MINCHU
Newsletter
Department of Electrical & Electronics Engineering

Volume 2 Issue 1 11-2017

Vision and Mission of the Institute

Vision

- To be one of the premier Institutes of Engineering and Management education in the country.

Mission

- To provide Engineering and Management education that meets the needs of human resources in the country.
- To develop leadership qualities, team spirit and concern for environment in students.

Objectives

- To achieve educational goals as stated in the vision through the mission statements which depicts the distinctive characteristics of the Institution.
- To make teaching-learning process an enjoyable pursuit for the students and teachers.

Vision and Mission of the Department

Vision

- To be a premier department for education in Electrical and Electronics Engineering in the state of Karnataka, moulding students into professional Engineers.

Mission

- To provide teaching/ learning facilities in Electrical and Electronics engineering better than prescribed by University for easy adaptation to industry and higher learning.
- Provide environment for self-learning to meet the challenges of changing technology and Inculcate team spirit and leadership qualities to succeed in professional career.
- Empathize with the societal needs and environmental concerns in Electrical Engineering practices.

"MINCHU" from the Department of Electrical & Electronics Engineering is dedicated to "Smt. Lalitha", the first woman Electrical Engineer in India, who completed her qualifying examination for Bachelor of Engineering degree in Electrical Engineering at College of Engineering, Guindy (CEG), Madras in 1943. She was invited to the First International Conference of Women Engineers and scientists (ICWES) in New York in 1964.

Contents

Vidyaya Amrutham Ashnuthe

B. N. M. Institute of Technology

(Approved by AICTE, Affiliated to VTU, ISO 9001:2008 certified and NAAC grade A accredited Institution)
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EDITOR'S DESK

Dear Readers,

Welcome to the Volume 2, Issue 1 of our newsletter "MINCHU".

We are glad to bring out the next edition of our department newsletter "MINCHU", which includes Articles, Dedication, Student's and staff's Achievements & Department activities.

The inculcation of passion for creative thinking and writing amongst the students is one of the major part in the overall personality development of a student. Our student authors have put across some amazing pieces of writing displaying their creative thinking and writing skills. We do hope that the newsletter encourages many more students to use this platform to express their creativity.

We have tried to capture the last six months achievements and activities. We are thankful to all the blooming writers who have responded to our call and penned their ideas for the newsletter.

We are happy to receive excellent reviews from our readers for our previous Newsletters. We are thankful to our readers and hope that we continue to bring Quality & Informative articles.

We sincerely hope that the edition gives you an excitement and interesting journey of reading.

BNMIT has been accredited with 'A' grade by the National Assessment and Accreditation Council.

About EEE Department

The Department of Electrical & Electronics Engineering started in the Year 2002 with an intake of 60 students. The department offers UG program in Electrical & Electronics Engineering and is currently headed by Dr. R.V. Parimala. The department has well equipped laboratories and Research & Development centre. It has excellent staff members, many of whom have secured University ranks in their post graduate degree from Institutions of International fame. They regularly participate in workshops and present technical papers in International / National Conferences to upgrade themselves. The faculty members of the department hold various positions in University body such as Paper setters, Examiners of UG/PG and PhD Programs. The department has various Professional Society Memberships and an in-house association to provide platform for developments in the field of Electrical & Electronics Engineering. Five faculty members are pursuing PhD program under VTU. All the faculty members are members of ISTE. The faculties of the department publish research papers regularly in peer reviewed Journals and National & International Conferences. The staff members have delivered several Invited lectures.

The students have consistently good performances in the University examinations. The department has fifteen university Ranks to its credits. The students have excelled in technical paper presentations, sports, yoga and cultural activities.

The department conducts workshops & conferences regularly which are well attended.

The Director of our Esteemed Institution Prof. T.J. RamaMurthy had a memorable get together with the BNMIT Alumni at Sunnyvale, USA on 29th September 2017.

