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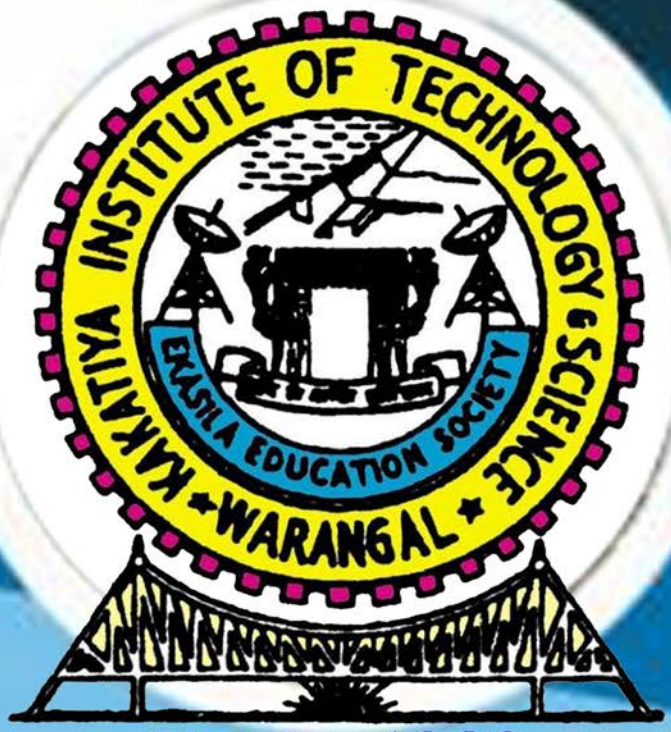
Scope

Technical Magazine



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Department of Electronics & Instrumentation Engineering

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

WARANGAL - 506015

(An Autonomous Institute under Kakatiya University, Warangal)

Vol. 6 **Dec. 2018**

scope

Technical Magazine

Electronics & Instrumentation Engineering

Department of Electronics & Instrumentation Engineering
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
Warangal-506 015
(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF ELECTRONICS & INSTRUMENTATION ENGINEERING
KAKATIYA INSITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15

VISION

To provide quality education in Electronics & Instrumentation Engineering by nurturing the students with strong technical, analytical, practical skills and ethics to make them engineering professionals who cater to the societal needs with a high degree of integrity and social concern.

MISSION

1. To provide progressive and quality educational environment with the help of dedicated faculty and staff by fully utilizing the information technology aiming at continuous teaching and learning process.

2. To produce engineering graduates fit for employability with a competence to design, develop, invent and solve instrumentation engineering problems.

3. To make the students ethically strong by inculcating sense of brotherhood.

4. To make the students research oriented by providing latest technical knowledge and thus cater to the changing needs of industry and commerce.

EDITORIAL BOARD

PREFACE

This magazine summarizes the current state of Electronics and Instrumentation Engineering, providing an arena for the student community to showcase their technical talents in a great way. Keeping in view of the present era of technological revolution in the field of Instrumentation Engineering, the students of E&IE department, KITS Warangal presents you **SCOPE**.

We acknowledge the essential contribution of the reviewers, whose efforts are deeply appreciated.

We feel that such technical magazine is very well required as it helps in updating the knowledge of future engineers.

The Department of E&IE is very much thankful to the Management for their continuous support and encouragement for making the Technical Magazine **SCOPE**.

Program Outcomes (POs)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: An ability for immediate professional practice as an Electronics & Instrumentation Engineer.

PSO2: An ability to use fundamental knowledge to investigate new and emerging technologies leading to innovations in the field of Electronic & Instrumentation Engineering.

Faculty Publications

JOURNAL OF MEDICAL ENGINEERING & TECHNOLOGY
2018, VOL. 42, NO. 5, 389–396
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INNOVATION

Quantification of error between the heartbeat intervals measured form photoplethysmogram and electrocardiogram by synchronisation

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ABSTRACT

Currently, heartbeat intervals required for the analysis of heart rate variability (HRV) are derived from electrocardiogram (ECG). Many investigators have explored the possibility of using photoplethysmography (PPG), for the analysis of HRV. However, all these studies are based on statistical approach and have used the correlation coefficient for the comparison of HRV data obtained using ECG and PPG, which is inappropriate as the causal relationship between the R-peaks in ECG and the systolic peaks in PPG is well known in physiology. In this study, the heart beat intervals measured from PPG, are compared, beat by beat, with the corresponding beat intervals of same cardiac cycle obtained from the synchronously recorded ECG and the differences between them are taken as errors. These errors are verified to exactly match with the variations in the pulse transit times (PTTs), beat by beat. The error in the measurement of heartbeat intervals using PPG is quantified by obtaining the root mean square of the errors associated with each beat interval for a subject. The rms error, which is found to vary between 0.17 and 1.81% across the study group of 42 subjects, can be treated as insignificant, considering the nonstationary character of physiological signals. The errors are compared and interpreted with the variations in PTT. In view of these findings, PPG can be considered as a low cost, safe and more convenient alternative to ECG, as a wearable sensor outside hospital environment, for the analysis of HRV, without compromising on accuracy.

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KEYWORDS
Photoplethysmogram; electrocardiogram; heart rate variability; R–R intervals; rms error

1. Introduction

Variations in consecutive heartbeat intervals is a normal feature and it happens continuously as a part of regulating process known as homeostasis, in human physiology. The heart rate variability (HRV) is an important dynamic indicator which has the potential to reveal the health of cardiovascular system [1,2]. Currently, the heart beat intervals required for the analysis of HRV are derived from electrocardiogram (ECG) as a standard practice. However, the electrodes used for ECG pose electrical contact problem and also require electrical isolation circuits. Photoplethysmography (PPG), on the other hand, is a simpler and easy way to use optical method that uses neither electrodes nor has any electrical isolation problems. However, the effect of motion artefacts on PPG need to be handled appropriately by limiting the low frequency response of the amplifier. The PPG gives a measure of blood volume changes in the micro-vascular bed of tissues driven by the pumping action of the heart. Therefore, several investigators have explored the possibility of using PPG in place of ECG for measuring the heartbeat intervals and found high correlation between the HRV derived from ECG and PPG in supine position [3–7]. But, all these studies are based on statistical approach and used the correlation coefficient for comparing the HRV parameters obtained using ECG and PPG. However, neither the correlation coefficient nor the regression analysis is appropriate to compare the data acquired by two methods of measurement [8]. The main aim of the study is to compare the heart beat intervals measured from PPG, beat by beat, with the corresponding beat intervals of same cardiac cycle obtained from the synchronously recorded ECG and analyse the error associated with the heart beat intervals.

2. Methodology of comparison

The pulsatile flow of blood in the arteries is produced through the circulatory pumping action of the heart by means of ventricular systole and diastole.

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An Adaptive Bayesian Computation Model for CDMA Multiuser Detection using Evolutionary Computation Scheme

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Abstract

Demand of wireless communication is increasing drastically where CDMA (Code Division Multiple Access) is considered as most promising technique for real-time communication. However, due to extreme utilization of these technologies several challenges occur such as interference and packet drop resulting in poor communication. To address these issues, multi-user detection schemes have been adopted widely which are based on the filtering techniques and MMSE (Minimum Mean Square Error) based multiuser detection schemes. In this work we address these issues and proposed a novel approach of multi-user detection for asynchronous CDMA using combined optimization and evolutionary computation. Bayesian computation model is applied which helps to compute the Log Likelihood Ratio (LLR) using Monte Carlo simulation. Later genetic algorithm is incorporated to obtain the optimal solution for LLR probability resulting in reliable communication. An extensive simulation study is presented which shows significant improvement in the performance when compared with state-of-art multiuser detection schemes.

Keywords—*CDMA, Multiple access interference (MAI), Multi user detection, Bayesian Model, evolutionary computation, Log-Likelihood ratio.*

Introduction

Recently, wireless communication has put forward due to its importance in various applications such as research application, industrial application, medical etc. The performance of wireless communication depends on various parameters which are rate of data transmission, power density, communication interference and multi-path resolution. Various techniques have been introduced for fruition of this type of demand to real-world communication scenario. In this field of wireless communication, CDMA (Code-Division Multiple Access) is considered as most popular technique for communication. These type of wireless communication systems are used for cellular radio communication where multiple access scheme can provide minimum cost for implementation and performance maximization which helps to improve the overall performance of communication system and delivers a better QoS (Quality of Service) for end-user experience. For further improvement in communication system, various multiple access based schemes has been developed. Recently, MC-CDMA (Multi-Carrier Code Division Multiple Access) (Wang et al., 2015) scheme is developed for CDMA systems. Similarly, another significant approach is known as DS-CDMA (Direct-Sequence Code-Division Multiple Access) (Shi et al., 2017). Communication through these systems depend on the orthogonal frequency and distinct codes. According to CDMA process, distinct codes and user are multiplexed whereas in FDMA (Frequency-Division Multiple Access) (Ding et. al., 2017) orthogonal frequency and users are multiplexed, similarly in TDMA (Shafie et. Al., 2017) (Time-Division Multiple Access) time-slots are users are multiplexed.

In this work we focus on generalized CDMA system for cellular communication network. During communication, multiple users participate to complete their desired communication process which motivates CDMA systems to ensure higher capacity which can be induced by using CDMA spreading signature and multiuser detection schemes at the receiver end. As discussed before that multiple user perform

Wireless Pers Commun
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New Channel Estimation Method Using Singular Spectrum Analysis for OFDM Systems

E. Hari Krishna[1] · **K. Sivani**[2] · **K. Ashoka Reddy**[2]

Abstract This paper presents a new method for OFDM channel estimation (CE) using singular spectrum analysis (SSA). In this method, the conventional LMMSE procedure is used for CE and then SSA based optimum low rank approximation is performed on channel correlation matrix. Detailed simulations for bit error rate and mean square error have shown good performance for this algorithm compared to the well-known LSE, MMSE, and SVD based CE methods. In the proposed method, the SSA is also employed for denoising the signal aimed at further improvement in the performance of CE. SSA decomposes the received OFDM symbol into empirical orthogonal functions (EOFs). A de-noised signal is reconstructed using selective EOFs based on Pearson correlation coefficients. The proposed method has outperformed LSE and MMSE based methods and shown an average 2 dB improvements over SVD based method.

Keywords Multi carrier communications · OFDM · Channel estimation · Singular spectrum analysis · Singular value decomposition · BER · MSE

1 Introduction

Orthogonal frequency division multiplexing (OFDM) is a promising method that allows multimedia communication over wireless broadband systems [1, 2]. In general, the wireless channel behaves like a non-linear random time varying system, which is highly complex in nature. To properly decode the received signal, it is required to remove the distortion and noise due to channel from received signal. Hence, estimation of channel with de-noising strategy plays an important part in an OFDM system. There are many different

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Performance Evaluation of Adaptive Continuous Wavelet Transform based Rake Receiver for UWB Systems

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ABSTRACT

This paper proposes an adaptive continuous wavelet transform (ACWT) based Rake receiver to mitigate interference for high speed ultra wideband (UWB) transmission. The major parts of the receiver are least mean square (LMS) adaptive equalizer and N-selective maximum ratio combiner (MRC). The main advantage of using continuous wavelet rake receiver is that it utilizes the maximum bandwidth (7.5GHz) of the UWB transmitted signal, as announced by the Federal Communication Commission (FCC). In the proposed ACWT Rake receiver, the weights and the finger positions are updated depending upon the convergence error over a period in which training data is transmitted. Line of sight (LOS) channel model (CM1 from 0 to 4 meters) and the Non line of sight (NLOS) channel models (CM, CM3 and CM4) are the indoor channel models selected for investigating in this research . The performance of the proposed adaptive system is evaluated by comparing with conventional rake and continuous wavelet transform (CWT) based rake. It showed an improved performance in all the different UWB channels (CM1 to CM4) for rake fingers of 2, 4 and 8. Simulations showed that for 8 rake fingers, the proposed adaptive CWT rake receiver has shown an SNR improvement of 2dB, 3dB, 10dB and 2dB respectively over CWT rake receiver in different UWB channels CM1, CM2, CM3 and CM4.

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1. INTRODUCTION

In recent years, ultra wideband (UWB) technologies have drawn great interest in the wireless community [1], [2].Among various applications, one of the most promising is in wireless sensor networks (WSNs) [3], [4] .UWB systems have potentially low complexity and low cost, with noise-like signal properties that create little interference to other systems, are resistant to severe multipath and jamming, and have very good time domain resolution allowing for precise location and tracking.

UWB system transmits very short pulses with relatively huge bandwidth [5]. UWB transmitted pulses have lower power of -10dB and bandwidth of order of several gigahertz's [6]. The use of this huge bandwidth accounts both advantages and disadvantages. The major advantage of this huge bandwidth is found when it is used in conjunction with the spreading techniques [7]-[13] provides robustness to jamming, as well as a low probability of detection. The major disadvantage of the UWB system due to its huge bandwidth is it always co-exists with the narrow band system or wide band system which already had dedicated frequency allocation in that band which results in high multiple signal interference [14].

