

# **TECHNOZINE**

**2017-18**

# ABOUT IEEE SIES GST

The IEEE student branch was established in the year 2006-2007 in SIES GST. Ever since, it has seen a vast growth in the quality of the chapter as well as the intellectual growth of its students. It is one of the oldest student bodies of SIES GST which has been very active over the years in organizing various co-curricular, extra-curricular activities, events, fest and workshops.

*"It is a great platform to build technical skills"*

*"We don't see things as they are, we see them as we are".*

- IEEE ALUMNI

We aim to imbibe the latest technical advancement and knowledge in the young growing minds by organizing innovative workshops and events for all its students. Some of the various workshops organized under the chapter are, drone workshop, Arduino workshop, ML workshop, FPGA workshop and many more.

IEEE SIES GST proudly presents its annual technical festival '**TECHOPEDIA**' every year. In order to grab the attention and encourage the students to build on their technical knowledge, the chapter organizes three national level events under the fest. They are **INQUISITIVE**- a national level quiz competition, **SQUABBLE**- a national level debate competition, **CIRCUIT MANIACS**- competition for testing the student's basic electronic knowledge. This major event sees active participants from within the college and many more students from colleges across Mumbai and Navi Mumbai.

The winners of each event are encouraged with cash prize, certificates and medals as a token of appreciation.

We as a chapter also focus on building the student's knowledge on the current developments and advancements by organizing various seminars, lectures and guest lectures. The speakers for each of these events are a set of well qualified faculties and experts from various colleges and institutions. We can proudly say that many of our own students have conducted many seminars successfully in recent times.

Apart from increasing the student's academic excellence, IEEE SIESGST also takes its students on Industrial visits to give them exposure and learning about the many evolutions taking place in the outside world industry.

As a whole IEEE has helped in carving out various young peers not only in the field of technology but also in leadership. Year by year the chapter has seen active participation and increase in interests in all its ventures which has increased the morale of IEEE SIESGST by leaps and bounds.

In a nutshell, IEEE SIESGST would like to thank our honorable principal, Dr. Vikram Patil, respected HOD, Dr. Atul Kemkar, Branch counselor Prof Biju Balakrishnan and last but not the least, the entire student council whose culmination of efforts has helped in the progress of IEEE SIESGST.

# EDITORIAL TEAM

PRINCIPAL:	DR. VIKRAM PATIL
HOD:	DR. ATUL KEMKAR
BRANCH COUNSELOR:	PROF. BIJU BALAKRISHNAN
CHAIRPERSON:	ARUNKUMAR IYER
SECRETARY:	ANKITA DEWASI
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## IEEE SIES-GST STUDENT BRANCH EXECUTIVE COMMITTEE 2017-18

NAME	POST
ARUN IYER	CHAIRPERSON & IEEE REPRESENTATIVE
NIVEDITA D	VICE-CHAIRPERSON
ANKITA D	SECRETARY
VIKRAM P	TECHNICAL HEAD
SAHAJ S	MEMBERSHIP DEVELOPMENT OFFICER(MDO)
AMAN R	PUBLICITY HEAD
VIVEK K	PUBLICITY CO-ORDINATOR
ADITI K	MARKETTING HEAD
RASHMITA S	MARKETTING CO-ORDINATOR
SUSHMITA G	MEMBER

# ABOUT SIES

The South Indian Education Society (SIES) was established in the year 1932. It is a pioneer in the field of education, knowledge and learning in this metropolis. The Society has been serving the cause of education and has carved for itself a niche, as a provider of quality and value based education from Nursery to Doctoral level in a wide variety of fields.

The institute seeks to achieve the educational mission by focussing on the modes of inquiry, which strengthens thinking skills and provides extensive field experiences, to bring together theory and practices.

*"This society should sincerely serve the cause of education and the education common man of this cosmopolitan city"*

**- SIES Mission set by our founder Shri M. V . Venkateshwaran in 1932**

*"To be a centre of excellence in Education and Technology committed towards Socio-Economic advancement of the country"*

**- SIES VISION**

SIES Graduate School of Technology, an integral part of this well-established community, started in the year 2002 is located in the list of an educational hub in Navi Mumbai imparting quality based technical education, offering four year Bachelor of Engineering courses in Electronics and Telecommunication Engineering, Computer Engineering, Information Technology, Printing & Packaging Technology and Mechanical Engineering.

SIES GST has been well known in terms of producing quality and quantity. It stands to be a prestigious institution with a rich set of qualified faculties who have always been there to serve the young growing minds. SIES GST aims to enlighten its students and bring the best out of them.

## **SIES GST EXTC Department Vision:**

To be a Premier Department in Electronics & Telecommunications Engineering.

