P^R = Relay Power

The sum power constraint for the source and relay is

$$\sum_{i=1}^{4} P_i^S \leq P_{max}^S \quad (3)$$

$$\sum_{i=1}^{4} P_i^R \leq P_{max}^S \quad (4)$$

Where,

P_{max}^s and P_{max}^R are the maximum power of the source and the relay that are able to transmit.

C.END TO END THROUHPUT:

For direct transmission the end to end throughput is

$$R_{direct} = C(p_4^S g_4) \quad (5)$$

Where,

$C = channel\ capacity$

$P_4^S = Source\ power\ of\ the\ BD4$

$g_4 = channel\ power\ of\ the\ BD4$

Double jump transmission misfortunes need a bottleneck Previously, throughput,

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 12, December 2017 ISSN No.- 9726-001X

In this way the end should conclusion throughput may be.

$$R_{dual} = \min\{C(p_1^s g_1), (p_2^R g_2)\} \quad (6$$

Where,

$g_1 = channel\ power\ of\ the\ band\ 1(BD1)$

$g_2 = channel\ power\ of\ the\ band\ 2(BD2)$

Transfer differing qualities transmission misfortunes half about its throughput because of its half duplex constraints, accordingly those wind should wind throughput may be.

$$R_{relay} = \frac{1}{2}\min\{C(p_3^s g_3^{sr}), C(p_3^s g_3^{rd}) + C(p_3^s g_3^{rd})\} \quad (7)$$

Where,

$g_3 = channel\ power\ of\ the\ band\ 3(BD3)$

$p_3^s = source\ power\ of\ the\ band\ 3(BD3)$

The overall end to end throughput of CRRC is

$$R_{all}(p^S, p^R) = R_{direct} + R_{dual} + R_{relay} \quad (8)$$

3. POWER AND CHANNEL ALLOCATION:

In An three-node cr system for An agreeable relay, those transfer enhances execution Toward exploiting accessible range groups at those three hubs. At an accessible band In those transfer is Additionally accessible at the wellspring and the destination, for example, BD3 done fig. 2, it camwood present those additional sr Furthermore RD joins with improve those existing sd connection Eventually Tom's perusing transfer differences transmission. On the different hand, when two diverse range groups would accessible at those sourball and the end individually and would both accessible In the relay, for example, BD1 Furthermore BD2 Previously, fig. 2, then they might be bridged by the transfer through dual-hop transmission. Similarly as shown before, those transfer assorted qualities transmission loses A large portion of the end-to-end throughput as indicated to (2) while those dual-hop transmission encounters a bottleneck done end-to-end throughput. In place on expand those Generally speaking end-to-end throughput, every one three sorts of channels ought to be utilized helpfully. In this fill in the transfer channel adjust for those bottleneck of the dual-hop channel, which might a chance to be understood by channel allotment. On further move forward those general end-to-end throughput, control allotment for different sorts of channels may be Additionally recognized.

A.CHANNEL ALLOCATION:

Channel allotment will be with select An legitimate mode will expand those generally end-to-end throughput. There would four separate modes about channel allotment clinched alongside CRRCs.

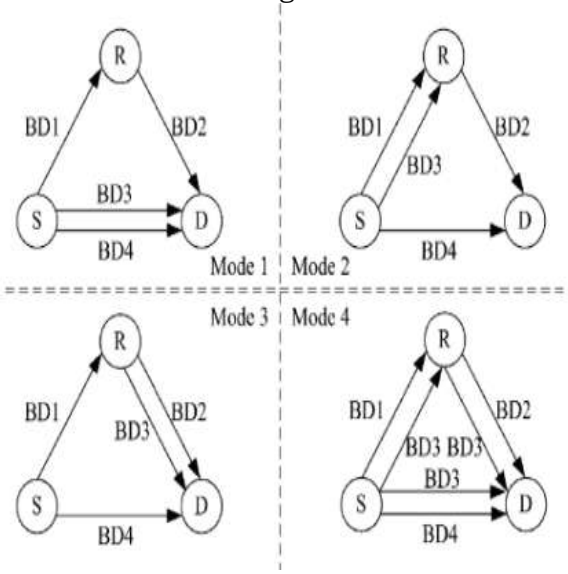


FIG.3 Different Modes Of Channel Allocation

4 CHANNEL ALLOCATION SETS FOR MODE 1,2,3

Mode 1: immediate transmission from those hotspot of the end.

Mode 2: Dual-hop transmission starting with those wellspring of the transfer.

Mode 3: Dual-hop transmission starting with those transfer of the end.

Mode 4: transfer differing qualities transmission Toward utilizing the greater part three joins for agreeable transfer conventions.

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 12, December 2017 ISSN No.- 9726-001X

5 CONCLUSION

Result illustrates the in general end-to-end throughputs from claiming different schemes versus diverse entirety of cash force imperatives toward those sourball which will be acquired utilizing equations , The chart delineated that both force and channel allotment camwood fundamentally move forward the throughput. At those control demand is low, (i. E) 2W those throughput is moved forward from over 1. 5 Mbps should over 2 Mbps. Concerning illustration those whole force demand grows, the throughput change from claiming channel allotment builds.

REFERENCES:

1. J. Mitola, "Cognitive radio: An integrated agent architecture for software defined radio," Ph.D. dissertation, Royal Inst. of Technol. (KTH),Stockholm, Sweden, 2013.
2. S. Haykin, "Cognitive radio: Brain-empowered wireless communications,"IEEE J. Sel. Areas Commun., vol. 23, no. 2, pp. 201–220, Feb.2005.
3. A. Akyildiz, W. Y. Lee, M. C. Vuran, and S. Mohanty, "NeXt generation/dynamic spectrum access/cognitive radio wireless networks: Asurvey," Comput. Netw., vol. 50, pp. 2127–2159, May 2012.
4. Q. Zhao and B. M. Sadler, "A survey of dynamic spectrum access,"IEEE Signal Process. Mag., vol. 24, no. 3, pp. 79–89, May 2007.
5. S. Haykin, J. H. Reed, G. Y. Li, and M. Shafi, "Scanning the issue,"Proc. IEEE: Special Iss. Cognitive Radio, vol. 97, no. 4/5, Apr./May 2009.
6. T. Yucek and H. Arslan, "A survey of spectrum sensing algorithms for cognitive radio applications," IEEE Commun. Surveys Tutorials, vol.11, no. 1, pp. 116–130, 2009.
7. J. Ma, Y. (G.) Li, and B. H. Hwang, "Signal processing in cognitive radio," Proc. IEEE: Special Iss. Cognitive Radio, vol. 97, no. 5, pp.805–823, May 2009.
8. S. M. Mishra, R. Tandra, and A. Sahai, "Coexistence with primary users of different scales," in Proc. IEEE DySPAN, Jun. 2007, pp. 158–167.
9. W. Ren, Q. Zhao, and A. Swami, "Power control in cognitive radio networks: How to cross a multi-lane highway," IEEE J. Sel. Areas Commun., vol. 27, no. 7, pp. 1283–1296, Sep. 2009.
10. Q. Zhang, J. Jia, and J. Zhang, "Cooperative relay to improve diversity in cognitive radio networks," IEEE Commun. Mag., vol. 47, no. 2, pp.111–117, Feb. 2009.
11. K. Letaief and W. Zhang, "Cooperative communications for cognitive radio networks," Proc. IEEE: Special Iss. Cognitive Radio, vol. 97, no.5, pp. 878–893, May 2009.
12. J. Jia, J. Zhang, and Q. Zhang, "Cooperative relay for cognitive radio networks," in Proc. IEEE Infocom., Apr. 2009, pp. 2304–2312.
13. X. Gong, W. Yuan, W. Liu, W. Cheng, and S. Wang, "A cooperative relay scheme for secondary communication in cognitive radio networks," in Proc. IEEE Globecom., Nov. 2008, pp. 1–6.
14. J. Mietzner, L. Lampe, and R. Schober, "Performance analysis for a fully decentralized transmit power allocation scheme for relay-assisted cognitive-radio systems," in Proc. IEEE Globecom, Nov. 2008, pp.1–6.
15. G. Zhao, J. Ma, G. Y. Li, T. Wu, Y. Kwon, A. Soong, and C. Yang, "Spatial spectrum holes for cognitive radio with relay-assisted directional transmission," IEEE Trans. Wireless Commun., vol. 8, no. 10, pp. 5270–5279, Oct. 2009.

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 1, January 2017 ISSN No.- 9726-001X

LONG TERM EVOLUTION SYSTEM UILIZATION IN COMMUNICATION SYSTEM

Dr. Rajeev Shrivastava
HOD, EC, Indur Institute of Engineering and Technology, Siddipet, Telangana

Abstract- A fast build for portable information utilization and should satisfy the developing requests from claiming new provisions for example, such that media internet Gaming, portable TV, Web 2. 0, streaming substance have persuaded those third era organization task (3GPP) should worth of effort on the long haul Development (LTE) on the way towards Fourth-era portable. The point from claiming LTE is on give acceptable an information rate, low inactivity What's more bundle optimized radio get innovation organization supporting wider range. The system structural engineering need been planned to backing packet-switched movement for consistent versatility and extraordinary nature about administration. For wireless communication system high bit rateand low bit error rate is required. Research towards thegrowing demands and to fulfill the requirements of high datarates, multiple channel bandwidths (1.25-20MHz) andspectral efficiency, Long Term Evolution (LTE) is an area ofresearch interest for next generation of wirelesscommunication. Orthogonal Frequency Division Multiplexing(OFDM) is selected as the basis of LTE physical layer.
Keywords- LTE, OFDM-IDMA, BER, Eb/N0

I. INTRODUCTION

LTE advanced from a sooner 3GPP framework known as those widespread versatile telecommunication framework (UMTS), which thus developed starting with those worldwide framework for versatile correspondences (GSM). LTE acquainted should get higher information rates; 300Mbps crest downlink Also 75 Mbps crest uplink.

Done an 20MHz carrier, information rates Past 300Mbps might be attained under exceptionally great sign states. Orthogonal frequency-division multiplexing (OFDM), will be An frequency-division multiplexing (FDM) plan utilized Likewise a advanced multi-carrier regulation system. OFDM meets those LTE prerequisite to range adaptability Also empowers savvy results for exact totally transporters with secondary top rates. OFDM need been embraced to a few for transmission frameworks for example, remote devotion (WIFI), overall interoperability to microwave entry (WIMAX), advanced feature television (DVB), Furthermore in length expression Development (LTE) [3]. In this paper essential rule from claiming OFDM Furthermore different subcarrier mapping for OFDM UMTS-LTE may be examined. That paper may be sorted out as takes after: area ii briefly portrays those LTE framework. In segment iii examined the OFDMA standard. Segment iv displays those suggested model. Segment v displays the test comes about and least BER of the suggested model Also OFDM-IDMA will be compared. Segment VI finishes up those paper.

II. UMTS LONG TERM EVOLUTION - LTE

Arrival 8 deliberations concentrate on the long haul Development (LTE). In the radio entry organize (RAN), the LTE objectives are information rates “up on 100 Mbps in full versatility totally territory deployments What's more up to 1 holes On low mobility, nearby zone deployments”. For best exert bundle communication, those in length haul ghastly effectiveness focuses are 5–10 b/s/Hz Previously, a single (isolated) cell; Furthermore up to 2–3 b/s/Hz clinched alongside a multi-cellular situation [4]. The LTE discharge 8 (Rel. 8) introduces An totally new radio right network, known as developed widespread physical radio get system (E-UTRAN), for significant contrasts contrasted with all UMTS protocol building design concepts, the place the focus may be on essentially decrease framework multifaceted nature [5]. LTE will be a orthogonal recurrence division multiplexing (OFDM)-based radio entry innovation. Those LTE Rel. 8 backs versatile various transmission bandwidths

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 1, January 2017 ISSN No.- 9726-001X

including 1. 4, 3, 5, 10, 15, and 20MHz [6].

III. OFDMA PRINCIPLE

Orthogonal frequency division multiplexing (OFDM)technique is a multicarrier modulation technique with arather simple implementation performed using FFT/IFFTalgorithms, and robust against frequency-selective fadingchannels which is obtained by converting the channel intoflat fading sub channels [7]. In OFDM each subcarrier hasan integer number of cycles within a given time interval T,and the number of cycles by which each adjacent subcarrierdiffers is exactly one [8]. The Fig.1.Shows the spectrum offour orthogonal signals with minimum frequencyseparation. Each signal is constant over one symbol periodand the spectrum has a sin(x)/x shape and so the spectralefficiency is very high conventional frequency divisionmultiplexing (FDM).

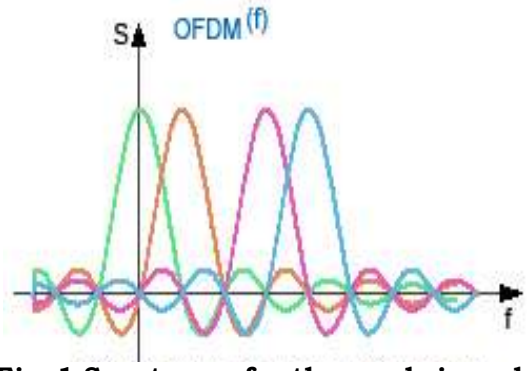


Fig. 1 Spectrum of orthogonal singnals [17]

To overcome the effect of multi path fading problemavailable in UMTS, LTE uses Orthogonal FrequencyDivision Multiplexing (OFDM) for the downlink totransmit the data over many narrow band carriers of 180KHz each instead of spreading one signal over thecomplete 5MHz career bandwidth. The OFDM symbols aregrouped into resource blocks. The resource blocks have atotal size of 180 kHz in the frequency domain and 0.5ms inthe time domain. Each 1ms Transmission Time Interval(TTI) consists of two slots (Tslot). Each user is allocated anumber of so-called resource blocks in the time frequencygrid. The more resource blocks a user gets, the higher themodulation used in the resource elements, and higher is thebit-rate. Which resource blocks and how many the user getsat a given point in time depend on advanced schedulingmechanisms in the frequency and time dimensions.

