



## SEMESTER VII



## SEMESTER V

## SEMESTER III





# FROM THE HOD'S DESK

"You cannot teach a man anything; you can only help him discover it in himself,, – Galileo.

Galileo Galilei (1564 - 1642) was an Italian astronomer, mathematician, physicist, and philosopher. Galileo's quote is one echoed for generations that one must learn something for themselves. Your mom may have told you the burner was hot as a kid but you eventually tested it for yourself. . . . . . . . . . . . . .

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** in the month of July-2017. This newsletter gives us the opportunity to update us about the recent staff and student achievements, newly introduced policies, feedback from the alumni, etc. for the academic year 2016-17. First of all, please join me in congratulating the group of following final year students and their guide for being awarded **"TCS-Best Project Award"** for the year 2016-17 for their project titled **"Lower Arm Active Prosthetic Hand Driven by Surface EMG Signals"** under the guidance of Prof. Jatin Desai:

- 1. Thale Vikas Subhash
- 2. Thakare Sanket Yograj
- 3. Nadar Prince
- 4. Samuel Nesamaniselvaraj

I would like to officially welcome third semester students to EXTC Department! The revised syllabus by the University of Mumbai for semester three will be applicable to this batch. If you compare revised syllabus with the old you will observe the following changes: (a) Total 'five' theory subjects in every semester instead of 'six' in the earlier syllabus; (b) Two hours tutorial for three subjects; (c) Compulsory mini-project for all the laboratories; (d) Gradual increase in term-work/practical marks from 30% in SE to 43% in BE; (e) Institute level optional course in the final year. I hope above changes in the syllabus will bring positive impact on overall performance of the students as far as teaching-learning process is concerned.

I would like to sincerely request all the students to get actively involved in teaching-learning process being followed by the department and secure above **6.75 CGPA** in all the semester examinations without any ATKT 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 ISF/ETSA banner which will be useful to you for enhancing your technical skills and overall personality.

Wish you all the best!

Dr. Milind Shah

Professor, Department of Electronics and

**Telecommunication Engineering** 

# WHAT'S INSIDE?

- 1. IETE COUNCIL 2017
- 2. KNOW YOUR FACULTY
- 3. SUB COMMITTEES
- 4. STAFF ACHIEVEMENTS
- 5. IoT
- 6. TOPPERS
- 7. IETE-ETSA EVENTS
- 8. STUDENT CORNER
- 9. B.E. PROJECT ABSTRACTS
- 10. ALUMNI
- 11. ACHIEVEMENTS

## THE IETE-ETSA COUNCIL

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	ELIZABETH ABRAHAM	R. KAUSHIK
Advisory Committee	ANCHAL M.	PRANITA S.



#### BANDWIDTH 2017 Organising Committee:

#### **PATRONS:**

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

Department Representation: Dr. Milind Shah, Professor and Head, EXTC Department.

Faculty Co-ordinator: Ms. Pushpa U.S., Assistant Prof., Ms. Sreedevi Nair, Assistant Prof., EXTC Department.

Editing Team: R. Kaushik, Ayushi Raina, Elizabeth Abraham, Divya Jose, Jefi James, Nikhil Shah.



### **HEAD OF THE DEPARTMENT AND PROFESSOR**

DR. MILIND SHAH

### **ASSOCIATE PROFESSORS**

MS. SADHANA PAI

MS. 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 Chandurkar	Ms.Smita Hande
Ms. Anita Jadhav	Ms. Manita Rajput
Ms. Sreedevi Nair	Ms. Amruta Mhatre
Ms. Sneha Revankar	Mr. Jatin Desai
Ms. Keerthi Unni	

### **NON-TEACHING STAFF**

Mr. Vijay S.	Lab Assistant
Ms. Sreekala N.	Lab Assistant
Mr. Sameer J.	Lab Assistant
Mr. Santosh M.	Lab Attendant
Mr. Prashant	Lab Assistant

### FR. C. RODRIGUES INSTITUTE OF TECHNOLOGY, VASHI DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING SUB-COMMITTEES (SC) JUNE 2017 ONWARDS

Sr.	Staff Name	SC-1	SC-2	SC-3	SC-4
No.		Convener	Convener (C) /	Convener (C) /	Convener (C) /
		(C) / Member	Member (M)	Member (M)	Member (NI)
		(M)			
1	Ms. Sadhana Pai	NBA	PTI	PhD	Making
		(C)	(C)	(admission,	available
				interviews,	various data as
				(C)	Governing
					Council, etc. (C)
2	Ms. Megha	1. NBA co	ourse file monito	ring	
2	Kolhekar (HS)	2. QP qua	ality checking		
3	Upadhya (HS)	4. Any ot	her important w	ork, if needed.	
4	Ms. Pranali				
	Choudhari (HS)				
5	Mr. Ashish				
6	Ms. Pushpa U. S.	IETE/ETSA	Institute/Dept.	2-Dav	Monitoring of
		(C)	magazine	workshop for	mentoring
			(C)	students	(C)
				before beginning of	
				new AY (C)	
7	Ms. Smita Chopde	LIC	FACES	University	Preparing
		(C)	(C)	affiliation	schedule for
				(171)	assembly +
					Preparing paper
					publication list
					and vacation
8	Ms. Nilashree	Etamax	Follow-up	NBA	Maintenance
	Wankhede (ML)	(C)	with	(M)	(other than
			attendance		equipment's)
			(outside		(C)
			students as		
			well as those		