Due to this dense multipath environment received signal contains many delayed and scaled replicas of the transmitted pulses. As most of the energy is distributed in these multipath components which can be

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MS-EMD based Signal Processing Method for Reduction of Motion Artifacts from PPG Signals

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Abstract

Pulse oximeter (PO) is used in critical care units to display the estimations of arterial oxygen saturation (SpO_2) and pulse rate (PR). Error free estimation of PR and SpO_2 by using PO is always a research challenging task. Using non-invasive procedure, PPG signal can be acquired from PO. Due to voluntary or involuntary movements of patient/subject, the PPG signal has every possibility of being corrupted by motion artifacts (MAs), which results in unreliable & inaccurate estimations of SpO_2. It is observed that weighted average based methods employed by present day POs face certain limitations due to which, those POs have to compromise with erroneous SpO_2 estimations. In this paper, we present a signal processing method based on Multi-scale Empirical Mode Decomposition (MS-EMD), which combines wavelet processing and empirical mode decomposition. PPG data acquired with intentionally created MAs is considered for experimental analysis. Performance of the proposed MS-EMD based method is also compared with Multi-scale Principle Component Analysis (MS-PCA) and Multi-scale Independent Component Analysis (MS-ICA) based signal processing methods. SpO_2 estimations are observed to be quite good in terms of their reliability and accuracy.

Keywords: Pulse oximeter, PPG, MA noise, MS-EMD, MS-PCA, MS-ICA, SpO_2.

INTRODUCTION

Pulse oximeter (PO) is very much helpful for medical diagnosis and enables the process of non-invasive & continuous monitoring of arterial blood oxygen saturation levels (SpO_2) and pulse rate (PR). In PO of critical care units, the transmittance type Photoplethysmographic (PPG) sensor unit, operated at red and IR wavelengths, is used for acquiring the PPG data [1]-[2]. Reliability & Accuracy of SpO_2 estimations are important characteristics of the PO, which is usually affected by the voluntary or involuntary movements of the subject attached with PPG sensor head. Main cause of error for inaccurate measurements of SpO_2 will be due to motion artifacts (MA) in the acquired PPG signal. Present day POs use weighted average based signal processing techniques to reduce MAs in case of MA episodes and then estimate SpO_2 from MA reduced PPG. Several signal processing techniques are proposed for effective removal of MA noise from PPGs.

Conventional methods like weighted moving average techniques and other methods proposed for MA reduction fail to eliminate MA noise [2]. Researchers found that MA noise component is an in-band noise with substantial spectral overlap. Quality of reference signals, correlation of signals and false peak detection during some window frames are the key features to be considered in case of adaptive filtering methods [3]-[5]. Signal processing methods based on Wavelet transforms [6] and smoothed pseudo Wigner-Ville distribution [7] could extract clean PPGs, but these methods have scale ambiguities and introduce phase distortion. Period estimation becomes difficult in case of ICA based MA reduction methods [8]. Researchers also focused on application of advanced signal processing methods based on cycle-by-cycle Fourier series (CFSA) [9], higher-order-statistics (HoS) [10] for MA reduction from corrupted PPGs. These methods fared well in MA reduction preserving all the morphological characteristics, but proved to be complex. Empirical mode decomposition (EMD) based method [11] works well with a limitation of soft thresholding. Motion tolerant adaptive filter [12] and Ensemble EMD based method [13] proposed for wearable gadgets to detect intense motions during physical exercises extracted artifact free PPGs but have limited performance due to inaccurate peak detection.

This paper presents a signal processing method based on Multi-scale Empirical Mode Decomposition (MS-EMD). The method is a combination of wavelet processing with empirical mode decomposition for effective reduction of MAs from acquired PPG signals.

Multi Level Image Thresholding Using Random Vector based Differential Evolution

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ABSTRACT *Image thresholding, it is the technique used to separate objects from its background at pixel level. It is one of the most important operations that can be used for image analysis. Image segmentation, done via multilevel thresholding, splits the image into various parts by selecting multiple threshold points. Most of the thresholding methods are depending on histogram; with those methods boundaries obtained between regions are no clear. To overcome the drawbacks of conventional techniques, a new method of algorithm called meta-heuristic Differential Evolution (DE) is proposed, which incorporates the fuzzy partition in which the Shannon entropy and fuzzy entropy are to be calculated and are to be compared. Based on flow of methodology, algorithm terminates for fixed number of thresholds as defined earlier. The performance of new method for segmentation is compared with well known algorithms optimization, like Particle Swarm Optimization and Genetic Algorithms for accurate convergence.*

Keywords: *Particle Swarm Optimization (PSO), Genetic Algorithm (GA) and Differential Evolution (DE).*

1 Introduction

Image segmentation had wide variety of applications in image analysis. Many algorithms are proposed for segmentation. No algorithm is convergent, based on image and application, different algorithms are to be tried and the algorithm which gives optimum result will be considered. As most of the methods for threshold based segmentations are histogram dependent and obtained boundaries are having not clear separated regions. To overcome the drawback, we propose new method metaheuristic Differential Evolution (DE). The proposed algorithm can be evaluated using MATLAB (R2012a) 7.14 version or any later released versions of 'MATLAB 7.0' programming language can be used for implementation of the proposed project importantly with image processing tool box to be included.

2 Existing Methods

2.1 Genetic Algorithm

The ultimate concept of Genetic Algorithm is to resemble the natural selection and the survival of fittest chromosomes. The solutions are considered as chromosomes which are having highest fitness value. The chromosomes are assessed for fitness values and they are arranged from top (Highest fitness value) to worst (Lowest fitness value based on their fitness value given. The procedure to generate new solutions in GA is impersonating the naturally choosing of living organisms, and this procedure can be achieved through repeated applications of three generalized genetic algorithm operators such as: selection, crossover and mutation [1]. At the beginning, the better chromosomes are chosen to become parents to reproduce new chromosomes. To simulate the survivor for the fittest, the chromosomes with better fitness are selected with larger probabilities than the chromosomes with smaller fitness values.

After the completion of selection of mother-father (parent) chromosomes, the crossover operator is introduced and combines the chromosomes of the parents to reproduce new baby chromosomes. Since chromosomes with larger fitness values are being selected generally, in such a way that there is a tendency that the new solutions may become alike after several generations of reproduction, and the assortment of the population may decline; and this could lead to population stagnation. Mutation is a procedure to introduce or stimulate diversity into the population of chromosomes so that stagnation can be avoided, that is they are more active when compare to parent [2].

2.2 Particle Swarm Optimization

In PSO, a candidate solution is considered as a particle, and population of solutions is called a swarm of particles. Each particle has two main properties: position updating and velocity updating. Each particle propagates to a new position based on velocity updating formulae. Once a new position is obtained, the best position of each particle and the best position of the group updating are needed.

Springer Link

A New High-Speed Multiplier Based on Carry-Look-Ahead Adder and Compressor

VLSI Design: Circuits, Systems and Applications pp 69-78 | Cite as

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First Online: 04 January 2018

Part of the Lecture Notes in Electrical Engineering book series (volume 469)

Abstract

This paper presents a new high-speed approximate multiplier using compressor and carry-look-ahead (CLA) adder to increase the speed of the computations. The number of full adders is reduced by introducing compressors. The CLA adder will reduce the waiting time by generating all carry at single instant. Initially, a 4 × 4 multiplier is designed using 4-2 compressor, 5-3 compressor, 5-bit CLA adder, a full adder, and a half adder. Later, the precision of multiplier is increased and designed up to 32 × 32 multiplier. All the designs are

STUDENTS ABSTRACT

AUTOMATIC STREET LIGHT CONTROL SYSTEM

Automatic Street Light Control System is a simple yet powerful concept, which uses transistor as a switch. By using this system manual works are 100% removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes. It automatically switches OFF lights whenever the sunlight comes, visible to our eyes. By using this system energy consumption is also reduced because nowadays the manually operated street lights are not switched off even the sunlight comes and also switched on earlier before sunset. In this project, no need of manual operation like ON time and OFF time setting. This project clearly demonstrates the working of transistor in saturation region and cut-off region. The working of relay is also known. Street light controllers are smarter versions of the mechanical or electronic timers previously used for street light ON-OFF operation. They come with energy conservation options like twilight saving, staggering or dimming. Also, many street light controllers come with an astronomical clock for a particular location or a Global Positioning System (GPS) connection to give the best ON-OFF time and energy saving. Automatic Street Light Control System is a simple and powerful concept, which uses transistor as a switch to switch ON and OFF the street light automatically. By using this system manual works are removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. It automatically switches OFF lights under illumination by sunlight.

ADVANTAGES & DISADVANTAGES:

By using this automatic system for street light controlling, we can reduce energy consumption because the manually operated street lights are not switch off properly even the sun light comes and Also not switched on earlier before sunset

- Low cost
- Low power consumption
- Very flexible
- Easy to manufactured

In sunny and rainy days, on and off time differ notice which is one of the major disadvantages of using timer circuit or manual operation for switching the street light system

Application:

The solar energy harvested from sunlight can be stored, inverted from DC voltage to AC voltage using sun tie converter. The AC voltage can be stepped up and given to the electric grid.

The AC voltage from the electric grid can be stepped down, rectified and used for powering the circuit. Meanwhile, the street light can also be powered by the A.C. voltage, which is controlled by a relay switch connected to the switching part of the circuit. The above-mentioned strategy will enable us to harvest solar energy in an effective way for the operation of the circuit and for powering the street light also.

CONCLUSION:

The Streetlight controller using ldr based Light intensity & traffic density, in the todays up growing countries will be more effective in case of cost, manpower and security as compare with today's running complicated and complex light controlling systems. Automatic Street Light Controlling System puts up a very user-friendly approach and could increase the power This paper elaborates the design and construction of automatic street control system circuit. Circuit works properly to turn street lamp ON/OFF. After designing the circuit which controls the light of the street as illustrated in the previous sections. LDR sensor and the photoelectric sensors are the two main conditions in working the circuit. If the two conditions have been satisfied the circuit will do the desired work according to specific program. Each sensor controls the turning ON or OFF the lighting column. The street lights has been successfully controlled by microcontroller. With commands from the controller the lights will be ON in the places of the movement when it's dark. furthermore, the drawback of the street light system using timer controller has been overcome, where the system depends on photoelectric sensor.

SUBMITTED BY:

S. LALITH KUMAR

(B16EI017)

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SUBMITTED BY:

S. LALITH KUMAR

(B16EI017)

BLUE BRAIN TECHNOLOGY

Virtual brain is an artificial brain, which does not actually the natural brain, but can act as the brain. It can think like brain, take decisions based on the past experience, and response as the natural brain can. It is possible by using a super computer, with a huge amount of storage capacity, processing power and an interface between the human brain and this artificial one. Through this interface the data stored in the natural brain can be up loaded into the computer. So the brain and the knowledge, intelligence of anyone can be kept and used for ever, even after the death of the person.

Brain of humans are the most valuable creation of God. A person is called intelligent because of his brain. The brain translates the information delivered by the impulses, which then enables the person to react. But we loss the knowledge of a brain when the body is destroyed after the death of man. That knowledge might have been used for the development of the human society. What happen if we create a brain and up load the contents of natural brain into it?

What Is Blue Brain?

The Blue Brain Project is assumed to be the first one to explore about a true “Artificial Intelligence” via the process of reverse engineering and also the effort to reverse engineering a human brain. The vision behind Virtual Brain will help shed some light on some aspects of human recognition. The Blue Brain Project aims to build a full computer model of a functioning brain to simulate drug treatments or any other brain related problems. Blue gene supercomputer constructed by IBM was a machine first used by Blue Brain Project and then a term Blue Brain was introduced. It can be implemented by using supercomputer, the fastest type but quite expensive and are assist for special tasks which require abundant amount of mathematical computations, like weather forecasting employs a supercomputer. The back pane of Blue Brain is Artificial Intelligence, a technology which builds intelligent machines and imparts intelligent agents. Knowledge, learning, reasoning, planning, communication and perception are the main goals of its research.

Why We Need Blue Brain?

Today we are developed because of our intelligence. Intelligence is the inborn quality that can’t be created. Some people have this quality, so that they can think up to such an extent where other can’t reach. Human society is always need of such intelligence and such an intelligent brain to have with. But the intelligence is lost along with the body after the death. The virtual brain is a solution to it. The brain and intelligence will alive even after the death. We often face difficulties in remembering things such as people’s names, their birthdays, and the spellings of words, proper grammar, important dates, history, facts etc… In the busy life every one want to be relaxed. Can’t we use any machine to assist for all these? Virtual brain may be the solution to it. What if we upload ourselves into computer, we were simply aware of a computer.