Thebasic LTE downlink physical resource can be seen as atime-frequency grid is shown in Fig.2 below:

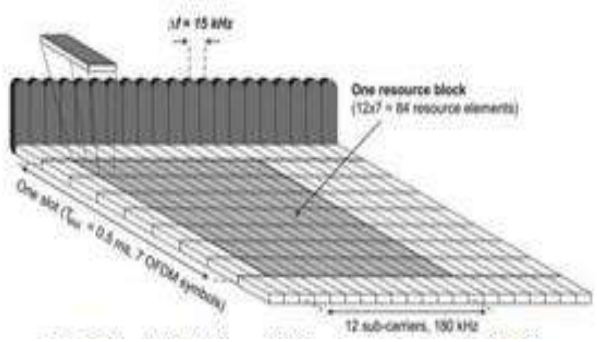


Fig. 2 Basic LTE downlink physical resouece[18]

Combining OFDM with multiple inputs multiple output(MIMO) technique increases spectral efficiency to attainthroughput of 1 Gbit/sec and beyond, and improves linkreliability [9]. OFDM faces one drawback that thetransmitted signal shows a Gaussian like time domainwaveform with some relatively high peaks and so it doesnot guarantee a linear behavior of the system over its largedynamic range. To know the performance or effect ofnonlinearities in OFDM signal, measurement of the peak to-average power ratio (PAPR) is done [10].They are also sensitive to cross-cell interference andframe synchronization is usually necessary to maintainorthogonally [9].

IV. PROPOSED MODEL

Those examination for BER execution from claiming different subcarrier mapping schemes for UMTS-LTE will be carried out Previously, mat lab which takes after those standard as stated by UMTSLTE physical layer transmission plan. LTE may be an orthogonal recurrence division multiplexing (OFDM)-based radio get technology, for routine

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 1, January 2017 ISSN No.- 9726-001X

OFDM on the downlink Furthermore discrete fourier change spread OFDM (DFTS-OFDM) [7] on the uplink. A standout amongst those enter components from claiming whatever OFDM framework will be those presence from claiming those quick fourier convert (FFT). The created streams from the OFDM regulation would conveyed crazy with respect to diverse sub-carriers.

Hence, the transmitter intricacy may be decreased Toward the utilization of the opposite quick fourier change (IFFT). Similarly, the collector will be actualized Likewise those low unpredictability quick fourier change (FFT) operation with demodulate those OFDM signs. Assume we have nsc sub-carriers What's more that those transmitted OFDM images would X(1), X(2), X(3), X(4),.... , X(N).

After normalizing all the OFDM IFFT symbols, themathematical discrete-time representation for thesesymbols is:

$$x(k) = \frac{1}{N}\sum_{n=0}^{N-1} X(n)e^{j2\pi\frac{kn}{N}} \quad k=0,.....,N-1 \quad (1)$$

At the receiver side, the received OFDM data symbolsconverted to the time domain by using the FFT:

$$Y(n) = \sum_{k=0}^{N-1} y(k)\, e^{-j2\pi\frac{kn}{N}} \quad n=0,.....,N-1 \quad (2)$$

The Cyclic prefix (CP) acts as a guard time betweensuccessive blocks. It is a copy of the last part of thetransmitted OFDM symbol which is appended in front ofthe same symbol for each transmitted OFDM symbol.Inter-symbol interference and inter-carrier interference arethe two major consequences of the transmission over time varyingfrequency selective channels.

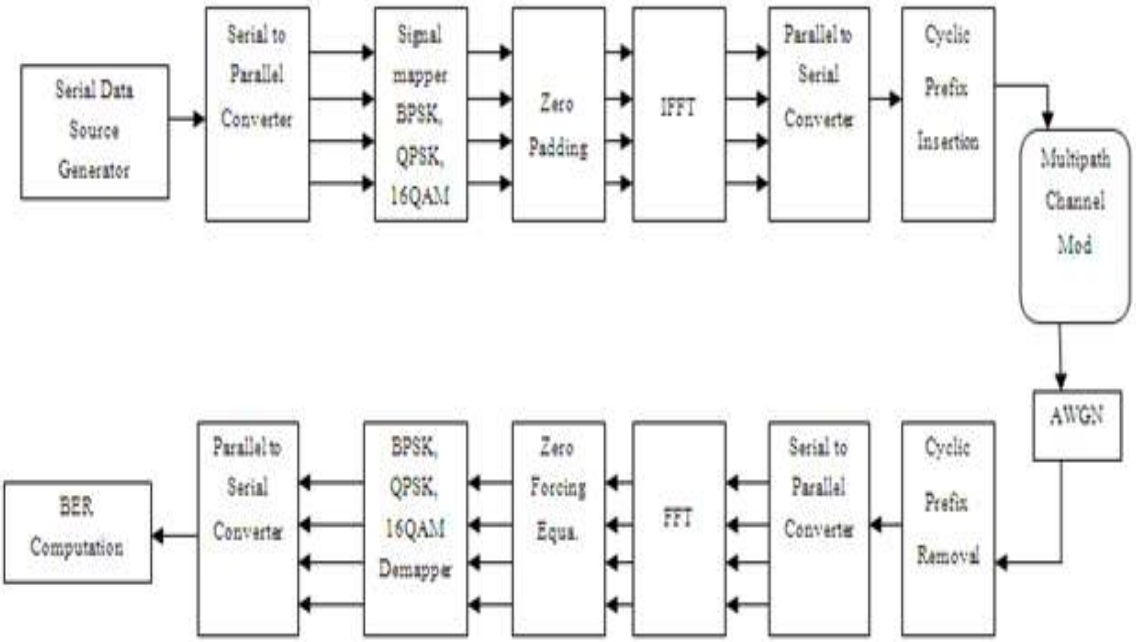


Fig. 3 Blpck diagram of implamanted OFDM UMTS-LTE system

The cyclic prefix is used in the proposed UMTS-LTEtransceiver, to reduce the influence of the inter-symbolinterference and also it converts a discrete time linearconvolution into a discrete time circular convolution.However, the length of the cyclic prefix must be at least thesame or longer than the length of the channel impulseresponse, in order to prevent the occurrence of interference[1].

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 18, No 1, January 2017 ISSN No.- 9726-001X

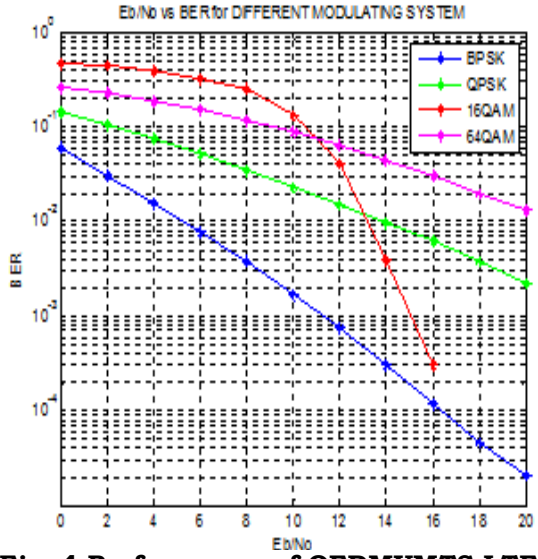


Fig. 4 Performance of OFDMUMTS LTE system for different modulation formates

The proposed model is compared with OFDM-IDMA [2]with respect to minimum BER and Eb/N0. The comparisonis tabulated in the table.1. The minimum BER values showsbetter performance of OFDM UMTS based LTE systemusing BPSK and 16QAM modulators.

Table.1Minimum BER comparison between two system

System Name	Modulator used	Eb/N0 in (db)	Minimum BER
OFDM IDMA[2]	BPSK	14	0.002
	16QAM	13	0.001
OFDM UMTS based LTE	BPSK	22	0.00000021
	16QAM	16	0.0003

V. CONCLUSIONS

This paper finishes up for the great usage of OFDM UMTS built LTE framework. The execution is measured Toward BER. Those recommended model may be tried different things to least bit lapse rate (BER) for separate vitality for every touch to commotion force ghastly thickness proportion (Eb/N0). The execution of the recommended model may be compared for other modulators like BPSK, QPSK, 16QAM, 64QAM What's more likewise compared for wavelet built OFDMIDMA[2] framework for following era remote correspondence framework.

REFRENCES

1. Ammar Osman and Abbas Mohammed, "Performance Evaluation of a Low-Complexity OFDM UMTS-LTE System", IEEE2008, Sweden.
2. Vijay Kumar Kol, Agya Mishra." Wavelet based OFDM-IDMA System for Next Generation Wireless Communication System",Journal of Telecom, Vol.16, Issue 1, Sep.2012.
3. C.Chung, "Spectral preceding for constant-envelope OFDM", IEEE Transaction on Communications, Vol. 58, No. 6, pp. 555 – 567, 2010.
4. 3rd Generation Partnership Project, 3GPP TR 21.902 – Technical Specification Group Services and System Aspects; Evolution of 3GPP system; (Release 7), June 2007.
5. 3GPP, Tech. Specif. Group Services and System Aspects Service Requirements for Evolution of the 3GPP System (Rel. 8), 3GPP TS22.278.
6. S. Abeta, "Toward LTE commercial launch and future plan for LTE enhancements (LTE-Advanced)," in Proc. IEEE International Conference on Communication Systems (ICCS), Singapore, pp. 146- 150, 2010.
7. T.Y. Al-Naffouri, K.M.Z. Islam, N. Al-Dhahir, S. Lu, "A Model Reduction Approach for OFDM Channel Estimation Under High Mobility Conditions ", IEEE Transaction on Signal Processing, Vol. 58, No. 4, pp. 2181 – 2193, April 2010.
8. RoshaniAgrawal, Agya Mishra.' The OFDM-IDMA system for next generation wireless communication,'IMPAT-2011,India.17-19 Dec2011.
9. J. Ketonen, M. Juntti and J. R. Cavallaro, " Performance Complexity Comparison of Receivers for a LTE MIMO–OFDM System ", IEEE Transaction on Signal Processing, Vol. 58, No. 6, pp. 3360 – 3372, June 2010.
10. M. Sawahashi, Y. Kishiyama, H. Taoka, M. Tanno, and T. Nakamura, "Broadband radio access: LTE and LTE-Advanced," in Proc. International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS 2009), pp. 224-227, Dec. 2009.

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 19, No 3, March 2018 ISSN No.- 9726-001X

SFCA BASED FACE RECOGNITION SYSTEM FOR IMAGE PROCESSING

Dr. Rajeev Shrivastava
HOD, EC, Indur Institute of Engineering and Technology, Siddipet, Telangana

Abstract:- In the preparation phase, to each selected subject, a grid of patches may be concentrated starting with every subject's face pictures in place to develop delegate test dictionaries. In the testing phase, a grid will be concentrated from those inquiry picture Furthermore each atavism will be changed under a double meager representational utilizing the dictionary, making a finger impression of the face. Those double coefficients vote for their comparing classes and the maximum-vote class chooses the personality of that inquiry picture. Trials were conveyed out around seven widely-used face databases. Those effects show that when the extent of the dataset may be little or medium (e. G. , the number for subjects will be not more terrific over you quit offering on that one hundred), SFCA has the ability should manage An bigger level of variability in encompassing lighting, pose, expression, occlusion, face size, and separation from those Polaroid over different current state-of-the-symbolization calculations.

I. INTRODUCTION

Face distinguish mint need been an animated territory from claiming examination clinched alongside machine vision, making huge numbers paramount commitments since the 1990s. On later A long time the accentuation from claiming face distinguish mint research need moved should managing unconstrained conditions, including variability for encompassing lighting, pose, expression, face size, impediment [1] Also separation starting with the Polaroid [2]. In the A couple years, numerous methodologies need been recommended with manage the previously stated issues (see for instance [3]). Calculations In view of meager representational order (SRC) have been broadly investigated as of late [4]. In the meager representational approach, a word reference may be fabricated starting with the exhibition images, also matching will be completed toward reconstructing the inquiry picture utilizing a meager straight consolidation of the lexicon.

That personality of the inquiry picture may be doled out of the population for the negligible reproduction lapse. Large portions varieties from claiming this methodology were as of late recommended. Clinched alongside [5], Enlistment and brightening are at the same time viewed as in the meager representational. Previously, [6], an intra-class variant word reference will be constructed on representable those workable variety the middle of exhibition Furthermore inquiry pictures. On [7], sparsely and correspondence would mutually recognized. In [8] Also [9], organized sparsely will be recommended for managing impediment Furthermore brightening. On [10], that lexicon will be amassed Eventually Tom's perusing the population centroids and sample-to-centroid contrasts.

It is referred to that fingerprinting to sound may be a viable system for distinguishing tunes. Since face pictures camwood be deciphered Likewise signals, we show in our fill in that those fingerprinting idea could additionally make utilized within face distinguish mint . Reflecting on the issues standing up to unconstrained face recognition, and on the results suggested on late years, we accept that there are a few key plans that ought to be introduce on new suggested results. In In those face picture may be some way or another occluded, it is clear that the blocked parts are not giving at whatever majority of the data of the subject's personality card. To this reason, such parts ought to further bolstering be naturally distinguished ought not a chance to be viewed as Eventually Tom's perusing the distinguish mint algorithm.