Happy Times

BNMIT Alumni Get together with Director Prof. T.J. Rama Murthy in Sunny Vale, USA on 29th Sept 2017

"Happy to share with all students and staff about my visit to USA and attending BNMIT Alumni get together in Sunnyvale on 29th September 2017. The get together was a platform to bring back the alumni to the almamater for encouragement and mentoring the budding engineers of our Institution. In the get together it was proposed to initiate a BNMIT alumni chapter in the Bay area which is well received by the management. BNMIT alumni will be an integral part of our endeavours."

Prof. T.J. Rama Murthy
Director of BNMIT

SOLAR PANELS ON SPACECRAFT

The success of a space mission is always linked to the performance of technology. To have a technology ready when a satellite flies, research and development must start years in advance. Solar cells are a good example of space technology. Every life form or machine needs energy to function. Nothing can change its state or position without energy. Just like many other machines, satellites also need electrical power to function. When one is out in space, however, the problem is where to get that power from.

The Sun is a very powerful, clean and convenient source of power, particularly for satellites. The only thing needed is a means to convert the energy contained in the Sun's radiation – mainly light and ultraviolet rays – into electrical power. The most efficient way to achieve this today is by using panels composed of semiconductor photovoltaic cells. 'Solar panels', as they are usually called, are now quite a common sight here on Earth, but they were first used in space in 1958 to power the 'Vanguard' satellite.

Hubble Space Telescope silicon cell

In real photovoltaic cells, such as the Hubble Space Telescope silicon solar cell shown here, the basic materials, the doping and the shape of the junction are chosen in such a way as to increase their capability of transforming the light energy into electrical energy. Each cell is capable of producing a small amount of current at a relatively low voltage, more or less like a common pen-light battery. Many of them have to be combined in series to produce the amount of electric power needed for a satellite to function and to meet the power demands of its on-board instruments.

Why do we require solar panels on spacecraft?

Solar panels on spacecraft supply power for two main uses:

Power to run the sensors, active heating, Cooling and Telemetry.

Power for spacecraft propulsion – electric propulsion, sometimes called solar-electric propulsion.

How do solar cells work?

Each one of the thousands photovoltaic cells to be found in a solar panel is made of a semiconductor material, mostly silicon, capable of converting the light arriving from the Sun into an electrical current. The NASA-ESA Hubble Space Telescope used silicon solar cells. These cells have an operating efficiency of about 14%.

Why are solar arrays so large?

Despite the strength of the Sun, the solar arrays needed by an average-sized satellite are quite large, due to the rather low efficiency of the individual solar cells.

This is why most pictures of classical satellites show a pair of long wings extending from their sides, which are the 'solar panels'. More modern solar cells based on semiconductor materials like gallium-arsenide/arsenium are now available. Their efficiency is nearly double to those of silicon cells. These new types of cells will allow smaller solar arrays to be used on future space missions.

What happens when the Sun is hidden?

Solar power generation is very convenient in space, especially because there are no clouds and the Sun never sets. Or does it?

Satellites orbiting the Earth pass through a shadow region on the opposite side of the Earth from the Sun. During these 'eclipses', the solar panels cannot produce electrical energy and the satellite would not only be unable to operate, it might also freeze to incredibly low temperatures (eventually around –270°C) if a backup power source were not available. Electrical energy therefore has to be stored on board the spacecraft when in sunlight for consumption during these eclipses. There are essentially two ways of storing electrical energy that are used on satellites, both of which rely on reversible chemical reactions. One is based on cells very similar to those found in portable phones and other equipment with rechargeable batteries. The other uses so-called 'fuel cells', a type of electrical accumulator now being used experimentally in cars and buses.

Solar panels on the International Space Station

Solar powered Juno mission.

