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Electrical & Electronics Engineering Department

e-Magazine

Electric vehicle

MEMS Technology

Say Goodbye to Pills. Nano Robots Can Cure

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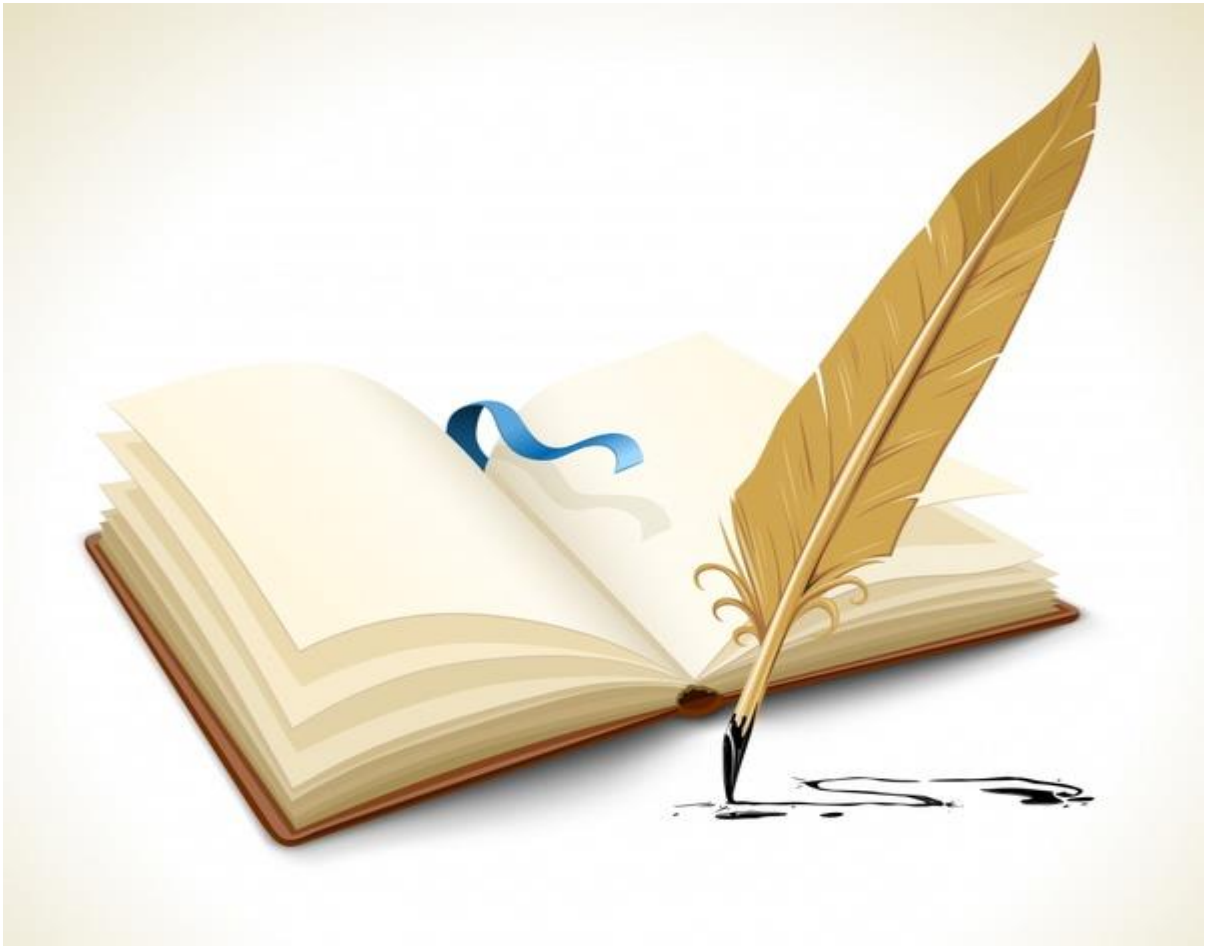
Editorial Board



- ❖Faculty Coordinator: Namrata Nebhnani
- ❖Editor- in-Chief: M s. Kunjal Parate
- ❖Co-Editors : Ms.Priyanka Kumari

Principal Message

Technical Education is the most potential instrument for socio-economic change. Presently, the engineer is seen as a high-tech player in the global market. Distinct separation is visible in our education between concepts and applications. Most areas of technology now change so rapidly that there is a need for professional institutes to update the knowledge and competence.

Institute of Engineering and Science, IPS Academy is a leading, premium institution devoted to imparting quality engineering education since 1999. The sustained growth with constant academic brilliance achieved by IES is due to a greater commitment from management, dynamic leadership of the president, academically distinctive and experienced faculty,
Disciplined students and service oriented supporting staff. The Institute is playing a key role in creating and ambiance for the creation of novel ideas, knowledge, and graduates who will be the leaders of tomorrow. The Institute is convinced that in order to achieve this objective, we will need to pursue a strategy that fosters creativity, supports interdisciplinary research and education. This will also provide the students with an understanding and appreciation not only of the process of knowledge creation, but also of the process by which technology and knowledge may be used to create wealth as well as achieve social economic goals.

I am delighted to note that the engineering graduates of this institute have been able to demonstrate their capable identities in different spheres of life and occupied prestigious position within the country and abroad. The excellence of any institute is a measure of achievements made by the students and faculty.

Dr. Archana Keerti Chowdhary

Principal

HOD'S Message

Our Country is passing through a critical phase of growth. If you take an over view of this growth, we find that we are developing new energy dimension and electrical energy plays the most vital part in total energy context. In fact, electricity is taking the role of indispensible energy form of our daily life. Ours is the sixth largest country in terms of global energy consumption. The last decades of economic growth of our country has brought an unprecedented demand for energy. The installed electrical generating capacity of our country stands at 162366 Megawatts in 2010, and is projected to be 950000 MW by 2030. This large scale use of electrical energy will definitely demand a large team of electrical engineers to manage its use. All the same there is continuous pressure of balancing our ecology especially in context to global warming. This is forcing to ensure efficient use of electrical energy. Electronic power control is offering new tools in management of electrical energy.

Electrical and Electronics engineering together is a dedicated branch of engineering to fulfill all challenges of electrical energy futures.

Prof. Manish Sahajwani

HOD

MEMS TECHNOLOGY

MAGIC MEANS MICRO

MEMS Technology Micro-Electro-Mechanical Systems, or MEMS, is a technology that in its most general form can be defined as miniaturized mechanical and electro-mechanical elements that are made using the techniques of micro fabrication. The critical physical dimensions of MEMS devices can vary from well below one micron on the lower end of the dimensional spectrum, all the way to several millimeters.

The term used to define MEMS varies in different parts of the world. In the United States they are predominantly called MEMS, while in some other parts of the world they are called "Microsystems Technology" or "Micro Machined Devices". While the functional elements of MEMS are miniaturized structures, sensors, actuators, and microelectronics, the most notable elements are the micro sensors and micro actuators. Micro sensors and micro actuators are appropriately categorized as "transducers", which are defined as devices that convert energy from one form to another. In the case of micro sensors, the device typically converts a measured mechanical signal into an electrical signal.

The more complex levels of integration are the future trend of MEMS technology. The present state-of-the-art is more modest and usually involves a single discrete micro sensor, a single discrete micro actuator, a single micro sensor integrated with electronics, a multiplicity of essentially identical micro sensors integrated with electronics and a single micro actuator integrated with electronics.

MEMS technology is sometimes cited as separate and distinct technology. In reality the distinction is not so clear-cut. The well-known Scanning Tunneling-Tip Microscope (STM) which is used to detect individual atoms and molecules on the nanometer scale is a MEMS device. Similarly the Atomic Force Microscope (AFM) which is used to manipulate the placement and position of individual atoms and molecules on the surface of a substrate is a MEMS device as well. In fact, a variety of MEMS technologies is required in order to interface with the nano-scale domain.

Thus the MEMS is a technology of encompassing highly miniaturized things that cannot be seen with the human eye. The common benefits afforded by this technology, include: increased information capabilities, miniaturization of systems, new materials resulting from new science at miniature dimensional scales, and increased functionality and autonomy for systems.

Priyanka Kumari
EX IV Year

ELECTRIC VEHICLES ARE NOT JUST THE WAVE OF THE FUTURE, THEY ARE SAVING LIVES TODAY.

An electric vehicle (EV) is one that operates on an electric motor, instead of an internal-combustion engine that generates power by burning a mix of fuel and gases. Therefore, such as vehicle is seen as a possible replacement for current-generation automobile, in order to address the issue of rising pollution, global warming, depleting natural resources, etc. Though the concept of electric vehicles has been around for a long time, it has drawn a considerable amount of interest in the past decade amid a rising carbon footprint and other environmental impacts of fuel-based vehicles.

In India, the first concrete decision to incentivise electric vehicles was taken in 2010. According to a Rs 95-crore scheme approved by the Ministry of New and Renewable Energy (MNRE), the government announced a financial incentive for manufacturers for electric vehicles sold in India. The scheme, effective from November 2010, envisaged incentives of up to 20 per cent on ex-factory prices of vehicles, subject to a maximum limit. However, the subsidy scheme was later withdrawn by the MNRE in March 2012.

In 2013, India unveiled the 'National Electric Mobility Mission Plan (NEMMP) 2020' to make a major shift to electric vehicles and to address the issues of national energy security, vehicular pollution and growth of domestic manufacturing capabilities. Though the scheme was to offer subsidies and create supporting infrastructure for e-vehicles, the plan mostly remained on papers. While presenting the Union Budget for 2015-16 in Parliament, then finance minister Arun Jaitley announced faster adoption and manufacturing of electric vehicles (FAME), with an initial outlay of Rs 75 crore. The scheme was announced with an aim to offer incentives for clean-fuel technology cars to boost their sales to up to 7 million vehicles by 2020.

In 2017, Transport Minister Nitin Gadkari made a statement showing India’s intent to move to 100 per cent electric cars by 2030. However, the automobile industry raised concerns over the execution of such a plan. The government subsequently diluted the plan from 100 per cent to 30 per cent.

In February 2019, the Union Cabinet cleared a Rs 10,000-crore programme under the FAME-II scheme. This scheme came into force from April 1, 2019. The main objective of the scheme is to encourage a faster adoption of electric and hybrid vehicles by offering upfront incentives on purchase of electric vehicles and also by establishing necessary charging infrastructure for EVs.

Say Goodbye to Pills. Nano Robots Can Cure

Nano robots will be able to repair damaged or diseased tissues. The circulatory system is the natural path for these devices and the nano robots will pass through the blood stream to the area of defect.

