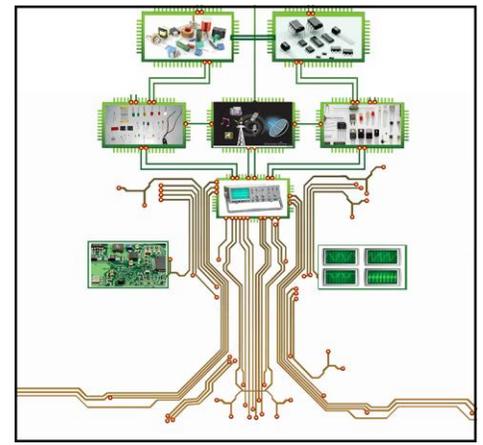


ELECTRONICA

Department of Electronics & Communication
Engineering



Volume 2

Issue1

Nov 2016

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.

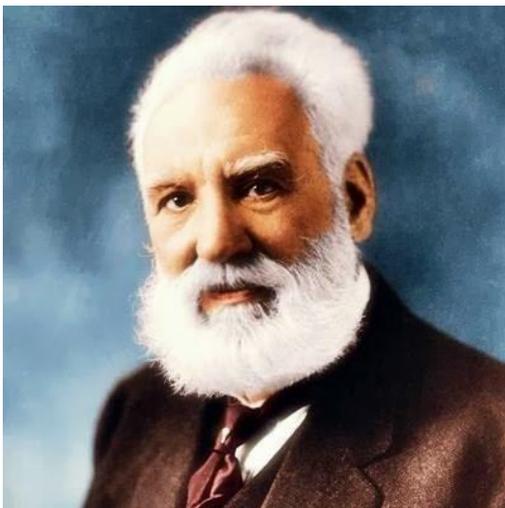
Vision and Mission of the Department

Vision

To be a renowned department for education in Electronics and Communication Engineering in Karnataka State, moulding students into professional engineers.

Mission

- To provide teaching - learning process in Electronics and Communication Engineering that will make students competitive and innovative to adapt to needs of industry and higher learning.
- To imbibe professional ethics, team spirit and leadership qualities to succeed in changing technological world.
- To inculcate empathy for societal needs and concern for environment in engineering design and practice.



“When one door closes another door opens; but we so often look so long and so regretfully upon the closed door, that we do not see the ones which open for us.”

~ Alexander Graham Bell

Scientist, Inventor, Engineer and Teacher of the Deaf. Best known as the Inventor of Telephone.

What's inside...

- *Quantum Data Locking*
- *Journey into particles*
- *White box*
- *E-textiles*
- *Blindar*
- *Electromagnetic Gun*
- *Virtual Eye*
- *Staff and Students' Achievements and more.....*



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FROM THE EDITOR'S DESK

Warm Greetings !!!

I am honoured to have an opportunity to present the forthcoming issue of ELECTRONICA, newsletter of Department of Electronics and Communication Engineering, BNMIT. My experience throughout the making of this news letter was at its best and I am truly delighted for having done this. This is such a blessed platform for all of us to have had a chance to publish our articles. I have made my best of efforts and taken care to bring this out as a memory. It has been a wonderful experience and honour, to be able to bring about comprehensive information and articles from the staff and the students.

This chronicle portrays various events, activities, achievements and expressions of staff and students. It ignites pleasure and satisfaction in me to ensure about the great stride gained by students and the staff. I know that it needs wonderful readers like you who are willing to gather around the campfire to make it a useful exercise. Thanks for caring and telling us what you liked and what you didn't.

N.SREE SAI KIRAN, VII ECE B

ABOUT THE DEPARTMENT

The Department of Electronics and Communication Engineering started in the Year 2001. Currently, the department is headed by Dr. P.A.Vijaya. The Department has 2 programs; B.E and M.Tech (VLSI design and Embedded Systems), affiliated to VTU.

The Department has a team of highly qualified and dedicated staff with teaching, research and industrial experience. Well-equipped laboratories with State-of-the-art infrastructure and class rooms with LCD projectors provide enhanced learning environment to cater to the budding engineers of tomorrow. The Department has a VTU recognized Research Centre and currently there are eleven registered candidates who are pursuing for doctoral degrees. Totally, nineteen faculties are pursuing their Ph.D under VTU.