### **Mission:**

1. To provide quality education satisfying the requirements of corporate world across diverse fields.
2. To develop life-long learning skills to cater to the socio-economic needs.
3. To strengthen Industry-Institute Interaction to bridge the gap between academic and industrial requirements.
4. To equip students with leadership and entrepreneurial skills.

### **Program Educational Objectives (PEOs) Graduates will be able to**

1. Identify, formulate and solve engineering problems in the Industry, complying with ethical standards and societal needs.
2. Pursue higher studies and professional development courses leading to significant advancement in the field of specialization.
3. Apply technical concepts to develop applications and design products.
4. Exhibit leadership and entrepreneurial acumen in career.

# FROM THE BRANCH COUNSELOR'S DESK (2017-18)

It is an honour for me to present the annual technical magazine 'TECHNOZINE' of our very own IEEE student branch. Technology keeps evolving and growing day by day. It is our duty to keep our self updated and develop ourselves with the upscale development happening. This knowledge which builds up will be the key factor to differentiate us from the others.

As IEEE branch counselor in SIES GST I aim to encourage the young growing minds of our college by igniting the spark in them. The student student branch has indeed made me proud with the smooth functioning of the council as well as conduction of the various events that would not have been possible without their corporation and efforts.

'TECHNOZINE' is a log book showcasing the culminative effort of the entire IEEE team and the minds who have worked behind the success of all events that have been conducted throughout this year. It also includes a plethora of technical articles written by our own students.

This was all possible with the support of our respected principle , Dr.Vikram Patil and our HOD, Dr. Atul Kemkar. I extend my warm regards and gratitude towards- them.

I would also like to thank and appreciate the team of IEEE SIESGST and the ones behind 'TECHNOZINE '. I wish success to each one of you for all your future endeavors.

- Prof.Biju Balakrishnan  
(IEEE Branch Counselor)



# WORDS BY CHAIRPERSON

The IEEE SIESGST student branch had been one of the biggest factors that drastically changed my college life experience and skills. Being the chairperson of this student body, brought numerous challenges along with excitement and the productivity that comes when you form a team that wants to make things happen. The student chapter organised various workshops by the student bodies themselves as well as by guest lecturers and people from the IEEE Bombay section. We organised industrial visits for the students and also attended IEEE conferences with the sole purpose of building new networks, meeting new people and getting ourselves acquainted with not just the theory, but also the mammoth industry that is engineering.

IEEE SIESGST aims to give the new students an open field to explore and create their hearts out in the field of engineering while being mentored by students and faculties who have been in their place, and are willing to give their time and efforts into creating something big. Exposure to machine learning, neural networks, competitive coding, web services, cloud computing, microcontroller hardware, nanotechnology etc can sound extremely overwhelming. But taking these things one step at a time over the whole academic year proves to be efficient and at the same time allows the student to improve his while performing great in his academics.

I want every member to make the most use of all the resources available. Speak up to the leaders if you are eager to learn a specific technical skill, they will surely help you with it. Also, Prof. Biju Balakrishnan is one of the best IEEE- SIESGST Faculty in-charges our college could have had! He not only has given us moral support in everything but has also taught us that organizational skills and disciplined nature is something we all should inculcate.

All around it was a great experience leading a sheer determined team, and I hope this continues for the years to come.

- Arun Iyer  
(Chairperson 2017-18)

# Applications of deep learning in medical image analysis

From the 1970s to the 1990s medical image analysis was performed using sequential application of low-level image processing like edge and line detector filters, region growing algorithms and mathematical modelling like fitting of straight lines, circles and ellipse.

Main problem with these methods is analysis or diagnosis is totally depending on doctor and on his or her expertise in that corresponding field. So there is a question on accuracy of diagnosis. So it may take much time to get correct diagnosis and that delay may turn up to be harmful in few cases.

So the solution is to make use of artificial intelligence to guide doctors for correct diagnosis. When it became possible to scan and load medical images into a computer system, researchers have started working on various algorithms and have built systems for automated analysis. This has completely changed the old system of human involvement to a new system in which networks are trained for feature extraction and decision are made based on that.

Deep learning is seen as a subset of artificial intelligence. It is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead unlike the microprocessors and microcontrollers which work on specified instructions. Machine learning algorithms build a mathematical model based on sample data, known as "training data" which is huge in number, in order to make predictions or decisions without being explicitly programmed to perform the task.

Deep learning is already in use for medical applications from last few years. The overall applications for which deep learning has been used in medical field can be broadly classified in following





## 1. Organ and substructure segmentation

The segmentation is nothing but grouping all those pixels (in case of 2D image) or voxels (in case of 3D image) together which have similar characteristics. In medical images the segmentation of organs and other substructures allows quantitative analysis of clinical parameters related to volume and shape of an organ, for example, in brain or cardiac analysis. Segmentation is the most common topic of paper publications in this field. Mostly CNN (Convolutional Neural Network) is used for Segmentation and in few cases RNN (Recurrent Neural Network) is also used. Few examples of segmentation include segmentation of tumour from the applied input image of brain MRI, segmentation of blood vessels from the applied input of retinal fundus photograph.