A very good example of utilization of blue brain is the case "short term memory". In some movies we might have noticed that a person might be having short term memories.

How Natural Brain Works?

The brain essentially serves as the body's information processing center. It receives signals from sensory neurons (nerve cell bodies and their axons and dendrites) in the central and peripheral nervous systems, and in response it generates and sends new signals that instruct the corresponding parts of the body to move or react in some way. It also integrates signals received from the body with signals from adjacent areas of the brain, giving rise to perception and consciousness. The brain weighs about 1,500 grams (3 pounds) and constitutes about 2 percent of total body weight. It consists of three major divisions;

- The massive paired hemispheres of the cerebrum
- The brainstem, consisting of the thalamus, hypothalamus, epithalamiums, sub thalamus, midbrain, pons, and medulla oblongata
- The cerebellum.

The human ability to feel, interpret and even see is controlled, in computer like calculations, by the magical nervous system. The nervous system is quite like magic because we can't see it, but its working through electric impulses through your body. One of the world's most "intricately organized" electron mechanisms is the nervous system. Not even engineers have come close to making circuit boards and computers as delicate and precise as the nervous system. To understand this system, one has to know the three simple functions that it puts into action; sensory input, integration & motor output.

How to upload Human Brain?

Nanobots, a very small robot, are the most promising factor for uploading. Emerging technology fields creating machines or robots whose components are nearly close to the scale of a nanometre. These monoids are so small that it can travel throughout our circulatory element. To accomplish these uploading, small robots known as nanobots are used. Fig. 4.1 Nanobots the activity and structure of our central nervous system will be monitored by them by travelling into the spine and the brain. An interface will be provided with computers that is very close as our mind can be while we still reside in our biological form. Carefully scanning the structure of the brain is the additional function of the nanobots which provides a complete readout of the connections. Further, this information helps the machine to function as the human functions. Finally, by using nanobots, the data stored in the entire brain will be uploaded into the computer

Requirements:

A supercomputer with high processing power processor

- A very large storing capacity
- A very wide interconnection network.
- A program to map electric impulses from human brain to input signal that can be received by the computer

Advantages:

• We can remember things without any effort.

• Decision can be made without the presence of a person.

• Even after the death of a man his intelligence can be used.

• The activity of different animals can be understood.

• It would allow the deaf to hear via direct nerve stimulation, and also be helpful for many psychological diseases. By down loading the contents of the brain that was uploaded into the computer, the man can get rid from the madness.

Disadvantages:

• There are many new dangers these technologies will open. We will be susceptible to new forms of harm.

• We become dependent upon the computer systems.

• Others may use technical knowledge against us.

• Computer viruses will pose an increasingly critical threat.

• The real threat, however, is the fear that people will have of new technologies. That fear may culminate in a large resistance. Clear evidence of this type of fear is found today with respect to human cloning.

SUBMITTED BY:

V.SAIPRIYA

(B16EI055)

BLUETOOTH CONTROL ROBOT

The operating system of smart phone is android which can develop effective remote-control program. At the same time, this program uses blue-tooth connection to communicate with robot. It has proven to allow for meaningful two-way communication between the Android phone and the robot which would allow a non-expert to interact with and adjust the functionality of a system which uses ATmega328 controller, a single board micro-controller intended to make the application of interactive objects or environments more accessible. The surveillance is always has been a quite sensitive task. And it includes so many risks. So, it's better to use robot for this job instead of people. And if you are able to control the robots with efficiency and accuracy then you can guarantee yourself with good results and success. This system is a good step for secure surveillance using robots

Here main motto is to control the car with android application. Here we can use mainly Arduino UNO (ATMEGA 328P), Bluetooth module (HC-05). We interface the Bluetooth module with the system so that we can easily control the system by smart phone application. This project is more necessary to the modern society in context of spying and surveillance. The project aims in designing a Robot that can be operated using Android mobile phone. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth feature present in it. Here in the project the Android smart phone is used as a remote control for operating the Robot. The controlling device of the whole system is a Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot. In achieving the task the controller is loaded with a program written using Embedded 'C' language. Still there exists a requirement of a cost-effective automation system, which will be easy to implement

The design of the system is kept as simple as possible. Few things like cost-effectiveness and simplicity in design, low profile structure etc. have been kept in mind before designing.

WORKING PRINCIPLE:

The working principle is kept as simple as possible. The working principle of the circuit has been elaborated with the help of a block diagram, of the system interconnection. A DC power supply is required to run the system. The DC power supple feeds the Microcontroller and the Bluetooth module. The Bluetooth module receives the signal sent from an android smart-phone, where the application software coded in C language is installed. The microcontroller, thereby, sends instructions, which when executed, helps in functioning of the motor driver. The movement and functioning of the motor can be controlled by using the android based application software.

Hardware of this project consists of Arduino UNO, Bluetooth module and a motor driver IC. The Bluetooth module is connected with the Arduino UNO board for the connection with

the user. Through the Bluetooth module for monitoring and controlling the particular motor reaches the board and process accordingly and the output of the Arduino goes to the motor driver IC and it controls the particular motor. Our proposed project consists of the following three sections:

a) Input section

b) Microcontroller section

c) Output section

In our android application base Bluetooth controlled robotic car, the user interacts with the system with a smart phone. In this method user must be present within in range (< 15 meters) to control the system.

When user sends any data to the Arduino board then the corresponding pin of Arduino goes to high state and switches the motor driver ic in the on mode. The corresponding motor moves as per the input data. Here in this project the user (android application) is the input section. This device is connected with the Arduino board (microcontroller section) by the means wirelessly i.e. Bluetooth module.

APPLICATIONS:

- It can be used in various industries where human intervention is not desired.
- It can be used to develop robot with military applications.
- It provides more application based on Android operating system.
- With tremendous smart phone in markets, it is bound to have many more applications in near future.

SUBMITTED BY:

MOHAMMED SHADAAB

(B16EI037)

ELECTRONIC DICE

This digital dice is used to display random numbers from 1 to 9 on the 7segment display. This is an alternative device that can be used to replace the traditional dice when you are playing games such as snake ladder and monopoly.

Playing with dice is an age old game. We all love to play with it too. Playing with dice needs us to pick up a dice and make sure that it is unbiased. Making a block as a dice and cutting it clearly to make sure that it is unbiased is all an old story. The dice becomes biased if the shape is not cut well.

Also, the dice can become biased due to deformations. If it is a wooden die, it can deform due to dampness in the atmosphere or due to mechanical stress. To solve all these problems which we have with a conventional dice, we have made a dice circuit which solves all the problems of a conventional dice.

Now, we are going to show you an electronic LED dice which is nearly unbiased. There is no chance to cheat as the circuit operates at such a high speed that the circuit is almost imperceptible to the human eye. There is also little maintenance and there is hardly any impact on aging of the circuit. The frequency may vary a bit with change in power supply voltage, aging of the active and passive components but still the randomness will be preserved without any trouble.

WHAT IS A DICE?

Dice are small throwable objects that can rest in multiple positions, used for generating random numbers. Dice are suitable as gambling devices for games like craps and are also used in non-gambling table top games.

A traditional die is a cube, with each of its six faces showing a different number of dots pipes from one to six. When thrown or rolled, the die comes to rest showing on its upper surface a random integer from one to six, each value being equally likely. A variety of similar devices are also described as dice; such specialized dice may have polyhedron or irregular shapes and may have faces marked with symbols instead of numbers. They may be used to produce results other than one through six. Loaded and crooked dice are designed to favour some results over others for purposes of cheating or amusement.

A dice tray, a tray used to contain thrown dice, is sometimes used for gambling or board games, in particular to allow dice throws which do not interfere with other game pieces.

ADVANTAGES AND DISADVANTAGES:

ADVANTAGES:

- An electronic dice can give fast response than a ordinary dice.
- It can give fast response without any delay.
- Cheating can be avoided while playing snake and ladder and ludo games.
- Reduces human effort.

DISADVANTAGES:

- It is costly when compared to ordinary dice.
- Difficult to carry.
- Power supply needed.
- As connections are complex we cannot use this equipment anywhere.

APPLICATIONS:

This unbiased electronic dice with LEDs can be used wherever traditional dice is used like:

- Snakes and Ladders
- Ludo
- Monopoly
- Business.

KEY POINTS:

- An alternative device is obtained that can be used to replace the traditional dice when you are playing games such as snake ladder, monopoly etc.
- It can efficiently work on +6V; power supply.
- In many cases cheating can be avoided while playing snake & ladder and ludo etc.,
- Reduces human effort.

SUBMITTED BY:

K. SAI VISHNU VARDHAN

(B16EI030**)**

EVALUATION OF FINFET

The Delay and Speed plays a complementary role in ICs, as the delay decreases the speed increases and vice-versa. The scaling of MOSFETs has resulted in reduction in size of ICs. As we scale down to nanometre regime, the Short Channel Effects (SCEs) of MOSFET affects the system performance and reliability. FinFET is an alternate MOSFET, through which the SCEs are reduced. The performance analysis of FinFET based digital applications such as inverter circuit, NAND and NOR gates at 22nm and 14nm technology nodes. The simulations are done using HSPICE. The results obtained for delay, average power dissipation and total power dissipation are so promising that FinFET will be an alternative to traditional MOSFETs issues.

As Gordon Moore predicted, over the last three decades number of transistors in a single chip has been increased significantly from thousand to several billion. As a result of this, the advancements in technologies gave us high-speed multi-core processor technology, huge size memory devices, etc. Yet, today's emerging advanced robotic systems and embedded systems need higher speeds, smaller sized IC's to push boundaries of their performance and current IC technologies are unable to deliver their requirement [1-3]. Hence development of such systems remains a challenge. To support development of such systems, it is necessary for IC technology to scale down the transistors and increases the speed and performance. Every circuit consists of an inverter, NAND and NOR circuits. The shrinking of the CMOS technology has been increased very aggressively with ultrathin sizes [2]. This creates many significant challenges and reliability issues in design which causes augmented process variations, SCEs, power densities and leakage currents etc. Thus Inverter, NAND and NOR circuits are one of the essential parts of digital system. The operations of such device are usually valued by taking its operation parameters like switching speed in terms of delay of operation and power consumption. Since the MOSFET's failure at the nanometre regime beyond 32nm and our focus is on operations at the lower node technology such as 22nm and 14nm where alternative MOSFET called FinFET comes into picture and its performance must be studied and we shall prove that it is the solution for conventional MOSFET's failure.

MOSFET AND FINFET STRUCTURE

Metal Oxide Semiconductor Field Effect Transistor (MOSFET) allowed us to build everyday advanced systems such as Smart Phones, Laptops, etc., which is prior to the 22nm node. In 22-nm node further scaling down of MosFET has become impossible due to increased SCEs, such as Drain Induced Barrier lowering (DIBL), Impact Ionization, Velocity saturation, Channel length modulation, Oxide breakdown, etc. Hence for advancements in 22-nm node most of the foundries introduced new type of transistor called Fin Field Effect Transistor (FinFET) [5-7]. To deliver small and fast IC's with large computation capability, key requirements of transistor design are: 1. High ON current (ION). 2. Low OFF current (IOFF) 3. High switching speed. To achieve these, other transistor options which will give the better performance, must be explored. That is the place where FinFET technology plays a pivotal role.

Fin Based Field Effect Transistor (FinFET) is a vertical multiple-gate device that has been stated as a promising candidate to substitute bulk CMOS technology for Very Large- Scale Integrated (VLSI) circuits, due to its higher potentiality to push back the integration limits [1012]. Additionally, other advantages are mainly: lower short channel effects impact, steeper subthreshold slope and reduced variability influence. Here we are considering a Double Gate (DG) shorted gate (SG) FinFET to analyse the digital circuits of Inverter, NAND and NOR gates.

TECHNICAL CONSIDERATIONS:

The concepts and considerations to be known prior to understand the Inverter, NAND and NOR gates are as follows.

(1). Technology Nodes: The 22-nanometer (22-nm) is the process step currently being used. The typical half-pitch (i.e., half the distance between identical features in an array) for a memory cell using the process is around 22 nm. The 14-nanometer (14 nm) node is the technology node following the 22-nm (20 nm) node.

(2). Device Parameter Considerations: The design parameters are considered with respect to the PTM model files. Table 1 shows the design parameters we have employed for the circuit simulations in our present work.

ADVANTAGES OF FINFET:

(1) Dual-gate FinFET, which trims the excess silicon by fabricating the channel using an ultrathin layer of silicon that sits on top of an insulator, therefore the electric field from the gate to the fin on the top is drastically reduced.

(2) Tri-gate FinFET, in which the FET gate wraps around three sides of the transistor's elevated channel, or "fin". Since fins are made vertical in nature, high packing density can be achieved, by packing transistors closer together. Further, to get even more performance and energy-efficiency gains, designers also have the ability to continue growing the height of the fins.

