Department of Electrical Engineering

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I Hod EE hereby declare that the particulars given above are true to the best of my knowledge and belief.

Er. Sushil Kakkar

HOD Electrical Engineering

Dated 15 June 2019

Vision of Department

-It is aimed to provide the finest environment for teaching, learning, research, innovation and character building so as to mould youth of today into world class technocrats of tomorrow who would Endeavour to increase the quality of life for mankind.

Mission of Department

M1 -- To evolve as an innovative & globally competent Electrical Engineering department that contributes to the socio - economic growth of region by utilizing the advancement in Electrical Engineering by providing conducive learning and interactive environment to students and faculty.

M2 -- To impart the quality education and enhance skills for developing globally competent Electrical Engineers.

M3 -- To provide state –of –the –art facilities and opportunities to create, interpret, apply and disseminate knowledge.

M4 -- To develop students and faculty to cope up with modern technology with research attitude to meet industry standards effective industry interface.

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DIRECTOR'S MESSAGE

Dr. Tanuja Srivastava
Director, BGIET

It is matter of immense pleasure for me that the Electronics & Communication Department Engineering of BGIET, Sangrur committed to excellence through technology is going to launch Annual Magazine "Electrika-19". This will provide a common platform to Students, Faculty Members and Eminent Engineers to share their ideas and technological assets to translate innovations from basic knowledge to quality products for better returns and competitions at the global level. Besides it will encourage the young students for recognition of their new innovations and technologies at the Institute Level. I congratulate those students and Faculty Members who have contributed and urge other to avail the opportunity next time.

With Best Wishes
Dr. TanujaSrivastva

HOD's MESSAGE

Dear students,

It is a matter of great pride & happiness that the third edition of the Electronics magazine "Electrika-19" is in your hands. You are reading your own creative & technical output. It is an endeavor by the college to provide you with an opportunity to look beyond the mundane routine. I take this opportunity to thank the many people who have made this launch of the magazine possible. First and foremost are the authors of various articles and editorials whose works over the years have made the magazine a reality and I also thank the Publications Board and publications staff of this magazine who have extended themselves to make this magazine possible. Finally, I want to thank all of our readers both those who have been with us for many years and those who have only recently discovered the magazine. It always a pleasure when a reader comes up to me at Semi-Term or writes to me about how much they enjoy the magazine and how useful they have found one of the articles.

Keep it up. Wishing you good luck.

Dr. Sushil Kakkar

HOD Electrical Engineering

INDUCTION PROGRAM

BGIET hosted the Induction Program, a unique fusion of specially engineered academic and non-academic activities, to nurture, mould and fortify engineering entrants for the days to come. Total 500 entrants from Civil, Computer, Electronics, Electrical, Mechanical, and Production branches of engineering participated enthusiastically and obtained benefit from the program. They were provided the cursory view of various dimensions of engineering and the career opportunities in the field and the systems and procedures of the BGIET to ease their transition to the core engineering program. They were enlightened about the prospective scope of the arena that they had opted for their success. The BGIET