Some of the Spacecrafts that have used solar power

Juno, Magellan, Mars Global Surveyor, and Mars Observer used solar power as does the Earth-orbiting, Hubble Space Telescope. The Rosetta space probe, launched 2 March 2004, used its 64 square metres of solar panels. The Juno mission, launched in 2011, is the first mission to Jupiter to use solar panels instead of the traditional RTGs that are used by previous outer solar system missions, making it the furthest spacecraft to use solar panels to date. It has 72 square metres of panels.

Future uses

For future missions, it is desirable to reduce solar array mass, and to increase the power generated per unit area. This will reduce overall spacecraft mass, and may make the operation of solar-powered spacecraft feasible at larger distances from the sun. Solar array mass could be reduced with thin-film photovoltaic cells, flexible blanket substrates, and composite support structures. Solar array efficiency could be improved by using new photovoltaic cell materials and solar concentrators that intensify the incident sunlight. Photovoltaic concentrator solar arrays for primary spacecraft power are devices which intensify the sunlight on the photovoltaics. This design uses a flat lens, called a Fresnel lens, which takes a large area of sunlight and concentrates it onto a smaller spot. The same principle is used to start fires with a magnifying glass on a sunny day.

Solar concentrators put one of these lenses over every solar cell. This focuses light from the large concentrator area down to the smaller cell area. This allows the quantity of expensive solar cells to be reduced by the amount of concentration. Concentrators work best when there is a single source of light and the concentrator can be pointed right at it. This is ideal in space, where the Sun is a single light source. Solar cells are the most expensive part of solar arrays, and arrays are often a very expensive part of the spacecraft. This technology may allow costs to be cut significantly due to the utilization of less material.

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SCIENCE OF SUPER CONDUCTORS

A superconductor is a material that can conduct electricity or transport electrons from one atom to another with no resistance. This means no heat, sound or any other form of energy would be released from the material when it has reached "critical temperature" (T_c), or the temperature at which the material becomes superconductive. Unfortunately, most materials must be in an extremely low energy state (very cold) in order to become superconductive.

The discovery of superconductivity was started in early 1900s. It was discovered by H. Kamerlingh-Onnes in Holland as a result of his investigations leading to the liquefaction of Helium gas. In Onnes's time superconductors were simple metals like mercury, lead, bismuth etc. These elements become superconductors only at the very low temperatures of liquid helium. During the 75 years that followed, great strides were made in the understanding of how superconductors worked. Over the time, various alloys were found that were superconductors at somewhat higher temperatures. Unfortunately, none of these alloy superconductors worked at temperatures much more than 23kelvin. Thus, liquid helium remained the only convenient refrigerant that could be employed with these superconductors.

Then in 1986, researchers at an IBM laboratory in Switzerland, discovered that ceramics form a class of materials called Perovskites, were superconductors at a temperature of about 35Kelvin. This event sparked great excitement in the world of physics, and earned the Swiss scientists a Nobel prize in 1987. As a result of this breakthrough, scientists began to examine the various Perovskite materials very carefully. In February of 1987, a Perovskite ceramic material was found that was a superconductor at 90kelvin. This was very significant because now it became possible to use liquid nitrogen as the refrigerant. Since these materials super conduct at a significantly higher temperature, they are called High Temperature Superconductors. Superconductors come in two different categories: type I and type II.

Type I Superconductors

A type I superconductor consists of basic conductive elements that are used in everything from electrical wiring to computer microchips. At present, type I superconductors have Transistion Temperature (T_cs) between 0.000325 °K and 7.8 °K at standard pressure. Some type I superconductors require incredible amounts of pressure in order to reach the superconductive state. One such material is sulphur which, requires a pressure of 9.3 million atmospheres (9.4 x 1011 N/m2) and a temperature of 17 °K to reach superconductivity. Some other examples of type I superconductors include Mercury - 4.15 °K, Lead - 7.2 °K, Aluminium - 1.175 °K and Zinc - 0.85 °K.