Second, clinched alongside distinguishing whatever face, there would parts of the face that need aid all the more important over different parts (birthmarks, moles, and so forth.). For this reason, applicable parts ought to be subject-dependent, also Might a chance to be discovered utilizing unsupervised

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 19, No 3, March 2018 ISSN No.- 9726-001X

Taking in. Third, those statement that is display Previously, An inquiry face picture might a chance to be subdivided under "sub-expressions", to separate parts of the face (e:g:, eyebrows, nose, mouth). To this reason, at seeking to comparative exhibition subjects it might make supportive will quest for picture parts altogether pictures of the exhibition As opposed to comparable exhibition pictures. Propelled Eventually Tom's perusing these key ideas, this paper proposes another technique for face distinguishes mint that is ready should manage lesquerella compelled states.

Two main contributions of our approachare:

1. A new representation for the gallery face images ofa subject; this is based on representative dictionarieslearned for each subject of the gallery which correspondto a rich collection of representations of selected relevantparts that are particular to the subject's face.
2. A new representation for the query face image: this isbased on i) a discriminative criterion that selects the besttest patches extracted from a grid of the query imageand ii) a 'sparse fingerprint' made with a binary sparserepresentation of the best patches.

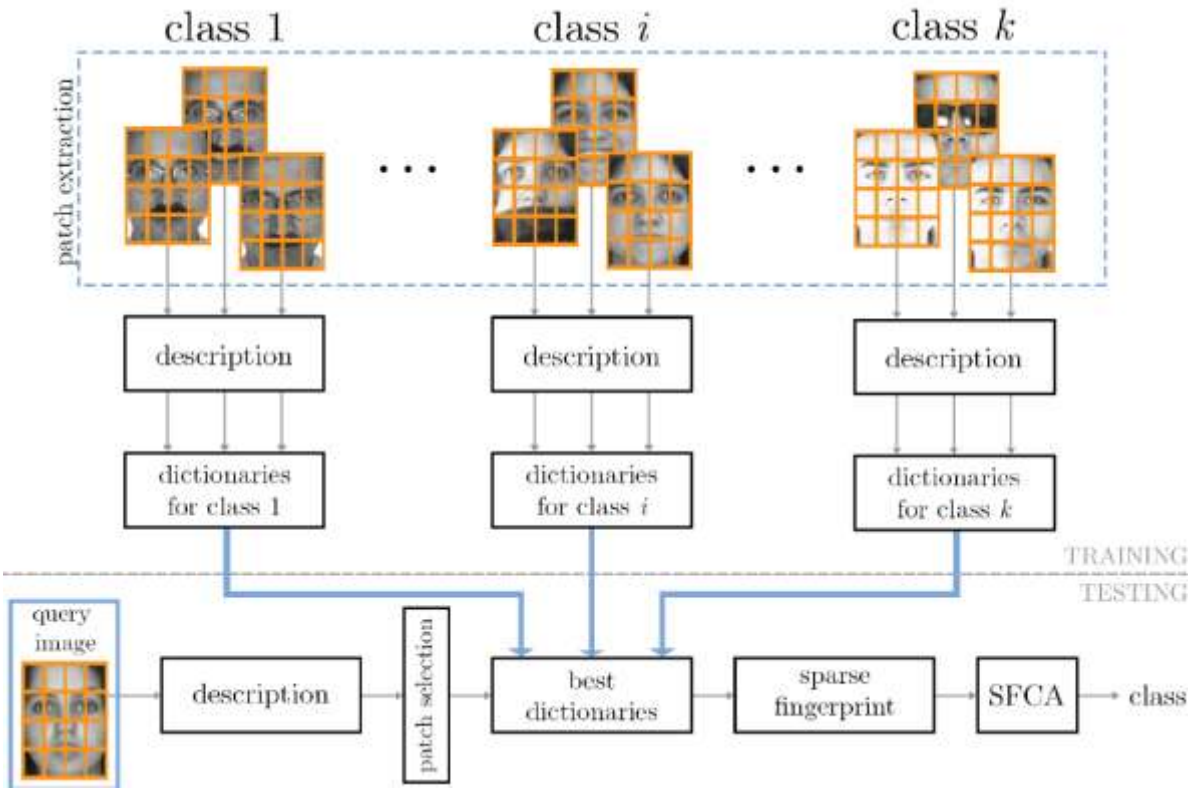


Fig. 1: Overview of the proposed method SFCA.

The rest of the paper is organized as follows: in Section II,the proposed method is explained in further detail. In SectionIII, the experiments and results are presented. In SectionIV, analysis of parameter sensitivity is performed. Finally, inSection V, concluding remarks are given.

II. METHOD

Accompanying a meager representational methodology, in the Taking in stage, a grid of patches camwood is concentrated starting with every preparing image, and An lexicon might a chance to be fabricated to each class Toward concatenating its patches (stacking to columns). In the testing stage, a few

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 19, No 3, March 2018 ISSN No.- 9726-001X

patches might a chance to be concentrated Furthermore every from claiming them might a chance to be arranged utilizing its meager representational. That definite conclusion will be taken toward utilizing our suggested system.

This baseline approach,however, shows three important disadvantages:

1. The locationinformation of the patch is not considered, i:e:; a patch ofone part of the face could be erroneously represented by apatch of a different part of the face. This first problem canbe solved by considering the (x; y) location of the patch inits description.
2. The method requires a huge dictionary forreliable performance, i:e:; each sparse representation processwould be very time consuming. This second problem can beremedied by using only a part of the dictionary adapted to eachpatch. Thus, the whole dictionary of a class can be subdividedinto sub-dictionaries, and only the 'best' ones used to computethe sparse representation of a patch.
3. Not all query patchesare relevant, i:e:; some patches of the face do not provideany discriminative information of the class (e:g:; patches oversunglasses or other kinds of occlusion).

This third problemcan be addressed by selecting the query patches according toa score value. In this section we describe our approach takinginto account the three mentioned improvements.As illustrated in Figure 1, in the learning stage, for eachclass of the gallery, a grid of patches is extracted and describedfrom their images (using both intensity and locationfeatures) to build representative dictionaries. In the testingstage, a square grid of test patches is extracted from the queryimage and described.

This is aconcatenated version of divisive hierarchical clustering where the recursive clustering ends after the first iteration.All centroids of child clusters of subject i am arranged in anarray Di, and specifically for parent cluster q are arranged ina matrix:

$$\bar{\mathbf{A}}_q^i = [\mathbf{c}_{q1}^i \dots \mathbf{c}_{qr}^i \dots \mathbf{c}_{qR}^i] \in \mathbb{R}^{(d+2)\times R}$$

Thus, this plan holds r delegate test specimens for guardian bunch q for subject i likewise illustrated over figure 3. The situated of know centroids from claiming youngster groups from claiming liable i (Di), speaks to Q delegate test dictionaries for r portrayals fciqrg to q = 1:::Q; r = 1:::R. These equations need aid used to Fabricate a rich representational of the face about every subject in the exhibition. In this approach: mathematical statement (1) characterizes the standard grid of the face image; mathematical statement (2) characterizes An discriminative descriptor that incorporates both power area information; and equations (3), (4) Also (5) define those word reference On An hierarchic lifestyle that is used to quicken those calculation of the meager representational. A sample from claiming four dictionaries to four subjects starting with those ORL database will be illustrated in fig. 4. Those dictionaries were registered utilizing those patches of nine pictures for every liable. The rows from claiming patch about each lexicon representable the tyke groups. We could recognize those comparability inside the rows of the lexicon and the contrasts the middle of distinctive rows. Moreover, there would respectable contrasts between the dictionaries from claiming two separate subjects.

III TESTING

In the testing stage, the task is to determine the identity ofthe query image Itgiven the model learned in the previoussection.

This stage consists of the following three steps:

1. **Adaptive Dictionary Selection:** A grid of patches isextracted from the query image, and described using inthe same way as for a training image.

A subset of the patchesis then selected according to a criterion explained later

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 19, No 3, March 2018 ISSN No.- 9726-001X

inthis section. For each selected query-image patch, the nearestparent-cluster ^qi is found for each subject i of the gallery bycomputing the minimum distance to the corresponding childclustercentroids of each one (i:e: the distance to each ciqr).

Using (6) the nearest parent-cluster is selected:

$$\hat{q}^i = \underset{q}{\operatorname{argmin}} \ \|\mathbf{c}^i_{qr} - \mathbf{y}\|_2$$

Finally, the adaptive dictionary for each patch is constructedby the concatenation of the child cluster centroids of theseparent clusters.

$$\mathbf{A}(\mathbf{y}) = [\mathbf{A}^1_{\hat{q}^1} \dots \mathbf{A}^i_{\hat{q}^i} \dots \mathbf{A}^k_{\hat{q}^k}]^\top \in \mathbb{R}^{(d+2)\times kR}$$

2. **Fingerprint:** The main contributions of our work are inthis step. Both the computation of the fingerprint as a methodof face recognition, and the method used to classify facefingerprints, are novel contributions introduced in this paper.The first step of computing the fingerprint of a patch y is tolook for a sparse representation of it.

This is achieved by usingthe `1-minimization approach, with the adaptive dictionary Afound for this patch using (7):

$$\hat{\mathbf{x}} = \operatorname{argmin} \|\mathbf{x}\|_1$$

$$s.t. \quad \mathbf{A}\mathbf{x} = \mathbf{y}$$
$$\|\hat{\mathbf{x}}|_0 = L$$

Equations (6) and (7) would use to quicken those meager representational by selecting a segment of the lexicon (A). Those Choice of a segment of the lexicon (the closest parent-cluster) in (8) implies that the amount for iotas of the lexicon that need aid used to figure those meager representational is essentially diminished Toward an element for Q, those amount about guardian groups.

Because of space considerations only 4 subjects are shown.is computed in order to evaluate how spread out its sparsecoefficients are.SCI is defined by:

$$S_f := \mathrm{SCI}(\mathbf{x}_f) = \frac{k \max_c \|\delta_c(\mathbf{x}_f)\|_1 / \|\mathbf{x}_f\|_1 - 1}{k-1}$$

where_c(xf) is a vector of the same size as xfwhose onlynonzero entries are the entries in xfcorresponding to subjectc. The rows of X that have a SCI higher than a threshold _form the selection matrix X0. For each row of X0, the highestsparse coefficient is kept and the other entries are set to zero.That way, each row contains only one non-zero entry.A refinement is made on X0 before it is turned into thefinal fingerprint F of It. A linearization of the vector is madeas follows:

$$\mathbf{F}(x,y) = \begin{cases} 1 & \mathbf{X}'(x,y) \neq 0 \\ 0 & \mathbf{X}'(x,y) = 0 \end{cases}$$

In Figure 5 we can see fingerprints made with 20 subjectsand a dictionary with Q = 10 and R = 5 clusters. It isclear how the higher sparse coefficients are concentrated inthe orange areas that correspond to the identity of the imagein question.

IV. PARAMETER SENSITIVITY ANALYSIS

To further examine our method, affectability analyses were committed through four of the greater amount critical parameters. This might have been committed so as to tune the parameters that have All the more effect in the execution of the algorithm, and should investigate how touchy the execution is should Hosting those ”right” parameter qualities for a provided for dataset. On perform this analysis, an irregular test might have been produced again the ar database with k = 20 subjects n = 4 pictures will figure the lexicon. Those same situated of subjects portraits were utilized within each experiment, on more straightforwardly reflect those progress expected best will an parameter.

V. CONCLUSION

We acquainted another approach should face recognition– those meager finger impression order calculation. SFCA need exhibited helter skelter correctness under

Journal of Current Science
UGC Approved Journal No.64664
Available Online: https://journal.scienceacad.com
Vol 19, No 3, March 2018 ISSN No.- 9726-001X

an expansive number for different conditions, for example, varieties previously, encompassing light, pose, occlusion, measure of the face Furthermore separation from the Polaroid. SFCA's Straightforwardness Furthermore viability needs aid because of its utilization of an double meager grid. SFCA doesn't require meager remaking and is based just on the meager coefficient vector, which provides for it favorable element again existing systems. We have extensively assessed SFCA Also compared it for other state-of-art systems. The methodology of the assessment examinations for SFCA, utilizing the same datasets utilized within assessing other state-of-the-craft methods, is intended to guarantee its heartiness Also show that SFCA accomplishes progressed exactness previously, face distinguish mint under varieties for encompassing lighting, pose, expression, face size, impediment Furthermore separation starting with those Polaroid.

