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Editors

# Computer Aided Intervention and Diagnostics in Clinical and Medical Images

 Springer

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# Modified Low-Power Built-in Self-test for Image Processing Application



P. Anitha, **P. Ramanathan** and P. T. Vanathi

**Abstract** In recent trend, optimization of power without degradation of performance is major concern in application areas like embedded systems digital image and signal processing. The proper selection of test pattern/test image is one of the major issues. Our motivation of this work is to reduce the total power dissipation and area overhead of a Test pattern generator. The proposed BIST uses Negative Edge triggered D-Flip flop (NEDFF) for random pattern generation. When compared to existing LFSR with regular D-FF, our Modified LFSR with NEDFF reduces the count of transistors extensively. BIST using NEDFF is implemented and simulated using Microwind tool with 90 nm technology. The result reveals that significant amount of total power consumption is reduced while testing a VLSI circuit with NEDFF.

**Keywords** Low-power testing · Less area · NEDFF · Power consumption  
Switching activity · Medical image processing

## 1 Introduction

In order to address error tolerance problem in medical image processing, testing techniques has been proposed to determine acceptability of target chips. The biomedical images are usually more complicated for doing error tolerability evaluation based on acquired attribute values. The role of BIST in medical image processing is to

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Banmali S. Rawat · Aditya Trivedi  
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# R-Peaks Detection Using Shannon Energy for HRV Analysis



Om Navin, Gautam Kumar, Nirmal Kumar, Kuldeep Baderia,  
**Ranjeet Kumar** and Anil Kumar

**Abstract** In this paper, a system for R-peak detection in ECG signal is presented that applicable in different heart rate variability (HRV) applications based on S-transform and Shannon energy. The presented technique and system are efficient in R-peak detection as per results illustrated up to 99.80% of sensitivity and positive predictivity. Here, Shannon energy envelope computes sharp peaks that help in the allocation of peak position in ECG signal. The presented technique is evaluated on 27 records of MIT-BIH arrhythmia database of ECG signals. A tool named as SpandanV.1 (Cardiac Rhythm Variability, version 1) also demonstrated for R-peak detection with HRV analysis.

**Keywords** ECG signal · R-peaks · Shannon energy · S-transform  
Heart rate variability

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# Chapter 1

## Envisioned Network Architectures for IoT Applications



**P. Sarwesh**, N. Shekar V. Shet, and K. Chandrasekaran

**Abstract** Internet of Things is the auspicious technology that connects different internet enabled devices in single network architecture. IoT contributes effective service in various applications such as industrial automation, health care sectors, and home automation. Availability of low cost devices makes IoT as innovative paradigm in large-scale wireless network research. Challenges in IoT applications vary from each other. For example, in smart grid applications QoS is more important, whereas for land slide monitoring applications, energy efficiency and reliability are the major requirements. Thus, in this chapter, we come up with various network architectures that are suitable for IoT applications. The network architectures are designed by combining different optimization techniques into single network design, to satisfy specific network requirements. This chapter elaborates the major issues that affect the network performance and suitable solutions for those issues by means of efficient network architectures.

### 1.1 Introduction

Internet of Things (IoT) is the ever-growing network of smart devices that promotes global information sharing. In the phrase Internet of Things, the word “things” can include from small watch to big vehicle [1]. It creates smart environment in every fields such as smart city, smart health, smart grid, smart market, smart agriculture, and smart home. MEMS technology is the major reason for IoT development, since availability of low power and low-cost devices is achieved by MEMS technology. Internet enabled devices work autonomously with its features such as sensing, communicating, and computing. IoT network is the combination of

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# Comparative analysis of CMOS AND gate and Domino Logic AND gate design by using Nano scaling technologies

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**Abstract**— In this paper, a CMOS AND gate and domino AND gate is designed at different nano scaling. The performance of the CMOS AND gate and domino AND is analyzed by it area and power consumption. The simulation results shows that the domino AND gate and CMOS AND gate consumes less power and area in comparison with conventional techniques

**Keywords** — Domino logic, Nano technology, Low power consumption.

## I. INTRODUCTION

In designing dynamic memories and microprocessors, dynamic logic circuits are widely used because it requires fewer transistors and its high speed in comparison with the complementary CMOS [1-3]. On the other hand, Dynamic logic circuits come with a cost of high power consumption and less noise immunity in comparison to static CMOS circuits [4]. Domino logic CMOS is based on the evolution of dynamic logic circuits. The advantages of domino logic in comparison to static CMOS is, it provides high speed operation by reducing the sub threshold voltage [5]. The below Fig. 1 shows the basic diagram of domino logic circuit.

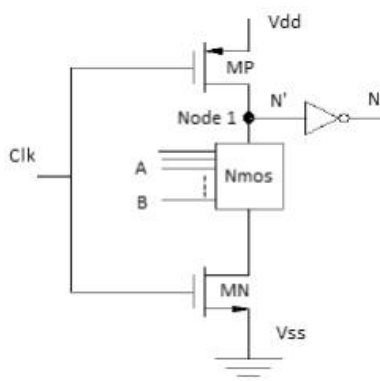


Fig.1 Schematic of domino logic circuits

The domino logic circuit has two phases one is precharge phase and the other is evaluation phase. In precharge phase, when clk is zero, the  $M_p$  transistor is ON, The node 1 which is said to be as dynamic node precharges to Vdd, The output

is set to Vdd irrespective of A and B values. During evaluation phase, when the Clk is high the output of the circuits depend on A and B values. When A and B values are set to high, then node 1 discharges to ground and the output of the circuit is high. If the values of A and B are set to low then the node 1 value should be high so the output of the circuit is low. In dynamic logic circuits, the node 1 charge is leaked due to charge redistribution, charge sharing problems and charge leakage [6]. So to avoid this problem, domino logic is used to serve the purpose.

Various CMOS logic gates has been proposed by using domino logic circuit and the performance is analyzed and compared with static CMOS technology in terms of power consumption and time delay [5]. To improve the performance high speed domino logic has been proposed and compared with various domino logic circuits and the performance I evaluated in terms of power dissipation, time delay , delay product by using different nano scaling technologies ranging from 180nm – 500nm [6]. Similar work has been proposed by [7] where the performance of the domino AND gate and static CMOS AND gate by using 90nm and 65nm nano scaling technologies are evaluated and compared. So, this paper focus on designing domino logic AND gate and Static CMOS AND gate by using 45nm and 32nm nano scaling technologies and the performance is evaluated and compared with the conventional technologies.

The rest of the paper as follows: CMOS AND gate and domino logic AND gate is summarized in section 2. Proposed CMOS AND gate and domino logic AND gate with micro and nano scaling technologies is discussed in section 3. The results and observation are illustrated in Section 4 and finally conclusion along with future scope is summarized

## II. CMOS AND GATE

The CMOS AND gate is build by using NAND gate and a NOT gate as shown in Fig. 2 The left part of schematic is representing NAND gate and right side an inverter. They are



# Highly Stable and Accessing Power Efficient One-Sided 7 Transistor (OS7T) Static Random Access (SRAM) Cache Memory

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**Abstract**— This article demonstrates a highly stable One-Sided 7T (OS7T) cache memory. Using Monte-Carlo simulations critical design metrics of proposed OS 7T Static RAM Bit-Cell (cache memory) are estimated and the estimated results are used to find the similarities with that of conventional (CON6T), conventional (CON7T), and conventional (CON8T) SRAM cell. The proposed OS7T Static RAM (Cache memory) achieves RSNM of 75mv, where as the conventional 6T/7T methods achieve 45mv, and it can be stated as improvement of 1.7 times compared to the conventional method of 6T/7T and same as CON8T . The WSNM of proposed 7T SRAM (cache memory) is of 34mv, where as the con6T, con7T have 18mv and con8T has 23mv.

**Keywords**—CMOS; Hold Power; Read Delay; Write Delay; Read SNM; Write SNM; Write Power.

## I. INTRODUCTION

With the contemporary submicron technologies it has been understood that power has been a major issue in soc designs. Thus controlling power and addressing the power dissipation plays a very major role. It has been seen that for the technologies below 180 nm, leakage is the main factor which dominates over the dynamic power and it's been responsible for power dissipation of almost nearly 50%.

Lowering the energy usage has become one of the main concerns while designing the circuits as most of the system on chip (SOC) applications is of battery powered. Hence, it's our main goal of designing is to reduce the power usage. Typically the total power of soc's has been dominated by the Static RAM. So one of the most desired methods for minimizing the power usage and for extending the lifetime of battery is to lower the voltage supply (VDD) for Static RAM [1]. And it has been noted that designing a high density Static RAM with a low VDD is a very challenging for few causes.

The 6T SRAM (Fig. 1) below 100nm technologies and in subthreshold region, faces many challenges in designing like, at low VDD (power supply) the CONV6T (conventional 6T) SRAM shows a very poor stability during read operation. Hence the flipping of data stored in the cell happens because of poor stability during read operation. During the process of parameters variation in submicrometer technology, CON6T Static RAM Bit-Cell also needs to face a maximum value of variability and has less reliability. Hence in order to improve this read SNM, many SRAM's with additional MOSFET's for extra support have been designed. And we can categorize

them as two different types:-1) Differential SRAM Bit-Cells  
2) One-Sided SRAM Bit- Cells.

When comparing both differential SRAM and One-sided SRAM it's observed that differential SRAM Bit-Cell is stronger and vigorous than One-Sided SRAM. So in order to maintain the One-Sided SRAM Bit-Cell reliable, it requires few additional compensation methods (or) techniques. In a One-Sided Static RAM Bit-Cell, Bit-Line leakage is data dependent, because the entire Bit-Line leakage depends basically on the data stored by the Bit-Cell on the column being approached. Hence a change in the Bit-Line leakage happens from one cell column to other and due to which read access duration time and write access duration time are highly distributed. Moreover, the major problem of One-Sided (OS) while performing the read operation is Sense Margin problem [2].

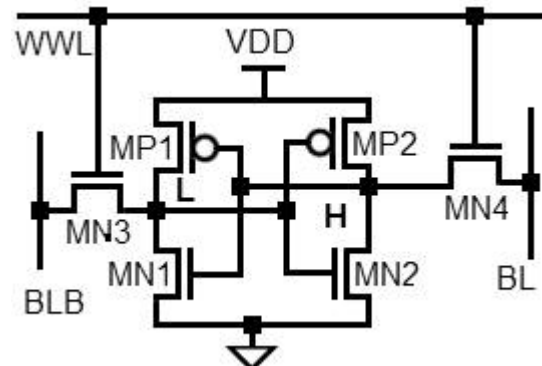


Fig.1. Conventional 6T (CONV 6T) Static RAM Bit-Cell.

The conventional 7T Static RAM (Fig. 2) design is a single ended Static RAM with a (Read Bit-line) RBL, (Write Bit-line) WBL, a (Write Word line) WWL, along with a read word line (RWL). Here transistor MP3 act as a source feedback in order to weaken the pull up path during the write operation is happening. We use MP4 as a read access transistor as PMOSFET is the one which has lots of immunity towards soft error. Moreover it been observed that PMOSFET has less effect because of velocity saturation. It also has a read access transistor (MN4), which is used as the same for the whole or whole row. Rest of MOSFET's construct the basic 6T SRAM Bit-Cell [3]. This overcomes the radical fall in RSNM (Read Static Noise Margin) because of voltage division between access FET's and PDN (pull down transistor). Even the maximum stability is achieved



# Characterization of single-ended 9T SRAM cell

Chandramauleshwar Roy<sup>1</sup> · Aminul Islam<sup>2</sup>

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## Abstract

We present a circuit-level technique of designing a lower write-power along with variability-resistant 9-MOFTET static random-access memory cell. Our proposed bitcell exhibits lower write-power consumption owing to reduction of activity factor and breakup of feedback path between the cross-coupled inverters during write operation. It exhibits higher read static noise margin (by  $3.09 \times$ ) compared with standard 6T SRAM cell @ minimum-area. LP9T shows higher static margin for write operation (by 41%) compared with 8T (S6T) @ iso-area (minimum-area). These improvements are achieved due to breakup of feedback path during the process of writing a bit on to the storage node. The paper investigates in detail the influence of variation in process related parameters, environmental parameters such as supply voltage and temperature on most of the important design parameters of the bitcell and compares the obtained simulation results with conventional 6-MOSFET (6T) and 8-MOSFET (8T) bitcells. It demonstrates its invariableness by showing  $1.5 \times$  tighter disperse in read time variability with a cost of  $1.41 \times$  higher read time compared with S6T @ minimum-area. It also exhibits 39% narrower disperse in read time variability in comparison to 8T @ iso-area. It draws lower power ( $2.06 \times$ ) from supply voltage while flipping of stored data during write mode compared with standard 8T SRAM cell @ iso-area. It also compares key design metrics of LP9T with those of few other 9T SRAM cells found in the literature. This work also realizes the proposed design using CNFET. The CNFET-based design outperforms its CMOS counterpart in all respect.

## 1 Introduction

Static random-access memory (SRAM) consumers a vast area of a state-of-the-art microprocessor ( $\mu$ P). In  $\mu$ P SRAM bitcell is used to make level-1 (L1), level-2 (L2) and level-3 (L3) caches. Future (SoC) that is system-on-chip and (NoC) that is network-on-chip will embed even bigger sized caches (i.e., L1, L2, L3) for bridging the gap between DRAM speed and the processor speed. The ITRS predicts, that the 90% of processor area will be occupied by cache memory in near future (Semiconductor Industry Association (SIA) 2013).

Dynamic or switching power ( $P_{DYN}$ ) dissipation in SRAM is the charging/discharging power of bitlines and power consumed by the peripheral circuits such as decoder and sense amplifier.  $P_{DYN}$  owing to discharging/charging of bitlines accounts for 60% of the total  $P_{DYN}$  because always at least one bitline discharges almost fully per write operation (Yang and Kim 2005). Yang and Kim (2005), Yoshimoto (1983), Mai (1998), Hattori and Sakurai (2004) and Karandikar and Parhi (1998) reduced dynamic power dissipation mainly by decreasing capacitances and voltage swing. Islam and Hasan (2012a), reduce leakage power dissipation with the use of stack effect, but dynamic power such as write power has not been considered.

A 5-MOSFET SRAM bitcell proposed by Nalam and Calhoun (2009) is single-ended one and seems to be very good because of smaller device count, but it shows writing “1” difficulties without write-assist method. Singh et al. (2008) proposed single-ended 6-MOSFET SRAM bitcell, which suffered from longer write time. Singh et al. (2008) proposed low-power 6-MOSFET SRAM bitcell (Mizuno and Nagano 1996) could decrease access time and write-power. However, it could not improve read static noise margin.