## 2. Lesion detection and image classification

Lesion detection is a key part of any diagnosis and it has a major contribution to medical image analysis. Lesion means region in an organ or tissue which has suffered damage through some injury. Typically, the tasks consist of the locating and identifying the small lesions in the image.

This identification is done as follows. First database of images is formed in which few images are belonging to disease and few are belonging to normal patients. Network is trained using this dataset and then for any newly applied input image it on its own identifies whether image is belonging to normal patient or to disease. Examples of this include determination of cancer from applied input of mammogram or detection of nodule from applied chest x ray image.

## 3. Object or lesion classification

Here, there is no classification involved about whether image is belonging to disease or not. Rather, here object is localised in the image and based on that decision is taken about stage or level of the disease or about its subtype in few cases. E.g. based on mammogram applied as input, algorithm gives result whether it is belonging to malignant or benign or after giving retinal fundus photograph as input, algorithm gives result about stage of the cataract.

## 4. Content-based image retrieval (CBIR)

It is a technique of finding typical digital images from database. For example, search of images indicating particular disease or finding identical case history from the massive database. Here CNN is trained first about patterns or content of the image that is to be searched for and then it is applied on the database.

-Mitalee Palwe  
(Student, EXTC Engg)

# WAYMO (FUTURISTIC VEHICLES)

Waymo LLC is a self-driving technology development company. The name Waymo is derived from its mission, "a new way forward in mobility. Waymo began a self-driving car Project in 2009. Its cars are completely driverless, and customers can use an app to request a cab. The cars are built for fully autonomy with sensors that provide 360-degree views and laser that detects objects up-to 300 meters away.

In 2017, Waymo unveiled new sensors and chips that are less expensive to manufacture, cameras that improve visibility, and wipers to clear the lidar system. Waymo manufactures a suite of self-driving hardware developed in-house. These sensors and hardware enhanced vision system, improved radar, and laser-based lidar reduce Waymo's dependence on suppliers. The in-house production system allows Waymo to efficiently integrate its technology to the hardware. In the beginning of the self-driving car program, the company spent \$75,000 for each lidar system from Velodyne.

Short-range lasers detect and focus on objects near the vehicle, while radar is used to see around vehicles and track objects in motion. The interior of these cars- include buttons for riders to control certain functions: "Help", "Lock", "Pull over", and "Start ride". Waymo engineers have also created a program called Carcraft, a virtual world where Waymo can simulate driving conditions. The Waymo project team has equipped various types of cars with the self-driving equipment, including the Toyota Prius, Audi TT, Fiat Chrysler Pacifica, and Lexus RX450h.

As of 2018, Waymo had tested its system in six states and 25 cities across the U.S over a span of more than 9 years. Google's vehicles have traversed San Francisco's Lombard Street, famed for its steep hairpin turns, and through city traffic. The system drives at the speed limit it has stored on its maps and maintains its distance from other vehicles using its system of sensors. It has since expanded its areas of testing.

According to a Waymo report, as of March 2018 Waymo's self-driving technology had driven more than 5 million miles on public roads and more than 5 billion miles via simulation.

By October 2018, Waymo had completed 10 million miles of driving on public roads and over 7 billion simulation miles. Waymo has highlighted four uses for its tech Taxicab services, trucking and logistics urban last-mile solutions for public transport, and passenger cars where it will license its autonomous tech to vehicle manufacturers.



-Diksha Adke  
(Student, EXTC Engg)

# SIGNAL PROCESSING IN SMART GRIDS

Smart grid is a network of electric supply that manages power demand in reliable and economic manner by detecting and reacting to local changes in usage. The infrastructure comprises of smart meters, appliances, and resources with a combination of modern technologies like, control, power, instrumentation, and communication. In such a complex scenario, signal processing techniques are essential to understand, plan, design and operate the complex future smart electronic grids. In addition to this, signal processing has wide variety of applications and is becoming an important tool for electric power system analysis. This is due to the fact that measurements retrieved from numerous locations of the grid can be used for data analysis. These measurements can also be used for a variety of issues such as voltage control, power quality and reliability, power system and equipment diagnostics, power system control and protection, etc.

Power quality is one of the main issue of the smart grid research where voltage, current and frequency deviations in the power system are the main concerns of the system operator. The characterization of the incompatibilities caused by these deviations requires an understanding of their principal cause. Other possible aspects that need inspection are the efficient representation of the voltage and current variations in various electrical equipment. Moreover, the signal processing of the power patterns leads to better understanding the behavior of these equipment. Continuous monitoring is also required to capture various events and variations. To meet future demands, methods and techniques must be developed to explore the full range of signals derived from the complex interaction between suppliers, consumers and network operators.