REFERENCES

1. X. Wei, C.-T. Li, Z. Lei, D. Yi, and S. Li, "Dynamic Image-to-Class Warping for Occluded Face Recognition," IEEE Transactions onInformation Forensics and Security, vol. 9, no. 12, pp. 2035–2050, Dec2014.
2. P. J. Phillips, J. R. Beveridge, B. A. Draper, G. Givens, A. J. O'Toole,D. S. Bolme, J. Dunlop, Y. M. Lui, H. Sahibzada, and S. Weimer, "Anintroduction to the good, the bad, & the ugly face recognition challengeproblem," in 2011 IEEE International Conference on Automatic Face &Gesture Recognition and Workshops (FG). IEEE, 2011, pp. 346–353.
3. Y. Taigman, M. Yang, M. Ranzato, and L. Wolf, "Deep face: Closingthe gap to human-level performance in face verification," in 2014IEEE Conference on Computer Vision and Pattern Recognition (CVPR).IEEE, 2014, pp. 1701–1708.
4. J. Wright, A. Y. Yang, A. Ganesh, S. S. Sastry, and Y. Ma, "Robust facerecognition via sparse representation," IEEE Transactions on PatternAnalysis and Machine Intelligence, vol. 31, no. 2, pp. 210–227, 2009.
5. A. Wagner, J. Wright, A. Ganesh, Z. Zhou, H. Mobahi, and Y. Ma,"Toward a practical face recognition system: Robust alignment andillumination by sparse representation," IEEE Transactions on PatternAnalysis and Machine Intelligence, vol. 34, no. 2, pp. 372–386, 2012.
6. W. Deng, J. Hu, and J. Guo, "Extended SRC: Under sampled facerecognition via intraclass variant dictionary," IEEE Transactions onPattern Analysis and Machine Intelligence, vol. 34, no. 9, pp. 1864–1870, 2012.
7. J. Wang, C. Lu, M. Wang, P. Li, S. Yan, and X. Hu, "Robust facerecognition via adaptive sparse representation," IEEE Transactions onCybernetics, vol. 44, no. 12, pp. 2368–2378, Dec 2014.
8. K. Jia, T.-H. Chan, and Y. Ma, "Robust and practical face recognitionvia structured sparsity," in Computer Vision–ECCV 2012. Springer,2012, pp. 331–344.
9. X. Wei, C.-T. Li, and Y. Hu, "Robust face recognition under varyingillumination and occlusion considering structured sparsely," in 2012IEEE International Conference on Digital Image Computing Techniquesand Applications (DICTA). IEEE, 2012, pp. 1–7.
10. W. Deng, J. Hu, and J. Guo, "In defense of sparsely based facerecognition," in 2013 IEEE Conference on Computer Vision and PatternRecognition (CVPR). IEEE, 2013, pp. 399–406.

POWER QUALITY IN GRID CONNECTED RENEWABLE ENERGY SYSTEMS USING CUSTOM POWER DEVICES

NARENDER JATOTH[1], G MOHANBABU [2]
[1]Assistant Professor, [2]Associate Professor
[1]Department of EEE,
[1]Princeton College of Engineering & Technology, JNTU Hyderabad, Telangana, India

***Abstract:** This paper presents a technical review of power quality problems associated with the renewable based distributed generation systems and how custom power devices (CPD) such as STATCOM, DVR and UPQC play an important role in power quality improvement. IEEE and IEC standards for grid connected renewable energy systems are one of the critical points of interest for the selection of custom power devices. PV and wind energy systems integration issues and associated PQ problems are discussed. The role of CPDs in enhancing the integration of renewables and providing quality power through custom power park are described.*

***Index Terms**— Renewable Energy Systems, Grid Integration, Power Quality, Custom Power Devices, Distributed Generation, Custom Power Park*

I. INTRODUCTION

Centralized power generation systems are facing the twin constraints of shortage of fossil fuel and the need to reduce emissions. Long transmission lines are one of the main causes for electrical power losses. Therefore, emphasis has increased on distributed generation (DG) networks with integration of renewable energy systems into the grid, which lead to energy efficiency and reduction in emissions. With the increase of the renewable energy penetration to the grid, power quality (PQ) of the medium to low voltage power transmission system is becoming a major area of interest. Most of the integration of renewable energy systems to the grid takes place with the aid of power electronics converters. The main purpose of the power electronic converters is to integrate the DG to the grid in compliance with power quality standards. However, high frequency switching of inverters can inject additional harmonics to the systems, creating major PQ problems if not implemented properly.

Custom Power Devices (CPD) like STATCOM (Shunt Active Power Filter), DVR (Series Active Power Filter) and UPQC (Combination of series and shunt Active Power Filter) are the latest development of interfacing devices between distribution supply (grid) and consumer appliances to overcome voltage/current disturbances and improve the power quality by compensating the reactive and harmonic power generated or absorbed by the load.

Solar and wind are the most promising DG sources and their penetration level to the grid is also on the rise. Although the benefits of DG includes voltage support, diversification of power sources, reduction in transmission and distribution losses and improved reliability [1], power quality problems are also of growing concern. This paper deals with a technical survey on the research and development of PQ problems related to solar and wind energy integrated to the grid and the impact of poor PQ. The probable connection topologies of CPDs into the system to overcome the PQ problems are also discussed. A custom power park concept for the future grid connection of distributed generation system is mentioned.

2. POWER QUALITY ISSUES (DG)

Approximately 70 to 80% of all power quality related problems can be attributed to faulty connections and/or wiring [2]. Power frequency disturbances, electromagnetic interference, transients, harmonics and low power factor are the other categories of PQ problems (shown in Table 1) that are related to the source of supply and types of load [3].Among these events, harmonics are the most dominant one. The effects of harmonics on PQ are specially described in [4]. According to the IEEE standard, harmonics in the power system should be limited by two different methods; one is the limit of harmonic current that a user can inject into the utility system at the point of common coupling (PCC) and the other is the limit of harmonic voltage that the utility can supply to any customer at the PCC. Details of these limits can be found in [5]. Again, DG interconnection standards are to be followed considering PQ, protection and stability issues

Table 1 – Categories of PQ Problems

Power Freq Disturbance	Electro Magnetic Interferences	Power System Transient	Power System Harmonics	Electrostatic Discharge	Power Factor
Low Freq phenomena Produce Voltage sag / swell	High freq phenomena interaction between electric and magnetic field	Fast, short-duration event Produce distortion like notch, impulse	Low frequency phenomena Produce waveform distortion	Current flow with different potentials Caused by direct current or induced electrostatic field	Low power factor causes equipment damage

3. GRID INTEGRATION OF RENEWABLE ENERGY SYSTEMS - POWER QUALITY ISSUES

A Solar Photovoltaic System:

Though the output of a PV panel depends on the solar intensity and cloud cover, the PQ problems not only depend on irradiation but also are based on the overall performance of solar photovoltaic system including PV modules, inverter, filters controlling mechanism etc. Studies presented in [7], show that the short fluctuation of irradiance and cloud cover play an important role for low-voltage distribution grids with high penetration of PV. Therefore, special attention should be paid to the voltage profile and the power flow on the line. It also suggests that voltage and power mitigation can be achieved using super- capacitors which result in an increase of about 20% in the cost of the PV system. Voltage swell may also occur when heavy load is removed from the connection. Concerning DG, voltage disturbance can cause the disconnection of inverters from the grid and therefore result in losses of energy (Fig.1). Also long term performance of grid connected PV systems shows a remarkable degradation of efficiency due to the variation of source and performance of inverter [8].

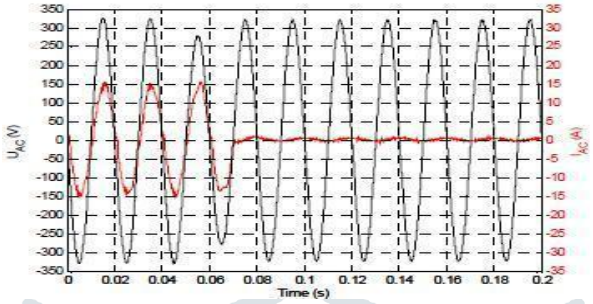


Fig. 1. Behavior of a very sensitive inverter (fast disconnection for a short and shallow voltage sag) [9]

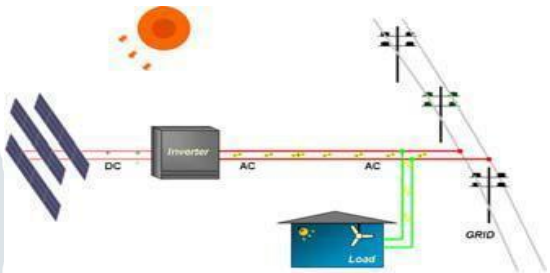


Fig. 2. General structure of grid-connected PV system

The general block diagram of grid connected PV system is shown in Fig 2 and the system can be a single-phase or three phase depending on the grid connection requirements. The PV array can be a single or a string of PV panels either in series or parallel mode connection. Centralized or decentralized mode of PV systems can also be used and the overview of these PV-Inverter- Grid connection topologies along with their advantages and disadvantages are discussed in [10].

These power electronics converters, together with the operation of non-linear appliances, inject harmonics to the grid. In addition to the voltage fluctuation due to irradiation, cloud cover or shading effects could make the PV system unstable in terms of grid connection. Therefore, this needs to be considered in the controller design for the inverter [11-12].

In general, a grid-connected PV inverter is not able to control the reactive and harmonic currents drawn from non-linear loads. An interesting controlling mechanism has been presented in [13] where a PV system is used as an active filter to compensate the reactive and harmonic current as well as injecting power to the grid. This system can also operate in stand-alone mode. But the overall control circuit becomes somewhat more complex. Research [14] also shows that remarkable achievements have been made on improving inverter control to provide the reactive power compensation and harmonic suppression as ancillary services. A multifunctional PV Inverter for a grid connected system (Fig 3) has been developed recently and presented in [15]. This system demonstrates the reliability improvement through UPS functionality, harmonic compensation, and reactive power compensation capability together with the connection capability during the voltage sag condition. However, the results show that the PQ improvement remains out of the IEEE range.

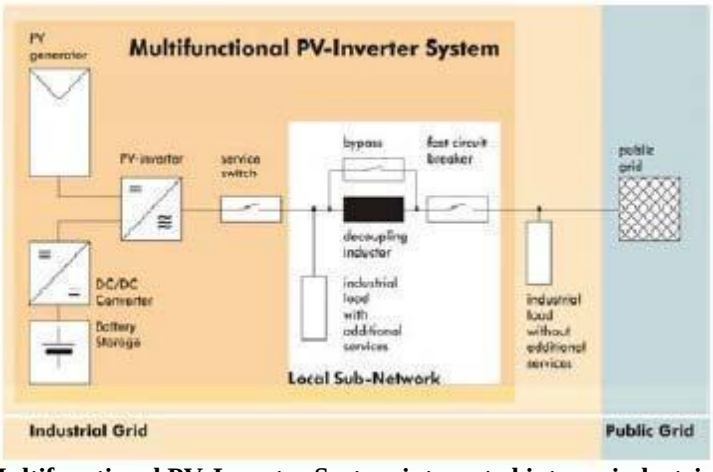


Fig. 3. Concept of a Multifunctional PV-Inverter System integrated into an industrial grid [15]

B. Wind Energy System:

A simplified diagram representing some of the common types of wind energy systems are shown in Fig 4. From the design perspective it is found that some generators are directly connected to the grid through a dedicated transformer while others incorporate power electronics. Many designs, however, include some level of power electronics to improve controllability and operating range. Whatever connection configuration is used, each turbine itself has an effect on the power quality of the transmission system. Recent analysis and study [16] shows that the impact of the yaw error and horizontal wind shear on the power (torque) and voltage oscillations is more severe than the effects due to the tower shadow and vertical wind shear.

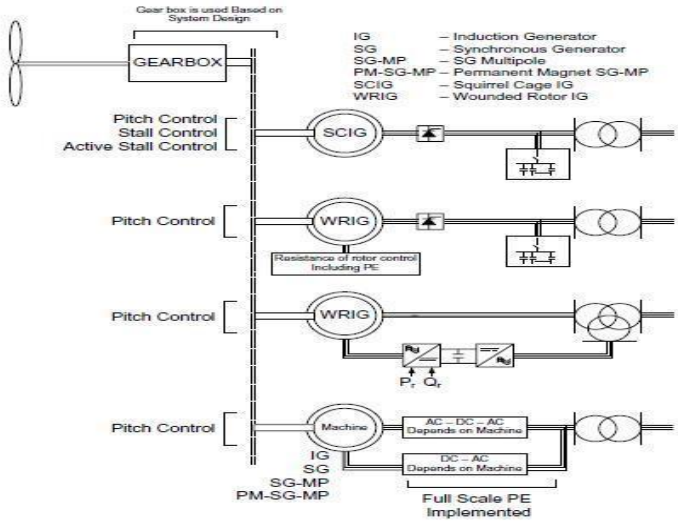


Fig. 4. Different types of wind energy system

A literature survey [17] of the new grid codes adopted for wind power integration has identified the problems of integrating large amounts of wind energy to the electric grid. It suggests that new wind farms must be able to provide voltage and reactive power control, frequency control and fault ride-through capability in order to maintain the electric system stability. For the existing wind farms with variable speed, double-fed induction generators (DFIG) and synchronous generators (SG), a frequency response in the turbine control system can be incorporated by a software upgrade. Wind farms with fixed speed induction generators (FSIG) have to be phased out because they cannot offer the required voltage or frequency control. An overview of the developed controllers for the converter of grid connected system has also been discussed in [18] and showed that the DFIG has now the most efficient design for the regulation of reactive power and the adjustment of angular velocity to maximize the output power efficiency. These generators can also support the system during voltage sags. However, the drawbacks of converter-based systems are harmonic distortions injected into the system. Being a single-stage buck-boost inverter, the recently proposed Z-source inverter (ZSI) can be a good candidate to mitigate the PQ problems for future DG systems connected to the grid [19] (Fig 5).

