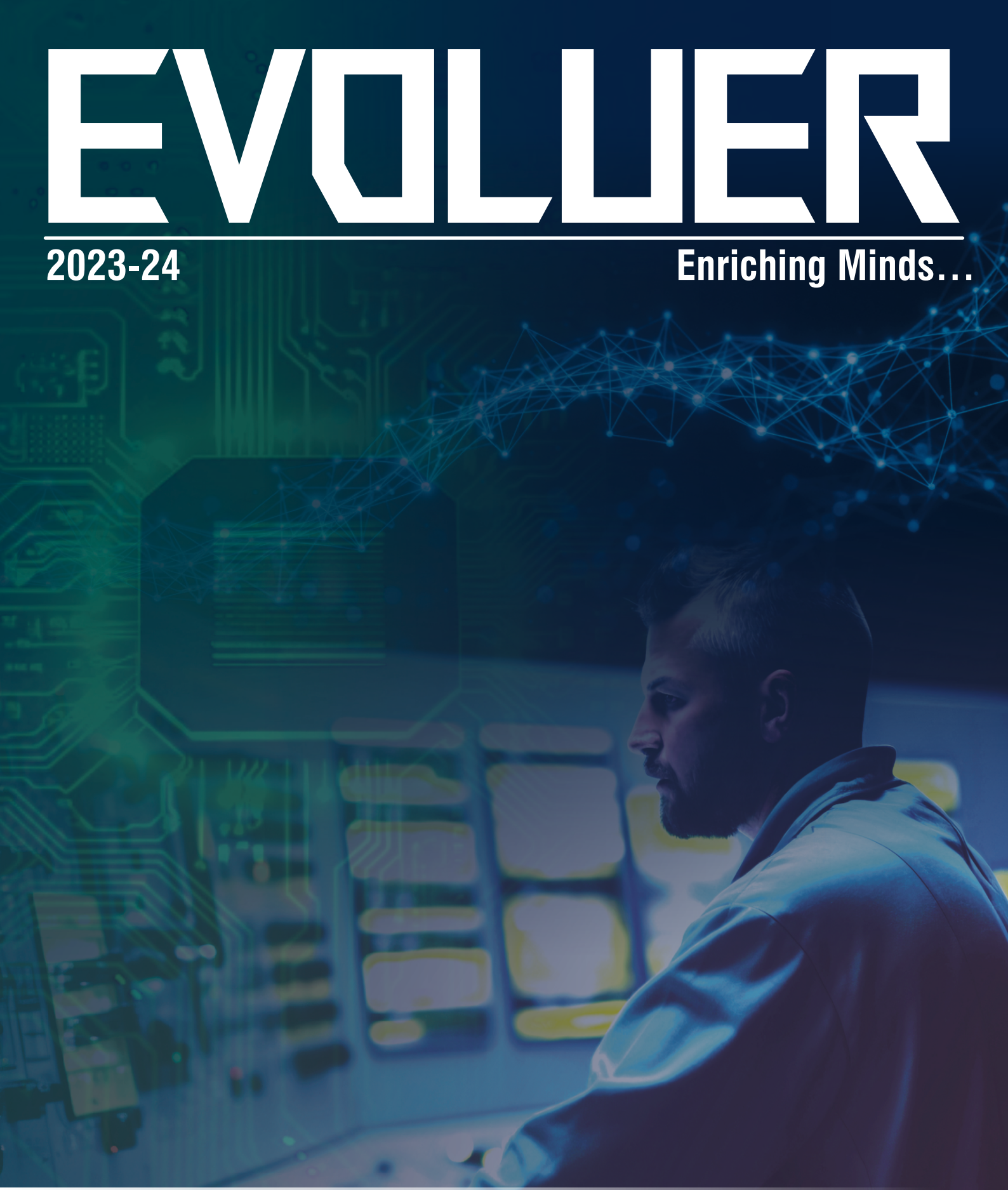
EVOLVER

2023-24

Enriching Minds...



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VISION STATEMENT OF THE INSTITUTE

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MISSION STATEMENT OF THE INSTITUTE

1.To foster holistic excellence in the new generation of students.
2.To instill in them, the power of aggressive positive thinking, insatiable desire for information and knowledge, a penchant for out of the box ideation and capacity of execution.
3.To contribute to the society with honesty and integrity through innovative research in the multi-disciplinary areas of evolving and upcoming technologies.

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"To become a globally recognized Department in imparting high quality result oriented technical education in the field of Electronics & Telecommunication Engineering and to sustain its excellence in teaching, research and community development to create excellent facilities in shaping the future of technocrats by nurturing their talents as per the need of the Nation."

MISSION STATEMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING DEPARTMENT

1.To impart high quality education in the current generation of students to excel in national and international platforms.
2.To be a Centre of Excellence in order to transform the creativity of faculty members and students into reality through innovation and research.
3.To promote the best practices for enhancing professional and academic growth through skill development programs to meet the challenges of industry and research organizations.
4.To induce leadership through incessant efforts during the dissemination of knowledge, whilst holding on to professional and ethical codes of conduct of the society.

An Invocation to EVOLUER

Evoluer has a French origin meaning "to evolve". Evolver is here for you to change your thinking, wisdom and implement the truth of technical knowledge in you. As you scroll through the pages you would find a new insight to the advancements in science and technology. This magazine will bring in you the inquisitiveness for technology, and thereby keep you updated of the technical world. Thus we hope that our sincere effort in bringing out the 2023-2024 edition of EVOLUER will add a spark to your knowledge in this techno-world

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Foreword from Chairperson, Trident Academy of Technology

I am extremely happy that the Electronics Society of our students is bearing out the next issue of their in house magazine "Evoluer". I am sure that this literary creation will bring to increase the potentiality among the young players and will prove to be a proper platform to present their talents and ideas. I wish all the best to "Evoluer".

Mrs. Smitarani Panigrahi
Chairperson,
Trident group of Institution,
Bhubaneswar.

Foreword from Principal, Trident Academy of Technology

I am glad that the electronics society which is under the department of Electronics & Telecommunication engineering Trident Academy of Technology is publishing a magazine, "EVOLUER".Manufacturing of electronics system have taken rapid strides in improvement with respect to speed, size and cost. The very purpose of the magazine is to inspire creativity among students and provide a platform to showcase their potential. I am confident that the deliberation in magazine would render valuable service to the students in providing an insight to the technological updates. I wish all the success to "E-Society".

Prof. (Dr.) Debanarayan Pattanayak
Principal
Trident Academy of Technology,
Bhubaneswar

EDITORIAL

Every issue of "EVOLUER" honour an individual who has made significant contributions of Electronics and Telecommunication Engineering and whose achievements are inspirational. After the release of the last issue, which I'm sure that all of you must have enjoyed reading, we have arrived at the happy situation of bringing the next issue. I take this opportunity to once again thank all the editorial board members. From the inception of the development of thought , the process is responsible for expanding the boundaries of our knowledge to understand the field behind the application to our syllabus. Exploration and development increase the human knowledge and experience. The pupils in this issue have struggled for more productive creativities in pursuit of excellence. The technologies that aid in integration of various sources of information and knowledge will find critical need in future for facing the challenges of understanding the field of telecommunication.

Articles exposing new frontiers of knowledge in the arenas of current advancements are published in this "EVOLUER", will contribute to future progress in the evolution of new methodologies for different valuable applications. The diversity of topics is nicely blended into this issue and I'm sure that the readers will enjoy and get sufficiently educated to appreciate the facets of this new technological prospects. I look forward to these contributions with great anticipation.

CONTENTS

People With Epilepsy in Sports And Exercise

Name: **Paresh Jena**
Redn. No.- **2201289498**
Branch: **ETC**

ABSTRACT-
People with epilepsy (PWEs) are often advised against participating in sports and exercise, mostly because of fear, overprotection, and ignorance about the specific benefits and risks associated with such activities. Available evidence suggests that physical exercise and active participation in sports may favorably affect seizure control, in addition to producing broader health and psychosocial benefits.. Sports are divided into three categories based on potential risk of injury or death should a seizure occur: group 1, sports with no significant additional risk; group 2, sports with moderate risk to PWEs, but no risk to bystanders; and group 3, sports with major risk. Factors to be considered when advising whether a PWE can participate in specific activities include the type of sport, the probability of a seizure occurring, the type and severity of the seizures, seizure precipitating factors, the usual timing of seizure occurrence, and the person's attitude in accepting some level of risk. The Task Force on Sports and Epilepsy considers this document as a work in progress to be updated as additional data become available.

INTRODUCTION: -
People with epilepsy (PWEs) have been advised often against participating in sports and exercise, mostly because of fear, overprotection, and ignorance about the benefits and risks associated with such activities.Although the implications of engaging in sports and physical exercise for PWEs have been extensively debated, several studies reported that in most cases these activities can have a beneficial influence on seizure frequency and severity. As a result, attitudes regarding sports and epilepsy have changed considerably in the last decades, as have recommendations in clinical practice.The purpose of this consensus paper developed by the International League Against Epilepsy (ILAE) Task Force on Sports and Epilepsy is to provide general guidance concerning participation in physical exercise and specific sports for PWEs and to suggest recommendations on the issuance of medical certificates related to the practice of sports activities.The literature search was narrowed using the following categories: randomized controlled trials; controlled clinical trials without randomization; uncontrolled clinical trials; case reports; and surveys. Exclusion criteria were dissertation abstracts because of lack of detail about methodology and outcome measures. The search was restricted to English-language articles. Of 981 articles identified by the search, 836 were rejected after reading the title and abstract because they were not considered to be relevant to the objective of this work and 128 additional articles were rejected for the same reason after reviewing the full text. The remaining 17 articles were included in this report.

SOLUTION:-
Determining whether a person with epilepsy can participate in specific physical activities or specific sports requires careful clinical assessment of the individual risk–benefit ratio, particularly with respect to the risk of a seizure occurring during the activity and related implications. Factors to be considered include not only the type of sport and the probability of a seizure occurring, but also individual characteristics such as the type and severity of the seizures, the consistency of any prodromal manifestations, the history concerning any seizure-precipitating factors, the likelihood of effective supervision by family members or other personnel, and the willingness of the informed PWE (or parents) to take a reasonable level of risk. A careful medical history is essential to ascertain not only the frequency and characteristics of the seizures, but also any previous seizure-related accidents or injuries, duration of periods of seizure freedom, and degree of adherence to treatment.Therefore, choosing a specific physical exercise/sport for a person with epilepsy requires consideration of personal attitudes and preferences, health status, as well as

medical advice. To this point, recommendations for the issuance of certificates of fitness for sports activities are needed.

In clinical studies, exercise has been reported to be associated with reduced epileptiform discharges on electroencephalography (EEG) and increased seizure threshold,and seizures are unlikely to occur during incremental physical effort to exhaustion.These findings are strengthened by studies in animal models of seizures and epilepsy, in which aerobic exercise training was found to retard the epileptogenic process to reduce seizure frequency, and to promote favorable plastic changes in the hippocampus. These benefits can be particularly prominent for children with epilepsy, and the involvement of these children in sports activities at school should be encouraged. Social exclusion is highly prevalent in the teen years, and teens with epilepsy are generally less physically active than their healthy siblings. Furthermore, regular exercise can improve cognitive function at all ages, and enforcing a sedentary lifestyle can have deleterious effects and impact on psychosocial development, independence, and mental health. These observations led to the general recommendation that PWEs should engage in physical exercise programs or sport activities that do not impose a significant risk of injury to themselves or to others. Assessing the risks involved in physical/sports activity participation is a responsibility to be shared among physicians, PWEs, and parents if the person with epilepsy is a child or adolescent.

A few clinical cases of seizures apparently precipitated by physical exercise have been reported, in some instances in relation to stimulus-related or reflex epilepsy syndromes. However, a causative link between these factors and the occurrence of seizures in some of the reported instances is speculative, and, in general, sport activities are unlikely to provoke or facilitate the occurrence of seizures.

IOT based solar power monitoring system

Name: **Tapaswin Sahoo**
Regn No- **2201289536**
Branch: **ETC**

ABSTRACT
The Internet of Things has a vision in which the internet extends into the real world embracing everyday objects. The IoT allows objects to be sensed and/or controlled remotely over existing network infrastructure, creating opportunities for pure integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. This technology has many applications like Solar cities, Smart villages, Micro grids and Solar Street lights and so on. As Renewable energy grew at a rate faster than any other time in history during this period. The proposed system refers to the online display of the power usage of solar energy as a renewable energy. This monitoring is done through raspberry pi using flask framework. Smart Monitoring displays daily usage of renewable energy. This helps the user to analysis of energy usage. Analysis impacts on the renewable energy usage and electricity issues.

INTRODUCTION
Photovoltaic solar systems can be divided into two basic categories –grid connected and off-grid (also called stand alone or isolated) solar systems. The grid connected systems feed the electricity produced by solar panels to the grid using an inverter. When the electricity is needed during night or periods with little sunlight, the energy is taken back from the grid. In isolated systems, the excess electricity is usually stored in batteries during the day and batteries are used to power the appliances in times when photovoltaic panels do not produce enough energy.
Solar regulators (also known as charge controllers) play an important role in isolated solar systems. Their goal is to ensure the batteries are working optimally, mainly to prevent overcharging (by disconnecting solar panels, when batteries are full) and to prevent too deep discharge (by disconnecting the load when necessary).
Battery lifetime reduces drastically due to overcharging and deep discharging. Battery is a very expensive component of a Solar Home System; hence it is necessary to protect batteries from being over charged or deeply discharged. In this regard, a charge controller plays a vital role to protect the battery One of the best ways to get power to remote, off-grid locations in Nigeria, is through Solar Home System (SHS).
The system consists of photovoltaic panel, battery, and a solar charge controller. Solar energy is stored into batteries. A solar charge controller regulates the voltage and current that is coming from the solar panels and going to the battery]. The charge controller is a switching device that controls the charging and discharging of the battery. This will protect the batteries from damage and hence prolong the lifespan of the battery .

SOLAR POWER MONITERING SYSTEM
Solar energy is widely available throughout the world and can contribute to minimize the dependence on energy imports. In 90 minutes, enough sunlight strikes the earth to provide the entire planet's energy needs for one year. Solar PV entails no greenhouse gas (GHG) emissions during operation and does not emit other pollutants. Solar has many benefits like system-friendly deployment, improved operating strategies, like advanced renewable energy forecasting and enhanced scheduling of power plants and also investment in additional flexible resources, comprising demand-side resources, electricity storage, grid infrastructure and flexible generation The traditional focus on the levelised cost of electricity (LCOE) – a measure of cost for a particular generating technology at the level of a power plant – is no longer sufficient. About a million solar panels were installed every day around the world last year. Solar PV leads providing almost 40% of global renewable electricity capacity growth over the medium-term.

Finally, in analyzing the likely evolution of electricity and energy-consuming sectors –

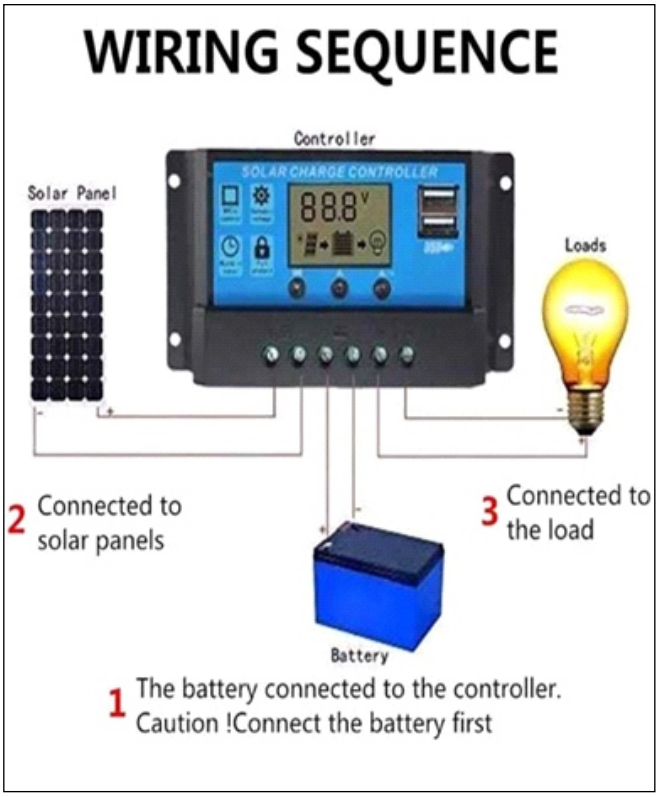
buildings, industry and transport – it explores the prime role solar energy could play in the long-term future of our energy system. Applications of the monitoring system are in the Rooftop Solar, Ground mounted Solar, Solar cities, Smart villages, Micro grids and Solar Street lights. Consumer Products like solar water heating systems; Solar home lighting systems; solar lanterns; solar pumps; solar mobile chargers; solar cookers; LED solar torch; solar RO plant; solar fan, solar Inverters, etc. can be monitor through this project. Commercial Products like Solar traffic signals, solar PATIL ET. AL.: SOLAR ENERGY MONITORING SYSTEM USING IoT Indian J.Sci.Res. Road studs/blinkers are also to be monitor through the proposed system. India, where frequent power cut is very common. Due to which it is important to use renewable energy and monitoring it. By monitoring the energy forecast, households and communities using solar power can time their energy production and consumption during good weather.

METHODOLOGY

the system design of the Solar Energy Monitoring System. System Design The proposed system is for monitoring of solar energy using IoT. Solar panel helps to store the energy in the battery. Battery has the energy which is useful for the electrical appliances. Battery is connected to the Arduino. Arduino is a micro controller which is used to read the sensor values. Current sensor and voltage divider are connecting to the Arduino.

System Design Arduino is connected to Raspberry pi through USB cable. Raspberry pi(RPi) is working as a server. The data from the arduino is display on the web page through RPi. The monitoring data upload to the cloud through RPi as shown in the Fig 1. Arduino Keeping in mind the economic constraints and the simplicity of the system, Arduino Uno has been used which abates the programming complexity. Arduino sense the current and voltage value through Analog pins. With the help of these values, Arduino programing calculates the power and energy. Raspberry Pi Raspberry Pi is used in the project as a central monitoring system. As Raspberry pi board is a portable and low cost, it reduces the system cost. As python is a widely used high-level, general-purpose, interpreted, dynamic programming language, this project use python as the programming language in the Raspberry Pi. Python web applications have one central callable object that implements the actual application. In Flask this is an instance of the Flask class.

With the help of python program monitoring data is upload to the cloud. Flask is a lightweight web application framework, which is written in Python and based on the WSGI toolkit and Jinja2 template engine.



Flask using the flexible Python programming language and provides a simple template for web development. Rpi has the inbuilt wifi. With the internet RPi displays the data on the web page and stores the data on the cloud. The cloud has public access so the user can access the monitoring. The user can estimate the usage and available of the battery.

SOLAR CHARGE CONTROLLER

A charge controller or alternatively a charge regulator is basically a voltage and/or current regulator, to keep batteries from overcharging. It regulates the voltage and current coming from the solar panels and going to the battery. Most "12 volt" panels produce about 16 to 20 volts, so if there is no regulation, the batteries will be damaged from overcharging [James and Dunlop, 2012]. The obvious question then comes up –"why aren't panels just made to put out 12 volts?" The reason is that if you do that, the panels will provide power only when cool, under perfect conditions and full sun. This is not something you can count on in most places. The panels need to provide some extra voltage so that when the sunlight is low in the sky, or you have heavy haze, cloud cover, or high temperatures, you still get some output from the panel, so the panel has to put out at least 12.7 volts under worst case conditions. The primary function of a charge controller is to maintain the battery at highest possible state of charge. The charge controller protects the battery from overcharge and disconnects the load to prevent deep discharge. Ideally, charge controller directly controls the state of the battery.

This work has produced a low cost, reliable and functional solar charge controller, using locally sourced and available components. The product worked satisfactorily and can be used in a solar home system to solve problems of power supply . As this system keeps continues track of solar power plant ,the daily weekly and monthly analysis becomes easy and efficient also with the help of this analysis it is possible to detect any fault occurred within power plant as the generated power may show some inconsistency in data of Solar power plant. Implementing Renewable Energy technologies is one recommended way of reducing the environmental impact. Because of frequent power cut it is important to use renewable energy and monitoring it. Monitoring guides the user in analysis of renewable energy usage. This system is cost effective. The system efficiency is about 95%.This enables the efficient use of renewable energy. Thus it is reducing the electricity issues. This project can be further enhanced, by using the results of this current project, i.e. the monitoring values obtained are helpful in predicting the future values of the parameters considered. The data stored in cloud can also be analyzed using the MatLab.

A new power transfer system using wireless sensor Network

Name: **Sachidananda Mohanty**
Regn. No. **2101289490**
Branch: **ETC**

ABSTRACT
Wireless Power Transfer (WPT) is a collective term that refers to a number of different technologies for transmitting energy by means of electromagnetic fields. In general a wireless power system consists of a "transmitter" connected to a source of power such as a mains power line, which converts the power to a time-varying electromagnetic field, and one or more "receiver" devices which receive the power and convert it back to DC or AC electric current which is used by an electrical load. At the transmitter the input power is converted to an oscillating electromagnetic field by some type of "antenna" device. The word "antenna" is used loosely here; it may be a coil of wire which generates a magnetic field, a metal plate which generates an electric field, an antenna which radiates radio waves, or a laser which generates light. A similar antenna or coupling device at the receiver converts the oscillating fields to an electric current. Wireless power uses the same fields and waves as wireless communication devices like radio, another familiar technology that involves electrical energy transmitted without wires by electromagnetic fields, used in cell phones, radio and television broadcasting, & Wi-Fi.

INTRODUCTION
Wireless power transfer (WPT), wireless power transmission, wireless energy transmission, or electromagnetic power transfer is the transmission of electrical energy from a power source to an electrical load, such as an electrical power grid or appliance, without the use of conductors like wires or cables. Wireless power is a generic term that refers to a number of different power transmission technologies that use time-varying electric, magnetic, or electromagnetic fields.

Wireless power techniques mainly fall into two categories, non-radioactive and radioactive. In near field or non-radioactive techniques, power is transferred by magnetic fields using inductive coupling between coils of wire, or by electric fields using capacitive coupling between metal electrodes.

Inductive coupling is the most widely used wireless technology; its applications include electric toothbrush chargers, RFID tags, smartcards, and chargers for implantable medical devices like artificial cardiac pacemakers, and inductive powering or charging of electric vehicles like SCMaglev, trains, AGV or buses.

A current focus is to develop wireless systems to charge mobile and handheld computing devices such as cell phones, digital music players and portable computers without being tethered to a wall plug. In far-field or radioactive techniques, also called power beaming, power is transferred by beams of electromagnetic radiation, like microwaves or laser beams. These techniques can transport energy longer distances but must be aimed at the receiver.