A smart grid performs measurement, monitoring and processing of waveforms based on acquisition, analysis, detection and classification techniques. Furthermore, these techniques can be utilized for the identification of the system events, phenomena and load characteristics. A key aspect of signal processing in power systems is signal processing methods which provide the best characterization and analysis of the signals to be investigated.

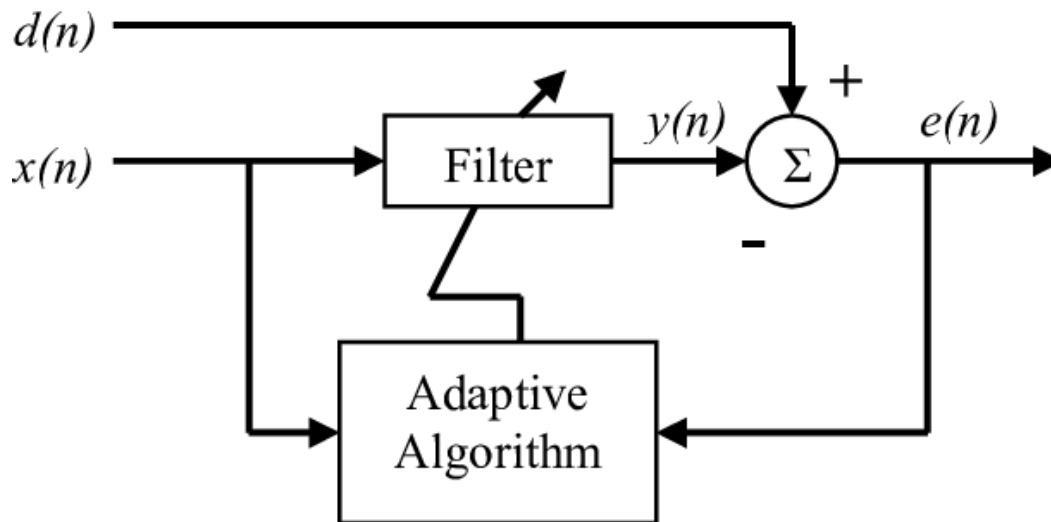
In power systems, signal processing provides the best characterization and analysis of the signals to be inspected. Signal processing also determines the correct parameter to be measured and its level of accuracy. Also, the time invariant analysis of the smart grid requires signal processing techniques. These techniques comprises of digital filters, moving average, and trapezoidal integration. Special digital systems like estimation of the differentiator, time-domain harmonic distortions and the notch filters are also included. The applications of signal processing in power systems can also be found in power quality analysis, protection and control. Furthermore, signals in electrical power systems are time and frequency dependent where frequency domain analysis is used to extract features and information for possible transient conditions associated with the presence of high frequency harmonics and other disturbances. Finally, the complexity of the future smart grid will require not only advanced signal processing that can identify specific parameters, but also intelligent methods for identifying particular patterns of behavior.

-Tanvi Joshi  
(Student,EXTC Engg)

# ADAPTIVE FILTER USING FPGA

Adaptive filters are digital filters capable of self-adjustment. These filters can change in accordance with their input signals. An adaptive filter is used in applications that require differing filter characteristics in response to variable signal conditions. Adaptive filters are typically used when noise occurs in the same band as the signal or when the noise band is unknown or varies over time. The adaptive filter requires two inputs: the input signal and a noise or reference input. An adaptive filter has the ability to update its coefficients. New coefficients are sent to the filter from a coefficient generator. The coefficient generator is an adaptive algorithm that modifies the coefficients in response to an incoming signal. In most applications the goal of the coefficient generator is to match the filter coefficients to the noise so that the adaptive filter can subtract the noise from the signal. Since the noise signal varies, the coefficients must vary to match it, hence the name adaptive filter.

The digital filter is typically a special type of Finite Impulse Response (FIR) filter, but it can be an Infinite Impulse Response (IIR) or other type of filter. Hence, FPGAs are the target hardware here for the implementation of Adaptive Algorithm.



## Advantages of FPGA:

Most digital signal processing done today uses a specialized microprocessor, called a digital signal processor, capable of very high speed multiplication. This traditional method of signal processing is bandwidth limited. There occur a fixed number of operations that the processor can perform on a sample before the next sample arrives. FPGA-based digital signal processing is based on hardware logic and does not suffer from any of the software based processor performance problems.