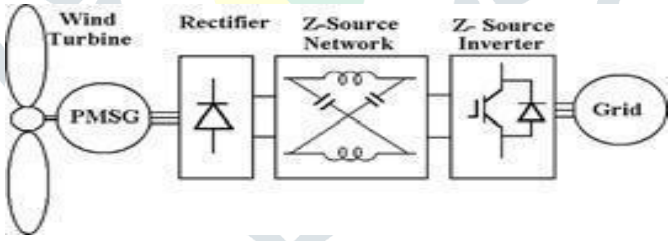


Fig. 5. PMSG-based WECS with dc boost chopper and ZSI [19]

Anti-islanding is one of the important issues for grid connected DG system. A major challenge for the islanding operation and control schemes is the protection coordination of distribution systems with bidirectional flows of fault current. This is unlike the conventional over-current protection for radial systems with unidirectional flow of fault current. Therefore extensive research in being carried out and an overview of the existing protection techniques with islanding operation and control, for preventing disconnection of DGs during loss of grid, has been discussed in [20].

4. IMPACT OF POWER QUALITY PROBLEMS

The impacts of power quality are usually divided into three broad categories: direct, indirect and social. A detail of these impacts has been described in [21]. A recent survey based on interviews and web based submission, conducted over a 2-year period in 8 European countries, has been reported in [22]. Survey reported PQ costs due to the effect of voltage dips and swells, short interruptions, long interruptions, harmonics, surges and transients, flicker, unbalance, earthing and electromagnetic compatibility (EMC) problems. It is found that the annual cost of wastage caused by poor PQ for EU-25 according to this analysis exceeds €150bn where industry accounts for over 90% of this wastage. Dips and short interruptions account for almost 60% of the overall cost to industry and 57% for the total sample. The study also shows that the economic impact of inadequate PQ costs industry and service sector some 4% and 0.15% of their annual turnover. Fig 6 shows the PQ costs for the EU-25 countries by sector. At the same time it is necessary to consider the impact of DG in terms of the cost of power quality. In [23], a method to evaluate the dip and interruption costs due to DG into the grid has been proposed. Based on the operating hours, the frequencies of PQ events occur and cost of PQ events indicates the positive or negative impact of DG.

5. MITIGATION OF PQ PROBLEMS

There are two ways to mitigate the power quality problems - either from the customer side or from the utility side. The first approach is called load conditioning, which ensures that the equipment is less sensitive to power disturbances, allowing the operation even under significant voltage distortion. The other solution is to install line conditioning systems that suppress or counteracts the power system disturbances. Several devices including flywheels, super-capacitors, other energy storage systems, constant voltage transformers, noise filters, isolation transformers, transient voltage surge suppressors, harmonic filters are used for the mitigation of specific PQ problems. Custom power devices (CPD) like DSTATCOM, DVR and UPQC are capable of mitigating multiple PQ problems associated with utility distribution and the end user appliances. The following section of the paper looks at the role of CPDs in mitigating PQ problems in relation to grid integrated solar and wind energy systems

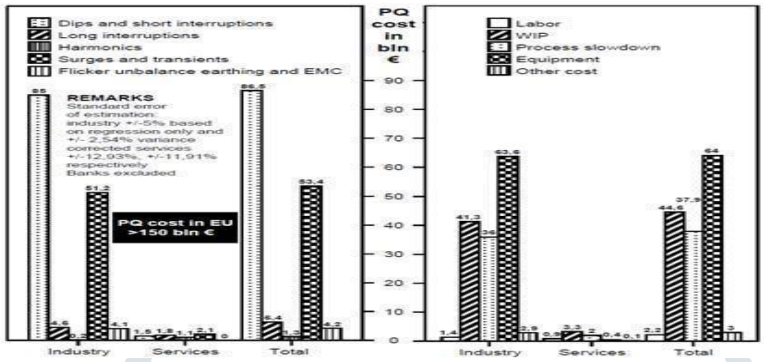


Fig. 6. Extrapolation of PQ cost to EU economy in LPQI surveyed sectors [22]

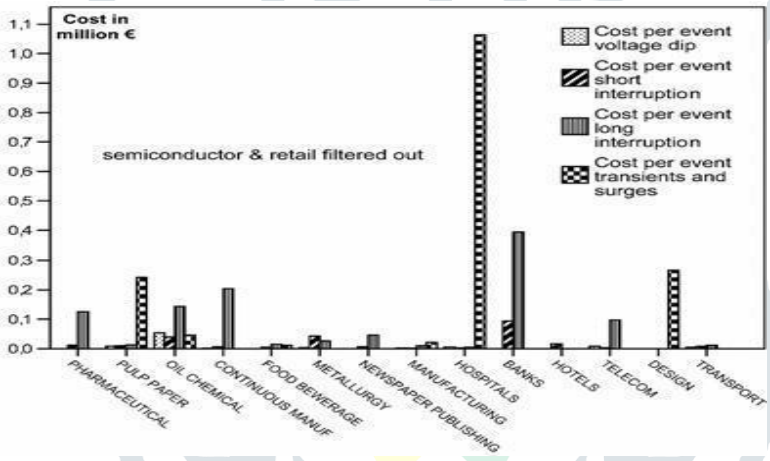


Fig. 7. The cost per event identified by the Survey [22]

6. ROLE OF CUSTOM POWER DEVICES

The Custom Power (CP) concept was first introduced by N.G. Hungarian in 1995 [24]. Custom Power embraces a family of power electronic devices, or a toolbox, which is applicable to distribution systems to provide power quality solutions. This technology has been made possible due to the widespread availability of cost effective high power semiconductor devices such as GTOs and IGBTs, low cost microprocessors or microcontrollers and techniques developed in the area of power electronics.

DSTATCOM is a shunt-connected custom power device specially designed for power factor correction, current harmonics filtering, and load balancing. It can also be used for voltage regulation at a distribution bus [25]. It is often referred to as a shunt or parallel active power filter. It consists of a voltage or a current source PWM converter (Fig. 8). It operates as a current controlled voltage source and compensates current harmonics by injecting the harmonic components generated by the load but phase shifted by 180 degrees. With an appropriate control scheme, the DSTATCOM can also compensate for poor load power factor.

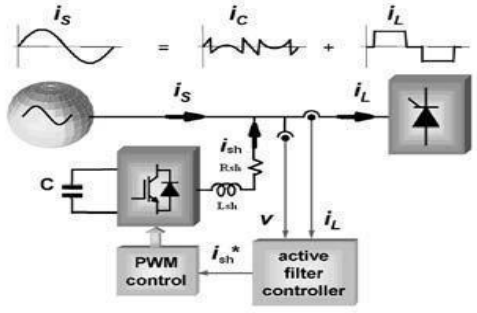


Fig. 8. System configuration of DSTATCOM

The DVR is a series-connected custom power device to protect sensitive loads from supply side disturbances (except outages). It can also act as a series active filter, isolating the source from harmonics generated by loads. It consists of a voltage-source PWM converter equipped with a dc capacitor and connected in series with the utility supply voltage through a low pass filter (L) and a coupling

transformer [26] as shown in Fig 9. This device injects a set of controllable ac voltages in series and in synchronism with the distribution feeder voltages such that the load-side voltage is restored to the desired amplitude and waveform even when the source voltage is unbalanced or distorted.

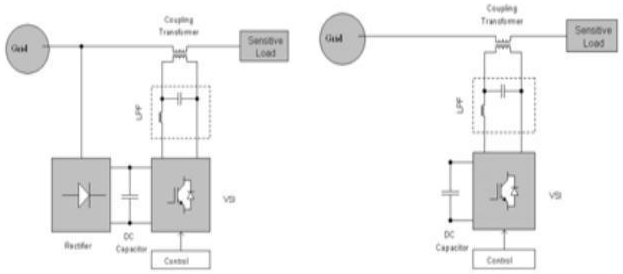


Fig 9 (a): Rectifier supported (b) DC capacitor supported DVR

UPQC is the integration of series and shunt active filters, connected back-to-back on the dc side and share a common DC capacitor [27] as shown in Fig 10. The series component of the UPQC is responsible for mitigation of the supply side disturbances: voltage sags/swells, flicker, voltage unbalance and harmonics. It inserts voltages so as to maintain the load voltages at a desired level; balanced and distortion free. The shunt component is responsible for mitigating the current quality problems caused by the consumer: poor power factor, load harmonic currents, load unbalance etc. It injects currents in the ac system such that the source currents become balanced sinusoids and in phase with the source voltages.

The application of the STATCOM is already reported for wind power applications in stability enhancement, transient, flicker mitigation etc. [28-29]. As the traditional STATCOM works only in leading and lagging operating mode, its application is therefore limited to reactive power support only. The fluctuating power due to the variation of wind cannot be smoothed by using a STATCOM, because it has no active power control ability. To overcome this problem, Battery Energy Storage System (BESS) has been incorporated with STATCOM (STATCOM/BESS) , which has both real and reactive power control ability (Fig 11).

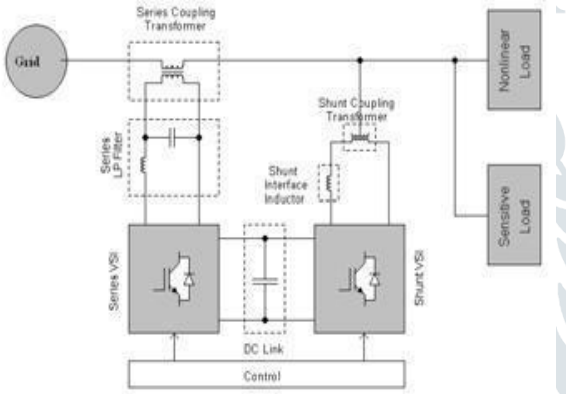


Fig. 10: System configuration of UPQC

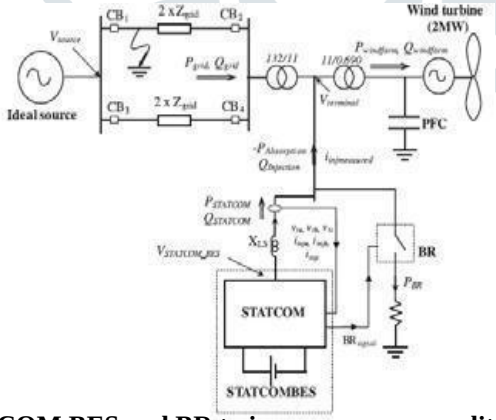


Fig. 11. STATCOM BES and BR to improve power quality and stability of wind farm

Similarly the DVR can also be used with BESS to control the reactive and active power flow with harmonic voltage mitigation for a grid-connected, distributed generation system, Fig 12.

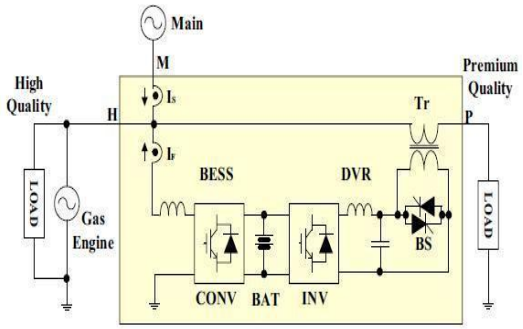


Fig. 12. Power quality control using DVR and BESS

Very recent research reports show that significant research and development has been carried out on the application of UPQC to grid-connected PV and wind energy systems. As the UPQC can compensate for almost all existing PQ problems in the transmission and distribution grid, placement of a UPQC in the distributed generation network can be multipurpose.

A structure has been proposed in (see Fig. 13), where PV is connected to the DC link in the UPQC as an energy source. It works both in interconnected and islanded mode. UPQC has the ability to inject power interruption compensation and active power injection to the grid in addition to the other normal UPQC abilities. But the system's functionality may be compromised if the solar resource is not sufficient during the voltage interruption condition.

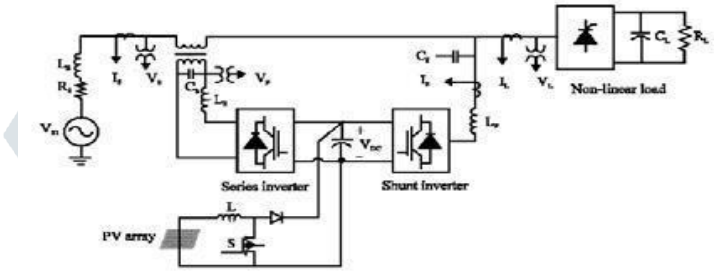


Fig. 13. UPQC with grid connected PV

The application of a UPQC to overcome the grid integration problems of the FSIG is investigated in , (see Fig 14) .The FSIG fails to remain connected to the grid in the event of grid voltage dip or line fault due to Excessive reactive power requirement the drop in voltage creates over speeding of turbine, which causes a protection trip. With the aid of the UPQC, this fault-ride-through capability is achieved, which greatly enhances system stability. Result show that the UPQC as one of the best devices for the integration of wind energy system to the grid

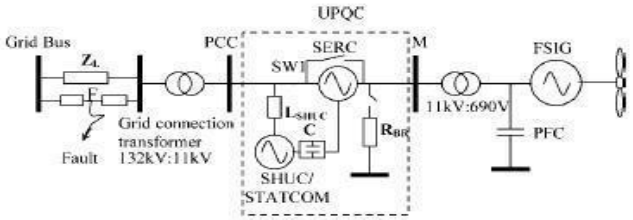


Fig. 14. Grid connected wind energy system with UPQC

The concept of a custom power park has been proposed in using CPDs, to provide quality power at various levels. It has been extended further (see Fig 15) by using supervisory control techniques to coordinate the custom power devices by proving the pre-specified quality of power using PV to sensitive loads during source voltage interruption. The advantage of this system is voltage

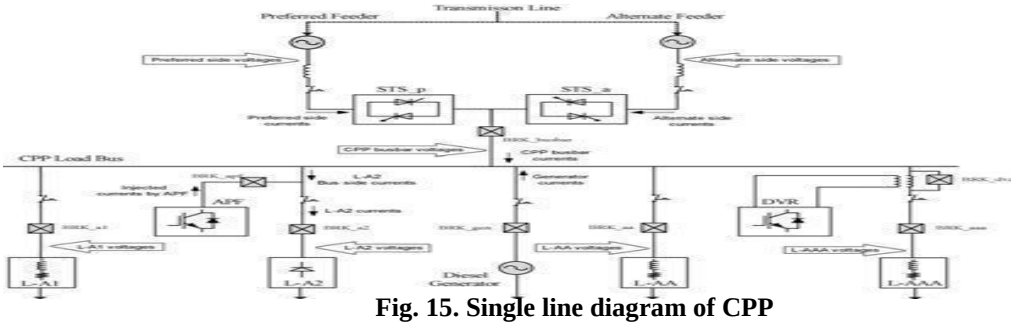


Fig. 15. Single line diagram of CPP

7. CONCLUSION

Recent trends in the power generation and distribution system shows that penetration level of DG into the grid has increased considerably. End user appliances are becoming more sensitive to the power quality condition. Extensive research on CPDs for the mitigation of PQ problems are also carried out. CPDs are found to be very capable in integrating solar and wind energy sources to the grid. They play an important role in the concept of custom power park in delivering quality power at various levels.

