LIVE WIRE
IEEE-CRIT

BY THE STUDENTS CHAPTER

IEEE-CRIT

FR.CONCEICAO RODRIGUES INSTITUTE OF TECHNOLOGY

VASHI

YEAR 2017-18

IEEE-CRIT 2017-18
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MESSAGE FROM THE BRANCH COUNSELOR

Mrs. Bindu R (IEEE Student Branch Counselor, FCRIT)

Engineering scholars' challenge is, beyond books and scores in the exams, to build a critical mind and attitude that seeks to research, go deeper, innovate and pursue excellence in everything they do. Our Institute provides integrated education to the budding engineers with a motive of their overall development by providing them various forums and opportunities to develop and showcase their technical as well as leadership potential.

IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE Student branch at Fr. C. Rodrigues Institute of Technology (IEEE-CRIT) is formed on 6th April 2000 under IEEE Bombay Section. It has been instrumental in promoting its members to organize and participate in technical events, workshops and seminars. In the academic year 2017-18, we had 54 IEEE student members and our branch organized various technical and educational events where the students got an opportunity for interacting with students of other engineering colleges in the state.

It is my pleasure to congratulate the IEEE-CRIT Council of 2017-18 for their whole hearted efforts in making all the events successful and also the editorial team for bringing out this year's LIVEWIRE edition in time. I am grateful to the Management, Dr. S.M. Khot (Principal), Dr. Bindu S (HOD of Electrical Engineering) and Dr. Milind Shah (HOD of

Electronics and Telecommunication Engineering) for providing support and the Infrastructure. Also thank everyone who came forward to participate and help us in all our endeavours.

EDITOR'S NOTE

JOY GEORGE

JOYRIN FERNANDES

EDITOR, IEEE-CRIT.

Another academic year has come to an end. May it have brought you both health and success! Welcome to IEEE LIVEWIRE 2018.

This magazine is a compilation of all the activities conducted by the IEEE-CRIT (2017-18) in order to guide you and to introduce you to the challenges and opportunities available in the field.

'TECHNOLOGY' this 10 letter word plays a really vital role in our life. Edward Teller said, 'The science of today is the technology of tomorrow.'

If you think of the future, you want a future that's better than the past. In order to have a better future we should be up to date with all the latest technological advancements.

Engineers are the ones who create the technology and its appropriate application for improving the quality of life of human being. Being aware of this fact the IEEE CRIT has organized various event throughout the years to keep you updated with the latest technology. The various activities, workshops and seminars conducted by IEEE CRIT has been mentioned in this magazine.

This wouldn't have been possible without the support and guidance of Mrs. Bindu R. We are also grateful to everyone from organizers to college staff for their contribution. And last but not the least a huge thank you to all the student members for their participation which made this an eventful year. We are fortunate to be given this opportunity.

THE YEAR AT A GLANCE

A. INTRODUCTORY SESSION:

This session was organized for all the IEEE members to inspire a global community to innovate for a better tomorrow.
We had a small talk with Racheal Dias - Editorial Coordinator, IEEE India Council SAC 2017, IEEE Xtreme Ambassador 2017, Public Relations Coordinator, IEEE Bombay Section 2017-18. cited publications, conferences, technology standards, and professional and educational activities. IEEE is the trusted "voice" for engineering, computing, and technology information around the globe. IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

Mission Statement:
IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity.

Vision Statement:
IEEE will be essential to the global technical community and to technical professionals everywhere and be universally recognized for the contributions of technology and of technical professionals in improving global conditions.

She gave us a brief idea about IEEE and its functioning.
The students from different branches and semesters came together and interacted with the council members and asked for the inputs regarding their expectations from the council.

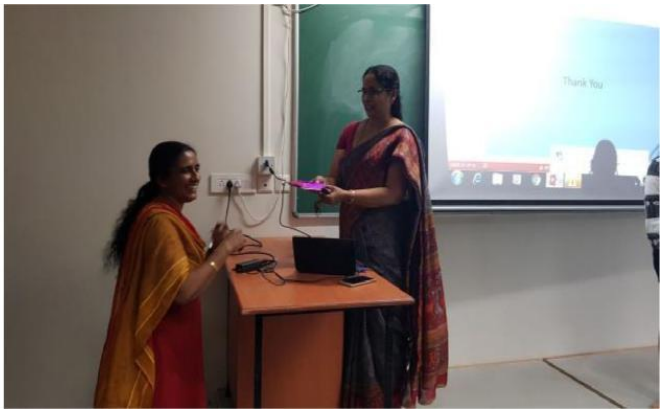
B. HOW TO WRITE A TECHNICAL PAPER:

IEEE-CRIT had organised a short talk on **"HOW TO WRITE A TECHNICAL PAPER**" on 9th January 2018 at 4:30pm. The speaker for this session was **Dr. Bindu. S. (HOD, Electrical Department, FCRIT)**. She has pursued her PhD from VJTI and in her career span she has written and published several papers. There were 97 participants from each department (Electrical, Electronics and Telecommunication, Information technology, Mechanical, and Computer).

The session included discussions on:

- The basic requirement for writing a technical paper, the method and guidelines that are to be maintained.
- Also involved a literature survey as well as research papers providing in depth description of each.
- Choosing a title which is simple to understand and gives information about it.
- Approaching the way you solve a problem, the findings, and what motivated you.
- Format which needs to be followed.
- Ensure the significance and implications of the figure.
- Papers should communicate the main ideas of your research.
- Representation of the paper should be taken into consideration.
- How you accomplish your result for the same.

The session involved active participation from the students who were enthusiastically involved in the teaching-learning process.



C. LEVEL 1 ROBOTICS:

IEEE-CRIT had conducted a level-1 robotics workshop on 18th and 19th JANUARY. It was a two - day workshop. There were 72 students divided in 18 groups where each group consisted of 4 members. The students consisted of 1st and 2nd years. On the first day the students were taught the basic connections involved in making a level 1 bot and were made to implement it. Each group was provided with all the necessary components.

Students were taught:

- Basics of robotics, its connections and working
- Working of a DPDT switch.
- Controlling a bot.

There was a competition held for the groups on the 2nd day titled 'ROBO SOCCER'.

The winning team consisted of:

1. **KAVERI PATIL**
2. **ANKITA PURKAR**
3. **SUTEJ MOTA**
4. **AVADHUT GOPALE**

The runners up were:

1. **VARUN PATIL**
2. **ROSELYN LORSON**
3. **BOBIN VARGHESE**
4. **STEPHIN MATHEW**

D. PYTHON WORKSHOP:

IEEE-CRIT had organised a Python workshop on 21st February 2018 . A workshop that gives you hands on experience. It was a 3 hours workshop conducted by the 3rd year students. There were 48 participants divided into 24 groups with 2 members each. The participants were from 1st and 2nd year. The participants were guided by the 3rd students

The workshop started with an introduction to Python language, which is a widely used high-level, general-purpose, interpreted, dynamic programming language followed by some examples covering topics like:

- Basic syntax.
- Looping.
- Additional functions.
- Information on few applications.
- A game on library pygame.

Guides:

- Jariel Joash Gojar
- Joel Miranda
- Robin Eliezer Andrew
- Dylan D'Souza

E. APP DEVELOPMENT:

IEEE-CRIT had organised an App Development workshop on 7th March 2018 . A workshop that gives you hands on experience. It was a 3 hours workshop conducted by the 3rd year students. There were 36 participants . The participants were from 1st, 2nd year and 3rd year. The workshop started with the introduction to block coding, real time usage of App followed by some examples covering topics like:

- Basic syntax.
- Looping.
- Additional functions.
- Few applications useful in real time.

The participants were guided by the 3rd students, and they were informed to bring their laptops.

Guides:

- Vaibhavi Patil
- Nikhil Shah
- Rahul Fatnani
- Mohit Patil

F. TECHPULSE:

IEEE-CRIT had organized a two-day State Level Competition named "TECHPULSE" on 23rd and 24th of March 2018. **Day 1:**

TECHNOVENTION:

TECHNOVENTION provides a great opportunity for the young minds to represent their project. It was conducted on 23rd March 2018. Mr. Nawaz Hussain, who has completed his Master's from IIT Bombay and was pursuing his PhD from IIT Bombay, was invited as the judge for the Project Competition. 18 teams had participated out of which the best two projects were awarded with a cash prize.

Day 2: TECHZOAH:

TECHZOAH is a platform for young engineers to present their research work. Technical Paper Presentation Competition was held on 24th March 2018. Mr Ram Bhoslae who was pursuing his PhD from IIT Bombay and had completed his Master's from FCRIT, was invited as the judge for the competition. 21 teams had participated in the competition and the best two were awarded with a cash prize.