			staying in hostel) for undertaking,		
9	Mr. Yogesh Chandurkar	Industrial visit (C)	ARC (C)	Students' participation at National Level technical events (C)	MoU with industries and actually conducting courses (C)
10	Ms. Smita Hande	PG coordinator (C)	LOOPS (C)	Alumni (M)	ICNTE-TPC (C)
11	Ms. Anita Jadhav	Alumni (C)	End semester students' feedback (C)	PG coordinator (M)	NBA (M)
12	Ms. Manita Rajput	MICRO (C)	Staff appraisal (C)	Time table (M)	Website (C)
13	Ms. Sreedevi Nair	Time table (C)	AICTE EOA (C)	2-days STTP for staff at the beginning of new AY (M)	IETE/ETSA (M)
14	Ms. Amruta Mhatre	University affiliation (C)	2-days STTP for staff at the beginning of new AY (C)	LIC (M)	Students database (co- curricular/extra- curricular activities) (C)
15	Ms. Sneha Revankar	Exam cell (C)	Department budget (C)	Result announcement and calling parents of students who failed (C)	Result analysis / statistics etc. (C)
16	Mr. Jatin Desai	Placement coordinator (C)	PTI (M)	-	-
17	Ms. Keerthi Unni	UG project (C)	Felicitation (C)	NBA (M)	Project exhibition (with the help of ISF/ETSA council) (C)

# STAFF ACHIEVEMENTS

## **R&D** Publications in EXTC Department

Sr. No.	Name	International/Online4 Journals	International Conferences	National Conferences	Total
1	Dr. Milind Shah	16	15	12	43
2	Ms. Sadhana Pai	4	9	8	21
3	Ms. Megha Kolhekar	7	5	9	21
4	Ms. Savitha Upadhya	10	8	3	21
5	Ms. Pranali Choudhari	9	9	2	20
6	Ms. Pushpa U. S.	5	5	3	13
7	Ms. Smita Chopde	7	1	6	14
8	Mr. Ashish Harsola	6	13	2	21
9	Mr. Yogesh Chandurkar	5	6	4	15
10	Ms. Nilashree Wankhede	7	4	7	18
11	Ms. Anita Jadhav	5	5	5	15
12	Ms. Manita Rajput	3	7	5	15
13	Ms. Smita Hande	4	3	3	10
14	Ms. Amruta Mhatre	3	3	3	9
15	Ms. Sneha Revankar	2	10	5	17
16	Ms. Sreedevi Nair	4	4	3	11
17	Mr. Jatin Desai	4	4	3	11
18	Ms. Keerthi Unni	2	9	3	14

## **INTERNET OF THINGS**

### WHAT IS IOT?

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

#### WHAT IS THE "THING" ?

The thing is an embedded computing design that transmits and receives information over a network for the purpose of controlling another device or interfacing with a user.

Hence a simple chair, TV, fan, microwave, Network Component fridge, sprinkler, bulb on their own cannot be called "Things" w.r.t. IoT because:

1. Most of the things like a fan, bed, chair or a bulb does not have an embedded system or an information processing capability.

2. Even if they do have embedded systems built in, they do not have the capabilities to transmit and receive information over a network.

For example, washing machine, microwave and electric stoves.



The Cloud platform

Remote Monitoring &

Control

twork Components

The Thing

### WHAT'S IN IT FOR FUTURE ENGINEERS?



Cisco has estimated that 20 million devices will be connected to the Internet by next year, and 50 billion by 2020. IoT is expected to be a \$14 trillion industry by 2020.

One of the biggest challenges for the expansion of IoT is of human resource. More and more companies will require skilled engineers who are trained in the field of IoT. This makes it a great opportunity for engineers who have knowledge of this domain.

### **APPLICATIONS**

- Smart city
- Automated transportation
- Smarter energy management system

3 out of 4 companies are

currently exploring the

Internet of things internally,

- IoT: Patent Landscape Analysis

Cities will spend €36 trillion in the next 20 years on

infrastructure upgrades for

and 68% are allocating IT

### SOME INTERESTING FACTS

budget to it.

IoT.



94% of businesses have seen a return on their investments in IoT.



- CSG international

4 The Internet of Things has the potential to create economic impact of €2.4 trillion to €5.4 trillion annually by 2025.



- McKinsey-report

Internet of Things (IoT) is one of the most active areas for innovation. 4.9 Billion connected "Things" will be in use in 2015. In 2020 25 Billion will be connected.

Intel

## LIST OF TOPPERS

### Third Semester



VALLIYAKARA JETIN

SGPA -10.00

### Fifth Semester



PATIL VAIBHAVI





**GUJAR TANMAY** 

SGPA-9.85



Y. NAMBINAYAGAN

SGPA-9.65



WADKE SHRIYA SGPA-9.96



PATIL SHEETAL SGPA-9.89



SHAIKH REHAN SGPA -9.59

### Fourth Year (2017 Pass out Batch)



**KEERTHANA MARY** 

SGPA -9.7



KOLI DOLCY SGPA -9.56



CHETTIAR MARIA SGPA-9.07

## <u>IETE-ETSA EVENTS 2016-2017</u>

1. **OSCILLATIONS**: Oscillations is a technical event conducted by IETE-ETSA council in the month of July & August. The various sub-events are:

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

2. <u>MICRO</u>: It is a departmental seminar for EXTC students to bridge the gap between academics and industrial exposure.