With the explosion of variety and number of mobile devices, wireless power transfer offers convenience of charging batteries without the annoyance of cables, and the in convenience of "plugging it". Additionally wireless power could potentially extend the working life of the battery. Another end-use of wireless power transfer can be found in medical applications, particularly medical implants. These rapidly emerging applications can result in major quality of life improvements and have significant life-extending implications. Wireless power transfer can also be used in safety-critical environments such as explosive or corrosive atmospheres, underwater, or any location where there is a safety risk when an electrical connection is made or broken with a corresponding spark.

Wireless Charging:
Inductive charging (also known as wireless charging) uses an electromagnetic field to transfer energy between two objects through electromagnetic induction. This is usually done with a charging station. Energy is sent through an inductive coupling to an electrical device, which can then use that energy to charge batteries or run the device.

Electric Vehicle Technologies

The electric vehicle that charges wirelessly while moving using electromagnetic induction (the wireless transfer of power through magnetic fields). It functions by using a segmented "recharging" road that induces a current in "pick-up" modules on the vehicle. In the "recharging" road, slim W-shaped ferrite cores (magnetic cores used in induction) are buried 30 cm underground in a fish bone like structure. Power cables are wrapped around the centre of the fish bone structures to make the "primary coils". This design combines the magnetic fields of the two sides of the cables and shapes the fields in a way that maximizes induction. Moreover, the primary coils are placed in segments across certain spans of the road so that only about 5% to 15% of the road needs to be remodelled.

AREAS OF APPLICATION

Several applications of wireless power transfer are apparent and obvious. Firstly, WPT could eliminate traditional charging systems in place today. Instead of plugging in a mobile phone or laptop via power cord to charge the battery, wireless power can be harnessed and implemented in a home such that a laptop and phone charge continuously and wirelessly without the need for plugging anything in. Higher level applications include charging of electric vehicles (EVs. Applications of WPT are described in this section.

1.**Industrial Applications**

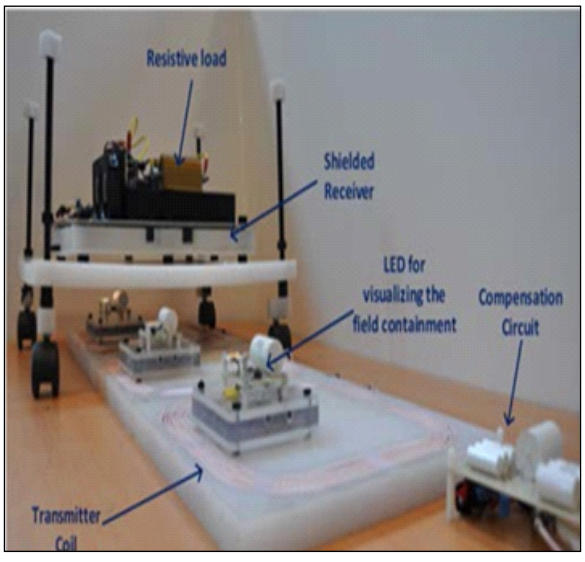
Wireless power transfer has seen tremendous applications and value addition to industries. The primary applications include wireless sensors on rotating shafts, wireless equipment charging and powering, and safe and watertight equipment through eliminating charging cords.

2.**Electronic portable devices (Wireless Charging)**

Cell phones, laptops, tablets, even smart watches are found all over the globe and are owned and used by billions of people. What these devices all have in common is the need to recharge their internal battery so that the device can be used while mobile.WPT has the potential to disrupt and revolutionize the traditional portable device, not only by making mobile devices more convenient by eliminating the need for a physical power supply, but also safer (power cords carry risk of shock and can cause fires), as well as a reduced cost for consumers. Research has even been done into multi-hop WPT systems, wherein a generator transmits power wirelessly to targets, which can then in turn become sources for other targets, and transfer power wirelessly to those targets.

Challenges to Wireless Power Transfer

The implementation of a wireless power transfer system poses many challenges to power system designers. Some of the challenges are market driven, while others are related to the practicality of the system. Today the mobile gadget market is driving the development of WPT, thus setting many of its requirements and challenges.These requirements include high efficiency, particularly for the receiving de3vices due to limited power dissipation budgets, low physical profile and robustness to all operating conditions. The need for robustness stems from the convenience-of-use factor that wireless power transfer offers – users do not want to be burdened with rules on device placements, limitations on the number of devices that can be powered at one time, and the size of the devices to be powered. Add to these requirements the need for systems to anticipate adverse operating conditions, such as the introduction of foreign objects that can drastically affect the operation and performance of wireless power transfer system.



The focus of this paper has been an overview of the MPT mechanism for WPT, and its aim has been to highlight the many benefits and applications of MPT. The discussion began by describing and defining the fundamental aspects of the MPT system. This was followed by a look at the many applications of MPT to wirelessly transfer power from a source to a target, both in practical and near future applications and in theoretical applications for the future. The limitations and potential safety concerns were also pointed out, and the mechanism of HR-WPT was described as an alternate method for WPT. WPT has the potential to completely disrupt the way that mobile devices, from cell phones and laptops to cars and aerial vehicles, operate and obtain energy. The future of energy is the unfettering of devices from a power cord to realize the freedom of mobile
zones and monitor various parameters of vehicle in-between constant time period and will send this data to the base unit is explained in this paper. Controlling the vehicle speed automatically in real time is very difficult. So, in order to avoid those difficulties, instead of controlling the vehicle speed automatically, this research papersucceededinalertingthedriveraboutt hespeedlimits and detecting the critical area. The entire system is control and the advantage of small volume and high reliability.

Future scope of that is to control the accidents and positioning the accidental vehicle. Many existing systems has discussed about the road safety's and has proposed many methods for the speed limitations and detection the critical area. There sult is simulated and achieved by KeilC software.

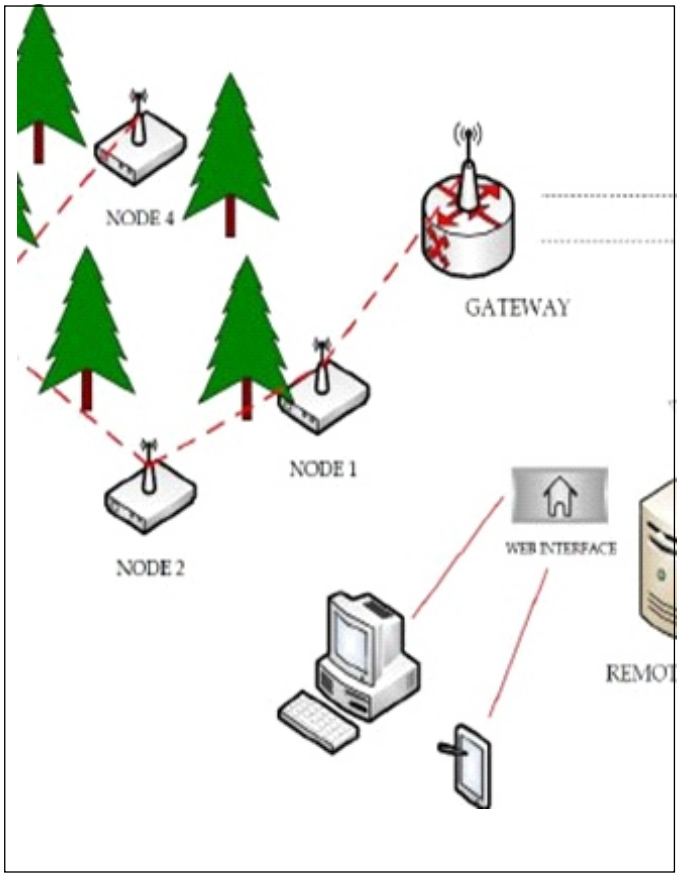
A smart agriculture system using IOT

Name: **Tamana Jena**
Regn. No. **2101289534**
Branch: **ETC**

ABSTRACT
Agriculture plays vital role in the development of agricultural country. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. 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. Hence the project aims at making agriculture smart using automation and IoT technologies. The highlighting features of this project includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, etc. Secondly it includes smart irrigation with smart control and intelligent decision making based on accurate real time field data. Thirdly, smart warehouse management which includes temperature maintenance, humidity maintenance and theft detection in the warehouse. Controlling of all these operations will be through any remote smart device or computer connected to Internet and the operations will be performed by interfacing sensors, Wi-Fi or ZigBee modules, camera and actuators with micro-controller and raspberry pi.

INTRODUCTION
Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy. It also provides large ample employment opportunities to the people. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield. Most of the papers signifies the use of wireless sensor network which collects the data from different types of sensors and then send it to main server using wireless protocol. The collected data provides the information about different environmental factors which in turns helps to monitor the system.. Monitoring environmental factors is not enough and complete solution to improve the yield of the crops.
In the present system, every node is integrated with different sensors and devices and they are interconnected to one central server via wireless communication modules. The server sends and receives information from user end using internet connectivity. There are two modes of operation of the system; auto mode and manual mode. In auto mode system takes its own decisions and controls the installed devices whereas in manual mode user can control the operations of system using android app or PC commands.
Node 1:
Node1 is GPS based mobile robot which can be controlled remotely using computer as well as it can be programmed so as to navigate autonomously within the boundary of field using the co-ordinates given by GPS module .The Remote controlled robot have various sensors and devices like camera, obstacle sensor, siren, cutter, sprayer and using them it will perform tasks like; Keeping vigilance, Bird and animal scaring, Weeding, and Spraying
Node 2:
Node2 will be the warehouse. It consists of motion detector, light sensor, humidity sensor, temperature sensor, room heater, cooling fan altogether interfaced with AVR microcontroller. Motion detector will detect the motion in the room when security mode will be ON and on detection of motion, it will send the alert signal to user via Raspberry pi and thus providing theft detection.
Node 3:
Node3 is a smart irrigation node with features like ; Smart control of water pump based on real time field data i.e. automatically turning on/off the pump after attaining the required soil moisture level in

auto mode, Switching water pump on/off remotely via mobile or computer in manual mode, and continuous monitoring of soil moisture.



HARDWARE USED:

a) **AVR Microcontroller Atmega 16/32**: The microcontroller used is, Low-power AVR® 8-bit Microcontroller, having 8K Bytes of In-System Self programmable Flash program memory, Programmable Serial USART, 8-channel, 10-bit ADC, 23 Programmable I/O Lines.

b) **ZigBee Module**: ZigBee is used for achieving wireless communication between Node1 and Node2. The range for Zigbee is roughly 50 meters and it can be increased using high power modules or by using network of modules. It operates on 2.4 GHz frequency. Its power consumption is very low and it is less expensive as compared to other wireless modules like Wi-Fi or Bluetooth. It is usually used to establish wireless local area networks.

c) **Temperature Sensor LM35**: The LM35 is precision IC temperature sensor. Output voltage of LM35 is directly proportional to the Centigrade/Celsius of temperature. The LM35 does not need external calibration or trimming to provide accurate temperature range. It is very low cost sensor. It has low output impedance and linear output. The operating temperature range for LM35 is −55˚ to +150˚C. With rise in temperature, the output voltage of the sensor increases linearly and the value of voltage is given to the microcontroller which is multiplied by the conversion factor in order to give the value of actual temperature.

d)**Moisture sensor**: Soil moisture sensor measures the water content in soil. It uses the property of the electrical resistance of the soil. The relationship among the measured property and soil moisture is calibrated and it may vary depending on environmental factors such as temperature, soil type, or electric conductivity. Here, It is used to sense the moisture in field and transfer it to microcontroller in order to take controlling action of switching water pump ON/OFF.

e) **Humidity sensor**: The DHT11 is a basic, low-cost digital temperature and humidity sensor. It gives out digital value and hence there is no need to use conversion algorithm at ADC of the microcontroller and hence we can give its output directly to data pin instead of ADC. It has a capacitive sensor for measuring humidity. The only real shortcoming of this sensor is that one can only get new data from it only after every 2 seconds.

f) **Obstacle sensor (Ultra-Sonic)**: The ultra-sonic sensor operates on the principle of sound waves and their reflection property. It has two parts; ultrasonic transmitter and ultra-sonic receiver. Transmitter transmits the 40 KHz sound wave and receiver receives the reflected 40 KHz wave and on its reception, it sends the electrical signal to the microcontroller. The speed of sound in air is already known. Hence from time required to receive back the transmitted sound wave, the distance of obstacle is calculated. Here, it is used for obstacle detection in case of mobile robot and as a motion detector in ware house for preventing thefts. The ultra-sonic sensor enables the robot to detect and avoid obstacles and also to measure the distance from the obstacle. The range of operation of ultra-sonic sensor is 10 cm to 30 cm.

g) **Raspberry Pi** : The Raspberry Pi is small pocket size computer used to do small computing and networking operations. It is the main element in the field of internet of things. It provides access to the internet and

system with remote location controlling device becomes possible. Raspberry Pi is available in various versions. Here, model Pi 2 model B is used and it has quad-core ARM Cortex-A53 CPU of 900 MHz, and RAM of 1GB. it also has: 40 GPIO pins, Full HDMI port, 4 USB ports, Ethernet port, 3.5mm audio jack, video Camera interface (CSI), the Display interface (DSI), and Micro SD card slot.

The sensors and microcontrollers of all three Nodes are successfully interfaced with raspberry pi and wireless communication is achieved between various Nodes. All observations and experimental tests proves that project is a complete solution to field activities, irrigation problems, and storage problems using remote controlled robot, smart irrigation system and a smart warehouse management system respectively. Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production

Image processing basedwheel chair system

Name: **Priyanshu Mohaty**
Redn. No. **2301289552**
Branch: **ETC**

ABSTRACT
The Eye Directive wheelchair is a mobility-aided device for persons with moderate/severe physical disabilities or chronic diseases as well as for the elderly. There are various interfaces for wheelchair available in the market, still they remain under-utilized, the reason being the ability, power and mind presence required to operate them. The proposed model is a possible alternative. In this model, we use the optical-type eye tracking system to control powered wheel chair. User's eye movements are translated to screen position using the optical type eye tracking system, without any direct contact. When user looks at appropriate angle, then computer input system will send command to the software based on the angle of rotation of pupil i.e., when user moves his eyes balls left (move left), right (move right), straight (move forward) in all other cases wheel chair will stop. Also, obstacle detection sensors are connected to the arduino to provide necessary feedback for proper operation of the wheelchair and to ensure the user's safety. The motors attached to the wheelchair support differential steering which avoids clumsy motion. The wheelchair has also been provided with a joystick control to ensure safe movement in case of tired vision and with a safety stop button, which will enable the user to stop the wheelchair at ease.

INTRODUCTION
The wheel chair model design illustrated here is a well-equipped and flexible motorized wheelchair for paralytic and motor disabled patients to drive the wheelchair without straining any of their physical posture. The gaze movement is tracked autonomously and the wheelchair is directed according to the eye position. It is an eco-friendly and cost-effective wheelchair that dissipates less power and can be fabricated using minimum resources. System has been designed taking into consideration the physical disability, thus it won't affect the patient physically. Obstacle and ground clearance sensing is performed to ensure patient's safety. Audible notification for the obstacles has been provided. Alternatively a joystick has been embedded for the control of wheelchair.
Design and Specifications

In Image Capturing Module, images are captured using wireless camera and are sent to the base station (computer/ laptop) for further processing. In Microprocessor Interfacing, the generated electric digital output from the base station is used to direct the motors of the wheelchair. Microprocessor also takes care of the obstacles and the user inputs.

Wireless camera: Eye of the user is captured with a pin hole wireless camera which transmits the images to the base station wirelessly.

Computer Base station: The images received from the camera are processed using Open source Computer Vision library and the gaze movement is sent to the chair via X-Bee communication.

Microcontroller: They are used to maintain wireless communication protocols and on the receiver side, it also takes care of obstacles and manual user inputs.
Motor Driver: They provide the high current required to drive the motors.

WORKING
The series of images taken by the camera is transmitted to the base station (computer/ laptop). The images are processed using Open Source Computer Vision Library (OpenCV), where they are converted into .xml file. OpenCV processing yields the length and width of the detected object(pupil). The length and width of each quadrant is prescribed in the OpenCV algorithm. The position helps to calibrate the quadrant in which the pupil lies, which helps us to find the direction in which the eye is pointing. The processing basically divides the image in three quadrants (left, right and

center). If position of the pupil lies in the right quadrant then the wheelchair moves left. If it lies in the left quadrant, wheelchair moves right. If the object lies in the center the wheelchair moves straight.
The wheelchair can operate either in the eye (image) directed mode or joystick mode. The modes can be switched by long-pressing the joystick button.
Mode I: Eye directed mode:The user's eye movement forms the basis of the entire system. The movement of the eyeballs is continuously tracked using a wireless camera. This camera is mounted in front the eye, such that the focus remains on the eye movement. These images are sent to a processing unit i.e. a computer or laptop. Every single image undergoes processing and the required information is generated from the image. The processing unit has an USB outlet to an Arduino. The information of the eyeball movement is sent to the transmitting arduino connected to the computer. The transmitting arduino then transmits the information wirelessly to the receiving arduino which is mounted on the wheelchair. The receiving arduino on the wheelchair is connected to the motor driver. On receiving appropriated command, the receiving arduino directs the motion in the required direction. The motors exhibit differential steering mechanism ensuring swift turning. The system has been enabled with four ultrasonic sensors which will help avoid collision in the left, right and forward direction respectively. The fourth sensor has been provided for ground clearance.
Mode II: Joystick mode: Joystick mechanism has alsobeen provided as an additional feature to ensure movement in case of tired vision. A stop button is provided on the wheelchair which will cease the working at the very instance it is pressed.

CONCLUSIONS

The system functions with an accuracy rate of 70-90 %. The aim of this project is to contribute to the society in our small way by setting out an idea for a system which could actually better the lives of millions of people across the globe. Direction in which pupil looks is decided by fixing range to the particular direction as user looks. Detection of pupil is done even on illumination unless the illumination is covering whole eye, this is because when the light hits the pupil and illumination spreads on the pupil covering whole pupil which ignores those pixels so as we treat the illumination spots it will leave behind a maximum change edges that cannot be determined and the operator will consider another position to be a iris location. This process works even if image taken in little dark environment.

Application of IOT for solar power monitoring and control

Name: **Pruthiraj Sahoo**
Regn. No-**2301289553**
Branch: **ETC**

ABSTRACT
Using the Internet Of Things Technology for supervising solar photovoltaic power generation can greatly enhance the performance, monitoring and maintenance of the plant. With advancement of technologies the cost of renewable energy equipments is going down globally encouraging large scale solar photovoltaic installations. This massive scale of solar photovoltaic deployment requires sophisticated systems for automation of the plant monitoring remotely using web based interfaces as majority of them are installed in inaccessible locations and thus unable to be monitored from a dedicated location. The discussion in this paper is based on implementation of new cost effective methodology based on IoT to remotely monitor a solar photovoltaic plant for performance evaluation. This will facilitate preventive maintenance, fault detection, historical analysis of the plant in addition to real time monitoring.

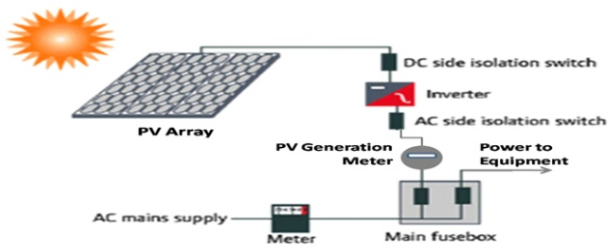
INTRODUCTION
Renewable energy source is a practical solution to address the persistent demand supply gap in the power industry. Due to the availability of solar energy across the country unlike other renewable sources which have geographic limitation ,Solar Photovoltaic among all renewable sources is proving to be most beneficial. Application of IoT is proving to be beneficial for monitoring power generation from renewable energy sources. India is blessed with abundance of solar radiation that attracts massive solar photovoltaic power plant installation. With advancement of wired and wireless network technologies, internet-connected mobile devices such as smart phones and tablets are no. Thus resulting in a new concept, Internet of Things (IoT) , was introduced and has received attention over the past few years. In general, IoT is actually an information sharing environment where objects in every-day life are connected to wired and wireless networks. Recently, it is used not only for the field of consumer electronics and appliances but also in other various fields such as a smart city, healthcare, smart home, smart car, energy system, and industrial security. At present, the solar photovoltaic (PV) energy is one of the pivotal renewable energy sources. The solar energy is becoming a potential solution towards sustainable energy supply in future. As more and more Rooftop Solar Photovoltaic systems are getting integrated into the existing grid, there is a growing need for monitoring of real timegeneration data obtained from solar photovoltaic plants so as to optimize the overall performance of the solar power plant and to maintain the grid stability. As local monitoring is not possible for the installer therefore monitoring remotely is essential for every solar power plant. At thjuncture harnessing the power of IoT for monitoring solar power plants by using digital technologies and more advanced computational facilities is promising. In general remote monitoring systems have to fetch, analyze, transmit, manage and feedback the remote information , by utilizing the most advanced science and technology field of communication technology and other areas. It also merges comprehensive usage of instrumentation, electronic technology and computer software. Prevalent monitoring PV system approaches presentposes some problems like low automaticity and poor real-time. These problems can be averted with an efficient remote environment information monitoring and controlling system. This system should include automatic diagnosis techniques the PV station. A predictive maintenance which includes localization and definition of related faults and failures in a PV system is very important. In what follows, concentration has been given on the most widely used ones. Remote monitoring and control of PV system based on Zigbee technology is proven inefficient in large scale because it can't face up huge distance.

Application of IOT for solar power Monitoring and Control:

1.IoT utilizes computing facilities and software systems for information processing and knowledge digging.

2.Using IoT Human to Machine and Machine to Machine information exchange and seamless linkage of information flows can be achieved.

3.Using IoT real-time control ,accurate management and intelligent decision-making of the physical world can be made.



WIRELESS TRANSFER MODULE

'SIM900' is a GSM/GPRS module used for communication between the data logger and the server. This modem as shown in figure 5 is a quad-band GSM/GPRS module with a powerful single-chip processor integrating AMR926EJ-S core manufactured by 'SIMCom Wireless Solutions Ltd'.

It delivers GSM/GPRS850/900/1800/1900 MHz performance for voice, SMS and data. It is a low power consumption module with current consumption as low as 1.0 mA in sleep mode thus it is highly energy efficient.

The module is 24 mm x 24 mm x 3 mm and is ideally designed to meet any requirements for Machine2Machine applications .It is interfaced by COM port by using RS232 protocol.

It has a GPRS multi-slot class 10/8 and a B-type GPRS mobile station class. Microcontroller is programmed to provide AT commands to control the GSM/GPRS module.