FPV Surveillance Bot

Jetin Mathew, Shubhashish Bhattacharya

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Abstract: ***In view of the increasing need of wireless communication and surveillance requirements in today's world, Internet of Things serves as a major technological advancement to help such causes. This paper proposes a method for remote video surveillance of any location having Wi-Fi access via a wireless embedded robotic system. It also explains the control of the robotic unit for motorized video surveillance. A Raspberry Pi hosting a Pi Camera module, streams to a web server providing a live video feed, displayed on a VR headset, creating an easy and immersive way for monitoring the remote location. Controls for the robotic unit are provided by using buttons embedded in the created web page for movement control, whereas the camera motion mimic the user's head movements. This paper gives an approach towards video surveillance and control using the "Things" of IoT like advanced processors, i.e., the Raspberry Pi and the low cost and low power microchips. The proposed system has a wide future scope in indoor security and military applications by implementing sensors and appropriate design. Experimental results verified the seamless video monitoring and uninterrupted motion controls***

Keywords: Surveillance Bot, Raspberry Pi, Internet of Things Headset

1. Introduction

Surveillance is the process of monitoring a situation, an area or a person. This generally occurs in a military scenario where surveillance of borderlines and enemy territory is essential to a country's safety. Human surveillance is achieved by deploying personnel near sensitive areas in order to constantly monitor for changes. But humans do have their limitations, and deployment in inaccessible places is not always possible. There are also added risks of losing personnel in the event of getting caught by the enemy. With advances in technology over the years, however, it is possibly to remotely monitor areas of importance by using robots in place of humans. Apart from the obvious advantage of not having to risk any personnel, terrestrial and aerial robots can also pick up details that are not obvious to humans. By equipping them with high resolution cameras and various sensors, it is possible to obtain information about the specific area remotely. Satellite communication makes it possible to communicate seamlessly with the robots and obtain real-time audiovisual feedback. Thus, in recent times, surveillance technology has become an area of great research interest. However, building a small robot for testing and research purposes proves to be extremely expensive. This robot uses raspberry pi model B for making this real time surveillance possible by providing the installing and processing high resource software's which makes it possible to live streaming & controlling the robot. Therefore, we aim to build a Surveillance robot which can be easily controlled using a joystick and a picamera over Wi-Fi since it has a wide range and can be controlled globally. The movements of the picamera are controlled by head movements of the user and the camera feed is shown on a Virtual Reality headset.

2. Block Diagram

Figure 1: Transmitter section

MPU6050: -

The MPU 6050 is a 6 DOF (degrees of freedom) or a six-axis IMU sensor, which means that it gives six values as output: three values from the accelerometer and three from the gyroscope. The MPU 6050 is a sensor based on MEMS (micro electro mechanical systems) technology.

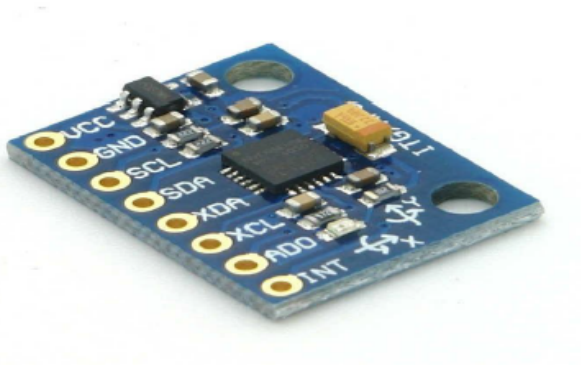

Figure 2: MPU 6050

ARDUINO PROMINI: -
Arduino is an open-source electronics platform based on easy-to-use hardware and software. The features are that they are Inexpensive, they can be used in Cross-platform operations, it is Simple in structure and design and also offers a clear programming environment and above all it is Open source and extensible software

NRF TRANSMITTER: -

These RF modules are very popular among the Arduino tinkerers. The nRF24L01 is used on a wide variety of applications that require wireless control. They are transceivers which this means that each module can transmit and receive data. These modules are very cheap and you can use them with any microcontroller (MCU)

Figure 3: NRF 24L01

Figure 4: Receiver section

NRF RECEIVER: -

These RF modules are very popular among the Arduino tinkerers. The nRF24L01 is used on a wide variety of applications that require wireless control. They are transceivers which this means that each module can transmit and receive data. These modules are very cheap and you can use them with any microcontroller (MCU).

SERVO MOTORS: -

Servo implies an error sensing feedback control which is utilized to correct the performance of a system. It also requires a generally sophisticated controller, often a dedicated module designed particularly for use with servomotors. Servo motors are DC motors that allows for precise control of angular position. They are actually DC motors whose speed is slowly lowered by the gears. The servo motors usually have a revolution cutoff from 90° to 180°. A few servo motors also have revolution cutoff of 360° or more. But servo motors do not rotate constantly. Their rotation is limited in between the fixed angles

CONTROL SECTION: -

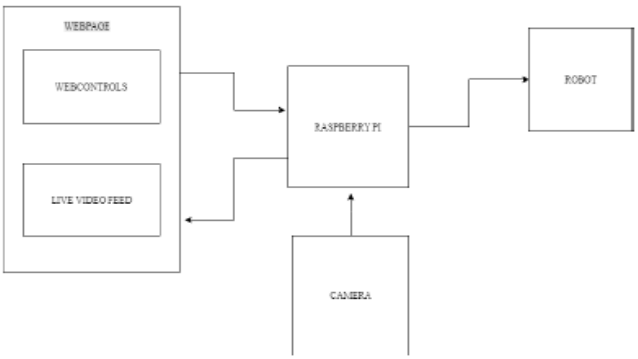

Figure 5: Control Section

Raspberry Pi: -

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.

Figure 6: Raspberry PI-2

WEB CAMERA: -

The visual feedback is provided by the Intex IT-306WC webcam. It can have a resolution of up to 30.0MP, Frame rate of 30FPS along with night time vision. It is plugged into the USB port of the Raspberry Pi.

L298 MOTOR DRIVER IC: -

The output from raspberry pi is sent to the motor driver IC. It has a Wide Supply-Voltage Range of 4.5 V to 36V. It has a Separate Input-Logic Supply and Internal ESD Protection. High-Noise-Immunity Inputs is another feature. The Output Current is 1 A Per Channel (600 mA for L298) and Peak Output Current 2 A Per Channel (1.2 A for L298D). Output Clamp Diodes for Inductive Transient Suppression (L298D) are also present. We can say that raspberry receives the commands through the nrf transreceiver which is then sent to the motor driver ic. The input data is decoded when there is no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin that is pin no1.

Virtual Reality Headset:

A virtual reality headset is a head-mounted device that provides virtual reality for the wearer. VR headsets are widely used with computer games but they are also used in other applications, including simulators and trainers. They comprise a stereoscopic head-mounted display (providing separate images for each eye), stereo sound, and head motion tracking sensors (which may include gyroscopes, accelerometers, structured light systems, etc.).

3. System implementation

3.1 Methodology for head motion recognition

The inertial motion unit is a 3D rigid body that can be rotated about the three orthogonal axes. Yaw, pitch and roll are referred to as rotation. These rotation takes place as Z-axis is called yaw, the next rotation X-axis is called pitch and last rotation about the Y-axis is called roll. Any orientation can be achieved by composing those three-elemental rotation. In our work, all of the planned head motions for robot control are simple gestures, each of which contains only one or two of the three elemental rotations.

3.2 Methodology for communication signal

Transmitter Module

An NRF transreceiver module is a small PCB ie, printed circuit board sub-assembly capable of transmitting a radio wave and modulating that wave to carry data. Transmitter modules are usually implemented alongside a micro controller which will

provide data to the module which is transmitted. RF transmitters are usually subject to regulatory requirements which dictate the maximum allowable transmitter power output, harmonics and band edge requirement.

Both transmission and reception of data are done using NRF transreceivers

Receiver modules

An NRF Receiver module NRF-24L01 is 2.4 GHz radio receiver receives the modulated RF signal, and then it demodulates. There are two types of RF receiver module. Super-regenerative modules are usually of low cost and low power designs using a series of amplifiers use to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies in a fair amount with temperature and power supply voltage. Super heterodyne receivers having a performance advantage over super-regenerative; they offer increased an accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in turn leads to a comparatively more expensive product.

Based on the input codes master will give command to slave microcontroller and robot will behave as follows.

- Moves in forward direction
- Moves in reverse direction,
- Speed controls in both the direction
- It can even turn left or right while moving forward or in reverse direction.
- In case of bump, moves reverse turn left or right and wail for the next instruction.
- On the spot left or right turn to pass through the narrow space
- We have also added head light, back light and turning lights to left a right.

Radio receiver which receives the transmitted coded from the remote place these codes are converted to digital format and output is available to the pin no 2 of the ic2 master microcontroller; this is the pin of inbuilt art of the microcontroller. We Based on the input codes master will give command to slave microcontroller and robot will behave as follows.

3.3 Methodology for Motion Control

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers as they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.
This project controls a remote robot through webpage. The ordinary 2.4 GHz NRF modules are used in this project. ARDUINO PROMINI microcontroller is used in this project.

This robot can perform their operations without direct human guidance. They are used basically for industrial applications and can be made laser guided.