3. **<u>EXTACY</u>**: It is a skill development event in which students can gain experience and skills on robotics and soldering.

4. **<u>BUZZ</u>**: It is an introductory event for all first-year students conduction by second year students. The main aim of this event is that students get to interact with each other.

5. **LOOPS**: It is a one-day departmental seminar for gaining knowledge in the field of electronics and communication.



**ROBOMAZE – event in EXTACY** 



**ROBOSUMO** – event in EXTACY

## STUDENT CORNER

## **MICROELECTRONIC PILLS**

### **COLLECTING DATA INSIDE THE BODY**

- Ashwini Poojari EXTC-5

Microelectronic pill is basically a multichannel sensor used for remote biomedical measurements using micro technology. This is used for the real-time measurement parameters such as temperature, pH, conductivity and dissolved oxygen. The sensors are fabricated using electron beam and photolithographic pattern integration and are controlled by an application specific integrated circuit (ASIC) which samples the data with 10-bit resolution prior to communication off chip as a single inter leaved data stream.

Microelectronic pill is a medical monitoring system which consists of a machined biocompatible (non-cytotoxic), chemically resistant polyether-terketone (PEEK) capsule and

a PCB chip carrier acting as a common platform for attachment of transmitter ASIC. & sensors, batteries. It is swallowable. It has a 16mm diameter, a length of 55mm and 5gram weight. Measurement parameters of this pills include analysis. temperature pН measurements, conductivity and dissolved oxygen and they can also capture images and send it to a system. When it moves through gastro-intestinal track it starts to



detect diseases and abnormalities. A small electronic pill can easily reach areas such as small intestine and large intestine and can deliver real time information to an external system. Total information will be displayed in a monitor. The electronic pill travels to the digestive system, collects data and sends it to the computer with a distance of 1 meter and more.

The overall aim of this technology is to deliver enhanced functionality, reduced size and power consumption, through system-level integration on a common integrated circuit platform comprising sensors, analog and digital signal processing and signal transmission. The generic nature of microelectronic pill makes it adaptable for use in corrosive environments related to environmental & industrial applications, such as the evaluation of water quality, pollution detection, fermentation process control & inspection of the pipelines. The integration of radiation sensors & the application of indirect imaging technologies such as ultrasound & impedance tomography, will improve the detection of tissue abnormalities & radiation treatment associated with cancer & chronic inflammation.

## <u>Artifical Neural</u> <u>Networks</u>

- Rahul Fatnani EXTC-5

Artificial neural networks (ANNs) or connectionist systems are computing systems inspired by the biological neural networks. ANN is a softcomputing tool that can learn



patterns and predicts behaviour. Such systems learn (progressively improve performance) to do tasks by considering examples, generally without task-specific programming. For example, in image recognition, they might learn to identify images that contain cats by analysing example images that have been manually labelled as "cat" or "no cat" and using the analytic results to identify cats in other images. They have found most use in applications difficult to express in a traditional computer algorithm using rule based\_programming.

They convey information via a host of electrochemical pathways. There are over one hundred different classes of neurons, depending on the classification method used. Together these neurons and their connections form a process which is not binary, not stable, and not synchronous. In short, it is nothing like the currently available electronic computers, or even artificial neural networks.

These artificial neural networks try to replicate only the most basic elements of this complicated, versatile, and powerful organism. They do it in a primitive way. An ANN is based on a collection of connected units called artificial neurons, (analogous to axons in a biological brain). Each connection (synapse) between neurons can transmit a signal to another neuron. The receiving (postsynaptic) neuron can process the signal(s) and then signal downstream neurons connected to it. Neurons may have state, generally represented by real typically between 0 and 1. Neurons and synapses may also have a weight that varies as learning proceeds, which can increase or decrease the strength of the signal that it sends downstream. Further, they may have a threshold such that only if the aggregate signal is below (or above) that level is the downstream signal sent.

The original goal of the neural network approach was to solve problems in the same way that a human brain would. Over time, attention focused on matching specific mental abilities, leading to deviations from biology such as back propagation, or passing information in the reverse direction and adjusting the network to reflect that information. Neural networks are very good at a wide variety of problems, most of which involve finding trends in large quantities of data. They are better suited than traditional computer architecture to problems that humans are naturally good at and which computers are traditionally bad at.

Neural networks have been used on a variety of tasks, including computer vision, speech recognition, machine translation, social network filtering, playing board and video games, medical diagnosis and in many other domains. In airplanes, you might use a neural network as a basic autopilot, with input units reading signals from the various cockpit instruments and output units modifying the plane's controls appropriately to keep it safely on course. Also, inside a factory, you could use a neural network for quality control.