FPGAs allow applications to run in parallel so that a 128 tap filter can run as fast as a 10 tap filter. Applications can also be pipelined in an FPGA, so that filtering, correlation, and many other applications can all run simultaneously. In an FPGA, most of the application is working mostly when timing requirements are strict. An FPGA can offer 10 to 1000 times the performance of the most advanced digital signal processor at similar or even lower costs. Nowadays, the use of FPGAs is increasing. They are the prototyping hardware devices, combining the main advantages of ASIC and DSP processors, since they provide both a programmable and a dedicated hardware solution. It is usual to use an FPGA as the prototyping device due to factors such as time and cost.

Moreover, an FPGA is more efficient in power consumption, an advantage for battery-operated systems, and, for the same application, requires less clock system speed compared to a DSP or a general-purpose processor, offering better electromagnetic compatibility properties. Thus, for a wide range of applications, FPGA implementation might be the best option. However, in the case of low sampling frequency requirements or no low power consumption needs, some other devices could be more suitable.

### **Therefore FPGAs make a better solution with added pros of:**

1. Re-configurability
2. Less Power Consumption
3. Low Response Times
4. Flexibility In Expansion Of Designs
5. Run Parallel
6. Pipelining.

**Applications of Adaptive Filter** : Adaptive filters can be used in a number of applications including noise cancellation, linear prediction, adaptive signal enhancement, and adaptive control which are variedly applied in Acoustic environment modelling for Sonar applications .

Noise cancellation is also an important field where adaptive filtering is used. Adaptive modelling plays a significant role in control systems and signal processing. It is widely used in control tasks, especially in cases when system structure is known, but its parameters are poorly defined. Impulsive noise suppression in speech is very important for clear voice communications. For signal processing, impulsive noise suppression is carried out using nonlinear M-filters, namely, median and myriad filters. And Least Mean Square (LMS) algorithm is used which is applicable for noise cancellation.

For design of adaptive filter Other algorithms that can be used include Recursive Least Squares, Normalised LMS, Variable Step-size algorithm etc. and further design can be done using hardware description language( HDL: VHDL /Verilog) and can be implemented using FPGA.

-Navin Subbu  
(Student, EXTC Engg)

# 3D METAL PRINTING

In recent years we have become used to 3D plastic printing and the ease it has brought to design and prototyping. Advances in the technology mean that instant metal fabrication is quickly becoming a reality, which clearly opens a new world of possibilities.

The ability to create large, intricate metal structures on demand could revolutionize manufacturing. "3D metal printing gives manufacturers the ability to make a single or small number of metal parts much more cheaply than using existing mass-production techniques," Rotman says. "Instead of keeping a large inventory of parts, the company can simply print a part when the customer needs it. Additionally, it can make complex shapes not possible with any other method. That can mean lighter or higher performance parts."

There are a lot of different 3D printing technologies and 3D printing materials actually available on the market. Metal 3D printing is developing really fast, and new technologies, 3D printers and 3D printing materials are unveiled quite regularly. This metal manufacturing process is really promising, giving life to outstanding projects. But metal 3D printing includes different technologies, and it can be a little bit difficult to understand exactly what they are all about.

We can notice two big categories: Powder bed technologies and Laser Metal Deposition technologies. They are the most used and you can totally manufacture parts printed with these two different processes.

The powder bed technologies uses, as their name tell us, a powder bed: the powdered metal is fused to create the parts additively. Metal deposition technologies are adding layers of materials. But let's see more in details how these techniques are working, and how you could make the most of them.

But first of all, we are going to explain to you the benefits of this technology, how it is actually used in various industries and why you should pay attention to this manufacturing technique and try it! This additive manufacturing technology is a great method to manufacture finished parts.



-Aditya Birajdar  
(Student,PPT Engg)

# ROADBOT WORKSHOP

IEEE SIES Graduate School of Technology had organised training sessions on the topic ROADBOT using Arduino UNO and NodeMCU. It was a nine week training programme conducted from 11th of January 2018 to 5th of April 2018.

This training was attended by students of second year and third year. There were about 15 students for this training. This free of cost training was conducted for students solely to enhance their technical knowledge. It was well organised by Mr. Vikram Parmar (TE EXTC Student) and his technical team under the guidance of Head of the Department of Electronics and Telecommunication department, Dr. Atul Kemkar and IEEE Branch Counselor Prof. Biju Balakrishnan.

The first week of the training started off with the general overview of the project, they discussed the problem definition. In the second week, students were given basic training of Arduino IDE. During third week students were introduced to Arduino UNO and NodeMCU boards; a basic working was explained to them and its practical implementation. In the fourth week, students were asked to perform basic programs in Arduino UNO and its interfacing with other boards were taught. Fifth week began with training the students about NodeMCU board and introducing them to various sensors; also they learnt interfacing various sensors with NodeMCU. Students were explained about motor drivers and other interfaces during the sixth week along with explanation regarding IoT and example solving of Firebase. In the seventh week students were taught how to use Wifi on NodeMCU, various methods of interacting wirelessly and combining all the hardware.