committee for Induction programme invited experts from different leading industries and esteemed institutions to interact with the entrants and brief the learners with their expertise in various fields. Along with expert talks, the students were exposed to village visit and industrial visits for catering their social as well as technical side of learning.
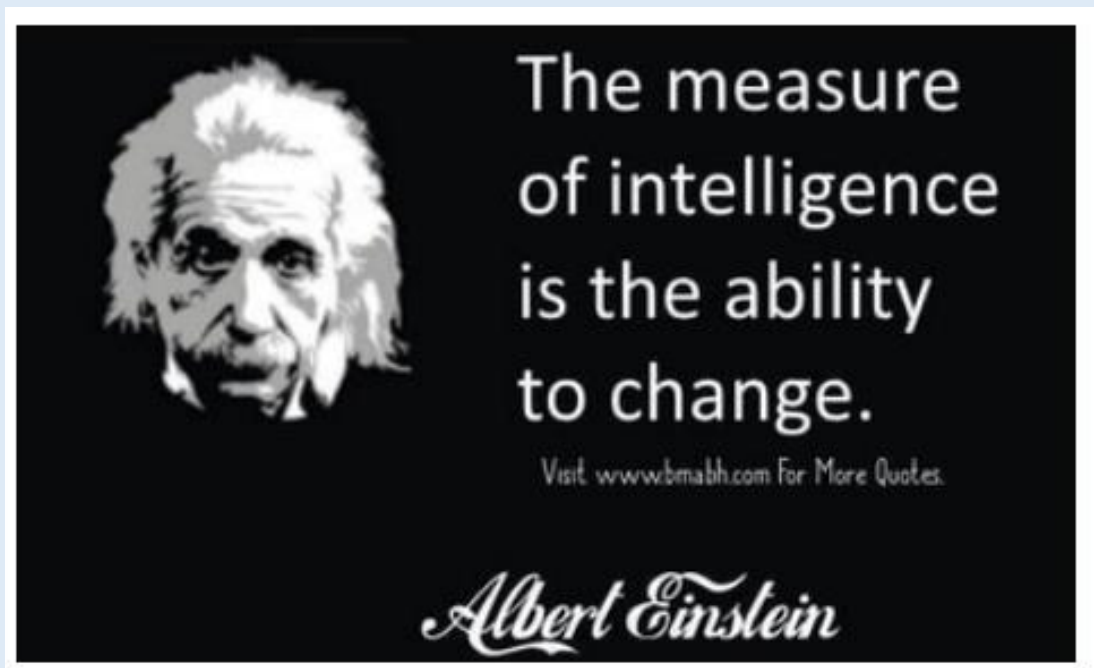
TEACHERS DAY CELEBRATION

It was an auspicious day for students, to celebrate Teachers' Day ."Teacher" is defined as a Motivational candle of student's life. By this view BGIET, organized teacher's day on 5th Sept 2019 at BGIET campus. On this occasion students conducted lectures on various subjects like computer organization, OOPS, DEL and soft Skills in the respective classes. Teachers' day celebration began at 2.00 pm, as the students presented gifts, as a token of respect. HOD EE and Respected faculty members inaugurated the program by lightening the lamp.

ENGINEERS DAY

Dr.Tanuja Srivastwa Director of BGIET also graced the event by visiting the department and shared her views and motivated students in building their career. Hence forth Dr.Tanuja Srivastva guided students and gave the overview of Dr. Sarvapalli Radhakrishnan, also gave the importance of teacher in every student's life. One of the students described the meaning of teacher by giving a nice poem on "Pandhari" on this special occasion. Students continued the activity by organizing a drawing competition for all faculty members by the theme of the imagination of individuals within 5 minutes of span of time. Later on students made faculty members to explain the drawing of the individuals by this students made faculties to remember their school days.Student of EE shared his views about importance of teacher in life and the way

how they mould the student's life in building once carrier. Also Students performed Skit, Dance and Song on this special occasion which created a good environment for students and faculty members. The event concluded by the musical performance by students of different branches. Hence, program was successful and entertaining, in disciplined manner. ENGINEERS DAY Department of Electrical Engineering clebrated Engineer's Day. Technical quiz was organized by Society of Electrical Engineers deserving students was awarded by certificates. The is celebrated every year, the country celebrates September 15 as National Engineer's Day to appreciate the contributions of Mokshagundam Visvesvaraya. The Bharat Ratna awardee, Visvesvaraya was born on September 15, 1861 in a village called Muddenahalli in Karnataka. He studied Bachelor of Arts (BA) from the University of Madras and pursued civil engineering at the College of Science in Pune. Department pays gratitude to his contributions.

The measure
of intelligence
is the ability
to change.

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Albert Einstein

CULTURAL PARTICIPATION

Institute has organized an cultural festival in which students of electrical engineering participated in different cultural events Student such as Bhangra and Gidha . The awesome environment was presented in a tradational manner The cultural festival plays an important role in a student's transition to a college life. Orientation programmes are aimed at familiarizing the students to an unknown campus environment, its faculties and infrastructure. It helps them to find their way in the institute for the next years and also encourages them to get better adjusted to the institute environment. BGIET organized an 'Orientation Program' for newly admitted students every year, as it plays a significant role in introducing the institutions activities. During orientation, students were informed about the various cells and their activities, infrastructural facilities, extracurricular activities, learning resources, and the college culture. They were made to understand their role and responsibilities during college life. Therefore, in order to give the most accurate view of an institution, there must be both an academic and social component to the orientation program. Students were also informed about the rules & regulations, campus safety and the academic calendar. BGIET motivates the students and wished them Good Luck for their bright and glorious future.

