

SIES GRADUATE SCHOOL OF TECHNOLOGY

IEEE SIESGST STUDENT BRANCH

PRESENTS

TECHNOZINE

2016-17

IEEE SIES-GST EXECUTIVE COMMITTEE 2016-17

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SIES GST EXTC Department Vision

***To be a Premier Department in
Electronics & Telecommunications Engineering.***

Mission

To provide quality education satisfying the requirements of corporate world across diverse fields.

To develop life-long learning skills to cater to the socio-economic needs.

To strengthen Industry-Institute Interaction to bridge the gap between academic and industrial requirements.

To equip students with leadership and entrepreneurial skills.

Program Educational Objectives (PEOs)

Identify, formulate and solve engineering problems in the Industry, complying with ethical standards and societal needs.

Pursue higher studies and professional development courses leading to significant advancement in the field of specialization.

Apply technical concepts to develop applications and design products.

Exhibit leadership and entrepreneurial acumen in career.

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 branch 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, electronics hacking and gesture control.

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.

ABOUT IEEE SIES-GST

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, Prof. Atul Kemkar, Branch counselor Prof. Preetee Khuperkar and last but not the least, the entire student body council whose culmination of efforts has helped in the progress of IEEE SIESGST.



BRANCH COUNSELLOR's DESK



Prof. Preetee Khuperkar
IEEE Branch Counselor

I Prof. Preetee Khuperkar, Branch Counselor of IEEE SIESGST would like to take this opportunity to present the annual technical magazine 'TECHNOZINE' of our very own IEEE student branch. It is truly a pride for me to release this journal which holds every tiny nuance of all the proceedings within the chapter.

“The science of today is the technology tomorrow”.

Having said this, I would say that it is our responsibility to update and develop our own skill set with the upscale development happening around us with each day coming to a new advancement. This knowledge that one would gain will surely be the differentiating factor of any individual, from the rest of the herd in order to stand out.

'IEEE SIESGST Branch Counselor, to be precise this post has not only given me a great deal of pride, but has also made me earn lot of knowledge, experience, exposure and so much more to a great extent. In my capability have always aimed to work towards the betterment of this chapter with the view of encouraging the young growing minds of our college to ignite the spark in them. Of course yes, the student branch has indeed made me proud with their smooth functioning and cumulative efforts of each one of them in the conduction of various events resulting in the success of this team.

This log book 'TECHNOZINE' showcases the multiple endeavours of our IEEE SIES GST executive committee and the creative minds who have worked behind the success of all events that have been conducted throughout this academic year. It also includes a plethora of technical articles written by our own students and it is truly overwhelming to read and understand the different perspectives that each one of them hold.

Apart from all the efforts and technical evolution that has been reflected, this magazine together binds all the sentiments and memories that I have towards this branch and the students who I have worked with.

Last but not the least, I have to mention about the constant support we have got from of our respected principal, Dr. Vikram Patil and our HOD, Dr. Atul Kemkar without whom none of this would have been possible. I extend my warm regards and thanks to them for always guiding and encouraging all our decisions. I would also like to thank and appreciate the team of IEEE SIES GST and all those who have put hard work, day and night behind 'TECHNOZINE'. I wish success to each one of you for all your future ventures.

TECHOPEDIA 2016

Techopedia, 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 23rd and 24th of September 2016. It included 3 events, namely Inquisitive (national level quiz competition), Squabble (national level debate competition) and Circuit Maniacs (national level circuit making competition). 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 honourable 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 consisted 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. 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. The students debated very skillfully in all the rounds. It started at 11:00 AM and ended at 5:15 PM. We had group discussion and one-on-one debate with time limitation. Participants were given guidelines about communication ethics before their performance.

TECHOPEDIA 2016

This event was quite helpful for participants to build their confidence on stage and to enhance their 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. The first round consisted of 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.



GLIMPSE OF TECHOPEDIA 2016



Events Held in 2016

The year 2016-17 was a promising year for IEEE Student Branch of SIES GST, which served as a good kick start for the forthcoming years.

Some of the many events which served as a very knowledgeable and interesting experience for all the students are, Virtual Appearance Seminar by Astronaut Mrs. Sunita Williams, NASA, where she shared her experience with NASA and also gave us a glimpse of various missions and achievements of her life. Hands on workshop on Drone Making conducted by the team of Drona Aviation Team of IIT Bombay. In the world of today where drones are playing a vital role in various industrial, commercial and military purposes, this workshop enabled the students to understand the basics of drone flying and aerodynamics and Workshop on Electronics Hacking & Gesture Control conducted by Founder & CEO of Gesttutorialized which introduced the participants to the world of robotics and embedded systems and also led them to the way in which these technologies can be used in various fields and applications.