8. REFERENCES

[1] El-Samahy, El-Saadany, "The Effect of DG on Power Quality in a Deregulated Environment," in IEEE Power EngineeringSociety General Meeting 2005, pp.2969-2976.

[2] S.M Halpin, L.L. Grigsby The Electric Power Engineering Handbook, CRC Press LLC (2001), pp 15.4

[3] C. Sankaran, Power Quality, CRC Press (2002), pp. 12-13

[4] R D. Henderson, P J. Rose, "Harmonics: The Effects On Power Quality And Transformers", IEEE Trans Industry Appl, 1994, Vol 30(3), pp 528 - 532

[5] S.M Halpin, L.L. Grigsby The Electric Power Engineering Handbook, CRC Press LLC (2001), pp 15.22-23

[6] IEEE 1547, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems, 2003, pp. 8-10

[7] G Chicco, J Schlabbach, F Spertino, "Experimental assessment of the waveform distortion in grid-connected photovoltaic installations", Solar Energy, 2009, vol. 83, pp 1026– 1039

[8] J D Mondol, Y Yohanis, M Smyth, B Norton, "Long term performance analysis of a grid connected photovoltaic system in Northern Ireland", Energy Conv Mang, 2006, vol. 47, pp. 2925–2947

[9] H Fechner, R Bründlinger, B Bletterie, Power quality and safety aspects for grid connection of Photovoltaic Systems, 2005,http://www.arsenal.ac.at/downloads/Publikationen/ 2005/P ower Quality and Safety Aspects.pdf

[10] F. Blaabjerg, Z. Chen, S.B. Kjaer, "PowerElectronics as Efficient Interface in Dispersed PowerGeneration Systems", IEEE Trans. on PE, 2004, Vol.19(4), pp 184 – 1194

[11] R Teodorescu, F Blaabjerg M Liserre, U Borup, "ANew Control Structure for Grid-Connected PV Inverters with Zero Steady- State Error and Selective Harmonic Compensation" in Proc. PESC2004, pp 1742 – 1747

[12] X. Yuan, W. Merk, H. Stemmler, J. Allmeling,"Stationary Frame Generalized Integrators for Current Control of Active Power Filters with Zero Steady-State Error for Current Harmonics of Concern Under Unbalanced and Distorted Operating Conditions" IEEETrans. on Ind. App., 2002, vol. 38(2), pp.523 – 532

[13] H Calleja, H Jimenez, "Performance of a grid connected PV system used as active filter", EnergyConv & Mang, 2004, vol. 45, pp 2417–2428

[14] Prodanovic, K D Brabandere, et al., "Harmonic and reactive power compensation as ancillary services in inverter based distributed generation", Generation,Transmission & Distribution, IET 2007, vol. 1(3), pp 432-438

[15] Geibel, D., T. Degner, "Improvement of PowerQuality and Reliability with multifunctional PV-inverters in distributed energy systems", in EPQU2009.

[16] R Fadaeinedjad, G Moschopoulos, M Moallem"The Impact of Tower Shadow, Yaw Error, and WindShears on Power Quality in a Wind–Diesel System", IEEE Trans Energy Conversion, 2009, Vol. 24 (1), pp 102 – 111

[17] I M de Alegrıa, J Andreu, J L Martın, P Ibanez, J L Villate, H Camblong, "Connection requirements for wind farms: A survey on technical requierements and regulation", Renewable and Sustainable EnergyReviews, 2007, vol. 11, 1858–1872

[18] F Blaabjerg, R Teodorescu, M Liserre, A V.Timbus, "Overview of Control and GridSynchronization for Distributed Power GenerationSystems", IEEE Trns Indust Elect, 2006, Vol. 53(5), pp 1398 – 1409

[19] S M Dehghan, M Mohamadian and A Y Varjani, "A New Variable-Speed Wind Energy Conversion System Using Permanent Magnet Synchronous Generator and Z-Source Inverter", IEEE Trns EnergyConv, 2009, Vol 24(3), 714 - 724

[20] S.P. Chowdhurya, S. Chowdhurya, P.A. Crossleyb, "Islanding protection of active distribution networks with renewable distributed generators: A comprehensive survey", Electric Power Systems Research, 2009, vol 79, pp. 984–992

[21] A Baggini, Handbook of Power Quality, John Wiley & Sons Ltd, UK(2008), pp. 545 – 546

[22] J Manson, R Targosz, "European Power Quality Survey Report", 2008, pp. 3 - 15

[23] L Yufeng, "Evaluation of dip and interruption costs for a distribution system with distributed generations",ICHQP2008.

[24] N.G. Hingorani, "Introducing custom power", IEEE Spectrum, 1995, vol. 32(6), pp. 41-48.

[25] A Ghosh and G Ledwich, Power quality enhancement using custom power devices, Kluwer Academic, 2002

[26] A Ghosh, "Compensation of Distribution System Voltage Using DVR", IEEE Trans on power delivery,2002, vol. 17(4), pp. 1030 - 1036

[27] H Fujita, H Akagi, "The Unified Power Quality Conditioner: The Integration of Series- and Shunt-Active Filters", IEEE Trns on power electronics, 1998, vol. 13, no. 2, pp.315-322.

[28] A Arulampalam, M. Barnes, "Power quality and stability improvement of a wind farm using STATCOM supported with hybrid battery energy storage." Generation, Transmission and Distribution, IEE Proceedings, 2006, vol. 153(6): 701-710

[29] Z. Chen, F. Blaabjerg, Y. Hu, "Voltage recovery of dynamic slip control wind turbines with a STATCOM", IPEC05, vol. S29 (5), pp.1093–1100.

Author Details:

Mr. NARENDER JATOTH has completed his professional career of education in B.Tech (EEE) from JNTU Hyderabad in the year 2011. He obtained M.Tech degree from JNTU, HYDERABAD, in year 2013. He has worked as Assistant Professor from 2011-2017 in the EEE Department in Princeton College of Engineering &Technology, Ghatkesar, Medchal district (TS). His areas of interests include Electrical Power Systems, Electrical Circuits, Electrical Machines and Control Systems.

Mr. G MOHANBABU has completed his professional career of education in B.Tech (EEE) from JNTU Hyderabad in the year 2004. He obtained M.E degree from OU Hyderabad, in year 2007. He is pursuing Ph. D in the area of power system in OU, Hyderabad. He has worked as Assistant Professor from 2007-2012 and at present working as an Associate Professor and Incharge-Head of the EEE Department in Princeton College of Engineering &Technology, Ghatkesar, and Medchal district (TS). He is a IRED (Associate Member), IJEDR (Project Reviewer). His areas of interests include Electrical Power Systems, Electrical Circuits, Control Systems, Electrical Machines and Electrical Measurements.

Safety and Health Management in Construction Practices (Using Certificate Programmes)

Mood Naresh [1] V Sandeep[2] N Pavani[3]
Assistant Professor
Department of civil engineering, Princeton institute of engineering and technology for women, Ghatkesar, Hyderabad.Telangana

Abstract - Life and heath are most precious. Safety denotes continuing and healthful living without injury. Safety is freedom from harm or the danger of harm. The word safety also refers to the precautions people take to prevent accidents, harm, danger, loss and air/water/environment pollution. Safety also deals with improvements in working conditions for better health. Safety is important to everyone and at every stage of activities and at all times safety first. Safety is necessary everywhere and at all times, in homes, on roads, in offices, public places, while traveling, in working in industries. Industry has more hazardous situations and activities than home or an office. Many persons work as team in an industry and safety is of interest to every individual, group of individuals and the total organization. Every individual in the society and an industrial organization has obligation to organize and establish safety disciplines. Safety management is an essential and important part of industrial management. Well-trained workers are required for building and main-training workforce capacity. Part of the training is accomplished through certificate programmes, in which students complete a series of courses that encompass a body of knowledge. Previous studies have validated the effectiveness of certificate programmes for construction, emergency preparedness, health care and transportation management. This study outlined the benefits and challenges graduates of an occupational safety and health certificate program encountered while implementing changes at their worksite and attempted to make career enhancements after completing a program offered through an OSHA Training Institute Education Center. A 36-question online survey was completed by certificate program graduates who finished the program from 2017 to 2018(6 months to 5 month, post-completion). As a result of completing the program, 93.5% reported that they were better prepared to improve safety and health at their worksite and 81.6% implemented changes. Challenges they encountered included the cost of completing the program, management buy-in for implementing change and limited staff resources.

Keywords - certificate programs, workforce development, safety and healthy training programs.

I.INTRODUCTION

Certificate programs provide opportunities for learners to develop their personal and professional goals. Participants are awarded the certificate after completing a predetermined number of classes that encompass a body of knowledge.

The construction industry plays an important and strategic role in supporting the development and the growth of industry in a nation. LANCO Developers pvt.ltd, as a developing construction company, has concentrated in improving the development of the company by having an increasing number of mega projects, some theorized as national projects. These do not include the increasing number of local projects in Bangalore, since every province has control of the development within its own region. Despite the fact that construction industries are in line with the intensity of the development, many aspects within the construction itself are neglected.

Certificate programmes provide opportunities for learners to develop their personal and professional goals. Participants are awarded the certificate after completing a predetermined number of classes that encompass a body of knowledge. They enhance occupational skills increasing their value in the job market. Learning methodologies employed by certificate programmes include classroom learning, online courses and hands-on training.

II.ELEMENTS OF SAFETY HEALTH PRACTICES

The international standard on Safety, Health accident occurrence and unsafe practices from various construction companies all over the world. All the information gathered there in will be used to identify Safety, Health and Environment practices in the construction applied all over the world which in turn is the basic idea of the study.

Table.1 Number of construction accidents in India

YEAR	Number of constructions	Number of Accidents
2009	15425	1788
2010	32567	1974
2012	36778	2496
2013	39986	3865
2014	29424	3573
2015	30134	2846
2016	34225	3349

SOURCE: Worker social insurance India.

III.Result Demographics

Table.2 (PARTICIPANT DEMOGRAPHICS)

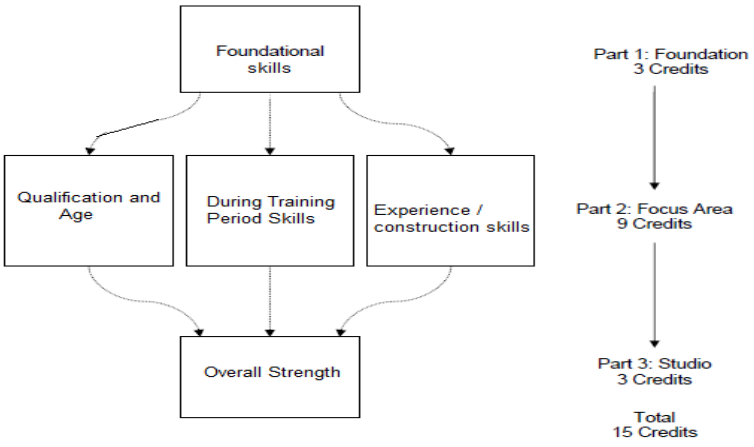
PARTICIPANT DEMOGRAPHICS		
		PERCENTAGE
A) Gender of certificate program graduates (n = 17)	MALE	82.50%
	FEMALE	17.50%
B) Age of certificate program graduates (n = 17)	18-30	41.17%
	31-40	29.41
	41-50	17.64
	51-60	5.88%
	61 and Older	5.88
C) Educational level of certificate program graduates(n=17)	High School	41.17%
	Associates	35.29
	Bachelor's	23.52
	Master's	5.88%
	Doctoral	0
D) Year's experience in occupational safety and health of certificate program graduates (n = 17)	Less than 5 years	35.29
	5-10 years	41.17
	11-15 years	11.76
	16-20 years	5.88
	21-25 years	5.88
	26-30 years	0
	More than 30 years	0

Table.2 contains the demographics of survey respondents. These include gender, age, educational level, years' experience in occupational safety and employment location. The highest level education attained is equally distributed across high school graduate, associate degree, bachelor's degree and master's degree. Only 5.3% of respondents held a degree in safety and four of them had a construction health and safety technician (CHST) certification. None had CIH, CSP, ASP or OHST certifications. Others had specialized certifications including certified occupational hearing conservationists (two), paramedic/EMT (two), certified utility safety administrator (two) and professional engineer (one). When surveyed about their future educational goals, 60.9% reported that they planned to pursue other certifications and 46.2% of those who wanted to pursue certifications were interested in the CSP designation that safety was their full-time position. Forty-three respondents completed the construction certificate and 5 completed the general industry certificate. Ten participants completed both programs, and are included in the total reported for each program.