They attach themselves to specific cells, such as cancer cells and report the position and structure of these tissues. A creative methodology in the use of these devices to fight cancer involves using silicon nano machines with a thin coating of gold and light in the near infrared spectrum.

Light in the 700-1000 nanometer range will pass through the tissue and reaches the defective cell. When this infrared light strikes the particular type of nano robot, the device gets hot due to the oscillation of the metal's electrons in response to the light.

Using an MRI, the nano robot is specifically placed in the cancerous region, and then the light causes the devices to heat to 131 degrees Fahrenheit which destroys the cancerous cells but doesn't damage surrounding tissues. This is the new technology, without any drawbacks. These nano robots can cure any disease without affecting any other cells or tissues. The future vision: Imagine going to the doctor to get treatment for a fever, instead of giving you a tablet the doctor implants a tiny robot into your bloodstream.

The robot detects the cause of your fever, travels to the appropriate system and provides a dose of medicine directly to the infected area.This is going to happen in a few years of time from now. Each person is going to have a nano robot in his body which is going to monitor human body system. So the time arrives to enjoy with the robot within our self.

Achal Hirwe

EX IV year

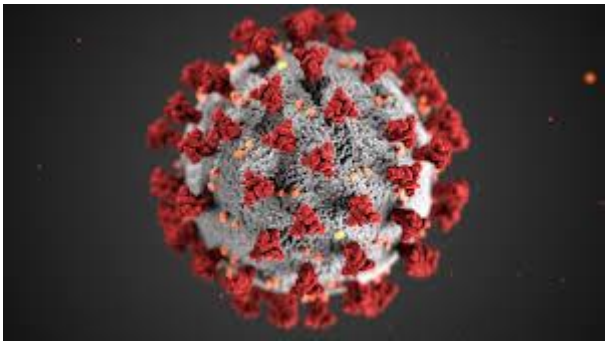
Coronavirus

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus.

Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

The best way to prevent and slow down transmission is to be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol based rub frequently and not touching your face.

The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow).



A Sibling

"Thicker than water" is the term used to describe the relationship of a sibling. A sibling relationship is potentially one of life's most significant connections. The relationship between two siblings, which begins with the birth of the younger and can continue until a sibling dies, is often the longest lasting relationship that a person can experience. I am always baffled when I hear my friends call their siblings as brats, pests and suck-ups. In my opinion, having a sibling for your own is the best way your life can ever be designed. As far as my life is concerned, it has been designed for me to be a solo artist, so in many cases I conflict to their comments. Strong bonds between siblings can develop remarkably early in life. The emotional importance of the sibling relationship can motivate even very small children to understand their siblings extremely well. I confess, a sibling, especially a younger bro/sis can be an absolute menace in your life, but it is truly inequitable if as adults you cannot understand that they are after all "children". Admit it! You have also been notorious in your childhood, haven't you? It is impossible for people with such opinions about their siblings to understand the life of an only child. Bound by blood, but not always by love, a sibling can be a friend or rival, defender or detractor sometimes simultaneously!

A sibling is the only relationship that accompanies, protects, secures, offends, defends, prosecutes for, and ofcourse loves you the way you are. Yes! For all the relationships you possess, parents, friends, relations, partners, a sibling is the only person who accepts and protects for who you really are! Siblings who grow up together accumulate a store of shared memories and experiences that can shape each sibling individually and establish a foundation for their lifelong relationships with each other. My innermost concerns to people who are by whatever reason, a single child in the family. Not being offensive but I'm sure we missed and is still missing the warm company of a sibling. They can most of the times be annoying but when they find you in some kind of grieve they will be the first to help you get out of it. In many ways a sibling assures to secure you from all your misfortunes, your failures and your worries. Though we solo artists are fortunate enough to get toys, clothes, candy and other comforts all for ourselves, we are not fortunate enough to get the cunning pleasure of fighting and conquering it from our siblings. It is always an indelible feeling to not have a sibling in our lives. The best way to love is to share it with our loved ones. Only with love and nobody to share it with, is deliberately brutal. It is extremely indescribable to express the gut feeling of loneliness. If not for now, in your dotage you will feel blessed for having such a blissful relationship in your life that you can never regret for. A sibling relationship can last for decades longer than the relationship between a parent and a child. Elderly siblings who have not maintained affectionate relationships with their bro/sis often identify this absence as a source of tremendous regret and loss. So don't lose them; love them, for you are blessed!

Abhishek Choudhary

EX II Year

Paper Presentation

INTERNET OF THINGS AND ITS APPLICATION
IN VARIOUS FIELD

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ABSTRACT

This review paper focuses on the research done on the Internet Of things for Smart grid, IOT Devices, Smart Meter. To save humans time have encouraged the adoption of Internet of Things. The goal of IOT is not only just connecting things such as machines, devices and applications, but also allows the things to communicate, exchange control data and other necessary information while executing applications towards machine goal. It consist of IOT devices that have unique identities and capable of performing remote sensing, monitoring and actuating task. IoT is an advanced automation and analytics system which deals with artificial intelligence, sensor, networking, electronic, cloud messaging etc. to deliver complete systems for the product or services.

CONTENTS

INTRODUCTION

IoT is an advanced automation and analytics system which deals with artificial intelligence, sensor, networking, electronic, cloud messaging etc. to deliver complete systems for the product or services. The system created by IoT has greater transparency, control, and performance.

Let's us look closely at our mobile device which contains GPS Tracking, Mobile Gyroscope, Adaptive brightness, Voice detection, Face detection etc. These components have their own individual features, but what about if these all communicate with each other to provide a better environment? For example, the phone brightness is adjusted based on my GPS location or my direction.

Connecting everyday things embedded with electronics, software, and sensors to internet enabling to collect and exchange data without human interaction called as the Internet of Things (IoT).

The term "Things" in the Internet of Things refers to anything and everything in day to day life which is accessed or connected through the internet.

Figure 1 BLOCK DIAGRAM OF IOT's

As we have a platform such as a cloud that contains all the data through which we connect all the things around us. For example, a house, where we can connect our home appliances such as air conditioner, light, etc. through each other and all these things are managed at the same platform. Since we have a platform, we can connect our car, track its fuel meter, speed level, and also track the location of the car.

The Internet of Things (IOT) is also impacted industrial sector, especially for industrial automation systems in which internet infrastructure makes an extensive access to sensors, controls and actually It is a global network in which computers, sensors and actuators are interconnected through internet protocols. For example, consider the figure below in which a computer communicates with a device consisting of sensor, over the internet. The TCP/IP protocol is used as internet protocol in such cases with a goal of increasing efficiency.

FEATURES OF IOT

The most important features of IoT on which it works are connectivity, analyzing, integrating, active engagement, and many more. Some of them are listed below:

Connectivity: Connectivity refers to establish a proper connection between all the things of IoT to IoT platform it may be server or cloud. After connecting the IoT devices, it needs a high speed messaging between the devices and cloud to enable reliable, secure and bi-directional communication.

Artificial Intelligence: IoT makes things smart and enhances life through the use of data. For example, if we have a coffee machine whose beans have going to end, then the coffee machine itself order the coffee beans of your choice from the retailer.

Sensing: The sensor devices used in IoT technologies detect and measure any change in the environment and report on their status. IoT technology brings passive networks to active networks. Without sensors, there could not hold an effective or true IoT environment.

ADVANTAGES AND DISADVANTAGES OF (IoT)

Any technology available today has not reached to its 100 % capability. It always has a gap to go. So, we can say that **Internet of Things** has a significant technology in a world that can help other technologies to reach its accurate and complete 100 % capability as well.

Let's take a look over the major, advantages, and disadvantages of the Internet of Things.

Advantages of IoT

Internet of things facilitates the several advantages in day-to-day life in the business sector. Some of its benefits are given below:

- **Efficient resource utilization:** If we know the functionality and the way that how each device work we definitely increase the efficient resource utilization as well as monitor natural resources.
- **Minimize human effort:** As the devices of IoT interact and communicate with each other and do lot of task for us, then they minimize the human effort.
- **Save time:** As it reduces the human effort then it definitely saves out time. Time is the primary factor which can save through IoT platform.
- **Improve security:** Now, if we have a system that all these things are interconnected then we can make the system more secure and efficient.

Disadvantages of IoT

As the Internet of things facilitates a set of benefits, it also creates a significant set of challenges. Some of the IoT challenges are given below:

Security: As the IoT systems are interconnected and communicate over networks. The system offers little control despite any security measures, and it can be lead the various kinds of network attacks.

Privacy: Even without the active participation on the user, the IoT system provides substantial personal data in maximum detail.

Complexity: The designing, developing, and maintaining and enabling the large technology to IoT system is quite complicated.

EMBEDDED DEVICES AND (SYSTEM) IN (IoT)

It is essential to know about the embedded devices while learning the IoT or building the projects on IoT. The embedded devices are the objects that build the unique computing system. These systems may or may not connect to the Internet.

An embedded device system generally runs as a single application. However, these devices can connect through the internet connection, and able communicate through other network devices.

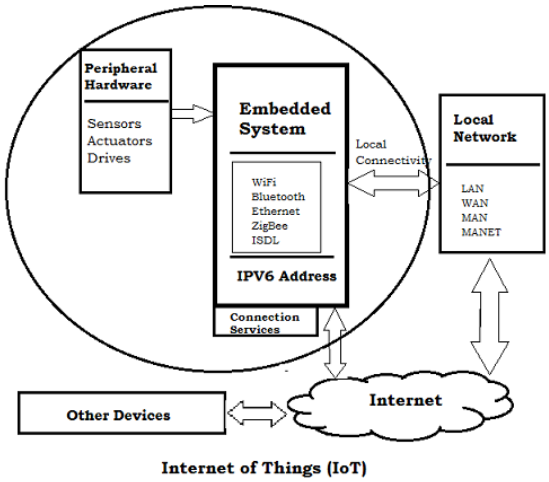

Figure 2 INTERNET OF THINGS

Embedded System Hardware

The embedded system can be of type microcontroller or type microprocessor. Both of these types contain an integrated circuit (IC).

The essential component of the embedded system is a RISC family microcontroller like Motorola 68HC11, PIC 16F84, Atmel 8051 and many more. The most important factor that differentiates these microcontrollers with the microprocessor like 8085 is their internal read and writable memory. The essential embedded device components and system architecture are specified below.