The active participation of all the IEEE members and fellow EXTC branch students in the mentioned events helped in giving a good kick start to IEEE SIES GST.

REPORT ON THE INDUSTRIAL VISIT TO ISTC, PUNE

One of the most eagerly awaited events was successfully completed when the third and final year students of EXTC visited the Institute of Satellite Telecommunication (ISTC), Kharadi, Pune on April 2nd, 2017. The visit was organized by IEEE Student Branch of SIESGST under the guidance of HOD.EXTC Dr. Atul Kemkar and IEEE SIESGST student branch counselor Prof. Preetee Khuperkar and Prof. Pushkar Sathe.

All students set their journey for the industrial visit from college on April 2nd morning and reached the venue just before noon.

After a while of rest and refreshments, the students were addressed by CEO and Founder of ISTC Mr. Krish Mehkarkar. He primarily focused on gaining a working knowledge of different devices in a general RF system, to begin the proceedings, video screenings of PSLV and GSLV animations were shown. They particularly focused on identifying different components of the launch vehicle. Later, various videos were shown to demonstrate ISRO's space development programs and missions. Mr. Krish Mehkarkar interacted with the students on topics such as Earth stations and antenna positioning parameters. One of the main highlights was the lecture delivery being very easy to comprehend and proper reasoning behind every concept being explained. The lecture concluded on a promising note to perform the practical of the topics which had been taught.

After the students were through with their lunch, they were shown the components inside a set top box and the functioning of each basic sub-system was explained by the industry coordinators. The second phase of the practical was to showcase the different antennas which included 9m Earth Station Antenna, 6m Receive Antenna and 3.8 m Trans/Receive Antenna.

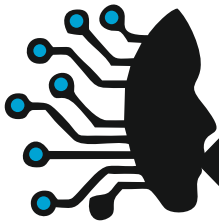
Students were informed about the installation and working of Antenna Control Systems, RF Equipment (Uplink & Downlink) like SSPA, HPA, UP/DOWN Converters, Modulators, Demodulators & Uplink Power Controllers and RF cabling.

REPORT ON THE INDUSTRIAL VISIT TO ISTC, PUNE

The key aspect of this industrial visit was that the students realized the importance of moving beyond the theoretical knowledge of satellite communication and applying them in functional devices to understand it's working. Mr. Krish Mehkarkar again focused on the fact that the best way to learn the working of a certain device was to be able to install, configure and troubleshoot it rather than only having a theoretical knowledge.

Thus, the Industrial Visit ended on a positive note with proper coordination of the whole team of IEEE SIESGST.





Applications of Image processing in medical field

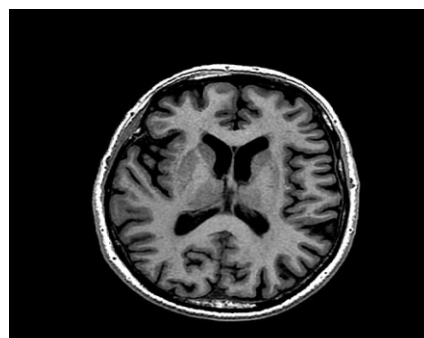
Visual information is the most important type of information perceived, processed and interpreted by the human brain. Imaging systems construct an image in response to signals from diverse types of objects. They can be classified in a number of ways, e.g. according to the radiation or field used, the property being investigated, or whether the images are formed directly or indirectly. Digital image processing acts as a computer-based technology which carries out automatic processing, manipulation and interpretation of visual information in the form of images, and it plays an increasingly important role in many aspects of our daily life, as well as in a wide variety of disciplines and fields in science and technology. It has many applications such as television, photography, robotics, remote sensing, medical diagnosis and industrial inspection. Today, there is almost no area that is not impacted by image processing. We are going to discuss about one of the fields of applications of image processing. That is medical image processing.

Medical imaging systems take input signals which arise from various properties of the body of a patient, such as its attenuation of x-rays or reflection of ultrasound. The resulting images can be continuous, i.e. analog, or discrete, i.e. digital. The challenge is to obtain an output image that is an accurate representation of the input signal, and then to analyze it and extract as much diagnostic information from the image as possible. Current advances in medical imaging are made in fields such as instrumentation, diagnostics, and therapeutic applications. Most of them are based on imaging technology and image processing. In fact, medical image processing has been established as a core field of innovation in modern health care. Biomedical image processing is a very vast growing and upcoming field.