WORKING OF THE SYSTEM

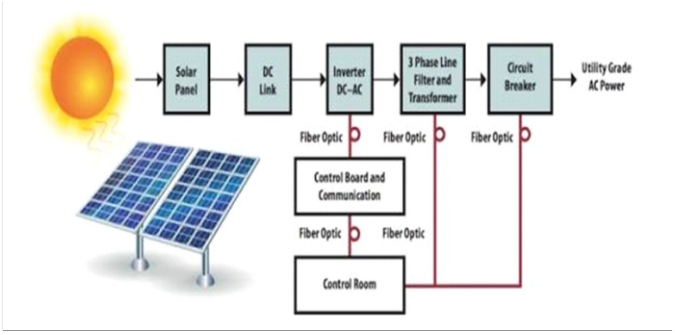
1.The major role of data logging system is to send data through the GPRS enabled modem .

2. Modem should perform these commands as soon as it receives them. From the sensing card, variable values are taken as a string.

3.At a particular instance of time, all variable values are taken together as a single string whose length would be less than 150 Bytes.

4.Each value may be separated by comma or spaces. Local RTC is to be incorporated into the controlling system to get a date, time-stamp with the current values.

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. Relates users and their smart devices along with sensors used in every day actionse.g smart phones andwearabledevices) IoT is expected to greatly transform the energy sector by improving the Consumer side-Generation side relationship.



IoT based remote monitoring will ensure comfortable plant monitoring Display of Yield ,Power ,earningsStatus messages via email to PC and mobile phone. It is an ideal solution to increase efficiency of plant monitoring Presentation of PV generation , consumption and self consumption Recommended consumption Automatic and intelligent control of loads Visualization of Live Data. Use of IoT for monitoring of a solar power plant is an important step as day by day renewable energy sources are getting integrated into utility grid. Thus automation and intellectualization of solar power plant monitoring will enhance future decision making process for large scale solar power plant and grid integration of such plants.

Effects of variations of MEMS Microcantilevers

Name: **Deakalyan Kar**
Regd No. **2301289537**
Branch: **ETC**

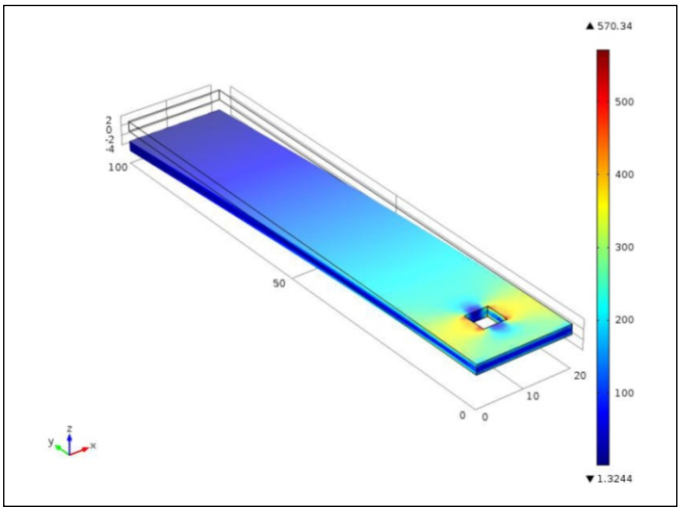
ABSTRACT
MEMS is the integration of active and passive elements on a single chip, which combine electronics, electrical as wellas mechanical elements to use in sensing and actuation. MEMS technology used the Microcantilevers as basic sensing elements. Microcantilevers are used to sense physical, chemical, biomedical and many other properties. In this paper different approaches are used to increase the sensitivity of sensors. Comparative analysis of simulated results of different microcantilevers is shown. Analytical approaches are also used to validate the design of microcantilevers.

INTRODUCTION
MEMS made microsensors are used for measuring physical parameters. The basic building block of a sensor is the transducer, which produces a measurable response to a change in a physical condition and transforms the response into the electrical signal, adopting various transduction principles.

Microcantilevers and beams are very useful transducer elements, using which many physical changes can be measured. The main principle is the deflection of the beam and cantilever structures. The deflections are sensed either by capacitive or piezoresistive measurement. The difference between a beam and a cantilever is that a beam is fixed at both the ends whereas a cantilever is fixed at only one end.[2]

Thispaper shows the effects of variation in different physical parameters and compares the output simulation results. In order to increase the sensitivity of the microcantilevers, rectangular hole is formed on the fixed end of the microcantilevers. Comparative analysis of all the output simulated results is performed.

MICROCANTILEVERS EQUATIONS
A cantilever is a beam in which one end is fixed and the other is free to deflect as per provided load. The cantilevers have more length as compare to width and have optimal thickness. Without load the cantilever is at the resting state and therefore initially it is horizontal and straight. When force is applied the horizontal axis of the beam is deformed into a curve. The deflection of the beam depends on its length, its cross-sectional shape, the material, the point at which the deflection force is applied and how the beam is supported. Two basic equations are used to study the behavior of cantilevers.



[Highly sensitive cantilevers with hole on fixed end.]

CONCLUSION
With the change in dimension of cantilevers respective change in sensitivity is obtained. So an optimum dimension selection is required in design of the cantilevers. Further sensitivity of cantilevers is increased with use of different holes on the fixed end of the cantilevers.

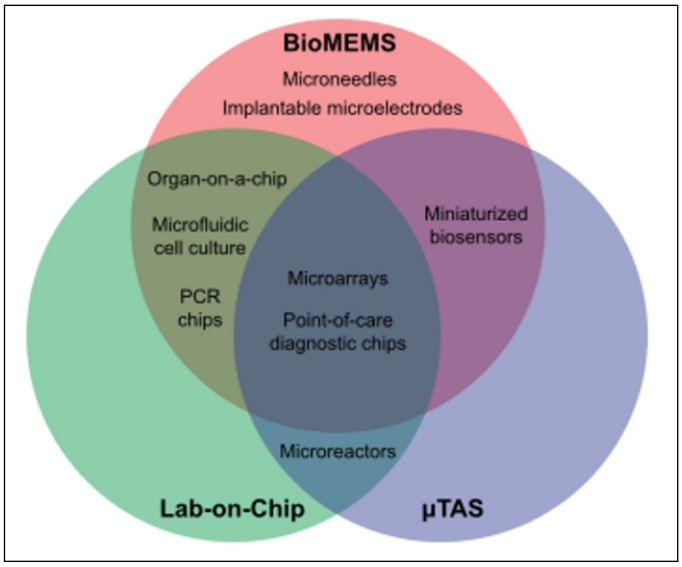
Biological MEMS : A Technological Application

Name: **Hersita Kumari**
Regd No. **2301289543**
Branch: **ETC**

ABSTRACT
Miniaturization of conventional technologies has long been understood to have many benefits, like: lower cost of production, lower form factor leading to portable applications, and lower power consumption. Micro/Nano fabrication has seen tremendous research and commercial activity in the past few decades buoyed by the silicon revolution. As an offset of the same fabrication platform, the Micro-electro-mechanical- systems (MEMS) technology was conceived to fabricate complex mechanical structures on a micro level. MEMS technology has generated considerable research interest recently, and has even led to some commercially successful applications. Almost every smart phone is now equipped with a MEMS accelerometer-gyroscope system. MEMS technology is now being used for realizing devices having biomedical applications. Such devices can be placed under a subset of MEMS called the Bio-MEMS (Biological MEMS). In this paper, a brief introduction to the Bio-MEMS tchnology and the current state of art applications is discussed.

INTRODUCTION
Generally, the Bio-MEMS can be defined as any system or device, which is fabricated using the micro-nano fabrication technology, and used for biomedical applications such as diagnostics, therapeutics, drug delivery or real time monitoring Bashir (2004). Any Bio-MEMS device can be broken down to two primary aspects, the sensor/actuator and the system The interdisciplinary nature of the Bio-MEMS research is highlighted in Figure 2. This highlights the overlapping of many different scientific disciplines, and the need for a healthy collaborative effort.

The population explosion in the past three decades, especially in the developing countries has put a severe strain on the



medical infrastructure of individual countries. Under such circumstances, a point of care rapid diagnostic solution is highly sought after. But the reduction in form factor of the sensor must not compromise on the sensitivity and accuracy of the system. Recent advances in MEMS technology have given researchers the ideal platform to conceptualise and develop miniaturised sensors, which are equally sensitive and accurate when compared to a traditional lab based diagnostic approach. In addition to the portability advantage, another direct outcome of MEMS is the ability to batch fabricate, driving the costs of these sensors to very low levels. These sensors, when coupled with adequate electronics, provide a very affordable and an accurate diagnostic option, especially to countries lacking an adequate medical facility penetration.However, to research and develop a Bio-MEMS device, a coherent inter-disciplinary approach needs to be adopted. The chemistry and/or biotechnology experts need to develop a highly specific bio-capture strategy. The entire process flow also depends on the end use of the sensor owing to the fact that the certification procedures of bio-sensors are highly critical, intensive and elaborate. The process gets more complicated for invasive sensors. The materials chosen for invasive sensors need to be receptive to favourable biochemistry and at the same time must be bio-compatible. In addition to the biocompatibility challenge, they need to be MRI compatible (with the exception of few critical technologies, like the heart pacemaker). Such stringent certification

laws pose a considerable challenge to the developers. The certification process also involves a lengthy and an intensive testing process. The entire procedure from proof of concept to a commercial product usually takes more than a decade.

MATERIALS AND FABRICATION TECHNOLOGY

MEMS/Bio-MEMS devices can be realized from a variety of materials, which can be grouped as : a) inorganic materials like silicon and glass, which have traditionally been used in the microelectronics fabrication, b) organic materials which include polymers like SU-8, PMMA, PDMS etc. and c) biomaterials like DNA, RNA and proteins which are utilized as biomimetic materials.

IMMOBILIZATION OF BIOMOLECULES

The essential component of a biosensor is the formation of a compact layer of bio-recognition element in close proximity to the transducer, to which the target molecules bind subsequently.

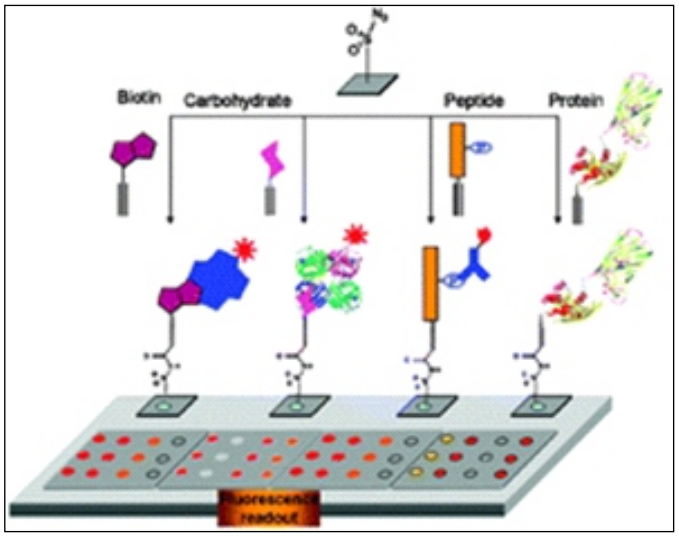


Fig 2-Immobilization of bio molecules

These molecules are usually nucleic acids, proteins (including antibodies, peptides etc.), carbohydrates or cells and are called as probe molecules. The immobilization of these molecules has a pivotal role in sensor fabrication because it affects sensor's limit of detection, specificity, reusability as well as reliability. The immobilization strategy of sensors with these molecules is that it must form stable, homogenous and reproducible layers on the surface, and also retain the activity of the probe molecules and its availability to the target molecule. The probe molecules can be bound by physical methods- adsorption, encapsulation or entrapment on the surface, or by chemical methods- covalently attached to the linker layer formed on the surface.

APPLICATIONS OF BIO-MEMS

Biosensors on chip are relatively a new concept. Traditionally, any device which is capable of identifying (qualitatively or quantitatively) a biological signal or event can be labelled as a biosensor. A simple thermometer or stethoscopes are very basic and primitive examples of a biosensor. Biosensors can be broadly divided into two categories, invasive and non-invasive. Invasive sensors usually accompany therapeutic devices like pacemakers and are implanted inside the human body (Hitchcock and Sorenson, 2005, Yang, 2003). Recently many implantable devices have been reported, which can perform sensing and automatic wireless telemetry (Lei et al., 2006). A brief overview of recent advances in implantable sensors is given in the therapeutics section.A huge array of non-invasive Bio-MEMS technologies and devices have been reported and developed. It becomes difficult to characterise the different technologies as many possible strategies exist.

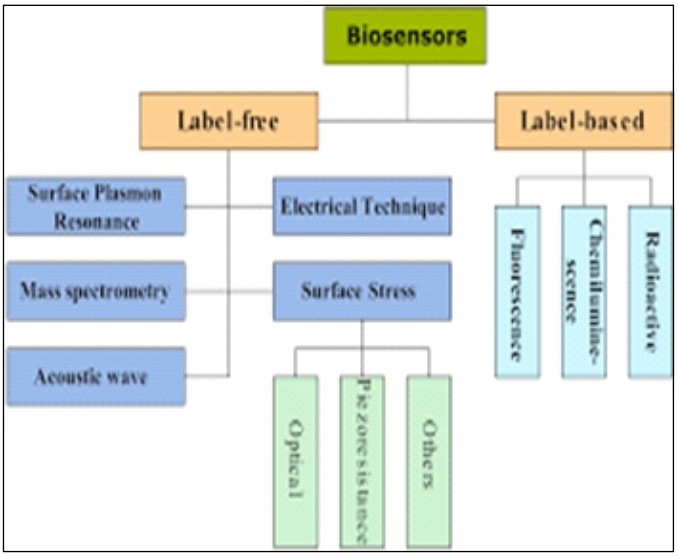


Fig 3-Classification of biosensors based on materials involved and sensing approach

Sensing of biochemical interactions, using change in optical properties (amplitude, polarization, resonance shift, and/or phase)

is a key research area, which has vast applications in health care, environmental monitoring, biomedical research and pharmaceuticals. These sensors probe the surface in a non-destructive manner. Both label-free and fluorescence/chemiluminiscence techniques come under the ambit of optical biosensors.When a light beam travelling from an optically rarer medium to an optically denser medium is reflected off the interface, a small evanescent wave is injected into the optically denser medium.An interferometric sensing offers label free detection and relies on the splitting of a single coherent light source into two paths. One of the split light beam travels through the sample media, which is functionalized for the particular analyte of interest. Analyte binding causes a change in the refractive index along the optical path, resulting in a phase shift with respect to the non-functionalized reference path. This phase shift causes a difference in the interference pattern of the two beams (Myers and Lee, 2008).The Surface plasmon resonance biosensor was first demonstrated by Liedberg et al. in 1983 (Liedberg et al., 1983). The Surface plasmon resonance phenomenon refers to the optical excitation of the surface plasmon oscillations on a thin metal layer on a dielectric by the evanescent waves leaking into the metal, during the reflection of light at this metal-dielectric interface.Photonic crystals are periodic arrays of material with a different dielectric constant, whose photonic transmission or reflection modes can be engineered. The periodicity of the array is of the order of the wavelength of interest. The Photonic biosensors use this property to perform label free bio-sensing.

CONCLUSIONS

Last couple of decades have shown considerable progress in the microfabrication technology. As a result, new materials and complicated structures are now being realised, which have enabled exciting applications. Especially in the field of Bio-MEMS, many commercial applications for lab on chip diagnostic systems and microfluidics have emerged. Some of the basic strategies were mentioned above. The interdisciplinary nature of any Bio-MEMS sensor was highlighted, demonstrating the challenges and also the outcomes of such an effort. As advances are continuously being made in MEMS, optics and also in the field of medicine, more exciting research outcomes are anticipated. For instance, an improved understanding of DNA hybridization has led to the research and development on DNA hybridization sensors for cancer detection. An exciting discovery in any of the disciplines acts as a catalyst for research in wider array of applications, or an improvement in current ones. Hence, this is a continuously evolving.

In this paper, it was attempted to initiate the reader in very brief, some of the existing strategies for MEMS fabrication and bio-functionalization. Some applications were discussed. However, it is also acknowledged that this paper offers a very brief and short introduction to Bio-MEMS, which has now progressed to innumerable domains and applications. For a more elaborate reading, readers are referred to this excellent book (Saliterman, 2006), where the author goes into much more detail in many aspects, and also enlists various exciting possibilities emerging currently.

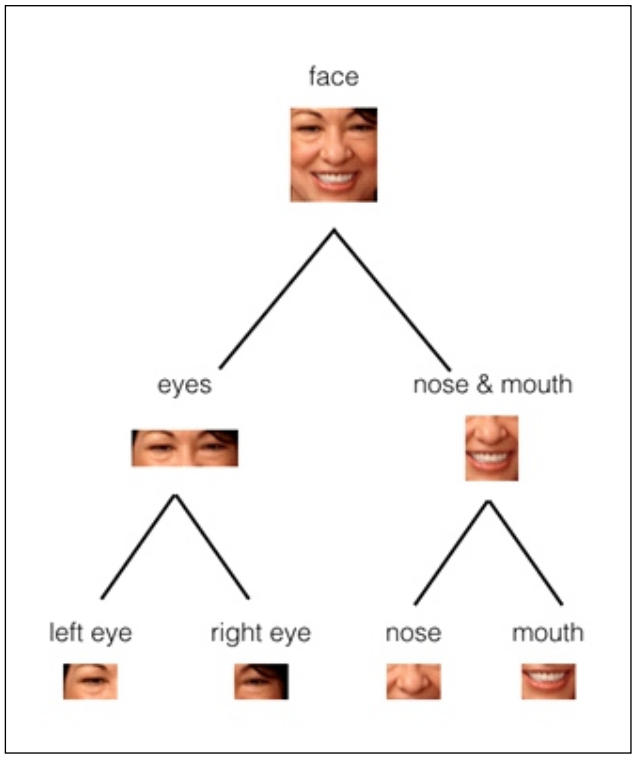
A focus on Capsule Networks

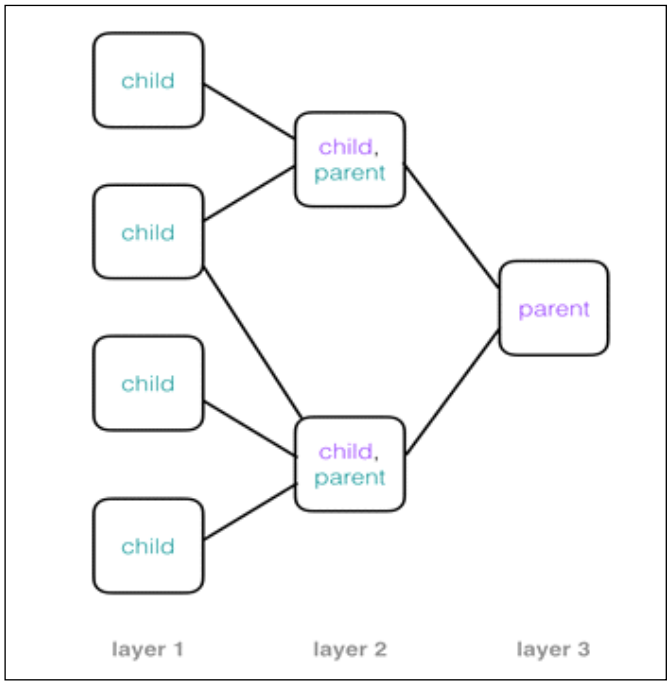
Name: **Aswin Das**
Regd No. **2301289533**
Branch: **ETC**

Capsule Networks provide a way to detect parts of objects in an image and represent spatial relationships between those parts. This means that capsule networks are able to recognize the same object in a variety of different poses even if they have not seen that pose in training data. So, what is a capsule and how do they work?

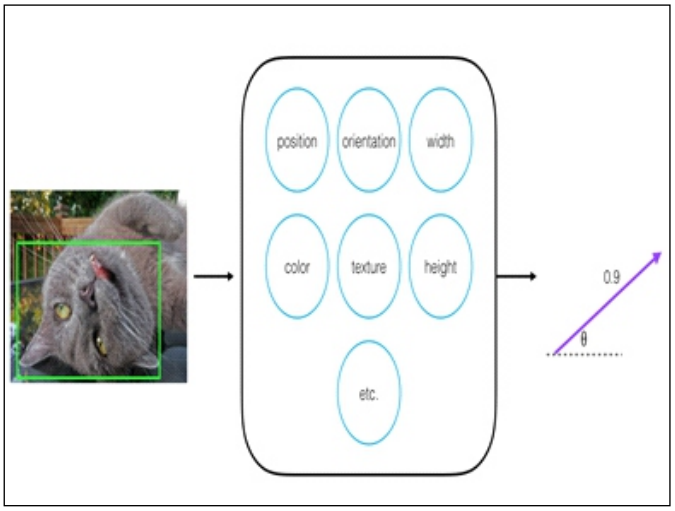
VISUAL PARSE TREE

Capsule Networks are modeled after how humans tend to focus. Our visual system is great at focusing on small parts of a scene at a time and building up a complete picture piece-by-piece. For example, think about what happens when you are talking with someone and looking at them; you cannot focus your eyes on that person's entire face at one time. Instead, your eyes are typically focused on only one area of that person's face; the right or left eye or even the bridge of their nose. You can only focus your eyes on a single point at a time. If you are looking at a larger scene, one with many faces or objects, a sequence of focused observations allows you to build up a detailed and complete picture of that scene.



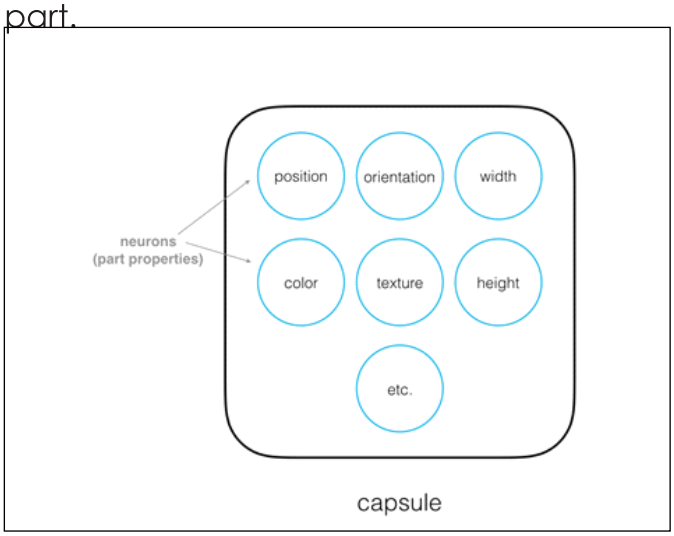


Parent nodes combine observations from child nodes to build up a more complex picture.



WHAT IS A CAPSULE?

Capsules are a small group of neurons where each neuron in a capsule represents various properties of a particular image part.



Existence

We can represent a part's existence in any image by a probability value: 0 if that part is not detected and 1 if it is; a value of 0.8 indicates an 80% confidence that the part has been found in the image.