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# An End-to-End Secure and Energy-Aware Routing Mechanism for IoT-Based Modern Health Care System



R. Nidhya, S. Karthik and G. Smilarubavathy

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**Abstract** Recent developments in information and communication technologies have grown to the emergence of Internet of Technology (IoT). The IoT permits the healthcare observing environment in the embedded devices which brings the convenience to patient and doctors, since the physical presence of the both is not required in health monitoring. This new technology can be applied in different areas such as real-time patient health monitoring, patient information maintenance, remote healthcare management. This new technology development in the applications of health care without examining security and energy consumption makes patient privacy as vulnerable, and they are also vulnerable to environment and operational damages. The existing systems are not guaranteed to end-to-end security and energy-aware routing mechanisms together for IoT-based healthcare applications. In this paper, we are proposing a novel secure and end-to-end energy-aware routing architecture

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# Body Area Network Challenges and Solutions

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# Security and Privacy Issues in Remote Healthcare Systems Using Wireless Body Area Networks



R. Nidhya and S. Karthik

## 1 Introduction

The wireless body area network (WBAN) is a subset of WBSN that consists of a set of sensors placed on or implanted on a person with a base station. The huge availability of pervasive smart wearable medical devices such as smart medical sensors and the usage of medical management software brought the new paradigm of healthcare data collection to the forefront. During medical process heterogeneous data are continuously sensed from human body using sensor devices. The data sensed by sensor devices are confidential and also sensitive in nature. These data should be accessed by only authorized users such as doctors or nurses for treatment decision-making.

To protect individual privacy, already there has been a set of regulations and standards proposed. The first one is HIPAA of 1996 (Health Insurance Portability and Accountability Act) which provides data privacy for personal healthcare data, followed by the European Information Protection Directive 95/46/EC, the Sarbanes-Oxley Act, the Gramm–Leach–Bliley Act (GLBA), and the EU’s Safe Harbour Law [1]. These are some of laws which emphasize strict security measures over the sharing and exchanging health data. If providers fail to meet the security measures, then severe penalties are imposed on them.

The electronic healthcare systems (EHCRs) rules have been categorized into different systems. One among them is a security critical system [2]. These systems are differentiated with other systems based on their various important aspects. The major

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# Query-Based Word Spotting in Handwritten Documents Using HMM



V. C. Bharathi, K. Veningston and P. V. Venkateswara Rao

**Abstract** The retrieval of keywords from handwritten documents is tasked between one or more query word in a database. The works involves segment the individual words from the document images and formation of an index to all words, it uses search mechanism to access the query word from the scanned documents. However, unconstrained handwritten document realization remains a challenging problem with inadequate work to providing robust research experience in handwritten document. The proposed work characterizes to focus on keyword retrieval. The input word images are  $2 \times 2$  block, each partition region again sub-block into  $4 \times 4$ ,  $5 \times 5$  and  $6 \times 6$ . In each sub-block, calculate average intensity of pixels and find the maximum average intensity value in horizontal and vertical direction. Thereby 32, 40 and 48 dimensional features are extracted from different sub-block and extracted MAIV features are fed to HMM to construct the models and validation of handwritten keywords. The query words are recognized using the Euclidean distance of the keyword and search keyword word acquire from the index position to retrieve the appropriate words from the document. The performance measure such as precision, recall and F-measure is calculated for keywords in different sub-block from different own handwritten dataset.

**Keywords** Handwritten word retrieval • Word spotting • Segmentation • Maximum average intensity vector (MAIV) • Hidden Markov models

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# Computational Vision and Bio-Inspired Computing

ICCVBIC 2019



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# WOAMSA: Whale Optimization Algorithm for Multiple Sequence Alignment of Protein Sequence

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**Abstract.** In the past few years, the Multiple Sequence Alignment (MSA) related problems has gained wide attractions of scientists and biologists as it is one of the major tools to find the structural and behavioral nature of Biomolecules. Furthermore, MSA can also be utilized for gene regulation networks, protein structure prediction, homology searches, genomic annotation or functional genomics. In this paper, we propose a new nature and bio-inspired algorithm, known as the Whale Optimization Algorithm for MSA (WOAMSA). The algorithm works on the principle of bubble-net hunting nature of the whale with the help of objective function we tried to solve the MSA problems of protein sequences. In order to focus on the effectiveness of the presented approach, we used BALiBASE benchmarks dataset. At the last, we have compared the obtained result for WOAMSA with other standard methods mentioned in the literature. After comparison, it was concluded that the presented approach is better (in terms of obtained scores) when compared with other methods available in the considered datasets.

**Keywords:** Proteins · Bioinformatics · Whale Optimization Algorithm · Multiple Sequence Alignment

## 1 Introduction

Alignment of multiple sequence or Multiple Sequence Alignment (MSA) [1] is the alignment of three or more amino/nucleotide acid. Generally, MSA is a method used to determine homology among the given pair of sequences. The most studied branches in bioinformatics, is the sequence similarity. The currently available molecular data is capable enough to teach us about evolution, structure and functions of molecules or biomolecules in the related domains. The motive to study or research on MSA is to have better aligned sequences which are capable of finding biological relationship between related sequences. But, developing optimal MSA is not at all easy. Let us take an example: Here, we will consider large number of sequences ( $N$ ) as input for MSA with a defined scoring meter for creating an optimal MSA. Although, a very simple requirement is mentioned here for developing a MSA. MSA may require the criteria for input selection along with the comparison model to evaluate the obtained alignment.

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Proceedings of ETES 2018

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# Application of Particle Swarm Optimization in Design of a Low-Profile Fractal Patch Antenna



Ankan Bhattacharya, Arnab De, Arindam Biswas, **Bappaditya Roy** and Anup K. Bhattacharjee

**Abstract** In this paper, a novel approach in Microstrip Patch Antenna analysis and design has been introduced. Here, a low-profile fractal microstrip antenna has been presented. ‘Sierpinski Triangular’ fractal geometry has been applied in the designing the antenna. Evolutionary Particle Swarm Optimization technique has been utilized for optimizing the design parameters. Triangular slots have been etched in the ground plane, repeated in the subsequent iterative stages. An inverted triangular patch has been placed on top of almost 1.00 mm thick Roger 4350 substrate having an electrical permittivity of 3.48 and loss tangent of 0.004. The antenna resonating frequency is 3.5 GHz with an impedance bandwidth of 700 MHz. The antenna finds its application in 3.5 GHz WiMAX band with a maximum gain of 3.34 dBi and return loss factor of 24 dB at the resonant frequency, which is reasonably better than conventional microstrip patches.

**Keywords** Compact microstrip patch antenna · Fractal geometry  
Particle swarm optimization

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# Coaxial Probe-Fed Slotted Antenna with Defected Ground Structure for Multi-band Applications



Arnab De, Mamoni Saha, Ankan Bhattacharya, Arindam Biswas, **Bappaditya Roy** and Anup K. Bhattacharjee

**Abstract** This paper describes a coaxial probe-fed slotted antenna with Defected Ground Structures (DGS) which can be tuned to resonate at our desired frequency bands by changing the position of DGS and width of the slots in the ground plane. The proposed antenna can be made to work in the WLAN (2.4/5.2/5.8 GHz) band and WiMAX applications. In this paper, we have tried to reflect a detailed study of the slots in the ground plane and its effect on the antenna parameters such as gain, polarization, return loss, radiation pattern, etc. The proposed antenna produced a multi-band application providing return loss of 11.81 dB at 1.69 GHz, 18.81 dB at 2.5 GHz, 19.59 dB at 2.89 GHz, 22.98 dB at 4.81 GHz, 19.80 dB at 5.80 GHz and 12.70 dB at 6.17 GHz by using FR-4 Epoxy substrate with dielectric constant ( $\epsilon_r$ ) of 4.4 and a substrate height (h) of 1.60 mm.

**Keywords** Slot antennas · DGS · WLAN

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Elijah Blessing Rajsingh  
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# Advances in Big Data and Cloud Computing

Elijah Blessing Rajsingh  
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# Advances in Big Data and Cloud Computing

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# Design of Smart Traffic Signal System Using Internet of Things and Genetic Algorithm



**P. Kuppusamy, P. Kamarajapandian, M. S. Sabari and J. Nithya**

**Abstract** The revolution of Internet of Things facilitates innumerable dimensionalities over industrial, home, and business uses. The amalgamation of sensors and manhandling devices with existing infrastructure makes the process proficient and reduces the manpower processing time. The novel smart traffic signal system is proposed using smart server with cloud-oriented infrastructure to improve the signal processing time in road intersection traffic signal post that reduces the waiting time, jamming, and contamination. This proposed approach also observes the vehicle mobility to change the signal for providing the way and also used to track vehicles. This tracking process would be utilized to find vehicles that are involved in illegal transportation and accident due to high speed. Genetic algorithm is proposed to observe multi-location data and analyze single-point well-designed decision using vehicles queue at four-direction roadway signal intersection. The experiments have been demonstrated with Arduino Uno kit and evaluated the smart traffic signal system by comparing with normal traffic system. The results show that proposed system facilitates hassle-free travel by decreasing the waiting time for the green signal and accidents.

**Keywords** Internet of Things · Traffic · Sensors · Cloud · Roadway Vehicles

## 1 Introduction

Rapid progress of Information and Communications Technology (ICT) is performing major role in people's lifestyle. Many people are utilizing the smart objects like smartphone, laptop that gather, process, share, analyze, and store the data with

---

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# Parallelization and Performance Evaluation of Method of Moment (MoM) Dense Matrix Direct Solution on Cray XC40 –Supercomputer (SAHASRAT)

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**Abstract**— The objective of this paper is to evaluate and analyze the performance of a suite of in-house developed parallel Integral Equation solvers using Method of Moments on a massively parallel-processing supercomputer system Cray XC40 named as SAHASRAT. The developed solvers can be used to accurately analyze composite structures, Radar Cross Section computation and antenna parameters for electrically large radar targets. With this methodology, large problems that were impossible to solve on a single-processor platform can be solved in a reasonable time on shared and distributed memory machines consisting of several thousands of cores. The size of the problem that can be extended to be as large as the amount of main memory on the available platform. In order to fill and perform dense linear algebra computations on the matrix, Message Passing Interface (MPI) with the state-of-the-art numerical library ScaLAPACK is used.

**Keywords**—parallel computing, Integral Equation, Method of Moments, Radar Cross Section, Speed-up, Efficiency

## I. INTRODUCTION

Integral Equation (IE) with Method of Moments (MoM) is an extremely powerful and versatile general numerical technique for solving scattering and radiation problems. However, IE formulations inherently lead to dense systems of equations and therefore computationally expensive in terms of system memory and processor time [1]. In case of IE based solver, the number of unknowns grows linearly with the size of the scatterer and quadratically with the frequency [2-3]. In spite of these complexities direct solvers are very good for small to moderate sized problems and particularly for multiple excitations, i.e. when monostatic radar cross section at multiple look angles are computed [4]. In the past the scattering and radiation problems were addressed by high frequency methods [5] or by hybridizing MoM with high frequency and iterative methods [6-7]. In this context parallel computing has become inevitable to solve the real world problems. Although, the full dense matrix solved in parallel environment using in-core and out-of-core solvers [8], does not reduce memory and time complexity. To overcome the bottleneck of memory and solution time, more recently, fast algorithms such as Adaptive Integral Method (AIM) [9], Fast Multipole Method (FMM) [10] and Adaptive Cross Approximation (ACA) [11] with their multilevel as well their parallel versions [12-13], Characteristic Basis Function Method (CBFM) [21], and fast

direct solvers [14-15] are developed and used. Fast solvers are based on robust iterative methods, a fast algorithm for computing matrix-vector products, and an efficient preconditioner to speed-up the convergence [3]. Ying Yan et. al presented a parallel in-core dense MoM solver using higher-order polynomial basis functions (HOBs) which reduced the number of unknowns, and hence computed 4.2 times faster than Rao-Wilton-Glisson (RWG) based parallel FMM method [16]. Yu Zhang et. al emphasized that, in spite of the fact that a Fast Multipole Method (FMM) might be an effective code, at times the dense-matrix formulation from the numerically exact MoM technique is still vital for a complex geometry, or where FMM option is not accessible. For antenna radiation problems where input impedances are desired or currents are of more interest than the fields, MoM solution is the preferred method over FMM [8].

Moreover, full-matrix inversion sometimes is essential, when tolerance on accuracy cannot be compromised. Also, the abundance and rapid growth of resources at current times, in terms of memory and computing power, renders full matrix solution a justifiable and sometimes judicious option as there will be an advantage of no loss in accuracy.

The objective of this paper is to evaluate and analyse the performance of in-house developed parallel EM direct and iterative solvers for Radar Cross Section (RCS) computation and antenna parameters for electrically large radar targets, using RWG, Schaubert-Wilton-Glisson (SWG) as well their hybridization and pulse basis and point matching based VIE solvers. These parallel solvers can be used to accurately analyse composite structures. With this methodology, large problems that were impossible to solve on a single-processor platform can be solved in reasonable time on shared and distributed memory machines consisting of several thousands of cores. The size of a MoM problem, that can be extended as large as the amount of RAM memory on the platform available. In order to fill and perform dense linear algebra calculations on the MoM matrix, Message Passing Interface (MPI) [17] with the state-of-the-art numerical library ScaLAPACK [18-19] is used. ScaLAPACK is well known for efficient and highly accurate computation, being scalable and portable across platforms. The performance of the parallel codes are presented in terms of speedup and efficiency.

# Numerical Simulation of Wave Propagation and Scattering in an Inhomogeneous Medium

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**Abstract**— In this paper, a rigorous numerical technique of atmospheric wave propagation and scattering from an inhomogeneous medium is considered and simulated using Integral Equation in conjunction with Method of Moments. The inhomogeneous medium is the result of flow over an aircraft, which calls for the numerical solution of multiphysics and multiscale problem governed by Euler equations describing the acoustics/fluid-dynamics and Maxwell's equations for electromagnetic wave propagation. An important relation between flow inhomogeneities and the direction of incident electromagnetic field is presented by solving numerically the Volume-Surface Integral Equation and spatio-temporal scattering is discussed. The method presented here can also be easily adapted to many important problems in electromagnetics and scattering from large complex shaped inhomogeneous bodies such as biological systems.

**Keywords**— Wave Propagation and Scattering, Euler and Maxwell's equations, Integral Equation (IE), Method of Moments (MoM), Radar Cross Section (RCS).

## I. INTRODUCTION

The scattering and propagation of electromagnetic (EM) waves in induced inhomogeneous profiles is a topic of great research interest due to extensive real world applications. Such inhomogeneous profiles can be due to variations in acoustic or optical properties, concentration, temperature or other physical phenomena. Among them scattering of EM waves from acoustically or flow induced inhomogeneous media often referred as electro-acoustic scattering, has a rich history and vast application in science and engineering such as remote sensing, crystallography, photonics, acousto-optical devices [1-4] etc.