-Ashish Sahu
EXTC Student



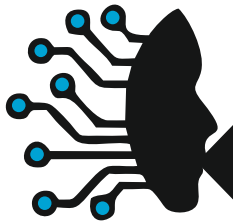
X-RAY IMAGE



BRAIN MRI



ULTRASOUND



Introduction to Fractal Antenna

A fractal antenna is an antenna that uses a fractal, self-similar design to maximize the effective length, or increase the perimeter (on inside sections or the outer structure), of material that can receive or transmit electromagnetic radiation within a given total surface area or volume.

Such fractal antennas are also referred to as multilevel and space filling curves, but the key aspects in their repetition of a motif over two or more scale sizes, or "iterations". For this reason, fractal antennas are very compact, multiband or wideband, and have useful applications in cellular telephone and microwave communications. A fractal antenna's response differs markedly from traditional antenna designs, in that it is capable of operating with good-to-excellent performance at many different frequencies simultaneously. Normally standard antennas have to be "cut" for the frequency for which they are to be used—and thus the standard antennas only work well at that frequency.

Antenna elements (as opposed to antenna arrays, which are usually not included as fractal antennas) made from self-similar shapes were first created by Nathan Cohen then a professor at Boston University, starting in 1988. Cohen's efforts with a variety of fractal antenna designs were first published in 1995.

Many fractal element antennas use the fractal structure as a virtual combination of capacitors and inductors. This makes the antenna so that it has many different resonances which can be chosen and adjusted by choosing the proper fractal design. This complexity arises because the current on the structure has a complex arrangement caused by the inductance and self-capacitance. In general, although their effective electrical length is longer, the fractal element antennas are themselves physically smaller, again due to this reactive loading.

Studies during the 2000s showed advantages of the fractal element technology in real-life applications, such as RFID and cell phones. Fractals have been used in antennas since 1988 and their advantages are good multiband performance, wide bandwidth, and small area and that reference showed that the gain with small size results from constructive interference with multiple current maxima, afforded by the electrically long structure in a small area.

- Rohit Vishwakarma
EXTC Student



Augmented Reality came as a magical technology to the world to mesmerize millions. Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory.

AR combines the real and the virtual world, helps us to have a real time interaction with an object and gives an accurate 3D registration of an object.

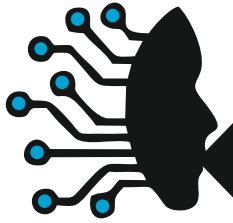
Hardware components for augmented reality are: a processor, display, sensors and input devices. Modern mobile computing devices like smartphones and tablet computers contain these elements, which often include a camera and Microelectromechanical systems (MEMS) sensors such as an accelerometer, GPS, and solid state compass, making them suitable AR platforms. There are two technologies used in augmented reality: diffractive waveguides and reflective waveguides.

Displays such as head mounted displays or head up displays are used to perceived AR. These displays have similar working but are different in regarding the field of view they possess. Contact lenses which can perceive AR are being developed. These have LEDs and ICs inbuilt in them.

Software and Algorithms

A key measure of AR systems is how realistically they integrate augmentations with the real world. The software must derive real world coordinates, independent of camera, and camera images. That process is called image registration, and uses different methods of computer vision, mostly related to video tracking. Many computer vision methods of augmented reality are inherited from visual odometry. The basic challenge of the algorithm is to detect the corner and edges of the object as to make a perfect image of the same.

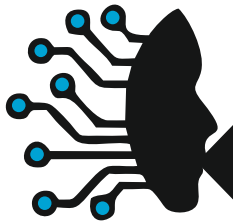
AR is one of the most important tools to make decisions regarding installation of any system or maybe decorate a house. It can be used in a wide way in the field of education. This technology finally makes a way for humans to connect with the virtual world.