## **QUANTUM TELEPORTATION**

- Ashwini Poojari EXTC-5

By creating two entangled photons from a pre-existing system and separating them by



One of the most important, fundamental rules of the universe is that there is an inherent uncertainty associated with knowing the position and momentum of any individual particle. The better you measure one of those quantities, the more ambiguous your knowledge of the other one gets. This principle is known as the Heisenberg uncertainty principle, and there's no way around it. It's impossible to know both the position and momentum of even one particle at the same time, much less multiple particles at once. Without that information, you have no way of knowing the quantum state of a particle, so it seems that a transporter would be impossible.

If two particles are entangled, they have complementary wave function properties, and measuring one determines properties of the other. That's where quantum teleportation comes in. Quantum teleportation is a real phenomenon, but doesn't actually transport or teleport any particles themselves. Rather, what gets transferred from one place to the other is the information inherent to an indeterminate quantum state, which is exactly what you'd need to arrive at your destination! The way this works is through pairs of entangled particles. Take two entangled particles, send one to the desired destination, and you can use quantum teleportation to send information about the state at the source to the destination, even without knowing or determining the information about the source state at all.



This discovery, that you can move information about one state to another location, was made in 1993 by the team of Charles H. Bennett, Gilles Brassard, Claude Crépeau, Richard Jozsa, Asher Peres and William K. Wootters in their paper, "Teleporting an unknown quantum state via dual classical and Einstein-Podolsky-Rosen channels".

The phenomenon of quantum teleportation has been known for decades, and has been experimentally confirmed under many different circumstances but it had certain limitations. Previously, that limit meant that a few kilometres was as far as you could go. Faithfully transferring the information from an unknown quantum state to another location is a tremendous capability, but it was too limited in range to, say, ever reach a spaceship. But that's why the new advance is so spectacular. By establishing a channel link from Earth to a satellite, most of the transport is through empty space, so there's virtually no loss-of-signal.

This new advance could, potentially, be incredibly useful or even revolutionary in constructing a quantum internet, which would take computing power to a whole new level.

## **MOLETRONICS**

### **AN INVISIBLE TECHNOLOGY**

#### - Akshara Nair EXTC-5

As a scientific pursuit, the search for a viable successor to silicon computer technology has garnered considerable curiosity in the last



decade. Moletronics, a branch of nanotechnology that uses single molecules or nanoscale collections of single molecules as electronic components. As single molecules constitute the smallest stable structures possible, this miniaturization is the ultimate goal for shrinking electrical circuits. It is an interdisciplinary area that spans physics, chemistry, and materials science.

Conventional electronic devices are traditionally made from bulk materials. These methods have inherent limits, and are growing increasingly demanding and costly. Thus, the idea was born that the components could instead be built up atom by atom in a chemistry lab (bottom up) as opposed to carving them out of bulk material (top down). In single molecule electronics, the bulk material is replaced by single molecules. That is, instead of creating structures by removing or applying material after a pattern scaffold, the atoms are put together in a chemistry lab. Individual molecules, such as those depicted in

were shown experimentally to have electrical properties that previously were thought to occur only in bulk semiconductors. Very soon thereafter it was shown that individual molecules also can switch small electric currents. While these currents are small in absolute magnitude, their densities are enormous. The molecules used have properties that resemble traditional electronic components such as a wire, transistor, or rectifier.

Moletronics is expected to touch almost every aspect of our lives, right down to the water we drink and the air we breathe. Experimental work has already resulted in the production of molecular tweezers, a carbon nanotube transistor, and logic gates. Moletronics is planning for a computer with devices and circuitry as much as one million times denser than that in today's commercial microcomputer. Within the Moletronics Program, several interdisciplinary teams are pursuing complementary, mutually supportive approaches to exploiting the favourable physical and chemical properties of molecules to make nanocomputers. The teams are experimenting with a range of structural, architectural, and assembly strategies.

Teramac computer has the capacity to perform 1012 operations in one seconds but it has 220,000 hardware defects and still has performed some tasks 100 times faster than singleprocessors. Such defect-tolerant computer architecture and its implications for Moletronics is the latest in this technology. Moletronics could bridge the gap between the current generation of microchips and the next generation of molecular-scale computers. One of the biggest hindrances for single molecule electronics to be commercially exploited is the lack of means to connect a molecular sized circuit to bulk electrodes in a way that gives reproducible results. Also problematic is that some measurements on single molecules are done at cryogenic temperatures, near absolute zero, which is very energy consuming.

## **SPINTRONICS**

### - Nikhil Shah EXTC-5

Spintronics, a portmanteau word meaning "spin transport electronics", is the use of a fundamental property of particles known as "electron spin" for information processing.



Electron spin can be detected as a magnetic field with one of two orientations: up and down. This provides an additional two binary states to the conventional low and high logic values, which are represented by simple currents. Carrying information in both the charge and spin of an electron potentially offers devices with a greater diversity of functionality.



So far, spintronic technology has been tested in informationstorage devices, such as hard drives and spin-based transistors. Spintronics technology also shows promise for digital electronics in general. The ability to manipulate four, rather than only two, defined logic states may result in greater

information-processing power, higher data transfer speed, and higher information-storage capacity. It is expected that spin transport electronic devices will be smaller, more versatile and more robust compared with their silicon counterparts. So far this technology is in the early development stage and, irrespective of intense research, we have to wait a couple of years to see the first commercial spin-based electronic chip.