Type II Superconductors

A type II superconductor is composed of metallic compounds such as copper or lead. They reach a superconductive state at much higher temperatures when compared to type I superconductors. The cause of this dramatic increase in temperature is not fully understood. The highest T_c reached at standard pressure, to date, is 135 °K or -138 °C by a compound (HgBa2Ca2Cu3O8) that falls into a group of superconductors known as cuprite perovskites. This group of superconductors generally has a ratio of 2 copper atoms to 3 oxygen atoms, and is considered to be a ceramic. Type II superconductors can also be penetrated by a magnetic field whereas a type I cannot.

Super conductors in Power Systems

Superconducting cable is most applicable solution to solve transmission congestion problem in high power density area such as metropolitan cities with its high-density transmission capability. Recently developed superconducting cable in distribution class can deliver about 5 times more power than conventional XLPE cable at same dimension. DC superconducting cable is also in developing stage to eliminate AC loss in superconductor, and will be applied to HVDC transmission system.

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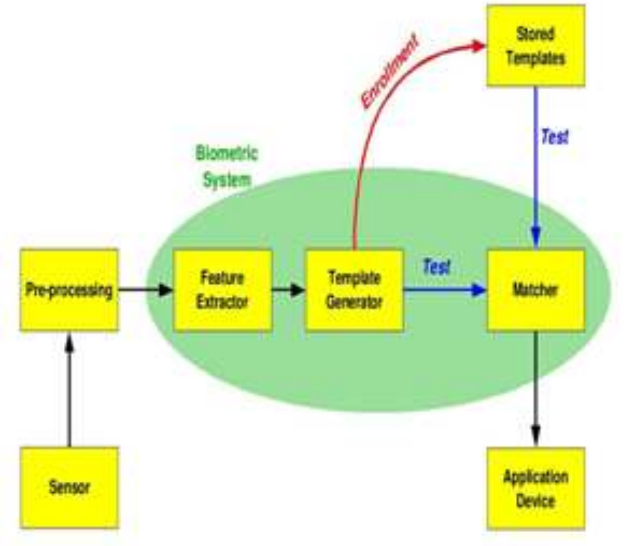
BIOMETRICS

Biometrics is the technical term for body measurements and calculations. It refers to metrics related to human characteristics. Biometrics authentication is used in computer science as a form of identification and access control. It is also used to identify individuals in groups that are under surveillance. Biometric identifiers are then distinctive, measurable characteristics used to label and describe individuals. Physiological characteristics include fingerprint, palm veins, face recognition, DNA, palm print, hand geometry, iris recognition and retina scan. Biometric identifiers are unique to individuals, they are more reliable in verifying identity than token and knowledge-based methods. However, the collection of biometric identifiers raises privacy concerns about the ultimate use of this information.
Seven such factors to be used when assessing the suitability of any trait for use in biometric authentication are:

- **Universality** means that every person using a system should possess the trait.
- **Uniqueness** means the trait should be sufficiently different for individuals in the relevant population such that they can be distinguished from one another.
- **Permanence** relates to the manner in which a trait varies over time. More specifically, a trait with 'good' permanence will be reasonably invariant over time with respect to the specific matching algorithm.
- **Measurability (collectability)** relates to the ease of acquisition or measurement of the trait. In addition, acquired data should be in a form that permits subsequent processing and extraction of the relevant feature sets.
- **Performance** relates to the accuracy, speed, and robustness of technology used.
- **Acceptability** relates to how well individuals in the relevant population accept the technology such that they are willing to have their biometric trait captured and assessed.
- **Circumvention** relates to the ease with which a trait might be imitated using an artifact or substitute.



The block diagram illustrates the two basic modes of a biometric system.

First, in verification (or authentication) mode the system performs a one-to-one comparison of a captured biometric with a specific template stored in a biometric database in order to verify the individual is the person they claim to be. Three steps are involved in the verification of a person. In the first step, reference models for all the users are generated and stored in the model database. In the second step, some samples are matched with reference models to generate the genuine and impostor scores and calculate the threshold. Third step is the testing step. This process may use a smart card, username or ID number to indicate which template should be used for comparison. 'Positive recognition' is a common use of the verification mode, where the aim is to prevent multiple people from using the same identity.