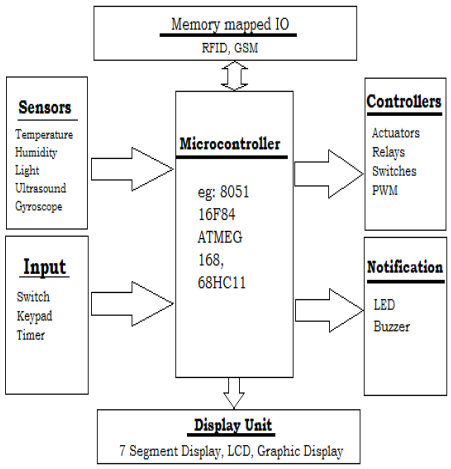

Figure 3 BASIC EMBEDDED SYSTEM

Embedded System Software

The embedded system that uses the devices for the operating system is based on the language platform, mainly where the real-time operation would be performed. Manufacturers build embedded software in electronics, e.g., cars, telephones, modems, appliances, etc. The embedded system software can be as simple as lighting controls running using an 8-bit microcontroller. It can also be complicated software for missiles, process control systems, airplanes etc.

How does Internet of Thing (IoT) Work?

The working of IoT is different for different IoT echo system (architecture). However, the key concept of there working are similar. The entire working process of IoT starts with the device themselves, such as smartphones, digital watches, electronic appliances, which securely communicate with the IoT platform. The platforms collect and analyze the data from all multiple devices and platforms and transfer the most valuable data with applications to devices.

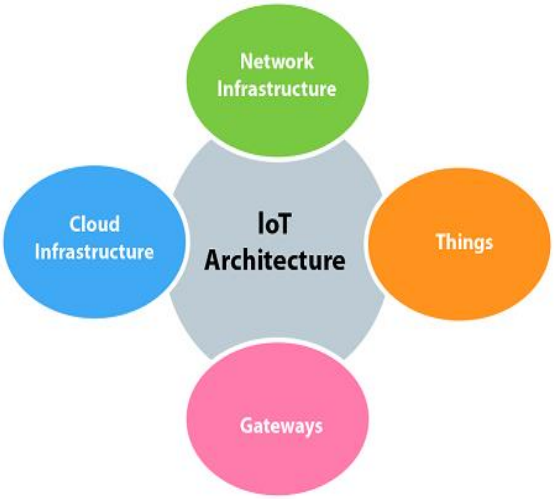

Figure 4 IOT ARCHITECTURE

2.**Applications of Internet of Things**

There will be 26 billion devices connected to the internet of things by 2020 according to Gartner Inc. The applications of the IOT are not restricted to some group of areas, but can be applied to a wide variety of domains whether individual, industry or infrastructure. IOT products are classified based on the type of application. These can be smart wearable, smart city, smart home, smart enterprise, or smart environment. Some of the application areas are:

Energy

The major area where IOT deals with energy management systems is the smart grid. IOT extends the benefits of smart grid beyond the automation, distribution and monitoring being done by the utilities. The task of the IOT in the field of electrical energy includes

1 .Advanced Metering Infrastructure (AMI)

2. SCADA (Supervisory Control and Data Acquisition)

3. Smart Inverters.

Home and Building Automation

There are several uses of INTERNET OF THINGS in various fields

Such as :-

1. IOT devices are used to monitor and control electronic, electrical and mechanical systems in buildings in order to improve convenience and safety. The tasks of IOT in this domain include

2. Smart lighting by adapting ambient conditions based switching

3. Web application and mobile apps enabled wireless and internet connected lights

4. Smart appliances management and control

Figure5 HOME & BUILDING AUTOMATION

Industries

IOT deals with real-time optimization of production and supply chain networks in a manufacturing industry by networking sensors, actuators, control systems and IOTs.

Figure 6 INDUSTRIAL USAGE

In case of process industries, it automates the process controls, service information systems and operator tools using digital controllers in order to achieve enhanced productivity and safe distribution system. Medical and Healthcare Systems

Medical and Healthcare Systems

Internet of Things technology has caused a certain degree of development in mobile digital medical systems. This enabled to obtain human body multiple physiological parameters to medical service center through human wearable multi-parameter sensor network. The tasks of IOT in this field include

1.Remote health monitoring

2.Emergency notification systems

Examples of IOT Usage in the Electrical Power Industry

The evaluation of the IOT in the electrical power industry transformed the way things performed in usual manner. IOT increased the use of wireless technology to connect power industry assets and infrastructure in order to lower the power consumption and cost. Some of the examples of IOT usage include SCADA, smart metering, building automation, smart grid, and connected public lighting.

Building Automation

IOT based solutions enable the efficient way of monitor and control of buildings to property owners as they connect lighting systems, elevators, environmental systems and other electrical appliances with internet and communication technologies. It saves the power consumption by automatically turning off the lights when rooms are not occupied and also by making sure of not drawing too much power by appliances. IOT based appliances provide remote monitoring and control through mobile and web applications to the end users or owners.

Figure 7 BUILDING AUTOMATION

Smart Grid

As discussed above that smart meter is a key part of the smart grid and there are millions of smart meters already connected to the grid. Smart grid makes better use of available energy supply by optimizing electricity generation and distribution depending upon the load demand.

This includes Ethernet based communication connected substations with intelligent equipment devices at each substation. This enables the automation of substations which can be coordinated effectively for a better power distribution especially during peak hours.

Figure 8 SMART GRID

Connected Public Lighting

This is the part of a project under smart cities where wireless IOT solutions are deployed to connect IP based lights. This smart public lighting uses intelligent-connected outdoor LED luminaries which are centrally controlled from the control station. This type of infrastructure also facilitates dynamical adjustment of illumination based on environmental changing conditions. This would dramatically result lower operating costs and power consumption.

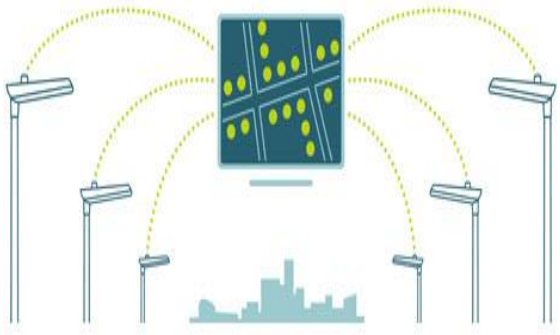

Figure 9 CONNECTED PUBLIC LIGHTING

SMART METER

Smart metering is an essential element in smart grid implementations as they are using Internet of Things technologies to transform traditional energy infrastructure. Smart metering through IOT helps to reduce operating costs by managing metering operations remotely. It also improves the forecasting and reduces energy theft and loss. These meters simply capture the data and send it back to the utility companies over highly reliable communication infrastructure.

Figure 10 SMART METER

CONCLUSION

IOT can integrate control, information processing and communications across various transportation systems by establishing an interconnection between drivers or users and vehicles. It is a global network in which computers, sensors and actuators are interconnected through internet protocols.

REFERENCE

1.Brown, Eric (13 September 2016). "Who Needs the Internet of Things. Linux.com. Retrieved 23 October 2016.

2.R. Howells, "The Business Case for IoT", June 2015, [online] Available: http://scn.sap.com/community/business-trends/blog/2015/06/18/the-business-case-for-iot

3.D. Evans, "The Internet of Things: How the Next Evolution of the Internet Is Changing Everything", Apr. 2011, [online] Available: www.cisco.com/web/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf.

4.D. Evans, "The Internet of Things: How the Next Evolution of the Internet Is Changing Everything", Apr. 2011, [online] Available: www.cisco.com/web/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf.

5.Kaashivinfotech online intrenshiphttps://kaashiv.com/learn/internet-of-things-online-internship/268506354

https://kaashiv.com/learn/internet-of-things-online-internship/1521638138

Wireless Technology for Power Theft Monitoring

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Abstract: ***With the electric industry undergoing change, increased attention is being focused on power supply reliability and power quality. The main aim of power theft monitoring and indication system at local substation using wireless technology indicate the location where the power is being stolen. The power theft is main problem in INDIA so power theft detection is required. This will provide the owner, manager of the system to know about the working or any kind of default in the system. The goal is to find improvement over the previous surveillance systems This model reduces the manual manipulation work and theft control. In order to integrate the various parts together we must first properly understand the working of the different parts to be integrated together.***

Keywords: Wireless technology, theft detection

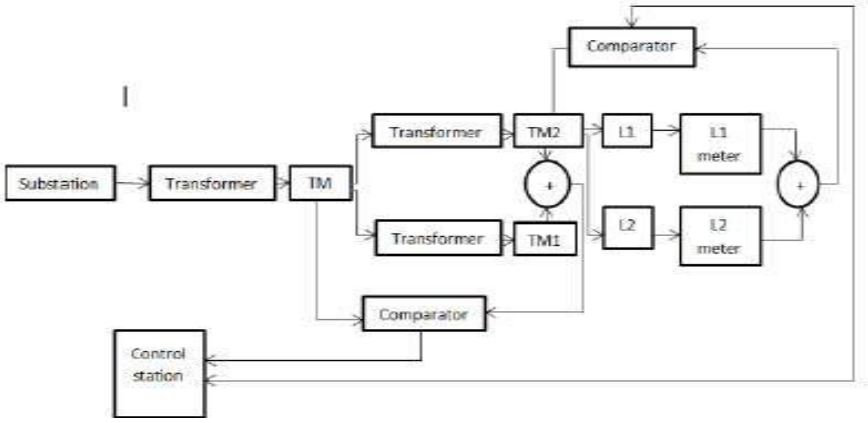
Contents

1. Introduction

Power theft is the biggest problem now days which causes huge loss to electricity boards. And to overcome these losses prices are increased. So if we can prevent this theft we can save lots of power. The normal practice for power theft is to short input output terminals or to place magnet on the wheel in case of old meters. In this system a micro controller is interfaced with an energy metering circuit current sensing circuit, RF communication & a contactor to make or break power line. If current is drawing & energy pulses are normal then no power is theft. If current is drawing & energy pulses are not coming then it indicates power theft. So microcontroller trip the o/p using relay. This information is sent to substation using wireless communication. Line faults may be caused due to over current or earth fault. If there happens to be a connection between two phase lines then over current fault occurs. Earth fault occurs due to the earthing of phase line through cross arm or any other way.

2. Proposed System

In the proposed method a relay circuit is used to trip the supply on sensing the abnormal condition. The relay is interfaced with the microcontroller and is connected after the meter continuing power supply. In PC's or laptops any infiltration to the material , unauthorized person can be reported to the owner of the material ,monitoring working of devices. This could be done by using proper settings and the use of this kind of system.