SEMINAR

Seminar on "Advance Sensors and Smart Controllers" was organized by SEE society of Electrical Engineering department on 5th Oct. 2018. The keynote speaker of the day was Er. Gurmeet Sharma, Engineer, EESPL, Chandigarh. He has shared his experience on Wireless Sensors those are utilized by the industries in present scenario. A total number of 72 students of electrical engineering department were participated in the workshop.

ARTICLES

Wireless Body Area Network

Wireless Body Area Network replaces the wires used in the old system with the wireless link between the sensor nodes that placed on and in the human body (Karulf, 2008) (Braem, 2011). Different types of sensor nodes are used in the human body some nodes are placed on the human body that are also called wearable devices and some nodes are placed inside the human body to sense the vital sign (Braem, 2011) (Otto, C., Milenkovic, A., Sanders, C., &Jovanov, 2006).As we use the different types of sensor nodes ,WBAN also deal with different types of data traffics. These data traffic is divided into following classifications. **Emergency Data**: Sometimes we defined a threshold level, when the sensed signal exceeds the threshold level, it is acknowledged. This type of data is called emergency data. To deal with these types of data generally single mode communication is used to decrease the delay **Normal Data**: Normal Data represent the normal conditions of the patients. For this type of data multimode communication is used. **On Demand**: This type of data is generated by the doctors or consultant to know about the important information for the treatment purpose. Generalized system architecture of a WBAN can be divided in three fundamental levels or tiers of communication as described in (Chen, Gonzalez, Vasilakos, Cao, & Leung, 2011) (Ullah et al., 2012) (Akyildiz, Su, Sankarasubramaniam, &Cayirci, 2002). Intra-WBAN communication, Inter- WBAN communication, Beyond WBAN communication.
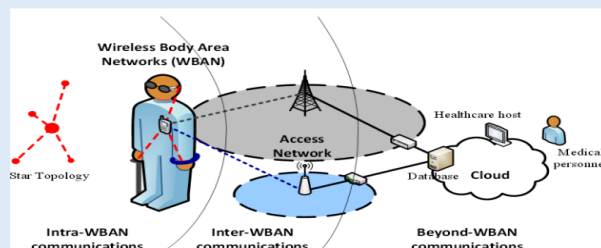
Intra-WBAN Communication It is also known as Tier-1 Communication. Tier-1 of WBAN has a number of sensor nodes which are capable of sensing, processing, sampling and communicating the vital information of the human body. There is various type of sensor nodes to detect the various information like ECG sensor are used to monitor the heartbeat of the human, EEG sensor nodes are used to monitor the brain activity, EMG sensor node is used to monitor the muscle activity and breathing sensor is used to monitor the respiration. These sensor nodes receive the initial command aInnd responds to the quires which are received from the PS (Personal Server) **Inter-WBAN Communication**The second tier is the PS (Personal Server) that provide interfaces sensor nodes of WBAN, provide graphical user interface and

also communicates with the services at the top tier personal computer. The PS implemented on a cell phone, PDA (Personal digital assistant) or home personal computer. AP is the important part of the network that brides the gap between the personal server and the user. Infrastructure based architecture is used mostly in WBAN. These types of network allow for active utilization even in the restricted area. This AP perform as a database server which provide security and central management. Another type of architecture is Ad-hoc based (Chen et al., 2011). **Beyond-WBAN Communication** It is used in metropolitan area. PDA as a gateway provide the bridge between the tier2 and tier 1. In medical environment database is the most important component. It provides application-specific communication. The database contains the information of the user and the medical history of the patient. Doctors are informed by the internet or through the SMS (short message service). It also stores the information for the further treatment (Chen et al., 2011) (Ullah et al. 2012) (Akyildiz et al., 2002) (Bilstrup, 2008) .

