# F.C.R.I.T **EXTC DEPT** ANDWIDT **AUGUST 2016 IETE / ETSA** VIRTUAL REALITY ГШИК FORWARD TO: **INTERVIEW WITH OPERATION HEAD KKNPP NPCIL.** LI-FI **Project** Ara

COVER DESIGN: VAIDEHI MULEY

Discover :

>

Quantum Computing

S Ε Μ Ε S Т Ε R





S Ε Μ Ε S Т Ε

V



IV at MECO Instruments, Rabale, Mumbai.

# FROM THE HOD's DESK



Dr. Milind Shah

Professor & Head, Department of Electronics and Telecommunication Engg. ,FCRIT



-Northrop Frve

Dear Readers,

Greetings on behalf of Department of Electronics and Telecommunication Engineering!

It gives me a great pleasure to release another issue of the Department newsletter *Bandwidth* for the academic year 2016–17. This newsletter gives us the opportunity to update us about the recent staff and student achievements, newly introduced policies, feedback from the alumni, etc.

First, please join me in congratulating our Department and Institute for being awarded research grant worth £50000/– by the Royal Academy of Engineering, UK. This grant is for conducting a collaborative research work among two industry partners and two academic institutes. The industry partners involved are Reliance Industries Ltd, India, and Parkinson Spencer Refractories Ltd., UK. The two academic institutes include University of Leeds, UK, and our department and institute.

On behalf of the Department, I congratulate all the students of TE and SE class of the academic year 2015–16 for successfully passing with overall passing percentage of 83% and 70%, respectively. We need to work hard and explore all the other options for further improving our TE and SE class results.

On behalf of the Department I would like to sincerely request you to get actively involved in teaching-learning process being followed by the department and secure above first class in all the semester examinations so that you become "eligible" for placement in the final year. Also, please actively get involved in all the department level co-curricular activities organized under IETE-ETSA banner which will be useful to you for enhancing your technical skills and overall personality.

Wish you all the best!

# **QUICK NAVIGATOR**

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 $Also, \ \text{look for interesting facts on VIRTUAL REALITY (VR)}.$ 

# THE IETE - ETSA COUNCIL



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Chairman	Anchal Mishra	Pranita Shewale	
Vice - Chairman	Nipun Bhirud	Soumik	
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Organizing Committe	e		

## **Patrons**

Rev. Fr. S. Almeida	Regional Superior, M. D., ATEC, Vashi
Rev. Fr. L. Dias	Procurator, ATEC, Vashi
Dr. S. M. Khot	Principal, Fr. C. R. I. T., Vashi

Department Representative: Dr. Milind Shah, Professor & Head, EXTC Department Faculty Coordinator: Mrs. Pushpa U. S., Assist. Prof., EXTC Department, Fr. C. R. I. T., Vashi

# Sub-Committees (SC): July-2016 Onwards

Sr. No.	Staff Name	Convener SC-1	Convener SC-2	Convener SC-3 / Member SC-1	Convener SC-4 / Member SC-2
1	Ms. Sadhana Pai	NBA	PTI	PhD (admission, interviews, etc.)	Making available various data as required in Governing Council, etc
2	Ms. Megha Kolhekar (HS)		Activities for PO atta	inment not covered by cur	riculum
3	Ms. Savitha Upadhya (HS)	<ol> <li>NBA file monitoring</li> <li>Member - UG Project (till Nilashree madam joins back)</li> </ol>			
4	Ms. Pranali Choudhari (HS)	1. NBA file n	nonitoring		
5	Ms. Pushpa U. S.	IETE/ETSA	Institute/Dept Magazine	2-Day Workshop for students before beginning of new AY (C)	Monitoring of mentoring (C)
6	Ms. Smita Chopde	LIC	FACES	University Affiliation	Preparing schedule for conducting assembly + Preparing paper publication list and vacation slot details (C)
7	Mr. Ashish Harsola (HS in pipeline)	1. NBA file monitoring			
8	Ms. Nilashree Wankhede (ML)				
9	Mr. Yogesh Chandurkar	Industrial visit	ARC	SSS	MoU with industries and actually conducting courses (C)
10	Ms. Smita Hande	PG Coordinators	LOOPS	Alumni	Website
11	Ms. Anita Jadhav	Alumni	End Semester Students' feedback	PG Coordinator	Department representative for the Dean-R&D
12	Ms. Manita Rajput	MICRO	Staff Appraisal	Time table	Department representative for the Dean-Academics
13	Ms. Sreedevi Nair	Time table	AICTE EOA	2-days STTP for staff at the beginning of new AY	Cross-checking of lab muster for regular grading etc
14	Ms. Amruta Mhatre	University Affiliation	2-days STTP for staff at the beginning of new AY	LIC	Department representative for the Dean-Students Affairs
15	Ms. Sneha Revankar	Exam cell	ICNTE-Technical Program Committee	Result announcement and calling parents of students who failed	Department budget
16	Mr. Jatin Desai	Placement coordinator		PTI	
17	Ms. Keerthi Unni	UG Project	Felicitation	NBA	Project exhibition (with the help of ISF/ETSA council)
18	Ms. Nishan Patnaik	Etamax	Follow-up with attendance defaulters (outside students as well as those staying in hostel) for undertaking, etc	NBA	Maintenance (other than equipment's)

# KNOW YOUR FACULTY

## HEAD OF THE DEPARTMENT AND PROFESSOR

DR. MILIND SHAH

### ASSOCIATE PROFESSORS

M5. SADHANA PAI M5. MEGHA KOLHEKAR

### ASSISTANT PROFESSORS

MS. SAVITHA UPADHYA	MS. PRANALI CHOUDHARI
MS. PUSHPA U S	MS. SMITA CHOPDE
MR. ASHISH HARSOLA	MS. NILASHREE WANKHEDE
MR. YOGESH GHANDURKAR	MS. SMITA HANDE
MS. ANITA JADHAV	MS. MANITA RAJPUT
MS. SREEDEVI NAIR	MS. AMRUTA MHATRE
MS. SNEHA REVANKAR	MR. JATIN DESAI
MS. KEERTHI UNNI	MS. NISHAN PATNAIK

#### NON TEACHING STAFF

MR. VIJAY S.	LAB ASSISTANT
MS. SREEKALA N.	LAB ASSISTANT
MR. SAMEER J.	LAB ASSISTANT
MR. SANTOSH	LAB ATTENDANT
MR. PRAVIN POTE	TECH ASSISTANT

*VR* is an artificial visual environment generated by your computer (or smartphone), which immerses the viewer into the world of VR by wearing specialized goggles.