(3) FinFET is the fin thickness, which needs to be smaller than or equal to the gate length. Their scaling does not depend on oxide thickness, which is a big advantage because it’s the process lithography that defines the FET characteristics at each new process node.

(4) Excellent control of the conducting channel by the gate, very little current is allowed to leak through the body when the device is in the off state.

(5) FinFET can also be run at a lower operating voltage for a given leakage current, halving its dynamic power consumption (which is proportional to CV2f) for a 0.7 scaling in VDD.

(6) At 1V, the FinFET is 18% faster than the equivalent planar device, but at 0.7V, the advantage is 37%. This is attributed to the FinFET’s sub-threshold swing (the amount that the

threshold voltage has to be changed to halve its leakage) which is lower than in a planar device. This enables the device to be operated at lower threshold voltages for the same leakage.

APPLICATIONS OF FINFET:

Inverter, NAND and NOR gates are essential component in any device circuits. According to International Technology Roadmap for Semiconductors (ITRS), in current world's the circuits numerous times. This demands the circuits to operate in high speed and also power consumption of embedded memory circuits to be reduced. Lowering the supply voltage is very effective in power saving but scaling down the power supply using conventional MOSFET is an issue due to SCE. Hence, FinFET can be used as an alternative to scale down the power supply.

SUBMITTED BY:

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FIBER OPTIC SENSOR SYSTEM TECHNOLOGY

The Foss technology developed at NASA 'S Armstrong flight research center represents a major breakthrough in high-speed operational monitoring and sensing technology. Driven by ultra-efficient algorithms, Foss can be used to determine in real time. A variety of critical parameters including strain, shape deformation, temperature, liquid level, strength and operational loads.

The system process information at rates up to 5000 times per second, representing a 1000-fold improvement over conventional fiber optic technologies. In addition, it offers unprecedented levels of data density as each 40-foot hair like optical Fiber provides up to 2000 data points with adjustable spatial resolution.

To achieve these revolutionary capabilities, Foss employee's fiber Bragg grating (FBG) sensor and a combination of optical frequency domain reflectometry (OFDR) for high spatial resolution and wavelength division multiplexing (WDM) for high acquisition speed, together with an interferometer technique that can simultaneously interrogate thousands of FBG sensors in a single fiber. This state-of-the-art sensor system deliver reliable measurement in the most demanding environments confronted by the aerospace engineering automotive and energy sectors.
A new technology has emerged in recent years that has the potential to dramatically improve the design and efficient operation of aerospace vehicles throughout their entire life cycle, from initial design to final retirement. This new technology, often referred in the literature as Fiber Optic "Smart" or "Sensory" Structures (FOSS), began in the early 1980s with breakthroughs in the miniaturization of sensors and actuators, along with advances made in the field of composite materials. The FOSS concept, as originally envisaged, involved the distribution of advanced sensor networks, such as fiber optic sensors, that could be integrated within, and adhered to the surface of load-bearing composite structures. The vision was that these sensors could be distributed in vast networks analogous to the nervous system in the human body. Information from these sensory networks could be fed-back to on-board or central processing computers, serving as the brain, which in turn could provide instructive information to pilots, maintenance crews, or other key decision makers responsible for ensuring vehicle performance over the vehicle's life cycle. Stresses, structural instabilities, temperature distributions, and a plethora of other engineering measurands could be monitored in real time with a single fiber optic-based instrumentation system. Such a system could offer an unparalleled amount of valid engineering data indicating the structure and sub-system health with almost no weight penalty.

While an increasing number of FOSS technologies are emerging from the research laboratory, many technological barriers still exist that impede its acceptance by the aerospace community. This acceptance is especially challenging because of strict vehicle performance requirements, coupled with highly aggressive project schedules that compete against the implementation of what is viewed by many as "high risk" technologies. Much of that risk comes from a lack of understanding of the accuracy and performance of embedded sensors in large-scale FOSS

components. This area must be addressed and the integration risk reduced by thoroughly validating the new technology using universally accepted industrial standards. A greater emphasis on large- scale sensor validation is required before FOSS components can gain full acceptance by the mainstream engineering community and placed into service.

While some of the barriers toward FOSS application are technical, many of these barriers are cultural. As with any new technology, the fear of change from what works, no matter how antiquated, to what could be involves a cultural paradigm shift from conventional thinking. Without these cultural changes, realizing the benefits of FOSS technologies could have the real consequence of limiting the efficiency and performance of future aircraft vehicle designs. Or far worse, a failure to embrace the advantages of new promising technologies, such as FOSS could impair competitiveness in combat or impact economic completeness' in the global marketplace.

To address these barriers, this paper first presents work that has been conducted at the National Aeronautics and Space Administration (NASA) Dryden Flight Research Center (Edwards, California) to clear some of the FOSS technical barriers to large-scale application. After a brief overview of conventional and fiber optic sensor technology, an overview of the research and development that has been conducted using fiber optic sensors at all vehicle phases will be discussed. Lastly, to help overcome the cultural resistance, the FOSS vision is presented and its potential benefits in aerospace vehicle design throughout the life cycle.
Fiber optics sensor system works based on two criteria's:

1.FBG Theory
2.Reflectomatry

MERITS OF FIBER OPTIC SENSORS:

- Weights
- Multiplexing
- Embedment
- Safety

APPLICATIONS:

The FOSS technology is ideal for monitoring the structural health of aircraft, buildings, and dams; improving the efficiency of turbines and industrial equipment; detecting instabilities within tunnels and power plants, and much more.

THE FUTURE OF FOSS AND FBG-OFDR TECHNOLOGIES

The benefits of FOSS technology and its potential to address these formidable challenges, make its acceptance by the aerospace community that much more important. The prospect of dramatically improving the measurement count-to-total sensor weight, or data-to-weight ratio

has the potential to benefit the vehicle management and operations from early design to final retirement. One recent in-house study estimates that FBG sensors based on OFDR can provide 100 to 1000 times the number of conventional strain/temperature measurements at 1/100 to 1/1000 of the total sensor weight, depending on the application. Conventional technologies and business-as-usual cultural practices and methodologies must be overcome to realize the full potential that the FOSS technologies offer.

LIMITATIONS:

- Optical fiber is more fragile than conventional strain gauges.
- Not practical if only interested in spot measurement.

SUBMITTED BY:
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(B16EI038)

FOOT STEP POWER GENERATION

Nowadays energy and power are the one of the basic necessities regarding this modern world. As the demand of energy is increasing day by day, so the ultimate solution to deal with these sorts of problems are just to implement the renewable sources of energy. So 'foot step power generation' can be employed for extremely populated nations like China and India where the streets, rail and bus station are over peopled.

The basic working principle of footstep power generation system is based on the piezoelectric sensor. Foot step power generation is power generation using footstep based on available piezoelectric sensor which converts mechanical energy into electrical energy. When the flooring is engineered with piezo electric technology, the electric energy produced by pressure is captured by the floor sensors and converted it into electrical charge by piezo transducers then stored and used as a power source.

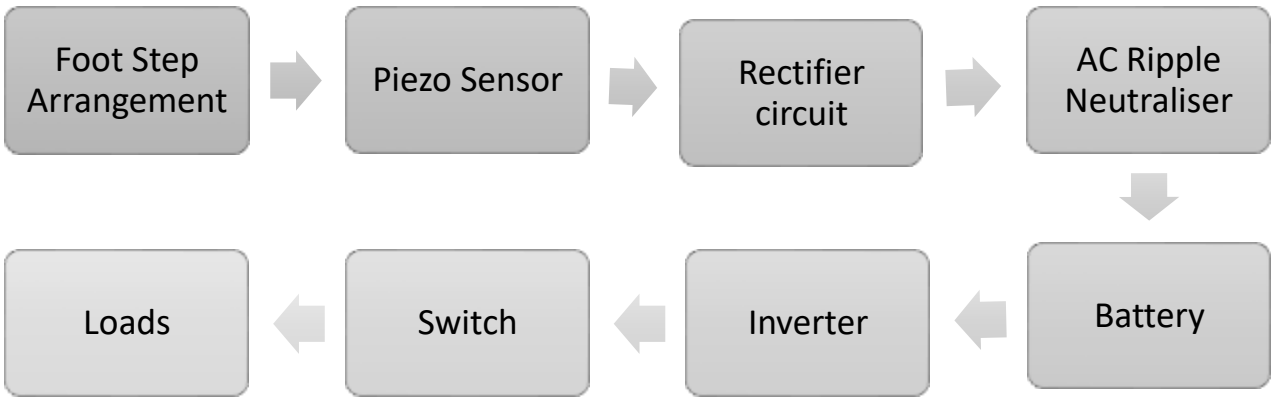
This power source has many applications in agriculture, home applications, street lights and as an energy source for sensors in remote locations. Thus, these techniques of power generating systems are very useful and handy in order to match the supply and demand of energy globally as well.

Principle:

The basic principle of foot step power generation is the "Piezo Electric Effect".

- Piezoelectric Effect is the ability of certain materials to generate an electric charge in response to applied mechanical stress.
- Whenever a person walks on the floor under which the piezo sensors are placed, the crystal undergoes some deformation and generates the electricity.

Block Diagram:



Working:

We are using conventional battery charging unit also for giving supply to the circuitry. The piezoelectric placed under insulating material like hard rubber and pressure created by foot step and water fall pressure will produce electrical energy which can be stored and used for domestic purpose. The property of Piezoelectric Material is to generate electricity when we apply pressure. It has two axis, mechanical axis & electrical axis. When we apply pressure in mechanical axis, it generates power in its electrical axis. Piezo means the generation of the electrical polarization of a material as a response to mechanical strain. This phenomenon is known as direct effect or generator effect and is applied fundamentally in the manufacture of sensors (mobile phone vibrators, lighters, etc.). In these cases, piezoelectric materials, also used in actuators, undergo an inverse or motor effect, i.e. a mechanical deformation due to the application of an electrical signal. Whenever force is applied on piezo electric crystals that force is converted to Electrical Energy. The generated electricity is of AC type, so in order to store that in a battery we convert the AC to DC using a Rectifier circuit. The ripples (if any) are eliminated using an AC ripple neutralizer which also provides constant voltage. The generated DC voltage is stored in a lead acid storage battery, the battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. This 230 Volt A.C

voltage is used to activate the loads and can be used for different kind of applications.

Advantages:

- Power is generated by simply walking on the floor.
- No fuel is required to generate the power.
- It is eco-friendlier since it is a non-conventional way of generating electricity.
- It is more reliable system.
- It is a Non-Conventional system.
- It has no moving parts, so it has a long life.
- It is self-generating system; no external power is required.
- It is compact yet highly sensitive.
- The maintenance cost is very less.

Disadvantages:

- Initial cost is very high.
- Only applicable for particular places.
- The output is affected by temperature variation.
- Care should be taken for batteries.

Applications:

- It can be used in Emergency power failures.
- It can be employed in different agricultural applications.
- Home applications to run different electronic appliances.
- It can be employed for lighting the streets.
- Metros, shopping malls, railway stations and places where people are overcrowded.
- It can also be employed for Rural applications.

SUBMITTED BY:

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(B16EI013)

HAPTIC TECHNOLOGY

“HAPTICS” --a technology that adds the sense of touch to visual environment. Haptic interfaces allow the user to feed as well as to see virtual objects on a computer, and so we can give an illusion of touching surfaces, shaping virtual clay or moving objects around.

The sensation of touch is the brain’s most effective learning mechanism—more effective than seeing or hearing—which is why the new technology holds so much promise as a teaching tool.

Haptic technology is like exploring the virtual world with a stick. With this technology, we can now sit down at a computer terminal and touch objects that exists only in the “mind” of the computer. By using special input/output devices (joystick, data gloves or other devices), users can receive feedback from computer applications in the form of felt sensations in the hand or other parts of the body. In combinations with the visual display, haptic technology can be used to train people for tasks requiring hand-eye coordination, such as surgery and space maneuvers.

Sensors and actuators are used for tracking the position and movement of the haptic device moved by the operator.

What is haptic interaction?

"A haptic interface is a force reflecting device which allows a user to touch, feel, manipulate, create and/or alter simulated 3D objects in a virtual environment" haptic. (Adjective Grk: haptein) having to do with the sense of touch; tactile haptics = touch, tactile, force-feedback, using force/resistance, texture, heat, vibration

How does it work?

Force display technology works by using mechanical actuators to apply forces to the user. By simulating the physics of the user’s virtual world, we can compute these forces in real-time, and then send them to the actuators so that the user feels them.