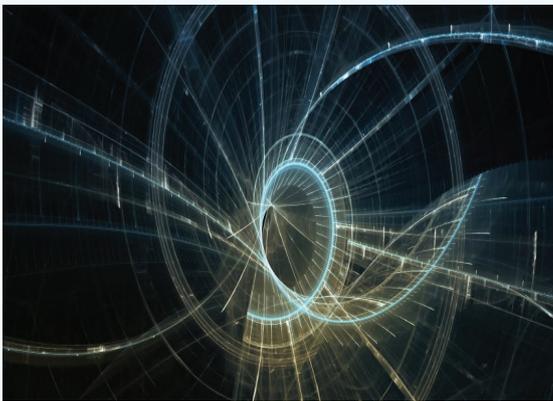
Academic performances of the students are excellent with nine university ranks. Students do innovative projects, internship training in industries and academic projects in reputed organisations. Students regularly participate in inter-college and intra-college technical, cultural & sports events and have regularly brought laurels to the department.

Dr. P.A.VIJAYA
HOD, DEPT. OF ECE

QUANTUM DATA LOCKING

Quantum data locking is a method of encryption in which the messages sent over the internet are encrypted using photons, light's smallest particles. Until now, unbreakable encrypted messages were transmitted via a system envisioned by American mathematician Claude Shannon. Shannon combined his knowledge of algebra and electrical circuitry to come up with a binary system of transmitting messages that are secure, under three conditions: the key is random, used only once, and is at least as long as the message itself. Unlike the binary method, quantum data locking makes use of light waves' features such as angle of tilt, wavelength and amplitude to generate keys that could encrypt messages.

These features are lot more than 0s and 1s. The important point is that all the information encoded on the photon is randomized by a random signal. So the sequence of random signals used for encryption can be significantly shorter than the message itself. Once a message is encrypted in such a way and transmitted, only those who have access to a previously agreed upon key can unscramble the message. And, even if someone manages to intercept the message, the very act of trying to unscramble it would result in the message being corrupted. This is because of a unique property of subatomic particles wherein measuring its state actually changes it. Along with



modifying the shape of photons, uncertainty principle was made use of, which states that “the more we know about one property of a particle, the less we know about another”. Because of that, the researchers were able to securely lock in six bits of classical information using only one bit of encryption key. Implementation: The researchers from the University of Rochester, led by Daniel Lum, have developed a Quantum Enigma Machine. The user sending the message will use the machine to generate photons that go through a spatial light modulator [SLM] that will transform the message into an encrypted form. Moreover, each photon in the

experiment was encrypted with six bits of information, of which 2.3 bits were used to encode a secret key. As a result, by using a stream of 63 photons, they were successfully able to use just 145 bits to encrypt the entire packet of information. “While our device is not 100 percent secure, due to photon loss,” said Lum, “it does show that data locking in message encryption is far more than a theory”. Although this has been a great breakthrough in the study of quantum physics and cryptography, there is still a lot of work that needs to be done.

Source: <http://www.ibtimes.com/researchers-use-quantum-data-locking-create-worlds-first-quantum-enigma-machine-2412338>

LIKHITHA B S, V ECE B

A JOURNEY INTO PARTICLES

Which is the smallest particle in nature?

The very first thing that we learn in science is there are two kinds of things; living and non-living. What are these made of? Well they are made of matter. Matter consists of atoms, atoms consists of protons and neutrons in the nucleus and electrons revolving around them.

Further, it is regarded that protons and neutrons are made of particles called quarks.

These quarks combine to form composite particles, among them the stable ones are protons and neutrons. Also it is regarded that quarks can experience all the four fundamental forces of nature.

Finding answers through string theory

There are two major theories in modern physics namely quantum physics and relativity. Quantum physics deals with the study of subatomic particles or to be in precise fundamental particles which constitute matter. Relativity deals with the study of galaxies, planets and universe. The common force which is very much essential in both the theories is Gravitational force. The theory which tries to bring together both the domains is quantum theory of gravity. But in the last few decades, string theory has emerged as the most promising approach to quantum theory of gravitation.