# **IETE- ETSA EVENTS 2015-16**

#### 1. OSCILLATIONS:

'Oscillations' is a technical intercollegiate event conducted by the IETE-ETSA council in the last week of July.

The various sub events are

- Technical Paper Presentation
- Visual Quiz
- Electropuzz
- Detective
- Junk Yard
- Judgement Day

#### 2. **MICRO**:

'Micro' is a departmental seminar for the second, third and final year students to help them gain in-depth knowledge of current technical topics and to bridge the gap between academics and industrial exposure.

#### 3. EXCTACY-

'Extacy' is a skill development event in which students gain valuable experience on skills such as robotics, soldering, debugging and reverse engineering.

#### 4. **BUZZ-**

'Buzz' is an introductory event for all the first year students and is conducted by the second year students. It involves general introduction to the department, faculty, policies followed and events conducted. Some time is also given for interaction among the students.

#### 5. LOOPS-

'Loops' is a one day departmental seminar for developing skills in the field of Electronics and Telecommunications and to generate interest among the students.







# **B.E. PROJECT ABSTRACTS** (2016-17)

## Digitally Interfaced Analog Signal <u>Processor</u>

Jasti Anish , Pulkundwar Chaitali Chandrakant, Kelkar Saurabh Ganesh, Nakra Neel Jawaharlal

High quality analog guitar signal processors often suffer from limitations with respect to flexibility while routing signals and saving set configurations. While this is overcome in digital signal processors, the audio signal quality is different from analog processing. The objective of our project is to build a system that uses the best of both worlds. The audio signal is preserved in the analog domain and thus free of A/D and D/A conversion losses. Control over switching and routing is accomplished using microcontrollers in the digital domain

### <u>Modulated DIATHERMY</u> <u>Methodologies for Pain Alleviating</u> <u>System</u>

Aishwarya Balasubramanian, Neha Joseph

The aim of the proposed system is to design an embedded system to study and apply the modulated therapy like music operated ultrasonic, Diathermyshortwave. microwave. Infrared stimulus. Electromagnetic Waves, magnetic therapy for alleviating pain. It consists of various pads (electrodes) to stimulate the muscle and nerve. The application of these various methodologies depends on the frequency of operation, intensity, exposure duration and it gets modulated in accordance with music. The system is designed to synchronize the human mind, body and control human immunological characteristics by these therapeutic methodologies to enhance the pain relief quicker and reduce or eliminate the pain, chronic pain disease. The proposed system adds improved procedure to treat chronic pain, feel better, even diagnose, analyse and apply the suitable therapy.

### Air-quality mater

Ankita Kumar, Shardul Dhusia, Saharsh Raina, Rachana Shetty

Air quality index or AQI is a number used by government agencies to communicate to the public how

polluted the air currently is or how polluted it is likely to become. The components used in this project are: ATmega328P, Temperature and humidity module (DHTH), Serial real time clock (RTC) IC (DS1307), Air-quality sensor (MQ135), PM2.5/PM10 sensor (SDS011). Cigarette smoke can be used as polluted air for testing. PM value can reach up to 999 within five seconds when smoke is generated. The smoke value increases with smoke density and temperature and humidity change as per the environment.

### IoT based Vehicle Parking Manager

Aditya Bhanje, Sneha Biradar, Dion Fernandes, Swapnil Gavhane

The main objective of this project is to design a solution for the parking issues that exist in public places such as malls, theatres etc. We aim to achieve the same by using the concept of Internet of Things, wherein we will create an Android Application for the customer, whose details are constantly updated by the Hardware/Server at the location. The features include: Unique Identification for each vehicle. Display available parking slots. Make reservations for the same. Maintain database (for the company side).

#### **Glass box**

Rohan D'souza, Anish Poojary, Prajakta Totawar, Sneha Aruldurai

The flight data recorder along with the flight cockpit recorder together is known as a black box. The data in black box plays a very important role in every flight crash investigations. The black box stores in all the data and analyzing those information will give us the reason of the crash. But if this black box is not recovered then the reason for the crash remains a mystery. Our project aims to build a black box which would in real time send all the information captured into the ground station in real time by uploading the data on the cloud. And the Air Traffic Control (ATC) can see the information and take supporting measures to prevent the crash or try to get help from the government if the aircraft is hijacked.

### **Smart irrigation**

Maria Chettiar, Dolcy Koli, Merin Francis, Jerin Varghese

With hosepipe bans becoming more frequent due to global warming, more and more people are starting to collect rainwater and grey water for use in their gardens. The only problem is getting the water from where it is collected and stored; to where it is needed. Solar power is absolutely perfect for use with irrigation systems for gardens, allotments and greenhouses. Smart irrigation involves the use of solar power to pump water for crops and to power an automated grass cutter and fencing. Net metering, a billing mechanism which credits solar energy system owners for the electricity they add to the grid, will be implemented. This project aims at creating a much effective and cost-friendly way of irrigation using renewable energy resource (solar energy) and also a means of protecting crops.

### Sound level meter

Anuja Padwal, Steffy Simon, Jenila Hendry, Joel Dsouza

A sound level meter is simply a device with audiofrequency sensing capabilities that is controlled, essentially, by a microcontroller, which measures, compares, and triggers the appropriate action to reduce noise level once the critical sound level has been exceeded. The sound level meter consists of a microphone, Pre-Amplifier, Condenser Microcontroller, Play and Record Chip, Power Amplifier, and LCD display. The Sound Level Meter measures sound level in decibels and can be used for activities such as environmental noise studies, sound level comparisons, investigating room acoustics, sound isolation modeling, sound propagation modeling etc. It can be applied in libraries, hospitals, laboratories, lecture rooms, meditation rooms amongst many others.