Output Vector

Every capsule outputs a vector, u, with a magnitude and orientation.

·Magnitude (m) = the probability that a part exists; a value between 0 and 1.

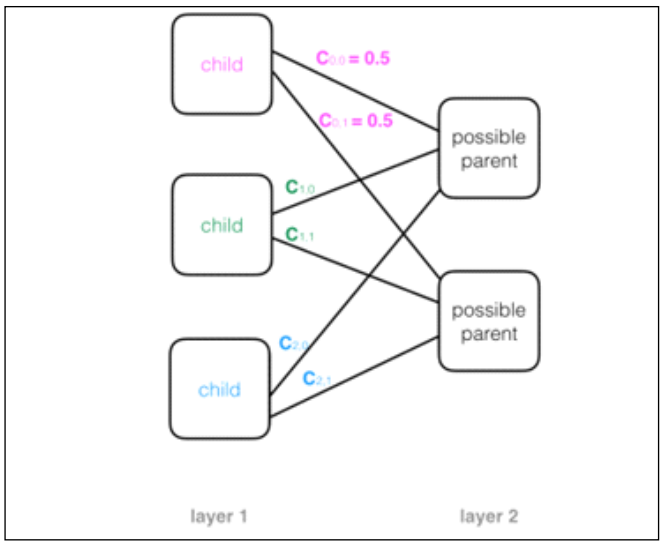
· Orientation (theta) = the state of the part properties.

Dynamic Routing

Dynamic routing is a process for finding the best connections between the output of one capsule and the inputs of the next layer of capsules. It allows capsules to communicate with each other and determine how data moves through them, according to real-time changes in the network inputs and outputs! So, no matter what kind of input image a capsule network sees, dynamic routing ensures that the output of one capsule gets sent to the appropriate parent capsule in the following layer.

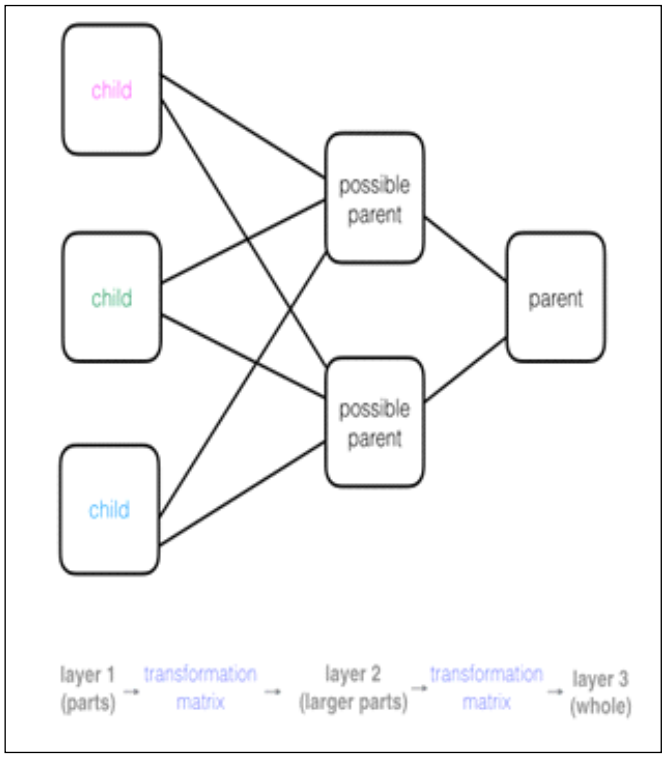
Coupling Coefficients

When a capsule network is initialized, capsules are not sure which parents their outputs should go to. In fact, each capsule starts out with a list of possible parents that starts out as all parent capsules in the next layer. This possibility is represented by a value called the coupling coefficient, c, which is the probability that a certain capsule's output should go to a parent capsule in the next layer.



Learning Spatial Relationships

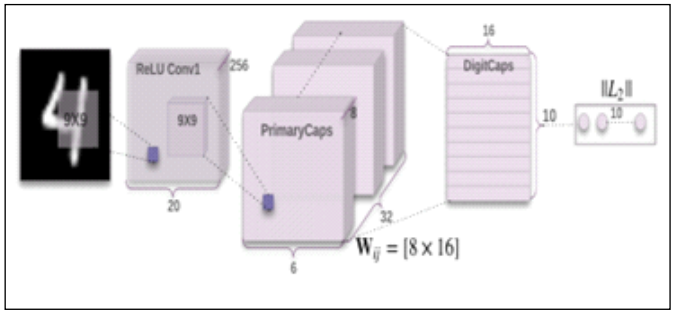
During the training process, while figuring out appropriate coupling coefficients between child and parent capsules, a capsule network learns the spatial relationships between parts and their wholes.



CAPSULE NETWORK ARCHITECTURE & IMPLEMENTATION

A Capsule Network can be broken down into two main parts:

1. A convolutional encoder
2. A fully-connected, linear decoder



Efficient Resource Allocation and Adaptive Scheduling to Enhance MIMO-OFDMA System Parameters

Name: **Ayush Nayak**
Regd No. **2301289534**
Branch: **ETC**

ABSTRACT

The combination of multiple antennas and multicarrier technology has the potential to largely increase the capacity of wireless communications and represents an airinterface solution for the next generation systems..Even though the multicarrier systems reduces Inter Symbol Interference (ISI), the Orthogonal Frequency Division Multiple Access (OFDMA) multiple input multiple output (MIMO) systems have the problem of adaptive scheduling. The systems suffer Multiple Access Interference (MAI) at receiver spatial filters and hinder the performance of the sequential allocation.The method to reduce the effect of MAI and thereby increasing the system performance is the efficient resource allocation of the signals to each sub channel .So a novel heuristic strategy that partitions the users in different groups based on their average channel quality and addresses the problems by a lowercomplexity allocation is implemented. The linear programming approach is combined with water-filling strategy will ease the task of resource allocation. The system efficiency is achieved by the efficient subcarrier, power, bandwidth allocation, the linear transmit and receive filters and BER (Bit Error Rate) reduction of the signals using link gain based grouping. The work also comprises of a comparative study of the system efficiencies.

INTRODUCTION

Wireless spectrum is a valuable resource and propagation conditions are hostile due to fading and interference from other users hence we need to increase spectral efficiency and improve link reliability. Multiple Access wireless technology seems to meet these by offering increased spectral efficiency through spatial multiplexing gain, and improved link reliability due to antenna diversity gain. Multiple Access Interference (MAI) and the Bit Error Rate (BER) should be considered in order to increase the spectral efficiency. This is done by the Linear Programming Sequential Channel Assignment Algorithm (LPSCA).Orthogonal Frequency Division Multiple Access (OFDMA) is a multi- user version of the popular Orthogonal Frequency Division Multiplexing (OFDM)digital modulation scheme. Multiple access is achieved in OFDMA by assigning subsets of subcarriers to individual users. This allows simultaneous low data rate transmissions. Resource allocation in MIMO-OFDMA systems has the potential for achieving large diversity gains but is extremely complex and computationally demanding since it requires the joint assignment of a) linear transmit and receive spatial filters b)channel assignment and c) power allocation d) bandwidth utilization over all the parallel links. Moreover, due to channel assignment and the presence of MAI, the allocation problem is not convex. The objective of resource allocation is to maximize the system throughput or minimize the overall transmit power, while satisfying some constraints, such as bit error rate (BER) and minimum data rate. In order to achieve the objective, resource allocation in the OFDMA system has three basic tasks: subcarrier allocation, bit allocation, and power allocation. The well-known optimal power allocation in maximizing the system capacity under a total power constraint is water-filling principle, which instructs that more power is allocated to the sub channel with better channel condition. When allocating subcarriers to different users, the multiuser diversity is an important concept to allow users to properly share sub channels according to the instantaneous channel conditions of the users. In a downlink OFDMA system, when sub channels are mutually independent from user to user, and that the best performance, such as the maximum bits per symbol or the minimum transmit power, can be achieved by allocating single subcarrier to the user with the best channel condition over the corresponding sub channel, and allocating the transmit power over all sub channels in terms of the water-filling principle.

RELATED WORK

Joint chunk, power and bit allocation has been explained in [8] by Zhu.H. et.al. In this the channel is assigned to different users on the base of the link gains. The resource allocation is done on chunk based model where multi level transfer is enabled. Scaling factor is considered for the optimal allocation and is based on a dynamic power allocation method. Although the maximum throughput or the minimal transmit power can be achieved by the subcarrier-based allocation scheme wireless transmission to convey channel and modulation information for each subcarrier, and is complicated. Optimal spectrum balancing algorithm has been implemented in [7] by Wei Yu.et.al. This paper is based on the transmissions based on the time sharing condition for the multiuser spectrum optimization This is an effective approach when the number of frequency carriers goes to infinity. This paper makes progress toward numerical solution of non convex optimization problems for multicarrier systems by studying their fundamental properties. In particular, paper focus on the characterization of the Lagrangian dual of these non convex problems.

CONCLUSION

The performance of a MIMO-OFDMA system with effective resource allocation scheme is analyzed. The efficiency is achieved by allocating the data to the appropriate sub channel that can hold specific power and bandwidth required for transmission. The MAI is reduced when resources are allocated suitably since the new users will not be interfered by the users already allocated. The spectral efficiency can be increased more with increased power that is analyzed in system implementation. Grouping based on link quality is found as an effective partitioning strategy which considers users more distance from base station first with no matter of how much data level it carries. Maximum data preservation can be achieved even though other interferences affect the system.Complexity of the algorithm is a factor that reduces the effect of suggested mode of allocation. An algorithm can be implemented with less complexity for resource allocation. Furthermore error rate can be dealt by reducing the Inter Carrier Interference (ICI) of the MIMO-OFDMA systems.

A New Secure Architecture For IOT Based On Block Chain

Name: **Deepali Pattnayak**
Regd No. **2301289534**
Branch: **ETC**

ABSTRACT
The Internet of Things (IoT) is experiencing exponential growth in research and industry, but it still suffers from privacy and security vulnerabilities. Conventional security and privacy approaches tend to be inapplicable for IoT, mainly due to its decentralized topology and the resource-constraints of the majority of its devices. BlockChain (BC) has been recently used to provide security and privacy in peer-to-peer networks with similar topologies to IoT. This position paper proposes a new secure, private, and lightweight architecture for IoT, based on BC technology that eliminates the overhead of BC while maintaining most of its security and privacy benefits.

INTRODUCTION
The Internet of Things (IoT) represents one of the most significant disruptive technologies of this century. It is a natural evolution of the Internet (of computers) to embedded and cyber-physical systems, "things" that, while not obviously computers themselves, nevertheless have computers inside them. With a network of cheap sensors and interconnected things, information collection on our world and environment can be achieved at a much higher granularity. Indeed, such detailed knowledge will improve efficiencies and deliver advanced services in a wide range of application domains including pervasive healthcare and smart city services. However, the increasingly invisible, dense and pervasive collection, processing and dissemination of data in the midst of people's private lives give rise to serious security and privacy concerns [1]. On the one hand, this data can be used to offer a range of sophisticated and personalized services that provide utility to the users. On the other hand, embedded in this data is information that can be used to algorithmically construct a virtual biography of our activities, revealing private behaviour and lifestyle patterns.

FEATURES
The following salient features of BC make it an attractive technology for addressing the aforementioned security and privacy challenges in IoT:
Decentralization: The lack of central control ensures scalability and robustness by using resources of all participating nodes and eliminating many-to-one traffic flows, which in turn decreases delay and overcomes the problem of a single point of failure.
Anonymity: The inherent anonymity afforded is well-suited for most IoT use cases where the identity of the users must be kept private.
Security: BC realizes a secure network over untrusted parties which is desirable in IoT with numerous and heterogeneous devices.

APPLICATION
Integrating IoT and BC is not so straightforward and will require addressing the following critical challenges:
- Mining is particularly computationally intensive, while the majority of IoT devices are resource restricted.
- Mining of blocks is time consuming while in most IoT applications low latency is desirable.
- BC scales poorly as the number of nodes in the network increases. IoT networks are expected to contain a large number of nodes.
- The underlying BC protocols create significant overhead traffic, which may be undesirable for certain bandwidth-limited IoT devices.

CONCLUSION
IoT security and privacy are critical success factors for meeting the high expectations of the technology to transform many aspects of our society and economy. Our proposed blockchain based IoT architecture handles most security and privacy threats, while considering the resource-constraints of many IoT devices. Our qualitative overhead analysis of the architecture has shown that it has constant performance overhead at best, and at worst most of its transactions scale with the number of clusters in the network, rather than the number of nodes.

While our architecture has been presented in the context of a smart home, it is broadly applicable to most multi-tiered IoT network topologies. Open questions remain around further reducing vulnerability to denial of service attacks, modification attacks, and the 51% attack for establishing distributed trust. The intrinsic broadcast medium, decentralization, and resource-constraints of IoT are key challenges towards answering these questions. The architecture proposed in this paper lays the groundwork for further research in this area, providing a lightweight, secure and private framework that retains most benefits of blockchain technology

A Smart Sun Tracking System Using IOT

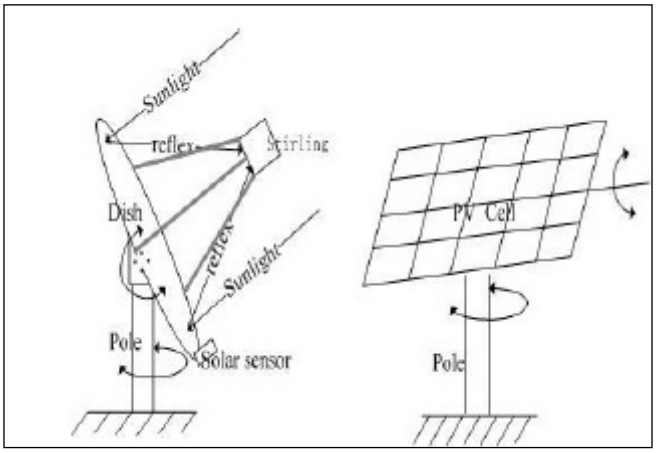
Name: **Harihar Sahoo**
Regd No. **2301289542**
Branch: **ETC**

ABSTRACT

In remote areas the sun is a cheap source of electricity because instead of hydraulic generators it uses solar cells to produce electricity. While the output of solar cells depends on the intensity of sunlight and the angle of incidence. It means to get maximum efficiency; the solar panels1 must remain in front of sun during the whole day. But due to rotation of earth those panels can't maintain their position always in front of sun. This problem results in decrease of their efficiency. Thus to get a constant output, an automated system is required which should be capable to constantly rotate the solar panel.

The Automatic Sun Tracking System (ASTS) was made as a prototype to solve the problem, mentioned above. It is completely automatic and keeps the panel in front of sun until that is visible. The unique feature of this system is that instead of taking the earth as its reference, it takes the sun as a guiding source. Its active sensors constantly monitor the sunlight and rotate the panel towards the direction where the intensity of sunlight is maximum. In case the sun gets invisible e.g. in cloudy weather, then without tracking the sun the ASTS keeps rotating the solar panel in opposite direction to the rotation of earth. But its speed of rotation is same as that of earth's rotation2.

Due to this property when after some time e.g. half an hour when the sun again gets visible, the solar panel is exactly in front of sun. Moreover the system can manage the errors and also provides the error messages on the LCD display. In manual mode, through the software (GUI) at computer, the solar panel can be rotated at any desired angle.



INTRODUCTION

ASTS can be used for Parabolic Trough tracker, Dishes tracker, PV (Photovoltaic generator) tracker, Heliostat, Solar Furnace and so on. Even though the theory of the controller system is similar to all the applications, there are some differences: the precision requirement for dishes tracker is more strict than PV tracker, while the Heliostat and solar furnace need the strictest precision requirement, and more difficult to apply solar sensor to make a closed-loop control system. So, when design these systems, selection of motor type, controller type and tracking mode should be different. ASTS is a hybrid hardware/software project. Its general structural diagram is shown in figure-3.

The software includes:

VB 6.0 based GUI.

Microsoft Access Database.

Embedded Software (written in C) for microcontroller AT89c52.

The hardware includes:

Solar panel assembly structure containing six functional sensors, stepper motor and solar cells.

System Control Unit containing LCD, Keypad, Error Indicators and Emergency Stop switch.

Complete PCB containing two microcontrollers (89c52). First one is the "Master Microcontroller" which controls the automatic operation of ASTS.

While second one, the "Slave Microcontroller" serially communicates (RS232) with VB software in computer.

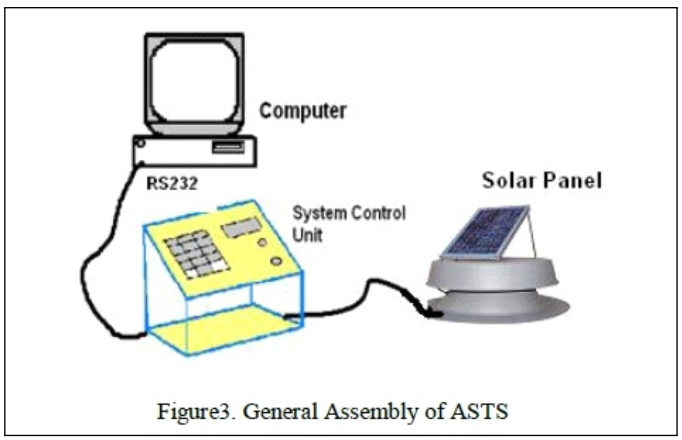
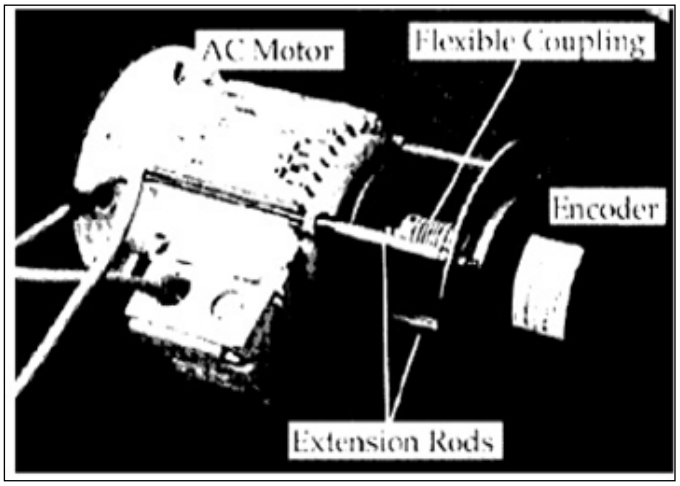


Figure3. General Assembly of ASTS

MOTOR SELECTION

There are many types of motor can be selected in ASTS design. Currently, several types of motors being used in the area of ASTS around the world are: Step-motor, Servo-motor, AC asynchronous motor, permanent magnetic DC servo motor, permanent magnetic brushless synchronous motor, etc. Generally speaking, as the gear ratio is high for the transmission system, motor control precision has very small impact to the tracking precision. For example, for a system with the gear ratio of 20000:1, the tracker only covers an angle of 0.314mrad when a one complete circle is finished by the motor. Therefore, all kinds of the motor can satisfy the precision of the tracking system. However the feature of each type of motor is different.



First of all, let's take a look at the AC asynchronous motor. To use this kind of motor, we need an encoder to locate the position of the tracker. In our project, we install an encoder at the end of AC motor. The PLC accepts the pulse to locate the tracker, while the transducer is used to adjust the tracker's speed. Certainly, we can install an encoder at the end of the transmission to ensure the position of the tracker. The obvious advantage to use AC asynchronous motor is its price. Even though it can achieve all the needed functions, AC asynchronous motor is too heavy, too large, and too low in efficiency to be installed. Also, for this type of motor, the torque at low speed is very small. In addition to these disadvantages, it needs the work frequency be above 5Hz to function properly. The lowest work frequency in our project is 10Hz. As such, the possibility for us to use AC asynchronous motor in the future is eliminated.

Secondly, let's compare the features of DC Servo-Motor and AC servo-motor. There are two types of DC servo-motor: motor with brush and motor without brush. Motor with brush is low in cost, simple in structure, and high in start torque. Also it has wide range of speed adjustment, is easy to control. Though it needs maintenance from time to time, it is very convenient to repair (replace the brush). However it produces electro-magnetic interfere. Motor without brush is small in size, light in weight, high in output, fast in response, small in inertia, smooth in spinning, stable in output torque, low motor maintenance fee, high in efficiency, low in electro-magnetic radiation, long life, and can be applied in different working environments. However it has more complex control system.

AC servo-motor is also a type of motor without brush. There are two types of AC servo-motor: synchronous AC motor and asynchronous AC motor. Currently, synchronous AC motor is generally used in movement control. It can cover a wide power range, which could be up to a very high power level. Nowadays, with the fast development of semiconductor technology, the shift frequency of power assembly, and the processing speed of micro-computer have been increased significantly. As such, it is possible to put the AC motor controller into a two-axial coordinate system to control the directional current components, in order to achieve the performance similar to the DC motor.

Fourthly, the comparison between AC servo-motor and step motor is done. AC servo-motor runs smoothly during low speed period; while step-motor is apt to have low-frequency vibration. In terms of the frequency-torque Characteristics, the output torque of step-motor decreases with the increasing of rotation speed. Furthermore the decrease is steep in high-speed range. AC servo-motor has a comparably stable output torque, when the rotation speed is within the rated rotation speed. It gives the constant output power when the rotation speed is beyond the rated value. Step-motor doesn't have the overload capability; while AC servo-motor posses a satisfactory overload capability.

The Panasonic AC servo-system is an example:
The maximum Output torque is three times big of the rated output torque, which can be used to overcome the inertia load during the start period. As the step-motor doesn't have the overload capability, a much bigger size of step-motor is needed. Obviously the step-motor will be over-sized during normal operation. Controller's type of Step-motor is open-loop type. It is easy to have the error of "step loss" or blockage when the start frequency is high or the load is heavy. Also it is easy to have the error of overshoot when it is stopped. So, to make sure the precision of control be achieved, designer needs to pay more attention to the speed-increase or speed-decrease periods. AC servo-motor system is a closed-loop system. It is possible for the driver-component to sample the signal from the motor encoder to complete a "position cycle" and "speed cycle" internally. As such, AC servo-motor system generally will not have the errors of "step loss" or "overshooting", and is more reliable in terms of controlling performance. Step-motor needs 200 to 400 mil-seconds to accelerate from still to a typical working speed of several hundred rpm. AC servo-motor is better in terms of acceleration performance. For example, Panasonic MSMA 400W needs only a few mil-seconds to accelerate from still to its rated speed of 3000RPM. So it is clear that step-motor's performance is not so good.
However it's cheaper. Started from late 70s and early 80s, with the development of micro-process technology, high-power, high-performance semiconductor technology, and manufacturing technology of permanent magnetic material, the performance price ratio of AC servo-system has been improved significantly. Price of AC servo-system also is gradually deceasing in recent years. AC servo motor is becoming the dominant product.
The conclusion is that all the motors, step-motor, AC asynchronous motor, DC motor with/without brush, AC servo-motor, can be applied in ASTS. Asynchronous AC motor is the cheapest. But it is big in size, and low in technical specification. The step-motor has a simple controlling mode and is also low in price. AC servo-motor has the best performance and wide power range. Its price is also the highest. As for the performance and price for permanent magnetic DC brushless motor, they are both rated between step-motor and AC servo-motor. Its performance is close to servomotor. For the situations that the output torque is not very high (less than 2 NM), permanent magnetic DC brushless motor is a good option.