3. Components of modern system

The whole system architecture is based on integrating wireless network with existing electrical grid. The architecture consists of four modules namely, Controlling Station (CS), Wireless Transformer Sensor Node (WTSN), Transmission Line Sensor Node (TLSN), Wireless Consumer Sensor Node (WCSN). WCSN is a consumer power metering device that measures the power consumed by the consumer and send the data periodically to the WTSN. Each feeder of the transformer has a WTSN which monitors power through each line and collects data from WCSN aggregate it and send to the CS. TLSN is another module associated with Distribution line, mounted in each distribution line posts. In Addition with following component:

1. Current transformer
2. Microcontroller
3. LCD (Liquid crystal display)

4. Objectives

This system would provide a simple way to detect a wireless power theft without any human interface. It would indicate exact zone and distribution line on which unauthorized taping is done in real time. It would be time saving if distribution company personnel take reading by this wireless technique. It would provide a digital record in case of any judicial dispute. To maximize the profit margin of power utility company.

5. Methods of Theft

Methods used to commit theft fall into the Following broad categories:

- Connection of supply without a meter Connection of supply without a meter following disconnection for non payment or by “squatters” occupying empty properties.
- By passing the meter with a cable It coveted into the supply side of the metering installation (i.e. the meter terminals, the metering cables, the cut-out or the service cable).
- Interfering with the meter to slow or stop The disc, including use of electrical devices which stop the meter or cause it to reverse (so-called 'black boxes).
- Interfering with the timing control Equipment used for two rate tariffs to obtain a cheaper rate.

6. Mathematical Expressions

Losses incurred in electrical power systems have two components:

- Technical losses and

- Non-technical losses (Commercial losses)

Technical Losses – Technical losses will always arise as the physics of electricity transport means that, no power system can be perfect in its delivery of energy to the end customer.

Non-Technical Losses (Commercial Losses) – Losses incurred by equipment breakdown are quite rare. These include losses from equipment struck by lightning, equipment damaged by time and neglect. Most power companies do not allow equipment to breakdown in such a way and virtually all companies maintain some form of maintenance policies.

Other probable causes of commercial losses are:
- Non-payment of bills by customers.
- Errors in technical losses computation.
- Errors in accounting and record keeping that distort technical information.

Whenever input power is passing from supplier to the receiver, at that time if the total amount of power is not received by the receiver then there is possibility of theft of energy.
ΣPsent = ΣPconsumed + Loss ……..No Theft
ΣPsent ≠ ΣPconsumed + Loss ……..Theft Occur
Here, Psent = Power measured by pole side energy meter.
Pconsumed = Power measured by load side energy meter.

7. Implementation of system

We can detect power theft wirelessly. Illegal usage of electricity can be solved electronically without any human control, using Radio frequency (RF) Technology. Electric Power is transforming from transmitter to the receiver at that time if load is apply in between transmission of power and if difference is find between the transforming and receiving.

8. Advantages

- The proposed system provides the solution for some of the main problems faced by the existing Indian grid system, such as wastage of energy, power theft, manual billing system, and transmission line fault.
- This method will reduce the energy wastage and save a lot of energy for future use.
- We can detect the location from where the power is being stolen which was not possible before.
- Optimized use of energy.
- Real time theft monitoring.
- Currently used energy meters can be modified into this sensor, so no need to replace currently used energy meters.
- If the power is not stolen then the power is saving.

9. Effect of electricity threat in power system

Negative effects of electricity theft are severe and dangerous. Primarily, electricity theft affects the utility company and then its customers. In addition, electricity theft overloads the generation unit. In energy market, utility companies expect their money back from the customers for the electricity supplied, most of which is lost by them due to the NTL (Nontechnical losses).Electricity theft is a serious concern for utility companies as they are under threat of survival because of these incurring economic losses. It is evident that some utility companies in developing countries are losing about 10 to 30 percent of their total revenue, which shows that they could not invest on measures to reduce the electricity theft. These economic losses affect the Utility company's interest in development of the devices in view of improving the quality of supply or for electrification process.

10. Conclusion

Wireless ZIGBEE technique based system is much useful to detect the stealing of the electricity worldwide. To control the revenue losses the authorized officials needs to detect the theft of the electricity it means the theft of the bypassing is the most effective one over the whole world comparing to the other techniques used to steal the electricity i.e. the unauthorized consumption of the electricity. This system ensures the accurate billing of the electricity consumed hence to provide the best way to prevent from the electricity theft. The supply cut by this system can only be reset by the authorized person of the electricity authorized department therefore this system helps to reduce the manual error and provide an excellent way to detect the bypassing of the energy meter. The low cost and the low power consumed by the ZIGBEE module makes it to deploy in most of the wireless system because it uses a cell-phone to send the information and due to the low power consumption it provides long battery life to use this cell-phone. Hence further more and more improvements can be done to make the system much more efficient and excellent also for the long haul. Further can be used to detect the theft of the gas, fuel and oil simply by changing the measurement meter and excellently the theft can be detected at tables by the authorized agencies.

11. References

[1] From open access paper – http://ijsrd.com/Article.php?manuscript=IJSRDV5I30669
[2] From open access paper – https://www.sciencedirect.com/science/article/pii/S2352467719301882
[3] From open access paper – https://www.ijert.org/smart-power-monitoring-system-and-theft-detector
[4] From open access paper – https://ieeexplore.ieee.org/document/7991288
[5] From open access paper – https://ieeexplore.ieee.org/document/7298003
[6] From – https://pdfs.semanticscholar.org/2f58/380e20bf40c74280a6096fa3273e80fec877.pdf
[7] Chapter 10 of Monitoring System (http://www.cl.cam.ac.uk/~rja14/Papers/SE-10.pdf)
[8] Kuperman, Benjamin A. "A Categorization of Computer Security Monitoring Systems and the Impact on the Design of Audit Sources". Ph.D. Thesis, Purdue University, August, 2004.
[9] James P. Anderson Co. "Computer Security Threat Monitoring and Surveillance".
[10] Smart Grid, www.wikipedia.org "Electrical Power Supply System for India."
[11] IEEE Std. 802.15.4. Part 15.4: Wireless medium access control (MAC) and physical layer (PHY) specifications for low-rate wireless personal area networks (WPANs), 2003.
[12] IEEE Std. 802.11. Wireless LAN medium access control (MAC) and physical layer (PHY) specification: higher speed physical layer (PHY) extension in the 2.4GHz Band, 1999.

Energy Generation from Speed Breaker

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Abstract – To construct an unit which is capable of producing electricity using kinetic energy of vehicles passing over the speed breakers with the help of rack and pinion arrangement beneath it. As the requirement of electricity is increasing day by day, we have to develop an alternate conventional source of energy to tackle the problem of energy crisis and reduce the dependency on power plants to some extent. Also such a unit do not require large space and cost of the unit is also comparative low. It can be employed in speed breakers where traffic intensity is very high such as Malls, Toll plazas, Multiplexes, etc. The energy obtained from it can be stored in batteries and then transmitted. This unit requires vehicle to pass over the speed breaker. As the vehicle passes over it, it presses the rack and as result it moves downward which in turn rotates the pinion. Pinion is attached to dynamo which in turn generates electricity which is stored in battery.

Index Terms – Energy Generation, rack and pinion, energy crisis, busy roads

1. INTRODUCTION

In our project our attempts is to show how energy can be tapped and used at a commonly used road speed breakers. The number of vehicles passing over the speed breaker in roads is increasing day by day. A large amount of energy is wasted at the speed breakers through the dissipation of heat and also through friction, every time a vehicle passes over it. There is great possibility of tapping this energy and generating power by making the speed-breaker as a power generation unit. The generated power can be used for the lamps, near the speed breakers. The present work an attempt has been made to fabricate a ramp, which can utilize the kinetic energy of vehicles in power generation. This type of ramp is best suited for the places where the speed breaker is a necessity. The places like Toll bridges or on vehicle parking stands are best for its utilization. The work also discusses the shortcomings of existing methods and the ways it is countered by this method. Increasing demand of energy adds to the need of identifying non-conventional resources of energy. In my paper, I will discuss about power generation from speed breaker and the possible mechanism required for it.

2. THEORY AND CONCEPTS

EASE OF USE

The unit used for power generation from speed breaker is small as compared to other power generation units like wind mill, power plants, and other such units. Thus, it provides ease in employing the unit wherever it is required and also it is economical. Once it has been employed it only then after requires periodic maintenance which further adds ease of use of it.

WORKING PRINCIPLE

The working of power generation unit is based on actuation of rack and pinion arrangement by vehicle passing over the speed breaker. When the vehicle passes over the speed breaker rack moves downward which transmits the motion to pinion. By using pulley assembly motion is transmitted from main shaft to another shaft on which flywheel is mounted. The purpose of flywheel is to maintain constant speed and reduce the shock. The flywheel is then connected to dynamo where the actual electrical power is generated. Thus, basic principle is to convert Mechanical power to Electrical Energy.

COMPONENTS REQUIRED

RACK AND PINION GEARS: The selection of rack and pinion used in the power generation unit is based on load applied on the unit and material of rack and pinion.

BEARINGS:

Fig.1. Bearing

Bearing is used to mount the shaft used in power generation unit. The purpose of it is to reduce the friction between shaft and the casing. Thus, they reduce the friction and transmit the motion effectively.

FLY WHEEL: The primary function of flywheel is to act as an energy accumulator. It reduces the fluctuations in speed. It absorbs the energy when demand is less and releases the same when it is required.

Fig.2. Flywheel

SHAFTS: It is a rotating element, which is used to transmit power from one place to another place. It supports the rotating elements like gears and flywheels. It must have high torsion rigidity and lateral rigidity.

DYNAMO: It is a device, which converts mechanical energy into electrical energy. The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through "Faraday's Law of Electromagnetic Induction". A dynamo machine consists of a stationary structure, called stator, which provides a constant magnetic field, and a set of rotating winding called the armature which turns within that field.

Fig.3. Dynamo

BELT & PULLEY ASSEMBLY: Belt and pulley assembly are used to transmit motion from pinion shaft to flywheel shaft.

FREEWHEEL: Freewheel is used to transmit power in one direction only. During downward motion pinion is rotated in one direction but during upward motion of rack, pinion is freed due to which no motion is transmitted.