Scattering from fluctuations in the refractive index of the atmosphere has provided a very powerful tool in the application of radars to clear air turbulence investigations. It is clearly established and widely accepted that high powered, very sensitive microwave radars can detect echoes caused by backscattering from inhomogeneities of the refractive index in the atmosphere [5-6]. The backscattered power is related to the intensity of the fluctuations in the refractive index within a narrow range of turbulent eddy sizes centered at one-half the radar wavelength. This region is known as the inertial sub-range of the turbulence. The theory of scattering of electromagnetic waves from refractive index inhomogeneities has been developed by Tatarskii [7]. The key expression derived by Tatarskii relates the refractive structure constant  $C_n^2$ , which is a measure of variability of the refractive index to the radar reflectivity. For isotropic scattering, the expression for atmospheric reflectivity factor  $\eta$  is:

$$\eta = 0.38 C_n^2 \lambda_e^{1/3} \quad (1)$$

where  $\lambda_e$  is the radar wavelength. The scattered electric field generated at  $\vec{r}_1$  due to the dielectric constant variations  $\Delta\epsilon(\vec{r})$  is expressed by the volume integration of the electric field  $E(\vec{r})$  and  $\Delta\epsilon(\vec{r})$  in the scattering volume as [9-10]

$$\vec{E}_s(\vec{r}) = \frac{k_e^2}{2\pi} \int_V \Delta\epsilon(\vec{r}_1) \frac{e^{jk_e|\vec{r}-\vec{r}_1|}}{|\vec{r}-\vec{r}_1|} \vec{E}(\vec{r}_1) dv \quad (2)$$

where  $k_e$  is the wavenumber and  $\vec{E}(\vec{r}_1)$  incident electric field at  $\vec{r}_1$ . The backscattering of the EM from such inhomogeneities can be maximized if the acoustic wave satisfies the Bragg scattering condition.

$$\lambda_a = \frac{\lambda_e}{2} \quad (3)$$

In recent past, approximate models were proposed to analyze the scattering from this kind of inhomogeneities, experimental studies were also conducted, especially in the wake vortex community. In particular to radar simulation of wake vortex detection, since mid-90's a large number of numerical studies are carried out to support the development of wake vortex radars and reported by Marshall and Myers, Myers and Scales, Boluriaan and Morris, Shariff and Wray, Li et al., Vanhoenacker-Janvier et al. and Zhongxun Liu et al. [11-20] for various aircrafts and meteorological conditions. Previous numerical research on wake vortex RCS are primarily based on vortex models and Born approximation methods for computing the scattered field [21]. On the other hand, hardly any rigorous numerical method is developed, to our knowledge, to simulate the wave scattering and propagation from flow induced inhomogeneous media.

However, there is still a need to improve the accuracy and efficiency of flow induced scattering problem, which demands for a rigorous full wave solution method. Owing to huge disparity in electromagnetic and flow induced acoustic frequencies, a quasi-stationary approximation using an adiabatic approach enables electromagnetic propagation at different instants of acoustic-flow cycle to be posed as scattering problem of a frozen inhomogeneous media [2], which then can be effectively solved through integral equation using Method of Moments (MoM).

## II. MATHEMATICAL FORMULATION

### A. Flow - Equations

The Euler equations which represent conservation laws of mass, momentum and energy for compressible inviscid flows are [22]

$$\frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \vec{u}) = 0 \quad (2.1)$$

Advances in Intelligent Systems and Computing 1013

Suresh Chandra Satapathy

Vikrant Bhateja

Bao Le Nguyen

Nhu Gia Nguyen

Dac-Nhuong Le *Editors*

# Frontiers in Intelligent Computing: Theory and Applications

Proceedings of the 7th International  
Conference on FICTA (2018), Volume 1

 Springer

Suresh Chandra Satapathy · Vikrant Bhateja ·  
Bao Le Nguyen · Nhu Gia Nguyen ·  
Dac-Nhuong Le  
Editors

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# An Efficient Privacy-Preserving Search Technique for Encrypted Cloud Data

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**Abstract.** In the present scenario of data management and computing, private data has been widely outsourced into cloud storage for its ability to provide low-cost access and maintenance services offered by public clouds such as Windows Azure, Google cloud platform, Amazon S3, IBM Bluemix, and so on for flexibility and economic benefits as well. Therefore, sensitive data such as Email, medical records, and other critical data assets must be kept in an encrypted form in order to preserve privacy and integrity of data. The major challenge in keeping encrypted data in cloud is that the searching process would be more complex. The data owner normally does not want the cloud provider to understand and analyze what has been done by the data owner and data user on the encrypted data in cloud storage. However, data owner and data user want to perform some computations on encrypted data such as sorting of records, splitting, searching, and ranking. This paper proposes a technique to perform search over encrypted data. When comes to performing, searching, and ranking on encrypted data, an algorithm which is mathematically strong is essential and it must be performed by the cloud provider without privacy leak. As a huge number of data users and data owners are maintaining large collection of documents in the cloud, it is essential to support multiple keyword searches in encrypted cloud data in order to present relevant documents with maximum accuracy and privacy preservation. The proposed technique for searching over encrypted data domain allows data users to search and rank according to the input query with less complexity in computation.

**Keywords:** Cloud storage · Encrypted data · Privacy preservation · Searching · Ranking

## 1 Introduction

A cloud service is any service made available to data users on demand through the Internet from cloud providers. It is basically broken down into four major services which include software as a service, data as a service, platform as a service, and storage as a service.

In this paper, the internal details about storage as a service has been discussed. Typically data owner does not want to keep data in physical flash drives which is highly vulnerable toward loss and privacy leak. Indeed, data owner prefer virtually available cloud-based storage services for permanent and reliable storage. However, privacy, integrity, and data leak are the important threat to the data maintained in public cloud storage. Cloud storage provider is responsible to secure the corporate and

# *A Secure and Energy Efficient Resource Allocation Scheme for Wireless Body Area Network*

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**Abstract**— Wireless Body Area Network (WBAN) is one of the emerging technologies, which is used to provide healthcare service by monitoring the patient's body. The WBAN has the sensors that are installed in, on or around the body that intelligently and spontaneously sense the patient's health information from the human body and it is transmitted to the hospital to provide the medical service. The major problems in heterogeneous and energy constrained WBAN system is that need high efficient energy with inadequate battery in sensor, dynamic link and because of patient's health data is sensitive it is important to give security in WBAN. To evaluate the sensor state the time slots are allocated and for security to achieve computation securely signcryption Certificateless algorithm (SCA) is used, which use homomorphic property based on bilinear cryptosystem. The experimental result discuss about low computational cost, low energy efficiency.

**Keywords**— Energy efficiency; dynamic link; Signcryption Certificateless Algorithm; computational cost.

## I. INTRODUCTION

The population in the city increases, so the new digital technologies like smart transportation and healthcare services have been proposed to adopt in smart cities. But the main problem is that how to expand smart healthcare system in an efficient way. To gratify this Wireless Body area Network (WBAN) is the wireless technology which brings more attraction in healthcare application. The WBAN is deployed with implantable or wearable sensors which continuously monitor the various physiological data from the human body and it gives feedback to patients and care giver in real time. [1] [2] Compared to current monitoring system WBAN has the several advantages like independent location monitoring and mobility. Typically WBAN has multiple body sensors and single hub. A hub is the sink or gateway which collects patient's health data from sensors frequently it has resources like processing, energy and storage buffer. The health data of patient's are monitored during normal and emergency situations by the sensors in the body and that are transmitted to the hub through the wireless channel using Wi-Fi or Zigbee.

Due to the size of sensors are tiny and it has limited energy resources it is important to concentrate on energy efficiency. Not only had the distance made channel waning between sensors and hub also the body segments. The link quality changes due to changes in environment and body position, so dynamic link quality is important. Moreover it is significant to protect health information against false injection, forgery and eavesdropping. [3] To avoid this problem, it is significant to design an access control scheme and give security for the health information. The proposed security algorithm reduces consumption of energy and cost of computation, and also the key escrow problem can be solved using the certificateless cryptography in this protocol.

## II. RELATED WORK

In recent years the WBAN performance is improved with the dynamic link characteristics. Xio et al. illustrates that the transmission power is adjusted during RSSI (Received Signal Strength Indicator) mean value is down threshold [4]. Quiwader et al. discussed about the linear relationship among the RSSI and transmission power, they have various parameters according to the different postural positions [5]. Kim et al. discuss about that for targeting RSSI range the long term channel states were estimated and also to progress the reliability of link and energy efficiency a power level was modified [6]. He et al. to guarantee QoS requirement for data delivery the transmission power rate and rate were optimized [7]. Zhou et al. In WBAN he energy efficiency was enhanced by formulating the restrictions of resource allocation scheme for bit loss rate and throughput and also energy consumption also reduced by allocating transmission power and time slots [8]. Deepak et al. Depends on the acknowledgement policy for different communication states the size of packet is optimized to improve the energy efficiency [9]. Zhou et al. for cloud assisted WBANs introduce a privacy preserving scheme [10]. Liu et al. to design an anonymous authentication scheme the author proposed a certificateless signature the advantage of certificateless cryptography is that does not have key escrow problem [11]. Zhu et al. to prevent integrity and

Jiacun Wang  
G. Ram Mohana Reddy  
V. Kamakshi Prasad  
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# Soft Computing and Signal Processing

Proceedings of ICSCSP 2018, Volume 1

Jiacun Wang · G. Ram Mohana Reddy  
V. Kamakshi Prasad · V. Sivakumar Reddy  
Editors

# Soft Computing and Signal Processing

Proceedings of ICSCSP 2018, Volume 1

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# An End-to-End Secure and Energy-Aware Routing Mechanism for IoT-Based Modern Health Care System



R. Nidhya, S. Karthik and G. Smilarubavathy

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**Abstract** Recent developments in information and communication technologies have grown to the emergence of Internet of Technology (IoT). The IoT permits the healthcare observing environment in the embedded devices which brings the convenience to patient and doctors, since the physical presence of the both is not required in health monitoring. This new technology can be applied in different areas such as real-time patient health monitoring, patient information maintenance, remote healthcare management. This new technology development in the applications of health care without examining security and energy consumption makes patient privacy as vulnerable, and they are also vulnerable to environment and operational damages. The existing systems are not guaranteed to end-to-end security and energy-aware routing mechanisms together for IoT-based healthcare applications. In this paper, we are proposing a novel secure and end-to-end energy-aware routing architecture

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# Survey on Clustering Techniques

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**Abstract**—In this article, we present the comprehensive review of several existing clustering algorithms. Our preliminary focus is on the existing MST-based clustering techniques. Here, we describe the various methodologies developed to deal with the problems faced by MST-based clustering in case of complex data. Then, we pay the attention on providing a detailed study of the clustering algorithms developed using the Voronoi diagram. Next, we provide a tiny report on the algorithms developed to solve the random initialization problem of the  $K$ -means. Then, we present an extensive survey on density-based clustering techniques. Here, we describe the common problems and the existing solutions of density-based clustering methods. Finally, we furnish the intense information about number of grid-based clustering algorithms.

## I. INTRODUCTION

Now a days we are living in the world with full of data where people frequently encounter with huge amount of information. This information is represented as data that is useful for further analysis and management to know its internal structure. Data generally describes the characteristics and properties of a natural phenomenon that are useful for further analysis, reasoning and decision making. Data analysis plays an extremely vital role in understanding the information of various phenomena. When we have the large amount of information, it is very difficult to preprocess every piece of information as a single entity. Therefore, it is greatly convenient, if the similar objects are classified into certain number of groups. Clustering [2], a special kind of classification technique, is an efficient tool of data mining to categorize or organize the unstructured multivariate data into subsets and by so doing it discovers the underlying or hidden format of a particular given data and derive meaningful conclusions about the data. Generally classification systems are either supervised or unsupervised. Basically, clustering is an unsupervised learning approach which is also known as data segmentation and class discovery (within data mining and machine-learning community respectively). Supervised classification and unsupervised clustering methods differed as follows. In case of supervised classification, we have a collection of labeled objects. Our aim is to classify or label a newly arrived sample which is not yet labeled. Here, the given labeled samples are used to observe the characteristics of those data samples and using observed characteristics newly arrived

samples are labeled. But in unsupervised clustering, our aim is to combine the given collection of unlabeled observations or points into meaningful subsets called clusters based on some predefined similarity. [3], [4]. Unsupervised learning is very useful as it is likely to be much more common.

There is no unanimously or specific accepted definition for clustering, how a cluster is exactly constituted. As a result, different clustering techniques usually do not produce identical results for the same data [5]. Everitt et al. [4] stated that “formal definition of cluster is not only difficult but may even be misplaced”. Considering such behaviour, Everitt et al. further described a cluster as follows. “A cluster is a set of entities which are alike, and entities from different clusters are not alike”. Arabie et al. [6] defined the clustering as “Those methods concerned in some ways with the identification of homogeneous groups of objects”. According to [7], clusters are nothing but the “high-density regions” of some multidimensional space. The term “similarity” among the objects being clustered is the central to all of the goals of cluster analysis. A clustering technique groups the given objects if and only if the definition of similarity is supplied prior. The Clustering process can also be used for data reduction purpose as it is the simplified representation of the entire given data set to deal with less number of homogeneous groups instead of dealing with vast number of single objects [8]. The main tasks in the process of clustering are feature selection, proximity of similarity measure selection, clustering criterion, validation and interpretation of the results [9].

The taxonomy of all clustering approaches are as shown in figure 1. The clustering approaches are categorized according to the nature of data, criteria of the similarity measure, dimensionality and scalability issues. Based on these, we have four main types of algorithms. [10], namely, hierarchical [11], partitional [12], density-based [13] and grid-based [14]. The hierarchical clustering approaches, It is a recursive approach to form the clusters. Unlike hierarchical, in case of Partitional clustering approach, it forms the clusters simultaneously by partitioning the data samples and it don't reflect the hierarchical structure. The main scheme of density-based clustering is to gather the neighboring objects of the data based on density conditions. In case of grid-based approach, the region of the

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# Experimental investigations to reduce unwanted evaporative losses of drinking water from a clay pot

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# Experimental investigations to reduce unwanted evaporative losses of drinking water from a clay pot

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**Abstract.** Clay pots are being widely used in hot-arid/tropical regions for reducing the temperature of the drinking water and this is due to the evaporative heat losses from the clay pot surface. However, excessive water loss from the surface is inevitable as the clay pot is porous. In this paper, strategy to reduce such unwanted water loss has been presented. It has been observed that more than 50% of water loss can be reduced without compromising the cooling effect.