The first time an individual uses a biometric system is called Enrollment. During the enrollment, biometric information from an individual is captured and stored. In subsequent uses, biometric information is detected and compared with the information stored at the time of enrollment. It is crucial that storage and retrieval of such systems themselves be secure if the biometric system is to be robust. The first block (sensor) is the interface between the real world and the system; it has to acquire all the necessary data. Most of the times it is an image acquisition system, but it can change according to the characteristics desired. The second block performs all the necessary pre-processing: it has to remove artifacts from the sensor, to enhance the input (e.g. removing background noise), to use some kind of normalization, etc. In the third block necessary features are extracted. This step is an important step as the correct features need to be extracted in the optimal way. A vector of numbers or an image with particular properties is used to create a template. A template is a synthesis of the relevant characteristics extracted from the source. Elements of the biometric measurement that are not used in the comparison algorithm are discarded in the template to reduce the file size and to protect the identity of the enrolee.

During the enrolment phase, the template is simply stored somewhere. During the matching phase, the obtained template is passed to a matcher that compares it with other existing templates, estimating the distance between them using any algorithm (e.g. Hamming distance). The matching program will analyse the template with the input. This will then be output for any specified use or purpose (e.g. entrance in a restricted area). The selection of biometrics for any practical application depends upon the characteristic measurements and user requirements. In selecting a particular biometric, factors to consider include, performance, social acceptability, ease of circumvention and/or spoofing, robustness, population coverage, size of equipment needed and identity theft deterrence. Selection of a biometric based on user requirements considers sensor and device availability, computational time and reliability, cost, sensor size and power consumption.

The electric Eel (a type of Knifefish) can deliver a shock of upto 600 volts in order to stun prey and predators at bay.

In recent times, biometrics based on brain (electroencephalogram) and heart (electrocardiogram) signals have emerged. A research has shown that people have certain distinct brain and heart patterns that are specific for each individual. The advantage of such 'futuristic' technology is that it is more fraud resistant compared to conventional biometrics like fingerprints. However, such technology is generally more cumbersome and still has issues such as lower accuracy and poor reproducibility over time. This new generation of biometrical systems is called biometrics of intent and it aims to scan intent. The technology will analyze physiological features such as eye movement, body temperature, breathing etc. and predict dangerous behaviour or hostile intent before it materializes into action.

On the portability side of biometric products, more and more vendors are embracing significantly-miniaturized Biometric Authentication Systems (BAS) thereby driving elaborate cost savings especially for large scale deployments. The innovative framework tackles biometric spoofing from a randomized trait analysis approach that guarantees more secure authentication.

Adaptive biometric systems aim to auto-update the templates or model to the intra-class variation of the operational data. The two-fold advantages of these systems are solving the problem of limited training data and tracking the temporal variations of the input data through adaptation. Recently, adaptive biometrics have received a significant attention from the research community.

This research direction is expected to gain momentum because of their key promulgated advantages. First, with an adaptive biometric system, one no longer needs to collect a large number of biometric samples during the enrollment process. Second, it is no longer necessary to re-enroll or retrain the system from scratch in order to cope with the changing environment. This convenience can significantly reduce the cost of maintaining a biometric system. Despite these advantages, there are several open issues involved with these systems. For mis-classification error (false acceptance) by the biometric system, cause adaptation using impostor sample. However, continuous research efforts are directed to resolve the open issues associated to the field of adaptive biometrics.

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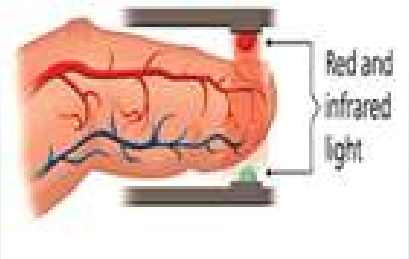
PULSE OXYMETER

What is Pulse Oximetry?