Creating robots that can see, feel, smell and taste

It has taken millions of years of evolution to create the myriad of animal designs that roam the Earth today. But despite the incredible range of shapes and sizes that have resulted, many of these creatures share some very basic and vital senses vision, touch, smell and taste. So fundamental to survival are these senses, that robotics overlooked the sheer complexity of their physiology, until now and finally after years of painstaking research, we are beginning to create robots that can interact with the world around them and the result is almost life-like.

- Sight
- Feel

- Smell
- Taste

The standard list of five senses does not really give our bodies credit for all of the amazing things they can do. There are at least a dozen different things we can sense

In order for us to have a sense, there needs to be a sensor. Each sensor is turned to one specific sensation. For example, there are sensors in your eyes that can detect light. That is all that they can detect. To track down all of the different senses a person has, the easiest things to do is to catalog all of the different sensors. Here is a reasonable list

In your eyes, you have two different types of light sensors. One set of sensors, called the rods, senses light intensity and works in low-light situations. The other type, called cones, can sense colors and require fairly intense light to be activated.

In your inner ears, there are sound sensors. Also, in your ears are sensors that let you detect your orientation in the gravitational field—they give you your sense of balance. In your skin, there are at least five different types of nerve endings for sensing heat, Cold, Pain, Itch, Pressure etc. These cells give us the sense of touch, sense of pain, sense of temperature and sense of itch.

The fight for Sight

Artificial vision involves far more than simply attaching a camera to the head of a robot. If robots are to actually react in a suitable way, they must be able to interpret what they are seeing.

How do you get a robot to recognize an apple? You have to program it with enough information in its internal memory system, so that the apple could not possibly be anything else. But look around you; think how much information you would have to provide to account for all the objects in the room, let alone the world

To Feel for Real

As you touch your keyboard now, millions of tiny nerves relay information to the brain about the position, texture and movement of the keys. Robots have no impulses, so how do they manipulate screwdrivers and spanners to perform delicate tasks.

The story of artificial touch begins in an area of virtual reality called HAPTICS which describes the physical handling of virtual objects. With your fingers placed in special thimbles, you can pluck non-existent objects of a virtual environment and even watch your virtual hands doing it!

Just a Taster!

In January this year, a hand-held robotic tongue was unveiled to the world. Now threatening to replace professional tasters, this tongue is able to distinguish not only between two different wines from the same winery but also between different years! Sophisticated wine connoisseur it may be, but the science behind it is simple The tongue’s

electric circuit contains four chemical sensors relating to the four basic tastes sweet, sour, salty and bitter. These sensors absorb dissolved substances differently. Specific foods have a unique “fingerprint” of these substances, therefore affecting the conductivity of the circuit in their own unique way.

Robots that Smell!

Like ants following there own pheromone trails back home, robots can be fitted with special quartz crystal microbalance (QCM) sensors to detect and follow specific chemicals along the ground. Again Professor Russell explains, “The QCM sensors actually weigh the odor molecules and the extra weigh reduces the crystal frequency.

Why is it going to be important?

- Not exploiting the interface to keep up with computing power
- More 3D and VR environments in games and elsewhere
- Demand for richer input and output possibilities

Potential Benefits

- Reduction in fatigue
- Increase in productivity and comfort
- decreased learning times
- Large reductions in manipulation errors.

What sorts of products are being produced?

- The Phantom haptic interaction device
- Magnetic levitation interaction devices
- Exoskeleton devices
- The Freedom 7

What application areas are best suited to haptic input?

- Medicine, for training, surgical simulation
- Other risky/specialized areas, e.g. astronauts, mechanics
- Education about complex objects, e.g. chemistry
- Creative 3D work, e.g. modeling, product design

SUBMITTED BY:

M.REVANTH KUMAR

(B16EI015)

LIFI TECHNOLOGY

In this era of advanced science, a number of wireless connections are available to connect to the internet. It has become a very common and a handy tool to access wireless internet from a coffee shop to a conference hall. As the number of people accessing the wireless internet increase, the clogged airwaves make it extremely difficult to latch on to a reliable signal. One German physicist Harald Hass has come up with a solution which he names as “data through illumination” taking the fiber out of fiber optics by sending data through LED light bulb that varies in intensity faster than a human eye can identify.

This technology is named as Li-Fi transmission which stands for light fidelity. This invention can produce data rates faster than 10megabits per second which is much more than that of an average broadband connection speed .**Li-Fi** is a label for wireless-communication systems using light as a carrier instead of traditional radio frequencies, as in Wi-Fi. Li-Fi should not be confused with the more general term visible light communications (VLC), which is the use of the visible light portion of the electromagnetic spectrum to transmit information. In the era of overcrowded (data communication) world, Li-Fi is a new way of wireless communication that uses LED lights to transmit data wirelessly. Transmission of data is one of the most important day to day activities in the fast growing world. The current wireless networks that connect us to the Internet are very slow when multiple devices are connected. Also with the increase in the number of devices which access the Internet, the availability of fixed bandwidth makes it much more difficult to enjoy high data transfer rates and to connect a secure network. Radio waves are just a small part of the electromagnetic spectrum available for data transfer. Li-Fi has got a much broader spectrum for transmission compared to conventional methods of wireless communications that rely on radio waves. The basic ideology behind this technology is that the data can be transferred through LED light by varying light intensities faster than the human eyes can perceive. This technology uses a part of the electromagnetic spectrum that is still not greatly utilized- The Visible Spectrum, instead of Gigahertz radio waves for data transfer.

The idea of Li-Fi was introduced for the first time by a German physicist Harald Hass in the TED (Technology, Entertainment, Design) Global talk on Visible Light Communication (VLC) in July 2011, by referring to it as “data through illumination”. He used a table lamp with an LED bulb to transmit a video of a blooming flower that was then projected onto a screen. In simple terms, Li-Fi can be thought of as a light-based Wi-Fi i.e. instead of radio waves it uses light to transmit data. In place of Wi-Fi modems, Li-Fi would use transceivers fitted with LED lamps that could light a room as well as transmit and receive information. By adding new and unutilized bandwidth of visible light to the currently available radio waves for data transfer, Li-Fi can play a major role in relieving the heavy loads which the current wireless system is facing. Thus it may offer additional frequency band of the order of 400 THz compared to that available in RF communication which is about 300 GHz. Also, as the Li-Fi uses the visible spectrum, it will help alleviate concerns that the electromagnetic waves coming with Wi-Fi could adversely affect our health.

By Communication through visible light, Li-Fi technology has the possibility to change how we access the Internet, stream videos, receive emails and much more. Security would not be an issue as data can't be accessed in the absence of light. As a result, it can be used in high security military areas where RF communication is prone to eavesdropping.

ARCHITECTURE OF Li-Fi SYSTEM

Li-Fi which can be the future of data communication appears to be a fast and cheap optical version of Wi-Fi. Being a Visible Light Communication (VLC), Li-Fi uses visible light of electromagnetic spectrum between 400 THz and 800 THz as optical carrier for data transmission and illumination. It uses fast pulses of light to transmit information in wireless medium. The main components of a basic Li-Fi system may contain the following:

a) A high brightness white LED which acts as transmission source.
b) A silicon photodiode with good response to visible light as the receiving element.

Switching the LEDs on and off can make them generate digital strings with different combination of 1s and 0s. To generate a new data stream, data can be encoded in the light by varying the flickering rate of the LED. In this way, the LEDs work as a sender by modulating the light with the data signal. The LED output appears constant to the human because they are made to flicker at a phenomenal speed (millions of times per second) and it's impossible for human eye to detect this frequency. Communication rate more than 100 Mbps can be achieved by using high speed LEDs with the help of various multiplexing techniques. And this VLC data rate can be further increased to as high as 10 Gbps via parallel data transmission using an array of LED lights with each LED transmitting a different data stream.

The Li-Fi transmitter system comprises of four primary subassemblies:

- Bulb
- RF Power Amplifier Circuit (PA)
- Printed Circuit Board (PCB)
- Enclosure

How it Works:

The working of Li-Fi is very simple. There is a light emitter on one end i.e. an LED transmitter, and a photo detector (light sensor) on the other. The data input to the LED transmitter is encoded in to the light (technically referred to as Visible Light Communication) by varying the flickering rate at which the LEDs flicker 'on' and 'off' to generate different strings of 1s and 0s. The on-off activity of the LED transmitter which seems to be invisible (The LED intensity is modulated so rapidly that human eye cannot notice, so the light of the LED appears constant to humans), enables data transmission in light form in accordance with the incoming binary codes: switching ON a LED is a logical '1', switching it OFF is a logical '0'. By varying the rate at which the LEDs flicker on and off, information can be encoded in the light to different combinations of 1s and 0s.

In a typical setup, the transmitter (LED) is connected to the data network (Internet through

the modem) and the receiver (photo detector/light sensor) on the receiving end receives the data as light signal and decodes the information, which is then displayed on the device connected to the receiver. The receiver (photo detector) registers a binary ‘1’ when the transmitter (LED) is ON and a binary ‘0’ when the transmitter (LED) is OFF. Thus flashing the LED numerous times or using an array of LEDs (perhaps of a few different colours) will eventually provide data rates in the range of hundreds of Mbps.

APPLICATIONS OF Li-Fi:

There are numerous applications of Li-Fi technology, from public Internet access through existing lighting (LED) to auto-piloted cars that communicate through their headlights (LED based). Applications of Li-Fi can extend in areas where the Wi-Fi technology lacks its presence like aircrafts and hospitals (operation theatres), power plants and various other areas, where electromagnetic (Radio) interference is of great concern for safety and security of equipments and people. Since Li-Fi uses just the light, it can be used safely in such locations or areas. In future with the Li-Fi enhancement all the street lamps can be transformed to Li-Fi connecting points to transfer data. As a result of it, it will be possible to access internet at any public place and street.

SUBMITTED BY:

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MOBILE DETECTOR

This handy, pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile cell phone from a distance of one and-a-half meters. So it can be used to prevent use of mobile phones in examination halls, confidential rooms, etc. It is also useful for detecting the use of mobile phone for Spying and unauthorized video transmission. The circuit can detect the incoming and outgoing calls, SMS and video transmission even if the mobile phone is kept in the silent mode. The moment the Bug detects RF transmission signal from an activated mobile phone, it starts sounding a beep alarm and the LED blinks. The alarm continues until the signal transmission ceases. Assemble the circuit on a general purpose PCB as compact as possible and enclose in a small box like junk mobile case. As mentioned earlier, capacitor C3 should have a lead length of 18 mm with lead spacing of 8 mm. Carefully solder the capacitor in standing position with equal spacing of the leads. The response can be optimized by trimming the lead length of C3 for the desired frequency. You may use a short telescopic type antenna.

Use the miniature 12V battery of a remote control and a small buzzer to make the gadget pocket-size. The unit will give the warning indication if someone uses Mobile phone within a radius of 1.5 meters.

the previous detection techniques which has been introduced already in the market.

The first signal detection technique, an existing design utilizing discrete component is difficult to implement. They are very affordable to construct, but require precision tuning. This design is analysed and found to be inaccurate.

The second signal detection technique, a design using a down converter, voltage-controlled oscillator (VCO), and a bandpass filter was investigated for cellular phone detection. The performance of this technique through hardware and computer modelling is discussed and the results are presented. The new system is accurate and a practical solution for detecting cellular phone in a secure facility.

A mobile phone (also known as a cellular phone, cell phone, and a hand phone) is a device that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.

In addition to telephone, modern mobile phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography.

A cellular network or mobile network is a radio network distributed over land areas called cells, each served by at least one fixed-location transceiver known as a cell site or base station. In a cellular network, each cell uses a different set of frequencies from neighbouring cells, to avoid interference and provide guaranteed bandwidth within each cell.

In a cellular radio system, a land area to be supplied with radio service is divided into regular shaped cells, which can be hexagonal, square, circular or some other regular shapes, although hexagonal cells are conventional. Each of these cells is assigned multiple frequencies (f1 – f6) which have corresponding radio base stations. The group of frequencies can be reused in other cells, provided that the same frequencies are not reused in adjacent neighbouring cells as that would cause co-channel interference.

The increased capacity in a cellular network, compared with a network with a single transmitter, comes from the fact that the same radio frequency can be reused in a different area for a completely different transmission. If there is a single plain transmitter, only one transmission can be used on any given frequency. Unfortunately, there is inevitably some level of interference from the signal from the other cells which use the same frequency. This means that, in a standard FDMA system, there must be at least a one cell gap between cells which reuse the same frequency.

In the simple case of the taxi company, each radio had a manually operated channel selector knob to tune to different frequencies. As the drivers moved around, they would change from channel to channel. The drivers knew which frequency covered approximately what area. When they did not receive a signal from the transmitter, they would try other channels until they found one that worked. The taxi drivers would only speak one at a time, when invited by the base station operator (this is, in a sense, time division multiple access (TDMA).

Practically every cellular system has some kind of broadcast mechanism. This can be used directly for distributing information to multiple mobiles, commonly, for example in mobile telephony systems, the most important use of broadcast information is to set up channels for one to one communication between the mobile transceiver and the base station. This is called paging.