Navigation is achieved by one of the several means, including following a path defined by buried inductive wires, surface mounted magnetic or optical strips; or alternatively by the way of laser guidance.

This is an improved version of our previous robot which was gesture controlled wirelessly and designed months ago.

Intelligent spy robot project has been designed for the spying purpose. It is internet controlled and can be operated at a radial distance of 100m radius. Most probably our army youth need to venture into the enemy area just to track their activities. Which is often a very risky job and may cost precious life. Such dangerous job could be done using small spy robot all the developed and advance nations are in the process of making it, a robot that can fight against enemy. Our robot us just a step towards similar activity.

4. Working

This robot is operated over the internet and is, self-powered, and has all the controls like a normal car.
All the controls of the robot including all the motions forward, backward, left, right etc. are provided as buttons on a single webpage. Based on our inputs the robot functions and performs various motions. A camera which can be a pi camera or a web camera is used to get the video feed of the location wherever the bot goes. This makes the surveillance much more effective. The various controls given by the user from the webpage is sent to the raspberry pi which is connected to the same network. The gpio pins of the raspberry pi is configured and accordingly connected tp the motor driver IC 1298.This motor driver IC then drives the two motors being a dual h bridge IC. The camera feed is given to the raspberry pi and from there it is hosted on the webpage where it is embedded which gives the user a live feed on the webpage wherever he is controlling the bot from. The camera is mounted on a pan-tilt mechanism created by using two servo motors. These servo motors respond to the head movements by the user. An IMU sensor is attached to the VR which captures the movements of the user's head and this is then sent to an Arduino and from there it is then sent to the NRF transreceiver. The IMU sensor values are mapped and converted to digital using the Arduino and sent to the transreceiver. A similar transreceiver is kept on the receiver side ie. the robot where it receives the transmitted signal and it is them decoded using another Arduino and depending on the codes the servo motors are controlled. The transmitted values are received and on the basis of the threshold values created by trial and error we decide the movements of the servo motors. Thus, we build a pan tilt mechanism where the user can get full experience of the scenary where the bot is on the VR and depending on his head movements the camera also moves thus giving a full complete VR experience
This feed is received at the VR headset using MJPEG stream on a server.
The movements of the PiCamera are controlled by MPU6050 which is mounted on the head of the user.

5. Special Circuit element

MPU 6050

The InvenSense MPU-6050 sensor contains a MEMS accelerometer and a MEMS gyro in a single chip. It is very accurate, as it contains 16-bits analog to digital conversion hardware for each channel. Therefor it captures the x, y, and z channel at the same time. The sensor uses the I2C-bus to interface with the Arduino.
The MPU-6050 devices combine a 3-axis gyroscope and a 3-axis accelerometer on the same silicon die, together with an onboard Digital Motion Processor (DMP), which processes complex 6-axis MotionFusion algorithms. The device can access external magnetometers or other sensors through an auxiliary master I²C bus, allowing the devices to gather a full set of sensor data without intervention from the system processor. The devices are offered in a 4 mm x 4 mm x 0.9 mm QFN package.
The MPU-60X0 features three 16-bit analog-to-digital converters (ADCs) for digitizing the gyroscope outputs
and three 16-bit ADCs for digitizing the accelerometer outputs. For precision tracking of both fast and slow
motions, the parts feature a user-programmable gyroscope full-scale range of ±250, ±500, ±1000, and
±2000°/sec (dps) and a user-programmable accelerometer full-scale range of ±2g, ±4g, ±8g, and ±16g.

Possible applications of this board include Robotics, Tilt and Motion Sensing, Freefall Detection, Image Stabilization Navigation and Dead Reckoning, tilt Compensation in inertial sensors, 3D-Gaming.

6. Result

Using this robotic system, a remote area can be monitored easily from remote end. One can easily monitor as well as control the activity of the robotic unit. This system can be used any conditions and areas where it is difficult for the security forces to reach it can monitor the areas. As the communication is done with the help of internet so limitation of range of operation does not arise and thus we can monitor any remote areas. If this robot is within the Wi-Fi range there is no need of internet too. We control the robot using the Wi-Fi as a medium. In this paper, we have presented a real-time surveillance robot using different system for human computer interaction with the surveillance robot in context. Also, this paper contains detailed information for controlling a robotic vehicle guided via internet. All this technique can be used any conditions and areas where it is difficult for the security forces to reach it can monitor the areas. These techniques have their own applications in that field. The surveillance robot was designed with Arduino microcontroller using embedded platform. A web camera is used which continuously monitors the place and sends the information to the control station. It is concluded that smart surveillance system using Raspberry pi capable of recording/capturing video/image and transmitting to a smart phone. It is advantageous as it offers reliability and privacy on both sides. It is authenticated and encrypted on the receiver side, hence it offers only the person concerned to view the details. Necessary action can be taken in short span of time in the case of emergency conditions such as elderly person falling sick, military areas, smart homes, offices, industries etc.

7. Future Scope

We can use this system for military applications installing suitable sensors. Just by changing the robotic unit design we can use it in hospitals for patient monitoring. Using some chemical sensors, we can detect harmful gas leakage in the chamber the time delay which occurs in the execution of commands can be reduced and thus we can have more real time access to the robot. With reduced time delay we can have faster operation and quick response to any illegal activities in the monitored area. Also, it can be used as a spy robot. The robot is very economical. Now that the Raspberry pi 2 has been released with more power into the same small frame than the previous version (Raspberry pi), the vision applications are larger and more complex than before. Like almost everyone else, makers and hackers now use Pi 2 board with a camera for wide range of applications. The many original projects being developed to shoot outdoor Infrared photos, Automatic video capturing, security surveillance applications and more. This can be implemented by making an android/ iOS/ windows phone app and then controlling it via the same. The robot can also made to implement the SLAM (simultaneous localization and mapping algorithms) to make it map the complete environment and then move autonomously after a certain periodic interval to check everything. Also, by giving it the ability to detect and recognize faces it can be made to alert us about any unknown person and take a snap of it and email us the same. It can be made to follow a specific face continuously rather than manually operate it to follow someone like the small children in the age group of1-4 years so that kids are continuously in front of our eyes. Can also take help of sensors to maintain a safe distance from the kids for the safety of the robot.

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Indian Language Identification using Cochleagram based LPQ texture descriptor and Artificial Neural Network Classifier

(Ashish H. Jog, Omkar A. Jugade, Atharva S. Kadegaonkar)

Abstract:

For a human translator, to identify more number of languages and to translate it accurately is difficult. The topic of identification of a spoken language has become an active research field in the community of speech processing. As language identification analysis systems are evolving, their multilingual capabilities are becoming more important. In this paper, a two level identification system for four Indian languages: Malayalam, Kannada, Manipuri and Marathi is proposed. In the first level, the approach converts the input speech signals into their corresponding Cochleagram Visual representation followed by their feature extraction using Local Phase Quantization (LPQ) texture descriptor. In the second stage the system identifies the spoken language using Pattern Net classifier.70% samples are used for training and rest 30% for testing of neural network. The overall accuracy obtained is 91.6%.

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PRATEESH R.K	KUNAL MAHADIK
SURAJ MAHANGADE	NIKHIL TATPATI
ELSON PINTO	ANEETA JOHN
MOHIT PATIL	SELVAN FERNANDO
OJAS MULEY	SEBBY D'SILVA
ABHISHEK KATRE	TEJAS DESHPANDE
RACHEAL DIAS	JOY K
SHUBHAM SARKAR	ASHUTOSH KAVITKAR
SARAH GEORGE	PRANAV KULKARNI
ANINDITA SAMANTA	PRINCE PATURAJ
SAURABH KILLEKAR	KARAN THAKUR
ANISH KANSE	KUNAL KULKARNI

FR. CONCEICAO RODRIGUES INSTITUTE OF TECHNOLOGY, VASHI

SPARK

ELECTRICAL ENGINEERING STUDENTS ASSOCIATION

(2017-18)

CORE COUNCIL 2017-18

M. Inshaal Khan
Chairperson

Sutej Mota
Secretary

Aishwarya M
Asst. Secretary

Mrs. Harshada C.B.
Convener

Mitalee B
Editor

Sreehari S
Editor

Jyotsna A
Editor

Meera Nair
Treasurer

From Editorial Team

"Electrical Engineers have just the right Spark."

It gives us immense joy to present this year's magazine '***Spark***'. A spark gives your life a meaning and purpose. It's an interest, a passion or a gift. And this is what exactly an electrical engineer requires to follow his/her passion, a spark.

The year 2017-18 has been wonderful. The activities that were left behind due to academics found a way through our magazine. Our magazine showcases the various aspects of the electrical engineering department of Fr. C. Rodrigues Institute of Technology.

A lot of effort, time and coordination has been put into the making of this magazine. We hope you appreciate and enjoy reading the magazine. We cherish our efforts and apologize for any shortcomings.

We are also grateful to all the teachers and students who have contributed to this magazine. Any suggestions or criticism on the magazine are welcome.