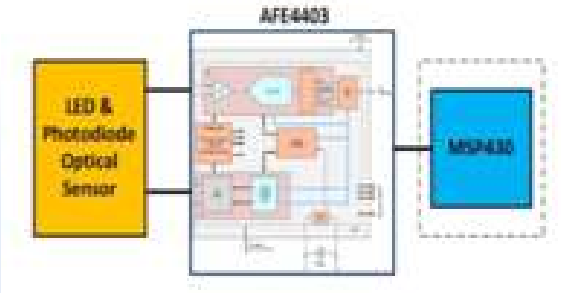
For people with asthma, Congestive Heart Failure (CHF) and other conditions, pulse oxymeter is a technology used to measure the oxygen level in the blood and heart rate. A finger pulse oximeter is equipped with technology to rapidly detect changes in the blood oxygen level. It can help give the knowledge of the need to take control of the health condition. A finger pulse oximeter is easy to use – just clip it on to the fingertip to get a blood oxygen reading.

How Does a Pulse Oximeter Work?

A finger pulse oximeter functions by shining light through the finger. The sensors detect how much oxygen is in the blood based on the way the light passes through finger. Pulse oximetry is the technology calculating the results to display a number on the oximeter's screen that tells the percent of oxygen in the blood. A finger pulse oximeter also measures the pulse rate.



Transmission Method



Block Diagram

Pulse Oximeter

Principle of Pulse oximeter

The principle of pulse oximeter is based on the differential absorption characteristics of oxygenated and the de-oxygenated haemoglobin. Oxygenated **haemoglobin** absorbs more infrared light and allows more red light to pass through, whereas Deoxygenated haemoglobin absorbs more red light and allowing more infrared light to pass through.

What's inside the Sensor?

Each pulse oximeter sensor probe contains two light emitting diode one emitting red light and the other emitting near infrared light, it also has a photo-detector. The photo-detector measures the intensity of transmitted light at each wavelength. And using the differences in the reading the blood oxygen content is calculated. The probe is placed on a suitable part of the body, usually a fingertip or ear lobe.

Methods for Monitoring Oxygen Saturation in Blood

Two different methods are used for transmitting light through the transmitting medium.

Transmission Method

In the transmission method the transmitter i.e. the LED & the receiver i.e. the photo-detector are placed on opposite side of the finger. In this method the finger will be placed between the LED's & the photo-detector. When the finger is placed a part of the light will be absorbed by the finger and some part will reach the photo detector. Now with each heart beat there will be increase in volume of blood flow this will result in more light getting absorbed by the finger so less light reaches the photo-detector.

Hence if the waveform of received light signal is observed, itconsist of peaks in between heart beats and trough (bottom) at each heartbeat. This difference between the trough & the peak value is the reflection value due to blood flow at heart beat.

Reflectance Method

In Reflective method, the LED & the photo-detector are placed on the same side i.e. next to each other.In the reflective method, there will be some fixed light reflection back to the sensor due to finger. With each heart-beat there will be an increase in blood volume in the finger this will result in more light reflection back to the sensor.

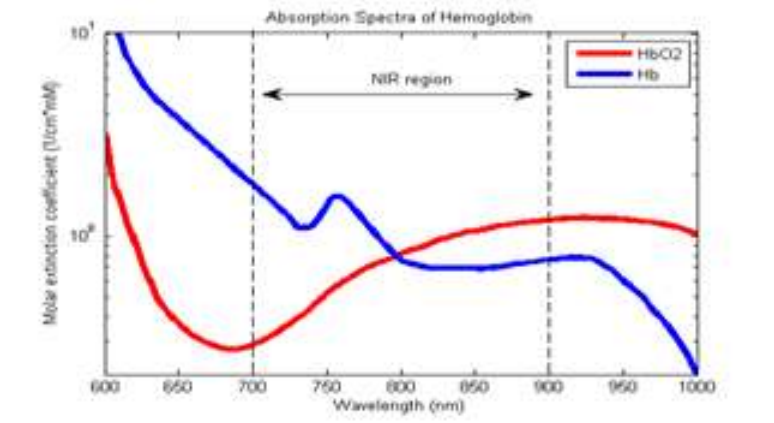
Hence if the waveform of the received light signal is observed, it will consist of peaks at each heartbeat. A fixed low value reading is there in between the heart beats can be considered as constant reflection and this difference of the peak subtracted from the constant reflection value is the reflection value due to blood flow at heart beat.