**Keywords.** Evaporative cooling, heat transfer through porous media, drinking water preservation, transport phenomena

## 1. Introduction

Clay pots are being widely used in hot-arid/tropical regions for reducing the temperature of the drinking water. Water in the clay pots gets cooled due to evaporative heat loss from the wall. Nevertheless, the drinking water loss is observed due to excessive evaporative losses that do not contribute to cooling. Hence, it is imperative to address this issue which is of great social importance. Further, very few studies have been reported in the past on the clay pot evaporative cooling. Probably it is due to the continuous modernization which attracted most of the researchers towards the artificial cooling systems.

Evaporative cooling is a natural phenomenon that ensures reduced entropy generation as compared to that in case of the artificial cooling systems. However, it can be coupled with the artificial cooling systems to enhance efficiency (Bartlett, 1996). Moreover, the temperature of water in the clay pots would be such that the drinking feels to be comfortable and satisfactory.

The evaporative heat loss from the pot surface results in water temperature reduction. In a related study, Aimiwu (1992) performed a study on the influence of convection currents around the pot neglecting the effects of gravity or temperature gradients on the evaporative cooling process of a clay pot and observed that the forced convection could significantly increase the cooling effect as it enhanced the evaporation rate. Further, the evaporative cooling process of clay pots was also found to be influenced by other factors such as humidity, pores' size, and the wall thickness. The effects of gravity (Tajer, 2011; Chauvet et al., 2009) and temperature gradients (Tajer, 2011; Huinink et al., 2002; Yiotis et al., 2004) on the evaporation through pores have been reported. However, these studies only reported on the microscopic effects of gravity and temperature gradients on the drying process

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# A hybrid multilevel inverter with reduced power electronic components with unipolar trapezoidal pulse width modulation

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**Abstract**—In this paper, a hybrid multilevel inverter is proposed with a minimum number of power electronics component for making the quality of output voltage waveform which is utilized for medium/high power application. The proposed multilevel inverter is the combination of a full bridge (H-bridge) and single phase reduced switch multilevel inverter. In this work, the full bridge inverter performs to increase the output voltage level is twice when compared with existing output voltage level. The reduced switch multilevel inverter has the switch and diode combination with separate DC source per basic unit. It can operate at both symmetric and asymmetric sequences, especially in the binary sequence. If the reduced switch multilevel inverter topology operates at the symmetric condition, the proposed topology will generate 11-level output voltage whereas the reduced switch topology operates in a binary sequence, the proposed topology will generate the 15-level output voltage. The % total harmonic distortion for 11-level and 15-level is 10.47% and 8.19%. Selected simulation results are shown in order to verify the operation of the proposed topology at both conditions.

**Keywords**—multilevel inverter; pulse width modulation; inverter; reduced switch; photovoltaic

## I. INTRODUCTION

Multilevel inverters (MLIs) have a rising and empowering innovation for power electronics. The three remarkable conventional topologies are Neutral Pointed Clamped Multilevel Inverter (NPCMLI), Flying Capacitor Multilevel Inverter (FCMLI) and Cascaded H-Bridge Multilevel Inverter (CHBMLI) which have been broadly investigated and utilized dominantly for medium/high power applications [1]. The cascaded multilevel inverter has designed with separate power sources, though the other conventional topologies have single power source. The single power sources topologies may require additional diodes, capacitors and more other components for achieving the desired output voltage waveform also its lacks in modularity. The voltage balancing problem occurs across the DC link capacitors in the NPCMLI and FCMLI [2]. The components count is the major issue in the conventional multilevel inverters. The number of components is directly proportional to the number of levels [3]. Nowadays many researches are targeting to develop the new topologies with reduced number of components and DC sources [4].

Many topologies have been reported so far to indicate the various advantages and disadvantages. The reduced switch topologies can be developed based on the following categories such as symmetric condition, asymmetric condition and hybrid condition [5]. But, still the new topologies are developing in this concept for various aspects for utilizing in different applications. Recently, modular multilevel inverters are introduced for high voltage dc transmission system [6-8]. But, the major drawback of these inverters has separate DC link voltage. To regulate and maintain the DC link voltage at same level is the challenging one. From the aforementioned topologies, the CHBMLI has pulled in more consideration because of its basic structure and separate power sources for each basic units. It has great potential to be utilized in the renewable energy application because each separate DC sources can be replaced by solar energy, wind energy and fuel cells. In renewable energy integration with power grid, the usage of MLIs has rapidly growing in last decades to achieve the reduced harmonic content and switching losses [9-11, 16]. Therefore, this work presents the new topology for making to utilize in the renewable power applications. The separate power sources in the proposed multilevel inverter can be replaced by the solar panels, wind energy or fuel cells. Pulse width modulation is the also the important one to reduce the harmonic contents and making the quality of output voltage waveforms. In the pulse width modulated output waveform is easily attenuated by the minimum size of passive filters to make the quality of output voltage waveform [12].

This paper deals with a new hybrid multilevel inverter utilizing minimum number of components for generating the quality of output voltage waveform. The proposed inverter is the combination of full bridge inverter and reduced switch multilevel inverter. Multicarrier pulse width modulation with unipolar trapezoidal reference is utilized for generating the switching pulses for making the desired output voltage level. The %THD is the most important factor while discussing in the multilevel inverter output voltage. In this work, the %THD is calculated in theoretical formula and it is compared with simulation results. The organization of the paper as follows: Section 2 deals with the existing multilevel inverter topology, section 3 deals with the proposed multilevel inverter topology with appropriate mathematical formulas for different

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# Numerical Analysis of Unsteady MHD Mixed Convection Flow in a Lid-Driven Square Cavity with Central Heating on Left Vertical Wall

K. Venkatadri, S. Gouse Mohiddin and M. Suryanarayana Reddy

**Abstract** The article presents a numerical study performed on analysis of unsteady magneto-convective heat transfer in a square enclosure with partial active wall. The thermally insulated top and bottom wall while the left vertical wall is heated at Centre the rest of the left vertical wall is adiabatic and right vertical wall maintained at a lower temperature  $T_c$ . MAC (Marker-and-Cell) method is used to solve numerically set of dimensionless governing partial differential equations. The effect of local heat source on left wall is evaluated. The influence of the governing of thermophysical parameters, namely Prandtl number, Rayleigh number ( $Ra$ ), Hartmann number ( $Ha$ ), Grashof number ( $Gr$ ) and Reynolds number ( $Re$ ), is obtained. The results of streamlines and temperature are presented graphically and discussed.

## Nomenclature

$Ha$  Hartmann number  
 $g$  Acceleration due to gravity,  $m\ s^{-2}$   
 $k$  Thermal conductivity,  $Wm^{-1}\ K^{-1}$   
 $H$  Height square cavity, m  
 $K$  Permeability,  $m^2$   
 $N$  Total number of nodes  
 $Nu$  Local Nusselt number  
 $Gr$  Grashof number  
 $T$  Temperature,  $K$   
 $u$   $x$  component of velocity,  $m\ s^{-1}$   
 $U$   $x$  component of dimensionless velocity  
 $U_0$   $x$  lid velocity,  $m\ s^{-1}$

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# Unsteady Mixed Convective Flow in a Porous Lid-Driven Cavity with Constant Heat Flux

B. Md. Hidayathulla Khan, V. Ramachandra Prasad  
and R. Bhuvana Vijaya

**Abstract** In this paper, we present the numerical analysis of mixed convection in a square cavity filled with porous medium. The left wall of the enclosure is kept at a constant heat flux, and the dimensionless governing equations are solved numerically with Marker and Cell (MAC) method. The numerical results are discussed graphically with the effect of Darcy number, Prandtl number, Rayleigh number, Grashof number, Reynolds number, temperature and streamlines.

## Nomenclature

$Da$  Darcy number  
 $g$  Acceleration due to gravity,  $\text{m s}^{-2}$   
 $k$  Thermal conductivity,  $\text{Wm}^{-1} \text{K}^{-1}$   
 $L$  Length of the square cavity, m  
 $K$  Permeability,  $\text{m}^2$   
 $N$  Total number of nodes  
 $Nu$  Local Nusselt number  
 $Gr$  Grashof number  
 $T$  Temperature, K  
 $U$   $x$  component of velocity,  $\text{m s}^{-1}$   
 $U$   $x$  component of dimensionless velocity  
 $U_0$   $x$  lid velocity,  $\text{m s}^{-1}$   
 $V$   $y$  component of dimensionless velocity  
 $X$  Dimensionless distance along  $x$ -coordinate  
 $Y$  Dimensionless distance along  $y$ -coordinate

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# Peristaltic Flow of a Bingham Fluid in Contact with a Jeffrey Fluid

R. Saravana, P. Hariprabakaran, R. Hemadri Reddy and S. Sreenadh

**Abstract** The article concerns the peristaltic transport of two-layered fluid, consisting of a Bingham fluid in the core region and a Jeffrey fluid in the peripheral region through a channel. The flow is analyzed in the wave of reference under the assumptions of long wavelength and low Reynolds number. The analytical expressions for stream function, pressure rise, and the frictional force per wavelength in both the regions are obtained. The effect of physical parameters namely yield stress, Jeffrey parameter associated with the flow are presented graphically. This model helps to understand the behavior of two immiscible physiological fluids in living structures and in modeling the biomechanical instruments.

## 1 Introduction

The mechanism of peristalsis takes place in the food bolus transport through esophagus, chyme movement in the gastrointestinal tract, lymph transport in the lymphatic vessels, urine transport from kidney to bladder through the ureter, and in the vasomotion of small blood vessels. In mechanical aspects, the peristaltic pumps are modeled to transport the corrosive liquids in nuclear industries and to filter blood in dialysis machine. A few investigations on the peristaltic flow of physiological

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## MHD peristaltic flow of a hyperbolic tangent fluid in a non-uniform channel with heat and mass transfer

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# MHD peristaltic flow of a hyperbolic tangent fluid in a non-uniform channel with heat and mass transfer

**R Saravana<sup>1</sup>, R Hemadri Reddy<sup>2</sup>, J Suresh Goud<sup>2</sup> and S Sreenadh<sup>3</sup>**

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**Abstract.** The influence of elastic wall properties on the peristaltic transport of a conducting hyperbolic tangent fluid in a non-uniform channel is investigated with heat and mass transfer. The flow is examined in a fixed frame of reference under the assumptions of long wavelength and low Reynolds number. The velocity slip, temperature and concentration jump boundary conditions are considered at the walls. The perturbation method of solution for stream function, velocity, temperature, concentration and the coefficient of heat transfer are obtained in terms of small Weissenberg number. The influence of several pertinent parameters on the flow are discussed by plotting graphs. The trapping phenomenon is also analysed. It is noticed that the size of the trapping bolus increases with increasing the power law index of hyperbolic tangent fluid.

## Nomenclature

$a$	wave amplitude (m)	$u, v$	Distribution of velocity in flow direction and perpendicular directions respectively (m/s)
$B_0$	magnetic field strength (T)	$We$	Weissenberg number
$C$	Dimensional concentration ( $\text{kg/m}^3$ )	$x, y$	Rectangular coordinates (m)
$\bar{C}$	Coefficient of viscous damping forces (Pa s/m)	<b>Greek symbols</b>	
$c$	constant wave speed (m/s)	$\rho$	Density of the fluid ( $\text{kg/m}^3$ )
$D$	coefficient of mass diffusion ( $\text{m}^2/\text{s}$ )	$\zeta$	Specific heat at constant volume (J/kg K)
$d$	half mean width of the symmetric channel (m)	$\lambda$	Wavelength (m)
$E_1$	membrane tension parameter	$\sigma$	Electrical conductivity of the fluid (A/V)
$E_2$	mass characterizing parameter	$\varepsilon$	Amplitude ratio
$E_3$	viscous damping parameter	$\delta$	Wave number
$Ec$	Eckert number	$\kappa$	Thermal conductivity (W/m K)



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## Peristaltic motion of a Bingham fluid in contact with a Newtonian fluid in a vertical channel

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# Peristaltic motion of a Bingham fluid in contact with a Newtonian fluid in a vertical channel

J Suresh Goud<sup>1</sup>, R Hemadri Reddy<sup>1</sup>, and R Saravana<sup>2</sup>

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**Abstract:** Peristaltic motion of a Bingham fluid in contact with a Newtonian fluid in a Vertical channel has been studied under long wavelength and low Reynolds number suspensions. The flow is investigated in a wave frame of reference moving with velocity of the wave. The solution is acquired for stream function, velocity field, friction force and the pressure rise in several sectors over one cycle of wavelength. The impacts of yield stress on the frame of interface are contemplated. It is discovered that the time-averaged flux against pressure rise is decreasing with an increase in the yield stress and viscosity ratio and it is also identified that the frictional force has unsimilar behavior with pressure rise

## 1. Introduction

The conversation peristalsis stems from the Grecian word peristalikos, which means fastening and compacting. It is utilized to describe a progressive wave of recession along a channel or tube whose cross-sectional range subsequently differs. In physiology, it has been observed to be engaged with numerous natural organs. Specifically, peristalsis might be a fundamental system for pee transport from kidney to bladder through the ureter, development of chyme in the gastrointestinal tract, transport of lymph in the lymphatic vessels and the vasomotion of little veins. In addition, peristaltic pumps are composed by engineers for directing destructive fluids without contact with the walls of the pumping apparatus. Applying a wave frame of reference, Jaffrin and Shapiro [1] made a point by point investigation on the peristaltic pumping of a viscous fluid under long wave length and low Reynolds number suppositions.

It is distinguished in some physiological frameworks, such as throat and ureter that the wall of the structure doing the pumping is normally covered with a fluid with various properties from those of the fluid being pumped. In order to have an understanding about the result of fluid covering on the motion, the single fluid analysis of peristaltic pumping is extended to two fluid analysis by including peripheral layer of distinct viscosity. This investigation was first done by Shukla et al. [2] for channel and axisymmetric geometries. For non-uniform axisymmetric tubes, Srivastava and Srivastava [3] made an important contribution in peristaltic pumping. Brasseur et al. [4] made a significant contribution on the peristaltic motion of two immiscible fluids in a channel using flexible walls and have demonstrated the deficiency of the examination specified above in the limit of vast peripheral layer thickness. This problem is solved for axisymmetric case by Ramachandra Rao and Usha et al.



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## Hall effects on peristaltic flow of couple stress fluid in a vertical asymmetric channel

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# Hall effects on peristaltic flow of couple stress fluid in a vertical asymmetric channel

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**Abstract:** The influence of Hall effect on peristaltic transport of a couple stress fluid in a vertical asymmetric channel is examined. The problem is solved under the assumptions of low Reynolds number and long wavelength. The velocity, temperature and concentration are obtained by using analytical solutions. Effect of Hall parameter, couple stress fluid parameter, Froude number, Hartmann number and the phase difference on the pumping characteristics, temperature and concentration are discussed graphically.