Editorial Team

Sreehari S.
Mitalee B.
Jyotsna A.

Contents

From the HOD

" It is possible to fly without motor, but not without ***knowledge and skill*** *"*

-Wilbur Wright

Every electrical engineer should possess a blend of soft skills and technical skills. This is essential for an individual to succeed and to be able to contribute to the growth of an organization. The Department helps our students to adapt to the changing needs of the industry by providing them with excellent infrastructure and experienced faculty. The students are encouraged to undergo internship training in electrical related companies to ensure that they are comfortable in a corporate environment. The department encourages our students to participate in extracurricular and co-curricular activities which will help them to improve their interpersonal skills and leadership qualities

I am taking this opportunity to congratulate the convener and the council members of EESA-2018 for their contribution in organizing various programs and also the efforts they have put in releasing the EESA magazine **"SPARK"**.

Regards

Dr Bindu S
HOD
Dept. of Electrical Engineering

About Fr. C.R.I.T

Fr. C.R.I.T. has, within a short span of time, established itself as a **leading engineering college** in Mumbai University. Though its reputation rests mainly on the **high quality, value-based technical education** that it imparts, it has to its credit a verdant, well-maintained Campus and extensive facilities. Its location in the vicinity of the holy places of various religious denominations underscores its secular credentials and its philosophy of *"Vasudhaiva Kuttumbakam"*.

Electrical Engineering at Fr. C.R.I.T

Electricity has been a subject of scientific interest since at least the 17th century and hence is considered as one of the oldest branch of engineering. The students are taught to design, analyze, implement and operate electrical and electronics systems efficiently, thus opening the doors to new challenges. In this aspect the students are given in- depth knowledge in **Machines, Power Systems, Control System, Signal Processing Drives, Power Electronics Microprocessors and Switched Mode Power Supplies**. To impart this we have well qualified, experienced and dedicated staff in the department. The department also offers a full-time Post Graduate programme in Power Electronics and Drives.

Vision & Mission

INSTITUTE

VISION

To evolve and flourish as a progressive centre for modern technical education, stirring creativity in every student leading to self-sustainable professionals, through holistic development; nurtured by strength and legitimate pride of Indian values and ethics.

MISSION

- To provide industry oriented quality education.
- To provide holistic environment for overall personal development.
- To foster relationship with other institutes of repute, alumni and industries.

QUALITY POLICIES

- Conform to the requirements of regulatory authorities.
- Quality assurance in teaching-learning processes through best practices.
- Ensure transparency in continuous evaluation through fair practices.
- Ensure best academic ambience by providing state-of-the-art infrastructure.
- Encourage overall development of students through co-curricular and extra-curricular activities.
- Promote collaborative learning and research through interaction/ partnership with industries and research organizations.

Vision & Mission

DEPARTMENT

VISION

To evolve as a progressive centre for modern technical education in the field of Electrical Engineering to produce self-sustainable professionals through value based education.

MISSION

1. To provide modern technical education in the area of Electrical Engineering.
2. To collaborate with industries and institutes of repute to grow progressively.
3. To provide holistic environment for the development of socially responsible citizens.

Program Educational Objectives

Graduates will be able to:

1. Demonstrate core competency in the areas of power system, power electronics, machines, renewable energy and allied disciplines.
2. Contribute to environmental sustainability through design, development and commissioning of green energy or clean energy systems.
3. Excel in professional career and higher education with ethical values.

Program Specific Outcomes

Graduates will be able to:

1. Comprehend and analyze the problems in power generation, transmission and distribution systems.
2. Acquire technical knowledge, skill and competency in development of Renewable energy system and contribute to energy efficiency.

Staff Publications

International Journals (2017-18)

Sr. No.	Title of Paper	Details	Author/ Co-author
1	Analysis and control of a Novel Transformer-less Microinverter for PV-Grid Interface	IEEE Journal of Photovoltaics, Vol 8, N0 4, July 2018	Mini Rajeev
2	Single Phase Current Source Inverter with Multi control for Transformer-less Grid-PV Interface	IEEE Transaction on Industry Applications, Vol 54, N0 3, May/June 2018	Mini Rajeev
3	A Multi-port Half bridge DC-DC converter for PV application	International Journal Electrical, Electronics and Computer Engineering (IJEECSE), Vol 4, Issue 6, Dec 2017.	Mini Rajeev

International Conferences (2017-18)

Sr. No.	Title of Paper	Details	Author/ Co-author
1.	Stability enhancement of Transformed PV system using Inrush mitigation Techniques	49th North American Power Symposium (NAPS17), in West Virginia University, Morgantown, WV, USA, during September 17-19, 2017	Mahendra Rane
2.	Control Scheme for Seamless Operating mode transfer of AC Micro grid	2017 the 5th IEEE International Conference on Smart Energy Grid Engineering	Dr. Sushil Thale
3.	A Novel Protection Scheme for DC Micro grid with Hierarchical Control	2017 the 5th IEEE International Conference on Smart Energy Grid Engineering	Dr. Sushil Thale

4.	Precision Agriculture through ICT and Data Ecosystem: An opportunity for Digital Transformation	60th Annual IETE Convention-2017, Organized by IETE HQ, Kochi Centre, 16-18th Sep 2017	Dr. Sushil Thale
5.	Performance analysis of Bipolar Marx Generator Topologies with input switch charging and inductive charging method	ICISIM-2017, Oct 2017, Aurangabad, Maharashtra.	Dr. Bindu S.
6.	Unbalanced voltage mitigation with reactive power control of grid-tied solar PV system	ICAER-2017, Dec 2017, IITB, Mumbai	Dr. Sushil Thale
7.	Enhancing power system learning experience using simulations	ICIRTE-2017, Oct 2017, Mumbai	Divya M.
8.	Realization of novel transformer-less grid-PV interfaced inverter	CCUBE-2017, Dec 2017, Bangalore, Karnataka	Mini Rajeev
9.	DC Emulation of Three Bus Transmission systemSystem	2017 IEEE conference on Technological Advancements in Power and Energy (TAP Energy 2017) Kollam, Kerala. Dec 2017	Divya M.
10.	Hardware Implementation of Three phase PWM Rectifier	2017 IEEE conference on Technological Advancements in Power and Energy (TAP Energy 2017) Kollam, Kerala. Dec 21-23, 2017	Uma L. Dr. Sincy George
11.	A Novel Configurable signal acquisition system for multiple bio signal measurements: Assistive technology for home rehabilitation	2017 IEEE conference on Technological Advancements in Power and Energy (TAP Energy 2017) Kollam, Kerala. Dec 21-23, 2017	Dr. Sushil Thale Uma L.
12.	Electric Vehicle Multiple Input Bidirectional Charge controller system	ICIRTE 2017, Oct 26-27, 2017	Rashmi Kale

13.	Bidirectional DC-DC converter in Solar PV System for Battery Charging Application	IEEE International conference on Smart City and Emerging Technologies, 5th Jan 2017.	Seema Jadhav
14.	Renewable Energy Application of Push Pull converter.	IEI Conference on Recent Trends in Renewable Energy Applications in Research 16-17 Feb 2018.	Mini Rajeev
15.	Power Generation using Solar Roof Top system- A case study	ICAEASM-2017, Oct 8th 2017	Poornima Rao Divya S.
16.	Sizing of Hybrid Energy Storage System and Propulsion Unit for Electric Vehicle	ITEC India 2017, 13-15 Dec 2017.	Bindu R and Dr. Sushil Thale
17.	Design and Control of Power Conversion System for Electric Vehicle Application	2017 IEEE International Conference on Technological Advancements in Power and Energy (TAP Energy 2017)	Bindu R, Dr. Sushil Thale
18.	Head motion controlled Electric wheel chair	ICSTM 2017, Pune 12th Nov 2017.	Harshada C.B.
19.	Analysis and Comparritive study of Varios Charging method implemented for Solid state Marx Generator	ICAER-2017, Dec 2017, IITB, Mumbai	Dr. Bindu S.
20.	Design and Implementation of PMBLDC motor using ANN	4th International conference on Industrial Engineering ICIE 2017, Dec 21-22 2017	Sreedevi Nair
21.	Design and Implementation of PFN with optimised pulse power and rise time	ICAC3-2017 Fr. CRCE Bandra on 5th Jan 2018.	Ruchi Harchandani
22.	Real Time Protection technique for DC Microgrid using Local Measurements	IEEE International Conference on Technologies for Smart City Energy Security and Power (ICSESP-2018), 28th -30 March 2018,Odisha	Dr. Bindu S.