### Low-cost gesture detector using Neural Networks

Nikita Sharma, Aishwarya Nambiar, Shivam Chakoo, Tanmay Dinde

Gestures are major form of human communication and are found to be an appealing way to interact with

computers. A primary goal of gesture recognition is to create a system which can identify specific human gestures and use them to convey information for device control. This project aims at bridging the disconnect between the real and the digital world by ways of gesture recognition and control. We need to design a product that can communicate wirelessly, be compact such that it can be fabricated into a wearable band and be cost-effective. Gesture patterns are recognized by using artificial neural networks (ANNs). To acquire gestures we need sensors such as flex sensors, gyroscope or an accelerometer. MSP430 with the trained network, a power source, a Bluetooth module and an accelerometer into a compact device. When a user makes a gesture, microcontroller reads the 3-axis data of the sensor and sends wirelessly through Bluetooth to the processor.

### Lower arm active prosthetic hand driven by surface EMG signals

Sanket Thakare, Vikas Thale, Nadar Samuel, Nadar Prince

The advancement of micro-electronics allowed the efficient recognition of different signals and the initialization of actuators based on these signals. Animatronics brought together both these elements and, allowed the recreation of the human gestures. The idea of the project is to control a lower arm robotic arm using the bio-potential generated from the muscle, known as Electromyography. The first phase of the project is to have an in-depth understanding of EMG signal & its behaviour. The second phase will be to provide the filtered and rectified output to the microcontroller system. The third phase of the project will be to build a 3D human lower arm, and use the actuating motion using servo motors. An efficient pattern recognition will be employed, so that we can get repetitive better performance.

### <u>Microcontroller based Irrigation system</u> <u>through wireless network</u>

Rajani Borkar, Neha Arun, Shrutika Jadhav, Dighe Archana

Agriculture is the source of livelihood of majority Indians and it also has a great impact on economy of the country. In our country rainfall controls the agriculture; but the rainfall is non-uniform and irregular which creates hassle in irrigation which badly affects the agriculture production. This project implements an irrigation system through wireless sensor networks, powered by solar energy. The objective of this project is to monitor various parameters which determines the soil quality, perform automatic irrigation and spray fertilizers based on the sensor inputs and inform the farmer about the same.

### <u>Analysis of MOSFET, its use in digital</u> <u>logic circuits using visual TCAD</u>

Jenis James, Jomy Joseph, Prerna Patil, Sneha Thomas

The purpose of our project is to design/develop 2D/3D model of digital circuits such as inverters and 6T-RAM using Visual TCAD and Gds2Mesh. Goal of our project starts from building up NMOS PMOS devices considering both physical configuration and related device properties and linking between broad range of physics and electrical behavior of models. These models are essential for integrated circuit development. Our design techniques would involve constructing mask layouts of digital circuits and generation of TCAD model using Gds2Mesh with suitable doping profile placements, modelling and meshing of circuits and using python scripting language.

### Smart BLE security system and Home Energy Monitoring

Vishaka Biradhar, Shenil Vincent, Y W Prakash, Minto Martin

Home Automation is an emerging field in the era of smart Home. In this project we mainly focus on Home security and technique to monitor energy consumption of the house. The Home security system uses BLE module to unlock the door and a camera and Wi-Fi module through which we transmit the image on the smart phone. This helps us identify the person entering the house. The energy monitoring system helps us to set a threshold value for each day and update us with a notification on crossing the threshold by which we can control the appliance.

#### **Music modulation tens therapy**

Keerthana Mary Arul, Macleen Martin Pereira, Yogesh Sapte

The aim of the proposed system is to design an Embedded system for study and apply the music

modulated like ultrasonic. TENS therapy (Transcutaneous Electrical Nerve Stimulus), microwave, Infrared stimulus, Electromagnetic Waves, magnetic therapy for the pain alleviating. It consists of various pads (electrodes) to stimulate the muscle and nerve. The application of these various methodologies depends on the frequency of operation, intensity, exposure duration and it gets modulated in accordance with music. The system is designed to synchronize the human mind, body and control human immunological characteristics by these therapeutic methodologies to enhance the pain relief quicker and reduce or eliminate the pain, chronic pain disease.

### Development of simulator for alarm <u>modules</u>

Prakarsha Saxena, Smita Kashid

Our BE final year project is an external project in NPCIL which is a PSU of Government Of India responsible for design, construction, operation & maintenance of nuclear power plants. Our external guide is Mr. Taheer Khan. The section, where we are going to do our project is a special Research & Development section (Electronics Division) of NPCIL. The nuclear reactors have various critical systems, where a lot of modules are in communication with each other & accordingly the processing within the systems is done. These are various embedded systems designed indigenously & tested in Lab at small level & then implemented at a large scale. These systems have to be efficient & responsive to take quick corrective actions, for controlling the processes. Here, in our project we are going to design a system which is based on 8951 microcontroller alarm system unit which will communicate with a Coldfire CPU based embedded system using RS485 Serial link.

### M2M ART (Machine to Machine Automation with Remote Control Technology)

Akshay Shriyan, Yash Shah, Aboli Patil, Shreyas Upasani

This project provides an overview of internet of things (IoT) with emphasis on enabling technologies, protocol and application issues. This project would establish machine to machine communication without any human interference i.e., controlling home appliances through cloud). In the coming years, IoT is expected to bridge diverse technologies to enable new applications by connecting physical objects together in support of intelligent decision making. Along with IoT, the IR based communication. This project includes controlling of light, fans, Air condition and other appliances also through IR communication. Finally, we plan to integrate both IR communication and IoT in this project to make the users of this technology feel ease and comfort controlling the home appliances by mere touch of his/her fingers.

### **Remote controlled unmanned**

Mahendra Gupta, Roshan Varghese, Thomson A Johnson, Abhimanyu R. Gupta

In the past decade Unmanned Aerial Vehicles (UAV) have become a topic of interest in many research organizations. UAV's are finding applications in various areas ranging from military applications to traffic surveillance. Researchers are frequently choosing quadcopters because it can accurately and efficiently perform task that would be of high risk for a human pilot to perform. Currently UAV's becomes an interesting topic for various countries as they are trying to capture images using camera mounted on it and processing the image for their utilities. In this project we will perform image processing using UAV controlled remotely.