## 1. Introduction

The phenomenon of a peristaltic transport of fluid is appears in a number of physiological and engineering applications like movement of chyme in the gastrointestinal tract, urine transport from kidney to bladder, mixing and transporting the contents of the gastrointestinal passage, vasomotion of small blood vessels such as arterioles, movement of ovum in the female fallopian tube etc. Latham [1] and Shapiro et al. [2] were one of the first researchers on peristaltic flow movement. After that by using analytical, numerical and experimental methods, analysis of peristaltic flows of viscous fluids are studied. Later peristaltic flows effects on magneto hydrodynamic fluids are reviewed.

The effect of applied magnetic field and heat transfer in the peristaltic flows are also analyzed in view of MHD character of blood, magneto hydrodynamic power generators, method of hemodialysis, oxygenation and hyperthermia. A few of the researchers who further studied in this field are [3, 4, 8, 12]. Prabakaran et al. [5] Concentrated on the magneto hydrodynamic peristaltic transport of a Jeffrey fluid in a permeable channel with the impact of compliant walls, heat and mass transfer under the various assumptions of long wavelength and low Reynolds number. Saravana et al. [6] has made discussions on the heat and mass exchange on the unstable visco-versatile second order Rivlin-Erickson liquid past an infinite vertical plate in the presence of constant mass flux Vajravelu et al. [7] The impact of velocity slip, temperature and concentration conditions on the MHD peristaltic flow of a Carreau liquid in a non-uniform channel with warmth and mass exchange is explored. Hari Prabakaran et al. [10] The Peristaltic stream of a fourth grade liquid between two permeable walls with suction and infusion is examined. Saravana et al. [11] Concentrate the Peristaltic transport of MHD Jeffrey liquid in a non-uniform permeable channel with the impact of slip, divider properties and warmth exchange under the suspicions of long wavelength and low Reynolds number.

Stokes [14] presented the theory of couple stress fluids in which the size-dependent effect in the presence of couple stresses; body couples and non-symmetric stress tensor are found. Cowin [15], Beg et al. [16] and Ali et al. [17] stressed the importance of couple stress effects in studies related to



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## Aligned magnetic field effect on unsteady liquid film flow of Casson fluid over a stretching surface

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# Aligned magnetic field effect on unsteady liquid film flow of Casson fluid over a stretching surface

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**Abstract.** The heat and mass transfer in non-Newtonian fluids plays a major role in technology and in nature due to its stress relaxation, shear thinning and thickening properties. In this study, we investigated the heat and mass transfer in unsteady liquid film flow of Casson fluid in the presence of aligned magnetic field, thermophoresis and Brownian moment effects. The transformed governing boundary layer equations are solved numerically by employing shooting technique. Dual solutions are explored for Newtonian and non-Newtonian cases. The impact of pertinent parameters on the flow, thermal and concentration fields are discussed with the assistance of graphical illustrations. The reduced Nusselt number is reported and discussed through tabular results.

## 1. Introduction

Many researchers have enticed by the concept of heat and mass transfer as they have enormous applications in multiple disciplines such as taxonomy of moisture and temperature amidst, orchard of fruit trees and farming fields. It is well known that when heat and mass transfer occur simultaneously, complex conduct was noticed in the connections between the fluxes and the guiding potentials. It is also observed that the energy flux can be embellished by both concentration and temperature gradients.

Sulochana and Sandeep [1] discussed the dual solution of temperature and mass transfer in a nanofluid over horizontal and exponentially stretching/shrinking cylinders in the presence of shape of nanoparticles, viscous dissipation, suction/injection. By considering two different geometries, Sandeep and Gnaneswara Reddy [2] investigated the heat transfer in Cu-water nanofluid. Crane [3] investigated the closed form of exponential solution of two dimensional flow over a stretching plane. MHD flow past a stretching porous surface has been studied by Pop and Na [4]. Heat and mass transfer of MHD flow over a stretching sheet has been reported sby Liu [5]. Chiam [6] illustrated the MHD flow past a stretching surface in the presence of power law velocity. Later on, a note on MHD flow over a stretching sheet by taking an account of power-law fluid has been studied by Cortell [7]. Yi-wu [8] investigated the 1-D non-uniform flow. The steady nonlinear MHD flow and heat transfer past a stretching surface of variable temperature have been studied by Anjali Devi and Thiyagarajan [9]. MHD non-Darcy flow and energy transfer past a stretching sheet in presence of Ohmic dissipation and





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# Investigation of PLL Performance for Utility Connected Systems Under Abnormal Grid Conditions

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**Abstract**-The operation of grid side converters (GSC) is significant in its robust control design. Phase locked loop (PLL) algorithm is introduced to acquire synchronization and perfect operation of GSC. The control design depends on rapid and exact tracking of phase angle of grid voltage. The task of PLL is crucial condition, since grid connected system is to operate the power system under grid fault conditions. The main objective of the PLL is to extract positive and negative fundamental voltages in a precise manner during distorted grid conditions. In the past decades several PLL techniques have shown better results in their accuracy. This paper deals with investigations of different grid interactive PLL techniques in the unbalanced supply voltage conditions. Decoupled double synchronous reference frame (DDSRF) shows better and quicker performance than the other PLL techniques. The analysis of different PLL techniques is compared and the results are shown in Matlab\Simulink.

**Keywords** - PLL, grid synchronization, SRF, DDSRF

## I. INTRODUCTION

The power produced from solar and wind is injected into the grid through power electronic converter. Therefore, care should be taken in its control strategy in supplying pure active power into the grid, meanwhile grid standard codes and regulations to be maintained. One of the main aspect to consider in grid utility is synchronization with three phase voltages. Grid connected inverter, will lose its controllability under distorted operating conditions, that could destroy the power inverter. Further, GSC can connect with the grid at the common coupling. For the above reason, voltage unbalance vector should be properly designed with robust synchronizing method. PLL tracks regularly the phase angle and amplitude of grid voltage. Zero crossing detection (ZCD) [1] an oldest method detects at every half cycle of the voltage frequency, with its inaccuracy as its drawbacks. A common technique to find phase angle is  $\alpha\beta$  or dq transformation. In the past decades, SRF-PLL works well in ideal grid conditions, with its high bandwidth that can produce rapid response in its control design. In non ideal grid conditions,

bandwidth reduction of SRF- PLL reduces the speed accuracy. For single phase grid connected applications, PLL structures are discussed in detail in [2-5]. It examines various SRF-PLL techniques with its merits and demerits in it.

## II. CONVENTIONAL THREE PHASE PLL STRUCTURE

The basic structure of PLL is shown in Fig. 1 that includes phase detector, loop filter and voltage controlled oscillator. Phase detector produces phase difference between input and output signals of the phase detector. The loop filter attenuates the unwanted components. Commonly, this is done by a PI controller or low pass filter (LPF). Voltage controlled oscillator generates its output an AC signal.

From the Fig. 2 SRF-PLL states that three phase voltage is transformed to alpha-Beta transform by applying clarke transformation [6-8]. From alpha beta transform it is changed to dq- transform as dc quantities. From that PI controller performance can be further improved by preferring output of PI controller as  $\Delta\omega$ .

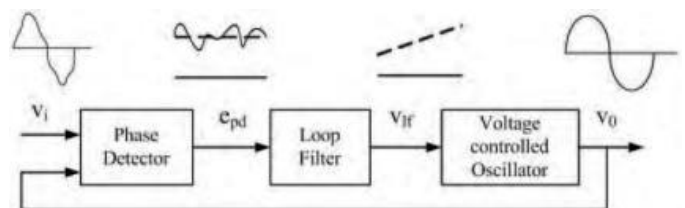


Fig. 1. General structure of PLL

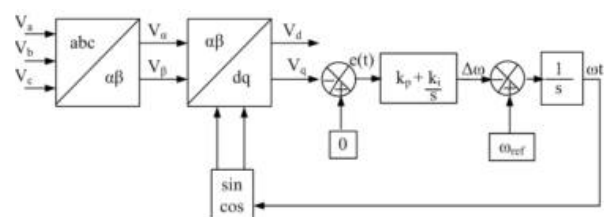


Fig. 2. Structure of SRF-PLL

# A Review on Low Voltage Ride Through Capability in Wind Turbines of India and Challenges in Implementation

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**Abstract**—The increase in penetration of wind power to grid has made Low Voltage Ride Through (LVRT) an imperative capability, to ensure grid security. Therefore, necessary grid code standards have been established in various countries to ensure operation of wind turbines during the fault conditions without tripping. The objective of this review is to comprehend these challenges in implementation of LVRT capability in India, in order to come up with appropriate solutions. The unforeseen difficulties in the implementation of the LVRT capability pertaining to the policy issues, stability analysis specific to the turbine type required, the additional cost incurred for LVRT augmentation techniques installed, the burden put forth on the manufacturers in terms of investments and the tedious LVRT testing process needed after installation are generally not focused. This paper tries to align the technical requirement and the real-time scenario, this knowledge is quite essential for the industries and academicians working towards renewable energy integration problems and solutions.

**Keywords**—Doubly-fed induction generator (DFIG), wind turbines, Squirrel cage induction generator (SCIG), Permanent magnet synchronous generator (PMSG), fault ride-through (FRT), low voltage ride through (LVRT).

## I. INTRODUCTION

The large wind power generation has led to demanding grid code requirements [1]. There are two important requirements in wind power: reactive power control during normal operating conditions and Low Voltage Ride Through (LVRT) capability requirements during fault conditions [2]. LVRT is an imperative capability for wind turbines to ensure its grid security [3]. The grid code for LVRT varies with each country based on the requirement of the 'Transmission System Operators' (TSOs) [4]. But the real-time challenges in actual implementation of solutions to achieve these grid codes in the wind turbines are often left unfocused [5]. The recent guidelines for mandatory LVRT capability requirement of wind turbines in India, to restore the endangering grid security have brought in several issues to be focused [6].

Therefore, the objective of this review is to comprehend these challenges in implementation of LVRT capability in India in order to come up with appropriate solutions [7]. The unforeseen difficulties in the implementation of the LVRT capability pertaining to the policy issues, stability analysis specific to the turbine type required, the additional cost incurred for LVRT augmentation techniques installed, the burden put forth on the manufacturers in terms of investments and the tedious LVRT testing process needed after installation are generally not focused [8]. Normally, the wind power plants are under private control of 'Independent Power Plant Operators' (IPPO), who may not be willing to invest more on the technical requirements beyond the scope of profit in terms of commercial benefits [9]. In such case, the investors and industries mostly try to identify ingenious ways to minimize the investment costs [10].

With such constraints, implementing the LVRT capability in wind turbines which are already installed and nearing the end of their life time becomes challenging [11]. Also, implementation of LVRT may not ensure profitability for the manufacturers and the implementation becomes challenging without the aid of subsidies [12]. Understanding the operation and need of LVRT requirement is necessary in establishing a co-operation among the system operators, IPPOs which includes the industries and the investors and the energy traders [13]. This is majorly dependent on the laws imposed on the power sector by the country.

This paper tries to align the technical requirement and the real-time scenario, which is quite essential for the industries and academicians working towards renewable energy integration problems and solutions [14]. Although several benefits are offered by installing retrofitting based solutions for LVRT capability in wind turbines like active crowbar [15], Fault Current Limiter (FCL) [16], Dynamic Voltage Restorer (DVR) [17], Static Compensator (STATCOM) [18], etc they are becoming unsuitable for installation due to economic and policy constraints [19]. This review is focused to understand the challenges and opportunities in

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**2015-2016**

# Design And Simulation Of Timer Core Using Spartan-3e

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**Abstract:** *Timer had been used in many applications. The timer that is implemented here demonstrates a two selecting inputs with three counters for selection purpose. A complete description of the timer is written in VHDL and synthesized using logic synthesis tool XILINX ISE 14.7 software. In this paper, the concept of timer is used to know the behavior of a simple AC motor. The hardware descriptive language used for the purpose of design of the timer is VHSIC Hardware Descriptive Language (VHDL) and is implemented on SPARTAN-3E xc3s1600e-4fgg484 FPGA board. Here proposed timer delay 6.46ns is reduced than 10.79ns of previous timers and output time after clock 4.283ns also reduced than 8.043ns of other timers.*

**Keywords:** Timer, FPGA, VHDL, ac motor.

## I. INTRODUCTION

Timer is used to indicate how many times someone has done something. Timer is a general and useful component. It is used to generate events at specific times. Timer measures the duration of specific events which are external to the processor. It is a programmable device. The general version of the timer is called a counter. It is used to count events in the form of pulsations just it counts the number of occurrences. Timers have two general functions. 1) Keeping time and/or calculating the amount of time between events. 2) Counting the events themselves. The time duration for which a timer has been set is termed the preset and is set in multiples of the time base used. Sometime bases are typically 10ms, 100ms, 1s, 10s and 100s. Thus a preset value of 5 with a time base of 100ms is a time of 500ms. In this paper using and implement our solution using Field-Programmable Gate Arrays (FPGAs), where FPGAs is an integrated circuit designed to be configured by a customer or a designer using.

## II. HARDWARE AND SOFTWARE REQUIREMENTS

A. *Hardware Requirements:*

The design of this project uses Spartan-3E. It consists of System gates - 50k, Equivalent logic gates – 1584, CLBs – 176, Slices – 704, Distributed RAM bits - 11k, Block RAM bits - 54k, Dedicated Multipliers – 3, DCMs – 2, Maximum user I/O – 108, Maximum differential I/O pairs – 50, Bit stream size - 427k, In-system flash bits - 1M. Combining FPGA and flash technology minimizes chip count, PCB traces and overall size while increasing system reliability. The Spartan-3E FPGA internal configuration interface is completely self-contained, increasing design security.



**Fig: 1. Spartan-3E kit**

B. *Software implementation:*

Software implementation of this work uses Xilinx ISE 14.7 software. For synthesis and analysis of HDL designs, Xilinx produced a software tool called Xilinx ISE (Integrated Synthesis Environment). It enables the developer to synthesize their designs, perform timing analysis, examine RTL diagrams, and configure the target device. Coding is done using

# Design and Analysis of Integer Divider Using Non Restoring Division Algorithm

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**ABSTRACT:** *Modern microprocessors require many clock cycles to perform the Arithmetic and Logic Unit (ALU) operations. The Arithmetic Logic Unit performs integer addition, subtraction, multiplication and division etc., Integer division is relatively more complex compared to other operations since it uses more clock cycles and logic circuit. The algorithm is based on the Digit recurrence non-restoring division algorithm. The available ALUs are designed using a combinational radix-2 integer division algorithm. The objective is to design for less structural hardware's to make faster ALUs. A detailed study is conducted for the use of sequential radix-2 integer division algorithm. The algorithm is designed to reduce area, power and delay. The simulation is carried out using Xilinx 14.7 ISE and divider is synthesized for target of Xilinx Spartan 3E kit.*

## I. INTRODUCTION

Integer division is the number crunching operation which takes division of two integer numbers yielding a remainder and quotient. Integer division is one of the basic arithmetic operations. Typically the ranges for latencies and throughputs in terms of clock cycles for addition and subtraction is 3 to 4 cycles, for multiplication operation is 2 to 8 cycles, for single precision floating point division is up to 16 cycles and for double precision floating point division is up to 60 cycles.