## B.E. PROJECT ABSTRACTS

#### **1. Iris Movement Based Assistance** for Catatonic Patients

Group Members: Ajay Bhaskar, Rehan Shaikh, Aditya Hartalkar, Rohan Jacob Under the guidance of Mrs. Manita Rajput

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#### ABSTRACT

The attention guiding technique using eyegaze tracking holds the potential for generating assistance to the disabled patients suffering from neurodegenerative diseases such as Amyotrophic lateral sclerosis (ALS) which rapidly weakens neuro-muscles resulting in loss of control of all voluntary movements. The aim of this project serves the purpose to develop and implement system consisting

of eye-tracking camera which pre-processes images captured in real time by extracting pyramid of histogram of gradients (PHOG) and local phase quantisation (LPQ) features for encoding the shape of various eye movements. The iris matching is done with these extracted images by comparing with set of template images stored in the processor. Various hex codes are assigned with the stored images for different device control. Once the image mapping is done, the processor will transmit the code to the device controller via ZigBee. The device controller consists of IR transmitters which communicate with the surrounding devices to gain access such as adjust the temperature of air conditioner, switching TV, activate nurse emergency call system, switching on/off lights and fan required. Thus, the IR based communication is interfaced with the surrounding appliances which will facilitate the disabled patient to control these appliances without applying any physical movement. An efficient pattern recognition will be employed, to get better accurate performance.

#### 2. Development of Optical Communication Framework with Xilinx Gigabit Transreceiver

Group Members: Vedant Chikhale, Raviraj Gharat, Shamika Gogate, Joso George

Under the guidance of Ms. Nilashree W., Ms. Smita Hande

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#### ABSTRACT

The project proposes an optical communication with Xilinx. The GTP MAC core would be used as base. Higher level protocols such as serial rapid IO and Aurora will be used. Development of top modules to handle the cores will be made possible. SP605 and SFP modules are the components used. The project will ensure high speed optical communication in Gbps. Physical layer signalling and MAC operations are also used.

#### 3. Self-Sustainable Node for Plant Irrigation

Group Members: Rahul Hande, Sneha Kavade, Snehal Dubal, Bhargav Shevare

Under the guidance of Mr. Jatin Desai

#### ABSTRACT

With the water requirement in farming, there is a need of irrigation system that can save water. Superflaws irrigation leaches nutritive element of soil as water seeps down due to gravitational force of earth. It also causes water logging, so irrigation needs constant monitoring. The improvement in irrigation system using wireless network is a solution to achieve water conservation as well as improvement in irrigation practices. The objective of this project is to control the flow of water in pipe with the help of soil moisture sensor. Depending on the need of plant or crop, water will be supplied automatically. Thus system is providing self-sustainable node for plant irrigation. This irrigation allows farmer to reduce run-off from over-water in saturated soil and also reduces water wastage and in effect improve the crop yield by ensuring adequate water supply when needed.

#### 4. Optical Spectrometer

Group Members: Michael Da Silva, Saurav Panda, Deeksha Tiwari

Under the guidance of Ms. Sreedevi Nair & Ms. Anita Jadhav

#### ABSTRACT

Spectrometers are used to study variety of phenomena by optical probing and studying the resultant spectra. Spectrometer records intensity of each wavelength of light. It is basically used in spectroscopic analysis to identify materials. The aim is to develop high quality optical spectrometer. Optical set-up with stepper motor driven grating and a sensitive photo detector will be developed to demonstrate the capability.

#### 5. Development of Portable Optical Communication Framework for FPGAs

Group Members: Vijayendra Kolhekar, Anchal Mishra, Oswald Mascarenhas, Rushikesh Padir

Under the guidance of Ms. Smita Hande (Guide) & Ms. Nilashree (Co-Guide)

ABSTRACT

There are many high-speed fibre optic communication solutions available in the market for embedded systems, but they are specialized, costly and require special (and costly) FPGA with hard IP cores. For comparatively low speed applications (~100Mbps), it is not efficient from design as well as economical point of view to dedicate such specialized resources for optical communication.

Project aim is to develop easy to use optical communication framework consisting of our own soft IP core to handle the asynchronous data operation with low cost multi-mode fibre channel. Such IP core can be virtually ported to any FPGA and thus have wide applications.

The basic data communication (byte by byte) with 8b/10b encoding/decoding has been demonstrated over multi-mode channel up to speed of 4Mbps. This work will be available as basic building block. Goal is to further develop a packetization/depacketization stack in Verilog on top of the existing developed MAC core.

#### 6. Railway Safety and Security System

Group Members: Anand Patil, Fahamidakhatun Khan, Dhanshree Kadam, Sainath Shetty.