Fig.4. Freewheel

S.No.	Component	Quantity
1	Rack & Pinion	1
2	Pulley	2
3	Belt	2
4	Dynamo	1
5	Shaft	2
6	Bearing	4
7	Metal Sheet	2
8	Coil Spring	1
9	Free Wheel	1

Table.1. Bill of Material

PROBLEM STATEMENT

Owing to the rising demand of electricity due to rapid industrialization, need for electricity is increasing very rapidly. Power plants though are efficient but could not meet the growing requirement. Thus, there is a need of system which can support the power plant to meet the requirement. So, we develop a model which is non-conventional source of energy which can be used supplementary with power plant and can reduce the dependency on power plant to some extent.

OBJECTIVE

Our objective behind this project is to make a unit which can solve the problem of energy crisis to some extent and also can support the power plants by reducing the dependency on power plant. Our aim is to reduce energy crisis by using speed breaker unit to develop power in economical and convenient way.

This can be achieve by employing the unit along with speed breakers where there is a heavy traffic like toll plazas, malls, Multiplexes, Traffic signals, Parking areas, etc.

ADVANTAGES

- Ease in employing because of simple assembly.
- Cost of the unit is comparatively low.
- Maintenances is comparatively low.
- It is non-conventional source of energy.
- Simple model can generate electricity up to 60 watt.
- Model size is small, thus it requires less floor area which is of great importance in metro cities where less area is available and power plant cannot be set up.
- It does not require huge components and transmission lines as it is required in power plants and other such power producing units.
- It doesn't require external source of energy for its operation as it is required in power plants.
- Effective & convenient way of power generation because of its simplicity and easy maintenance.

DISADVANTAGES

- Capacity of unit is low as compare to power plant unit.
- Load carrying capacity i.e. capacity of vehicle passing over it is low.
- Though it requires periodic maintenance, still its maintenance is difficult.
- Its maintenance requires seizing of road causing many traffic problems.
- Effectiveness of the unit depends upon the intensity of the traffic. Thus, it cannot promise fix power supply.
- Stress carrying capacity of the unit is also low.

1. FUTURE SCOPE

As the demand for electricity is increasing day by day due to rapid industrialization & urbanization, load on power plant is increasing rapidly. Due to this, power plant could not meet the requirement of industries as well as domestic requirement. This has resulted in load shedding problem in many areas. There is insufficient supply of electricity.

To meet this requirement, research are going on to find alternative methods of power generation by using different sources like solar, wind, thermal, tidal, kinetic energy, Geothermal energy etc.

Thus, our project aims at future requirement of electricity by using non-conventional source of energy i.e. kinetic energy of vehicles passing over the speed breaker.

2. LITERATURE REVIEW

The energy crisis is a bottleneck in the supply of energy resources to an economy. The studies to sort out the energy crisis led to the idea of generating power using speed breaker. First to make use were South African people, their electrical crisis has made them to implement this method to light up small villages of the highway. The idea of basic physics to convert the kinetic energy into electrical energy that goes waste when the vehicle runs over the speed-break was used. Since then a lot has been done in this field. The idea caught our working team and we have decided to

develop such a project that will produce more power and store it for use at night time as it proves to be a boon to the economy of the country.

Recently several attempts and models have been suggested and tested for harnessing kinetic energy of vehicles via a speed bump. Mechanisms which include springs by A.K. Singh, Deepak S., Madhawendra K. and V. Pandit Rack and Pinion by Aswathaman. V, Priyadharshini.M, Shakun Srivastava , AnkitAsthana in "Produce electricity by the use of speed Breakers" and by Ankit Gupta, Kuldeep Chaudhary & B.N Agrawal in "An Experimental study of Generation of Electricity using Speed Breaker". Slider crank by Noor Fatima and Jiyaul Mustafa in "Production of electricity by the method of road power generation" have been suggested for producing electricity. Electrodynamics based models by Ankita and MeenuBala in "Power generation from speed breaker" have also been suggested, but are not only expensive to fabricate but involve complicated calculations and can't be used a large scale very easily. Totaram uses a platform plate which is kept inclined on a raised base level to allow vehicles to pass over the raised surface. This system will not work till a vehicle passes on roadway.

3. CONCLUSION

Since, today electricity crisis is increasing rapidly so we have to develop a non conventional power producing unit which can overcome the crisis of electrical energy, which can use the waste energy i.e. kinetic energy of vehicle due to the friction between tyre of vehicles and road. This will support the power generating method and will tackle the problem of energy crisis to some extent.

Various studies conclude how this energy gets wasted if we do not employ such a unit near a speed breaker. Also how effective this can be converted to electricity. Works of various personalities concludes the importance of such a non conventional source of electricity keeping future requirement in mind.

REFERENCE

[1] Mukherjee.DChakrabarti.S, 2005, Fundamentals of renewable energy systems, New Age

[2] International Limited publishers, New Delhi.

[3] Sharma P.C., "Non-conventional power plants", 2005

[4] P.M. Anderson and A.A. Fouad, 'Power System Control and Stability', Galgotia Publications.

[5] 'Every speed breaker is now a source of power', IPCBEE vol.1, 2011.

[6] Noor Fatima,Jiyaul Mustafa, 'Production of electricity by the method of road power generation', International Journal of Advances in Electrical and Electronics Engineering, Sep-14.

Passive Islanding Technique for Distributed Grid: A Review on Smart Grid Technologies and Optimization Techniques

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Keywords:
Passive islanding technique,
Smart grid,
Distributed generators,
Islanding detection.

Abstract

This review paper focuses on the research done on the passive islanding technique for smart grid. Energy crisis and environmental issues have encouraged the adoption of islanding techniques as an alternative energy option which when uses renewable sources as standby distributed generators becomes environmental friendly. The use of distributed generators including solar photovoltaic, wind, small hydro, biomass etc. are playing an important role in the restructured power system. However, there are certain issues related to grid integration of DGs including islanding detection. Hence, it becomes an important area of research nowadays for power engineers. There are various islanding detection techniques including passive, active, hybrid, utility, communication based etc. This paper reviews the framework, benefits and challenges of the passive islanding technology. This paper also summarises the main optimization techniques to achieve different passive islanding technique objectives while satisfying multiple constraints.

Contents

I. INTRODUCTION

Today's power system operates through the synchronized operation of large power plants producing bulk power and transmitting it through long transmission lines at high voltage before reducing the voltage for consumption in customer premises. This is mainly due to the cost of production of bulk quantities of electricity being much lower than the cost of producing many small quantities of electricity. But the advancement in technologies like fuel cells, gas turbines, micro-hydro, wind turbines and photovoltaic, new innovation in power electronics, electricity market deregulation, customer's demand for better power quality and reliability, and above all environment concern are forcing the power industry for yet another shift and this time back to the distributed and dispersed generation.

Over the past decade, with the increase in worldwide consumption of electricity and increasing loads, the traditional model of the grid is no longer sufficient to fulfil the load demands. This gives rise to the concept of distributed generation . Distributed generators or DGs are secondary power sources, renewable in nature that may be connected to the grid at various places and essentially fulfil the load demand that is required. DGs are usually wind powered turbines, hydroelectric dams or array of PV cells acting as a solar power producing unit [1].

Islanding takes place when part of the network becomes disconnected from the grid, and is powered by one or more DGs only [2]. Although this is not an entirely undesirable mode of operation, it does pose problems. Current standards dictate that the voltage and frequency of the system must be maintained within specific operational limits, and this is not guaranteed in an island [3], [4]. Line worker safety is also put at risk since lines that are thought to be disconnected are still energized by the DGs. Thus, it is important that DGs are equipped with an islanding detection method.

From perspective of the electric utility, the concerns with the islanded network are [5]–[7]:

- loss of control over voltage and frequency;
- safety issues since a portion of the system remains energized while it is not expected to be;
- excessive transient stresses upon reconnection to the grid;
- uncoordinated protection;
- in-adequate grounding.

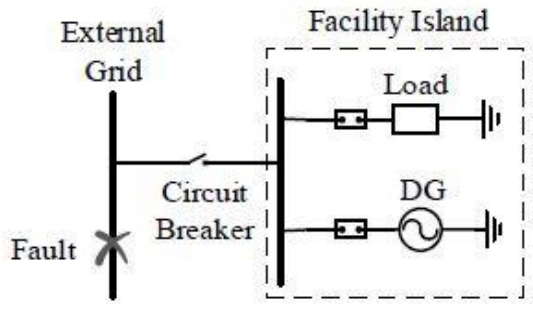

Fig. 1. An island defined in IEEE 1547.4-2011 [8].

Islanding detection has been studied for synchronous-based and inverter-based DGs. Some methods can be applied to both while others are specific to one type. Islanding detection methods are broadly divided into three categories: active, passive, and hybrid communication-based methods.

Passive islanding methods infer the occurrence of islanding based only on measurements made at the point of common coupling (PCC). This is an advantage diluted only by the fact that it is often not easy to rely only on system parameters for accurate detection; many other non islanding disturbances will produce transients that mimic very closely those of an islanding event. For this reason, thresholds on measured parameters (for example, frequency or voltage) are set wide, but this results in large non detection zones (NDZ). Passive techniques that have been developed include over/under voltage and over/under frequency (OVP/UVP and OFP/UFP) [9], system input impedance [10], rate of change of frequency with time [11], rate of change of power with time [12], rate of change of frequency with power [13], and total harmonic distortion measures [14].

Active detection methods, on the other hand, deliberately introduce perturbations into the system. Under normal operation, these perturbations will not cause a significant deviation in the operating conditions due to the presence of the utility. In the absence of the utility, however, small deviations will be amplified by positive feedback and, hence, it becomes easy to detect the islanding condition. The advantage of these methods over passive detection methods is their relatively small NDZ. The main disadvantage, however, is power–quality problems due to the instabilities introduced on the system. Some active islanding detection methods that have been proposed include active frequency drift [15], slip-mode frequency shift [16], automatic phase shift [17], and Sandia frequency and voltage shift methods [18]. Improved voltage and frequency shift methods have been proposed in [19]–[21] to enhance islanding detection and to eliminate the NDZ.

Hybrid -based techniques have been recently proposed in the literature for islanding detection. An intelligent-based approach was developed in [22], where islanding and non islanding conditions were simulated for a system with synchronous-based DG. Eleven parameters, including the frequency and voltage deviations, the total harmonic distortion, and others were measured. These parameters were then fed to a classifier along with their respective classes, and a classification tree was obtained. The proposed classification tree was capable of detecting non islanding conditions with a 0%

misclassification rate, but did not perform as well for islanding events (16% misclassification rate).