### Arduino based Car Security System

Sayali Warankar, Twinkle Bardeskar, Suraj Nawale

The project is about a system designed to use vehicles with high security in which motion detection is done with PIR sensors and a call is placed if an intruder enters the car, using GSM. Many times we park our cars on roads and they are towed by the traffic authority or they might get stolen. The location tracking system installed will help us to locate the car. If accident takes place, the relatives will be informed by sending a message. The car has hands free feature, i.e. the car will be controlled only via voice commands.

### **Digital Assistance for the Blind**

Utkarsh Bansal, Prince Bose, Davis D'souza, Apoorva Malpathak

We intend to design a voice controlled system for the visually impaired, which will trans-receive information

in the form of audio. It will enable the user to receive and send emails, control indoor ambience, access social media, access daily news and weather forecast, set reminders and alarms, make notes. Existing technology used for the blind or visually impaired to use the internet or any digital form of information is dependent on Braille displays and keyboards which are expensive and scarce. Another shortcoming of existing technology is that out of all the visually impaired population, less than 2% know how to interpret Braille. Python scripting language will be used for programming our system.

### **Digital Stethoscope for Remote Diagnosis**

Samruddhi Patil, Sharon S. Joseph, Bandu Desai, Sapna Wagh

This project presents real time heart sound capture and analysis. The purpose of this work is to design and implement a digital stethoscope to serve as a platform for the acquisition of heart sounds, cardiac murmurs and analyse them. A digital stethoscope can be used to assist physicians in analysing cardiac signals in real time during auscultation to reduce the risks of not detecting certain conditions. The system uses a sensor to capture heart sounds and converts them to electrical signals. The captured signal is conditioned, converted in digital form for storage and also outputted to a standard audio jack for real-time auscultation.

The digital stethoscope system features: Acquisition of Heart Sounds, Audio output on headphone/speaker, Noise-reduction filters Playback and record signals, Data logging.

### IoT based Biometric Voting System

Nikhil Nair Shivam Singh Hashmeet Singh Obhan Adel Jathanna.

The objective of this project is to completely digitalise the voting system currently being used in our country. This project works on the principle of biometric scanning which will be used to cast the vote. A RFID (Radio Frequency Identification) card will be used for authentication of the voter and to prevent any fraudulent practices such as booth capturing, forging id to vote can be avoided. The biometric scanning will serve as a second layer of the identification process as well as for casting the vote. Finally, the principle of IoT will be used to display the results of the election on a separate website.

# Student Corner

# BLUE EYES TECHNOLOGY



Sheetal Patil EXTC V

 $T_{he world of}$ 

science cannot be measured in terms

of process and development. Today, technology has reached a point that we are sitting in front of our personal computer which can sense and control human emotion known as "BLUE EYE TECHNOLOGY". Blue in terms of Bluetooth which enables reliable wireless communication, eyes because the eye movement enables us to obtain a lot of interesting and important information.

Blue Eyes is a technology conducted by the research team of IBM at its Almaden Research Center (ARC) in San Jose, California since 1997.

All human beings have some perceptual capabilities, the ability to understand each other's emotional level or feelings from their facial expressions. Blue eyes technology aims at creating a computer that have the abilities to understand the perceptual powers of human being by recognizing their facial expressions and react accordingly to them.

The hardware consists of a central system unit (CSU) and data acquisition unit (DAU). Microcontroller-ATMEL 89C52. Bluetooth technology is provided for the coordination and communication between the two units.

The DAU used is the mobile component of the system. The main function of DAU is to gather the physiological information from sensors and forward to the CSU for processing and verification purposes. The blue tooth module, which is integrated with the mobile device (DAU), provides a wireless interface between the Central System Unit (CSU) and the user or operator having the sensors. PIN codes and ID cards are assigned for authentication purposes. The device uses a five-key keyboard, beeper and LCD display for the interaction with the operators. DAU incorporates various hardware modules like system-core Bluetooth section, Atmel 89C52 microcontroller, EEPROM, Beeper, LCD display (HD44780), LED indicator, voltage level monitors and 6 AA batteries.

CSU is the next squint of wireless-network connection in the Blue Eyes technology. The CSU mainly contains codec (PCM Codec commonly used for voice information transmission) and a wireless bluetooth module. This CSU section is integrated to a personal computer using USB, parallel and serial cable.

The operator's physiological condition is continually supervised by the Blue Eyes technology software. The software will respond in real time according to the operator's physiological condition.

Conclusion: Blue eyes technological approach assures a convenient technique that simplifies the life by supporting more elegant and user friendly provision in computing devices. The day is very near, that Blue Eyes technology will advance its way towards your household devices. In the future, even this Blue Eyes will reach to your hand held mobile device.

# LI-FI



Rushikesh Padir, Vishakha Ghike

EXTC V

## What is Li-Fi?

Light Fidelity or Li-Fi is a Visible Light Communications (VLC) system running wireless communications travelling at very high speeds. Li-Fi uses common household LED lightbulbs to enable data transfer, boasting speeds of up to 224 gigabits per second.

Li-Fi and Wi-Fi are quite similar as both transmit data electromagnetically. However, Wi-Fi uses radio waves while Li-Fi runs on visible light.

As we now know, Li-Fi is a VLC system. This means that it accommodates a photo-detector to receive light signals and a signal processing element to convert the data into 'stream-able' content.

An LED lightbulb is a semi-conductor light source meaning that the constant current of electricity supplied to an LED lightbulb can be dipped and dimmed, up and down at extremely high speeds, without being visible to the human eye.For example, data is fed into an LED light bulb (with signal processing technology), it then sends data (embedded in its beam) at rapid speeds to the photo-detector (photodiode).

The tiny changes in the rapid dimming of LED bulbs is then converted by the 'receiver' into electrical signal.

The signal is then converted back into a binary data stream that we would recognize as web, video and audio applications that run on internet enables devices.