Under the guidance of Ms.Sneha Revankar

External Guide:- Mr.Vikas Gawde

#### ABSTRACT

Indian Railways is one of the world's largest railway networks and carries around 23 million passengers daily. Being a Government run organization, there has always been a big question mark on its productivity. Various reports over the years have shown that some small changes in the working of railways can result in big profits and major customer. In this project, we are developing in such a way that to solve railway problems. We have designed a system that detects crack in the railway track as well as overhead wires which are running at 25000 volts so we are stepping down the voltage and tapping a wire. Also, applications such as Labour Security which identifies trains entering tunnel and provide indication to rescue one's life. Automatic railway platform which is used for automatically close/open the platforms in between the train track to dedicate secure crossing for handicapped, senior citizen and pregnant ladies, power saving to avoid unnecessary wastage of power inside tunnels and in trains. Train Detection at the terminals of the station and communication using track.

#### 7. Bio-Medical Signal Processing and Diagnosis using Machine Learning

Group Members: Carlton D'silva, Akash Patil, Elbin Xavier, Sahil Khaire, Davis D'souza

Under the guidance of Mr. Ashish Harsola

#### ABSTRACT

In this work, we have proposed a versatile signal processing and analysis framework for Electrocardiogram (ECG) and Electroencephalogram (EEG). Within this framework the signals will be acquired using a portable custom made device and a set of statistical features are extracted from the sub-bands to analyse different signal parameters. Principal components analysis (PCA), independent components analysis (ICA) and linear discriminant analysis (LDA) is used to reduce the dimension of data, which will be used as an input to a support vector machine (SVM).The performance of classification process due to different methods can be implemented by using machine learning. This method will be used for finding out proper diagnosis for the person from whom the signal has been acquired (patients). Android device will be used as a frontend for providing the results of the processed data.

## 8. Vehicle Tracking and Accident Alert System

Group Members: Racheal Dias, Jennifer Johnraj, Nicholas Fernandes, Vishakha Ghike

Under the guidance of Ms. Anita Jadhav

#### ABSTRACT

Now-a-days many accidents occur on roads due to increase in traffic or due to rash driving on highways. In many situations, the family members or the ambulance authorities are not informed in time. This results in delay of medical aid to the victim which may at times prove to be fatal. The main objective of our project 'Vehicle Tracking and Accident Monitoring System' is designed to avoid such mishaps. The project detects right side and left side accidents, as well as front and back accidents. After detecting the accident, the system sends a message via cellular network to the family or friend of the victim, which gives the latitude and longitude of the accident spot. For vehicle tracking, the system can be linked to Google maps. Secondly, we can keep a track of accident prone areas by storing their locations on the cloud with the use of IoT. This is done to inform the car driver about these spots, when the car passes such areas. In this way, our system prevents death due to untimely treatment and also avoids unwanted disasters.

#### 9. Hall Probe

Group Members: Monika Budania, Annabelle Dani, Sanika Itagi, Lawansh Singh

Under the guidance of Dr. Satyanarayana Bheesette (External Guide)

Ms.Amruta Mhatre (Internal Guide)

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Measurement of Magnetic fields is one of the parameters required by various research institutions and industries for research and development purposes. Hall probe is used to measure this parameter. Meanwhile, these hall probes must be able to measure magnetic fields in narrow gaps or crevices which depend upon the applications. Therefore, this project emphasises on an embedded system in sensor will be designed and interfaced to a microcontroller, which will acquire the data from the customized sensor. A GUI will also be developed in order to display the data in desirable format. The Hall Probe is based on the principle of Hall Effect, wherein Current is generated due to a magnetic field.

#### **10.** Automatic Moving Shopping Trolley

Group Members: Brian Mathew, Sharon Malachi, Aditya Singh, Ankit Jalgaonkar.

Under the guidance of Mr. Ashish Harsola.

#### ABSTRACT

Objective: To create a state of the art, user interface shopping trolley which would be able to perform functions like:

1. Allow the user to input their grocery list which would later make the trolley move to the premapped region in the marketplace.2. A fast billing and packaging unit to help ease the shopping experience. Aspects: Android App for the trolley: We are planning to develop an Android based app which will be consisting 3-4 layers. Layers will be divided for the following purposes: Login: The categories customer wants to pass through Bill confirmation. So, the categories will have sections like Dairy products, Vegetables, Fruits etc. Now once the customer is done with shopping he/she can then confirm the final bill that is being displayed on the app screen Movement of the trolley: A line follower system will be used to help the trolley move to one of these section. Packing Mechanism: The basic idea is that after shopping when the basket is kept on the billing desk, the items should automatically get transferred into the carry bag by opening the base of the basket.

#### **11. EEG Based Mood Detection**

Group Members: Joel Nadar, Sony Sunny, Juie Shah, Omkar Chavan

Under the guidance of Mr. Jatin Desai

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#### ABSTRACT

Mood plays an important role in the daily life of human beings; the need and importance of automatic mood recognition has grown with increasing role of human computer interface applications. Mood recognition could be done from the text, speech, facial expression or gesture. We can recognize six emotions such as fear, frustrated, sad, happy, pleasant and satisfied. In this project, we concentrate on recognition of moods from electroencephalogram (EEG) signals. The detection is based on alpha, beta, gamma, theta. These values are obtained by placing 3-20 electrodes on different places of brain according to 10-20 standards. The main challenge of this project to design a filter which will pass frequency of range between 8-31 Hz. Once alpha, beta, gamma, theta components are obtained from filters they are converted into digital equivalent of analog signal, then by using FFT function on that data we can obtain necessary information by comparing it with arousals-valance model. It has wide application in day to day life such as depending on the mood of the person specific music would be played or notification of mood would be given in advance.