23.	Multi Year Tariff Structure Impact on Financial Status of electric Utility	IEEE International Conference on Innovative Technologies in Engineering (ICITE-2018), 11th -13 April 2018, Hyderabad	Dr. Bindu S.
24.	Impact of Various Factors on Tariff during Multi Year Tariff Period	International Conference on Smart Electric Drives and Power System (ICSEDPS), 12th -13 June 2018, Nagpur	Dr. Bindu S.
25.	Active Power Decoupling Method using Active Buffer in a Single phase Photovoltaic Inverter	EIT June 2017	Mini Rajeeev
26.	Simulation of Three stage PFN based Marx generator with Boosting Operation	International Conference on Frontiers in Engineering, Applied science and Technology (FEAST-18), April 27th-28th, 2018 at NIT, Trichy	Ruchi Harchandani
27.	Effective Two-input Two-output Plugin charging Method for Hybrid Vehicle Technology	International Conference on Frontiers in Engineering, Applied science and Technology (FEAST-18), April 27th-28th, 2018 at NIT, Trichy	Rashmi Kale
28.	Transient Stability Studies using SMIB Emulator	International Conference on Frontiers in Engineering, Applied science and Technology (FEAST-18), April 27th-28th, 2018 at NIT, Trichy	Divya M.
29.	Design and Simulation of Active Filter for Induction Motor Drives	International Conference on Frontiers in Engineering, Applied science and Technology (FEAST-18), April 27th-28th, 2018 at NIT, Trichy	Harshada C.B.
30.	Design and Implementation of Bidirectional DC-DC converter for Battery Charging and Discharging Application	International Conference on Global Technology and Initiatives (ICGTI) at Rizvi college, , 30th April 2018	Seema Jadhav

Staff Achievements (2017-18)

Sr. No.	Achievement	Details	Faculty
1.	Best paper	**Paper Title:** Performance Analysis of Bipolar Marx Generator Topologies with Input switch charging and Inductive charging method. **Event:** IEEE & CSI sponsored 1st International conference on "Intelligent Systems & Information Management" ICISIM-2017, Oct 2017 Aurangabad, Maharashtra	Dr.Bindu S.
2	Best paper	**Paper Title:** Unbalanced voltage mitigation with reactive power control of grid-tied solar PV system **Event:** International Conference on Advances in Energy Research Dec 2017, IIT Bombay, Mumbai	Dr. Sushil Thale.
3	Best paper	**Paper Title:** Precision agriculture through ICT and data ecosystem: An opportunity for digital transformation. **Event:** 60th annual IETE convention, Sept 2017, Kochi, Kerala	Dr. Sushil Thale
4	Elected as Senior member IEEE.		Dr. Sushil Thale.
5	Industrial Consultancy	Projects worth 25 lacs	Dr. Sushil Thale.
6	Best Faculty of the year	Best Faculty of the year under sub category Specific Innovations manifest in prototypes, patents etc at the CSI TechNext India 2018 Awards to Academia, Feb.2018.	Mrs. Mini Rajeev

7	Best paper of the Conf. Award	**Paper Title:** Realization of Novel Transformer-less Grid –PV Interfaced Inverter **Event:** International conference on Circuits, Controls and Communications CCUBE 2017, Dec.2017, Bangalore, Karnataka.	Mrs. Mini Rajeev
8	Best paper Award	**Paper Title:** Enhancing Power System Learning Experience using Simulations **Event:** International Conference on Innovation and Research in Technology and Engineering in Vasantdada Patil College. Of Engg. , Sion, Maharashtra	Divya M.

Students' Achievements (2017-18)

Sr. No.	Achievement	Details	Student
1.	1st prize with cash prize of 4000/-	**Paper Title:** Optimal Power Control in Domestic Power System **Event:** Technical Paper presentation Competition 9th September 2017 , IEEE chapter K J Somaiya Institute of Engineering and Information Tech.	Gaurav Gosavi
2.	2nd prize	**Paper Title:** Application of Opt electrics in Power System Design **Event:** Technical Paper presentation ,COEP, Pune 13th September 2017	Gaurav Gosavi
3.	2nd prize	**Project Title:** Single phasing preventer and overload protection for 3Φ IM **Event:** Mini project competition conducted by Bharatiya Vidyapeeth College of Engineering on 22nd September 2017	Mota Sutej, Prasad Shekhar, Gopale Avadhut, Parab Parth
4.	Scholarship	Scholarship of Rs.6000 was awarded to four students from Institute of Engineers (India), Kolkata	Kunal Mahadik, Lokesh Nagar, Anindita Samantha & Aishwarya Mahadik.
5.	1st prize	Project Presentation on PI-BOT(Online Surveillance Robot) Venue : St. Francis Institute of Technology, Borivali.	Mohit Patil
6.	Ranked in top 8 (AIR)	Smart India Hackathon 2018 Topic: App on Information of Riverbank Erosion / Health of Embankment	Mohit Patil
7.	3rd Prize	IEEE Technical Paper Presentation Competition Topic: 2D Printer using CNC mechanism	Mitalee B. Merlin Vincent Bennadit Nadar Ashley Noronha

BE Results (May 2018)

Rank	Name	CGPI
1	Kanchan Vijetha Shakila Begum	9.42
2	Neha Devdas	9.38
3	Aditya Palissery	9.35

Vidyut Seminar

Electrical Engineering department organizes one day seminars under "Vidyut" for Electrical students to keep them aware and updated about the current developments in Electrical Field. Eminent speakers and experts from industries are invited for conducting these sessions. This year to following the same trend industry experts took sessions on different topics for our second, third and final year Electrical students.

Vidyut - II Half of 2017

Date	Topic	Speaker	No. of students
09/09/2017	Individual and Team	Mr.Swapnil Tulsankar, Pidilite Industries Ltd	72
09/09/2017	Transducers and Industrial Measurement	Mr.Omprakash Barure, Bajeshree Instrumentation	72

		Trainers and consultants	
09/09/2017	Entrepreneurship Development	Mr.Prasad Menon Asst Professor, FCRIMS, Vashi	74
09/09/2017	Power System Dynamics, Stability and Control	Dr.S.R.Wagh, VJTI Matunga	74

Vidyut - I Half of 2018

Date	Topic	Speaker	No. of students
24/02/2018	Environmental sustainability	Dr.Ivaturi Rao, Head-Corp Environment and Climate change, Tata power company Ltd	63
24/02/2018	Electrical Safety	Mr.M.M. Patro, Additional Chief Engineer, NPCIL,Mumbai	63

Industrial Visit

Every semester students of all three years are taken for an industrial visit with a purpose of giving industrial exposure and to gain knowledge beyond books and curriculum. This year too industrial visits were organized to following industries. The companies visited are as follows:

Sr. No.	Company visited and purpose	Date	Semester
1	Industrial Visit to Bosch-Verna “Packaging Industry”	28-07-17	VII
2	Industrial Visit to DOL MOTORS Pvt. Ltd. “Practical aspects of Construction, Design & Testing of Induction Machines”	05-08-17	V
3	Industrial Visit to Uran Power Station. “Practical understanding of Operation of Gas Turbine Power Station”	18-08-17	III
4	Industrial Visit to Saini Electricals “Practical aspects of Electrical drives”	07-03-18	VIII
5	Industrial Visit to Traction Division, Sanpada “Practical understanding of various aspects related to electric traction”	03-03-18	VI
6	Industrial Visit to Shrihans Electricals Pvt. Ltd. “Practical overview on Construction, Design & Testing of Tranformers & Reactors”	03-03-18	IV

Short Term Training Program

Electrical department had organized a 5 days STTP on “Reliability in Electrical and Electronic Systems” from June 27th– to July 1st, 2017. Mrs. Seema Jadhav was the convener of the STTP. Eminent speakers from renowned colleges and industries were invited to conduct sessions. Key note speech on “Importance of Reliability Analysis in Engineering Applications” was given by Dr. H.A.

Mangalvedekar former Head and Professor (VJTI). Other speakers to name a few among them is Dr. Faruk Kazi from VJTI on “Smart grid Cyber Security and Reliability”. Prof. Aqlim Siddiqui from FCRIT, Vashi on ”Introduction to Reliability Engineering”, “Power System Reliability” by Dr. Bindu S , HOD and Professor ,FCRIT, Vashi. Dr. Faruk Kazi from VJTI conducted session on “Smart grid Cyber Security and Reliability”. Speakers from Industry like Mr. Manish Punjabi from Sarman Engineering Private Limited spoke on “Industry perspective in reliable system design”. Dr. V. Gopika Vinod from BARC took a session on “Applications of Reliability in Interdisciplinary Engineering fields. Dr.Rupesh Wandhare from Kisan Solar Pvt. Ltd. Spoke on “Reliability in Power Electronics Systems”. Participants from various colleges joined and benefitted from the STTP.