String theory tries to explain complete fundamental structure of the universe. Therefore string theory is regarded as “The theory of Everything”. Now defining what string theory is, it is a theoretical framework in which, point like particles in particle physics are considered to be made of one dimensional objects called strings.

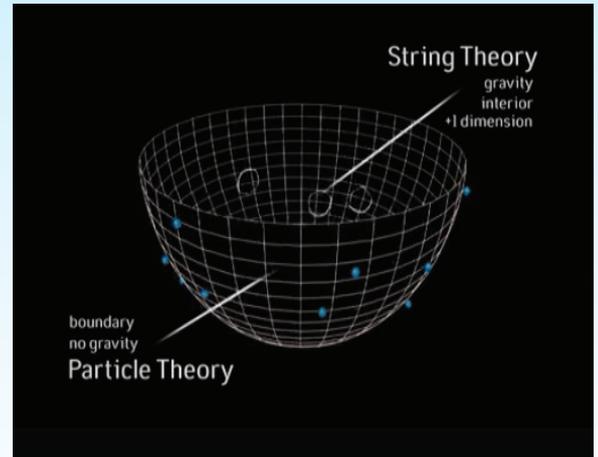
Study of String theory was started around 1990's,. It initially concentrated on study of nuclear force, but only later it was found that it was useful in studying quantum theory of gravitation as well. The initial work on string theory incorporated on the class of particles called bosons and this was also known as bosonic string theory. Later based on the concept of supersymmetry between particles called bosons and fermions string theory is now studied as super string theory. According to string theory point like particles are regarded as strings. These strings are oscillating and at a large distance appear to be like a particle with mass, charge and other characteristics which are determined by the vibrational properties of the string. According to string theory, one of the vibrational states gives rise to particles called graviton. Graviton is regarded as a hypothetical particle which mediates the force of gravitation in quantum theory of gravitation. String theory has been extensively used to study black holes and universe cosmology.

Source: <http://www.nuclecu.unam.mx/~alberto/physics/string.html>

<https://en.wikipedia.org/wiki/Quark>

<http://www.dummies.com/education/science/physics/the-basic-elements-of-string-theory/>

<https://en.wikipedia.org/wiki/Graviton>



AKHILA. K, V ECE A

WHITE-BOX

The Black Box in the cockpit of an aeroplane, has only been elemental in recording the audio signals in the cockpit and apparently, the control station at the ATC sets the deferred data as explained by Pilot and thus there is no automated system to obtain the instantaneous reports about the happenings in cockpit.

The proposed system provides the automated information to the Base station, and also the instantaneous relay of the alert levels and the replay of the course of journey the pilot had covered till the given time.

The design uses an embedded system for tracking and positioning any aircraft by using Global Positioning System and Global system for mobile communication. AT89S52 microcontroller was used for interfacing various hardware peripherals. On the other end we have an embedded system which will continuously monitor a moving aircraft and report the status of the aircraft on demand.

A GSM modem is used to send the position of the aircraft and the GPS will continuously give the data, i.e. the latitude and longitude indicating the position of the aircraft. The GPS modem provides many parameters as the output, but only the NMEA data coming out is read and displayed on to the LCD monitor. The microcontroller communicates with the help of serial communication. It takes the data from the GPS receiver and then sends the information to the owner in the form of SMS with the help of GSM modem. The GPS receiver which works on 9600 baud rate is used to receive the data from satellites. The GPS values of different satellites are sent to microcontroller AT89S52, where these are processed and forwarded to GSM. At the time of processing GPS receives only GPRMC values. From these values, the microcontroller takes only latitude and longitude values excluding time, altitude, name of the satellite, authentication etc.