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Protocols in Wireless Sensor Network

The Wireless Sensor Network is taken as real time embedded mechanism in an account, installed in a specific domain to sense several sorts of conditional parameters like humidity, pressure, temperature, gas and so forth. Recently, with the research community a lot of interest has been generated by the large applications of WSN such as forest fire detection, transport monitoring, habitant monitoring, surveillances and so forth [1]. Generally, the wireless sensor networks are heavily installed in dangerous locations in which battery recharge or replacement is not possible and human monitoring mechanism is very hazardous.

There are several general problems like restricted computing capacity, radio connectivity, power constraints, open environment makes the sensor nodes defective various times. After the setup of the network, the data is sensed by the nodes and the power of the battery goes exponentially. If the node finds an event then this information is transmitted to all other nodes including sink node. Every so often, the base station receives the same information as achieved with the neighbor nodes by which the network will become non effective.

The data aggregation and sensor fusion have been accentuated in the previous research in order to evade this data redundancy and to prepare the system to be more effective to the energy [2]. In order to make the network energy efficient, several routing protocols among various distinctive ideas have been projected by various authors in the previous research [3]. One of the effective concepts is the cluster based routing protocol in which the sensor nodes are alienated into numerous groups and every group is known as a cluster. There is a cluster head in every cluster that is chosen as a group leader. Data aggregation is attained at the cluster head. The information is transmitted to the sink node from the cluster head. The basic model for clustering based WSN is shown in Figure 1.
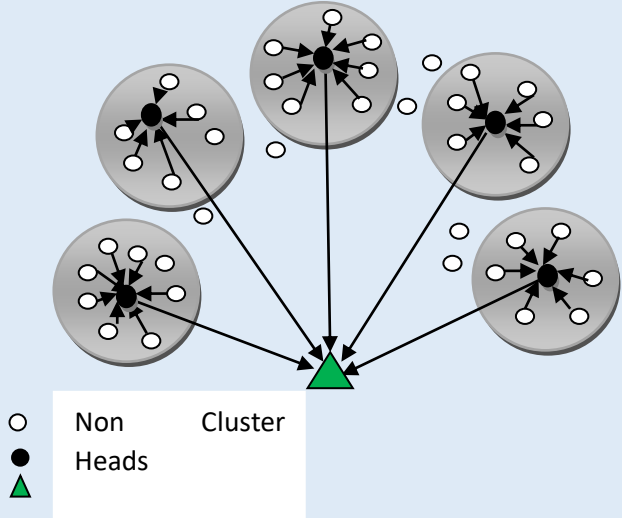
General System Model for clustered WSN [1]

WSN Features of WSN

Sensor auto-configuration: Auto-configuration is very important feature as the sensors are generally installed in a random way or by a human [4]. However, every node can self-configure as well as collaborate with other nodes in the network. A transmitting/receiving unit is inbuilt in the sensors by which the data can be exchanged in the nodes. **Scalability:** In order to attain a common objective, the sensor network should be scalable as it is capable to accept multiple sensors to work together. **Fault**

tolerance: If there should arise an occurrence of a sensor malfunction or if new sensors are added to the system, the conventional sensor nodes in the WSN should work normally with no interference. This clarifies the way that a WSN does not embrace a fixed yet rather dynamic topology. **Communication ability:** For WSN, multi-hop communication is the minimum energy intensive and remains the most sought-after type of communication which needs a minimum energy utilization. **Transmission scope:** For the deployment of wireless sensor network, it is a significant criterion. It is restricted via the radiation capability of the antennas utilized and the signal strength included. **Storage and processing power:** As the sensors have minimum storage as well as the minimum processing power they cannot operate on huge operations.

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Surface Morphology

Anodization is the process of deposition of an oxide layer on the metal substrate, this is a conventional technique of coloring titanium and provide it various colorful shades, due to anodization interference in reflecting lights occurs which creates aesthetic change. The recognizable benefit of titanium anodizing is the surface luster and surface finishing appears just as uniform as electropolishing, titanium anodizing gives the surface of variants in color. This can be used for marketing titanium parts as aesthetically unique and decorative. A.K. Sharma [1] investigated the effect of anodizing parameters such as voltage, the concentration of electrolyte used and temperature of electrolyte during anodization and optical properties on different operating conditions were analyzed when anodized titanium was used for space applications.