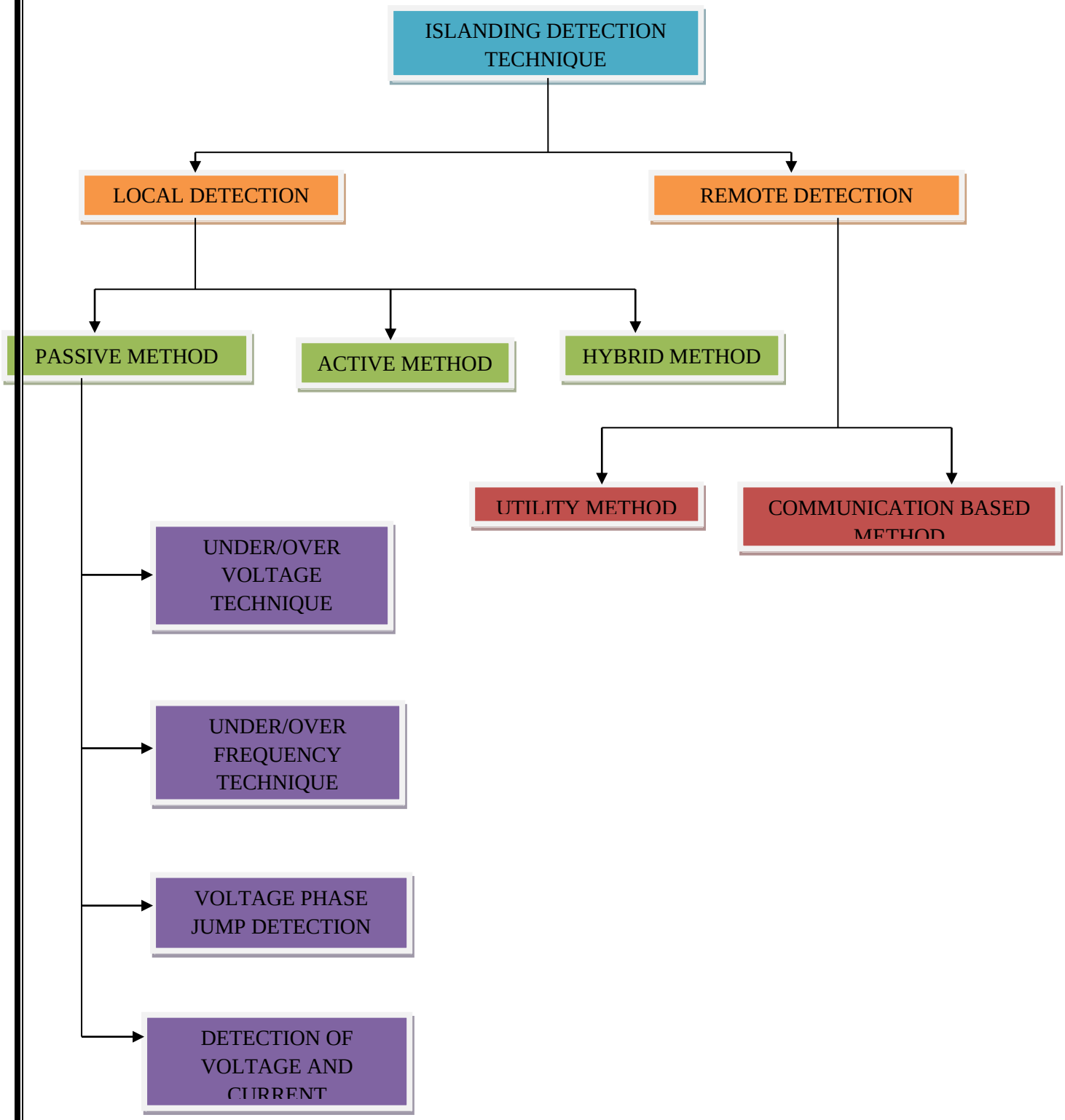

Fig. 2. Classification of islanding detection techniques

II. ISLANDING DETECTION TECHNIQUES

Mainly the islanding detection techniques are classified into two groups, one is Local detection technique and other is remote detection technique [23]. Local detection method can further be classified into Active and Passive methods.

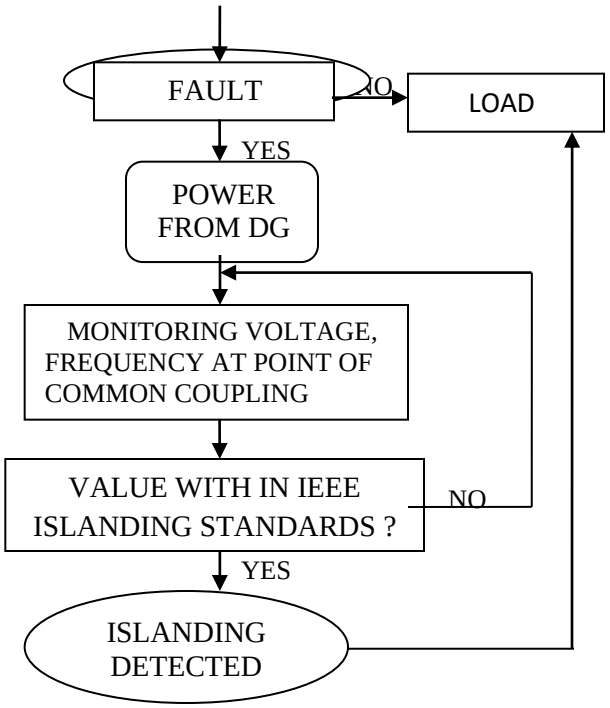

Fig 3. Flow chart of smart grid islanding

A. Passive Islanding Detection Technique

Passive islanding detection technique (PIDT) is based on measurement of system parameters. In this method, parameters like voltage, frequency, harmonic distortion, power, and sequence impedance which affect the output of grid connected converters are measured and accordingly analysis of islanding is carried out [24]. The detection of healthier or faulty power system is determined at pee. At pee, if the parameters are within well defined range, then no islanding will occur otherwise it will be an islanding condition.

A. Active Islanding Detection Technique

Active islanding detection technique (AIDT) involves feedback control technique which measures the variation in parameters such as voltage or frequency at the point of common coupling. In AIDT, small disturbance is introduced at PCC and then system corresponding parameters are identified and detect the islanding condition [25].

B. Hybrid Islanding Detection Technique

Hybrid islanding detection technique is the combination of both passive and active islanding detection methods. In this method first the parameters are measured at pee and compared at comparator which checks its limits and if it is within threshold limits then injects the disturbance signal to clarify more preciously the islanding condition. Since it is a combination of both methods, it has high effectiveness as compared to other methods [26,27,]. Menon and Nehrir [28] detected the new hybrid techniques for synchronously rotating DGs so that the DG can be isolated from the system safely as the grid is not injecting power.

Before going in the detailed procedure of passive islanding detection method, one needs to understand the basic requirement of the passive islanding. The two main attributes of passive islanding is Non detection zone (NDZ) and Quality factor [29].

Non Detection Zone (NDZ) is an area where DG fails to detect island after occurrence of islanding. The area under this region represents the power mismatch between distributed generator power (P_{DG}) and load power (P_d which creates deviation

in real as well as reactive power that is ΔP and ΔQ respectively. The NDZ can be used as a performance evaluator for islanding technique.

$P_L - P_{DG} = \Delta P$

$Q_L - Q_{DG} = \Delta Q$

The second attribute is power quality factor (Q_f). Q_f may be defined by the equation below. For better islanding, the quality factor should be low.

Q_f = 2π x ratio of maximum energy stored to energy dissipated per cycle at a given frequency

Quality factor is directly proportional to the non detection zone. The more the quality factor, the more will be non detection zone and the less effective will be the islanding detection. Hence for enhancement of islanding methods, the system should have low power quality factor and shrivel non detection zone area.

III. IEEE STANDARDS FOR ISLANDING

The IEEE std. 1547, IEEE standard for Interconnecting Distributed Resources with Electrical Power Systems[I], provides the technical specifications and requirements for interconnecting distributed resources with power system so that operation, testing, maintenance and safety considerations can be imparted on the complex power system. As per the standard, the requirements should be met at the point of common coupling (PCC), irrespective of the devices location.

TABLE I. DEFAULT RESPONSE TO ABNORNAL VOLTAGES

Voltage Range (% of base voltage)	***Clearing Time (in sec)***	***Clearing Time: adjustable up to and including (in sec)***
V < 45	0.16	0.16
45 ≤ V < 60	1	11
60 ≤ V < 88	2	21
110 < V < 120	1	31
V ≥ 120	0.16	0.16

TABLE II. DEFAULT RESPONSE TO ABNORNAL FREQUENCIES

		Default Settings	***Range of adjustability***	
Function	Frequency (in Hz)	Clearing time (in sec)	Frequency (in Hz)	Clearing time (in sec) adjustable up to and including
UF1	< 57	0.16	56-60	10
UF2	< 59.5	2	56-60	300
OF1	> 60.5	2	60-64	300
OF2	> 62	0.11'6	60-64	10

As per IEEE standard 1547, the voltage threshold should be within the limits of 85% to 110% of the normal value and frequency should be ± 1 %. In India, the rated frequency is 50 Hz and according to current grid code by central electricity regulatory commission, the frequency can ranges from 49.8 Hz to 50.1 Hz. If the voltage or frequency varies from their respective limits, then the system is said to be islanded.