The actual introduction to Firebase were explained to students in the eighth week and also prototyping was instructed; students were asked to make a database and taught controlling via NodeMCU.

Lastly the training sessions got concluded by the final assembly of bot and its actual working. It was a very interactive training programme. Students learnt a lot about how a simple bot can be built with a microcontroller board as Arduino and NodeMCU.

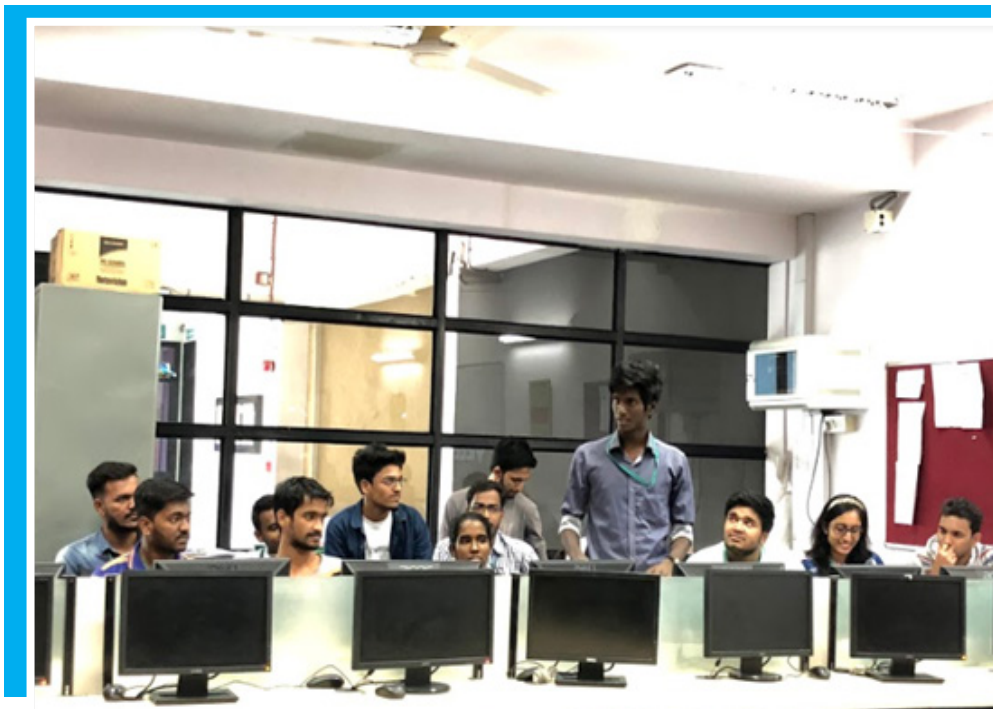
The concept of Arduino, NodeMCU, sensors, motors, firebase was pretty much understood by the students and thus it turned out to be technically educative workshop. Through this workshop we could attain our aim of inculcating the technical knowledge and influence students towards practical implementation of knowledge

# FPGA DESIGN USING VHDL

IEEE SIES GST had organised a workshop on topic 'FPGA DESIGN USING VHDL' from 20th – 22nd of December 2017. Since their introduction in the 1985, field programmable gate arrays (FPGAs) have become increasingly important to the electronics industry. It was a 3 days hands on training on FPGA DESIGN USING VHDL course conducted by faculty members of SIES GST EXTC Department under the guidance of The Head of the Department of Electronics and Telecommunication department, Dr.AtulKemkar and IEEE faculty in-charge, Prof.Preetee Kuperkar.

The aim of workshop is to provide a platform for students to learn, design and implement digital system on FPGA using VHDL. Course completion certificates were provided to the 13 participants from second and third year of engineering .

The course content included Introduction to VLSI design flow & concepts of FPGA's & CPLD's ,Combinational circuit design using VHDL & its FPGA implementation,and Sequential circuit design using VHDL & its FPGA implementation.



**Impact Analysis:** Students had a great exposure to VHDL software and made many mini projects using this software and FPGA.



# INTERNATIONAL WOMEN'S DAY CELEBRATION

On the occasion of International Women's Day, IEEE Bombay Section WIE in association with IEEE SIESGST had organized a seminar on WIE and its Importance. The session had been organized to highlight the importance and the opportunities provided by IEEE WIE affinity group and IEEE Young Professional Affinity group.