He found that the colors of the oxide layers were changed with the change in the applied voltage and the slope between applied current density and time of anodization was rapidlyfall and after a particular value, it becomes a straight line approximately. Manjaiah et al. [2] investigated biocompatibility of titanium because of its ability to osseointegrate. He observed that an increase in applied voltage enhanced oxide deposition; this incremental change in the thickness of the oxide layer also increases resistance to flowage of the current through the circuit. At a particular value of the appliedvoltage, the thickness of the oxide layer reached to a critical value where the resistance has increased to an extent where only a few oxides of hydrogen ions were available to support continue oxide deposition. Anodization using H_2SO_4 as an electrolyte is an efficient way to develop nanoporous surface along with high surface roughness leads the apatite formation which is beneficial to osseointegration.

Trail et al. [3] suggested that the electrolytic conductivity increases with an increase in the temperature of the electrolyte, to perform this titanium grade-2 specimen was used. Anodization was performed at a temperature (25^oC and 40^oC) and anodizing time (5 and 10 minutes). During anodization, it was ascertained that at a higher temperature more current density and the less potential difference was obtained as compared to lower temperature. In the opticalanalysis, he observed that the oxide layer formed on the surface of the titanium alloy has a more homogeneous porous structure and oxide thickness at 25^oC as compared to anodization performed at 40^oC. Increase in time of anodizationresulted in an incremental change in crystalline anatase.

Williamson et al. [4] explained those nano-sized pores formed during anodization are suitable for bone cell attachment and reproduction of cells when anodized titanium is used in orthopedic and dental implantation. In his investigation anodization of titanium was performed at various concentration levels of H_2SO_4 as electrolyte and morphological analysis at varied voltage stages was observed. Indira et al. [5] reviewed the effect of anodization parameters including ph value of electrolyte, anodic voltage, the temperature of electrolyte and current density on the formation of TNT (Titanium Nano Tubes) because TNT formation plays a very important role in osseointegration when anodized titanium is used as a biocompatible material. Scanning electron microscopy and atomic force microscopy analysis showed that anodization of titanium was performed using sulphuric acid as electrolyte then within specific range of voltage very fine nanopores with a very small change in surface roughness was observed showing uniformity in structure. [6,7]. As well as the potential difference across terminal ends was increased, more oxygen ions diffusion would take place but suddenly the rate of diffusion was dropped due to a thick barrier of oxide layer was depleted on the metal surface which affects small current density at the surface where more diffusion of oxygen ions was commenced. [9] N. Masahashi et al. investigated that nano-sized pores appeared in oxide layer at minimum electrolyte concentration (0.1M) and surface area of pore increased with further increase in sulfuric acid concentration, incremental change in the electrolyte

concentration(H_2SO_4) prevailed that phase of titanium oxide changed from anatase to rutile.P. Mingthong et al. [10] explained in his surface analysis that if other parameters of anodization were kept constant microstructure of TiO_2 was depend only on the concentration of the electrolyte, the surface study was performed by SEM and X-Ray powder Diffractometer to identify crystalline phase formation and revealed that anodized surface is more aqua phobic than the non-anodized surface. To obtain uniformity in pore formation and to enhance surface finish from metallic part such surface treatments were performed during anodization especially pickling and compact anodization but these type of treatments resulting in a reduction in endurance limit [11].

In summary previous research showed that electrical variables like as current density, applied voltage, electrolyte concentration, the temperature of the electrolyte and duration for which current is passed through the circuit affect a lot to TiO_2 formation. Due to this, pore density, pore size i.e. diameter and depth of pore as well as surface morphology also changed, thus it is concluded from literature that during application of anodized titanium such as medical implantation, space applications or in any other purposes, these effective parameters should be critically analyzed and should be monitored during anodization.

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Transformer

A clear understanding of how transformers work is necessary in order to wire them properly in an electrical system. Understanding input and output current and grounding are particularly troublesome. A dual-voltage transformer can be ruined when power is applied, if the connections are made improperly.