IV. PASSIVE ISLANDING DETECTION TECHNIQUE

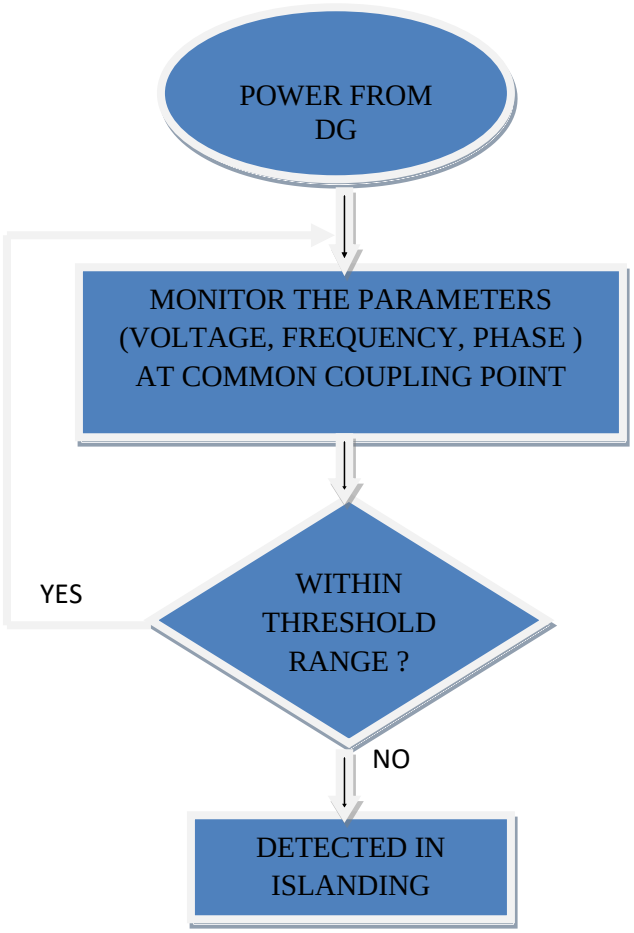

Fig.4 Passive islanding detection technique

Passive islanding detection technique is simply based on the variation in the parameters of the system. If the system deviates from the defined range then islanding detection takes place. If the system consists of RLC load, then the system is defined by the following equations:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

$$R = \frac{V^2}{P}$$

$$L = \frac{V^2}{2\pi f P Q_f}$$

$$C = \frac{P Q_f}{2\pi f V^2}$$

Based on the parameters of the system, the methods of Passive islanding detection are classified as below:

a) Under/Over Voltage Protection (UVP/OVP)
b) Under/Over Frequency Protection (UFP/OFP)
c) Voltage Phase Jump Detection Method
d) Other Passive Islanding Detection Methods[1]

A. Under/Over Voltage Protection (UVP/OVP)

This method senses the abnormal voltage change at the PCC. The voltage at pee say V PCC must lie within the stipulated range that is V min :S V pee :S V max> where V min and V max are respectively the minimum and maximum threshold values. If the system deviates from these two end values, then island detected, and DG has to be disconnected. The active power at load of the system will be:

$$P_L = \frac{V_{pcc}^2}{R}$$

After isolation of grid from the load, the active power of the load will try to be same as that of DG [30] and thus the voltage of the grid changes to

$$V' = k \times V \quad \text{where,} \quad k = \sqrt{\frac{P_{DG}}{P_L}}$$

B. *Under/Over Frequency Protection (UFP/OFP)*

UFP/OFP is the detection of frequency variations from its defined range at the point of common coupling. The frequency of the system is related with the power defined by swing equations below. [31]

where,

ω is synchronous speed

δ is internal angle

P_m and P_e are the mechanical and electrical power respectively

H is inertia constant and f_r is rated frequency

The lower and upper limits of the frequency are set according to IEEE standard which is the variation of ±l% of the rated frequency. For 50 Hz supply, the frequency ranges from 49.5 Hz ≤ f ≤ 51.5 Hz. The frequency changes at PCC when the grid is disconnected from the system the reactive power of the load try to change till Q_L becomes equal to Q_{DG} as shown in equation below

$$Q_L = V^2_{pcc}\left(\frac{1}{\omega L} - \omega C\right)$$

The frequency, ω controls the reactive power at pee and is responsible to balance the reactive power between the load and the distributed generator.

C. Voltage Phase-Jump Detection

In this method of passive islanding detection, the phase difference between voltage and current of the DG is continuously observed to detect the sudden variation in the phase [34]. If this sudden phase jump observed in the system then it shows that the islanding has been detected. The difference in phase can be called as phase error. The non detection zone of voltage phase jump method depends on the power factor and the power factor depends on the type of load connected with the system. So it is necessary that the DG should be operating at unity power factor. This is the reason the voltage phase jump method is also called power factor detection or transient phase detection.

D. Advantages

Passive islanding technique posses following advantages:

- Passive methods are simple and fast but they leave some non-detection zone which can be avoided by having a proper set point [32,33]

- Passive islanding methods infer the occurrence of islanding based only on measurements made at the point of common coupling (PCC)[1]

E. Disadvantages

The main disadvantages of passive islanding technique is:

- Comparatively large non detection zone(NDZ)
- The main disadvantage, however, is power–quality problems due to the instabilities introduced on the system.

F. Other Passive Islanding Detection Methods

There are many new techniques in the passive islanding technique which researcher has reported. Saleh in his paper [35] has detected the new passive anti-islanding technique for three phase distributed generators in which transient high frequency components are extracted from the d-q wavelet transform packets of three phase instant apparent power. Islanding based on total harmonic detection (THD) is also a renowned passive islanding detection technique. In this method third harmonic of voltage at pee is changed during the islanding situation. This difference in original and changed value leads to islanding. Another new method of passive islanding detection is proposed in [36] by Liserre in which detection is based on the state estimation method. Some algorithm of islanding is based on Kalman Filters in which the islanding is based on the difference in the third and fifth harmonics of the grid voltage.

V. INTENTIONAL FACILITY ISLAND

Utility operators and PV owners can create an intentional island, presented in Fig. 1 [37], under external fault conditions if the following conditions are met:

(a) There should be sufficient power to maintain a voltage and frequency of the preplanned island within an acceptable range, typically within ± 5 percent of the rated voltage and frequency [38].
(b) There should be protection devices able to communicate with protection devices outside of a preplanned island [39,40].
(c) Mutual agreement between utility operators and PV owners, including safety issues [41].

VI. CONCLUSION

Islanding detection is an important requirement for the modified power system scenario with increased perception of distribution sources. In this paper the passive techniques are used for islanding detection. The main purpose of the islanding detection is to continue the supply to load or providing an interruption free supply to the load. There are a many instruments or systems which required un-interrupted power supply. In such type of cases, islanding plays a significant role. Furthermore, it is easily integrates with the wind and solar power.

REFERENCES

[]] Dube , A .,Rizwan , M., & Jamil, M. (2015*). Passive islanding detection technique for multi-DG power system.* 2015 Annual IEEE India Conference (INDICON). doi:10.1109/indicon.2015.7443456.

[2] Najy, W. K. A., Zeineldin, H. H., Alaboudy, A. H. K., & Woon, W. L. (2011). *A Bayesian Passive Islanding Detection Method for Inverter-Based Distributed Generation Using ESPRIT.* IEEE Transactions on Power Delivery, 26(4), 2687–2696. doi:10.1109/tpwrd.2011.2159403

[3] IEEE Application Guide for IEEE Std 1547, IEEE Standard for Interconnecting Distributed Resources With Electric Power Systems, IEEE Std. 1547.2-2008, 2009.

[4] IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems, IEEE Std. 929-2000, 2000

[5] W. Bower and M. Ropp, "Evaluation of Islanding Detection Methods for Photovoltaic Utility-Interactive Power Systems," Int. Energy Agency, Tech. Rep. IEA PVPS T5-09, Mar. 2002.

[6] V. John, Z. Ye, and A. Kolwalkar, "Investigation of anti-islanding protection of power converter based distributed generators using frequency domain analysis," in *Proc. IEEE Power Eng. Soc. General Meeting*, vol. 4, Jul. 2003, pp. 2452–2458.

[7] R. A.Walling and N.W. Miller, “Distributed generation islanding-implications on power system dynamic performance,” in *Proc. IEEE Power Eng. Soc. Summer Meeting*, vol. 1, Jul. 2002, pp. 92–96

[8] *IEEE Guide for Design, Operation, and Integration of Distributed Resource Island Systems with Electric Power Systems,* IEEE Std 1547.4-2011.

[9] M. Ropp, M. Begovic, A. Rohatgi, G. Kern, S. Bonn, R. H. , and S. Gonzalez, “Determining the relative effectiveness of islanding detection methods using phase criteria and nondetection zones,” IEEE Trans. Energy Convers., vol. 15, no. 3, pp. 290–296, Sep. 2000.

[10] P. O’Kane and B. Fox, “Loss of mains detection for embedded
generation by system impedance monitoring,” in Proc. 6th Int. Conf. Develop. Power Syst. Protect., Mar. 1997, pp. 95–98.

[11] J. Vieira, W. Freitas, Z. Huang, W. Xu, and A. Morelato, “Formulas for predicting the dynamic performance of ROCOF relays for embedded generation applications,” Proc. Inst. Elect. Eng., Gen., Transm. Distrib., vol. 153, no. 4, pp. 399–406, 2006.

[12] M. Redfern, O. Usta, and G. Fielding, “Protection against loss of utility grid supply for a dispersed storage and generation unit,” IEEE Trans. Power Del., vol. 8, no. 3, pp. 948–954, Jul. 1993.

[13] F. S. Pai and S. J. Huang, “A detection algorithm for islanding-prevention of dispersed consumer-owned storage and generating units,” IEEE Power Eng. Rev., vol. 21, no. 12, p. 67, 2001.

[14] S.-I. Jang and K.-H. Kim, “An islanding detection method for distributed generations using voltage unbalance and total harmonic distortion of current,” IEEE Trans. Power Del., vol. 19, no. 2, pp. 745–752, Apr. 2004.

[15] X. Zhu, G. Shen, and D. Xu, “Evaluation of AFD islanding detection methods based on NDZs described in power mismatch space,” in Proc. IEEE Energy Convers. Congr. Expo., 2009, pp. 2733–2739.

[16] H. H. Zeineldin and M. M. A. Salama, “Impact of load frequency dependence on the NDZ and performance of the SFS islanding detection method,” IEEE Trans. Ind. Electron., vol. 58, no. 1, pp. 139–146, Jan. 2011.

[17] J. Yin, L. Chang, and C. Diduch, “A new adaptive logic phase-shift algorithm for anti-islanding protections in inverter-based DG systems,” in Proc. IEEE 36th Power Electron. Specialists Conf., 2005, pp. 2482–2486.

[18] L. Lopes and H. Sun, “Performance assessment of active frequency drifting islanding detection methods,” IEEE Trans. Energy Convers., vol. 21, no. 1, pp. 171–180, Mar. 2006.

[19] F. Liu, Y. Kang, Y. Zhang, S. Duan, and X. Lin, “Improved sms islanding detection method for grid-connected converters,” Inst. Eng. Technol. Renew. Power Gen., vol. 4, no. 1, pp. 36–42, 2010.

[20] S.-K. Kim, J.-H. Jeon, J.-B. Ahn, B. Lee, and S.-H. Kwon, “Frequencyshift acceleration control for anti-islanding of a distributed-generation inverter,” IEEE Trans. Ind. Electron., vol. 57, no. 2, pp. 494–504, Feb. 2010.

[21] S.-K. Kim, J.-H. Jeon, and H.-K. Choi, “Design of dq-based voltage positive feedback for anti-islanding of a dg inverter,” in Proc. Transm. Distrib. Conf. Expo.: Asia Pacific, 2009, pp. 1–4.