The details of the process of paging vary somewhat from network to network, but normally we know a limited number of cells where the phone is located (this group of cells is called a Location Area in the GSM or UMTS system, or Routing Area if a data packet session is involved; in LTE, cells are grouped into Tracking Areas).

This is called the handover or handoff. Typically, a new channel is automatically selected for the mobile unit on the new base station which will serve it. The mobile unit then automatically switches from the current channel to the new channel and communication continues.

Some cellular phones come with 802.11 wireless built in and allows the phone to connect to any nearby wireless network. This provides an alternate connection method to the Internet and saves money if you are on a limited data plan. Also, connecting with 802.11 is most likely going to provide better throughput than using the cellular phone network.

All these features make cellular phone today very versatile. They can connect with almost any storage medium or computer. In the years to come, cellular phones will continue to gain more and more features.

APPLICATIONS:

(i) Colleges and Universities.
(ii) Cinemas.
(iii) Restaurants.
(iv) Petrol Stations
(v) Airplanes.

SUBMITTED BY:

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(B16EI007)

OBSTACLE AVOIDING ROBOT

Robotics is an interesting and fast-growing field. Being a branch of engineering, the applications of robotics are increasing with the advancement of technology. The concept of Mobile Robot is fast evolving and the number of mobile robots and their complexity are increasing with different applications.

There are many types of mobile robot navigation techniques like path planning, self – localization and map interpreting. An Obstacle Avoiding Robot is a type of autonomous mobile robot that avoids collision with unexpected obstacles.

In this project, an Obstacle Avoiding Robot is designed. It is an Arduino based robot that uses Ultrasonic range finder sensors to avoid collisions. If the distance between the robot and the obstacle is less than 15cm, the Robot stops and scans in left and right directions for new distance using Servo Motor and Ultrasonic sensor.

Robotics is an interesting and fast-growing field. Being a branch of engineering, the applications of robotics are increasing with the advancement of technology. The concept of Mobile Robot is fast evolving and the number of mobile robots and their complexities are increasing with different applications. There are many types of mobile robot navigation techniques like path planning, self – localization and map interpreting. An Obstacle Avoiding Robot is a type of autonomous mobile robot that avoids collision with unexpected obstacles. In this project, an Obstacle Avoiding Robot is designed. It is an Arduino based robot that uses Ultrasonic range finder sensors to avoid collisions. **Obstacle Avoiding Robot** is an intelligent device which can automatically sense the obstacle in front of it and avoid them by turning itself in another direction. This design allows the robot to navigate in unknown environment by avoiding collisions, which is a primary requirement for any autonomous mobile robot. The application of Obstacle Avoiding robot is not limited and it is used in most of the military organization now which helps carry out many risky jobs that cannot be done by any soldiers.

APPLICATIONS:

- Obstacle avoiding robots can be used in almost all mobile robot navigation systems.
- They can be used for household work like automatic vacuum cleaning.
- They can also be used in dangerous environments, where human penetration could be fatal.
- Especially military applications
- It can be used for city wars

Earlier the robots move in all directions as per the commands are given to it. Later they came to know that it got stuck when there is an unexpected obstacle in front of it. So they made extreme research work and come with the Obstacle avoidance Arduino robots.

Whenever the robot is going on the desired path the ultrasonic sensor transmits the ultrasonic waves continuously from its sensor head. Whenever an obstacle comes ahead of it the ultrasonic waves are reflected back from an object and that information is passed to the microcontroller. The microcontroller controls the motors left, right, back, front, based on ultrasonic signals. In order to control the speed of each motor pulse width modulation is used (PWM).

CONCLUSION:

From this study, a walking robot that achieved the stated objectives can be developed. The robot is able to produce the basic walking movements using two gearmotors. We can develop the robot with a very good intelligence which is easily capable to sense the obstacle and by processing the signal coming from the sensor it is perfectly avoiding the obstacle coming in between the path .Robot take the left or right or the forward movement in according to the sensing signal with the help of the two gear motor which makes the movement of the robot smooth .In future, the sensing range can be increased by increasing the sensor quality with the help of ultrasonic sensor or the IR signal spread all over the provide area

SUBMITTED BY:

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(B16EI017)

OLED TECHNOLOGY

If ever a technology has begged to be disrupted, it is Liquid Crystal Displays. Invented in 1963 and envisioned as a slimmed-down replacement for bulky cathode ray tubes or as screens for wall mounted televisions – a use never realized due to problems scaling up to large surfaces – liquid crystal displays have instead become the standard for everything from watches to laptop computers. Despite this, however, remains high production and commercial expenses that have never come down enough to successfully mass market these displays, leaving the technology vulnerable to new innovations.

With the imaging appliance revolution underway, the need for more advanced handheld devices that will combine the attributes of a computer, PDA, and cell phone is increasing and the flat-panel mobile display industry is searching for a display technology that will revolutionize the industry. The need for new lightweight, low-power, wide viewing angled, handheld portable communication devices have pushed the display industry to revisit the current flat-panel digital display technology used for mobile applications. Struggling to meet the needs of demanding applications such as e-books, smart networked household appliances, identity management cards, and display-centric handheld mobile imaging devices, the flat panel industry is now looking at new displays known as Organic Light Emitting Diodes (OLED).

Organic Light Emitting Diode technology, pioneered and patented by Kodak/Sanyo, enables full color, full-motion flat panel displays with a level of brightness and sharpness not possible with other technologies.

Unlike traditional LCD's, OLED's are self-luminous and do not require backlighting, diffusers, polarizers, or any of the other baggage that goes with liquid crystal displays. Essentially, the OLED consists of two charged electrodes sandwiched on top of some organic light emitting material. This eliminates the need for bulky and environmentally undesirable mercury lamps and yields a thinner, more versatile and more compact display. Their low power consumption provides for maximum efficiency and helps minimize heat and electric interference in electronic devices. Armed with this combination of features, OLED displays communicate more information in a more engaging way while adding less weight and taking up less space.

There are two forms of OLED displays:

- Passive-matrix
- Active-matrix

OLED Technology:

Discovery of polymeric conductors in the 1970s. Polymeric materials, which have historically been classified exclusively as electrical insulators, are now finding varied applications as both

conductors and semiconductors. Expensive ceramic semiconductors that are brittle and difficult to pattern have historically been the driving force of the digital age for the last fifty years. But now combinations of properties exist today in polymers that are making many previously impossible appliances a reality.

Within a very short time organic conductors have been developed with the conductivity of metals such as copper, while organic electronics has evolved photoelectric cells, diodes, light emitting diodes, lasers and transistors. The result is that a class of plastic materials referred to as conjugated polymers are fast displacing traditional materials such as natural polymers (e.g. wood), metals, ceramics and glass in many applications owing to the combination of their physical/mechanical properties (light weight combined with physical strength) and ease of processability (the ability to mould the shape of plastic materials or extrude into sheet and rod through a die).

What this means is that OLEDs can be deployed in a wide range of electronic devices and can be used extensively throughout any given device. Active components of displays can be polymers, substrates can be polymers, logical electronics can be polymers, and so on. In the years ahead OLEDs will see applications in personal computers, cell phones, televisions, general wide area lighting, signs, billboards, communications and any of a number of information appliances.

Developments:

The first observations of electroluminescence in organic materials were in the early 1950s by A.Bernanose and co-workers at the Nancy-University, France. They applied high-voltage alternating current (AC) fields in air to materials such as acridine orange, either deposited on or dissolved in cellulose or cellophane thin films. The proposed mechanism was either direct excitation of the dye molecules or excitation of electrons

Device performance was limited by the poor electrical conductivity of contemporary organic materials. This was overcome by the discovery and development of highly conductive polymers. For more on the history of such materials, see conductive polymers.

Types Of OLED:

There are several types of OLEDs

(1) Passive-matrix OLED

(2) Active-matrix OLED

(3) Transparent OLED

(4) Top-emitting OLED

(5) Bottom-emitting OLED

(6) Foldable OLED

(7) White OLED

Efficiency of blue OLEDs:

Improvements to the efficiency and lifetime of blue OLEDs is vital to the success of OLEDs as replacements for LCD technology. Considerable research has been invested in developing blue OLEDs with high external quantum efficiency as well as a deeper blue color. External quantum efficiency values of 20% and 19% have been reported for red (625 nm) and green (530 nm) diodes, respectively. However, blue diodes (430 nm) have only been able to achieve maximum external quantum efficiencies in the range between 4% to 6%.

Applications:

- Samsung applications
- Sony applications
- Military
- Intelligence Traffic Control

SUBMITTED BY:
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PARKING LOT SYSTEM

Nowadays in many multiplex systems there is a severe problem for car parking systems. There are many lanes for car parking, so to park a car one has to look for the all lanes. Moreover, there is a lot of men labour involved for this process for which there is lot of investment. So, the need is to develop a system which indicates directly which parking slot is vacant in any lane. The project involves a system including infrared transmitter and receiver in every lane and a LED display outside the car parking gate. So, the person entering parking area can view the LED display and can decide which lane to enter so as to park the car.

Conventionally, car parking systems does not have any intelligent monitoring system. Parking lots are monitored by human beings. All vehicles enter into the parking and waste time for searching for parking slot. Sometimes it creates blockage. Condition become worse when there are multiple parking lanes and each lane have multiple parking slots. Use of automated system for car parking monitoring will reduce the human efforts. Display unit is installed on entrance of parking lot which will show LEDs for all Parking slot and for all parking lanes. Empty slot is indicated by the respective glowing LED.

WORKING PRINCIPLE:

When a car comes to enter the lot, the pressure pad present near the entry as well as exit senses the car and the circuit becomes closed circuit due to the weight of car and makes the gate controlled by the servo motor to rotate through 90 degrees making a clear path for the car to enter or exit.

APPLICATIONS:

- Autonomous car-manoeuvring system to perform parallel, perpendicular or angle parking.
- Enhancing the comfort and safety of driving in constrained environments to steer the car with attention.
- To ensure collision-free motion within the available space.

ADVANTAGES:

- Since it is an automated system, it is programmed that is no interruptions would stop its functionally.

- To monitor the environment, that is not comfortable to monitor for humans(especially for extended periods).
- Prevents waste of energy.

DISADVANTAGES:

- The 7-segment display shows the maximum count when if power is gone and again comes back.
- Once the barrier is opened or closed, there is a count of the car.
- At the time of entering two consecutive cars, there is a overcrowding situation.

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ROBOTIC PROCESS AUTOMATION

The present business scenario is partly automated. Many companies use RPA, core banking, and other such systems to cater their businesses. Each company require a lot of Human Resources to handle these systems. It is obvious that when there is human intervention, chances of errors are comparatively high. As a result, end customer faces some or the other problem which will again give some pain to the Human Processor to amend the erroneous actions taken earlier. Hence, to serve the customers in a faster an consistent way and to help increase the potential of the personnel in the key areas of the business, a new technology called Robotic Process Automation (RPA) is on its way. This project is aimed at understanding the uniqueness and merits of the RPA system adopted by many organizations and its impact on the working of back hand operations of these Multinationals. Research has showed that RPA is a much better way to carry on day-to-day operations with a quality achievement of almost 99%. Along with the quality, there are much more advantages like Direct Business Benefit, Faster processing & Cost advantage. The focus of my research was to automate the ERP systems, keeping in mind the business areas where the Human Resources are needed. My job was to analyse the technology with respect to the scale it can be used to. There can be no better opportunity to interact with the external as well as the internal resources of an organization. Finally, the results of the research verify the fact that RPA.

Robotic process automation (RPA) is the application of technology that allows employees in a company to configure computer software or a “robot” to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses and communicating with other digital systems.

Any company that uses labour on a large scale for general knowledge process work, where people are performing high-volume, highly transactional process functions, will boost their capabilities and save money and time with robotic process automation software.

Just as industrial robots are remaking the manufacturing industry by creating higher production rates and improved quality, RPA “robots” are revolutionizing the way we think about and administer business processes, IT support processes, workflow processes, remote infrastructure and back-office work. RPA provides dramatic improvements in accuracy and cycle time and increased productivity in transaction processing while it elevates the nature of work by removing people from dull, repetitive tasks. The technology of RPA can be applied specifically wide.

HISTORIC EVOLUTION

Although the term "robotic process automation" can be traced to the early 2000s, it had been developing for a number of years previously. RPA evolved from three key technologies: screen scraping, workflow automation and artificial intelligence.

Screen scraping is the process of collecting screen display data from a legacy application so that the data can be displayed by a more modern user interface. The advantages of workflow automation software, which eliminates the need for manual data entry and increases order fulfillment rates, include increased speed, efficiency and accuracy. Lastly, artificial intelligence involves the ability of computer systems to perform tasks that normally require human intervention and intelligence.