But, Li-Fi's exclusive use of visible light could halt a mass uptake. Li-Fi signals cannot pass through walls, so in order to enjoy full connectivity, capable LED bulbs will need to be placed throughout the home. Not to mention, Li-Fi requires the lightbulb is on at all times to provide connectivity, meaning that the lights will need to be on during the day. Also, where there is a lack of lightbulbs, there is a lack of Li-Fi internet so Li-Fi does take a hit when it comes to public Wi-Fi networks. But it's not all doom and gloom! Due to its impressive speeds, Li-Fi could make a huge impact on the internet of things too, with data transferred at much higher levels with even more devices able to connect to one another. Due to its shorter range, Li-Fi is more secure than Wi-Fi and it's reported that embedded light beams reflected off a surface could still achieve 70 megabits per second.

# The future of Li-Fi :

The integration of internet of things devices and Li-Fi will provide a wealth of opportunities for retailers. Li-Fi is reportedly being tested in Dubai, by UAE-based telecommunications provider, du and Zero1. What's more, reports suggest that Apple may build future iPhones with Li-Fi capabilities. A Twitter user found that within its iOS 9.1 code there were references to Li-Fi written as 'LiFiCapability' hinting that Apple may integrate Li-fi with iPhones in the future.

# **Project Ara**

Nipun Bhirud

EXTC III

**P**roject Ara is the codename for an unnamed, upcoming modular smartphone that is made of a central module board with individual modules that can be connected. The platform will include a structural frame or endoskeleton that holds smartphone modules of the owner's choice, such as a display, camera or an extra battery. It would allow users to swap out malfunctioning modules or upgrade individual modules as innovations emerge, providing longer lifetime cycles for the handset, and potentially reducing electronic waste. Project Ara smartphone is scheduled to begin pilot testing in the United States in 2016 with a target bill of materials cost of \$50 for a basic grey phone.

The project was originally headed by the Advanced Technology and Projects team within Motorola Mobility while it was a subsidiary of Google. Google says the device is designed to be utilized by "6 billion people"; including 1 billion current smartphone users, 5 billion feature phone users, and 1 billion future users not currently connected. Google intends to sell a starter kit where the bill of materials is US\$50 and includes a frame, display, battery, low-end CPU and WiFi.

Google wants Project Ara to lower the entry barrier for phone hardware manufacturers so there could be "hundreds of thousands of developers" instead of the current handful of big manufacturers. This would be similar to how the Google Play Store is structured. Lowering the barrier for entry allows many more people to develop modules. Anyone will be able to build a module without requiring a license or paying a fee.

Ara Smartphones are built using modules inserted into metal endoskeletal frames known as "endos". The frame will be the only component in an Ara Smartphone made by Google. It acts as the switch to the on-device network linking all the modules together. Two frame sizes will be available at first: "mini", a frame about the size of a Nokia 3310 and "medium", about the size of a LG Nexus 5. In the future, a "large" frame about the size of a Samsung Galaxy Note 3 will be available. Frames have slots on the front for the display and other modules. On the back are additional slots for modules. Each frame is expected to cost around US\$15. The data from the modules can be transferred at up to 10gigabits/sec per connection. The  $2\times 2$  modules have two connections and will allow up to 20gigabits/sec.

Modules can provide common smartphone features, such as cameras and speakers, but can also provide more specialized features, such as medical devices, receipt printers, laser pointers, pico projectors, night vision sensors, or game controller buttons. Each slot on the frame will accept any module of the correct size. Modules can be swapped without turning the phone off. The frame also includes a small backup battery so the main battery can be hot-swapped. Modules were originally to be secured with electro permanent magnets, but according to the team a new, better solution has been developed. The enclosures of the modules were planned to be 3D-printed, but due to the lack of development in the technology Google opted instead for a customizable molded case.

Modules will be available both at an official Google store and at third-party stores. Ara Smartphones will only accept official modules by default, but users can change a software setting to enable unofficial modules.

Initial reception to an earlier but similar modular phone concept—Phonebloks—was mixed, citing possible infeasibility, lack of a working prototype, as well as other production and development concerns. Project Ara's launch followed shortly after the launch of Phonebloks and better addressed some of the production and development issues since it had OEM backing, but other issues were raised about the Project Ara modular concept.

Potential issues with the modular concept include a tradeoff between volumetric efficiency and modularity, as the framework interface holding the device would increase overall size and weight. Eremenko says modularity would create a difference of less than 25% in size, power, and weight to components, and he believes that is an acceptable trade-off for the added flexibility. The current prototype is 9.7mm thick, slightly thicker than conventional smartphones. Additional issues include regulatory approval; the FCC tests single configurations for approval, not modular configurations. Google said the FCC "has been encouraging so far".

# Micro-super Capacitors will Supercharge Mobile Electronics

Aditya Hartalkar EXTC V

## If you need to store a reasonable amount of energy

for a relatively short period of time (from a few seconds to a few minutes), you've got too much energy to store in a capacitor and you've not got time to charge a battery, a super capacitor may be just what you need.

Supercapacitors have been widely used as the electrical equivalents of flywheels in machines known as "energy reservoirs" that smooth out power supplies to electrical and electronic equipment. Supercapacitors can also be connected to batteries to regulate the power they supply.

In an ordinary capacitor, the plates are separated by a relatively thick dielectric made from something like mica (a ceramic) or even air. The super capacitors have its plates effectively have a much bigger area and the distance between them is much smaller and has 100F of charge storage, which are emerging as an alternative to batteries in applications where the importance of power delivery trumps that of total energy storage.



The big advantage of a supercapacitor is that it can store and release energy almost instantly—much more quickly than a battery. But, in order to make use in fast

charging devices there is strange need to decrease the size of supercapacitors. If they finally obeyed Moore's Law by squeezing themselves down to the microscale, it would make life a lot easier for electronics engineers in designing them in motherboards of various electronic devices. With tiny but powerful capacitors you could make cheaper, even tinier cardiac pacemakers and computers. They would be great in non-volatile memory, microsensors and actuators, and microelectromechanical systems, applications in which the power supplies can weigh up to 10 times as much as the other parts combined. And because,

like all capacitors, they could be coupled with highenergy batteries to provide periodic surges, as conventional capacitors do to power the flash in smartphone cameras.

Therefore, such micro supercapacitors can be fabricated using the technique called as direct laserwriting, an inexpensive, off-the-shelf laser technology that is used to etch labels and designs onto compact discs called as LightScribe. Therefore, to increase the charge you must maximize the area and minimize the distance which is typically about a micrometer.