The available combinational implementation of the radix-2 [1, 2] non-restoring algorithm [1] yields as an array divider which seems to be more complex. Pipelining is possible to increase the throughput but the number of iterations is increased pipelining stages also increased which causes to be more complex. There are no registers to store the dividend and divisor values to perform the division operation.

In this paper, we proposed a Sequential implementation of the integer divider; it is based on the Radix-2 non-restoring division algorithm. The most available algorithms for integer division are digit recurrence division algorithms. The partial remainders can be represented by Signed Digit representation of radix-2 (SD2) [5]. The quotient bit can be directly obtained from sign of the partial remainders.

The digit recurrence algorithms are more convenient to produce constant quotient digits in the quotient digit selection function based on the choice of radix. Higher radices increase the latencies due to in this paper choice of radix is considered as 2.

In the first section objectives and definitions of the paper are described, in the second section hardware algorithm, its flowcharts and operations are presented, in the third section designing of the integer divider are presented.

## II. PRILIMINARIES

### A. Integer Division

In this paper integer division[1, 2, 4] is considered as follows, let dividend as X, divisor as Y( $\neq 0$ ) after performing the division operation the results treated as quotient as Z and remainder as R as n-bit two's complement binary numbers. Therefore  $X = Y \times Z + R$  and R has the same sign as X and there is another option to choose R has the same sign as Y which can be implemented more easily. Here  $X, Y \neq -2^{n-1}$ .

### B. Digit Recurrence Algorithm

Digit recurrence algorithms are the most commonly implemented division algorithms which can be implemented as more easily. It produces a fixed number of quotient digits per one iteration in quotient digit selection function. These are all based on the following equation called as standard digit recurrence equation.

$$P_{(j+1)} = R \quad P_j - D \quad q_{n-(j+1)}$$

The equation can be expressed as:

- $P_j$  is j-th the partial remainder.
- R is the Radix i.e., binary.
- $q_{n-(j+1)}$  is n-(j+1) th position of quotient bit, where the digit positions are numbered from 0 to n – 1.
- n is no of digits in the quotient.
- D is the divisor.

The below figure (1) shows the division data flow step of digit recurrence algorithm.



# Multi Precision Arithmetic Adders

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Abstract–Arithmetic adder is the most important basic element for many digital applications. In this paper different types of adders are taken for experimental study such as Ripple Carry Adder, Carry Save adder, Carry Look ahead adder, Carry Increment adder, Carry Select adder, and Carry Skip adder. Here in this paper introducing a novel technique for designing a new Carry Select adder for multi precision arithmetic circuits. By using this technique improvements has been achieved like low latency and less power consumption and along with less gate count. Experimentally synthesized and simulated by using Xilinx ISE14.7, also tested in SPARTAN3E, XC3S1600E with speed of -5.

Keywords– Index Terms: ASIC, DSP, RCA, CLA, CSKA, CSA, and CSLA.

## I. INTRODUCTION

Design of high speed digital circuits targeted to achieve in terms of throughput, latency and power efficient[1]. Arithmetic Logical Unit (ALU) is the main functional block in several areas like digital systems design, Digital Signal Processing (DSP), Data Processing units, Microprocessors, Micro controllers and cryptographic arithmetic applications and many more.

Researchers are concentrated to develop the faster adders [1,8] for improvement in the arithmetic processors. Addition and subtractions are the most basic elements in ALU. An adder circuit became significant hardware element for any operation like subtraction, multiplication and division including complements (1's and 2's)[18,33], encoding, decoding etc.

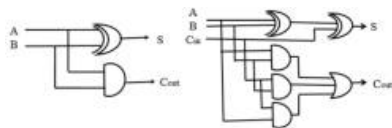


Figure 1: Half adder & Full adder

An addition operation is a process which can add two or more number resulting output is Sum and Carry out. Any research in combinational circuit starts with the basic building blocks such as half adder and Full adder. In adder circuit contains several logic gates like AND, OR, NAND,

NOR, XOR. The following diagrams of Half adder and full adder as shown in figure-1.

Half adder is one type of adder which is designed using two logic gates, namely AND and XOR. Full Adder is one type of adder which is designed using three logic gates, namely AND, OR and XOR, this circuit has 3 inputs, A, B, Cin [2,25,29,33,36]. The resultant outputs are Sum and Cout.

Table I: Gate count & Gate delay

comb circuit	Gate Delay	Gate Area
XOR	3	5
2:1 MUX	3	4
Half Adder	3	6
Full Adder	6	14

This paper is organised as follows: section II Discussion of different type of adders ranging from 8-bit to 1024-bit, in section III discussion of proposed carry select adder and in section IV discussion in performance analysis of different types of adders and proposed carry select adder.

## II. TYPES OF ADDERS

In this section different types of adders ranging from 8-bit to 1024-bits are discussing like Ripple Carry Adder, Carry Look ahead adder, Carry Save adder, Carry Skip adder, and Carry Select adder.

### A. Ripple Carry adder

Ripple Carry adders (RCAs) [1,7,24,26,30,33] are used to performs parallel addition. These RCAs are designed by cascading of full adders where these adders are connected in series. Each full adder having three inputs and producing two outputs such as sum and carry.

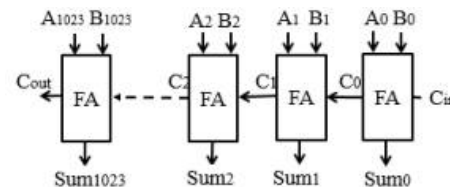


Figure 2: 1024-bit Ripple carry adder

# Performance Comparison of Network on Chip Methods

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**Abstract:** Network on chip is a new trend in multi-core applications. Typically multiprocessor requires several Intellectual property (IP) cores based on the application needs. When the number of processing elements (PEs) increases in the multi-core device then a couple of problems encountered like traffic congestion, deadlock, interconnection problems, area, power latency and so on. There are several types of Network on Chip (NoC) techniques are available to resolve the problems in Multi-core devices. Hence, this review paper interpreted the performance comparison of various metrics of NoC is presented.

**Keywords:** Network on chip, System on chip, Intellectual properties, Topologies, Routing Techniques and Multi-core processors.

## I. INTRODUCTION

In future, integrated circuit (IC) will contain a huge number of transistors along with the number of processing elements rapidly increases. According to the Moore's law for every eighteen months, the number of transistors becomes double, which will steer us to integrate a number of transistors and number of IP cores must be fabricated in a single chip[1], [2].

The statement of Moore's law is crossed by the transistors count in multiprocessors. Multiprocessor System on Chip (MPSoC) is normally designed by using predefined IP cores or processing elements (PEs) or macros, but few of the them need to be customized if it is not available in the predefined library. Processing element (PE) may be in the form of soft macro or hard macro, standard cell or functional block. MPSoC is a combination of both hardware and software components.

Normally, MPSoC carries a huge number of transistors, the number of IP (Intellectual Property) blocks or custom blocks are available. So, because of this huge density system performance may be degraded. Therefore, the objective is to design the product without degrading the performance, even after increasing the complexity or increasing the functionalities of the microchip. In this context, Network on chip technique is one of the best solutions to manipulate the complexity in MPSoC[1]–[4]. we would like to briefly discuss with the simple example how actual the problem faced in MPSoC.

For example, challenging application like fig-1 multimedia System on Chip (SoC) processor has a huge number of components and different processing elements [2],[5] which

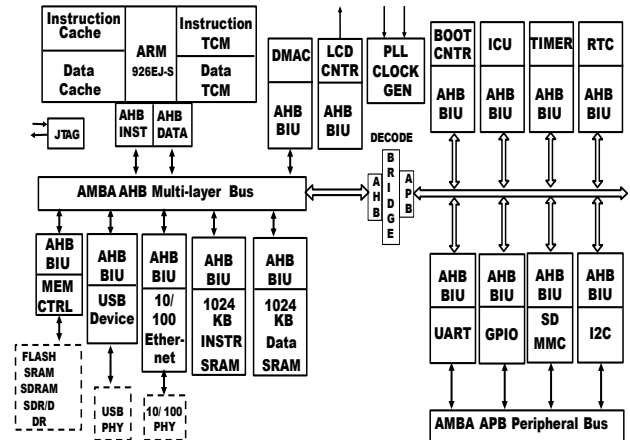


Figure 1: System on Chip multimedia processor

are available inside the chip. In this SoC device consists of heterogeneous IP components and are interconnected with some peripherals like memory blocks, DMA, PLL, TIMER, UART, INSTRUCTION CACHE, GPIO, and status signals etc.,[2],[6]. So, in order to maintain those many hardware components in a small chip, it becomes tedious by using bus-based approach.

To observe figure-1 is modelled like hierarchical heterogeneous bus-based with non-scalable point-point connection architecture. So, in this bus based approach only one master element and one slave element can become an active at a time among in all hardware elements, but there is no concurrent operation performed in these approach.

Therefore, the main intention of this review paper to know how to eliminate the complexity issues in MPSoC, how to achieve the quality of services, how to resolve the problems and finally how to meet the system performance in all aspects is important.

The rest of the paper organised as follows: in section-2 introducing the fundamentals of NoC Concepts, in section-3 Generic CAD tool flow for Network on Chip application, in section-4 brief overview of Global & local problems incurred in MPSoC, in section-5 comparison of NoC methods, in section-6 performance comparison of NoC methods, in section-7 related work, and in section-8 summary of conclusion.



# Survey on Edge Detection and Characterization of Tumor in MRI Images Using Xilinx System Generator

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**ABSTRACT-***The survey paper analyzes a generalized edge detection techniques used in magnetic resonance images for tumor characterization with implementation using Xilinx system generator (XSG) on FPGA. The HDL code for this process is too bulky and time consuming in Xilinx FPGA, So Xilinx system generator blocks are used to design the system. XSG tool is a high-level graphical interface under Matlab environment, it is very easy to handle simulink blocks to other hardware and software. In this paper various edge detection techniques for tumor characterization is analyzed using the Xilinx system generator tool.*

**KEYWORDS-**Matlab, Xilinx System Generator, FPGA, Sobel edge detection.

## 1.0 INTRODUCTION

Image processing plays an important role to obtain the quality images and to provide the image accuracy. For efficient image processing the poor image quality is an obstacle. MRI is the most indispensable tool which is used for analysis of different parts of human brain. The detailed information of the internal parts of the human brain can be given by MRI and it also detects the tumors present in the patient brain. Noise removal is done in the MRI (magnetic resonance imaging) medical images. Pixel by pixel processing of image and alteration of pixel neighborhoods and conversion can be applied to the entire image or only to a specified

image. The real time image processing is a time consuming process. Xilinx system generator leads to the implementation in hardware level, which decreases the processing time and offers parallelism. FPGA's are mostly used in current image processing applications like filtering of images [1,2], medical imaging[3,4], compression of images[5,6]. This paper analyzes architecture of edge detection using Xilinx system generator, it is an addition of simulink and contains "XILINX BLOCKS". For detecting brain tumor in advanced stages MRI is one of the best techniques which are currently being used. Due to complexity of tumor characterization in images and large variance diagnosis is a challenging task like shape, size, intensities and location.

## 1.1 MAGNETIC RESONANCE IMAGING (MRI)

For detection and visualization of internal structural information of the body in medical field MRI is generally used. Differences between the body tissues can be detected and it is an improved technique compared to the computed tomography [7]. This is a special technique which is mostly used for tumor detection in brain and cancer imaging [7]. For comparison of CT and MRI, MRI uses strong magnetic field to align the nuclear magnetization that follows by changing the alignment of the magnetization by radio frequencies which can be detected by scanner while CT uses radiating

# SEGMENTATION OF BRAIN TUMOUR AFFECTED CELLS USING SIMULINK MODEL

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## ABSTRACT

*This paper analysis brain tumor affected cells segmentation using simulink model for MRI (Magnetic Resonance Imaging) images. The proposed simulink model uses various edge detection operators for segmenting the affected cells. The statistical analysis of affected cells are also calculated and compared with the normal cells in the image. Edge detection forms a pre-processing stage to remove the redundant information from the input image, thus dramatically reducing the amount of data to be processed while at the same time preserving useful information about the boundaries. Here various edge detection techniques simulink models and the segmented output statistical analysis are discussed.*

## INTRODUCTION

To obtain the quality images and to provide the image accuracy Image processing plays an important role. Image processing is a type of signal processing in computer vision where the input is an image. Image processing output can be a image or parameters related to image. In segmentation image is subdivided into its constituent objects or regions. It partitions the digital image into multiple regions and extracting meaningful region known as ROI region of interest. ROI varies with applications. For multi-

domain simulation and model based design of dynamic system simulink is a platform. For modeling simulink is an interactive tool and is ideal for digital signal processing, control system design and communication system design simulation option [1][2]. In most of the image processing applications edge detection is a fundamental tool used to obtain frames information before extracting features and segmentation [3] of objects. Edge detection detects object outlines, boundaries and background in the image. The matrix area gradient operation is a basic edge detection operator which determines the variance levels between pixels. Sobel, Prewitt and Robert operators are the examples of gradient based edge detectors. EDGE DETECTION TECHNIQUES

The boundary between two homogeneous regions forms an image. The process of locating and identifying sharp discontinuities in image refers to edge detection. Edge detection detects the outlines and the background in image. Different types of edge detection operators are available each designed to be sensitive to certain types of edges. Many edge detection methods exist like Sobel [4][5][6], Prewitt [7], Robert. The amount of data in the image is significantly reduced during preservation of most important structural features of the image [8]. Blocks used for simulink implementation is shown in Table 1.



# TEACHING METHODS OF BRAILLE SCRIPT

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## ABSTRACT

Braille is a tactile learning system used by blind people and the people who are with low vision. It is traditionally written with embossed paper. The main objective of this paper is to survey on the existing methods of teaching Braille for first time learners and to propose a system which automates the teaching process by overcoming the drawbacks in the traditional methods.

The traditional method of teaching Braille script is quite simple using a wooden board with holes in it and marbles, but it has some potential drawbacks. In most of the cases the teacher will also be a blind person and it is quite difficult to handle the marbles. Various methods have been proposed to ease the process but all those methods need the help of teacher. Hence a system has to be implemented which doesn't need the help of a teacher. This can be possible by the voice output of the corresponding alphabet. This type of system can be implemented using a Raspberry Pi based hardware implementation.

Keywords: Braille script, Braille cell, Raspberry Pi, Raspberry Pi Simulink.

## 1. INTRODUCTION

Language is an important perspective which makes the human being different from all other species on the earth. It is the most basic path of communication for all of us to express our feelings, convey our messages. For any language script is considered as the main backbone as it preserves the language and gives space for its development. But what in the case of blinds. The Braille script is considered as a revolutionary development in the field of literature for the blind.