[22] K. El-Arroudi, G. Joos, I. Kamwa, and D. McGillis, “Intelligent-based approach to islanding detection in distributed generation,” IEEE Trans. Power Del., vol. 22, no. 2, pp. 828–835, Apr. 2007.

[23] Wei Yee Teoh, Chee Wei Tan, "An Overview of Islanding Detection Methods in Photovoltaic System," World Academy of Science, Engineering and Technology, vol. 5, pp. 533-541, 2011.

[24] Pukar Mahat, Chen Zhe, Birgitte Bak-Jensen, "Review of Islanding Detection Methods for Distributed Generation," Third International Conference on Electric Utility Deregulation and Restructuring and Power Technologies, pp. 2743-2748, 2008.

[25] R S Kunte, and G Wenzhong, "Comparison and review of islanding detection techniques for distributed energy resources", 40'h North American Power Symposium NAPS, pp. 1-8,2008.

[26] C Wen-Yeau, "A hybrid islanding detection method for distributed synchronous generators",International Power Electronics Conference (lPEC), pp. 1326-1330,2010.

[27] Y Jun, C Liuchen, and C Diduch, "A new hybrid anti-islandind algorithm in grid connected three phase inverter system",36,h IEEE conference in Power Electronics Specialists, pp. 1-7,2006.

[28] V Menon and M H Nehrir, "A hybrid islanding detection technique using voltage unbalance and frequency set point", IEEE Transation on Power System, vol. 22, no. I, pp. 442-448, 2007.

[29] Y Zhihong, "Evaluation of Anti-islanding Schemes Based on NonDetection Zone concept", IEEE Transaction on Power Electronics, vol. 19, no.5, pp. 1171-1176, September 2004.

[30] Tomas Skocil, Oriol Gomis-Bellmunt, Daniel Montesinos, Samuel Galceran and Joan Rull-Drum, "Passive and Active Methods of Islanding for PV sysems", 13'h Europian Conferene on Power Electronics and Application, EPE'09, pp. 1-10,2009.

[31] Klitsanee Prasartsuwan and Peerapol jirapong, "Analysis of Islanding Detection Methods for Grid-Connected Distriduted Generation in Prvincial Electricity authority Distribution Systems" 9'h International Conference on Electrical Engineering/Electronics, Computer, Telecommunications, and Information Technology (ECTI-CON), pp. 1- 4,2012.

[32] *IEEE Guide for Design, Operation, and Integration of Distributed Resource Island Systems with Electric Power Systems,* IEEE Std 1547.4-2011.

[33] *IEEE Application Guide for IEEE Std 1547(TM), IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems*, IEEE Standard 1547.2-2008.

[34] AS Aljankawey, W G Morsi and C P Diduch, "Passive Method-based Islanding Detection of Renewable-based Distributed Generation: The issues", IEEE Electrical Power and Energy Conference(EPEC), pp. 1-8, 2010.

[35] S A Saleh, A S Aljankawey, Ryan Meng, J Meng, C P Diduch, and L Chang, "Anti islanding Protection Based on Signatures Extracted from the Instantaneous Apparent Power", vol. 29, no. II, pp 5872-5891, November, 2014.

[36] M Liserre, "An Anti-Islanding Methods for Single-Phase Inverters Based on a Grid Voltage Sensorless Control", IEEE Transaction on Industrial Electronics, vol. 53 , issue 5, pp. 1418-1426, October, 2006.

THE PHONE

I am the phone,
Which every one does own...!
I connect many friends,
Also I come in different trends...!
I be with my owner in their home,
And follow them wherever they roam..!
When there is a fall in my charge,
They recharge me in-charge..!
For few I am ferocious,
But many think I am precious..!
Though there is a rise in my bill,
People who throw me away are nil..!
No one calls me boring,
Because they always remember me as loving..!

Rishab Sharma
EX IIIYear

Alumina

PARVEZ KHAN (Batch 2015)

IES IPS ACADEMY

(Electrical and Electronics Engineering Dept.)

Played Inter University all four year , represented RGPV [First year Sagar, Madhya pradesh , Second year Jaipur Rajasthan, Third year Rourkela, Orissa, Fourth year, bhopal Madhya Pradesh]

Manager of Hockey Madhya Bharat's sub junior team at 6th Hockey India Sub junior mens national championship 2016, held at Imphal, Manipur

2015-16 worked at K.tech Resourcing

In 2017, participated HOCKEY MADHYA BHARAT's Sub junior womens hockey team as a COACH - 7TH HOCKEY INDIA SUB JUNIOR WOMENS national championship held at RAMNATHPURAM, TAMIL NADU

Also played 7th HOCKEY INDIA SENIOR MENS CHAMPIONSHIP HELD at Lucknow, up representing HOCKEY MADHYA BHARAT'S senior mens team

He is now coach of D.H.A(District Hockey Association Neemuch) and also coach at hockey feeder center neemuch working under dsyw office (Khel Avam Yuva Kalyan Vibhag) also, a Physical Educator At Carmel Convent School Neemuch.

ADITYA NAGAR (Batch 2014)

Aditya's journey started in college similar to everyone in the first year of engineering in Electrical and Electronics Branch.

He was excited to learn and perform in this new phase of life. He started tinkering with robotics and electronics and used to pursue his hobby after college hours. During the time, when tech-fests were just-in thing, he started participating in many inter college events of Robotics and Automation. He won several events in his first and second year in IITs and NITs and brought recognition to the institution.

After scoring a fair share of accolades for himself, he started mentoring junior students and motivated them to take part in such events which further continued the spirit of participation.

In parallel, he started working on Unmanned Aerial Vehicles (UAVs) during his second year as a hobby and during the same year started to import, assemble, supply and maintain UAV systems to several organisations and Individuals in India and started his journey as an entrepreneur. His company's name is GALACTIC HOBBY SQUARE est. in 2012. He completed his engineering in the year 2014 and his company's turnover was 7 million at the time.

In 2018, he launched his second venture, Blacksof which deals in to providing design solutions to brands and in a span of 18 months his team has grown from 3 to 30. His journey was crucial and full of struggles during this time to become an entrepreneur. His plans are to take both the companies to great heights and we wish him abundance of success.

Few things he believes in

"**Language is the sharpest and deadliest assault weapon to win any war"**

"India is a follow up country, even a cow will not give milk without follow-up"

"Meet fools often than intellectuals, they teach you more"

With Best Regards

Aditya Nagar

Co-Founder & CEO

BLACKSOF

Phone : +91 96172 71343

POEMS

A Poem For Mom

You are the sunlight in my day,
You are the moon I see far away.
You are the tree I lean upon,
You are the one that makes troubles be gone.
You are the one who taught me life,
How not to fight, and what is right.
You are the words inside my song,
You are my love, my life, my mom.
You are the one who cares for me,
You are the eyes that help me see.
You are the one who knows me best,
When it's time to have fun and time to rest.
You are the one who has helped me to dream,
You hear my heart and you hear my screams.
Afraid of life but looking for love,
I'm blessed for God sent you from above.
You are my friend, my heart, and my soul.
You are the greatest friend I know.
You are the words inside my song,
You are my love, my life, my Mom

- by RITIKA JAIN

(EX III year)

आज भी

आज भी.....
कुछ कुछ धुंधली सी याद है...
दौड़ हो आज की या हो पहला कदम,

टीचर ...
तब साथ थी आप मेरे आज भी आप मेरे साथ है

वो घर के लिय मेरा रोना
वो बार बार माँ को पुकारना
ये देख आपका प्यार से टॉफ़ी देकर फुसलाना
आज भी.....
कुछ कुछ धुंधली सी याद है.....
तब साथ थी आप मेरे आज भी आप मेरे साथ है

वो मेरा डर के अकेले चुप चुप रहना
जिंदगी की पहली सीख वो दोस्ती की रीत
आपने ही तो हमारी बात करवाई थी
वो धीरे धीरे बात करने पर आपका डाटना
आज भी.....
कुछ कुछ धुंधली सी याद है....
तब साथ थी आप मेरे आज भी आप मेरे साथ है

क ख ग ....से आज की दुनिया में खड़ा होना
सफल हो परीक्षा में या हो अंको का रोना
जीत हो या हार...
आपकी डॉट हो या शाबाशी में छुपा प्यार
आज भी....
कुछ कुछ धुंधली सी याद है....
तब साथ थी आप मेरे आज भी आप मेरे साथ है

अब ये याद धुंधली नही होने देंगे
जीत के रुतबे में आपका साथ न खोने देंगे
आपके आशीर्वाद की फ़रियाद है,

टीचर ....

तब भी आप हमे याद थी....

आज भी आप हमे याद है....

तब भी साथ थी आप मेरे आज भी आप मेरे साथ है....

By Drishti Raj

(EX 4th year)

IES IPS ACADEMY

ऐ जिंदगी तेरा सबक

ऐ जिंदगी तेरा सबक क्या लाज़वाब है,
ज़मीर की खातिर, गमों का दौर भी जरूरी है।
इस भाग-दौड़ से क्या हाँसिल हुआ अब तक,
इसका हिसाब करने को, इक ठौर भी जरूरी है।
जिस राह पर चले थे मंजिल को ढूंढने,
'उसका मुकाम क्या है', यह गौर भी जरूरी है।
बस प्यार के सहारे जीने चले थे हम,
अब जाके समझ आया, 'कुछ और' भी जरूरी है।

By KUNJAL PARATE

(EX 4th year)

IES IPS ACADEMY

चिंतन दर्शन जीवन सर्जन

चिंतन दर्शन जीवन सर्जन
रूह नज़र पर छाई अम्मा
सारे घर का शोर शराबा
सूनापन तनहाई अम्मा

उसने खुद को खोकर मुझमें
एक नया आकार लिया है,
धरती अंबर आग हवा जल
जैसी ही सच्चाई अम्मा
सारे रिश्ते- जेठ दुपहरी
गर्म हवा आतिश अंगारे
झरना दरिया झील समंदर
भीनी-सी पुरवाई अम्मा
घर में झीने रिश्ते मैंने
लाखों बार उधड़ते देखे
चुपके चुपके कर देती थी
जाने कब तुरपाई अम्मा
बाबू जी गुज़रे, आपस में-
सब चीज़ें तक़सीम हुई तब-
मैं घर में सबसे छोटा था
मेरे हिस्से आई अम्मा

By Sahjma Hussain

(EX III year)

IES IPS ACADEMY