Supercapacitors minimize the distance bv borrowing a bit of battery technology-the electrolyte. It consists of two electrodes impregnated with a liquid electrolyte and separated by an ion-permeable layer to prevent short circuits between the electrodes. As voltage is applied, ions from the electrolyte move onto the surfaces of the electrode of the opposite charge. Charge accumulates at the interface between the electrodes and the electrolyte, forming two charged layers, or electric double layers, that are separated by only a The 2-D graphene sheets are nanometer. assembled into macroscopic 3-D network which causes the electrons to move 100 times as fast in 3-D graphene as in the graphite plate used in batteries and 10 times as fast as in state-of-the-art carbon nanotubes. That speediness meant that supercapacitors could be an excellent application.

The supercapacitor adsorpts ions on the surface of graphene, and therefore the ion diffusion rate controls the rate of charge and discharge of the supercapacitor. Faster ion diffusion means faster charge and discharge capabilities. As a result, the new interdigitated supercapacitors demonstrate greater charge storage. This single-step laser-writing method can produce devices at a fraction of the cost of conventional microfabrication techniques.

To avoid the corrosion caused by leaked electrolyte the microsupercapacitors employ an allsolid-state electrolyte, which we apply directly onto the interdigitated pattern

Commercial applications of these devices are now being explored by Nanotech Energy, a Los Angeles-based startup. As mass production costs should expands, unit plummet until microsupercapacitors find their way into camera phones, RFID tags, and solar cells. Typical practice today is to use batteries for this application, but supercapacitors would be better because they can extract charge much more efficiently and with minimal losses. In addition, integrated supercapacitors can simplify the external wiring used in conventional energy harvesting and storage systems. And as Moore's Law begins to apply in full force, supercapacitors will begin to shrink right out of sight. As electronics engineers well know, there's plenty of room at the bottom.

# **Quantum Computing**

### Nipun Bhirud

### EXTC III



Quantum computing studies theoretical computation systems (quantum computers) that make direct use of quantum-mechanical phenomena, such as superposition and entanglement, to perform operations on data. Quantum computers are different from binary digital electronic computers based on transistors. Whereas common digital computing requires that the data are encoded into binary digits (bits), each of which is always in one of two definite states (0 or 1), quantum computation uses quantum bits, which can be in superposition of states. A quantum Turing machine is a theoretical model of such a computer, and is also known as the universal quantum computer. The field of quantum computing was initiated by the work of Paul Benioff and Yuri Manin, Richard Feynman and David Deutsch.

As of 2016, the development of actual quantum computers is still in its infancy, but experiments have been carried out in which quantum computational operations were executed on a very small number of quantum bits. Both practical and theoretical research continues, and many national governments and military agencies are funding quantum computing research in an effort to develop quantum computers.

Large-scale quantum computers would theoretically be able to solve certain problems much more quickly than any classical computers that use even the best currently known algorithms. There exist quantum algorithms, such as Simon's algorithm, that run faster than any possible probabilistic classical algorithm. Given sufficient computational resources, a classical computer could in theory be made to simulate any quantum algorithm, as quantum computation does not violate the Church-Turing thesis. A quantum computer maintains a sequence of qubits. A single qubit can represent a one, a zero, or any quantum superposition of those two qubit states; a pair of qubits can be in any quantum superposition of 4 states, and three qubits in any superposition of 8 states. In general, a quantum computer with n qubits can be in an arbitrary superposition of up to different states simultaneously (this compares to a normal computer that can only be in one of these states at any one time). A quantum computer operates by setting the qubits in a controlled initial state that represents the problem at hand and by manipulating those qubits with a fixed sequence of quantum logic gates. The sequence of gates to be applied is called a quantum algorithm.

VR: Sony has a headset coming out for the Playstation 4, hence making it's mark in the VR world.

# Interview

# Kudankulam Nuclear Power Plant, Nuclear Power Corporation of India Limited.



# Lakshmi Gopidas

BTech in Chemical Engineering.

Senior Training Officer & Senior Technical Audit Engineer, KKNPP, NPCIL

# 1. What is the function of KKNPP organization?

Kudankulam Nuclear Power Project, KKNPP, a unit of Nuclear Power Corporation of India Limited (NPCIL), is entrusted with the responsibility of Construction, Commissioning, Operation and Maintenance of 1000MWe Nuclear Power Plants in a safe and economical manner without any adverse effect of flora and fauna.

Presently at KKNPP, one unit of 1000MWe is operating at full power, second unit of 1000MWe is commissioned and operational phase is started. Construction activities are started for Unit 3 & 4, each having capacity of 1000MWe.

The reactors at KKNPP are Light Water Reactors in the category VVER (Water Moderated Water Cooled

Energy Reactors) of Russian Design.

# 2. There was a recent news of criticality of unit 2 of KKNPP. What does the term "criticality" mean?

The term "Criticality" means the starting of controlled sustained fission chain reaction. You may know that energy produced in nuclear reactor is by nuclear fission i.e. a neutron bombarding unstable nuclei of  ${}_{92}U^{235}$  gives fission products, 2-3 neutrons and 200 MeV of energy. These product neutrons will cause further fission in  ${}_{92}U^{235}$  and so on. This is called fission chain reaction. Controlled fission chain reaction means the no. of neutrons at any given generation is same as the no. of neutrons at the previous generation. The extra neutrons are absorbed by boron in coolant.

# 3. What is your role as Senior Training Officer?

As Senior Training Officer, my role is to develop competency among the new entrants and to upgrade the competency of working personnel on continual basis for safe, reliable and effective performance and projecting realistic and positive image of KKNPP in the surrounding populations

4. Do you face any problems while dealing with new recruits of your organization and what are the present criteria for selection of scientific officers in your organization? The Executive Trainees i.e. graduate engineers are recruited by conducting national level examination or by GATE score, every year. This is common for all NPCIL stations including KKNPP. The engineers recruited for Light Water type of reactors are sent to Nuclear Training Centre, KKNPP. The Executive Trainees of all disciplines undergo one year common orientation training program (OTP). Fundamentals of core engineering, nuclear technology, Radiation protection, Reactor physics, KKNPP specific courses, Managerial skill development are some of the main topics for the training. Executive Trainees undergo field training for 2-3 months as part of OTP. The performance assessment is done through written examinations, viva voce and project works. As the students belongs to different disciplines and have to learn few topics other than their core engineering, the training is said to be tough and exhaustive. However, the trainees adapt to the system by the end of initial 1-2 months and enjoys the remaining training program.