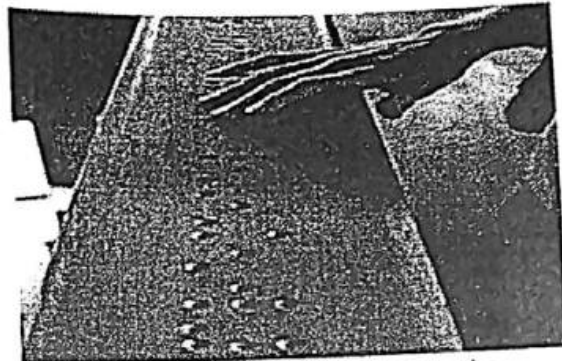


Fig:1 Initial stage of Braille Learning

The Braille system was invented by Louis Braille. In braille, an alphabet is made up by a combination of six dots. Each character in braille consists of one or more (to a maximum of six) raised dots. The position of the different dots represents the different letters of the alphabet. These dots are made by punching an awl-like tool on a type of thick paper.

## The Braille Alphabet

Grade 1 Braille is the most basic representation of letters, numbers and punctuation and is represented by the following dot combinations.

a<sup>1</sup> b<sup>2</sup> c<sup>3</sup> d<sup>4</sup> e<sup>5</sup> f<sup>6</sup> g<sup>7</sup> h<sup>8</sup>  
k<sup>9</sup> l<sup>10</sup> m<sup>11</sup> n<sup>12</sup> o<sup>13</sup> p<sup>14</sup> q<sup>15</sup> r<sup>16</sup>  
u<sup>17</sup> v<sup>18</sup> w<sup>19</sup> x<sup>20</sup> y<sup>21</sup> z<sup>22</sup>

By itself a braille letter is assumed to be in lower case. To show a uppercase letter, the capital sign is put in front of the braille letter.

a<sup>1</sup> A<sup>2</sup> b<sup>3</sup> B<sup>4</sup>

# A Roadmap to the Realization of Wireless Body Area Networks: A Review

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**Abstract**—Wireless Body Area Network (WBAN) is extremely useful emerging technology having enormous utilities and benefits in everyday life not only for health care but also for athletic guidance, public protection, and end user electronics. With the arrival of less power and inexpensive wireless connectivity innovations, Body area Networks could be implemented using available complementary technology. Noninvasive, miniature wearable sensors allow compilation of large amount of information mechanically, decreasing the cost and decreasing of regular visits to the doctor. In this paper, a comprehensive survey on the various aspects of the WBAN consisting of stand-alone sections on the standards for WBAN, Challenging issues of WBANs, key security necessities for information security and privacy furthermore different applications of WBANs are discussed.

**Keywords**—Wireless Body Area Network; Sensor; Security; challenges.

## I. INTRODUCTION

With the scientific innovations in the wireless communication, Micro Electro Mechanical Systems, in embedded computing region allows the establishment of large scale, low power, multifunctional and low cost network. This network maintains higher levels of connectivity and miniaturization which is called as Body Area Network (BAN). BAN is a natural byproduct of accessible sensor network technology and biomedical engineering that represents the union of connectivity and miniaturization [1].

BAN technology is at a standstill promising innovation, and accordingly it has a short history. Research on BANs can be gone back to 1961 with work from Mackay [2] on radio telemetry inside the body. The extension of WBAN innovation began around 1995 on utilizing wireless personal area network advancements to actualize communications on, close, as well as in the region of the human body [3].

Wireless body area networks was initially given by T G Zimmerman in an editorial from 1996 [4] and he has given the name for body area networks as wireless

personal area network (WPAN). Zimmerman for the most part addresses the in-body communication. Professor Guang Zhong Yang was formally characterized the expression "Body Sensor Network" (BSN) in a book Body Sensor Networks in 2006 [1]. The IEEE 802.15.6 standard portrays its motto as "a communication standard enhanced for low power gadgets and action on, in or around the human body (however not restricted to human beings) to give a scope of utilizations in therapeutic, end user electronics / personal amusement and others [5].

BANs are also known as Body Sensor Networks (BSNs), Wireless Body Area Network (WBAN) and, to a lesser extent, Body Area Wireless Sensor Network (BAWSN). A WBAN consists of a number of transportable, miniaturized and self-governing sensors that can sense, process and convey. The sensors are planned in manner that they can be worn or embedded under the skin [6]. The data received by the sensors is sent to a portal, for example, a mobile as shown in figure a. The portal then conveys its data via a cellular system or the web to the care takers [7].

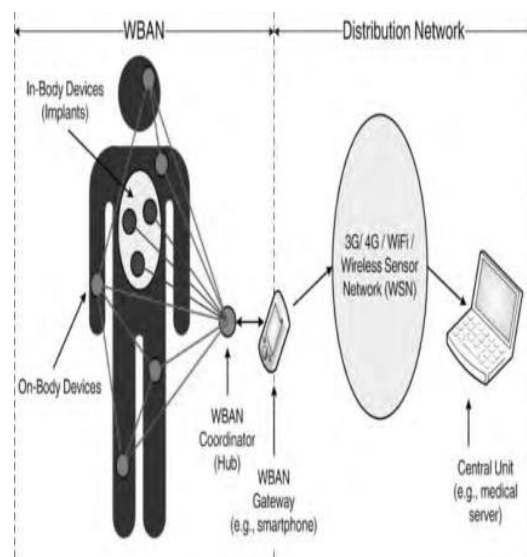


Fig. a) Nodes in WBAN



# Health Monitoring System by Wireless Sensor Network

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**Abstract:** In this paper we propose a system for smart way of health caring system based upon an advanced wireless sensor networks (WSN). It is specially assisted for living residents and remote health monitoring consumers. We present the advantages, objectives, and status of the design of system. To monitor the patient health periodically visit the doctor periodically. By using wireless sensor networks (WSN) technology we monitor the health condition of the patients. We focus on wireless personal area networks methods, WiMAX, Wi-Fi and Zigbee.

**Keywords:** wireless sensor networks (WSN), Wireless personal area networks (WPAN), Wi-Fi, Zigbee.

## INTRODUCTION

As the day by day world population increases, the number of persons are suffering different diseases is also increased. In health monitoring system we need one observer (nurse) for monitoring the health condition and reporting to doctor. In some emergency applications we need fast response for caring them, these type of situation we also needed one observer. In the case of some delay in any one we loss one life. So we introduced one system that monitors health position of the patients with wireless sensor networks (WSN).

This sensors sends the information to doctor. No need of one carrier to send information. In this system we deploy the wireless sensors into patient body and those interconnected using wireless personal area networks like Zigbee, Wi-Fi. Generally wireless personal area networks are working with ultralow power, high data rate and low cost. These wireless sensor networks are transmitted the information from patient to doctor and problem is rectified by the doctor. No need of doctor checking periodically.

## AIM's:

We are developing a network architecture for smart way of health monitoring system which show the path for continuous observation of resident patients. We can reduce the high installation cost and also implement different systems using future applications of medical field as integrity and web sensors. The wireless sensor networks (WSN) has following properties.

## PORTABILITY:

We are inserting small devices and its collects the information and send's through wireless environment and also operating with low voltages.

# Survey on Different Flight Data Recording System for Unmanned Aerial Vehicle

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## Abstract

This paper discussed about different flight data recording systems for UAV. There exist many kinds of microprocessor based and micro controller based data acquisition system but all of them do not satisfy specific requirements of UAV flight data gathering and registration processes. This FDAS consists of micro-controller based flight data recorder equipped with SD/MMC memory card to experimental data, set of sensors to measure UAV flight parameters and software utility providing experiment data recorded.

## Keywords

Data Acquisition System Unmanned Aerial Vehicle (DAS UAV), Flight Data Recording System (FDAS), Multi Media Card (MMC).

## 1. Introduction

A flight data recorder (FDR) electronic device employed to record instructions sent to any electronic systems on an aircraft. Morden day FDRs receive inputs via specific data frames from the flight data acquisition units. They record significant parameters, including the control and actuator positions, engine information and time of day. This has also given rise to flight data monitoring

programs, whereby flights are analysed for optimum fuel consumption and dangerous flight crew habits. In this paper we proposed a new method for flight data recording system using SD/MMC.

## 2. Literature survey

Data acquisition and communication system of miniature based on DSP: The requirements of flight parameters high-speed, accurate data acquisition and reliable transmission of micro-UAV control and navigation system, this paper designed a data acquisition and transmission system based on the TMS320F2812DSP. This system can conduct the digital signals acquisition, computation, and filtering, which are output from the GPS receiver and micro inertial measurement unit, and the data is sent to the ground station in the form of messages periodically. Using the model of a tightly coupled combination of navigation, an improved UKF algorithm, which introduce a square root filter into UKF(unscented kalman filter), was proposed to solve the problem of filter divergence under high dynamic conditions. Experiments show that the system hardware and software coordinate well and improved UKF tightly coupled navigation system has a better accuracy and stability under high dynamic.

# **CRITERIA 3**

## **KEY INDICATOR 3.4.4**

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**2014-2015**

## Radio Frequency Engineering of Fourth Generation Mobile Phone Networks For Long Term Evolution Advanced Specification

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### *Abstract:*

Fourth Generation (4G) Mobile phone networks offers hundreds of Megabit per second data rates at mobile speed greater than 100 Km / hour. Radio Frequency (RF) engineering of such network has to address a host of engineering parameters for realizing outage-free (< 0.01 % of outage) mobile communication. The conventional cellular approach will not be able to meet such requirement. Therefore, the design of such networks with alternative approach using micro cells, pico cells, and femto cells is required. Apart from conventional techniques such as Forward Error Correct (FEC), interleaving, and equalizers, 4G networks require advanced technologies such as Multi Input and Multi output (MIMO) and Orthogonal Frequency Division Multiplexing (OFDM). The paper presents the design of 4G cells for Long Term Evolution (LTE) advanced specifications. The design helps to realize high capacity and high throughput mobile phone networks using 256 QAM-modulation with 100 MHz bandwidth.

**Index Terms**—Long Term Evolution (LTE),4G technology, macro cell, pico cell, femto cell, 5G technology,FEC, 256 QAM modulation, band width and minimal power

### **Introduction**

The rapid increase of smart phone users and growth of mobile phone networks are creating problems in wireless communication. The broadband mobile phones need a low latency, high quality, and high mobility for multimedia and live video applications. These application demand very high data rates in wireless technology. The 1<sup>st</sup> generation is an analog wireless communication. It used for just to make calls and send messages. Whereas 2<sup>nd</sup> generation is digital, it used for sending images, text message and browsing. When comes to 3<sup>rd</sup> generation it is not only used for send images and text but also using for video calls and live video conferencing. LTE Advanced is the right solution for wireless communication. LTE Advanced is also known as 4<sup>th</sup> generation technology. 4G provides high data rate, low latency, spectral efficiency, and works on all IP address. 4G products are based on MIMO, OFDM and MIMO-OFDM technologies. LTE supports 350Mbps in downlink and 100 Mbps in uplink. The LTE improves the coverage and throughput with same low transmission power using heterogeneous networks such as macro, pico and femto cells along with MIMO techniques.

### **Homogeneous Networks**

Earlier mobile phone networks are of homogeneous type since these are using common macro cells in wireless mobile communication. A typical network is shown in figure 1. Though homogeneous network are simple to implement but it consumes more transmitting power and bandwidth for a given data rate. Even though it covers large area due to macro cell



## Performance Study of 4G Modulation Schemes with MIMO in Rician Channel

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### Abstract

The main objective of this paper is to study the performance of different lower and higher order modulation schemes like BPSK, QPSK and M-QAM for  $M=16, 64, 128, 256$  that are using in 4G technologies. The performance of these modulation schemes with MIMO technique is observed in Rician fading channel environment. System models are designed for each modulation scheme using MATLAB SIMULINK software. The designed system models are implemented with the help of BERTool provided by MATLAB. Then BER vs SNR graphs for each modulation scheme is obtained by varying K factor value in Multipath Rician Fading Channel Block of each system model. BER values of all modulation schemes are compared and observed the better modulation scheme that provides high data rate with low error rate.

**Index Terms**— 4G, BER, BERTool, BPSK, MATLAB, MIMO, M-QAM, QPSK, Rician Fading Channel, SIMULINK, SNR

### Introduction

Wireless communications has experienced explosive growth in the past 25 years, due to demand and advances in Very Large Integrated Circuit and Discrete Signal Processing technologies. It is useful to refer to mobile cellular technology when describing the recent evolution in wireless communications, since its market has experienced the most growth, and gives a good representation of the capabilities of wireless technology.

Based on the efficiencies of bandwidth, power and cost communications systems are considered. The ability of a modulation scheme which accommodates data within a limited bandwidth is described by bandwidth efficiency. The ability of system to send reliable information at lower practical power level is defined as power efficiency and cost is a dominant system priority. Earlier it was possible to make a radio low-cost by sacrificing power and bandwidth efficiency but now this is no longer possible.

Now a day's spectrum is extremely valuable and operators are losing their licenses in the competition if they are not using spectrum efficiently. In order to utilize the spectrum efficiently usage of the higher order modulation schemes is playing a very important role in many emerging wireless communication technologies like LTE and LTE-Advanced which are parts of fourth generation technology.

The main objective of this Paper is to study different modulation schemes using MIMO technique in multipath fading environment. This study is conducted in MATLAB SIMULINK software by designing system models for different modulation schemes like BPSK, QPSK and M-QAM for  $M=16, 64, 128, 256$ . Better modulation scheme which is used to transfer high data rates is observed by comparing different BER values. These are obtained after simulating various simulink models for different modulation schemes that are using in 4G. The simulink models are executed using MATLAB SIMULINK software.

Inorder to achieve high data throughput rates, several techniques such as higher level Modulation, MIMO and OFDM are used. These techniques are in fourth generation mobile phone networks complying with LTE Advanced specification.

## ARM 9 based finger print authentication system

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### Abstract:

Most of the universities are enforcing affiliated colleges to implement biometric fingerprint attendance system to monitor student attendance. Biometric fingerprint scanner need to be installed in college where the student studying and it is monitored by the university online. There is possibility of adding fake finger print into the scanner which can be used for proxy attendance of student who is not attending the college. In this paper, the acquired fingerprint of the student is initially stored in the database with complete student profile and photograph. When the student places his fingerprint it compares with stored database. If fingerprint matches it displays the student photo. The proposed intelligent system includes R305 fingerprint sensor and ARM 9 processor. RS232 has been used for interfacing with system and visual studio 2008 software for designing the interface.