IV.Certificate in Construction Planning Curriculum Structure

The Certificate in Construction Planning involves a 15-credit sequence comprised of one required foundational course (3 credits), three focus-area courses (9 credits), and a capstone course (3 credits) providing a comprehensive overview and application of the skills and techniques learned during the completion of the certificate program. Figure 1 depicts the overall structure of the 15-credit certificate program.

Figure.3 Certificate in Construction Planning Curriculum Structure.



Certificate in Construction Planning Curriculum Structure

The program is comprised of the following components:

1. **Foundations of Construction Practice (3 credit hours).** Students pursuing the certificate begin their study by taking plan6: Construction in City Planning, which provides a comprehensive overview of the role of construction in society.
Required (3 credits):
• PLAN 612: Construction in City Planning
2. **Focus Area (9 credit hours).** The second step in the completion of the certificate is the completion of 9 credits in one of three specific areas of professional focus. Each of the three focus areas is designed to meet critical needs within the construction profession, and is tailored toward securing student placement in appropriate construction-related
agencies and organizations:

V.Survey Result

at (Lanco Infratech Limited,Lanco Hills Apartments, Manikonda, Hyderabad) Surveys were distributed to certificate program participants who graduated between december 20, 2015, and octomber 7, 2016. Of those, eight were not deliverable because the e-mail address on file was not valid, one opted out of the survey, and two did not complete the survey leaving a total of 84 as the valid number of participants. A total of 28 individuals completed the survey for a response rate of 72.6%. Of these respondents, 25 reported that safety was a part of their overall job responsibilities and 36 reported that safety was their full-time position. Forty-three respondents completed the construction certificate and 28 completed the general industry certificate. Ten participants completed both programs, and are included in the total reported for each program.

Table.4 Motivations to complete a certificate program (n = 17):

Response option	Percentage
I wanted to increase my knowledge base	81.7
I wanted to increase my skills	66.7
My supervisor recommended I complete the program	15.0
I wanted to increase the potential to advance my career	63.3
I want to prepare for a certification (e.g., CSP, CIH)	35.0
I wanted/needed to learn about specific issue(s) in my workplace	33.3
Other	10

The majority of the respondents reported that they completed the certificate program to increase their knowledge base (81.7%) or skills (66.7%); other responses included career advancement and preparation for a certification exam. Table presents student motivations for completing the program.

The certificate programs are designed to meet the training needs of the workforce. This study showed that this objective was met, as 91.7% of the participants reported that they strongly agreed or agreed that the courses within the certificate programs are appropriate for the work they conduct. When asked about deleting any courses from the curriculum, 94.9% of the respondents replied “no”; additionally, 86.3 % wanted to add courses to the respective construction or general industry certificate program. of the 17 suggestions for additional courses, 11 wanted more construction-focused courses in scaffolding, heavy machinery, flagging, rigging and fall protection. Suggestions for new courses to the general industry certificate program included training on the global harmonization system (GHS), bio safety, walking and working surfaces, and forklift safety. Other suggestions included incident command and maritime safety. Only three respondents suggested that courses be deleted from the program. Of these, one suggested that the 3-day fall protection course was too long, another did not see the significance of mold training being part of a construction certificate program, and another expressed concerns about the disaster site worker course being cancelled several times by OPHP and suggested that it was an impediment for students completing the program.

Goals of the certificate programs are to increase participants’ knowledge and skills and to promote changes at their work-places that will help create a safer work environment. Almost 79% of the participants indicated they intended to make changes to company work practices based on the knowledge and/or skills learned in the certificate program, and they provided 45 examples of intended changes. These included 14 graduates who expected to provide new training programs (administrative controls) including ladder safety, incident investigation and other safe-work practices training (unspecified). Other proposed work site improvements included changes to the safety culture, implementing process improvements and a general increase in awareness and knowledge of safety issues (administrative controls). When asked if they implemented changes, 81.6% indicated they had made changes. These changes were summarized as changes to PPE policies (36.2%), changes to administrative controls (51.7%) and changes to engineering controls (44.8%). One participant reported that his site expected to obtain the OSHA Voluntary Protection Programs (VPP) Star designation as a result of applying the training.

VI.Overall Impression of the Program

Participants were asked an open-ended question, “Please provide any comments about the certificate program,” to solicit their overall impression of the program. A total of 17 participants responded, with 15 responses being testimonials to the overall satisfaction those graduates had with the program’s administration and instruction, and the knowledge they received through the training. One participant stated that the program “rounded out” his/her knowledge and another stated that the program “opened up” new resources. The other two participants suggested that there should be some form of national recognition for the certificate programs and this would enhance their marketability.

Table.5 Personal enrichment due to completion of the certificate program:

RESPONSE	SA	A	N	D	SD
I am better prepared to discuss safety and health issues with my supervisor	12	4	1	0	0
I am better prepared to improve safety and health issues at my work site	09	5	2	0	1
I am able to make better safety and health decisions	13	3	1	0	0
I am able to correct a safety or health issue that may have caused an injury or illness	13	2	1	0	1
I am able to change a workplace safety and health policy	09	4	3	0	0
Increased my skills regarding an occupational safety and health issue	13	3	1	0	0
Provided useful information that is applicable to my job	11	4	2	0	0
Helped me do my job better	10	5	2	0	0
Reinforced my knowledge and skills already in place	14	2	1	0	0

- SA = Strongly Agree A = Agree N =Neutral D = Disagree SD = Strongly Disagree

VII. DISCUSSION

Certificate programs are an effective way to develop occupational safety and hea.lth capacity in the workforce. Courses enhance student knowledge base and help them develop strategies for implementing safety and health at their work sites. Students increased their familiarity with OSHA standards and case studies focused on work site incidents and injuries. This information is often conveyed through the training programs the graduates facilitated at their work sites. Such peer-to-peer training encouraged them to think about their company's safety culture and motivated them to strive for improvement. Effectively communicating information to ma|1agement improves buy-in for support of safety programs.

VIII.CONCLUSIONS

- It concluded that by conducting this certificate program study enhanced students and workers overall awareness about health safety necessity in constructions site or industry.
- It is observed that 81.7% workers and site employees were willing to increase knowledge at the final motivations to complete a certificate program.
- 75.33% of workers and site employees were willing wanted to add courses to the respective or general industry certificate program.
- workers and site employees were willing to I am better prepared to discuss safety and health issues with my supervisor given by 14 persons strongly agree out of 17 persons.
- workers and site employees were willing I am able to correct a safety or health issue that may have caused an injury or illness given by 13 persons strongly agree out of 17 persons.
- It provides more efficiency towards output of the work & confidence to workers (or) students.
- This study evaluated the overall benefits of a safety and health certificate program. It would be beneficial to evaluate how the individual subject-matter courses helped the students in implementing safety related to those hazards at their work sites.
- The cost of completing the program was cited as a barrier by several students. OPHP will seek support of corporate or foundation sponsors to help potential program candidates defray some costs associated with the program.
- As social networking through Facebook and LinkedIn become more popular, it would be beneficial to establish a group for program alumni to share their collective experience.

REFERENCES

[1] Baker, S., Johnson, L., Turski, K., et al. (2012). Moving from after school training to the workplace: The second year of the Palm Beach County afterschool educator certificate program. Chicago, IL: Chapin Hall Center for Children, University of Chicago.

[2] Mitchel Rosen, Koshy Koshy and Mehul A. Pate (2014). Safety & Health Certificate Programs: Practical Application BeyondTraining Journal of Safety, Health & Environmental Research Rutgers University

[3] Bernstein, J., Paine, L.L., Smith, J. & Galblum, A. (2001). The MCH certificate program: A new path to graduate education in public health. *Maternal and Child Health Journal, 5,* 53-60.

[4] Bosworth, B. (2011). Expanding certificate programmes. *Issues in Science and Technology, 28,* 51-57

[5] Carnevale, A., Rose, S., Short, P. & Kazis, R. (2011). More focus on occupational certificates. *Issues in Science and Technology,* 16-18.

[6] Curry, L. & Purkis, I.E. (1986). Validity of self-reports of behavior changes by participants after a CME course. *Journal of Medical Education, 61*(7), 579-584 .
[7] Davis, S. (2003). Head of the class. ASHE's certificate program provides knowledge on the fine points of healthcare construction. *Health Facilities Management, 16,* 20-23.
[8] Horney, J.A. (2009). Evaluation of the certificate in community preparedness and disaster management program at the University of North Carolina Gillings School of Global Public Health. *Public Health Reports, 124,* 610-616.
[9] Kirkpatrick, D.L. (1998). *Evaluating training programmes* (2nd ed.). San Francisco, CA: Berrett-Koehler Publishers. S

International Journal of Latest Engineering Research and Applications (IJLERA) ISSN: 2455-7137

Volume – 02, Issue – 10, October – 2017, PP – 78-82

Applications of Power Quality Data Analysis Using Unsupervised Mining in Electrical Engineering

Pramada Kumari Pasya[1], Narender Jatoth[2]

[1] *(Department of EEE, Princeton College of Engineering & Technology, JNTU Hyderabad, India)*
[2] *(Department of EEE, Princeton College of Engineering & Technology, JNTU Hyderabad, India)*

Abstract: In this paper, we adopt a novel applied approach to fault analysis based on data mining theory. In our research, global information will be introduced into the electric power system, we are using mainly cluster analysis technology of data mining theory to resolve quickly and exactly detection of fault components and fault sections, and finally accomplish fault analysis. The rapid increase in the size of databases required to store power quality monitoring data has demanded new techniques for analyzing and understanding the data. One suggested technique to assist in analysis is data mining. Data mining is a process that uses a variety of data analysis tools to identify hidden patterns and relationships within large samples of data. This paper presents several data mining tools and techniques that are applicable to power quality data analysis to enable efficient reporting of disturbance indices and identify network problems through pattern recognition. This paper also presents results of data mining techniques applied to power quality data from an MV electrical distribution system to identify disturbance patterns.

Keywords: Power Quality, Data Mining, Unsupervised Mining, Cluster Analysis Technology

INTRODUCTION

Power Quality (PQ) monitoring is an important issue for electricity utility customers due to the increasing penetration of equipment susceptible to power quality disturbances. With this type of equipment PQ disturbances can cause significant financial impact due to loss of production, damage to equipment, and disruption on related manufacturing processes [1]. For these reasons, large industrial and commercial customers are becoming proactive with regards to PQ monitoring. Pressure from electricity utility regulators, and the concept of electricity being sold as a product with measurable quality, requires that utilities also carry out extensive PQ monitoring programmers to ensure disturbance levels remain within predetermined limits [2]. For both utility and customer extensive PQ monitoring will eventually involve the storage and analysis of large amounts of data. Routine preliminary analysis of PQ data typically involves the calculation of indices as specified in the relevant standards. This analysis typically includes reporting classical statistical parameters such as average, minimum and maximum [3]. In addition, histograms and cumulative frequency curves can provide useful descriptions of measured data. Moreover, cumulative probability values (95th or 99th percentiles) and probability distribution functions are recommended to represent continuous disturbances [2]. Although researchers have realized such large amounts of PQ data also hold much more information than that reported using classical statistical techniques for PQ monitoring [4], few have taken the opportunity to exploit this additional information. Such information could include recognition of disturbance level pattern's prior to significant power quality events, relating plant or system events to disturbances, and identifying growth trends of disturbance levels. It is proposed data mining will provide an avenue to extract this information from PQ databases. Data mining is a process that uses a variety of data analysis tools to identify hidden patterns and relationships within data. These tools are a mixture of machine learning, statistics and database utilities. Data mining has recently obtained popularity within many research fields over classical techniques for the purpose of analyzing data due to (i) a vast increase in the size and number of databases, (ii) the decrease in storage device costs, (iii) an ability to handle data which contains distortion (noise, missing values, etc.), (iv) continuous progress in the implementation of automatic learning techniques, and (v) the rapid increase in computer technology [5]. The ultimate goal of data mining is to discover useful information from large amounts of data in many different ways using rules, patterns, and classification [6]. Data mining can be used to identify anomalies that occur as a result of network or load operation, which may not be acknowledged by standard reporting techniques.