KARTHIK J, III ECE C

E- TEXTILES

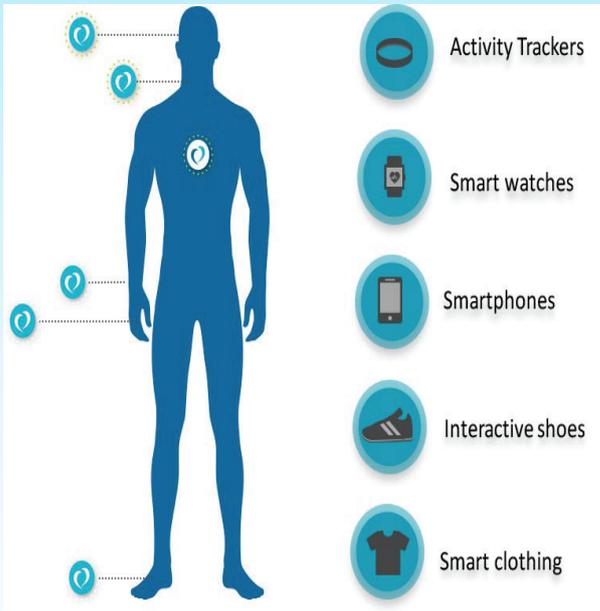
The aim for modern technology is to make people's lives easier by finding solutions to existing problems and also to come up with new techniques that help in making things easier. One such aspect of technology involves the use of wearable technology, i.e E-Textiles.

Electronic textiles are essentially clothes that have electronic components embedded in them to perform such functions that would enable smart communication. These fabrics generally harness energy in an eco-friendly way from the environment by means of sound vibrations, heat energy or even light energy.

The most important factors due to which E Textiles never gained popularity earlier were comfort, rigidity, fragility and cost. A new study by the researchers at the University of Cambridge, UK and the University of Jiangnan, China shows that there is a new way to overcome all of these setbacks and use basic Cotton Materials to produce Smart Fabrics with the help of nanomaterials. The technique is Formulation and Deposition of Graphene based inks onto Cotton Fabrics to produce an electrically conductive material that can not only be manipulated electrically but is also comfortable for everyday wear. These inks are chemically modified, so that the cotton can latch on to the conductive inks in the same way that they bond with dye to make coloured fabric.

Formulation of Graphene Oxide is done by dispersion of Graphite Oxide. Graphite Oxide can be dispersed in different solvents. By full exfoliation of the Graphite Oxide in these solvents, single layer Graphene Oxide sheets can be produced by Sonication, or "Hot Press Method" the Carbon-to-Oxygen ratio increases from 1.77 to 3.42 after hot press reduction. These sheets, having a high Carbon-to-Oxygen ratio, possess thickness in the order of a few Microns to a few hundred nanometres.

These textiles can withstand wash in an ordinary washing machine for upto 10 times and can detect over 500 wash cycles, and therefore the fabrics exhibit long term useability. The Sonication causes the Deposition of Graphene Oxide, as it links well with Cotton Fabrics, which is suitable for applications in the E Textile Industry. These Graphene textiles being developed, finds its use in:



1) Strain Sensors – the conductive cotton developed showed a uniform change in electrical resistance, with 3M ohm resistance under tensile strain and 10K ohm under compressive strain. It showed great viability even after 400 bending cycles.

2) Hospital Equipment and garments for patients that will be easy to use, comfortable to wear and more useful to monitor and track the medical conditions of a patient.

3) This method adopted by Two-Dimensional Nanomaterials is integrated with fabric to produce fibre based electronic textiles with components like transistors or LEDs.

4) This eco-friendly method of producing fabrics can be used in large scale industrial production of reduced Graphene Oxide based conductive Cotton Fabrics for various applications.

5) Wearable technology can be used by cinematographers, performers, dancers to add a new dimension in the Entertainment Industry.

6) Athletic Equipment to monitor physical conditions of Athletes.

7) Incorporation into everyday fabrics that can be used as interterfaces or sensors for Wearable Electronics.