#### **12. Bone Densitometer**

Group Members: Varnita A, Shervin A, Rupa P., & Pranita S.

Under the guidance of Ms. Pranali Choudhari

Bone densitometer is a system that will help to determine the wholesomeness of various bones present in human body. Bone density measurement is used in clinical medicine as an indirect indicator of osteoporosis and fracture risk. It is measured by a procedure called densitometry. The focus has been on the study of Bone Densitometer Setup using Ultrasonic Testing (UT). An ultrasound densitometer for measuring the physical properties and integrity of a member in vivo includes a transmit transducer from which acoustic signals are transmitted, and a receiver transducer which receives the acoustic signals after they have been transmitted through the member and/or a material with known acoustic properties. A system will be developed to display the data obtained from bone density test using ultrasonic technique for estimating the bone's health.

#### 13. IoT based Restaurant

Group Members: Anju Mathew, Abisha Nadar, Pallavi Kharade, Ayush Shetty

Under the guidance of Ms. Pranali Chaudhari

#### ABSTRACT

To compete with the international market place, it is crucial for hotel industry to be able to continually improve its services. In order to construct an electronic marketplace (e-market), it is an inherent requirement to build a correct architecture with a proper approach of an intelligent systems embedded on it. This paper introduces a web based intelligent that helps in maintaining a hotel by reducing the immediate involvement of manpower. The hotel reception policy. room facilities and intelligent personalization promotion are the main focuses of this paper. An intelligent search for existing boarders is incorporated in the system. For each of the facilities, a flow chart has been developed which confirms the techniques and relevant devices used in the system. By studying several scenarios, the paper outlines a number of techniques for realization of the intelligent hotel management system. Special attention is paid to the security and also prevention of power and water wastages. Moreover, this proposed automated computerized scheme also takes an account of the cost advantage. Considering the scarcity of manpower in several countries, the objective of this paper is to initiate the discussion and research for making the proposed system for commercialisation.

## 14. High Precision TDC readout system development with FPGA

Group Members: Shriya Wadke, Varada Kulkarni, Nachiket Rao, Anurag Karmarkar

Under the guidance of Ms. Sadhana Pai , Ms. Sneha Revankar

#### ABSTRACT

Time to digital converters are used to measure me difference between two events with high accuracy and resolution (100ps). We are exploring use of commercially available TDC7200 series from Texas instruments with silicon photomultiplier. Basic capabilities of tdc with USB readout frameless using PIC microcontroller has been demonstrated and now the system needs to be ported to FPGA based system for mul channel operation at high readout rates. Aim of this project is to develop FPGA based readout system for tdc which will provide readout rates up to 2 KHz. The FPGA firmware needs to communicate over SPI bus to configure the TDC IC and readout the data from IC on occurrence of the hardware interrupts. The collected data at the FPGA will be transferred to PC via Ethernet or USB.

#### 15. Office Automation System based on IoT

Group Member: Adi Madan, Tasneem Ansari, Sharon Bojja, Christina Babu, Pratik Gawde

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Under the guidance of Ms. Keerthi Unni.

#### ABSTRACT

The project aims at making a smart and efficient automation system for an office. This includes smart controls for the lights and fans, and an efficient attendance monitoring system. The project also includes implementation of a mobile application to order food from the canteen, as well as to monitor and replenish office stationary. The app will also be able to provide information to the employers about the availability of parking space in various parking zones. Another highlight of the project is to implement smart lighting with appropriate dimming control based on the available illumination.

#### 16. Implementation of FPGA based Digital Lock-In Amplifier

Group Members: Sheetal Patil, Meghna Ghole, Piyush Jaiswal, Jaise Sam Johns

Under the guidance of Ms.Sneha Rewankar and Ms.Sadhana Pai

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#### ABSTRACT

Lock-in amplifiers are used for phase locked measurement of signals in the noisy environment. It extracts the signal only corresponding to the frequency of the reference signal. Digital lock-in amplifiers are largely used to perform high-resolution measurements in different scientific fields.

project implements a lock-in This amplifier using an all-digital architecture FPGA. Historically, on an lock-in amplifiers were constructed of precision analog components, filters, mixers, etc. A well designed lock-in of this nature can perform beautifully, but requires high quality, expensive components and careful engineering. By implementing all the signal path components in digital form on an FPGA a number of advantages are realized. First, using digital multipliers, ideal digital mixers and filters can be created. This removes any possibility of added noise after digitization as well as reducing complexity. Secondly, if sufficient precision is used in all calculations, the linear response range of digitized component can each be arbitrarily large, again making the engineering easier. Finally, the simplicity of having almost all components on a single chip, could greatly decrease cost. In addition the modular nature and reprogrammability of FPGA logic could allow lock-in amplifiers to be easily implemented into other designs.