As a form of automation, the same concept has been around for a long time in the form of screen scraping but RPA is considered to be a significant technological evolution of this technique in the sense that new software platforms are emerging which are sufficiently mature, resilient, scalable and reliable to make this approach viable for use in large enterprises (who would otherwise be reluctant due to perceived risks to quality and reputation).

By way of illustration of how far the technology has developed since its early form in screen scraping, it is useful to consider the example cited in one academic study. Users of one platform at Xchanging - a UK-based global company which provides business processing, technology and procurement services across the globe - anthropomorphized their robot into a co-worker named "Poppy" and even invited "her" to the Christmas party. Such an illustration perhaps serves to demonstrate the level of intuition, engagement and ease of use of modern RPA technology platforms that leads their users (or “trainers” to relate to them as beings rather than abstract software services.

DEPLOYMENT:

The hosting of RPA services also aligns with the metaphor of a software robot, with each robotic instance having its own virtual workstation, much like a human worker. The robot uses keyboard and mouse controls to take actions and execute automations. Normally all of these actions take place in a virtual environment and not on screen; the robot does not need a physical screen to operate, rather it interprets the screen display electronically. The scalability of modern solutions based on architectures such as these owes much to the advent of virtualization technology, without which the scalability of large deployments would be limited by available capacity to manage physical hardware and by the associated costs. The implementation of RPA in business enterprises has shown dramatic cost savings when compared to traditional non-RPA solutions.

DIFFERENCE BETWEEN RPA AND REGULAR AUTOMATION:

What distinguishes RPA from traditional IT automation is the ability of the RPA software to be aware and adapt to changing circumstances, exceptions and new situations. Once RPA software has been trained to capture and interpret the actions of specific processes in existing software applications, it can then manipulate data, trigger responses, initiate new actions and communicate with other systems autonomously. RPA software is particularly useful for organizations that have many different and complicated systems that need to interact together fluidly.

For instance, if an electronic form from a human resource system is missing a zip code, traditional automation software would flag the form as having an exception and an employee would handle the exception by looking up the correct zip code and entering it on the form. Once the form is complete, the employee might send it on to payroll so the information can be entered into the organization's payroll system.

THE FUTURE OF RPA:

A Global Market Insights Inc. report expects the RPA market to reach $5 billion by 2024. The increased adoption of RPA technologies by organizations to enhance their capabilities and performance and boost cost savings will reportedly drive the growth of the robotic process automation market most during that

time. The future of RPA is subject to much speculation, as the early majority adopt the technology and discover new uses and new synergies. Possible future trends may include:

A convergence of BPM and RPA tools, much in the way that the distinction between BPM and workflow tools is now blurred. The acquisition of Open Span in 2016 by Pegasystems is perhaps just one early indication of such a convergence.

Greater incorporation of artificial intelligence (AI) for advanced decision making and inferencing, leading to RPAAI. Some analysts speculate about such developments but, as yet, it is not easy to identify verifiable public domain case studies which provide evidence of this type of technology being deployed alongside RPA.

SUBMITTED BY:

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(B16EI037)

SECURITY ALARM USING ULTRASONIC SENSOR

A **security alarm** is a system designed to detect intrusion – unauthorized entry – into a building or other area. Security alarms are used in residential, commercial, industrial, and military properties for protection against burglary (theft) or property damage, as well as personal protection against intruders. Security alarms in residential areas show a correlation with decreased theft. Car alarm likewise help protect vehicles and their contents. Prisons also use security systems for control of inmates.

Some alarm systems serve a single purpose of burglary protection; combination systems provide both fire and intrusion protection. Intrusion alarm systems may also be combined with closed-circuit television surveillance (CCTV) systems to automatically record the activities of intruders, and may interface to access control systems for electrically locked doors. Systems range from small, self-contained noisemakers, to complicated, multirally systems with computer monitoring and control. It may even include two-way voice which allows communication between the panel and Monitoring station.

Technical Specifications:

- Microcontroller ATmega328
- Operating Voltage 5V
- Supply Voltage (recommended) 7-12V
- Maximum supply voltage (not recommended) 20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 32 KB (ATmega328) of which 0.5 KB used by boot loader
- SRAM 2 KB (ATmega328)
- EEPROM 1 KB (ATmega328)
- Clock Speed 16 MHz

WORKING PRINCIPLE

The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

Distance = Speed × Time

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module as shown in the picture below

Fig 4.1: ultrasonic sensor working principle

Now, to calculate the distance using the above formulae, we should know the Speed and time. Since we are using the Ultrasonic wave we know the universal speed of US wave at room conditions which is 330m/s. The circuitry inbuilt on the module will calculate the time taken for the US wave to come back and turns on the echo pin high for that same particular amount of time, this way we can also know the time taken. Now simply calculate the distance using a microcontroller or microprocessor.

APPLICATIONS:

- Intruder or Burglar Alarm.
- can be installed near the door to detect the presence of anybody at the door.
- This system can also serve the purpose of Motion Detector.

ADVANTAGES:

- Since it is an automated system, it is programmed that is no interruptions would stop its functionally.
- To monitor the environment, that is not comfortable to monitor for humans (especially for extended periods).
- Prevents waste of energy.

SUBMITTED BY:

M.REVANTH KUMAR

(B16EI015)

SILENT SOUND TECHNOLOGY

Now-a-days whenever we are talking on a cell phone in a crowd, then actually we are not talking, we are yelling because of lots of disturbance and noise around us. However, there is no need to scream to convey our message and wasting our energy anymore. For this purpose a new technology known as the Silent Sound Technology has been introduced that will put an end to the noise pollution.

The Silent sound technology is a perfect solution for those people who have lost their voice but wish to speak on mobile phones. It is developed at the Karlsruhe Institute of Technology and you can expect to see it in the near future. When this technology is used, it detects every lip movement and internally converts the electrical pulses into sounds signals and sends them neglecting all other surrounding noise. It is going to be really beneficial for the people who hate talking loudly on cell phones.

Silent Sound technology aims to notice every movement of the lips and transform them into sounds, which could help people who lose voices to speak, and allow people to make silent calls without bothering others. This technology can be used for languages like English, French & German but not for languages like Chinese because different tones hold different meaning in Chinese language.

This new technology will be very helpful whenever a person loses his voice while speaking or allow people to make silent calls without disturbing others, thus now we can speak anything with our friends or family in private without anyone eavesdropping. At the other end, the listener can hear a clear voice. This device works with 99% efficiency, and can been seen in the market in another 5-10 years and once launched it will have a drastic effect and with no doubt it will be widely used.

Silence is the best answer for all the situations even your mobile understands!

- The word Cell Phone has become greatest buzz word in Cellular Communication industry.

- There are lots and lots of technology that tries to reduce the Noise pollution and make the environment a better place to live in.

- I will tell about a new technology known as Silent Sound Technology that will put an end to Noise pollution.

You are in a movie theater or noisy restaurant or a bus etc. where there is lot of noise around is big issue while talking on a mobile phone. But in the future this problem is eliminated with" silent sounds", a new technology unveiled at the CeBIT fair on Tuesday that transforms lip movements into a computer-generated voice for the listener at the other end of the phone.

It is a technology that helps you to transmit information without using your vocal cords. This technology aims to notice lip movements & transform them into a computer generated sound

that can be transmitted over a phone. Hence person on other end of phone receives the information in audio.
In the 2010 CeBIT's "future park", a concept "Silent Sound" Technology demonstrated which aims to notice every movement of the lips and transform them into sounds, which could help people who lose voices to speak, and allow people to make silent calls without bothering others. The device, developed by the Karlsruhe Institute of Technology (KIT), uses electromyography, monitoring tiny muscular movements that occur when we speak and converting them into electrical pulses that can then be turned into speech, without a sound uttered.
'Silent Sound' technology aims to notice every movement of the lips and transform them into sounds, which could help people who lose voices to speak, and allow people to make silent calls without bothering others. Rather than making any sounds, your handset would decipher the movements your mouth makes by measuring muscle activity, then convert this into speech that the person on the other end of the call can hear. So, basically, it reads your lips.

"We currently use electrodes which are glued to the skin. In the future, such electrodes might for example by incorporated into cellphones", said Michael Wand, from the KIT.
The technology opens up a host of applications, from helping people who have lost their voice due to illness or accident to telling a trusted friend your PIN number over the phone without anyone eavesdropping — assuming no lip-readers are around.
The technology can also turn you into an instant polyglot. Because the electrical pulses are universal, they can be immediately transformed into the language of the user's choice.
"Native speakers can silently utter a sentence in their language, and the receivers hear the translated sentence in their language. It appears as if the native speaker produced speech in a foreign language," said Wand.

The translation technology works for languages like English, French and German, but for languages like Chinese, where different tones can hold many different meanings, poses a problem, he added.
Noisy people in your office? Not any more. "We are also working on technology to be used in an office environment," the KIT scientist told AFP.
The engineers have got the device working to 99 percent efficiency, so the mechanical voice at the other end of the phone gets one word in 100 wrong, explained Wand.
"But we're working to overcome the remaining technical difficulties. In five, maybe ten years.

NEED FOR SILENT SOUND:

Silent Sound Technology will put an end to embarrassed situation such as-

- A person answering his silent, but vibrating cell phone in a meeting, lecture or performance, and whispering loudly, 'I can't talk to you right now'.

- In the case of an urgent call, apologetically rushing out of the room in order to answer or call the person back.

When you add lawnmowers, snow blowers, leaf blowers, jack hammers, jet engines, transport trucks, and horns and buzzers of all types and descriptions you have a wall of constant noise and irritation. Even when watching a television program at a reasonable volume level you are blown out of your chair when a commercial comes on at the decibel level of a jet.

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SMART HOME USING IOT

As technology is advancing so houses are also getting smarter. Modern houses are gradually shifting from conventional switches to centralized control system, involving remote controlled switches. Presently, conventional wall switches located in different parts of the house makes it difficult for the user to go near them to operate. Even more it becomes more difficult for the elderly or physically handicapped people to do so. Remote controlled home automation system provides a most modern solution with smart phones. Setting in any part of world we can operate our home just by our smart phone. Here we use the concept called IOT (internet of things) to make human life easy and reliable. Main aim of this project is to develop a home automation system using a Node MCU(ESP8266) board with Internet being remotely controlled by any Android OS smart phone (Blynk app). In order to achieve this, a relay module is interfaced to the Node MCU board at the receiver end while on the transmitter end, a GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. By touching the specified location on the GUI, the loads can be turned ON/OFF remotely through this technology. The loads are operated by IOT board through Relay Module.

Automatic Control:

Automatic Control has now become one of the major factors for any system. The automatic control gives us the ease of use & flexibility. Things are getting smarter and safer these days. In order to achieve this, a relay module is interfaced to the Node MCU board at the receiver end while on the transmitter end, a GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. By touching the specified location on the widgets, the AC loads can be switched ON/OFF remotely through this technology.

Manual Control:

Manual Control is the old conventional way of controlling the things. In this type of control, the human effort is more compared to the automatic Control. It can be achieved by connecting the switches in between the Node MCU and the relay board. So that the output load will be HIGH for any HIGH signal coming either from Node MCU or from manual switches. It will be more advantageous in case of damage to the Node MCU.

Components

- **Hardware:**
  - Node MCU
  - Relay Module
  - Load
- **Software:**
  - Blink App.

- Arduino IDE

Working:

The Working principle is very simple. The connections for the circuits are shown in the above figure. The ground pin of the NodeMCU is connected to the Ground of the Relay module and similarly the VCC of the NodeMCU is connected to the VCC of the Relay Module. There digital pin of the MCU d0 or d1 is connected to the Relay Module input i.e., IN1 or IN2 in order to select the channel for the Relay Module. Suppose if we consider a 2 channel relay module IN1 is used for selecting 1st channel of the relay and similarly IN2 is for second channel of the relay. Now similarly at the output of the Relay there are three terminals: NO, NC, COM as described previously. COM of the Relay is connected to the common of the BULB and NO pin of the Relay is connected to other terminal of the bulb through a plug. All the connections are made using female to female jumper jumper wires and powered using the main supply voltage.

Advantages:

• It is a very convenient system and simple to use.

• Customization is possible with this system.

• It is a Wireless Connectivity system since it is connected over WIFI.

• It is a Time saving process since the human intervention is not there and the things get simpler and smarter.

• It is an Energy saving system.

Disadvantages:

• The initial Installation becomes somewhat difficult if you power up the entire home and one must have knowledge regarding IOT.

• The Cost of the system increases.

. • Learning of the system is important in order to work with these kinds of systems.

Applications:

➢ Home appliances like:

• light, AC, Geyser, etc.

Future Scope:

1. To make it available in very less cost to ruler area peoples and schools.

2. Reducing more complexity of things and easily available to people.

3. Increasing security of the system

Conclusion:

• We can control the AC loads using the Blynk app. The designed system can be controlled from anywhere throughout the world.