The speaker for the seminar was Miss Seema Kawale, Vice-chairperson of IEEE Bombay Section WIE group. Various scholarships and international events were introduced to students. This session was attended by interested students from all the branches and also by the faculty members. The aim of the seminar was to cherish the true form of feminism as an attempt to unleash the potential of Women in Engineering. The Speaker shared her experiences and also encouraged students to do the extraordinary. It was an interactive session and very helpful to students. IEEE WIE envisions a vibrant community of IEEE women and men collectively using their diverse talents to innovate for the benefit of humanity



# IEEE DAY CELEBRATION

On 9th October 2017 IEEE Day was celebrated in SIES GST by heads ,volunteers and members of IEEE . We had our event started with a glimpse of achievements that we have had so far and also with admiration of goals that we have in future. Various global benefits of IEEE were explained and the students were introduced to Scholarships and competitions under IEEE. Students were encouraged to participate in competitions like IEEE extreme and will have our full support in preparation for it. The technical secretary had talk about the upcoming technical project for the members and volunteers under IEEE .

All the technical knowledge for project will be taught to members by the technical team. It was well organised under the guidance of The Head of the Department of Electronics and Telecommunication department, Dr. Atul Kemkar IEEE Student Branch Counselor and IEEE faculty in-charge , Prof Biju Balakrishnan, past counselor Prof. Preetee Kuperkar, Prof. Pushkar Sathe and other faculty members had also attended the celebration. Finally the event was ended by a cake cutting celebration.



Impact Analysis: IEEE day celebration not only brings all the IEEE members under one roof but also gives the members to reach out to executive committee of IEEE SIES GST as what they expect from IEEE SIES GST.

# AI powered robot microscopes

By 2025, a quarter of the world's population could be affected by a shortage of water. Technology developed by ICM, powered by artificial intelligence, have developed robotic cameras that have the potential to monitor the behaviour of microscopic plankton. This information can give us vital clues on chemical pollution levels, temperature change among numerous other variables.

## So how does the technology work?

The cameras developed have the capability to monitor these factors in more detail than ever before. Analysis of the data can give real-time insights into variables affecting water quality. To deploy the devices on a large-scale and make them accessible, the devices will need to be as low powered as possible; therefore they don't contain complicated mechanical parts.

IBM researchers are building small, autonomous microscopes that can be placed in bodies of water to monitor plankton in situ, identifying different species and tracking their movement in three dimensions. The findings can be used to better understand their behaviour, such as how they respond to changes to their environment caused by everything from temperature to oil spills to run off. They could even be used to predict threats to our water supply, like red tides.

In the future, the microscope could be outfitted with high performance, low power AI technology to analyse and interpret the data locally, reporting any abnormalities in real-time so they can be acted upon immediately.

-Harsh Ramesh  
(Student, EXTC Engg)



# GENE THERAPY: The Future Is Here!

The future is unwritten . . . but that won't stop me from speculating.

Gene therapy (also called human gene transfer) is a medical field which focuses on the utilization of the therapeutic delivery of nucleic acid into a patient's cells as a drug to treat disease.

The genes in your body's cells play an important role in your health — indeed, a defective gene or genes can make you sick.



## What is gene therapy?

Gene therapy is an experimental technique that uses genes to treat or prevent disease. In the future, this technique may allow doctors to treat a disorder by inserting a gene into a patient's cells instead of using drugs or surgery. Researchers are testing several approaches to gene therapy, including:

- Replacing a mutated gene that causes disease with a healthy copy of the gene.
- Inactivating, or "knocking out," a mutated gene that is functioning improperly.
- Introducing a new gene into the body to help fight a disease.

Although gene therapy is a promising treatment option for a number of diseases (including inherited disorders, some types of cancer, and certain viral infections), the technique remains risky and is still under study to make sure that it will be safe and effective. Gene therapy is currently being tested only for diseases that have no other cures.

## How does gene therapy work?

Gene therapy is designed to introduce genetic material into cells to compensate for abnormal genes or to make a beneficial protein. If a mutated gene causes a necessary protein to be faulty or missing, gene therapy may be able to introduce a normal copy of the gene to restore the function of the protein.

In gene therapy, scientists can do one of several things depending on the problem that is present. They can replace a gene that causes a medical problem with one that doesn't, add genes to help the body to fight or treat disease, or turn off genes that are causing problems.

-Siddhant meshram  
(Student, EXTC Engg)



# Industrial Visit to Jio Experience Centre

An Industrial visit to Reliance Corporate Park, Navi Mumbai was organized by IEEE SIESGST on Wednesday, 28th March 2018. Twenty Seven students with IEEE student branch counselor Prof. Biju Balakrishnan visited the Experience Centre of Reliance JIO to interact with the Telecom experts to understand the current market scenarios, latest and the most demanding technologies & criteria for selection etc.