An important property of electricity is that a magnetic field is produced around a wire in which electrical current is flowing, Figure 14-3. The more current that flows, the stronger is the magnetic field. An even stronger magnetic field can be produced by winding the wire into a coil. Now the magnetic fields of adjacent wires add together to form one strong magnetic field. The electrical current flowing in a transformer is alternating current. The current flows first in one direction, stops, then reverses and flows in the other direc- tion. The magnetic field around the winding is constantly in motion. Figure 14-4 shows the magnetic field during one cycle. Notice that the north and south poles of the magnetic field reverse when the flow of current reverses. Another property of electricity is important to the operation of a transformer. When a magnetic field moves across a wire, a voltage is induced into the wire. If the wire forms a complete circuit, current will flow in the wire. If a second coil of wire is placed in a moving magnetic field, then a voltage will be induced in this second coil, Figure 14-6. This phenomenon is called *mutual induction.* Alternating current in one winding produces a moving magnetic field that induces a voltage in a second winding. Electrical energy is converted into' magnetic field and then converted back into electrical energy in a second winding. The trick is to do this with little or no loss of energy. The magnetic field loses strength quickly in air therefore, a special steel core is used. The core is com posed of thin sheets of a silicon-steel alloy. The magnetic field is concentrated in the core, and energy losses are reduced to a minimum. Figure 14-6 shows the windings separated. Most transformers have one winding placed directly over the other to further reduce the loss of energy, as shown in Figure 14-7.

Circuit Breaker

What is a circuit breaker? Definitions vary depending upon where you read the definition. *NEMA* Definition: A circuit breaker is defined in NEMA standards as a device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overcurrent without injury to itself when properly applied within its rating. *ANSI* Definition: A circuit breaker is defined in ANSI standards as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions. Also capable of making and carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of a short circuit. The premise is the same for both definitions and both are accurate, but the wording is quite different. The same is true with the many types of circuit breakers. Their

general purpose is the same, but there are also a number of significant differences. The circuit breaker might be applied as an individual item in its own enclosure, or be utilized in conjunction with a wide variety of other equipment in a common enclosure such as *load centers, panel boards* and *switchboards.*

No matter where or how it is applied, you will soon realize that the circuit breaker plays a pivotal role in the movement, distribution and use of electric power.

Operating Mechanism Circuit breakers require some type of operating mechanism to open and close the contacts. This operating mechanism can be mechanical or a combination of mechanical and power. Depending upon the type of circuit breaker being considered, the operating mechanism could be called upon to:

- Open and close the contacts manually
- Open and close the contacts on demand
- Open the contacts automatically

Let's consider a basic *three-phase* circuit breaker. It is designed such that all three sets of contacts open or close simultaneously. This requires that all the contacts be linked together in some manner. This part of the mechanism might be connected mechanically to a common handle. The handle, when operated, puts the mechanism into motion and opens or closes the circuit breaker by opening or closing the contacts. In reality, mechanisms are not quite as simple as just described. Circuit breakers, by virtue of their size and/or some standards requirement, need additional assistance to set the mechanism in motion to open or close the contacts. This additional assistance takes the form of springs. Springs play a big role in the precise functioning of circuit breaker mechanisms. Springs are stretched or compressed to provide the energy necessary to assist with the proper opening or closing of the contacts.

Photovoltaic Generator

The direct conversion of light to electric energy is possible through the use of photovoltaic generator (PVG). Unfortunately, the energy transform process is characterized by poor efficiency. This is caused because of primarily to the physical structure limits of the solar cells that found the PVG source. In addition to the observed poor efficiency, the resultant electric energy got from the PVG might be completely lost if there is no adequate electric load connected across the terminals of the PVG.However, the electric energy can be used by PVG mostly; only possible when proper matching between the PVG and the electric load is measured.

Photovoltaic (PV) cell is defined as when solar energy collected by photovoltaic effect, and it is considered as the most suitable renewable resource because of the abundance, sustainability and ubiquity also counted as a strong alternative to avoid reliance on fossil fuel [1].From field experience, the solar photovoltaic (SPV) system (Series parallel combination of PV cells/arrays use to provide required terminal voltage and current ratings) show low output power then on name plate rating [2].