The executive trainees are absorbed by NPCIL as Scientific Officer up on completion of one year Orientation Training Program.

The new entrants under supervisor i.e. engineering diploma holders and technicians are recruited locally and are given orientation training for  $1\frac{1}{2}$  - 2 years including field training before posting to different sections.

# 5. In your opinion what qualities our young engineers need to inculcate in them to be successful.

Positive attitude, interest to learn more, orientation for working with equipment, ability to accept new environment, determination to produce output, commitment to the organization are the qualities, I feel, our young engineers need to inculcate in them to be successful.

#### 6. The gap between theoretical knowledge and practical application is big suggest some measures to reduce this gap.

As I have explained before, the initial orientation training helps to bridge the gap. The on-the job training helps them to understand what is studied in the classroom. Moreover, many ongoing training programmes are arranged to develop skill of employees in specialized areas. In fact, work and training goes hand-in-hand.

# 7. What does a student need to do in order to develop practical knowledge of their field?

More enthusiasm towards practical works, visiting industries etc. will help. E-learning on the equipment operations where videos with good audio explanations of equipment operations are available. In fact computer based training for every discipline can include such videos which are self-explanatory and students. Working models can be developed in workshops for students to practice.

# 8. What activities should a college conduct to increase industrial knowledge of student?

Suggestions given earlier can be considered. In plant training of the students after every year can be made mandatory.

# 9. Do you think internship programmes conducted by companies are helpful to the student?

Very much. Such programmes helps the student to have an overall understanding about the technical and administrative aspects of an industry.

# 10. What efforts did you make to reach at this position in such an important organization?

Dedication to the work. Making use of opportunities. Working towards improvement of existing systems to give better output. There is always a scope for improvement.

# 11. What message would you like to give to our engineering students

Dream high and work to achieve your dream with full dedication. Make India the topmost nation with super technologies.

## K. V. Gopidas

BTech Chemical Engineering. Operation Superintendent, KKNPP NPCIL.

# 12. What is your role as leader of operation department

My role as a leader of operation department is to operate KKNPP 1 & 2 as per approved regulations, procedures, and policies in a safe and economical manner.

My responsibility also includes ensuring that the operating members are updated with operating experience feedback reports from within and outside India and suggest for improvements in systems & procedures, Review of deficiencies in the operation of the systems and rectifying them, maintaining a good safety culture in operation group and Waste management of the plant.

# 13. What challenges do you face while executing such a great responsibility

Challenges faced are:

- Execution of commissioning and operation activities as per the target.
- Getting clearance from regulator for each stage of commissioning & operation.
- Tackling technical problems in the plant/systems.
- Manning the plant with adequate trained and licensed manpower.

# 14. Does nuclear power plant cause health hazards to general public living in its vicinity

No. Nuclear power plants does not cause any health hazards to general public. Nuclear Energy is a clean form of energy, particularly in comparison with sources such as coal and oil. It helps to reduce global warming by lowering Greenhouse gases emission and protecting the Ozone layer. It preserves air quality as it does not release harmful gases such as CO2, NO2, SO2 and particulates.

# 15. What efforts should an aspiring engineer make to be a part of such an organization

The fresh engineers are recruited every year by conducting national level examination or by GATE score, followed by an interview. The engineers who are having an excellent knowledge on the discipline and has good communication skills can only get through the competition. Hence, perform well in the college and understand engineering thoroughly, have general awareness on nuclear energy.

# 16. What activities should students undertake to create awareness of nuclear energy (clean energy) among general public.

Arrange workshops/seminars on nuclear energy in the college which can be open to public. Conduct invited lectures/ speeches by experts in the field. Have up-to-date knowledge on nuclear related matters by reading newspaper, magazine, through web site of nuclear establishments. Undergo in plant training/internship in nuclear establishments.

## .....

# 66

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Group Discussion conducted for the Judgement Day (Oscillations 2016).



*VR:* 'Valve' is a gaming company that will be first of the high-end manufactures to market with its Vive headset this year.

# FACULTY ACHIEVEMENT

#### Dr. Milind Shah

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#### 3) Ms. Savitha Upadhya

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- Solly Joy and Savitha S Upadhya "Computer Software Package for Analysis of Speech Signal" International Journal of Research (IJR) Vol-2, Issue-04, April 2015. ISSN:2348-6848 with Impact Factor 3.541.
- Solly Joy and Savitha S Upadhya " **Discriminating voiced and unvoiced segments of speech signal using GUI**" IETE 46th Mid Term Symposium "Impact of Technology on Skill Development" MTS- 2015 Special Issue of International Journal of Electronics, Communication & Soft Computing Science and Engineering, ISSN: 2277-9477, Journal Impact Factor-2.02 Indexed by- ProQuest, DOAJ and many International Bodies,pp 258-261

#### **International Conferences**

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#### 4) Ms. Pranali C.

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- Pranali Choudhari, Rajul Chopade and Sarika Phad, "**Removal of Baseline Wander from Physiological Signals Using Wavelet Transform**", Emerging Research in Computing, Information, Communication and Applications, vol. 3 pp 225-234, 2016

#### 5) Ms. Pushpa U. S.

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#### 6) Ms. Smita Chopde

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#### 7) Mr. Ashish Harsola

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#### **International Conferences:**

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- Paper published on "**Multipurpose Smart Bag**", in proceedings of the International Conference on Cloud computing and Virtualization 2016 held on February 26th-27th 2016, Thakur college of Engineering and Technology, Mumbai and full length paper also included in the Elsevier Journal, Procedia Computer Science 79 (2016), doi: 10.1016/j.procs.2016.03.011, Pg 77-84.

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#### 11) Ms. Anita J.

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#### **National Conferences**

Published paper on "**Sixth sense gadget** " at National conference on Academics on Recent Innovations in Science Engg and technology at Pune, on 6<sup>th</sup> september , 2015.