TANISH ISLAM, III ECE C

DEPARTMENT EVENTS

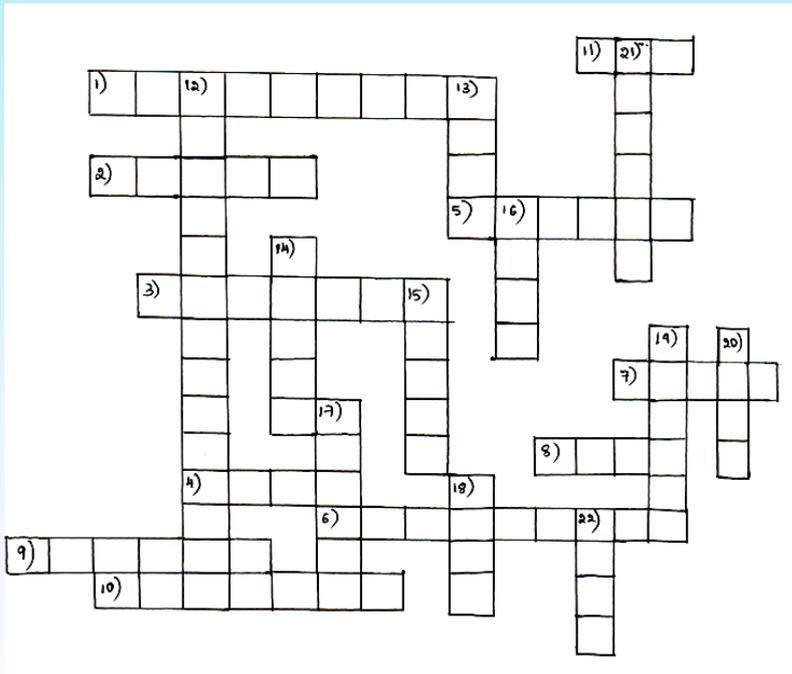


Dignitaries lighting the lamp during the FDP program on “Computer and Wireless Networks”



Chief Guest Shri B.N.Pal, Chairman, IEEE COMSOC, Bangalore Chapter, addressing during the FDP.

CROSSWORD



DOWN:

12. A low-to-high transition means '0' and high-to-low transition means '1'.
13. Linearly rising signal.
14. Used for numeric display.
15. Device under development by search engine giant.
16. Co-founded a multinational internet company in 1994.
17. Relates to touch.
18. Seattle, WA-based super computer company founded in 1970's.
19. XML messaging protocol (prior to 2000).
20. Its free, open source and embedded.
21. Abbreviation ; used as a volume control in audio amplifiers (two words).
22. A basic image file format.

ACROSS:

1. The functional equivalent of a synapse.
2. New Zealand-based circuit cellular contributor and recent interviewer who is fascinated with advanced robot technologies.
3. HDL created in early 1980's by Goel and Moorby.
4. Basic component of an electronic device.
5. An open-source programming language that relies on automatic memory management.
6. It has four-layer N and P-type construction.
7. Commonly used for PCB design.
8. Stores binary data ; (synonym : drop)
9. An amp device with three electrodes.
10. An effect that creates electricity.
11. Used in FM demodulation.

VAISHNAVI B R , V E C E B

PREVIOUS CROSSWORD ANSWERS

ACROSS:

1. RASPBERRY PI ZERO 2. PICONET 3. SQUIRREL 6.YOCTO PROJECT 7. BEAGLE 9.CROSS FIELD AMPLIFIER
13. SQUEGGING 14. VOLTAGE REFERENCE 15. SAMBA 16. AUTODYNE.

DOWN:

1. RTOS 4. UPENN 5. NETMASK 8. PEAKER 10. WIDLAR 11. PETAFLOPS 12. DYNATRON 17. EMI
18. LYOT FILTER

DOWN:

12. MANCHESTER CODE 13. RAMP 14. NIXIE 15. GLASS 16. YANG 17. HAPTIC 18. GRAY 19. JABBER
20. ELUA 21. LOG POT 22.TIFF

ACROSS:

1. MEMRISTOR 2. SANDER 3. VERILOG 4. CHIP 5. PYTHON 6. THYRISTOR 7. EAGLE 8. BLOB 9. TRIODE
10. SEEDBECK 11. PLL

ANSWERS FOR THE CROSSWORD

BLINDAR

In this modern era of technology and development, we need to address the problems that directly affect the health and well being of people around us. There is one such problem that affects about 300 million people worldwide- Blindness.