In both the above cases, we can see the troughs/peaks in reflected light occur at each heartbeat. The duration between two spikes can be used to measure the persons Heart Rate. Hence a typical heart beat sensor Module consists of only on Transmitter LED (mostly infrared) and one photo-detector.

How is Oxygen Saturation Calculated?

As said earlier the sensor consist of two transmitting LED's a Red led of approximately 650 nm (nano-meter) and an infra-red led which has a wavelength of 950 nm.

In the above graph,we can see the absorbance rate of Oxygenated haemoglobin to various light wavelength. We can see Oxygenated haemoglobin (RED line) absorbs more infrared light than red light. Also the De-Oxygenated haemoglobin (blue line) absorbs more red light as compared to infrared light. The oxygen content in the blood can be easily calculated by comparing how much red light (R) is absorbed as compared to infra-red (IR) light.



Depending on the amount of Oxygenated haemoglobin or De-Oxygenated haemoglobin the ratio of red light absorbed versus Infra-red light (R/IR) absorbed will change. And we can have a look-up table than can convert this ratio into SPO2 value. Most manufacturers have their own look-up table. Typically R/IR ratio of 0.5 equates to approximately 100% SpO2, a ratio of 1.0 to approximately 82% SpO2, while a ratio of 2.0 equates to 0% SpO2.

Which Sensor to use for measuring Oxygen Saturation?

Pulse Oximeter sensor can be made by using an IR Transmitter, red LED & an Light Dependent Resistor (LDR), which then can be connected to a micro-controller and the ratio (red light absorbed versus Infra-red light absorbed) can then be calculated and from that SPO2 value can be calculated.

We can also use direct ready sensors like 'MAXIMs MAX30100 which is a fully integrated optical bio-sensor for complete pulse oximeter and heart rate measurement.

Shalmali. G. Magal [1BG15EE041]

Vijetha. M.S [1BG15EE058]

V semester, EEE

INNOVATIVE PROJECT LAB

- Syed Abrar and Swathi M of III semester won the semester level Best IPL project award for the project **"MAV-Multi-purpose Agricultural Vehicle"** during the IPL Winter Competition-2017 held on10th November, 2017.

- Alagar Krishna, Md Safeeulla, Monisha S, Raghuveer S and Shashank T of V semester presented the project **"Lightning Storage"** during the IPL Winter Competition-2017 held on 10th November, 2017.

A technical talk on "**Career Opportunities for Electrical Engineering** " by **Smt. Sandhya R J**, Manager, R&D, PRDC Pvt Ltd, Bengaluru was arranged in our department on **31st October 2017,** under ISTE Student Chapter and the department association ABEEE. In this program, the students who scored First class with Distinction during 2016-17 were honoured with the Momentoes.

A technical talk on "**Solar application in Stand-alone and off-grid scenario**" by **Mr. Deepak K Srivatsav**, Test Engineer, M/s. Tessolve Semiconductor Pvt. Ltd., Bengaluru was arranged on **23rd August 2017**. The participants were the students of III sem and V sem, EEE department.

A technical talk on "**Concepts of Electrical Engineering**" by **Mr. Raghavendra**, Technical Consultant, M/s. ABB India Limited Ltd., Bengaluru was arranged on **23rd August 2017**. The participants were the students of III sem and V sem, EEE department.