SOLAR SENSOR

Dish type tracking controller and PV tracking controller can be both applied as four-quadrants solar sensor to correct tracking bias. It is known that solar sensor will lose its functionality temporally when it's cloudy. In the area of solar thermal generation, solar sensor system usually follows the equation based on the astronomic formula to locate the position of the sun. When a MPU (micro-processor unit) is applied to calculate the sun's position, because of its low process speed and low precision, it's necessary to include a solar sensor to make a closed loop system.
If the tracking system uses a PC or a high-performance DSP as the controller, the bias for the calculated sun position will be within one percent of mrad (milliradian), when the system clock is precisely set (Direct time from GPS is an option). No solar sensor is needed to track the sun, especially when the slope error and the gear-diastema are all small. Exception happens when the motor is a step-motor and the output torque is not enough. The situation can lead to a blockage of the motor (For example, a windy weather), which will fail the tracking system to track the sun precisely. As such, a closed loop solar sensor is recommended in such system. There are many kinds of solar sensor.
In four quadrant sensor system, the Photovoltaic current will be bigger for the quadrant of bigger solar facular area, which will indicate whether the sun's incident ray is parallel with the axial direction of the sensor, then to adjust the angle by the motor. It should be stressed during the solar sensor design that the inside wall of the solar sensor needs to be blacken to avoid misjudgment by the reflection of sunray inside the solar

sensor

CONCLUSIONS

Although ASTS is a prototype towards a real system, but still its software and hardware can be used to drive a real and very huge solar panel. A small portable battery can drive its control circuitry. Therefore by just replacing the sensing instrument, its algorithm and control system can be used in RADAR and moveable Dish Antennas

GSM BASED STREET LIGHT MONITORING AND CONTROL SYSTEM

Name: **Gaurav Kumar Nayak**
Regd No. **2301289541**
Branch: **ETC**

ABSTRACT
A Street light, lamppost, street lamp, light standard, or lamp standard is a raised source of light on the edge of a road or walkway, which is turned on or lit at a certain time every night. Major advantages of street lighting includes: prevention of accidents and increase in safety. Studies have shown that darkness results in a large number of crashes and fatalities, especially those involving pedestrians; pedestrian fatalities are 3 to 6.75 times more likely in the dark than in daylight. Street lighting has been found to reduce pedestrian crashes by approximately 50%.A number of street light control systems have been developed to control and reduce energy consumption of a town's public lighting system. These range from controlling a circuit of street lights and/or individual lights with specific ballasts and network operating protocols. These may include sending and receiving instructions via separate data networks, at high frequency over the top of the low voltage supply or wireless. Various protocols have been developed as well as compatible hardware for most types of lighting. The control center will deal with the data so that it can know the situation of each streetlight. According to the result the control center gives orders to each streetlight to control the switch state and illumination of them.

INTRODUCTION
GSM based street light monitoring & control system is an automated system designed to increase the efficiency and accuracy of an industry by automatically timed controlled switching of street lights. GSM based street light monitoring & control system consists of an 89C51 microcontroller which on setting of time delays switches ON/OFF the street lights and sends the update through a phone to the specified phone number. This is smart way of managing street lighting systems. There are basically two modules which include the client side and the server side. The client side consists of the GSM modem which is further connected to the microcontroller. The server side consists of the JAVA based web server; it has a core engine which interacts with the user, database and the GSM communication manager.

IMPLEMENTAION OF THE SYSYTEM
GSM based street light monitoring & control system is an automated system designed to increase the efficiency and accuracy of an industry by automatically timed controlled Switching of street lights. This project describes a new economical solution of street light control systems. The control system consists of a GSM Modem, and control circuitry and the electrical devices. This also includes client server mechanism where user can directly interact with web based application to control the Street light of any place from single position. Base server will running a Java Web Application which will maintain complete street light recode of City/State/Country. When we want to switch ON/OFF any particular street light, server will send a GSM SMS to that street controller to take necessary action. Street light controller will receive that SMS and will decode it and finds the particular street light which needs to put ON/OFF using relay circuit. Here the street controller 89C51 is connected to GSM modem through its UART port (Serial Ports). 89C51 cannot talk to GSM modem directly due tomismatch in voltage levels. So GSM modem is connected through voltage level convertor MAX 232. Only 2 lines RX & TX are connected to the MAX 232.The MAX232 is connected to GSM modem via RS 232 cable. An oscillator circuit of 4 MHz is connected to the 89C51. One of the port of 89C51 is connected to relay driver circuit which will help 89C51 to switch power ON/OFF of the street lights.89C51 will continuously reading the serial port after every second for new SMS. Ones the SMS came it will try to fetch that SMS from GSM modem using AT commands. It will then decode the will decode it and finds the particular street light which needs to put ON/OFF using relay circuit. The entire street light lamps are connected to relay driver circuit. Base server will running a Java

application which will maintain complete street lighting details of the city. When we want to switch ON/OFF any particular street light, server will send a GSM SMS to that street controller to take necessary action.
This power can be diverted to different areas under load shedding and attempt to reduce the problem of load shedding can be achieved.

FUTURE SCOPE AND CONCLUSION

For further development, a 2-way communication can be possible i.e. from server to client and from client to server. Android/IOS based applications can be developed for Smart Tabs/Mobile Phones making mobility of control possible. We have put forth a technical solution for implementation of wireless intelligent smart street lighting system. It provides a low cost infrastructure for managing municipal street lighting system. Energy consumption can be controlled making it eco-friendly in usage.

IOT Based Smart Health Monitoring System

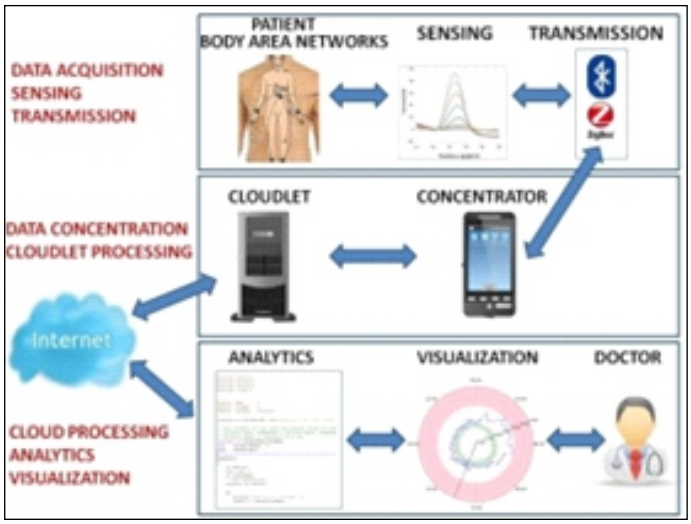
Name: **Dipali pattnayak**
Regd No. **2301289540**
Branch: **ETC**

ABSTRACT
Among the panoply of applications enabled by the Internet of Things (IoT), smart and connected health care is a particularly important one. Networked sensors, either worn on the body or embedded in our living environments, make possible the gathering of rich information indicative of our physical and mental health. Captured on a continual basis, aggregated, and effectively mined, such information can bring about a positive transformative change in the health care landscape. In particular, the availability of data at hitherto unimagined scales and temporal longitudes coupled with a new generation of intelligent processing algorithms can: (a) facilitate an evolution in the practice of medicine, from the current post facto diagnose-and- treat reactive paradigm, to a proactive framework for prognosis of diseases at an incipient stage, coupled with prevention, cure, and overall management of health instead of disease, (b) enable personalization of treatment and management options targeted particularly to the specific circumstances and needs of the individual, and (c) help reduce the cost of health care while simultaneously improving outcomes. In this paper, we highlight the opportunities and challenges for IoT in realizing this vision of the future of healthcare.

INTRODUCTION
Recent years have seen a rising interest in wearable sensors and today several devices are commercially available [1]–[3] for personal health care, fitness, and activity awareness. In addition to the niche recreational fitness arena catered to by current devices, researchers have also considered applications of such technologies in clinical applications in remote health monitoring systems for long term recording, management and clinical access to patient's physiological information [4]–[8]. Based on current technological trends, one can readilyimaginea time in the near future when your routine physical exami- nation is preceded by a two–three day period of continuous physiological monitoring using inexpensive wearable sensors. Over this interval, the sensors would continuously record signals correlated with your key physiological parameters and relay the resulting data to a database linked with your health records .When you show up for your physical examination, the doctor has available not only conventional clinic/lab-test based static measurements of your physiological and metabolic state, but also the much richer longitudinal record provided by the sensors. Using the available data, and aided by decision- support systems that also have access to a large corpus of observation data for other individuals, the doctor can make a much better prognosis for your health and recommend treatment, early intervention, and life-style choices that are particularly effective in improving the quality of your health. Such a disruptive technology could have a transformative impact on global healthcare systems and drastically reduce healthcare costs and improve speed and accuracy for diag- noses.
Technologically, the vision presented in the preceding para- graph has been feasible for a few years now. Yet, wearable sensors have, thus far, had little influence on the current clin- ical practice of medicine. In this paper, we focus particularly on the clinical arena and examine the opportunities afforded by available and upcoming technologies and the challenges that must be addressed in order to allow integration of these into the practice of medicine. The paper is organized as follows: Section II highlight some of the key related work in this area. In Section III, we outline the architecture for remote health monitoring systems based on wearable sensors, partitioning the system into for main components acquisition, analytics, and visualization. In Sections IV– VII we highlight the opportunities and challenges related to each of these components. We conclude the paper in Section VIII with a summary and discussion.

ARCHITECTURE

Figure illustrates the system architecture for a remote health monitoring system, whose major components we de- scribe next:



Data Acquisition is performed by multiple wearable sensors that measure physiological biomarkers, such as ECG, skin temperature, respiratory rate, EMG muscle activity, and gait (posture). The sensors connect to the network though an intermediatedataaggregatororconcentrator,whichistypicallyasmartphonelocatedinthevicinityofthepatient.

The Data Transmission components of the system are responsible for conveying recordings of the patient from the patient's house (or any remote location) to the data center of the Healthcare Organization (HCO) with assured security and privacy, ideally in near real-time. Typically, the sensory acquisition platform is equipped with a short range radio such as Zigbee or low-power Bluetooth, which it uses to transfer sensor data to the concentrator. Aggregated data is further relayed to a HCO for long term storage using Internet connec- tivity on the concentrator, typically via a smartphone's WiFi or cellular data connection. Sensors in the data acquisition part form an Internet of Things (IoT) -based architecture as each individual sensor's data can be accessed through the Internet via the concentrator [20],[21].

Often a storage/processing device in vicinity of a mobile client, sometimes referred to as a cloudlet, is used to augment its storage/processing capability whenever the local mobile resources do not fulfill the application's requirements [22]. The cloudlet can be a local processing unit (such as a desktop computer) which is directly accessible by the concentrator through WiFi network. In addition to providing temporary storage prior to communication of data to the cloud, the cloudlet can also be used for running time critical tasks onthepatient's aggregated data. Moreover, the cloudlet can be used to transmit the aggregated data to the cloud in case of limitations on the mobile device such as temporary lack of connectivity orenergy.

Cloud Processing has three distinct components: storage, analytics, and visualization. The system is designed for long term storage of patient's biomedical information as well as- sisting health professionals with diagnostic information. Cloud based medical data storage and the upfront challenges have been extensively addressed in the literature [23], [24]. Analyt- icsthat use the sensor data along with e-Health records that are becoming prevalent can help with diagnoses and prognoses for a number of health conditions and diseases. Additionally, Visualization is a key requirement for any such system because it is impractical to ask physicians to pore over the voluminous data or analyses from wearable sensors. Visualization methods that make the data and analyses accessible to them in a readily digestible format are essential if the wearable sensors are to impact clinical practice.

CONCLUSION

In this article, were viewed the current state and projected future directions for integration of remote health monitoring technologies into the clinical practice of medicine. Wearable sensors, particularly those equipped with IoT intelligence, offer attractive options for enabling observation and recording of data in home and work environments, over much longer durations than are currently done at office and laboratory visits. This treasure trove of data, when analyzed and presented to physicians in easy-to-as similate visualizations has the potential for radically improving healthcare and reducing costs. We highlighted several of the challenges in sensing, analytics, and visualization that need to be addressed before systems can be designed for seamless integration into clinical practice.

A New Approach For Theft of Electricity

Name: **Rajlochan Swain**
Regd No. **2301289557**
Branch: **ETC**

ABSTRACT
IOT use things to things connection to access the internet of things, allow data to store and access services. Services over internet of things development according to need of person to person and thing to person, machine to machine interaction without human interaction. As there is limited non-renewable resources are present in our daily life, Electricity is one of them which utilized in every country that results abundant losses due to electricity larceny. Power theft is going to be the key challenges. A smart energy meter is used to minimize the electricity larceny. Basically energy meter is a device that calculates the cost of electricity consumed by homes, business, or an electrical device. It reduces the theft of electricity. In this paper a government person can find the dishonest user by showing the status of energy meter at the back end of electricity office. To attain this, energy meter communicate with raspberry pi through GPIO pins. GPIO pins fetch the effective data from energy meter and it send effective data to the raspberry pi and connect raspberry pi with the internet. At the backend, government person can see the status of energy meter in the form ofgraphs.

INTRODUCTION
With the increasing of internet connectivity in home environment electronic gadget used to create home network services. IOT use things to things connection to access the internet of things, allow data to store and access services, such as remote home sensor . Services over internet of things development according to need of person to person and thing to person , machine to machine interaction without human interaction . Technology used in this system is radio frequency identification. Transmission and delivery of electricity is smartness from the utilize of renewable energies and advanced measurement and latest communication technologies as well utilities grow to be smart. So with smart utility latest measurement and energy sources and load efficiently manage. The key element of such a measurement and control network could be a smart meter. A smart energy meter is used to minimize the electricity larceny. Basically energy meter is a device that calculates the cost of electricity consumed by homes, business, or an electrical device. It reduces the theft of electricity. Electronic energy meter measures current in both Phase and Neutral lines and calculate powerconsumption.

SOFTWARE AND HARDWAREUSED

a.**IOT**
With the increasing of internet connectivity in home environment electronic gadget used to create home network services. IOT use things to things connection to access the internet of things, allow data to store and access services, such as remote home sensor. Moreover lights will automatically shut off when leaving a room or apartment when exiting for work. In addition, the room temperature can be reduced when leaving for work and increased in advance of coming home. Other functions that can be controlled away from home include determining whether or not the apartment windows are closed or the coffee maker is shut off. An energy provider can read the energy consumption for a day, week, or month. Services over internet of things development according to need of person to person and thing to person, machine to machine interaction without human interaction.
Technology used in this system is radio frequency identification. The operation of buildings and/or homes will be more simple, safe, reliable, environmentally friendly, and cost effective by using smart devices in conjunction with IOT.

b.**ELECTRICENERGY**
Electric Energy is a necessary resource in everyday life and a backbone of the industry. Its limited, so proper use and measurement is very important. Before utilization of electricity it passes some phases. It is first Generated (G) then

Transmitted (T) over long distances and finally Distributed (D) to consumers. In this process of GTD energy losses take place. Energy loss is defined as the difference between energy generated and consumption.
There are mainly two types of losses.
I) Technical losses.
ii) Non-Technical losses.

Technical losses
Technical losses are those losses which occur due to properties of materials used in transmission and distribution system.
For example, energy dissipated due to resistance of conductor used in transmission lines Technical losses are easy to simulate and calculate; computation tools for calculating power flow, losses, and equipment status in power systems have been developed for some time. Improvements in information technology and data acquisition have also made the calculations and verifications easier.

Non-technicallosses
Non-technical losses are electricity theft and non-payment . Electricity theft is defined as a conscience attempt by a person to reduce or eliminate the amount of money he or she will owe the utility for electric energy. This could range from tampering with the meter to create false consumption information used in billings to making unauthorized connections to the power grid. Non-technical losses are difficult to quantify. They refer to losses that occur independently of technical losses in the power system. Two easy examples of sources of such losses are component breakdowns that drastically increase losses before they are replaced in time, and electricity theft. The reason that meter inspection is the main method of NTL detection is because the utilities consider electricity theft to be the major source of NTL and the majority of electricity theft cases involves meter tampering or meter destruction or damage.
Main reasons for non-technicallosses
1.Electricity theft: Electricity theft means that electric energy distributes to consumer that is not calculate by energy meter of consumer. Consumer break the mechanically, place a strong magnet also by remote control try to stopmeter.
2.Metering inaccuracies: Metering inaccuracies define as difference between actually energy deliver to the energy meter and energy measured by energy meter. Small amount of Error are present in all energymeter.

c.**ENERGYMETER**
Energy meter and watt hours meter is a device which calculate amount of electricity energy which is utilized by consumer. Energy meter is install at each place like as home, organization and industries to measured the consumption of electricity by load like fans, lights and many more. Being a limited and very important resource the metering of electricity consumption is essential. Generally people don't care for the consumption of electricity in their day to day processes and are concerned about it when they get their electricity bills or in case of power shortage. Measuring of electricity consumption was started with Electromechanical Induction meter which operates by counting the revolutions of a metal disc rotating at a speed proportional to the power. The number of revolutions is proportional to the energy usage. The electric meter had taken more important roles in power system. The power meter can be utilized to detect or measure the presence of voltage, current, power and other parameters. The electric energy meter is the most important in the accuracy
i) Electronic Energy meters
Electronics energy meter are highly accurate and reliable energy measurement device as compare to other mechanical meter. It utilize very small amount of power and its start calculating energy consumption immediately when attach with load. Those meter are either analog or digital. In the analog energy meter power is changed to relative frequency and it converted by counter which located inside it.
But in digital energy meter processor are used to measure the electricity. Logic circuits are used to integrate the power to get energy and also help for testing. Then it change frequency or pulse rate.

In analog energy meter phase divider is used to obtain value of current and voltage and current transformer directly join to load

Fig.2. Types of Energy meters

A. Raspberrypi

The raspberry pi is small in size and it is a cheap computer which is launch by raspberry pi foundation with the help of Broadcom and university of Cambridge laboratory for the propagation of computer training in school. Raspberry pi is not only helps us in study but also helps in number of tasks. The raspberry module also called microcomputer and this microcomputer is stand on Broadcom BCM2835 SoC unit. SoC means system on the chip in which all configuration of microprocessor is included. So there is RAM(random access memory), ROM (read only memory), CPU(central processing unit), and also A to D(analog to digital) and D to A(digital to analog) converter in addition serialinterfaces.

The thing that is distinct SoC from microcontroller is that, SoC devices are directly connect with CPU so huge computational ability which build it feasible to run operational manner. The Broadcom BCM2835 have ARM1176JZFS processor, 512 MB RAM and GPU (graphics processing unit) .raspberry pi does not have any solid state drive only SD card is used for install the operating system on it and this SD card is also help to store all data[7] The raspberry pi operating system is open source LINUX (Raspbian) [7]LINUX operating system provide communication with external device [7] Microsoft window is not install on it. But we can install many other linux versions on it and it seems similar to window. Raspberry pi used to send electronic mail or surf internet. Raspberry pi only required 5V 1A power supply to operate and this power supply provide by micro USB port. The secret of the less power is required is that ARM based BCM2835 is used. We cannot see the heat sink on this device because it generate very less heat even during complex operation is performed. On the laptop and desktop mostly two operating system are run, appleor Microsoft window operating system but these both operating system are closed source. In the close source operating system we cannot change the source code according to our requirement but in open source Linux operating system we can make changes according to our desire. Nothing is conceal in open source. There are several version of Linux including fedora remix, arch Linux andDebian.

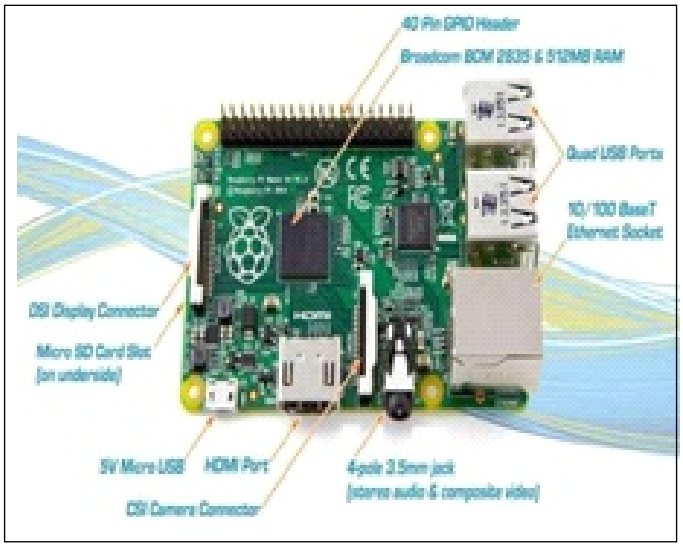


Fig.2. Raspberry Pi model

I. ALGORITHMUSED

Fig.3. Algorithm used to design the system

Above figure shows the algorithm used. In this there are two sections software and hardware.

A. SOFTWARE

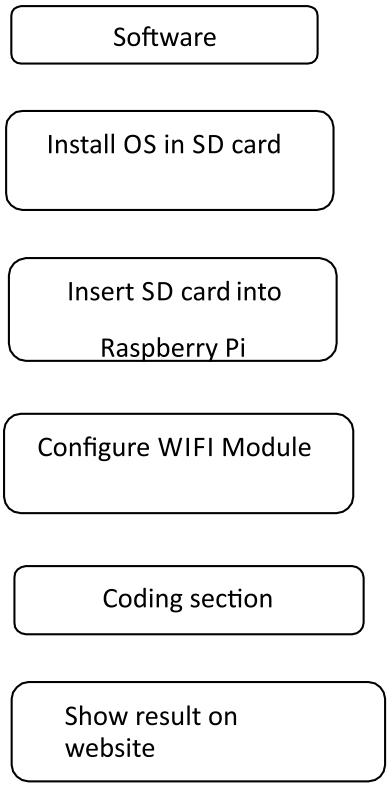
Software isa general term for the various kinds of programs used to operate related devices. Software consists of carefully organized instructions and code written by programmers in any of various special computerlanguages.