Almost 75% of the cases are “avoidable blindness”, which means that with good treatment, the person would not be blind. Providing sight to these people proves to be a costly affair, even with the technology of the Bionic eye. People face another problem - Accidents on Road. Most of these accidents are caused by human error, and not knowing where the obstacles are, due to which a collision occurs. This project seeks to tackle these problems and provide a feasible solution.



The Project Champion award of Rs.10000/- was awarded to Suhas Bhargav, Vishaka Murari G and Zeeshan Saquib of V Semester, for their project, “Blindar”

“BLINDAR” or “Blind Radar” is essentially a microcontroller controlled device. The prototype consists of an Ultrasonic Sensor (HC SR-04), a Sound Buzzer, and an Arduino Microcontroller, with the option of adding a Wifi Module (ESP- 8266) and a GPS Module (SKG13). A hollow Water Pipe (“Blind Stick”) is used as the handle for users. The main principle on which the project is built is that Ultrasonic Sound Waves travel at a very high speed and will echo off opaque objects, and can be detected by an Ultrasonic Sensor. A GPS module with encryption can also be attached to the device so that friends and family can track the location of the user.

BLINDAR is thus, an inexpensive device that enables blind people to be more mobile and independent, thus boosting their confidence and their ability to carry out their day to day activities more easily. It is simple, reliable, and user-friendly. Another objective of this project was to create an obstacle sensor for people who use vehicles. It is BLINDAR which is slightly modified so that it can be mounted on any given vehicle.

The Device warns the Driver/Rider by means of an Audio Signal (Buzzer) and/or a Visual Signal (Blinking LEDs) that they are driving/riding too close to a vehicle in front of them, or can even tell them if they are approaching an obstacle too fast, or can even detect obstacles at night. As a future enhancement, we can add a horn to the vehicle so that the vehicle in front could be alerted. BLINDAR is cost-effective and can be mounted on something as small as a bicycle. This encourages more people to use Bicycles and keep the environment cleaner and pollution free.

SUHAS BHARGAV, VISHAKA MURARI G, ZEESHAN SAQUIB, V ECE B

ELECTROMAGNETIC GUN

The electromagnetic gun is a weapon that fires projectiles using electricity instead of chemical propellants. Magnetic fields created by high electrical currents accelerate a sliding metal conductor. It is an intriguing technology and has several applications. It has not yet reached the conceptual or practical limits of its potential, even after a century of inventions.



The Best Project Award of Rs. 5000/- was awarded to Arrshith R G and Vishnu Shankar of III semester for their project, "Electromagnetic Gun"

This project uses a lithium polymer battery for power supply. To convert the power to ac, a push pull configuration full bridge is used. This device uses around 3000uF capacitance and a voltage of around 470 Volts. The energy delivered by this electromagnetic gun is close to 383 Joules.

A coil of very low resistance, about 0.2 Ohm and a fully charged capacitor is the heart of this gun. Once switched on, the capacitor starts to discharge through the coil, thus providing a large magnetic field of large flux density, which attracts the projectile towards the centre of the coil with a great acceleration. The capacitor is fully discharged by the time the projectile reaches the centre of the coil. The momentum of the projectile is acting as the output kinetic energy to launch the projectile.

ARSHITH RG ,VISHNU PRASAD BHAT ,III ECE C

VIRTUAL EYE

Blindness is a problem that has existed in human history since time immemorial. There have been a number of ways humans have developed solutions to help the Blind, such as using Blind-Aid dogs and walking sticks. Braille was revolutionary in educating Blind People.

The main aim of the project 'Virtual Eye' is to provide an efficient visual platform to enhance the perception of the surroundings for a visually impaired user. The Virtual Eye is a simple and efficient method of providing a glimpse of the world through sound. It will help boost the morale of Visually Impaired Community. This is achieved by using image processing and segmentation, along with a database which stores information that aids in the recognition of the images captured. An audio based feedback interface is how the prototype reacts to the environment, thus describing accurately to the user what the surroundings are like. The model comprises of the following components- an Ultrasonic Sensor (HC SR-04), a Webcam Camera (Quantum QHM 500-8LMS), and an Arduino Uno Microcontroller, with various Sensors and Actuators, a TTS (Text-to-Speech) Module, Beagle Bone Black, and Speakers/Headphones (based on the User's choice).