• This will help the user by saving the power by switching off the home appliances in case of forgot to switch off.

This will also help for physically disabled people who might otherwise require care givers.

• The inefficiency of operation of conventional wall switches can be avoided using Home automation System.

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SMART IRRIGATION USING IOT

Agriculture plays vital role in the development of agricultural country. Issues concerning agriculture have been always hindering the development of the country. The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Smart agriculture is an automated and directed information technology implemented with IoT (Internet of Things). IoT is developing rapidly and widely used in all wireless environments. The main objective of proposed topic is to develop an automation irrigation system using an Node MCU board with Internet being remotely controlled by any Android OS smart phone. So that agricultural lands are irrigate automatically without physical present of farmer. As technology is advancing so irrigating is also getting smarter. Modern irrigation pumps are gradually shifting from conventional switches to centralized control system, involving remote controlled switches. Remote controlled irrigation automation system provides a most modern solution with smart phones for those persons who want to do agriculture without physically present on that place. To achieve this, a IoT module is interfaced to the Node MCU board at the receiver end while on the transmitter end, a GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. By touching the specified location on the GUI, the loads can be turned ON/OFF remotely through this technology. The loads are operated by IoT board through Relay Module. Along with this we use a soil sensor. Which detect whether soil is dry or wet. When soil condition is dry soil sensor give command to IoT module to start the pump. When soil becomes wet it gives command to stop the water pump. It works in accordance with the soil condition.

Need for Embedded Systems:

The uses of embedded systems are virtually limitless, because every day new products are introduced to the market that utilizes embedded computers in new ways. In recent years, hardware such as microprocessors, microcontrollers, and FPGA chips have become much cheaper. So, when implementing a new form of control, it's wiser to just buy the generic chip and write your own custom software for it. Producing a custom-made chip to handle a task or set of tasks costs far more time and money. Many embedded computers even come with extensive libraries, so that "writing your own software" becomes a very trivial task indeed. From an implementation viewpoint, there is a major difference between a computer and an embedded system. Embedded systems are often required to provide Realtime response. The main elements that make embedded systems unique are its reliability and ease in debugging.

Working:

The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. Each of the 14 digital pins can be used as an input or output, using pin Mode (), digital Write(), and digital Read() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pullup resistor (disconnected by default) of 2050k ohm.

A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller. In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.

PWM: 3, 5, 6, 9, 10, and 11. Provide 8bit PWM output with the analog Write () function.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using

the SPI library.

LED: 13. There is a built-in LED driven by digital pin 13. TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library. The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default, they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analog Reference () function. There are a couple of other pins on the board, AREF Reference voltage for the analog inputs. Used with analog Reference (). Reset, bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

ESP8266 is a complete and self-contained Wi-Fi network solutions that can carry software applications, or through another application processor uninstall all Wi-Fi networking capabilities. ESP8266 when the device is mounted and as the only application of the application processor, the flash memory can be started directly from an external Move. Built-in cache will help improve system performance and reduce memory requirements. Another situation is when wireless Internet access assume the task of Wi-Fi adapter, you can add it to any microcontroller-based design, and the connection is simple, just by SPI / SDIO interface or central processor AHB bridge interface.

Conclusion:

The agriculture field is being monitored and controlled by embedded sensors at user end. The ESP8266 is the best Wi-Fi device for IoT projects. Since it is small, compact, lightweight, easily programmable, and easily installable and have enough GPIO pins to use them. At field end which receives the messages from broker network and manipulates it and will perform the function mentioned in message. After it will send the messages to broker network and in turn it will be published to the Client (user end).

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UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER

The Universal Asynchronous Receiver Transmitter (UART) is the most widely used serial data communication circuit ever. UARTs allow full duplex communication over serial communication links as RS232. UARTs are available as inexpensive standard products from many semiconductor suppliers, making it unlikely that this specific design is useful by itself.

The basic functions of a UART are a microprocessor interface, double buffering of transmitter data, frame generation, parity generation, parallel to serial conversion, double buffering of receiver data, parity checking, serial to parallel conversion. The data is transmitted asynchronously one bit at a time and there is no clock line.

The frame format of used by UARTs is a low start bit, 5-8 data bits, optional parity bit, and 1 or 2 stop bits. Universal Asynchronous Receive/Transmit consists of baud rate generator, transmitter and receiver. The number of bits transmitted per second is called baud rate and the baud rate generator generates the transmitter and receiver clocks separately. UART synchronizes the incoming bit stream with the local clock.

Transmitter interfaces to the data bus with the transmitter data register empty (TDRE) and write signals. When transmitting, UART takes eight bits of parallel data and converts it into serial bit stream and transmit them serially.

Receiver interfaces to the data bus with the receiver ready and the read signals. When UART detects the start bit, it receives the data serially and converts it into parallel form and when stop bit (logic high) is detected, data is recognized as a valid data.

History:

Some early telegraph schemes used variable-length pulses (as in Morse code) and rotating clockwork mechanisms to transmit alphabetic characters. The first serial communication devices (with fixed-length pulses) were rotating mechanical switches (commutators). Various character codes using 5, 6, 7, or 8 data bits became common in teleprinters and later as computer peripherals. The teletypewriter made an excellent general-purpose I/O device for a small computer.

Gordon Bell of DEC designed the first UART, occupying an entire circuit board called a line unit, for the PDP series of computers beginning with the PDP-1. According to Bell, the main innovation of the UART was its use of sampling to convert the signal into the digital domain, allowing more reliable timing than previous circuits that used analog timing devices with manually adjusted potentiometers. To reduce the cost of wiring, backplane and other components, these computers also pioneered flow control using XON and XOFF characters rather than hardware wires.

DEC condensed the line unit design into an early single-chip UART for their own use. Western Digital developed this into the first widely available single-chip UART, the WD1402A, around 1971. This was an early example of a medium-scale integrated circuit. Another popular chip was the SCN2651 from the Signets 2650 family.

An example of an early 1980s UART was the National Semiconductor 8250 used in the original IBM PC's Asynchronous Communications Adapter card. In the 1990s, newer UARTs were developed with on-chip buffers. This allowed higher transmission speed without data loss and without requiring such frequent attention from the computer. For example, the popular National Semiconductor 16550 has a 16-byte FIFO, and spawned many variants, including the 16C550, 16C650, 16C750, and 16C850.

Depending on the manufacturer, different terms are used to identify devices that perform the UART functions. Intel called their 8251 device a "Programmable Communication Interface". MOS Technology 6551 was known under the name "Asynchronous Communications Interface Adapter" (ACIA). The term "Serial Communications Interface" (SCI) was first used at Motorola around 1975 to refer to their start-stop asynchronous serial interface device, which others were calling a UART. Silos manufactured a number of Serial Communication Controllers or SCCs.

After most IBM PC compatible computers removed the RS-232 COM port in the 2000s, you could instead use an external USB-to-UART bridge. FTDI is one supplier of these chips.

Structure:

A UART usually contains the following components:

- A clock generator, usually a multiple of the bit rate to allow sampling in the middle of a bit period.
- Input and output shift registers
- Transmit/Receive control
- Read/Write control logic
- Transmit/Receive buffers (optional)
- System data bus buffer (optional)
- First-in, first-out (FIFO) buffer memory (optional)
- Signals needed by a third party DMA controller (optional)
- Integrated bus mastering DMA controller (optional)

Applications:

- ✓ Transmitting and receiving UARTs must be set for the same bit speed, character length, parity, and stop bits for proper operation. The receiving UART may detect some mismatched settings and set a "framing error" flag bit for the host system; in exceptional

cases the receiving UART will produce an erratic stream of mutilated characters and transfer them to the host system.

- ✓ Typical serial ports used with personal computers connected to modems use eight data bits, no parity, and one stop bit; for this configuration the number of ASCII characters per second equals the bit rate divided by 10.
- ✓ Some very low-cost home computers or embedded systems dispense with a UART and use the CPU to sample the state of an input port or directly manipulate an output port for data transmission. While very CPU-intensive (since the CPU timing is critical), the UART chip can thus be omitted, saving money and space. The technique is known as bit-banging.

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VOICE CONTROLLED HOME AUTOMATION

Now-a-days we use many electrical devices at homes, industries, offices, institutions that are controlled manually. To control all electrical devices we need a lot of “MAN POWER”. If manpower increases maintenance cost also rises. This causes a disbenefit to the industry. So to avoid these kind of drawbacks we need some wireless controlling systems.

One such wireless communication systems to be used is Bluetooth communication system. This communication system can be used in all fields like industries, domestic purposes like home appliances controlling using Bluetooth as a remote. This system can be helpful for elderly or disabled persons who are unable to go to switchboard to control the devices.

Remote operation is using smart phones or devices with Android operating system, upon a GUI (Graphical User Interface) based voice command. This Arduino based voice controlled home appliances using Bluetooth uses the android application that sends voice command to the devices through the Bluetooth. The main attraction of any automated system is reducing human labor, effort, time and errors due to human negligence. We can control all loads at a time from one place without connecting any physical wire between loads and control room.

The concept of Home Automation is gaining popularity as it helps in reducing human effort and errors and thus increasing the efficiency. With the help of Home Automation system, we can control different appliances like lights, fans, TV, AC etc. Additionally, a home automation system can also provide other features like security, alarms, emergency systems etc. can be integrated.

There are many types of Home Automation Systems like Bluetooth Controlled, Internet Controlled, RF Controlled, Remote Controlled (IR Remote) etc. Each type has its own advantages and disadvantages. In this project, we have designed a Voice Activated Home Automation system, where different appliances are controlled by sending a Voice Command.

The Voice Activated Home Automation project is implemented using Arduino UNO, Bluetooth and a smart phone. Further sections will explain circuit diagram, components required and working of the project.

PROS AND CONS OF HOME AUTOMATION

PROS OF HOME AUTOMATION:

Energy Savings

Home automation systems have definitely proven themselves in the arena of energy efficiency. Automated thermostats allow you to pre-program temperatures based on the time of day and the day of the week. And some even adjust to your behaviours , learning and adapting to your temperature preferences without your ever inputting a pre-selected schedule. Traditional or behaviour-based automation can also be applied to virtually every gadget that can be remotely controlled – from sprinkler systems to coffee makers.

Actual energy savings ultimately depend on the type of device you select and its automation capabilities. But on average, product manufacturers estimate the systems can help consumers save anywhere from 10 to 15 percent off of heating and cooling bills.

Convenience:

In today's fast-paced society, the less you have to worry about, the better. Right? Convenience is another primary selling point of home automation device, which virtually eliminate small hassles such as turning the lights off before you go to bed or adjusting the thermostat when you wake up in the morning.

Many systems come with remote dashboard capabilities, so forgetting to turn off that coffee pot before you leave no longer requires a trip back to the house. Simply pull up the dashboard on a smart device or computer, and turn the coffee pot off in a matter of seconds.

Security:

Remote monitoring can put your mind at ease while you're away from the house. With remote dashboards, lights and lamps can be turned on and off, and automated blinds can be raised and lowered. These capabilities – combined with automated security systems – can help you mitigate the risks of intrusions: you will be alerted immediately if something uncharacteristic happens.

CONS OF HOME AUTOMATION.

Installation:

Depending on the complexity of the system, installing a home automation device can be a significant burden on the homeowner. It can either cost you money if you hire an outside contractor or cost you time if you venture to do it yourself.

Complex Technology:

Automating everything in life may sound extremely appealing, but sometimes a good old-fashioned flip of the switch is a lot easier than reaching for your smart phone to turn lights on and off. Before you decide which system is right for you, think about how far you really want to take home automation in your household.

System Compatibility:

Controlling all aspects of home automation from one centralized platform is important, but not all systems are compatible with one another. Your security system, for example, may require you to log in to one location to manage settings, while your smart thermostat may require you to log in to another platform to turn the air conditioner on and off. To truly leverage the convenience of home automation, you may need to invest in centralized platform technology to control all systems and devices from one location.

Cost:

Even though the price of home automation systems has become much more affordable in recent years, the cost to purchase and install a device can still add up. Consumer Reports offers a wide range of information and insights – including costs – on the best home automation systems on the market.

APPLICATIONS:

- The Voice Activated Home Automation system will help us control different loads (electrical appliances) with simple voice commands.
- This kind of system is very useful for people with disabilities.
- We can connect to internet and control the home from remote location over internet and also monitor the safety.
- Further, the project can be expanded by adding different sensors (light, smoke, etc.).

FUTURE SCOPE:

- Arduino based device control using Bluetooth on smartphone or project can be enhanced to control the speed of the fan or volume of the buzzer etc.

- Home automation and device controlling can be done using Internet of Things-IOT technology.

- We can replace Bluetooth by GSM modem so that we can achieve device controlling by sending SMS using GSM modem.

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