Install OS in Sdcard

Firstly we have to download operating

system which is recommended and then extract the downloaded file . After this download another software win 32diskimager and insert SD card into PC. Then open win 32diskimager software and select the extracted select derive where extract file have to written.

i) Configure WIFIModule



Make sure our Wi-Fi adapter is plugged into the Raspberry Pi. Before the Wi-Fi adapter can be configured it needs to check that the correct drivers are installed. With the help of SSH connection establish wifi USB dongle provide raspberry pi remote desktop application. This provides a major role because with this remote desktop application we able to connect raspberry pi over the everywhere in word.

I) Coding section: Coding section is divided into two parts.

1) Write code: In this we write the code in python language according to the application and save it with extension.py.

2) Run Code: To run the code firstly open the LX terminal which is placed on the raspberry pi desktop. Now enter the command to run theprogram.

ii) Show result on website: Now login your website page by user id and password. After login meter status isshow.

CONCLUSION AND FUTURESCOPE

The planned system has mentioned implementation of IOT. It is concluded that by using IOT technology the government person can find the dishonest user, it can make the assignment of the agents impracticable to steal the electricity. This analysis work has been implemented to find the dishonest user. To implement our objective, get hardware raspberry pi and install the operating system. Energy meter communicate with raspberry pi through GPIO pins. GPIO pins fetch the effective data from energy meter and it send effective data to the raspberry pi, then connect wifi module with raspberry pi. After this, connect raspberry pi with the internet. At the backend, where government person see the status of energy meter after successfully login with username and password and the status of energy meter are shown in the form of graphs. The entire implementation is being taken place in PYTHON surroundings. From the results it has been concluded that if there is any dishonest user then government person can find that dishonestuser.

In further implementation smart meter automatically cut electricity when any one tried to theft and it also monitor the electricity consumption through smart phone and smart meter that sends status if any fault occurred in transmission line. Furthermore it create bill by our self and also pay it and anyone can check the online status of energy meter as well as the consumption ofenergy.

GPS-GSM Based Vehicle Tracking System

Name: **Ritika Kumari**
Regd No. **2301289559**
Branch: **ETC**

ABSTRACT
GPS is one of the technologies that are used in a huge number of applications today. One of the applications is tracking your vehicle and keeps regular monitoring on them. This tracking system can inform you the location and route travelled by vehicle, and that information can be observed from any other remote location. It also includes the web application that provides you exact location of target. This system enables us to track target in any weather conditions. This system uses GPS and GSM technologies. The paper includes the hardware part which comprises of GPS, GSM, Atmega microcontroller MAX 232, 16x2 LCD and software part is used for interfacing all the required modules and a web application is also developed at the client side. Main objective is to design a system that can be easily installed and to provide platform for furtherenhancement.

INTRODUCTION
Inthisurbanlifetransportationisverycommon. Alotofmishappeningsoccurontheroadever y day .Therefore the need of security and monitoring is developed. To resolve such problems, a system is developed using GPS and GSM technologies and an application is introduced in this research work.

Various problems that we face:

1. In critical condition(when vehicle is stolen),one is confused what to do
2. If one has something expensive and he wants to check it regularly
3. To find the shortest path available

All these problems are overcome by the system.

This system has Global Positioning System (GPS) which will receive the coordinates from the satellites among other critical information. Tracking system is very important in modern world. This can be useful in soldier monitoring, tracking of the theft vehicle and various other applications. The system is microcontroller based that consists of a global positioning system (GPS) and global system for mobile communication (GSM). This project uses only one GPS device and a two way communication process is achieved using a GSM modem. GSM modem, provided with a SIM card uses the same communication process as we are using in regular phone.
The system is not limited to find the location of the target but also calculates the distance travelled b/w two stations.

This system is user friendly, easily in stallable, easily accessible and can be used for various other purposes. After installation system will locate target by the use of a Web application (HTML based application)in Google map. The system allows to track the target any time and any where in any weather conditions.
SYSTEM ARCHITECTURE
It consists of two units one is transmitting side (vehicle unit) and other one is monitoring side.

GPS
GPS modules are popularly used for navigation, positioning, time and other purposes. GPS antenna receives the location values from the satellites. GPS gives information about:

1) Message transmission time
2) Position at thattime

GSM
GSM modem is used for transmitting and receiving the data. SIM 300 is a tri- band GSM/GPRS engine. It works on various frequencies i.e. EGSM 900MHz, DCS 1800MHz and PCS 1900MHz.

SOFTWARE
The software programming is done in 'C 'language. Data (co-ordinates) received by GPS from the satellites is defined in the software. Decoding the NMEA (National Marine Electronics Association) protocol is the main purpose of developing this software. The mobile number of the user

should be included in the software programming in order to receive the location values from the SIM card which we are using in GSM modem. The NMEA protocol consists of set of messages. These messages are ASCII character set. GPS receives data and present it in the form of ASCII comma – delimited message strings. '$' sign is used at the starting of each message. The locations(latitude and longitude)have the format of ddmm.mmmm.i.e..degrees minutes and decimal minutes. The software protocol consists of the GGA (global positioning system fixed

CONCLUSION

The project is all about controlling theft of a vehicle. The system is about making vehicle more secure by the use of GPS, GSM technology and a web application. The simulation is done by PROTEUS software. It can also be beneficial for:

1. Parents to look after their children.
2. To track animals in jungles
3. Delivery services
4. Cops department and fire services

This project can be further enhanced by the use of camera and by developing a mobile based application to get the real time view of the vehicle instead to check it on PC, which would be more convenient for the user to track the target.

Intelligent Machine to machine communication in a Smart Grid

Name: **Banti Giri**
Regd No. **2301289535**
Branch: **ETC**

ABSTRACT
In the past few years, the cost of access to public wireless data networks has been dropping while the capabilities of these networks continue to increase. Machine-to-machine (M2M)communications is a new technology that leverages these networks to bring smart services to a much wider audience. Different from the traditional human to human (H2H)communications for which the current wireless networks are designed and optimized, M2M communications is seen as a form of data communications between entities that do not necessarily need any form of human intervention. It is different from current communication models in the sense that it involves new or different market scenarios, low cost and low effort, a potentially very large number of communicating terminals, and small and infrequent traffic transmission per terminal. The industry has already been working on providing M2M communications and smart services offerings across a wide variety of market segments, including healthcare, manufacturing, utilities, distribution, and consumer products.
Smart services are the new services and business models enabled by M2M capabilities. For example, smart grid technology enables utility providers to wirelessly connect to their grid assets, such as circuit breakers, transformers, and their substation equipment. This wireless monitoring capability allows them to develop interactive utility networks that are more intelligent, resilient, reliable, and self balancing. M2M communications, or machine-type communications(MTC) as sometimes referred by the Third Generation Partnership Project (3GPP), is enabling a ubiquitous computing environment toward the pervasive Internet. The current wireless networks are mainly designed for H2H communication mode, which means there are high requirements for mobility and human interactive experience such as call setup delay and quality of service (QoS).
Since M2M communication brings very different requirements and the number of M2M communication devices may increase quickly, the wireless access network is proposed to be enhanced for M2M communications by the industry. The topic of M2M communications has gained much momentum in the industry and research community recently. It has attracted the attention of standardization bodies such as 3GPP Long Term Evolution (LTE), whose objectives are looking into potential requirements to facilitate improvements in M2M communications, and more efficient use of radio and network resources. There is an urgent need in both industry and the research community to better understand the technical details and recent progress of M2M communications.
In this seminar, "Toward Intelligent Machine to Machine Communications in Smart Grid", we survey a number of existing communication technologies that can be adopted for M2M communications in the smart grid. They also present a possible solution to improve the scalability of smart grid communications. This decade is widely predicted to see the rise of machine-to-machine (M2M) communications over wired and wireless links. For instance, researchers predict that by 2014 there will be 1.5 billion wirelessly connected devices that are not mobile phones and do not require any human intervention. This will lead to an unprecedented increase in data traffic involving machines communicating with other machines without human interaction. Various applications of M2M have already started to emerge in various sectors such as healthcare, vehicular, smart home technologies, and so forth. The evolution of M2Mhas also begun in developing a smart power grid framework, referred to as the smart grid (SG).
An electric grid having smart capability allows the power providers, distributors, and consumers to maintain near-real-time awareness of one another's operating requirements and capabilities. Through this awareness, SG is able to produce, distribute and consume power in the most efficient and intelligent way. This type of communication takes place only among

machines such as sensors, smart meters, and other equipment. Indeed, the M2M communication in SG must be private and secure since many of the autonomic functions that will run over it will be critical. SG will have numerous electrical appliances connected to one another in a complex manner so that they can report back on elements such as power consumption and other monitoring signals. This promises higher efficiency in the power distribution networks (i.e., greater availability of power to homes and factories at lower cost), and will allow distributed power generation such as local solar and wind generators. It will reach into home-based devices, which is why scalability and fast communication is crucial for practical deployment of SG.

To facilitate effective SG communication, existing networking technologies must be taken into account to deal with the multiple services and quality requirements of residential appliances. The need to differentiate high and low priority traffic will be just as important as being able to dynamically adapt the network to varying capacity requirements in real time. Therefore, it is essential that we consider appropriate technologies to implement the communication networks of SG, which may allow the flexible use of existing capacities without impacting the service quality of the SG. Today's network infrastructure, largely based on synchronous optical network (SONET) and synchronous digital hierarchy (SDH) technologies, cannot physically or economically support the ever changing demands caused by the over whelming increase in bandwidth, transport of IP traffic, and the need for more flexible connectivity, higher resiliency and network automation.

To address this concern and remain competitive, service providers have been investing heavily in building next-generation networks. Indeed, it is important to review how existing communication technologies such as IEEE 802.11 (Wi-Fi),IEEE 802.15.4 (ZigBee), Bluetooth, and so on respond to the bandwidth and delay requirements of the M2M communication of SG. In this seminar, we provide a detailed M2M communication model for SG and verify the effectiveness of different adopted communication technologies. This article points out the shortcomings of the conventional networking technologies that maybe adopted for SG M2M communications. We also investigate incorporating a level of intelligence in the smart meters so that we may be able to deal with such shortcomings and improve SG communications.

European Telecommunications Standards Institute(ETSI) has launched the M2M Technical Committee with the purpose to develop an end to-end architecture for M2M communications

An M2M network as standardized by ETSI is composed of five key elements:

- The M2M component, usually embedded ina smart electrical device, replies to requests or transmits data
- The M2M gateway enables connectivity between the M2M components and the communication network.
- The M2M server works as a middle ware layer to pass data through various application services..
- The M2M area network provides connectivity between M2M components and M2M gateways.
- The M2M communication network provides connection between M2M gateways and M2M servers

These five elements constitute the three domains of M2M system specified by ETSI: the M2M component working in the device domain, the M2M area network and gateway in the network domain, and the M2M server and communication network in the application domain.

IOT Based Petroleum Well Fuel Pump Control System

Name: **Jayaesh Khilar**
Regd No. **2301289544**
Branch: **ETC**

ABSTRACT
In order to realize remote automatic measurement and control of all petroleum well fuel pumps which are located in different regions of the crude oil production enterprises, this paper discusses and designs a petroleum well fuel pump measurement & control system based on internet of things technology. The measurement and control system uses a threetier (perception layer, network layer and application control layer) form of the IOT (Internet of Things) structure, and then the function and feature of all layers are analyzed. As a focus, the hardware components and the control theory of the sensor instrument node and the aggregation instrument node, whichare existed in the measurement & control system, are given and discussed also. In the end, programming flow chart of the node microcontroller and main design software module content of the IOT center computer are depicted and proposed. The enterprise experiment result shows that the system has the advantages of easy operation and maintenance, low labor intensity, high time efficiency of measurement & control and high precision with the traditional manual inspection methods of the petroleum well fuel pump to compare.

INTRODUCTION
Fuel pumps are important requisite external power transmission equipment for wells. As most of the wells are distributed in the desert and wild mountains, Oil-Fields enterprise management of its use field instruments to show monitoring, and carry out the early warning management by artificial way of power line patrol, that is inspectors daily check the operation of the group of oil wells, record the relevant data, access to the pumps phase of the time running the flow pressure as well as temperature and other information. With the oil field production and transmission pipe network is more and more wide and the number of wells continues to expand, This approach gradually shows the lack of management, which shows great intensity of work labor, and shows some shortcomings of problem processing lag, for example :if the operating pressure of oil pump is abnormal, manual inspection line found that processing is not timely, it could cause the pipeline to burst, further, it causes a series of serious problems, such as property loss of oilfield enterprises and environmental pollution. The internet of things is "things connected to things in the Internet", it is the automatic information acquisition equipment through various sensing devices, ZigBee wireless sensor network technology, 4G network transmission technology, RFID technology, video recognition technology, infrared sensors, GPS, laser scanners and etc. , intelligent network system, according to the agreement, and the need to realize the interconnection of the network of things, for information exchange and communication, in order to achieve intelligent identification, positioning, tracking, monitoring and management of intelligent network system. .

DESIGN OF PETROLEUM FUEL PUMP MEASUREMENT & CONTROL SYSTEM BASED ON INTERNET OF THINGS ARCHITECTURE

Measurement & control of petroleum well fuel pumps data is the foundation for the construction of the digital intelligent oil fields. The goal is to detect the running status and parameters of the well fuel pump equipments in real time and transmit the running data to the Internet of Thing control center through the intelligent correspondent node, and dedicated 4G network. On the one hand, the central machine analysis and process through the upper intelligent control software, if necessary, makes decision-making control, and then output to the equipment control agencies by a dedicate 4G network. On the other hand, the central machine can make gathered data store to the database server through the algorithm transforms andnormalizes, at the same time, through the pubic 4G network or internet network for mobile terminals or desktop terminal users. Based on Internet To Things architecture of

the equipment compositionstructure shown in Figure 1, the system is used a hierarchical design method to achieve real-time data collection and monitoring of pipeline pressure, flow and temperature and so on. It has the advantages of low cost,automatic monitoring ability, which consists of 3 layers: the perception layer, the network layer and the application control layer.

A. The perception layer

The sensor signal of oil pump of the measurement and control in the oil field mainly include: various parts of the value switch of components inlet and outlet pressure of pumps, inlet and outlet temperature of pumps, the pump output flow and the pump body temperature an so on. The perception layer is composed of zigbee wireless subnet of pumps and wells in several areas. The zigbee wireless subnet consists of sensor instrument nodes, aggregation instrument nodes with zigbee correspondence module (zigbee wells control correspondence instrument, also called gateway nodes). In this system, aggregation instrument node is the transfer station for each oil well's external correspondence, and its core component is the ZigBee wireless transceiver module. Aggregation instrument is a relatively independent processing unit, If the external network failure cannot be connected with the Internet of things control center machine, if the external network fault occurs and cannot connect with the Internet of things control center machine. It can automatically control the running state of the local oil pump according to the logical rule library running in the node. In addition, it can store the local measurement & control data for a period of time, and can query local sensors to display real-time or historical running data.

B. The network layer

The network layer mainly completes the reliable transmission of the oil pump collection information or the central control signal of the Internet of things. In essence it is based on WLAN (Wireless Local Area Network, WLAN) wireless mesh protocol to form a larger network of aggregation instrument nodes, thus monitoring the oil pump in multiple regions. Its specific function is that mainly receives the information of the perception layer aggregation instrument node and can transmit to the control application layer by appropriate algorithm encryption as required, in addition, the information and control output of the application layer are transferred back to the aggregationinstrument nodes of the perception layer, and the network layer acts as a bridge. As the oil wells of oilfield enterprises are mostly in the wild areas, these places often do not have public correspondence 4G network, so it is necessary to set up a dedicated wireless correspondence network to serve the system. C. The application control layer

The application control layer is the highest level in the functional structure diagram of the system. It is the remote controlcenter of the system. It realizes the automatic safety control of the oil pump on the basis of receiving and analyzing the information of each well. The application control layer is mainly composed of central machine of internet of things, database server, desktop terminal, mobile terminal and so on. The central machine of the Internet of things generally has wireless transceiver module, which can receive the equipment information transmitted by the 4G network and the base station at the transport layer in real time, according to the operating parameters of the pump to analyze and process through the software system. Different production wells are equipped with different pump power, operating parameters are not the same, by controlling the man-machine interface of the application control layer, various device parameters can be set up, and the regular rule library instructions are downloaded into the control correspondence instrument of the ZigBee well group as the local backup. Application control layer receives the network layer data generally go through check, unpacking, reverse the encryption transformation , It can dynamically display oil well temperature, pressure and flow of data through intelligent computer graphics software system of powerful, it can predict the abnormal running of the equipment,

and make the corresponding output actions quickly according to the equipment process, mobile terminals, such as mobile phones and handheld PDA, can be allowed to access the Web interface of the control system through the public 4G network, operating curves, data, etc. that can be accessed by the device under permission; in addition, each branch of the oilfield enterprise can also access the operation of the browsing system or remote control through the Internet. It is convenient for Oilfield Enterprises to manage oil pumps efficiently.

• MEASUREMENT & CONTROL NODE HARDWARE OF PUMPS' INTERNET TO THING

A. Sensor instrument node

The main function of sensor instrument node is collecting current and voltage data, convert data to A/D, and process 1 times digital filtering, these sensors are equipped with wireless ZigBee correspondence module, they can upload data to the aggregation instrument node, and accept the instructions of the aggregation instrument node to make the necessary adjustment output. Typical pump sensor instrument node consists of a sensor module, analogfilter module, A/D conversion module, D/A output module, I/O control module, CPU processor, RFID wireless nodemodule, storage module and power management module etc. The schematic diagram of the hardware is shown in The pressure sensor of this system adopts

Rosemount

measuring accuracy 0.1% sensors, and the measuring range is 0~10 Mpa, the direct-current supply voltage is DC24V, the output sensing signal is 4 ~ 20mA, and the medium temperature is -20 ~ 90 . The flow sensor adopts FDM100AT sensor, the detection distance is 4~150 mm, the switching frequency is 1000Hz, the output mode is NPN, the response time is less than 0.5 ms, it can realize the detection of liquid flow in a severe environment, and is suitable for the field arrangement of an oil pipeline in an oil field enterprise.

The temperature sensor uses the model DS18B20, its range is -55 ~ 125 , can carry on the sampling to the temperature data, the quantification coding, the resolution generally may reach 0.0625, the work voltage is 3 ~ 5.5V, the sensor transforms the temperature into a digital format with only a maximum of 740ms, which is suitable for the low power consumption of sensor nodes.

B. Aggregation instrument node (Sink node)

Aggregation instrument node (ZigBee well control correspondence device, also known as gateway node or sink Node, or Coordinator node), it is responsible for collecting local sensor signals, andinteracting with data through the network layer and the central machine of Internet of things . When the central machine of the Internet of things sends a control instruction through data operation, after aggregation instrument node receiving, then send to the sensor node immediately through the wireless correspondence, thesensor node unpack according to the correspondence command information, carry out D/A output or I/O control. The aggregation instrument node is mainly composed of the upper layer wireless correspondence module, lower layer wireless correspondence module, node processor CPU, node LCD display module, node Key button controlmodule, node storage module and power management module etc, itsschematic diagram of the hardware is shown in Figure 3.The aggregation instrument node itself is a relatively independent local oil pump control instrument, and it has two patterns: Remote and Local, the normal situation is in the remote pattern. Once the correspondence delay or correspondence failure, the aggregation instrument node automatically transfers to the local pattern, and automatically regulates the oil pump according to the standby rule library of the instrument.

CONCLUSION

Design of petroleum well fuel pump measurement & control system based on Internet of things technology is an important part of digital oilfield construction, it can collect,transform and transfer information about the operation

and monitoring of the petroleum fuel pumps in different areas, so as to realize remote real-time control, reducing the labor intensity of workers, improving the reliability of pump equipment operation. In addition it can realize trans regional cooperative work of oil well through internet to things, and closely connects to other parts of crude oil production, such as transportation, storage, and sales. It has realized the efficient integration of

Power Management For wireless data transmission using complex Event Processing

Name: **Adayasha Biswal**
Regd No. **2301289526**
Branch:**ETC**

ABSTRACT
This presentation on Power Management for Wireless Data Transmission Using Complex Event Processing discuss about Power Management of WNI, System Architecture, Architecture of EDF, Complex Event Processing, Event Generator, Event Processing Agent, Scheduler, Implementation, Event Specification and ECA Rules, XML Elements in Event Processing and ECA Rules, Event Processing Agent, Conflict Detection and Resolution.
A significant component of overall energy consumption on mobile devices caused by wireless data transmission, Energy consumed dependent on the situation in which the transmission happens. Propose an event driven framework, used for implementing power management. Framework can use ECA rules to describe the power management mechanism. Framework supports complex event processing. Energy consumption of wireless data transmission is caused by the operation of WNI. Implemented as a part of hardware resource management. Try to keep the hardware components in lower power states. The PSM for Wi-Fi forces the WNI to go sleep. Event driven framework that supports complex event processing for PM.

SYSTEM ARCHITECTURE
Propose an event driven framework for power management. Event driven adaptations are described with ECA rules. Three components of the framework are event generator, event processing agent and scheduler. The ECA rules and event processing specification-rule base. Contents of context storage get updated when relevant contexts change.
Complex Event Processing
Event-driven framework support complex event processing in the event processing agent. Difference between simple and complex event processing is in functionality. It also support event derivation and pattern matching, Take into account the history of event occurrences. Generate events of higher abstraction levels based on changes in the patterns of event occurrences.

EVENT GENERATOR
Software component that generates events based on the changes in contexts.
Definition 1 - An atomic state is a tuple: S = (c, op, val), where c is the capability value, op is one of the binary operators defined in a set: <; >; ; ;=; , and val is the reference value of the capability.
Definition2 - An atomic event e indicates the change in a state from S0 to S1. It can be represented as e: S0->S1.

EVENT PROCESSING AGENT
Event processing specification written in structural XML is loaded into the event processing agent. Event processing agent provides four logical functions of complex event processing are event filtering, Instance partitioning, Event derivation, Pattern matching

SCHEDULER
When loading a new rule, the scheduler checks if the newly loaded rule has any potential conflicts with the previously loaded rules. If the installation of the new rule is successful, the scheduler will subscribe to the events that may trigger the new rule from the event processing agent.

EVENT GENERATORS
Implemented the framework and the two applications in C++. Two event generators are
Traffic monitor - Provides the atomic events. Implemented packet sniffing in a kernel module using Netfilter.
Network monitor - Generates events for the changes in the network environment. It does not passively listen for messages. It pulls information directly through OS APIs. Generates events that indicate changes in the predicted SNR
Event Specification and ECA Rules
Define rules for event processing in the event processing agent. ECA rules define event driven adaptations to be scheduled. Represent using structural XML. Rule type

includes four types of XML elements.