The Best Project Award of Rs. 5000/- was awarded to Pruthvi S, Shama M S, Hitesh V Harithas and Sujay Jain of V semester for their project, "Virtual Eye"

The objective of the model is to provide an Open Source Technology with an enhanced, futuristic and user-friendly solution to the common problems faced by the visually impaired community. Virtual Eye establishes a platform for the user to connect to the real world.

This is a sincere effort to connect the real world virtually, by using computer vision. The head mount camera, is used to capture an image on a real time basis whenever desired. The camera detects images with a viewing angle of 120 degrees. The Ultrasonic Sensor has high range and accurately detects obstacles in the range of 4cm to 500cm.

The captured image is then processed and compared with the information stored in the database, and through a feedback system provides an audio output which can be interpreted easily by the user. The camera is placed to provide a maximum field of vision and to eliminate the blind spot to a greater extent.

The effect of a blind spot is to overcome by using grid technology. Beagle Bone Black along with Central Processing Unit is used to process the image obtained from the webcam and to recognise the captured image from the database. The TTS module is used to convert the text data stored in the database to audio format, which is then amplified by the Speakers / Headphones system.

PRUTHVI S, SHAMA M S, HITESH V HARITAS, SUJAY JAIN , V ECE B

DEPARTMENT EVENTS



Alumni interaction with current final year students under BNM Mentors Network



Students explaining about their projects during the IPL project exhibition.

STUDENTS ACHIEVEMENTS

- **Neha Bakshi** and **Namratha R Samak** of 7th sem published a paper “ Solar Lawn Mower with Solar tracker ”, in Vol-2, Issue-11,2016 in Imperial Journal of Interdisciplinary Research, 2016.
- **Anjali M V** and **Hitesh Anand** of 7th sem published a paper “Survey on Hawkeye Technology” in Vol-6, Issue-10 in IJARCSSE during October, 2016.
- **Venkatesha S** of 7th sem published a paper “ Dual Synchronization algorithm for Internet of Things Communication Security” , at ICIOT 2016 conducted by APS College of Engineering, Bangalore during August,2016
- **Guruprasad Hebbar** of 7th sem published a paper “ Automated Room Light Control with Visitor counter sysytem”, at ICIOT 2016 conducted by APS College of Engineering, Bangalore during August, 2016.
- **Shreya Deepak** of 5th sem secured 1st place in 21kms category, in VTU Inter-collegiate Athletics Meet 2016-17 in Dr. T Thimmaiah Institute of Technology, Kolar.

STAFF ACHIEVEMENTS

- **Dr. P.A. Vijaya** was a keynote speaker for the International Conference ITC-2016, on 10th November,2016 at SSCE, Bangalore on the topic “Innovative Embedded Systems Applications”
- **Prof. Yasha Jyothi M Shirur** submitted her Ph.D thesis (VTU) under the guidance of Dr. M.S Suresh and Dr. Veena S Chakrvarthy during October 2016.
- **Prabhavathi P & Chaitra N** have published their research papers in reputed International conferences and journals during July- Nov, 2016.
- **Prof. Keerti Kulkarni** delivered invited talk on “ Digital Signal Processing” on 4th November, 2016 at Sri Sairam College of Engineering, Bangalore.

DEPARTMENT EVENTS



HOD and the staff co-ordinators with the Chief guest during the FCD function



HOD felicitating the Guest of Honour, Sri Sunil T. Shambhatnavar at FCD function.



HOD with the newsletter editorial team during 2015-2016.



Talk on "Industry interaction on Design and Development" under ISTE chapter, BNMIT

EDITORIAL TEAM

CHIEF EDITOR

- Dr. P.A.Vijaya, HOD, Dept. of ECE.

FACULTY MEMBERS

- Mrs. PADMAJA JAIN
- Mrs. CHAITRA. N

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- STHUTHIE V MURTHY, VII ECE B
- SANA ANAUM, V ECE B
- PRAJVAL A M, V ECE A
- TANISH ISLAM, III ECE C
- RAKSHITH B V , III ECE C

Any suggestions and articles, kindly mail to : bnmecenewsletter@gmail.com