#### 12) Ms. Manita R.

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- **1. "Android Based Aid for the Deaf"** published in International Conference on Electronics and Computing technologies held in March 2016.
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#### 19) Ms. Nishan P.

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#### **International Conferences**

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- Paper published on "Optimal backoff Sleep Time Algorithm for Improved Sleep Scheduling Performance in Wireless Sensor Networks", in the proceedings of the IEEE sponsored 3rd International Conference on electronics and Communication Systems (ICECS 2016).
- Paper Published on "Optimal backoff sleep Time based Protocol for Prolonged Network Life with Blacklisting ٠ of Failure Prone Nodes in Wireless Sensor Networks". In proceedings of 3rd international Conference on innovations in information, Embedded and communication Systems (ICIIECS).
- Paper published on "Gesture Based Voice Recognition for Audio Vocally Impaired Individuals." By Elsevier B. V. for the 7<sup>th</sup> international conference on Communication, Computing and Virtualization 2016.



# **SOLVE THIS !**

#### ACROSS

#### DOWN

1.grid lines on CRO 2. the % tolerance of a resistor with only 3	<ol> <li>CGS unit of magnetic field.</li> <li>a transfers thermal energy from high temp device to low temp</li> </ol>
bands	fluid medium
3. the law which gives the polarity of induced	
voltage in inductor	3. color of second band of 47k ohm resistor
4. selects 1 of several i/p and forwards it to o/p	4. fastest logic family
5.type of a mechanical transducer 6. the amount of retardation in the response of	5. time based dependence of systems o/p on present and past i/p's
instrument	6. SI unit of luminous intensity
	7. the range of measured variables to which instrument doesn't respond
Answers: ACROSS (graticule, twenty, lenz, multiples	ker, bellows, lag); DOWN(gauss, heat sink, violet, ecl, candela, dead zone)

Submitted by: Akshara M. Nair (Sem III)

*VR*: Since 2015, virtual reality has been installed onto a number of roller coasters, including <u>Galactica</u> at Alton Towers, The New Revolution at Six Flags Magic Mountain and <u>Alpenexpress</u> at Europapark.

# ACADEMICS AT A GLANCE

## **B.E.** -

### SECOND YEAR (Sem 3 and 4):



Sheetal Patil (9.495)



Rushikesh Padir (9.445)



Pranita S. (9.33)

### THIRD YEAR (Sem 5 and 6):



Keerthana Mary (9.85)



Macleen Pereira (9.635)



Aishwarya B. (9.48)

### FINAL YEAR (Sem 7):



Second: (9.11)

- Rishi S.
- Bhushan Kamble
- Mayuri Mhetre

First: Samruddhi Kaulapure (9.41)

**M.E.** - Vrushali Taware (8.545), Swati R. (8.095), Rupali Hole (7.82)

*VR:* Head mounted displays (HMD) were released for gaming during the early-mid 1990s. These included the Virtual Boy developed by Nintendo, the iGlasses developed by Virtual I-O, the Cybermaxx developed by Victormaxx and the VFX1 Headgear developed by Forte Technologies.

# DOWN THE MEMORY LANE WITH ALUMNI

### **Gaurav Bagde**

Batch: June 2007- June 2011

MS, Computer Engineering, North Carolina State University, Raleigh, North Carolina, US from Aug 2011-Dec 2012. 36 months work experience as a Digital Design Verification Engineer, Freescale Semiconductors, Austin, Texas, USA. MBA, Indian Institute of Management Ahmedabad. I plan to startup in the tech sector post my MBA. His time at FCRIT:

Right from the start I got multiple opportunities to build a good network of friends and colleagues. Multiple opportunities to sharpen soft skills through the various committees, event organization etc. Thanks to FCRIT and its strict rules, I was really prepared better for the rigour of outside world. The professors and faculty at the EXTC department has always been very helpful. I particularly remember the time when VLSI was introduced as an elective by Mumbai University and our department was ready to add it to our curriculum. At least four students are currently working in the semiconductor field abroad.

### Poonam P. Sakhare

#### Batch: June 2012-June 2016

When I look back at the four years in Agnels I realize that this institute has helped me to enhance my skills and to evolve as a human being. Many conclude Agnels as a jail but I choose to differ. This institute is just like our parents who expect their children to be disciplined. But again the strictness is for our benefit. Now when I am introduced to the industry atmosphere, I feel thankful for all the drilling and grilling done by our faculty which made me more adaptable. Our faculty members being very dedicated at workplace were a complete source of motivation for the students. The students used to complain about the number of exams we had or the grading scheme which was being followed, but now we realize that there's no alternative for hard work and our college was just making us used to it. Despite of all frustration, tension, stress I had been throughout the four years, now I appreciate the kind of quality education earned which will surely yield me lifelong satisfaction.

### Kruthik Siddeswarappa

#### Batch: June 2010-June 2014

EXTC department, FCRIT....It's a mini FCRIT inside the huge FCRIT :). Journey of 5 years, 4 years as a student and an additional year as a Faculty, in EXTC department was really blissful. The best part of the entire department is the

Faculty. Most of the faculty we had were really very supportive and helped us to understand what really EXTC was all about. How can I forget those lectures where everything was spoon fed (now realizing here in BITS Pilani when everything has to be figured out by our own), those labs where we tried our RnD work, those compulsory treks and Industrial visits, the intimate relation between leave notes, class notes and attendance and those tech-fests that we organized under IETE-ETSA Student Forum. I would say, I was in a department that took care that I grow in all spheres of life. "Whoever can survive in Fr.Agnels can survive anywhere in this world and whoever can survive in EXTC department can survive anywhere in the entire comic manifestation. :D"

### Jonaki Basu

#### Batch: June 2005-June 2008

My 4 years at FCRIT were one of the most memorable experiences. My college did not just teach me engineering but it taught me to engineer my life. Dealing with deadlines in my professional career reminded me of the much simpler times when we tried to meet our deadlines of submitting assignments on time. The overall culture of FCRIT really helped us to shape our future. Besides being a student, I was also lucky enough to get a glimpse of the faculty life here. During my tenure as a lecturer, I got to know about the high commitment level and research orientation amongst professors. Overall amongst the various challenges, I had a great time with the amazing bunch of people I met here.