Expert Lectures

Serial No.	**Expert Lecture on**	**Conducted By**	**Date**
1	The Industry: Testing, Metering and Measuring	Mr. Pratik Mukherjee, Electrical Engineering Department, Thyssenkrupp Industrial Solutions India Pvt. Ltd. Mumbai.	14th October 2017
2	Project Management	Mr. Aman Sanjay Saxena Management Student IBS, Pune.	11th March 2018
3	Modelling of Buck Converter using State Space Averaging for First Order Control	Ms. Maitreyee Deshmukh FCRIT, Vashi, Navi Mumbai	14th March 2018
4	Transmission Line Project Execution	Mr. Ravindra Kachare Project Engineer, OHTL Projects, Kec International, Saudi Arabia	10th March 2018

Serial No.	Expert Lecture on	Conducted By	Date
5	Classification of Transformers	Mrs. Mohini Kher Assistant Professor, Electrical Engineering Department FCRIT, Vashi Navi Mumbai	10th March 2017

Mini Project Winners

Serial No.	Name	Title of Project	Remark
1	Pranav Kulkarni Mohit Patle Sharun Shibi Aboh Ngoacha	Weather Monitoring System	1st Prize
2	Sutej Mota Shekhar Prasad Avadhut Gopale Parth Parab	Single Phase Preventer and Overload Protection for 3 Phase Induction Motor	2nd Prize
3	Mitalee Babhulkar Meerakrishna Nair Bennadit Nadar	2D Printer using CNC Mechanism	3rd Prize
4	Anindita Samanta Renuka Chavan Riyaz Dange Rajat Sharma	Lock using Arduino	3rd Prize

Placement Summary (2017-18)

No of students placed: 39

1. No of core Companies Visited: **13**

I.	Godrej and Boyce	5.6 LPA
II.	Burns MCD	3.5 LPA
III.	Torrent Power	3.25 LPA
IV.	Galaxy Surfactants	4.5 LPA
V.	Sterling Wilson	2.76 LPA
VI.	SAINI Electrical	1.8 LPA
VII.	Buildtrack	2.8 LPA
VIII.	Jacobs	3.6 LPA
IX.	ETAP	3 LPA
X.	Selec Control	4.5 LPA
XI.	Sylvyn Studios	3 LPA
XII.	L&T	3 LPA
XIII.	ANSYCAD	1.8 LPA

2. **No of IT companies visited: 2**

I.	TCS	3.36 LPA
II.	ATOS	3.1 LPA

3. **Highest Package on Campus: 5.6 Lakhs per Annum**
4. **Minimum Package on Campus: 1.8 Lakhs per Annum**
5. **Average Salary Offered on Campus: 3.3 Lakhs per Annum**

Activities under EESA

<u>Maintenance Workshop</u> :

Date – 18.10.2017

Conducted By: Mr. V Sawant, Mr. Shashank S.

Event Co-ordinators – Avadhut G, Sutej M

Description – A one-day workshop on Electrical Maintenance was conducted for second year Electrical students. It featured hands-on experience on rectifying common types of faults occurring in household electrical equipments. After a brief session, students were given actual equipments with fault.

The students were asked to test the same, detect the fault and conclude the measures to be taken.

No. of participants: 38

TORQUE 2K17

In today's world of evolving technology, to survive a competitive environment it is necessary for the students to exhibit and make use of their ideas and knowledge. **TORQUE** is a platform where students get to participate in competitions and show their technical and cultural skills apart from their busy academic life, helping them transform into better person and also for their all-round development.

1. Technical Quiz :

Date -17.02.2018

Event Co-ordinators – Prajakta N, Inshaal K, Sreehari S, Sutej M

Description - The event was conducted in 3 rounds testing student's technical as well as general knowledge.

Round 1: Basic Fundamental Test: Here the participant's knowledge regarding electrical basics was tested. A questionnaire consisting of 29 questions was given to the students.

Round 2: Guess the Term: Participants were given a questionnaire having 21 questions on Pure Electrical Engineering. The participants were given a description of the word and were asked to guess the correct associated term.

Round 3: Application-Oriented Quiz: The Top 4 group were asked 16 questions on the application of various concepts in practical world.

No. of Participants: 18

WINNERS:

First: Shivam Maurya, Prajakta Makhi

Second: Saurabh Shelke, Pratik Raut

2. Melt the Metal :

Date – 17.02.2018

Event Co-ordinators – Ankita P, Mayuri G, Jersan George

Description -The whole event was divided into 2 levels. Each group was provided with 1 solder iron and components required.

Level 1: A simple circuit was given to the participants and they were asked to mount and solder exactly as per the diagram on PCB. Eliminations were according to time taken by groups to submit the completed circuit.

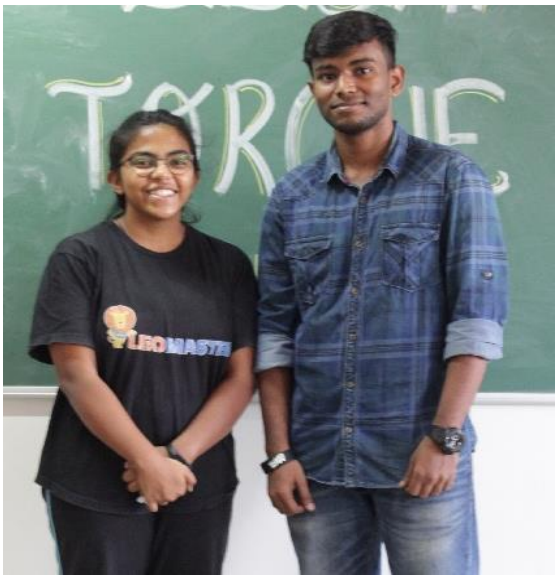
Level 2: A complicated, tricky circuit diagram was given with added complex components. The group whose output came first in minimum time-frame, with near to theoretical value was declared to be the winner.

Level 3: A tricky circuit with more components and complex design was given to the finalists. The winning team was decided on the basis of maximum closeness to true value, in minimum value of time.

No. of Participants: 40

WINNERS:

First: Varun P, Bhavesh G



Second: Bennadit N, Merlin V

3. Pirates of Circuits :

Date – 17.02.2018

Event Co-ordinators – Kaveri P, Shweta H, Aishwarya M

Description –The event was conducted in two rounds.

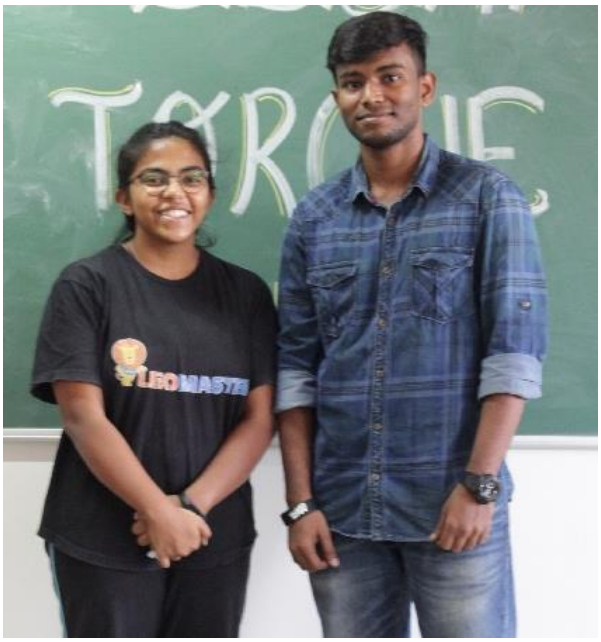
Round 1: The participants were given a circuit drawn on blackboard which they have to solved and give the correct value of equivalent resistance in minimum time limit.

Round 2: A network diagram with faulty resistor and associated fault current was drawn on blackboard. Participants were asked to compute value of faulty resistor.

Round 3: Circuit given to the participants have to be solved and give the correct value of resistance. After that with the help of colour coding participants have to collect the resistance and mount it on breadboard and give the correct output in minimum time limit.

No. of Participants: 36

WINNERS:



First: Bennadit N, Merlin V

Second: Shekhar P, Anindita S

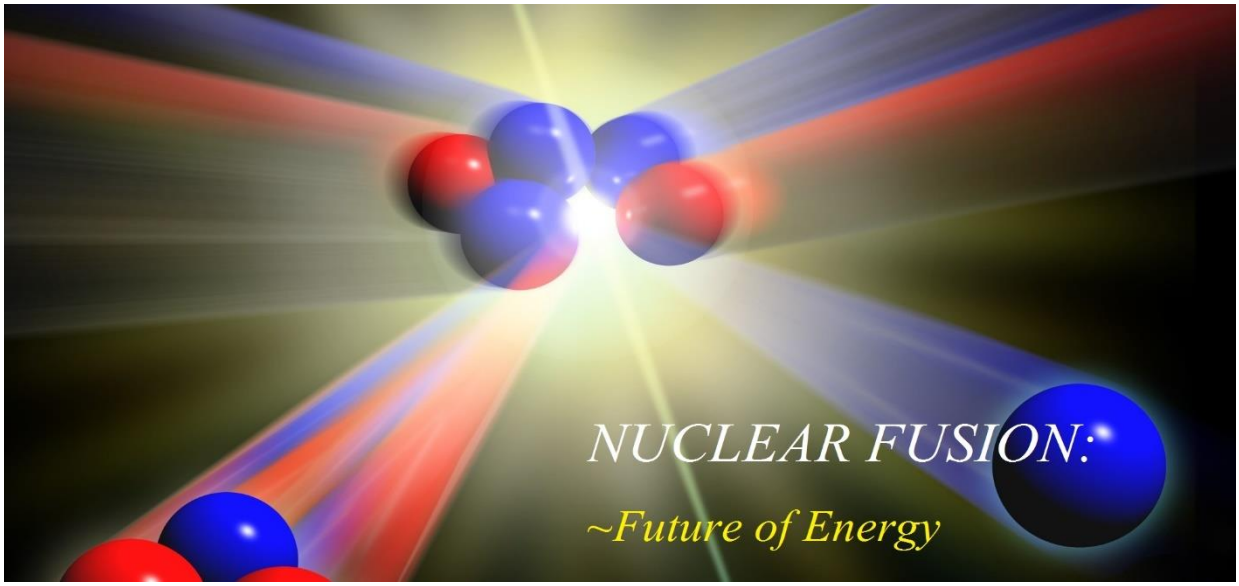
Cleanliness Drive

A cleanliness drive was organised as a social activity under EESA on 10th February 2018 at Mini Sea Shore, Vashi. The cleanliness drive saw a huge participation of students from all the semesters of electrical department. Even the faculties and staff members participated in the cleanliness drive. The main motive of this cleanliness drive was to support the on-going Swachh Bharat Mission.