**Keywords:** R305 sensor, RS 232, ARM 9, Visual studio 2008

### Introduction

Implanted frameworks are electronic gadgets that fuse microchips with in their executions. The principle purposes of the microchips are to rearrange the framework plan and give adaptability. Having a chip in the gadget helps in uprooting the bugs, making alterations, or including new gimmicks are just matter of changing the product that controls the gadget. On the other hand as such implanted machine frameworks are electronic frameworks that incorporate a microcomputer to perform a particular committed application [1]. The machine is covered up inside these items. Installed frameworks are universal. Consistently a large number of small machine chips come spilling out of plants discovering their path into our common place items.

Installed frameworks are independent projects that are inserted inside a bit of fittings [2]. While a general machine has numerous distinctive applications and programming that can be connected to different assignments, inserted frameworks are typically situated to a particular undertaking that can't be modified without physically controlling the hardware. An alternate approach to think about an installed framework is as a machine framework that is made with ideal proficiency, subsequently permitting it to finish particular capacities as fast as could be expected under the circumstances.

Implanted frameworks creators normally have a critical handle of fittings advances. They utilize particular programming dialects and programming to create inserted frameworks and control the supplies [3]. At the point when looking on the web, organizations offer installed frameworks improvement units and other inserted frameworks instruments for utilization by architects and organizations.

# Advanced Spy Camera Using Raspberry Pi

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## Abstract:

This paper is related to Image processing based Advanced Spy camera using Raspberry pi and Gyro sensor. This design is a small portable monitoring gadget for home and office security. This gadget will monitor with respect to security using camera and then send out an alert email with the image to the user. The model uses hardware mechanism such as Raspberry pi (model B), Gyro sensor and Raspberry pi camera. Matlab, Simulink tool boxes are used to employ the project. The proposed gadget will works in standalone mode without the requirement of PC once programmed.

Keywords-Raspberry pi, Gyro sensor, Raspberry pi camera, Monitoring device.

## I.Introduction

Video surveillance systems plays very vital part in numerous fields of our general public. for example, in keeping money, individual security, fund and so on. Beginning from little houses to enormous businesses, now video surveillance is essential and assumes critical part to satisfy our security angles from numerous points of view. Thievery and burglary have dependably been a migraine for conventional inhabitants, particularly for those living in the enormous urban communities. Therefore it is very important to discover a powerful approach to essentially lessen it. All through the world the utilization of Video surveillance system started from twentieth century. Observation framework has dependably been assuming an essential part in managing the theft cases. On the other hand, it is costly for common occupants to introduce such sort of framework and it is additionally endured the imperfection of not immediate, which implies it doesn't educate the client quickly when the theft happens. What is ordinarily the case is that we can just check the surveillance video after the thievery happened and some individuals will deliberately destroy the cameras. Besides, as a result of the way that surveillance systems record all the videos of ordinary life, it must be constantly in the working mode to record the features, accordingly, it is an enormous waste of the power vitality. Then again, the features recorded by the surveillance system are in truly low definition, some of the time even not sufficiently clear to perceive the burglary's face. That is simply on the grounds that if the video is in high caliber, the framework would be more extravagant and there would be insufficient space to store all the feature records. Simply in light of the fact that those weak points of the surveillance system, a energy productive versatile system that can take pictures or videos when the theft happens and convey a caution signal in the meantime is much superior to the presently being used video surveillance systems. The primary preferences of this gadget are little size compact stand-alone gadget with its own particular power source, it is not difficult to actualize, truly modest for private utilization and energy capable with immediate alarm.

## II. Literature Survey

The surveillance system has been broadly utilized as a part of numerous fields.



## Video Stabilization Using Raspberry Pi

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### Abstract

A method for implementing video processing based stabilizing the video is proposed. The video stabilization is an important video enhancement technique, describes how to remove the effect of camera motion from a video stream using video processing algorithms and mat lab simulink tool box for obtaining stabilized video. The stabilized video will be displayed on ntsc/pal tft display which is attached to spectacles. Hardware components such as raspberry pi (model b), usb web camera and ntsc/pal tft display are used. The proposed method works in real time using mat lab and raspberry pi.

**Keywords:** raspberry pi, ntsc/pal tft display, video stabilization, usb web camera.

### Introduction:

There are many people throughout the world, who are having hobby of reading news papers and watching videos on a handheld device, such as a mobile phones while they are travelling from one place to another place. When a hand held devices undergoes vibrations or unwanted motions while vehicle is moving it records a jumpy video created by small, random movements. In such conditions it is very difficult to read news paper or watch a video. The poor quality of such recording may cause the video not to be useful. In order to develop applications on mobile platforms simple and efficient algorithms must be developed. It is nothing but video stabilization: video stabilization is an important step for many video processing works. Video stabilization is nothing but to remove the effect of camera motion from a video stream.

In this paper we will stabilize the video using raspberry pi and the usb web camera. The video is first captured using web camera. Video processing is implemented by utilizing raspberry pi and simulink tools that run on mat lab software on a computer. Simulink provides an interactive graphical environment and customizable set of block libraries in order to design not only signal, image, and video processing systems but also communication and control systems. Simulink let users design, simulate, implement, and test their projects. The captured video is stabilized by using video processing algorithms, first it will identify the particular target to track either it may be words or lines in the news paper or it establishes dynamic search region. In this dynamic search region it searches for the target which reduces the number of computations required to find the target in the particular video frame, it determines how much the target has moved relative to the previous frame in the video and removes unwanted translational camera motions and generate a stabilized video. The stabilized video is displayed on ntsc/pal tft display which is attached to spectacles to identify the particular target and it makes people so easy to watch the videos and reading news paper even though vehicle is moving.

## 3-D Image Reconstruction methods from 2-D Images

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### Abstract

A 3-D profundity extraction and reproduction framework is composed and created to gauge the profundity varieties and also recognize the deformities of the pictures. Examination utilizing 2-D pictures has notable impediments, for example, power and shade of the same physical positions may differ impressively crosswise over continuous pictures. Furthermore, the state of retinal fundus is just about planar, which makes the estimation of profundity more troublesome. Investigation of the skull is likewise intricate by review it from single two dimensional perspectives.

*Key Words: 2-D registration, Depth Extraction, 3-D reconstruction*

### Introduction

Generally ophthalmologists and neurologists are relying upon 2-D pictures for location of retinopathy and cracks in the skull and their diagnosis. This paper presents a few consequences of remaking 3-D pictures of skull furthermore profundity extraction and its variety of retinal pictures, which are vital devices for medicinal picture transforming. 3-D recreation and profundity extraction are utilized for location and separation of the retinal pictures and skull. PC based analysis of the retinopathy is demonstrated compelling in exploration labs. Anyway, lamentably, a significant number of these advances have in this way fizzled amid move from the lab to the facility. The most ideal approach to diagnose and treat retinopathy is by considering the profundity varieties of the retinal fundus by utilizing 3-D remaking methods. In the same way, crack or some other surrenders in the skull can be recognized by remaking the skull in 3 dimensional arrangement utilizing number of MRI cuts of the skull. By the application of 3-D recreation procedures, it is conceivable to

- Analyze retinal pictures
- Detect the imperfections in the retina
- Obtain the profundity guide of distinctive pictures
- Analyze the skull

Customarily just 2-D representations of our 3-D world exist. Case in point, satellite images taken of remote places and/or brutal situations where it would risky or unsafe for human's vicinity yet where it would advantageous to have information of the spatial states of nature of investment. Pictures of a scene give extremely significant data, yet they just fail to offer the spatial information that we are acclimated to for exploring around our surroundings.



# Elderly Abnormal Human Activity Recognition Based On Morphology and Hidden Markov Model Classifier

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## ABSTRACT

Video surveillance has been used in many applications including elderly care and home nursing environment. The project discusses a problem of detecting abnormalities in the human activity. The focus is taken mainly on elderly people, since there is an assumption of stereotypes in their day routine. Process of abnormal behavior detection is usually divided into two main steps - activity recognition and making decision whether an event belongs to normal state or does not. If there is an abnormal action is detected the system gives an alarm for medical assistance. The system train, learn and recognizing the human activities using morphology and Hidden Markov Model. The proposed algorithm is proposed to test on six different types of activities. The proposed methods achieve good recognition accuracy.

Index Terms -Abnormal activity, Morphology, Hidden Markov model.

## INTRODUCTION

The extent of elderly individuals in the populace is becoming rapidly; the rate of those matured more than 60 years is anticipated to twofold in the following two decades. Therefore, one of the principle destinations of any general public is to verify that legitimate consideration is given to elderly individuals so they can live the extent that this would be possible solid, free and content lives. Notwithstanding, it is realized that anomalous exercises, particularly in elderly individuals, can result in genuine wounds with related therapeutic muddling, for example, inward draining and hypothermia, which might inevitably prompt fatalities. One conceivable arrangement is to make utilization of a productive irregular movement recognition framework, which can expand their certainty and empower them to keep appreciating their dynamic way of life. One playing point of the utilization of an anomalous action recognition framework is that it can supplant human observation by observing completely an individual's exercises through computerized innovations. Its sensors can discover Its sensors can discover its shopper gadgets, with applications in elderly individuals wellbeing observing, security reconnaissance, games activity distinguishment, and face distinguishment frameworks for brilliant home. The elderly individuals living alone are expanding tremendously. They have wellbeing issues that need persistent observing to perceive anomalous activities. Hospitalization and nursing watch over 24 hours is not doable because of high cost and restricted recourses in healing facilities. This examination intends to build up a programmed social insurance framework for elderly individuals to perceive strange exercises viably. Strange action in this exploration is characterized as a movement that needs crisis restorative help. Six strange exercises are forward fall; regressive fall, midsection agony, swoon, regurgitation, and migraine are characterized by specialist's conference. The most mainstream existing technique

## Weathering a storm in space: Satellites and Space-weather

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### Abstract

The use of artificial earth satellites has crept into the day to day functioning of our human civilization. Even essential services are starting to be reliant on satellites. This has necessitated a 24\*7 availability of satellite services. In this paper we will discuss the various space weather phenomena which are capable of disrupting satellite services possibly leading to chaos and even catastrophic results on Earth. We will also briefly discuss some methods of mitigating space weather effects.

### Introduction:

We have come a long way from the launch of the first artificial earth satellite Sputnik-I in 1957. Today satellites in different orbits (LEO, MEO, Molniya and GEO) are routinely used by everyone including the common man and big corporations. Almost all households have small aperture antennas looking up in the sky to receive signals from satellites enabling the availability of hundred of channels broadcast from all around the world in their TV sets. People use their smart phones to directly connect to GPS satellites to navigate their way through the towns and cities. Air, maritime, road and rail traffic has increased by manifolds in the last few decades and this has mainly become possible due to the use of accurate navigation using global navigation satellite systems (GNSS). Air, maritime, road and rail services use GNSS for efficiency and safety.

The GNSS provides not only navigational and positioning data but also accurate timing data to users. The timing data is used by critical infrastructure sectors like energy, agriculture, commerce and communications. GPS timing function is to synchronize call hand-offs in wireless communications in order to optimize efficiency and capacity usage. Power grid systems use GPS timing in a technology that helps synchronizing the phase of current to minimize inefficiencies. The commerce sector uses GPS timing to time stamp financial transactions and synchronize financial computer systems to guarantee financial transaction traceability[1].

Some other uses for timing information are Doppler weather radars, which measure tiny variations in the frequency of a signal. In order to obtain a coherent view of a single event by several radars, exact time calibration is required. A similar technique is employed in seismic measurements, where, seismographs around the world must be synchronized in order to determine the source of an earthquake or predict a potential tsunami.

Space weather can disrupt satellite services. This can happen through direct impacts on satellites, rendering them useless or through impacts on satellite uplinks and downlinks,



## Design And Simulation Of Solid State Power Amplifier For Radar Applications

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### Abstract

This paper proposes a design and simulation of solid state power amplifier by using ADS(Advanced Design System) Software which will be useful for radar applications. The selection of proper device for the desired application plays a vital role. There are various steps involved in the present design such as direct current (DC) simulation in order to get the proper quiescent operating point under the platform. Subsequently, stability simulations are to be carried out to make sure that the amplifier can be unconditionally stable. Load pull and Source pull simulations are required to match the load and source impedances, and finally Harmonic Balance (HB) simulations are to be carried out to verify the harmonic levels of the signals other than designed frequency of operation.

### Introduction

The key features while designing an amplifier are wide bandwidth, improved efficiency, high output power, reliability, good thermal performance and gain of the amplifier. A critical element in Radio Frequency (RF) front ends is the Power Amplifier (PA). Critical specifications for PA design include linearity and efficiency.

Linearity must be maximized in order to reduce signal distortion and minimize Adjacent Channel Leakage Ratio (ACLR). This paper describes the process of designing a single stage PA for operation in the Desired band of frequency. The circuit was to be fabricated on evaluation board using passive elements available from the Georgia Tech ECE department.

### Why Do We Need A Power Amplifier

Power Amplifiers (PA) are used for increase input signal strength and for getting the desired output the power amplifier in radar applications is used for getting more efficiency and gain. And by using power amplifier we can eliminate the distortions and losses of the input signal.





# IMAGE PROCESSING BASED ROBOTIC ARM CONTROL BY USING RASPBERRY PI

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## ABSTRACT

In the present context we proposed a robot capable of surveillance and also with an alternate application in detecting and following a pre specified object. The detection and recognition has been done using open CV library. The code was written in C++. And this all processing has been done on raspberry pi which works on Raspbian OS based on Debian which is Linux OS. Raspberry pi is a small sized single-board computer. For capturing the images we are using pi Camera Board. For surveillance, we have used video streaming over Wi Fi through a router from Raspberry Pi to laptop. The main aim of our project is to make a mobile, wireless robot capable of following a pre specified object and also can be used as a surveillance robot. For achieving this task we have chosen raspberrypi as our processing hardware with Raspbian OS. The Raspberrypi is a credit-card sized computer that plugs to a TV or an HDMI monitor to view its interface. The visual input is taken by pi. For efficient image capture we require good camera compatible with our pi. Camera Module attached to raspberrypi via cable into the CSI port of Pi. The whole code for object detection and following is written in MATLAB. The system locomotion is controlled by microcontroller which is connected to raspberry pi and servo motors. Open offers set of possibilities such as simple motion detection to facial recognition and advanced capabilities such as object detection and object tracking hence image processing will be taken care by the open cv libraries.

## KEYWORDS:

image processing, raspberrypi, raspberrycamera, Robotarm, MATLAB, SIMULINK.

## INTRODUCTION

We made a robot capable of surveillance and also with an alternate application in detecting and following a pre specified object. The detection and recognition has been done using open CV library. The main aim of project is to make a mobile, wireless robot capable of following a pre specified object and also can be used as a surveillance robot Raspberrypi has found its way in major in number of useful and versatile applications in robotic systems Raspberrypi is low cost hardware which does not implement any usual motor control peripherals in hardware. The whole code is written in MATLAB. Raspberrypi has more useful in real time projects. Raspberry pi has small sized pc board.