#### **17. Design and Development of Secure Body Area Sensor Network for Energy Efficient Performance**

Group Members: Nadeem Ahmed, Rohit Nair, Avi Noronha, Shardul tadaskar

Under the guidance of Ms.Megha Kolhekar

#### ABSTRACT

A Body Area Network (BAN) is formally defined by IEEE 802.15 as, "a communication standard optimized for low power devices and operation on, in or around the human body (but not limited to humans) to serve a variety of applications including medical, consumer electronics / personal entertainment and other " [IEEE 802.15]. Loosely speaking several sensor devices implanted in the proximity of a human body form a cooperative adhoc network and facilitate wireless transmission of body parameters. The types of sensors, their number, their topology, communication protocols and what is the data collected put to use of, varies from application to application. This class of networks is paving the way for the deployment of innovative healthcare monitoring applications. Health sector is a major beneficiary of BANs. There are several challenges like energy efficiency, signal propagation, scalability, privacy etc. Several researchers have taken up medical applications for "fitness quotient computation", "clinical parameter monitoring", "heart disease alarm raising" as given in some references.

In this project we aim at the following:

1. To design a Body Area Sensor Network for monitoring body temperature, pulse and oxygen level for two patients.

2. To design energy efficient communication protocols in order to enhance sensor life.

3. To provide privacy to user data through authentication.

4. To use the collected data for processing in order give indications to the health monitoring entity.

5. To validate the performance through standard conventional measurements.

6. To facilitate patient mobility and ease of health monitoring.

## WORDS FROM ALUMNI ...

Hello to all my friends it's a long journey of 1st year to 4th year but every year you learn something new which will change you and your personality will be different from the day you came here in first year and by the end of final year you will be coming out with a good personality and will be confident to face the new challenges in your life after your college. This college teaches you the main thing struggling, facing new difficulties and make you strong enough to enable it out as a good output in life during college time. Rest is cherish these moments with friends and teachers you really gonna miss it once you are leaving this college trust me yours friendly.

#### Jerin Mathew

June 2013-2017

As it is said, you realize the importance of something only when it's gone...same is the case with our college days. Once you step into the corporate world you realize how conducive an environment our college provides for the growth and development of each of its students. The caring and understanding nature of our teachers is unparalleled in the outside world. I miss the lectures, the lab sessions, the classroom fun, the last minute revision, projects, presentations, assignments. The tests, the vivas seemed never ending. But I do realize now that they have helped me handle stress and manage time as well. Of course, no schedule can be as hectic as agnels. You will have your highs and lows, but at the end of these four years you will find yourself improved, confiden, ready for the world. Best of luck and Long Live Agnels!!

Rishi Girisan

June 2012-2016

Presently pursuing – Intern at Animal Factory Amplification (AFA)

It gives me immense pleasure to share my views on the Department. First things first, I am grateful to all the faculty members of the department. Today when I look back at the four-year long journey, I can make out the parenting that we were receiving- making a choice of best against better for us, giving us the exposure that apparently not only helped us narrow down our subject of interest but also nurture our ideas and made all the efforts to help us to transform it into a reality. If we wouldn't have got the permission to work until late night in the labs, we wouldn't have ended up doing good research oriented projects; this in itself is an achievement of the department. It is not the lectures, assignments, vivas and compulsions that sums up the relation between a teacher and a student but actually it all starts beyond that. They not only have been excellently delivering concepts but also have imparted the right virtues at the right time, which unknowingly transformed us into good human beings. The "No Tiffin Day" celebration is the one of the most amazing moments, which will be cherished forever and is still as fresh in mind as if it was celebrated yesterday, that tells the warmth and respect we share in our relations. My advice to juniors is explore as much as you can and make most of every opportunity that knocks your door. From my experience, I can surely tell you that there won't be any dearth of support and motivation from the department, as it has always been the department's prime interest to encourage innovation.

Sanket Thakare

June 2013-2017

## STUDENT & CHIEVEMENTS

### **TCS BEST FINAL YEAR PROJECT AWARD**

Title: Lower Arm Active Prosthetic Hand Driven by Surface EMG Signals



Won the TCS Best Final Year Project award and Best Paper award at IEEE International Conference on Control, Instrumentation, Communication and Computational Technologies, (ICCICCT-2016) under the field of Controls and Instrumentation organized by The Department of Electronics and Instrumentation Engineering, Noorul Islam University, Kumaracoil, Kanyakumari District, Tamil Nadu on 16<sup>th</sup> and 17<sup>th</sup> December 2016.

Also won many National and State Level Project Competition held in various Engineering Colleges across Mumbai and Navi Mumbai.

#### Second Year Student Achievements:

1. Vrushali Salunke and Madhavi Bhaleghare from EXTC Dept. Sem-4 secured 1<sup>st</sup> Prize in National Level Paper Presentation Competition for their technical paper titled "Electrogastrography" held at Fr. C. Rodrigues College of Engineering, Bandra in IEEE-CRCE organized TECHNOMANIA on 18<sup>TH</sup> March 2017.

2. Manasi Bhavsar, Nikhil Shah, Nipun Bhirud, Rahul Fatnani from EXTC Dept. Sem-4 secured 1<sup>st</sup> prize in Technical Project Competition for their project titled "Voice Controlled Home Automation" held at Fr. C. Rodrigues Institute of Technology, Vashi in IEEE-CRIT in TECHNOVENTION on 9<sup>th</sup> March 2017.

## **BATCH 2013-2017**



## **PLACEMENT DETAILS**



### **Placement Summary**