The event was organised by Nincy George and Renuka Chavan under the guidance of Mrs. Harshada Bhosale. All the students were separated into different groups and allotted different area which was to be cleaned. The Waste Collection Department of NMMC extended their support and guidance in cleaning activity. The areas covered during cleaning were the Mini Sea Shore and the gardens nearby it.

After the completion of the activity, the Head of the Waste Collection Department told us the importance of proper waste management in this time where the generation of waste is more than the production of actual materials. Also the importance of separating waste into biodegradable and non-biodegradable waste was made. The Waste Collection Department has also launched an app wherein a person has to upload the photo of the place consisting of garbage; the NMMC then takes action within 24 hours. This is a good initiative taken by the NMMC in cleaning up the city. The activity finally ended well, leaving behind a neat and clean Mini Sea Shore.

No. of participants: 88



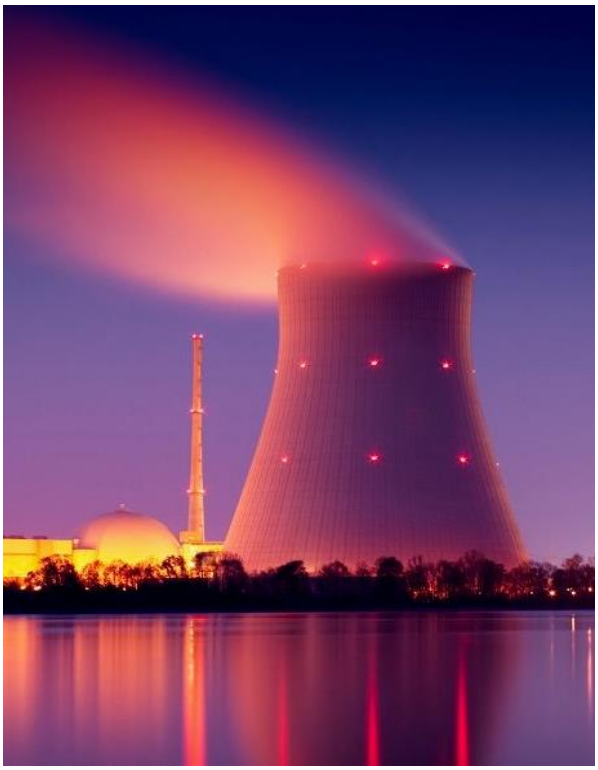
- Pranav Kulkarni (Sem-7)

Last century has seen a multifold advancement in technology. As a result, today's world is highly dependent on machines, equipment and gadgets which run on electricity. Our current methods of energy generation do not go much beyond the conventional sources of coal and hydro. The newer methods of Solar and wind, although cleaner and are becoming cheaper, do not seem to possess the potential to meet the ever increasing energy demand. Nuclear Fission on the other hand, although capable of providing base load supply, also results in radioactive waste and poses a threat of potential meltdown. Hence, there is a necessity to look for a clean energy source which also has the capacity to meet the energy demands of future.

One such source is Nuclear Fusion. Unlike the present nuclear plants which disintegrate Uranium using neutrons to create lighter nuclei and releasing energy in the process, Fusion reactors combine lighter nuclei like Hydrogen to form heavier and more stable nucleus like Helium. Since the product nucleus is more stable, it has a lesser potential energy and as a result, lesser mass (from the equation $E=mc^2$). The difference between the total masses of fuel nuclei (hydrogen) and the mass of product nucleus (helium) is the energy released in the process, given by $E=\Delta mc^2$ (where Δm is the mass defect).

The nucleus of an atom consists of protons and neutrons and to combine two nuclei, the electrostatic repulsion between the protons becomes the major hurdle. That repulsion can be overcome by very high temperature and pressure. The most fascinating working example of this reaction is our Sun. Fusion takes place at its core with hydrogen nuclei smashing into each other to form Helium nuclei, releasing energy in the form of heat and light. However, Sun has the great advantage of huge mass which creates tremendous pressure in the core. This is not possible to replicate on Earth. Consequently, absence of pressure is compensated by increase in temperature.

Therefore, to attain nuclear fusion in Lab, temperatures of more than 5 million K are required which creates plasma and a reaction mixture which cannot be contained using any material on earth. This presents a problem which is one of the major hurdles in creating a fully functional fusion reactor - Plasma Containment. Thanks to the decades of plasma and fusion research throughout the world, we have developed few ways to tackle this problem which include – Magnetic



Confinement, Inertial Confinement, and Magnetized Target Fusion etc.

Building a working Fusion reactor is one of those unique challenges which demands

both Theoretical and Engineering research. Large research facilities throughout the world are leading our way into making this a reality. Current major research facilities include Joint European Torus (UK), Wendelstein-7X (Germany), Princeton Plasma Physics Laboratory (USA), National Ignition Facility (USA) and many others in Japan, China etc. However, all eyes are set on the International Thermonuclear Experimental Reactor (ITER) being built in Cadarache, France. It will be the largest Science Experiment on earth and will produce a self-sustaining Fusion reaction which will provide 500MW of power for an input of 50MW i.e. a net gain factor of 10. It will be a proof of concept of a working fusion reactor and will become operational by 2020.

India has also contributed to this research with us being one of the seven countries of the world which have funded this megaproject of ITER and having our own research facilities at Institute of Plasma Physics at Gandhinagar, Variable Energy Cyclotron Centre (VECC), Kolkata and TIFR, Mumbai.

We as electrical engineers have a great challenge in front of us to provide working solutions to these technological hurdles. The quest is worth it because the stakes are high and if, rather when we become successful, we will have harnessed the real energy of Sun and with it, a clean source of energy which can power us for next billion years.

Refernces:

[1]- Nutall W J, pp. 3-4-5-8. September 2008. London. ‘Fusion as an Energy Source: Challenges and opportunities’, Institute of Physics.

[2]- World Energy Resources 2016. World Energy Council.

~ Lokesh Nagar (Elec-5)

Wireless Transmission, as the name suggests, is the technique to transfer electrical power without wires or conductors as physical link. The power is mainly transmitted through air.

Why do we need Wireless Transmission?

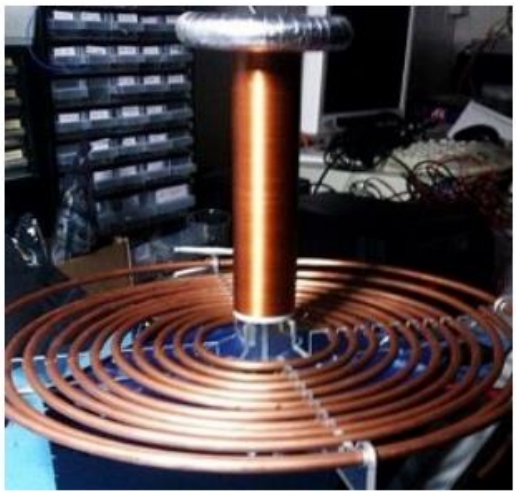
Wireless transmission will definitely save lots of money for the power company supplying power as no conductors are used. In conventional way of power transfer there are a lot of ways in which power is lost and the chance of short circuit is high as physical wires are present. This problem is solved in case of wireless transmission. However, the initial cost of the setup will be high but in future this would be much cheaper.

Tesla Coil

Wireless transmission was first observed by **Nikola Tesla** with help of his invented device "Tesla Coil". The tesla coil works on the principle of *electromagnetic induction.* It states that when a conductor is present in a changing magnetic field, potential is generated and current starts to flow. If a conductor carries a current, through it magnetic field is produced across it. The direction of this magnetic field is given by the right-hand thumb rule. Which states, if we hold the conductor in our right hand in such a way that the thumb shows the direction of current, then the other fingers show the direction of magnetic field. Similarly, if a magnetic field flows through the center of a coiled wire, voltage is generated and current starts to flow.