A technical talk on "**Renewable Energy sources**" by **Mr. Vivek Shenoy**, Vice President, R&D, Tejas Networks, Bengaluru was arranged on **27th September 2017**. The participants were the students of III sem and V sem, EEE department.

Staff Achievements

- **Mr. Venkatesha K**, Associate Professor, Department of EEE, received the Best Faculty Award -2016-17 given by M/s Cognizant Technology Solutions, Bengaluru.

- **Mr. Venkatesha K** received the Best paper award for the technical paper "Experimental analysis of Symmetrical & Asymmetrical PWM based Single Phase AC to AC Converter for Power Quality Improvement" in International conference on smart grids, power and advanced control engineering [ICSPACE-2017] at Global Academy of Technology, Bengaluru during August-2017.
- **Mr. A Kumar,** Associate Professor, Department of EEE has delivered Technical Talk on " Analog Electronics Circuits" at Sai Ram College of Engineering on 9th November 2017
- **Smt. Savita Sangappanavar,** Assistant Professor, Department of EEE won II prize in State level ecofriendly Rangoli competition held in Cubbon Park for Kannada Rajyotsava on 12th November 2017.

The first electric passenger train consisting of the locomotive and three cars was presented by Werner von Siemens at Berlin in1879 which was driven by a 2.2 kW, series-wound motor.

Students Achievements

1. Shwetha. S, Suparna Bose, Avadhanula Aslesh Kumar, Monisha. S Raghuveer Bhat, Ashwin Gowda, Kavya K of V sem EEE were runners up in Street Play held at IISC, Bengaluru in October 2017.
2. Arpitha. B.M & Suparna Bose of V sem EEE have presented a paper on reducing carbon footprint held at IISC, Bengaluru.
3. Arpitha. B.M & Suparna Bose, Monisha.S & Shwetha.S, 5th sem EEE have presented a poster for "Climate change and mitigation" Idea conclave for better Bengaluru held at IISC, Bengaluru.
4. Shwetha.S of V sem EEE has secured 2nd prize in Inter-zonal Table Tennis tournament held at HKBK college of engineering in 2017 & also secured 2nd prize in Zonal Tabble Tennis tournament held at RLJIT, Belgaum in 2017.
5. Manasa K R of V sem has won 1st place in a technical talk on "Smart Grid" in Katalyst Tech Fest-2017 on 28th September 2017 conducted in Siemens.
6. Manasa K R of V sem has won 2nd place in Mini Engineering Project on "Wireless Mobile Charger" in Katalyst Tech Fest-2017 during 28th September 2017 conducted in Siemens.
7. Nishanth S of V Sem won I place in 50m, 100m and 200m, II place in 50m and 100m, III place in 200m Breaststroke swimming during VTU meet held in Basavanagudi Aquatic centre on 30th August 2017.
8. Nishanth S of V Sem won III place in 100m, 200m and 400m in Freestyle and III place in 200m and 400m in Individual Medley swimming during VTU meet held in Basavanagudi Aquatic centre on 30th August 2017.
9. Nishanth S won III place in 100m and 200m in Breaststroke swimming during Dasara Games-2017 organized by the Department of Youth service & sports, Government of Karnataka at St. Joseph's Indian High school Pool held during 14th and 15th September 2017.
10. Shashank of V sem has participated in Triple Jump and Long Jump in VTU Intercollege Athletic meet during 3rd to 6th November in Belagavi.
11. Shankar of V sem has participated in Javelin in VTU Intercollege Athletic meet during 3rd to 6th November in Belagavi.
12. Keshav Jindal of Vsem has participated in 100 m Medley during VTU State Inter collegiate swimming competition in Basavanagudi Aquatic center.

Fond Memories of a VII Sem student

Mr. Sagar S [1BG14EE42]
[24-02-1996 – 21-11-2017]

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