In this visit students were very eagerly waiting for listening to industrial higher authority and get some insight into Jio's grand plans for the India market. Jio is probably one of the biggest disruptions in the Indian Telecom market and also the most ambitious network roll outs anywhere in the world. The Jio Experience center aims to showcase the company's Jio Digital Life under one roof. Right from the acquisition of the Jio sim card to future plans such as Jio Fiber and Smart Car. The Complete Experience Center had 24 components known as "Pods" or centers of experience that have been divided into 11 clusters. Different new technologies explained to the students are as follows

- Jionet wifi
- High definition video and voice calling.
- Jio 4G voice
- Wifi calling/voice over wifi.
- Jio money and mobile payments
- Jio mags and jiomusic
- Jio tv and jio cinema
- Education and health
- Smart car
- Jio fiber and smarthome

Jio demonstrated a Smart TV experience on a NVIDIA Shield Android TV which has been customized heavily for the Jio suite of apps. The search feature has been customized to suit the Indian content.

There are even plans to bring power line communication equipment to the market which will tap your electrical network at your home for transferring network packets. So instead of having to use LAN cables or expensive routers and repeaters, you can just fix pairs of power line equipment at your home and get full speed at every corner of your house.

It was an informative, interesting and a successful visit. This trip was highly useful for the students in terms of practical knowledge.

**T**echopedia, the annual national level festival organised under IEEE Student branch of SIES GST. It was a pleasure to organize this event alongside the annual technical festival of SIES GST. Techopedia was conducted on 15th and 16th of September 2017. It included 3 events, namely Inquisitive (national level quiz) competition, Squabble (national level debate competition) and Circuit Maniacs. There was a great response from the students of our college and from other colleges all over the city. The feedback that we have received from the participants was very much positive and appreciative.

The inauguration was attended by all the faculty members of EXTC branch and also from other branches, also by participants and other students. The festival was inaugurated at 9:30 AM by our honorable chief guest. Later, the events commenced at 10:00 am and winded up by 5pm. Following is the detailed report of the day.

Inquisitive, a national level quiz competition, conducted every year by IEEE SIESGST under Techopedia. It started at 11:00 AM and ended at 5:00 PM. It was a one-day event wherein all your knowledge was tested in all fields especially in technical. It consists of three rounds, first was a pen and paper round followed by a buzzer round and ending with a rapid-fire round. The participants were in a team of two. In all of these levels' participants had to dangle with mental evaluation of mathematics, aptitude test and general knowledge-based questions within the time limits. It was a team event and we had 80 teams participating. According to the feedback the event was thrilling and also very informative.

Squabble, a debate competition and a platform to showcase your oratory skills with technical perspective. It started at 11:00 AM and ended at 5:15 PM. We had group discussion and one-on-one debate with time limitation. It was a team of two event with 60 teams participating. Participants were given guidelines about communication ethics before their performance. This event was quite helpful for participants to build their confidence on stage and to enhance the communication skills.

Circuit maniacs- An event which will provide opportunity for all electronic geeks to showcase their knowledge about circuit designing and implementation by competing with others with interest in similar fields. It began at 11:00 AM sharp and ended at 5:15 PM. It was exclusively for students of first and second years. We had 50 teams participating. The first round consisted testing of knowledge based on electronic components followed by a buzzer round and lastly circuit making and problem-solving techniques.

Lastly the prize distribution ceremony was conducted at 5:30 PM. All the winners of respective events were given certificates by IEEE, medals and cash prizes. Thus, the festival ended on a good note.

# EVENTS HELD IN 17-18

The year 2017-18 was a prominent year for our IEEE student branch of SIES GST. Some of the many events conducted in this year uplifted the standards of our student branch.

Some of the many events which served as a very knowledgeable and interesting experience for all the students are, IE3D-Antenna Design workshop, Haptics-Robotics Arm Workshop, MIT App Inventor Workshop, Workshop on embedded design, arduino and IOT & some seminars.

In IE3D-antenna design workshop students gained insights on core concepts of telecommunication side, this workshop aimed at discussing briefly some of the antenna's technical design features and presents several important examples of the antenna's commercial applications with design and simulation of antenna using IE3D software. The Haptics-Robotics Arm workshop developed a strong interest among students and faculty members about this evolving technology with hands on experience.

Students were able to handle and operate mobile applications and develop it from scratch in MIT App Inventor Workshop. Workshop on embedded design, arduino and IOT were very beneficial for students working on projects. This workshop provided hands-on practice on Intel Galileo microcontroller with different sensors, actuators and displays devices to fulfil the gap between academic and industry.

Seminar on Machine Learning and Roadbot explained the Artificial Neural networks and data analytics along with the briefing about construction of Roadbot. Seminar on Google Crowd Source gave us the insights of benefits of crowd sourcing, building apps and machine learning with data binding and testing.

The active participation of all the IEEE members and fellow EXTC branch students in the mentioned events helped to boost the morale of the team and indeed made it a promising year for IEEE SIESGST to celebrate and cherish.

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