EVENT PROCESSING AGENT

Share an event queue with event generators. Get events out of the queue and also push back events that are generated during event processing. Instance partitioning divided into two types, segmentation-oriented partitioning temporal-oriented partitioning. Segmentation-oriented partitioning-classifies event instances based on event attribute. Temporal-oriented partitioning divides the input into groups based on the timestamps of the event occurrence. Events accepted by the input filter. Partitioned based on the connection identifier. difference-event attributes used for differing event instances in segmentation-oriented partitioning are defined in the attributes of the <on> element. Temporal-oriented partitioning-implement with a time window

Conflict Detection and Resolution

The scheduler checks for potential conflicts whenever loading a new rule. Parses the actions defined in the new rule into operations to be applied to certain hardware/software components. Rule that tries to set different values to the same parameter of the same component is found conflict.

CONCLUSION

We proposed an event-driven framework for rule-based power management for wireless data transmission. The framework supports complex event processing, Provides potential for reducing the event processing overhead. Event driven framework can be extended to support the collection and sharing of context data between mobile devices and to utilize the context data that other users produce for saving energy.

Exploring CAN Sniffing Techniques: A Study in Design and Development

Name: **Mukesh Kumar Behera**
Regd No. **2101289480**

ABSTRACT
Controller Area Network (CAN) is used extensively in automotive applications, with in excess of 400 million CAN enabled microcontrollers manufactured each year. CAN messages could be calculated and hence guarantees provided that message response times would not exceed their deadlines. This seminal research has been cited in over 200 subsequent papers and transferred to industry in the form of commercial CAN schedulability analysis tools. These tools have been used by a large number of major automotive manufacturers in the design of in-vehicle networks for a wide range of cars, millions of which have been manufactured over the last 8 years. This paper shows that the original schedulability analysis given for CAN messages is flawed. It may provide guarantees for messages that will in fact miss their deadlines in the worst-case. This paper provides revised analysis resolving the problems with the original approach. Further, it highlights that the priority assignment policy, previously claimed to be optimal for CAN, is not in fact optimal and cites a method of obtaining an optimal priority ordering that is applicable to CAN. The paper discusses the possible impact on commercial CAN systems designed and developed using flawed schedulability analysis and makes recommendations for the revision of CAN schedulability analysis tools. The CAN Sniffer Tool is a simple to use low cost CAN bus monitor which can be used to develop and debug a high speed CAN network. The tool supports CAN 2.0b and ISO11898-2 and a broad range of functions which allow it to be used across various market segments including automotive, industrial, medical and marine. The toolkit comes with all the hardware and software required to connect a CAN network to a PC. In CAN bus, the two CAN channels can send/receive CAN messages either with extended or standard ID. All messages received by the CAN interface are sent via UART to the serial port of PC. On the PC the CAN-messages get collected and ordered by CAN-ID. In CAN the communication is done in two-wire, the CAN sniffer can receives the messages based on arbitration process.
Keywords: CAN, UART, CAN-ID, PC.

INTRODUCTION

Controller Area Network (CAN) is a serial communications bus designed to provide simple, efficient and robust communications for in-vehicle networks. CAN was developed by Robert Bosch GmbH beginning in 1983 and presented to a wider audience at the Society of Automotive Engineers (SAE) Congress in 1986 – effectively the "birth of CAN". In 1987 the first CAN controller chips were released by Intel (82526) and Philips (82C200). In the early 1990s Bosch submitted the CAN specification [20] for standardisation, leading to publication of the first ISO standard for CAN (11898) in 1993. Mercedes was the first automotive manufacturer to deploy CAN in a production car, the 1991 S-class. By the mid 1990s, the complexity of automotive electronics was increasing rapidly. The number
of networked Electronic Control Units (ECUs) in Mercedes, BMW, Audi and VW cars went from 5 or less at the beginning of the 1990s to around 40 at the turn of the millennium. With this explosion in complexity traditional point-to-point wiring became increasingly expensive to manufacture, install, and maintain due to the hundreds of separate connections and tens of kilograms of copper wire required. As a result CAN was rapidly adopted by the cost-conscious automotive industry, providing an effective solution to the problems posed by increasing vehicle electronics content. Following on from Mercedes other manufacturers including Volvo, Saab, BMW, Volkswagen, Ford, Renault, PSA, Fiat and others all adopted CAN technology.

CONTROLLER AREA NETWORK (CAN)

This section describes elements of the CAN protocol and characteristics of a system model that are needed to formulate a schedulability test.
CAN Protocol and Terminology

Controller Area Network (CAN) is a multi-master serial data bus which uses Carrier Sense Multiple Access/ Collision Resolution (CSMA/CR) to determine access.
CAN was designed as a simple and robust broadcast bus capable of operating at speeds of up to 1 Mbit/s. Message transfer over CAN is controlled by 4 different types of frame: Data frames, Remote Transmit Request (RTR) frames, Overload frames and Error frames.

DISCUSSION

In this section we consider various characteristics of CAN systems and discuss whether flaws in the existing analysis can result in erroneous guarantees under specific circumstances that are relevant to real-world systems.
We seek to answer the following questions.
1. Can the existing analysis give faulty guarantees to messages of any priority?
Message Omission Many CAN applications allow for 8
data byte diagnostic messages, which are not transmitted
during the normal mode of operation. These messages9 are transmitted only when the system is in diagnostic mode and
linked to service equipment. In this section, we consider whether the omission of diagnostic messages provides sufficient reduction in interference / blocking to ensure that messages do not miss their deadlines during normal operation, despite being given potentially optimistic worst-case response times by the existing analysis.
Message Guarantees not at Risk In this section, we consider the circumstances under which the first instance of a message in the busy period is guaranteed to have the longest response time. Under these circumstances, despite its flaws, the existing analysis gives correct results.
Priority Assignment Policies The analysis presented in section 3 is applicable independent of the priority ordering of CAN messages. However, choosing an appropriate priority ordering is important in obtaining a schedulable system and in maximising robustness to errors. Priority ordering is determined by a priority assignment policy. A priority assignment policy P is referred to as optimal if there are no systems that are schedulable using any other priority assignment policy that are not also schedulable using policy

IV. CONCLUSION

In this paper we highlighted a significant flaw in long-standing highly cited and widely used schedulability analysis of CAN. We showed how this flaw could lead to the computation of optimistic worst-case response times for CAN messages, broken guarantees and deadline misses. This paper provides revised analysis that can be used to calculate correct worst-case response times for CAN.
In addition, we showed that:
1. The existing analysis can provide optimrdistic worst-case
response times for messages from the 3 highest priority to the lowest priority.
2. The existing analysis can lead to broken guarantees and hence deadline misses in systems with low bus utilisation.
3. Where an error model has been considered, the flaw in the existing analysis is not sufficient to lead to CAN configurations that will result in missed deadlines when no errors are present on the bus. The desired robustness to errors may not however be achieved.
4. The omission of a single maximum length diagnostic message, accounted for by the existing analysis, reduces interference / blocking enough to ensure that the deadlines of all the remaining messages are met during normal operation.
5. Despite its flaws, the existing analysis gives the correct response time for any message where there is at least one lower priority message with the same or greater transmission time / message length.

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Joining AISI 4130 Steel and 18% Ni Maraging Steel: Exploring Dissimilar Metal Welding Techniques

Name: **Subhama Das and Udit Routray**
Regd No. **2401289228 and 2401289234**

ABSTRACT
Maraging steels are ultra-high strength and high toughness steels used in the rocket motor casing, leaf springs, landing gears etc. They obtain their strength and toughness from precipitation hardening. The strength of AISI 4130 steels is obtained by austenizing followed by quenching and tempering. They obtain their strength from martensite phase transformation. As the heat treatment for the two steels are different due to different hardening mechanisms, an optimum heat treatment needs to be developed to obtain maximum strength for the dissimilar welding of this two materials. Weldments are often made from dissimilar metals in order to satisfy different requirements for performance. A successful weld between dissimilar metals is that it possesses sufficient tensile strength and ductility so that the joint will not fail. In the present work, 18%Ni
(250) maraging steel was joined to AISI 4130 low alloy steel by TIG welding with W2 maraging steel filler wire. These dissimilar welds were realized with two different material conditions. The first condition is welding of solutionised maraging steel to hardened and tempered AISI 4130 steel. The second condition is welding of aged maraging steel to hardened and tempered AISI 4130 steel. The dissimilar welds we subjected to non-destructive testing i.e. X-ray radiography and subsequently subjected to different post weld heat treatment cycles depending on the initial material condition. The joints were offered for microstructure and mechanical property evaluations such as ultimate tensile strength, yield strength and % elongation. The model of the specimen was created using the CATIA software. The model was meshed using software ABAQUS. Boundary conditions were given on the finite element model through ABAQUS.
Keywords: Dissimilar Metal Welding, AISI 4130, MDN 250, 18% Ni Maraging Steel.

INTRODUCTION
18% Ni Maraging steels are a class of very low-carbon high alloy steels exhibiting a unique combination of ultra-high strength, excellent fracture toughness and good weldability. The alloy gains its strength from the precipitation hardening of its soft iron-nickel martensite microstructure. As a consequence, it possesses a combination of strength and toughness superior to other high strength steels by employing a relatively simple heat treatment.
AISI 4130 steels come in the category of high strength medium carbon low alloy steels. It is one of the most widely used steels in aircraft construction because of its combination of moderate strength and reasonable ductility in the quenched and tempered conditions. 4130 steels are strengthened by quenching to form martensite and tempered to the desired strength levels.
In the present work, 18% Ni (250) maraging steel was joined to AISI 4130 low alloy steel by TIG welding with W2 maraging steel filler wire. These dissimilar welds were realized with two different material conditions. The first condition is welding of solutionised maraging steel to hardened and tempered AISI 4130 steel. The second condition is welding of aged maraging steel to hardened and tempered AISI 4130 steel. The dissimilar welds were subjected to non-destructive testing i.e., X-ray radiography and subsequently subjected to different post weld heat treatment cycles depending on the initial material condition. The joint characterization studies include microstructural examination and mechanical property evaluations such as ultimate tensile strength, yield strength and % elongation. The model of the specimen was created using the CATIA software. The model was meshed using software ABAQUS. Boundary conditions were given on the finite element model through ABAQUS.

War Head Section	P1 & P2 Motors	Nozzle Scurt
AISI 4130	MDN 250	AISI 4130

Circumferential welds

The two materials are selected for the

fabrication of rocket motor assembly are AISI 4130 and 18% Ni Maraging steels. The War Head Section (WHS) and Nozzle Scurt are made of AISI 4130 steel and P1, P2 Rocket motors are made of 18% Ni maraging steel MDN 250.

The fabrication of total rocket motor assembly involves welding of WHS to P2 rocket motor and P1 rocket motor to Nozzle Scurt where in dissimilar welding of Maraging steel and AISI 4130 steel with 1.3mm thickness is the primary requirement.

The prime requirement from the designer is the dissimilar weldment between 4130 steel and maraging steel in the final condition should possess yield strength of 900 MPa.

Dissimilar Metal Welding of AISI 4130 Steel To 18% NI Mararing Steel

I. LITERATURE SURVEY Heat treatable low-alloy steels

Heat Treatable Low-Alloy Steels (HTLA) has high hardenability and is capable of offering high strengths depending upon the hardening and tempering heat treatments that they have undergone. HTLA steels frequently are welded in the annealed condition. The entire weldment is then heat treated to the desired strength or hardness.

Metallurgical considerations

Under as quenched condition, the material has highest level of strength and hardness. But its ductility is the lowest. This can be explained based on the phase transformation of steels during quenching process, where the lattice structure of steel changes immediately from face-centered cubic (phase) to a body-centered tetragonal (marten site). At the same time a large amount of distortion occurs during the formation of the platelets of martensite, which leads to rapid increase of strength and hardness. (K.R. Brown [4])

II. EXPERIMENTAL DETAILS

III. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- Dissimilar welding between maraging steel and 4130 steel is feasible and a radio graphically sound joint can be achieved.
- W2 maraging steel filler wire to be used to weld these dissimilar materials.
- The preferable diameter of the filler wire is 1 mm for welding 1.3 mm thick Rocket Motor Assembly.
- TIG welding should be performed in pulsed current mode with copper fixture and with continuous water cooling.
- All the specimens have failed in the HAZ portion of 4130 base metal for the dissimilar combination of 4130 (Q&T) and maraging steel (aged).
- Possible sequences of welding and heat treatment of dissimilar materials to achieve 900MP yield strength for dissimilar weldment.
- Pulsed TIG welding of Maraging steel (Solution annealed, 32 HRC) to 4130 (Quenched 8700C, 1 Hr/OQ& tempered at 2600C, 1 Hr/AC to 42-HRC) with post weld heat treatment cycle of 4800C , 3 Hr, AC.
- Pulsed TIG welding of Maraging steel (aged, 48-50HRC) to 4130 (Quenched 8700C, 1 Hr/OQ& tempered at 2600C, 1 Hr/AC to 42-44HRC) with poste weld heat treatment cycle of 4000C, 1 Hr, AC.

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A K Nayak, Itishree Behera,A.K.Sahoo

Abstract: ***This paper deals with permanent magnet synchronous generator (PMSG) based wind energy conversion system (WECS) integrated with grid with two back to back connected converters with a common DC link. The machine side converter is used to extract maximum power from the wind. In this paper a study of WECS is done by using a constant speed wind turbine and 2 mass drive train in Matlab. Moreover, by maintaining the dc link voltage at its reference value, the output ac voltage of the inverter can be kept constant irrespective of variations in the wind speed and load. An effective control technique for the inverter, based on the pulse width modulation (PWM) has been developed to make the line voltages at the point of common coupling.***

Keywords: Permanent magnet synchronous generator (PMSG), Wind energy conversion system (WECS) ,DC link capacitor ,variable speed wind turbine, Pulse width modulation (PWM), Insulated gate bipolar transistor (IGBT) Voltage and frequency control.

I. INTRODUCTION

Now days the consumption of fossil fuel is increasing day by day. The main reason behind the use of fossil fuel is to generate more and more energy. Due to consumption of more fossil fuel all living and non living beings including the environment is badly affected continuously.

In order to overcome these causes the renewable source of electricity generation is very advantageous because there is no harmful emission and the infinite availability of prime mover that is converted into electricity.

For the installation of wind energy MNRE scheme (The Ministry of New & Renewable energy) has introduced to aware more and more people about this technology, government also gives incentives in order to promote wind energy. Wind is air in motion; this is actually derived from solar energy. About 2% of total solar flux that reaches the earth's surface is transformed into wind energy due to uneven heating of atmosphere.

Correspondence Author
Dr.A.K.Nayak, Asst.Professoer Department of Mechanical Engineering,TAT Bhubaneswar Email :aknayak@tat,ac,in.

Itishree Behera,Asst.Prof Department Of Mechanical Engineering,TAT Bhubaneswar,Email :itishreebehera@tat.ac.in

Dr.A.K.Sahoo,Professor,Department of Mechanical Engineering,TAT Bhubaneswar, Email :aksahoo@tat.ac.in

This kinetic energy of wind is used to gain the rotational motion of wind turbine which is coupled with an electrical generator to supply over a region acting as stand alone or supplying power to a grid. An actual WECS (Wind energy conversion system) be considered as follow [1] which can be used in two different ways

(A) Isolated stand alone system
(B) Grid connected system

Figure 1 shows Isolated Standalone system which is used to provide energy to small scale industries or towns located in remote areas. Whereas Grid connected system leads to increased energy efficiency, increases support and reliability of system.

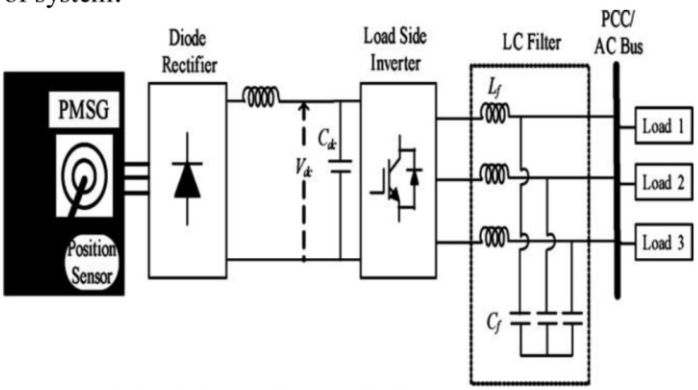

Fig. 1. Standalone wind energy system.

In wind energy application variable speed wind turbines are much better performance due to its maximum power point tracking algorithm (MPPT) .Now a days Doubly fed Induction generator are widely used in a variable speed wind turbine but te main drawback is the requirement of gear box to match turbine and rotor speed. The gearbox many times suffers and requires regular maintenance making the system unreliable [2] . The reliability of variable speed wind turbine can be improved significantly using a direct drive based permanent magnet synchronous generator (PMSG). To extract maximum power from the fluctuating wind, variable-speed operation of the wind-turbine generator is necessary. This requires a sophisticated control strategy for the generator. Optimum power/torque tracking is a popular control strategy, as it helps to achieve optimum wind-energy utilization [4-8]. Some of these control strategies use wind velocity to obtain the desired shaft speed to vary the generator speed. However, anemometer-based control strategy increases cost and reduces the reliability of the overall system. These control strategies are not suitable or too expensive for a small-scale wind turbine.

For output maximization of a PMSG based wind turbine a control strategy has been developed.

The generator side switch mode rectifier is controlled to achieve maximum power from the wind .This method requires one switching device (IGBT) insulated gate bipolar transistor, which is used to control generator torque to extract maximum power.

II WIND TURBINE CHARACTERISTICS

1 modeling of wind turbine

Fig (3) shows the control structure of grid connected variable speed wind turbine which consists of wind turbine, PMSG ,single switch-three phase-switch mode rectifier and a vector controlled PWM voltage source inverter .The output of a variable speed wind turbine is not suitable for use as it varies in amplitude and frequency due to fluctuating wind .A constant DC voltage is required for direct use, or conversion to ac via inverter .The single switch three phase switch mode rectifier consist of a three phase diode bridge rectifier. The output of switch mode rectifier can be controlled by controlling the duty cycle of an active switch .At any wind speed to extract maximum power from the wind turbine and to supply loads .A vector controlled IGBT inverter is used to regulate the output voltage and frequency during load or wind variation. A horizontal axis wind turbine is used to drive the PMSG. A surface mounted non salient pole type PMSG is used. The kinetic energy presents in the wind is converted into the mechanical torque using a wind turbine. Mechanical energy is converted into electrical energy using a PMSG. To facilitate variable speed operation for achieving MPPT, the PMSG cannot be interfaced with the grid directly. Phase voltages are then applied to 10 KW load with suitable breakers.

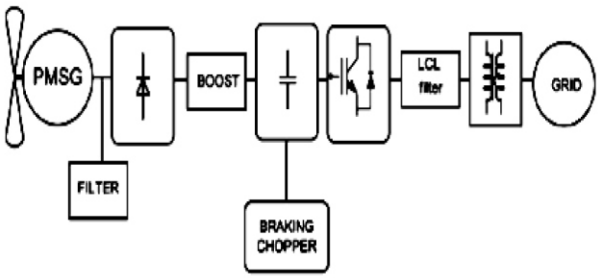

Fig 2: Block diagram of wind turbine connected with grid

This block implements a variable pitch wind turbine model. The performance coefficient C_p of the turbine is the mechanical output power of the turbine divided by wind power and a function of wind speed, rotational speed, and pitch angle (beta). C_p reaches its maximum value at zero beta . According to the Aerodynamics, the aerodynamic power of the wind turbine can be expressed as

$$P_r=1/2\rho\pi R^2 Cp\ (\lambda)\ v3 \qquad \ldots (1)$$

When the rotor speed is adjusted to maintain its optimal value, the maximum power can be gained as

$$P_{r\max} = k_{\text{opt}}\omega^3 \qquad \cdots (2)$$

Where k_{opt} is decided by

$$Kopt = \rho\pi R5Cpmax2\lambda 3opt \quad .... (3)$$

The mechanical rotor power generated by the turbine as a function of the rotor speed for different wind speed is shown in Fig. 3.

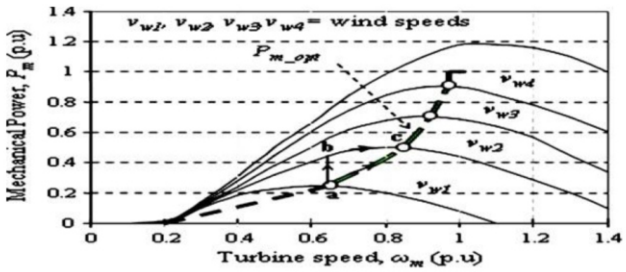

Fig 3: Variation of mechanical power with turbine speed

The optimum power is also shown in this figure. The optimum power curve (*P*opt) shows how maximum energy can be captured from the fluctuating wind. The function of the controller is to keep the turbine operating on this curve, as the wind velocity varies. It is observed from this figure 3 that there is always a matching rotor speed which produces optimum power for any wind speed. If the controller can properly follow the optimum curve, the wind turbine will produce maximum power at any speed within the allowable range. The optimum torque can be calculated from the optimum power given by equation (3). For the generator speed below the rated maximum speed, the generator follows equation (3)[6] . If V_{dc} is maintained constant at its reference value and keeping the modulation index of load side inverter at 1.5, the amplitude of output ac voltage can be controlled and maintained at the rated voltage . The relation between dc voltage and output ac voltage of three-phase pulse width modulation (PWM) inverter is given by [7]

$$V_{LL1} = \frac{\sqrt{3}}{2\sqrt{2}} \text{k } V_{dc}$$

Where

$$Tm\ \text{opt} = K\text{opt}\ (\omega m\_\text{opt})^2.$$

V_{LL1} is Fundamental phase-phase root-mean-square (rms) Voltage on the ac side

K = Fundamental phase-phase root-mean-square (rms) Voltage on the ac side

V_{dc} is the dc link voltage

2. Two mass Drive Train

Here WECS is represented with the two-mass drive train model. The differential equations governing its mechanical dynamics are presented as follows [11]

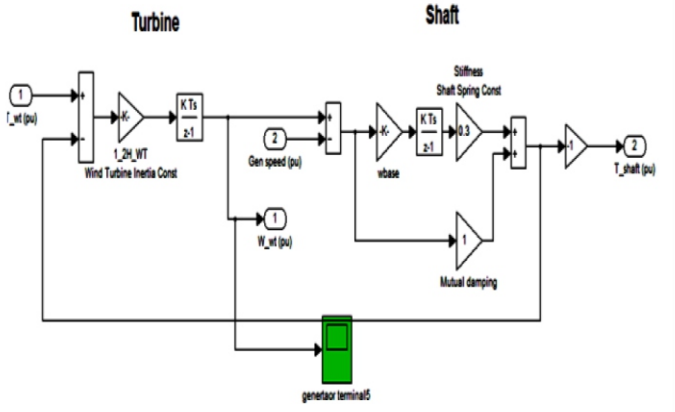

Fig 4 Two mass drive train

$2H_t\, dw_t/dt = T_m - T_{sh}$
$1/w_{elb} * d\theta_{tw}/dt = w_t - w_r$
$2H_g dw_r/dt = T_{sh} - T_g$
Where H_t is the inertia constant of the turbine, H_g is the inertia
Constant of the PMSG, θtw is the shaft twist angle, w_t is the
Angular speed of the wind turbine in p.u., wr is the rotor speed
of the PMSG in p.u., w_{elb} is the electrical base speed, and the
Shaft torque T_{sh} is
$T_{sh} = K_{sh}\, \theta_{tw} + D_t\, d\theta_{tw}/dt$
Where K_{sh} is the shaft stiffness and D_t is the damping coefficient.