The electric potential increases as the number of turns in the coil increases. A

coil having 100 turns will produce 10 times of more voltage than a coil having 10 turns. The current would reduce as the voltage increases to conserve energy. This working is similar to that of a transformer where the voltage is stepped up or down on the basis of the number of turns in the primary and secondary voltage. Tesla coil does similar job but in a different way.



Wireless Charging

This is the most used application of wireless power transmission in recent times. Wireless charging is the term basically referred to charge mobile phones without using the actual USB cords. The working principle is same, i.e. *electromagnetic induction*. There is a sender coil present in the charging pads which is given supply. This sender coil generates oscillating magnetic fields. The receiver circuit is present in the mobile phone, which when comes in contact with the oscillating magnetic fields produced by sender circuit and when it resonates with the magnetic field emf is induced and current start flowing and the battery gets charged. If there are more than one receiving circuits in the surrounding area, all the devices could be charged at once. Coil size also affects the distance of power transfer. The bigger the coil, or the more coils there are, the greater the distance a charge can travel. In the case of smartphone wireless charging pads, for example, the copper coils are only a few inches in diameter, severely limiting the distance over which power can travel efficiently. But when the coils are larger, more energy can be transferred wirelessly.

This phenomenon through which wireless charging takes place is known as *inductive charging.*

Advantages of inductive charging:

1. Inductive Charging is safer as no physical wires are present and so you can use the devices with wet hands (as most of the bathroom devices are inductively charged).
2. More than one devices can be charged at a time with only one charging plate.

Disadvantages of inductive charging:

1. Weak magnetic field may create problem if more than one devices are connected to a single magnetic plate.
2. The process of charging is slow.

Reference:

www.wirelesspowerconsortium.com

EESA Council 2017-18

Sr. No.	Names	Designation
01.	M. Inshaal Khan	Chairperson
02.	Sutej Mota	Secretary
03.	Aishwarya M	Asst. Secretary
04.	Meerakrishna Nair	Treasurer
05.	Sreehari Sasidharan	Editor
06.	Mitalee Babhulkar	
07.	Jyotsna Anand	
08.	Kaveri Patil	Program Co-ordinators
09.	Ankita Purkar	
10.	Prajakta Nalwade	
11.	Shweta Honyalkar	
12.	Mayuri Gaykar	
13.	Renuka Chavan	
14.	Nincy George	
15.	Avadhut Gopale	
16.	Jersan George	
17.	Sharun Shibi	

EESA Council 2017-18

ELECTRICAL ENGINEERING STUDENTS ASSOCIATION

IEI Newsletter

SH 2018

The Institution of Engineers (India)

Students' Chapter (Electrical)

Fr. C. Rodrigues Institute of Technology
Agnel Technical Education Complex
Vashi

About Institute

Fr. C.R.I.T. has, within a short span of time, established itself as a leading engineering college in Mumbai University. Though its reputation rests mainly on the high quality, value-based technical education that it imparts, it has to its credit a verdant, well-maintained Campus and extensive facilities. Its location in the vicinity of the holy places of various religious denominations underscores its secular credentials and its philosophy of "Vasudhaiva Kuttumbakam". The college prides on being one of few that as accreditation for all five branches vide file no. 28-41/2010-NBA dated 14.11.2012.

About Department

Electricity has been a subject of scientific interest since at least the 17th century and hence is considered as one of the oldest branch of engineering. The students are taught to design, analyze, implement and operate electrical and electronics systems efficiently, thus opening the doors to new challenges. In this aspect the students are given in-depth knowledge in Machines, Power Systems, Control System, Signal Processing Drives, Power Electronics Microprocessors and Switched Mode Power Supplies. To impart this, we have well qualified experienced and dedicated staff in the department. The department Vision and Mission are:

Department Vision:

To evolve as a progressive centre for modern technical education in the field of Electrical Engineering to produce self-sustainable professionals through value based education.

Department Mission:

- To provide modern technical education in the area of Electrical Engineering.
- To collaborate with industries and institutes of repute to grow progressively.
- To provide holistic environment for the development of socially responsible citizens.

Program Educational Objectives (PEO):

Graduates will be able to…

- Demonstrate core competency in the areas of power system, power electronics, machines, renewable energy and allied disciplines
- Contribute to environmental sustainability through design, development and

commissioning of green energy or clean energy systems
- Excel in professional career and higher education with ethical values**.**

Program Specific Outcomes (PSO):

Graduates will be able to…

- Comprehend and analyze the problems in power generation, transmission and distribution systems.
- Acquire technical knowledge, skill and competency in development of Renewable energy system and contribute to energy efficiency

About IEI

The Institution of Engineers (India) [IEI] is a statutory body to promote and advance the engineering and technology, established in 1920 and incorporated by Royal Charter in 1935. It is the largest multi-disciplinary professional body of engineers encompassing 15 (fifteen) engineering disciplines with a membership of more than 820 thousand, and serving the nation for more than 9 decades.

IEI has bilateral agreements with a number of Professional societies across the globe. It holds the International Professional Engineers (IntPE) Register for India under the global International Professional Engineers Alliance (IntPEA). The Institution also awards the Professional Engineers (PE) Certification. The Institution of Engineers (India), with its headquarters in Kolkata, India, is administered by a National Council with the President of IEI as its Head.

IEI Students' Chapter (Electrical)

All the students of electrical department are members of the IEI students' chapter. From the second year students four members are selected as the council members for the academic year 2017-18. The duration of the council is for one year. The committee for the academic year is:

CONVENOR:
- Saud Shaikh

COUNCIL MEMBERS:
- Utkarsh Mishra
- KhushbooZope
- Shraddha Pawar

FACULTY ADVISOR:
- Mrs.Divya Sajeesh

The following events were conducted under IEI for the academic year 2017-18

IEI EVENTS 2017-18

- Mini Project competition
- Intra departmental quiz
- Expert lecture

Mini Project competition:

An intra departmental quiz competition was held on 22/07/2017. Twenty groups of 4 members each participated in the competition. The groups were judged by Mr. Ramachandra Bhosale, Research scholar from IIT, Bombay. First prize was awarded to group with title "Weather monitoring system", second prize for "single phasing preventer and overload protection for three phase induction motor" and third prize for "Lock using Arduino". Cash prize and certificates were awarded to the winning teams.

Mini Project team

Quiz:

An intra departmental quiz competition was held on 19 January 2018. The response of students from 2nd and 3rd year was good so an elimination round was held to select the students for the final competition. Around 50 students participated out of which 20 were selected and 4 teams of 5 members each were formed. The teams were formed in a fair manner Technical and non-technical rounds were conducted. Teams were very competitive for each and every round held. The round conducted were

a) Rapid fire round: This round required the contestants to have knowledge of both technical and non-technical questions.
b) Visual and general knowledge: Each team had to answer 6 questions and each question was given 30 seconds to answer.
c) Technical round: This round required the contestants to use,their entire knowledge of subjects

they had studied till now. Each team had to answer 6 questions within 30 seconds. The quiz was conducted successfully and the winning team and the 1st runner up team were awarded with certificates.

Expert Lecture:

The students of FCRIT were guided by experts on various topics. Around 17 expert lectures were conducted by the electrical department for students of semester 8, 6 and 4 by experts from different fields. The lectures were on various topics related to the subjects that the students study.

Lecture by Mr.Prajof Prabhakaran, IIT Bombay

The lectures included topics such as Digital signal controllers and their applications in power system by Mr. Prajof Prabhakaran, Phd scholar, IIT Bombay, Impact of electric vehicle on electrical power system by Mr. Prathamesh Joglekar L&T, Mumbai, modelling of induction machine in d-q reference frame by Mr. Ramachandra Bhosale, Phd scholar, IIT Bombay, Advancements in Electric Traction Motors by Mr.Jaipreet Singh, Saini Electrical &Engineering works Mumbai etc.

Intradepartmental quiz competition

CONTRIBUTIONS TO ELECTRICAL FIELD

Bimal kumar Bose

Bimal Kumar Bose (Born in 1932), also known as B. K. Bose, is an electrical engineer, artificial intelligence researcher, scientist, educator, and currently a professor emeritus of power electronics in the Department of Electrical Engineering and Computer Science at the University of Tennessee, Knoxville. Bose is the sole author/editor of seven books in power electronics some of which have been translated into several foreign languages, and some of which are widely used as text books throughout the world. His book "Power Electronics and AC Drives"(1986) is the first English language text book in power electronics and motor drives area.

- Power Electronics and Motor Drives-Advances and Trends (Elsevier/Academic Press, 2006)
- Modern Power Electronics and AC Drives (Prentice-Hall, 2001)
- Power Electronics and AC Drives (Prentice-Hall, 1986)
- Power Electronics and Variable Frequency Drives (Wiley/IEEE Press, 1997)
- Modern Power Electronics (IEEE Press, 1992)