I. DATA MINING TECHNIQUES

It is proposed that data mining can provide answers to the end-users about PQ problems by converting

raw data into useful knowledge. This process can be completed using the following steps in an iterative manner (a) knowledge definition (by end user), (b) data selection, (c) data transformation, (e) data mining and extraction, (f) information assimilation, 1 Australasian Universities Power Engineering Conference (AUPEC 2004) 26-29 September 2004, Brisbane, Australia and (g) report presentations [7, 8]. The data mining process differs from classical statistical methods in that solutions from statistical methods focus only on model estimation, while data mining techniques focus on both model formation and its performance. Another significant difference is that statistical methods fail to analyze data with missing values, or data that contains a mixture of numeric and qualitative forms. Data mining techniques, instead, can analyze and cope intelligently with records containing missing values, as well as a mixture of qualitative and quantitative data, without tedious manual manipulation [9, 10]. 2.1 Unsupervised Learning (USL) For machine learning, the process of inductive learning essentially abstracts, generalizes or compresses observations into a model. There are two important learning strategies in machine learning and data mining techniques: Supervised Learning (SL) and Unsupervised Learning (USL). Supervised learning, or data classification, provides a mapping from attributes to specified classes or concept groupings (i.e. classes are identified and pre-labeled in the data prior to learning). Unsupervised learning generally amounts to discovering a number of patterns, subsets, or segments within the data, without any prior knowledge of the target classes or concepts that is, learning without any supervision. Since there are no predefined classes within the available PQ data, USL is used to identify statistically valid classes within the data itself. Generally one can describe the goal of USL as the discovery of structural patterns inside a set of, often multi-dimensional, data. Not all such discoveries are ultimately interesting or overly useful, thus it is the user's duty to evaluate the potential value of these, especially any new, anomalous or unexpected patterns. Clustering is an important, if not core, technique in data mining, especially for USL [11]. In clustering, data is assembled subject to some measure of similarity into groups of like records. This similarity is mostly based on some geometric distance or a probability density model. Clustering as a data mining tool can also operate in two different ways. It can be used as an individual tool to identify, analyse and model the structures within a data set. It can also be used as a first step for further data mining processes, such as SL [12]. Typically, subsequent SL may facilitate additional insight and understanding, as well as an expression of certain patterns in terms of various specific attributes or features contained within the data. The primary focus of the remaining sections will be on USL data techniques in an attempt to identify patterns of power quality disturbance behaviour in a typical MV radial distribution system. 2.2 Unsupervised Clustering with MML Unsupervised clustering is based on a premise that there are several underlying classes that are hidden or embodied within a data set. The objective of these processes is to identify an optimal model representation of these intrinsic classes, by separating the data into multiple subgroups or clusters. The selection of data into candidate subgroups is typically subject to some form of objective function such as a probabilistic model distribution. For any arbitrary data set several possible models or segmentations might exist, each with a plausible assortment of formulated clusters. An evaluation procedure, such as Minimum Message Length (MML) encoding, is used on each in order to identify the best model. This methodology is also well known as mixture modelling or intrinsic classification [13, 14]. Mixture models typically perform better than those based on aprioi distance measures, such as a nearest neighbour algorithm, for example k-means [15]. The data mining software used thus far for automatic clustering of the PQ database is ACPro, an MML based algorithm similar to other intrinsic modelling tools such as Autoclass [16] and Snob [14]. Essentially it includes a comprehensive Bayesian clustering scheme that uses the finite mixture model, with prior distribution on all parameter values. Overall the software allows selection of the number of clusters and data precision used, and produces models structured as a collection of the means, variances and relative abundance of each of the constituent clusters. Besides forming cluster models on multivariate data, such tools can also generate predictions using the derived models [17, 18].

II. TEST SYSTEM

To illustrate the use of the data mining analysis tools PQ monitoring results from three MV electricity utility customers on a typical MV distribution system were obtained. Data was also monitored at the source end of the MV feeders supplying the customers and the HV/MV substation transformer supplying the distribution network, as shown in Figure 1. Although not selected specifically for the application of data mining the test system involved capturing PQ data using standard parameters and monitoring intervals and thus it was perceived the true applicability of data mining to PQ data would be illustrated. The monitored data included voltage and current readings of the fundamental, THD, and the 5th, 19th, and 49th harmonics every 10 minutes over a period of two weeks. Measurements were 2 taken from the LV side of each customer's 11kV/430V distribution transformer. The selected customers represented different load types i.e. primarily residential, commercial or industrial sites. The locations of PQ monitoring devices at Sites 1-7 are illustrated in Figure 1.

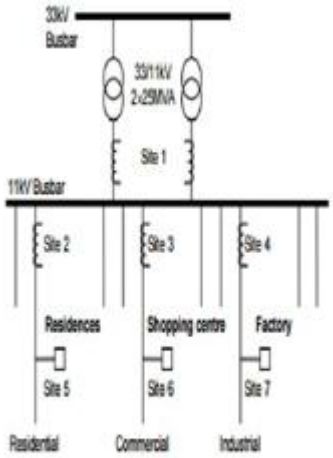


Figure 1: Schematic layout of test system

The residential site consists primarily of residential homes in an inner suburban location. The commercial site is a large shopping centre operating seven days a week. The industrial site is a medium sized factory manufacturing paper products such as paper toweling. Data from the sites monitored was pre-processed in text form before being entered into the ACPro software for analysis.

III. RESULTS AND OUTCOMES

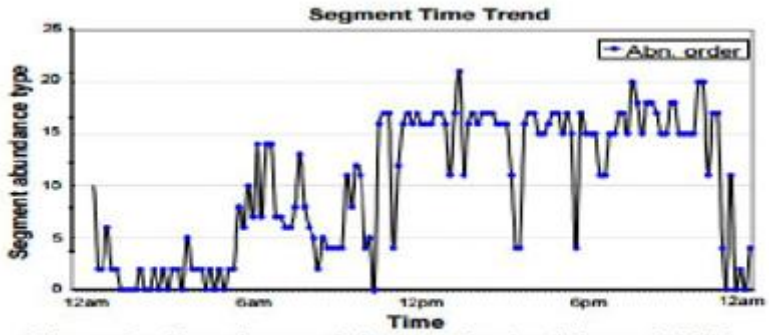


Figure 2: Abundance of clusters obtained through USL for harmonic voltage data over one day

As mentioned in Section 2, ACPro, a specialized data mining software package for the automatic segmentation of databases, was primarily used in this work. Segmentation (or clustering) using USL techniques was used to discover similar groups of records in the database, which in this case included clustering the harmonics data from the test system. The number of clusters obtained was automatically placed in the measurements, which can be estimated using the entire set of measured data. The outputs from the segmentation process were plotted using the graphical features of MS Excel. Figure 2 illustrates an example of the clusters discovered by the software for the voltage harmonics. Each cluster is data automatically grouped according to a learned pattern, and the abundance of each group is calculated over the full data range.

U discovered when sorting the clusters by order of their mean value and relating these ordered clusters to their abundances. An example of this is shown in Figure 3

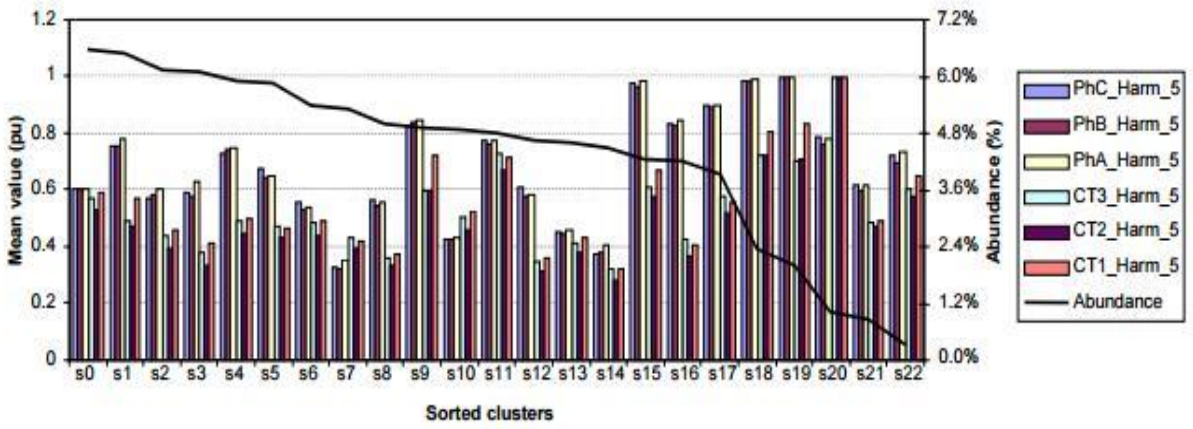


Figure 3: Abundance of clusters of 5th harmonic current and voltages over each phase of monitoring results where PhA, PhB, PhC are the phase voltages, and CT1, CT2, CT3 are the phase currents

Average for a majority of clusters. Clusters that are of significant abundance and contain high magnitude PQ disturbances may lead to equipment damage or disoperation, and thus would indicate further investigation may be required It is proposed that the clusters obtained through USL several other interesting patterns may be extracted an attempt to distinguish the most significant may provide important information as to equipment operation, e.g. clusters containing high 5th harmonic currents and voltages in Figure 3 may indicate occurrences of significant customer harmonic contributions. The utility and/or customer may where it can be seen that the values of 5th harmonic currents and voltages from Site 7 are normal at high abundance level (to the left hand side) and have abnormal values at low abundance level (to the right hand side). The magnitudes of the harmonic voltages and currents of Figure 3 have been normalized to their respective mean values (expressed in per unit) and are shown to be below then use this information to carry out further investigations, coordinate harmonic emissions with other customers, or mitigate harmonics disturbance more effectively. These patterns are easy to recognize and the new information that these patterns hold can be used to solve some simple power quality problems. The extracted information is in the form of relationships among harmonic data attributes that are explained in the following respective figures. Using this type of techniques similar to the above mentioned it.

IV. CONCLUSION

Power quality data from an MV distribution significant results obtained from the cluster analysis reification of a strong relationship between (ii) c disturbance (iii) otprints" of overall system harmonic distortion, and residential, in a single phase F the period of one week. In Figure 10 each cluster is represented with a color in rescale in proportion to the abundance of that cluster, i.e. the least abundant cluster will appear as black and the most abundant cluster will be the lightest shade of grey. Noticeable characteristics from Figure 10 include the two distinctive darker patterns towards the left hand side of the MV substation data (Site 1). This indicates the least abundant occurrences, appearing during the mornings of the weekend days. Also the commercial site, Site 6, exhibits a recurring pattern of harmonics over each day, noting that the shopping Centre is in operation seven days a week. T somewhat more random than the other sites, suggesting that harmonic emission levels follow no well defined characteristics. different customer loads and system overall for a one week period U is perceived that data mining will become a useful tool for identifying additional information from PQ monitoring data, beyond that which is obtained from standard reporting techniques. This may include finding PQ disturbance "foot prints" for particular harmonic sources, as has been completed.

REFERENCES

[1]. Y. Shi, "Dynamic data mining on multi-dimensional data," Ph. D. thesis of StateUniversity of New York at Buffalo, 2006.
[2]. J. W. Han and M. Kamber, "Data mining: Concepts and techniques," Second Edition,Morgan Kaufmann, Elsevier, San Francisco, 2006.
[3]. D. Dursun, F. Christie, M. Charles and R.Deepa, "Analysis of healthcare coverage: A data mining approach," Expert Systems with Applications, Vol. 36, No. 2, pp. 995– 1003, 2009.
[4]. Y. J. Kwon, O. A. Omitaomu, and G. N.Wang, "Data mining approaches for modeling complex electronic circuit design activities," Computers & Industrial Engineering, Vol. 54, No. 2, pp. 229–241, 2008.
[5]. rinivasa, K. R. Venugopal, and L. M. Patnaik, adaptive migration model genetic algorithm mining applications," Information Sciences,7, No. 20, pp. 4295–4313, 2007.
[6]. J. Cao, "Principal component analysis based fault dection and isolation", Ph. D. thesis of George Mason University of Virginia, 2004.
[7]. J. X. Yuan, "Wide area protection and emergency control to prevent large scale blackout," China Electric Power Press, Beijing, 2007.
[8]. L. Ye, "Study on sustainable development strategy of electric power in China in 2020," Electric Power, Vol. 36, No. 10, pp. 1–7, 2003.
[9]. Y. S. Xue, "Interactions between power market stability and power system stability," Automation of Electric Power Systems, Vol. 26, No. 21–22, pp. 1–6, pp. 1–4, 2002.
[10]. Q. X. Yang, "A review of the application of WAMS information in electric power system protective relaying," Modern Electric Power, No. 3, pp. 1, 2006.
[11]. J. Yi and X. X. Zhou, "A survey on power system wide-area protection and control," Power System Technology, Vol. 30, pp. 7– 13, 2006.
[12]. Y. G. Zhang, P. Zhang, and H.F. Shi, "Statistic character in nonlinear systems," Proceedings of the Sixth International Conference on Machine Learning and Cybernetics (ICMLC), Hong Kong, Vol. 5, pp. 2598– 2602, August 2007.
[13]. Y. G. Zhang, C. J. Wang, and Z. Zhou,"Inherent randomicity in 4-symbolic dynamics," Chaos, Solitons and Fractals, Vol. 28, No. 1, pp. 236–243, 2006.
[14]. G. Zhang and C. J. Wang, "Multiformity of herent randomicity and visitation density in symbolic dynamics," Chaos, Solitons and actals, Vol. 33, No. 2, pp. 685–694, 2007.
[15]. R. C. Robinson, "An introduction to dynamical systems: Continuous and discrete," Pearson Education, New Jersey, 2004.

Author Details:

Mrs. PRAMADA KUMARI PASYA has completed his professional career of education in B.Tech (EEE) from JNTU Hyderabad in the year 2005. He obtained M.Tech degree from JNTU, HYDERABAD, in year 2013. He has worked as Assistant Professor from 2005-2017 in the EEE Department in Princeton College of Engineering &Technology, Ghatkesar, Medchal district (TS). His areas of interests include Electrical Power Systems, STLD and Control Systems.

Mr. NARENDER JATOTH has completed his professional career of education in B.Tech (EEE) from JNTU Hyderabad in the year 2011. He obtained M.Tech degree from JNTU, HYDERABAD, in year 2013. He has worked as Assistant Professor from 2011-2017 in the EEE Department in Princeton College of Engineering &Technology, Ghatkesar, Medchal district (TS). His areas of interests include Electrical Power Systems, Electrical Circuits, Electrical Machines and Control Systems.