III. PERMANENT MAGNET SYNCHRONOUS MACHINE

The permanent magnet synchronous machine operates as a generator .The electrical and mechanical parts of this machine is represented by second order state space model. The sinusoidal model assumes that the flux established by the permanent magnet is sinusoidal which implies that electromotive forces are sinusoidal. These equations are represented in rotor reference frame .All quantities in the rotor reference frame referred to the stator.

$$\frac{d}{dt} i_d = \frac{1}{Ld} v_d - \frac{R}{Ld} i_d + \frac{Lq}{Ld} p\omega_r \text{ iq}$$

$$\frac{d}{dt} i_q = \frac{1}{L_q} v_q - \frac{R}{L_q} i_q + \frac{Ld}{Lq} p\omega_r \text{ id} - \frac{\lambda p \omega r}{Lq}$$

$$T_e = 1.5P\,[\lambda\, i_q + (Ld - Lq) i_d\, i_q\,]$$

The Lq and Ld inductances represent the relation between the phase inductance and the rotor position due to the saliency of the rotor. For example, the inductance measured between phase a and b (phase c is left open) is given by

$$L_{ab} = L_d + L_q + (L_q - L_d)\, \cos(2\theta_e + \tfrac{\pi}{3})$$

θ_e Represents the electrical angle
L_q, L_d q and d axis inductances
L_q, L_d q and d axis inductances
R Resistance of the stator windings
I_q, I_d q and d axis currents
V_q, V_d q and d axis voltages
Wr Angular velocity of the rotor
λ Amplitude of the flux induced by the permanent magnets of the rotor in the stator phases
P Number of pole pairs
Te Electromagnetic torque

IV. CONTROL OF PROPOSED WIND ENERGY SYSTEM

In this proposed wind energy system the output ac voltage is controlled through amplitude and frequency. Power from PMSG based wind turbine is fed to ac-dc-ac converters to maintain the output voltage at desired amplitude and frequency. The reactive power and an active power exchange with the grid are function of phase and amplitude of terminal voltage at AC terminals of a GSC. The objective of controlling a GSC is to keep constant DC link voltage under change in generated active power while keeping sinusoidal currents of PMSG as shown in figure 4.

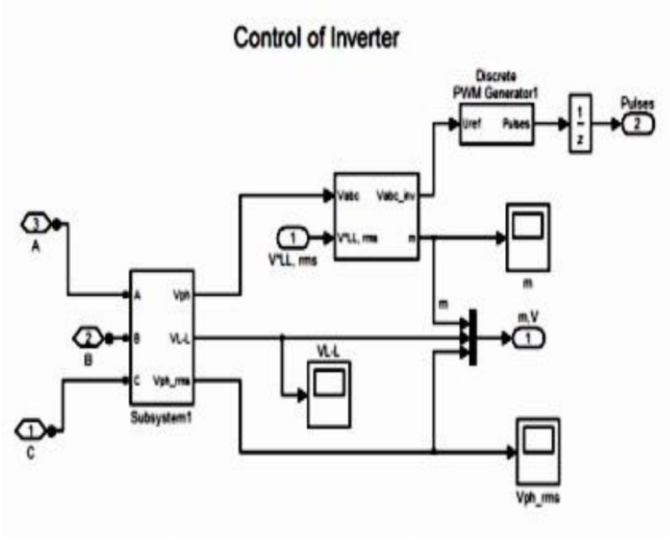

Fig 5 Inverter control system

Figure 6 shows the equivalent circuit of voltage source converter PWM VSI used here is a three phase VSI with six switches. In this figure three phase converters has six semiconductors displayed in three legs a, b and c. Only one switch on the same leg can be conducting at the same time each switch (S1, S2, S3, S4, S5 & S6) in the inverter branch is composed of semiconductor devices connected with antiparallel diode. The semiconductor device is a controllable device and diode is for protection.

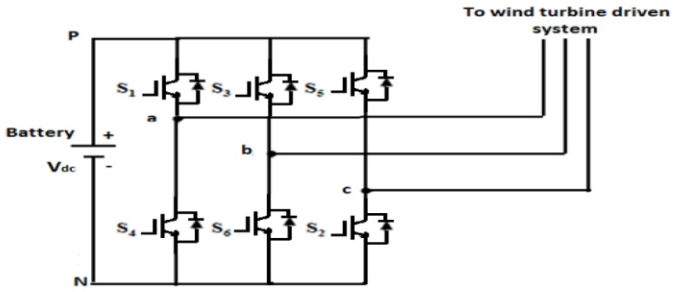

Fig 6 Six switch composition of converter

Due to unbalanced load connected to an inverter the currents will not same in all the phases and hence LC filters will cause unequal voltage drops. Hence it is necessary to compensate voltage imbalance .To achieve this goal the rms value of phase voltages and the reference phase voltage is given to a PI controller. The output of PI controller is multiplied with a unit sine wave generator to get the reference phase voltages. By using these reference voltages PWM pulses are generated to switch the load side inverter. The schematic of this control arrangement is shown in below figure 7. [9]

Phase voltage is firstly arranged to the rms value and compare it with reference value and this reference value is calculated by V_{LLrms} and giving this rms value to PI controller .One voltage has been generated for inverter this voltage is given to the reference voltage of PWM .The above fig is of fixed reference value 222 or by peak detection method the output of which is shown by dotted but in this paper we are using a simple arrangement for reference value 400.

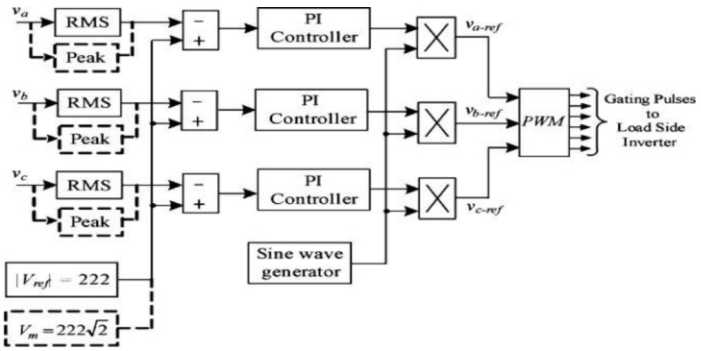

Fig 7 Control System of inverter

V. FILTER DESIGN

In order to achieve almost sinusoidal voltage the resonance frequency of the filter has to be well below the lowest harmonic frequency of the inverter voltage resulting from pulse width modulation. The resonance frequency determines damping and stability. Resonance frequency is determined by the product of L and C [12]

$$W_r = \frac{1}{\sqrt{LC}}$$

The choice of the individual values of L and C is a remaining degree of freedom. From the view of cost and weights, the capacitor is much cheaper device. Looking at the inverter current a big choke has the advantage that it limits the current which the inverter has to deliver for charging the filter capacitors. The current adds to the motor current and is an extra load to the inverter. A choke that is too small therefore either reduces the output power of the inverter or causes extra costs because of oversized power semiconductors. [10]

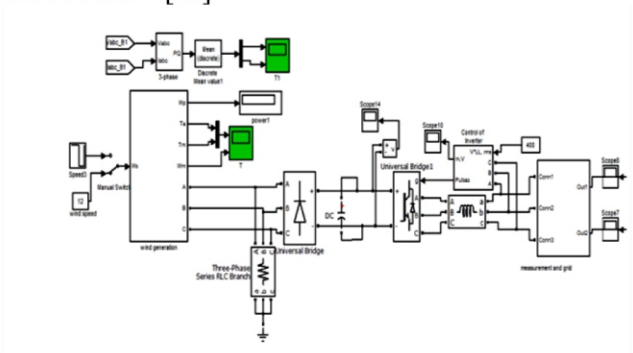

Fig 8 Proposed wind energy conversion system in Matlab/Simulink

VI. RESULT

All the modeling is done in Matlab simulink with simulation type continuous powergui.In this section the measurements results for the grid connection of permanent magnet synchronous generator using the power electronic converter described above. Figure 9.6 shows phase voltages and phase currents. The output of WECS using PWM technique is shown below in which the phase voltages line currents , rms value of phase currents active power and rotor speed is shown in figure 9.1,modulation index is maintained at 1.5 as shown in figure 9.2.simulation results of developed WECS connected to a utility grid under different conditions . I.e. under constant wind speed , step change in wind speed.

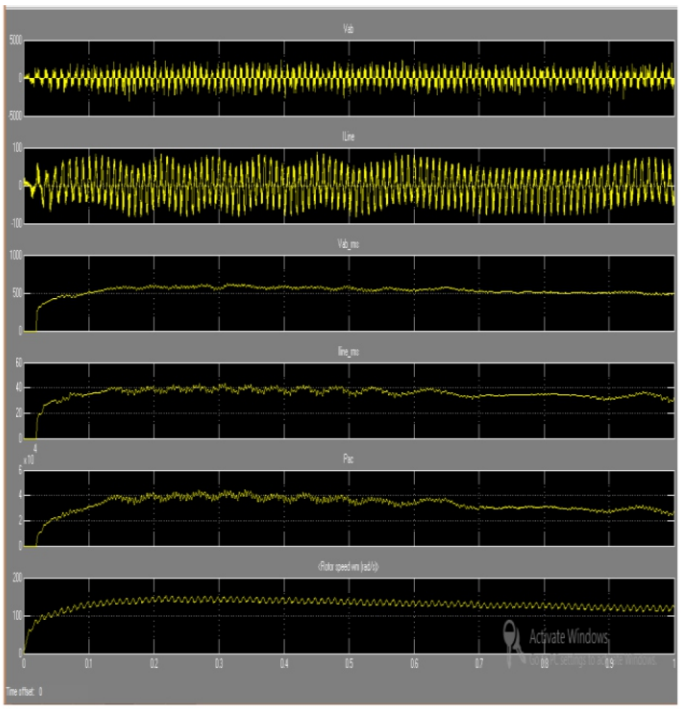

Fig 9.1 Figure 9(a) shows that phase voltages (b) shows line currents (c) rms value of phase voltage (d) rms value of phase currents (e) active power (f) rotor speed for wind speed 7m/s

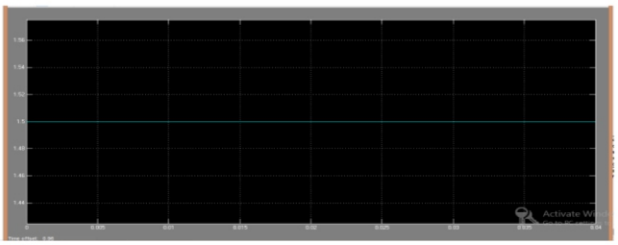

Fig 9.2 shows the modulation index

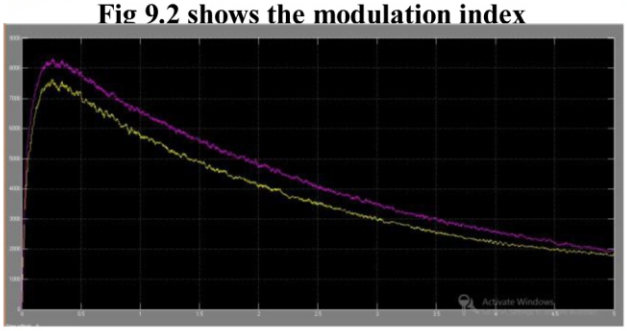

Fig 9.3 Instantaneous active and reactive power waveforms

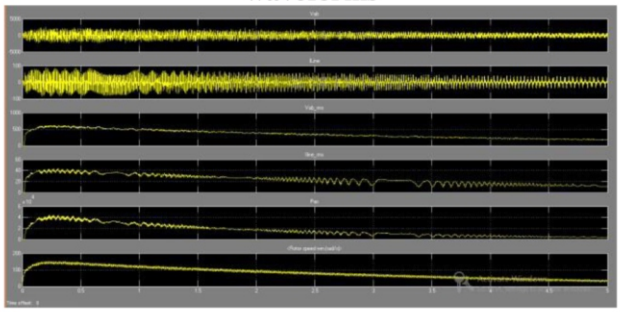

Fig 9.4 Figure 9(a) shows that phase voltages (b) shows line currents (c) rms value of phase voltage (d) rms value of phase currents (e) active power (f) rotor speed for wind speed 12 m/sec

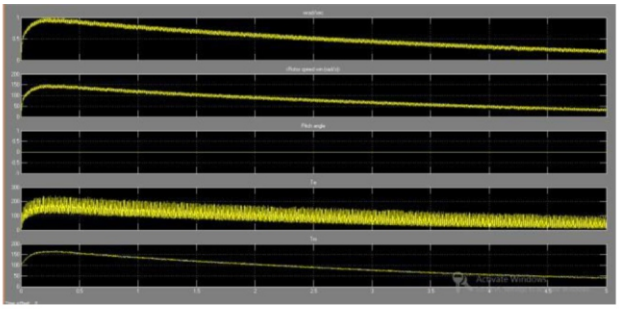

Fig 9.5 (a) wind speed (b) rotor speed (c) pitch angle (d) Electrical Torque (e) Torque

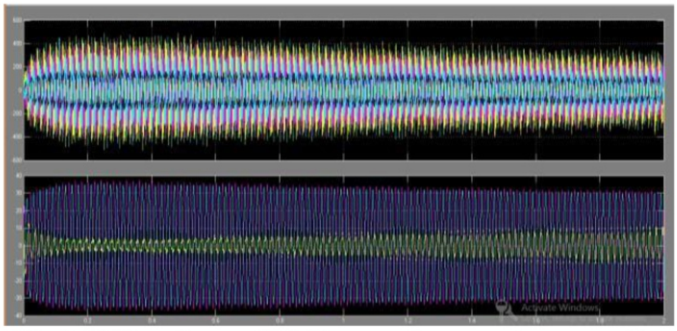

Fig 9.6 Waveform of Voltage and currents across the grid in constant wind speed 12m/s

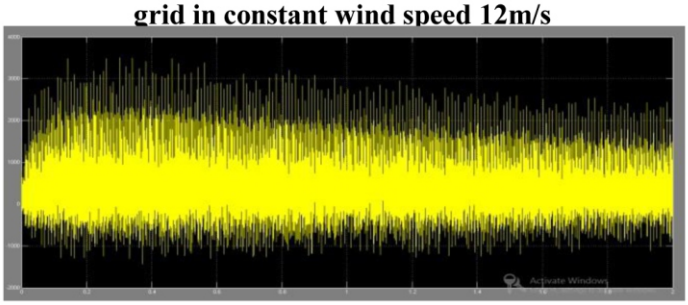

Fig 9.7 Waveforms of DC link voltage

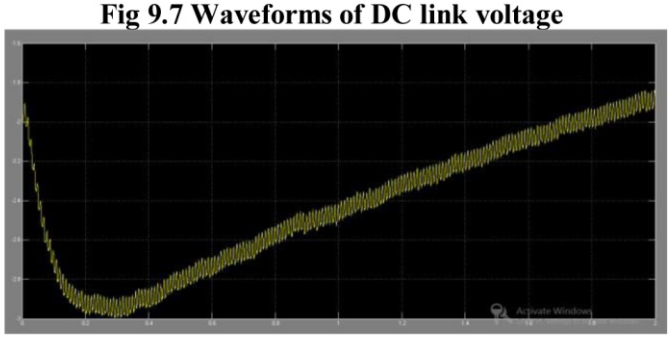

Fig 9.8 shaft torque

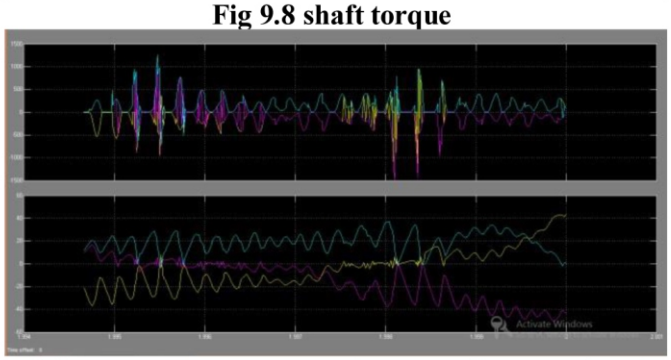

Fig 9.9 voltage and current before entering machine side converter

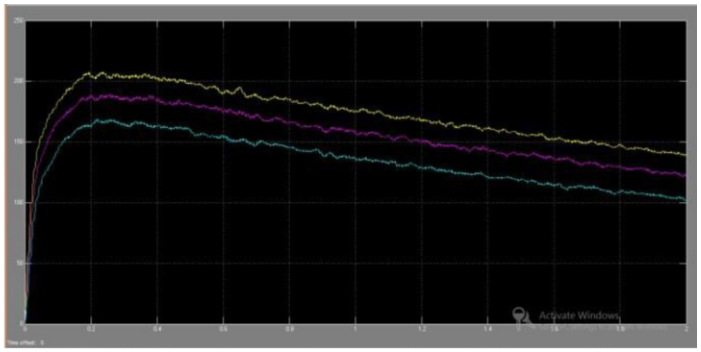

Fig 9.10 Waveform of Rms value of phase voltages

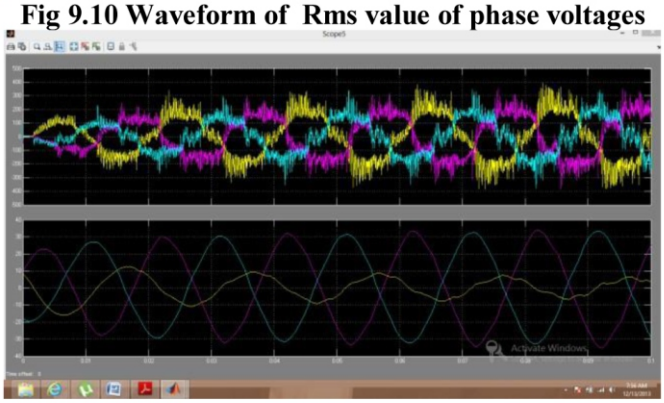

Fig 9.11Waveform of Phase Voltage and currents for small time 7m/sec

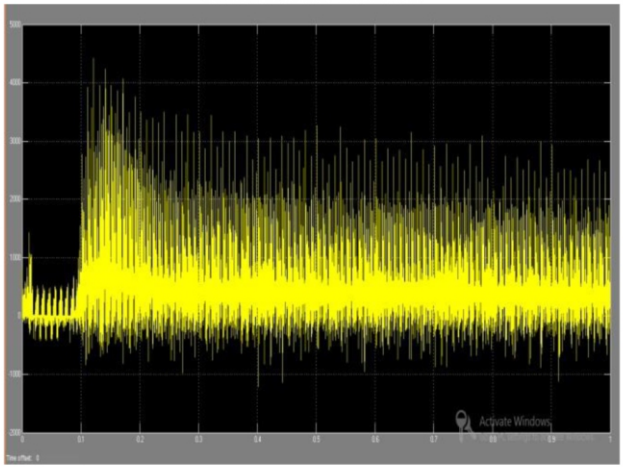

Fig 9.12 shows DC link voltage during fault

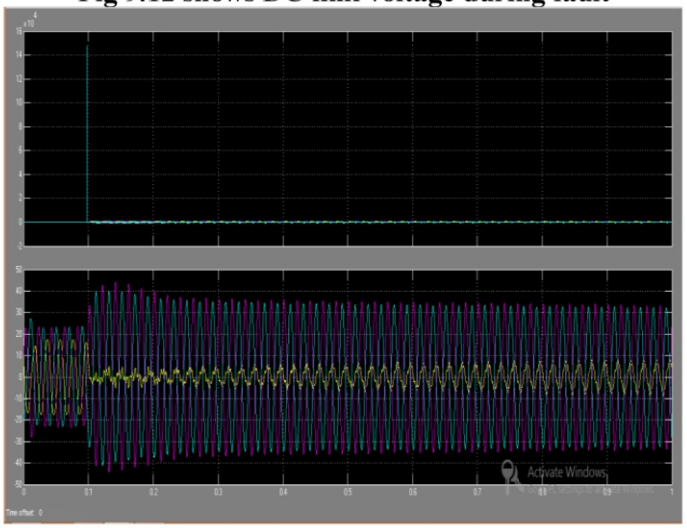

Fig 9.13 shows voltage and current waveform after fault

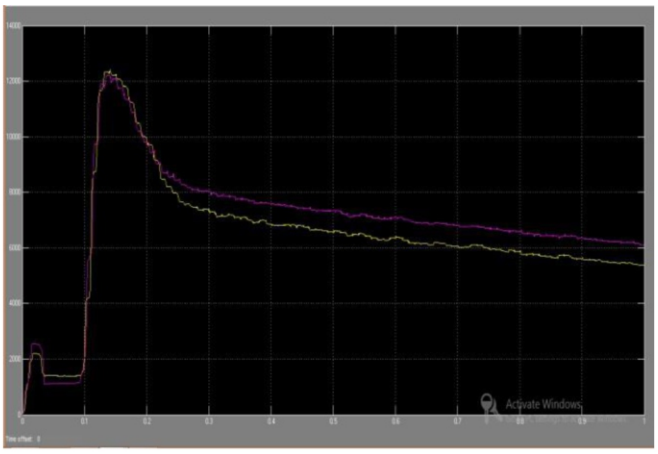

Fig 9.14 shows active and reactive power after fault

Table I Parameters of turbine generator system

Wind Turbine	
Density of air	1.225 Kg/m^3
Area swept by blades , A	1.06m^2
Base wind speed	12 m/s
PMSG	
No of poles	10
Rated speed	153 rad/s
Rated current	12 amp
Armature resistance	0.425Ω
Magnetic flux linkage	0.433 wb
Stator inductance	4 mH
Rated torque	40 Nm
Rated power	6 kW

VII. DISCUSSION

In this paper we can see that output voltage and currents are near about desired value .Active power for constant speed gives constant value. When a three phase fault occurs with transition time 1/60 5/60 . We can see that DC link voltage has changed starting values are near about 500 for small duration of time and after that its value varies near 3000 and above. We can compare its value by the DC voltages before fault. In future we can work for MPPT which is more accurate and also give some effort for improving power quality by using FACTS devices.

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Plot No.F2/A, Chandaka Industrial Estate,
Infocity Area, Chandrasekharpur,
Bhubaneswar-751 024,Odisha
Phone: (0674) 3530517, Email : info@trident.ac.in,

www.trident.ac.in