The maximum power point tracking (MPPT) used to remove the maximum power from solar photovoltaic

(SPV) system which tracks the maximum power from array input varying with the ratio

between current and voltage. One of the key reason produced for low output power from solar photovoltaic (SPV) system is the mismatch between the arrays or cells. [3][4] To reach the maximum point of power output for SPV, many algorithms have been developed. Several researches are also going on for the further development the MPPT algorithms. [5-7]

The objective of this paper is to explore the model of different MPPT algorithms for SPV subsystems which simulate by using of MATLAB/SIMULINK software and to present GSAPSO based approach to get MPPT. Perturb and observe method has been observed and MPPT using GSAPSO is compared in this paper

1.1.1 PV System

System design of PV module or PV System is the combination of solar cells arranged in parallel, series or both is considered as solar PV module. The solar cell is the basic part of a PV module. A PV array is used to convert the light from the sun into DC current and voltage. To increase the terminal voltage of DC converter, it is connected to the PV array and provides the means to implement an MPPT technique by controlling its switching duty cycle. A single phase inverter is then connected to perform the power conversion of the array output power into AC power suitable for injection into the grid. The phase and magnitude of the inverter output voltage are shaped by pulse width modulation control. To decrease the harmonics in the output current a harmonics filter is added after the inverter is the result from the power conversion process. An interfacing transformer, to set up the inverter output (AC voltage) with the grid voltage level is connected after the filter. Protection relays and circuit breakers are used to isolate the PV system is used to isolate the PV system when faults occur to prevent damage to the equipment if their ratings are exceeded [2].

Riddles

1. I have holes in my top and bottom, my left and right, and in the middle. But I still hold water. What am I?

2. I am weightless, but you can see me. Put me in a bucket, and I'll make it lighter. What am I?

3. I'm light as a feather, yet the strongest man can't hold me for much more than a minute. What am I?

4. I'm the part of the bird that's not in the sky. I can swim in the ocean and yet remain dry. What am I?

5. Throw it off the highest building, and I'll not break. But put me in the ocean, and I will. What am I?

6. I run over fields and woods all day. Under the bed at night I sit not alone. My tongue hangs out, up and to the rear, waiting to be filled in the morning. What am I?

7. A certain crime is punishable if attempted but not punishable if committed. What is it? - Suicide

8. The man who invented it doesn't want it. The man who bought it doesn't need it. The man who needs it doesn't know it. What is it?

9. You use a knife to slice my head and weep beside me when I am dead. What am I?

10. You throw away the outside and cook the inside. Then you eat the outside and throw away the inside. What did you eat?

SOLUTION:

1. Sponge 2.A hole 3. Breath 4. Shadow 5. Waves 6. Shoe 7. Suicide 8. Coffin 9. Onion 10. Chicken E

- Deepak gupta
EE-6th sem

Gems of Era

Archimedes (c. 287 BC c. 212 BC)
Archimedes was a great mathematician, physicist, engineer, inventor, and astronomer of his age. But generally, he is considered to be the greatest mathematician of antiquity and one of the greatest of all time.

Andreas Vesalius (1514-1564

Andreas Vesalius was an anatomist, physician, and also an author of one of the most influential books on human anatomy. He is considering as the ―founder of modern human anatomy‖.His important innovations were to perform postmortem dissections.

Technical Jokes

1) A retired electronic technician came into the clinic and said, "Doctor, I have a serious memory problem." The doctor asked, **"When did it start?"** The technician replied, **"When did what start?"**

2) An Engineer working in the film factory came running in the office and yelled, "Doctor, doctor!! - my colleague just swallowed a roll of film!!" The doctor calmly replied, **"Let's just wait and see what develops."**

3) When I told my doctor I broke my leg in two places while carrying a big Monitor, he told me to stop going to those places.

4) I told my repair friend I had a ringing in my ears due to the heavy explosion caused by a big capacitor. His advice: **"Don't answer it."**

GOLDEN PHRASES

Money glitters, beauty sparkles, and intelligence shines.   - *Hitler*

When there is a conflict between heart & brain let the heart be followed.   - *Swami Vivekananda*

"There is a time to let things happen and a time to make things happen."   - *Hugh Prather*

"Sometimes you win and sometimes you learn."   - *Kiyosak*

"One day in retrospect the years of struggle will strike you as the most beautiful."

- Sigmund Freud

"Success often comes to those who have the aptitude to see way down the road."

- Laing Burns, Jr.

The secret of life is not enjoyment, but education through experience Without continual growth and progress, such words as improvement, achievement, and success have no meaning.

- Benjamin Franklin

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