Interconnecting Smart Objects in Internet of Things

Have you ever thought of how tiny devices are connected to the Internet of Things (IoT)? Most of you have worked and are working on IoT based projects using Zigbee, RFID, Bluetooth, cellular and WiFi wireless communication technologies to send the sensed data to the cloud. But do you know how the tiny devices/objects are able to communicate in the IoT? Since tiny devices are memory constraint how they can be IP (Internet Protocol) enabled so as to communicate among themselves in the IoT? Yes, the way out to make tiny devices IP enabled is the 6LoWPAN (IPv6 over low power wireless personal area network) technology which provides IPv6 header compression in the lightweight operating system stack such that it is within the memory capacity of the tiny devices and objects. These smart objects are enabled with lightweight operating systems like Contiki OS and RIOT OS. The latter one can even fit into a wrist watch. The 6LoWPAN technology is based on IEEE 802.15.4 standard like Zigbee but offers much higher range than Zigbee (10s to 100s of kilometres). The IEEE 802.15.4 operates in unlicensed ISM band of frequencies from 2.4GHz to 2.483 GHz. 6LoWPAN depends on MAC/PHY standards of IEEE 802.15.4 which offers limitations on packet size and throughput. The 6LoWPAN devices are available as end devices, gateways and border routers. The challenges for 6LoWPAN technology include the interoperability among heterogeneous devices, energy efficient communication, scalability and mobility. The future scope is to work around these challenges.

- Aadityanand
EXTC Student

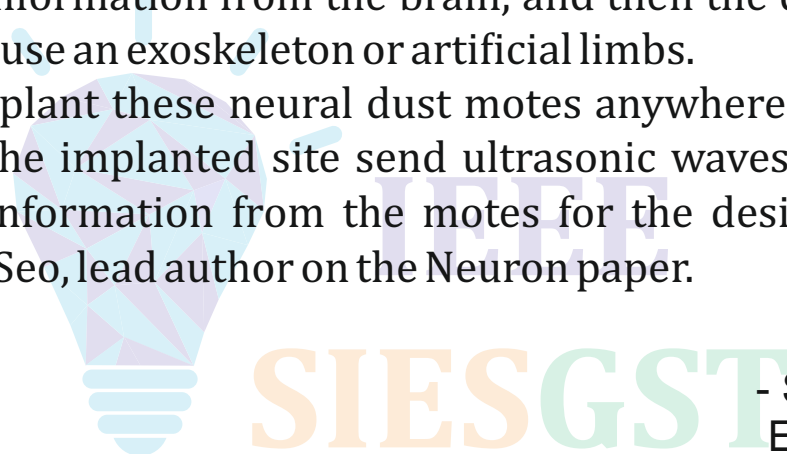


Dust Sized Sensors

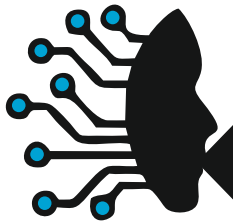
Having to seem a little eccentric, Fitbit will be replaced by dust sized sensors that will be implanted in the body, which have the potential to robotically control diseases like epilepsy, a prosthetic armor leg. The astute engineers at the University of California, Berkeley have created the very first set of tiny, dust-sized sensors that are wireless that can be read. It can also be powered by ultrasound to read data from the inside of the body.

The neural dust that is currently about the size of a sand grain. For people who are paralyzed, the device could eventually be used to run a brain machine interface to help them move prosthetics. Right now, some similar technology uses implantable electrodes that can only last a couple years. The tiny new devices could pull information from the brain, and then the data could help a paralyzed person to use an exoskeleton or artificial limbs.

"The vision is to implant these neural dust motes anywhere in the body, and have a patch over the implanted site send ultrasonic waves to wake up and receive necessary information from the motes for the desired therapy you want," says Dongjin Seo, lead author on the Neuron paper.



- Sahil Pandita
EXTC Student

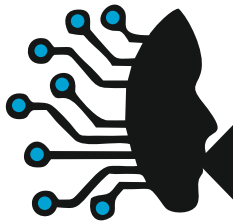


Distributed Ledger Technology

A DLT is one of the biggest buzzword in the technology now-a-days. DLT which is also known as Blockchain Technology is situated under the cryptocurrencies such as Bitcoin, Ethereum, Facton, Bitshares, Namecoin and Truthcoin platform. First major application of DLT was Bitcoin, which was released in 2009. A bitcoin is a public ledger system of every transaction taken place through the internet in a secure and safe manner. The bitcoins blockchain works in a decentralized way. While traditional digital currencies are issued by central banks whereas bitcoin used in blockchain has no central authority. Instead, this bitcoin was maintained by a network, which solves the complex mathematical problems. This technology is used almost in all the sectors of real world applications which use E-Tag or Electronic or Online. It can change the dimensions of the digital operations by performing distributed ledger transactions in daily human's life by averting the third parties.

In general, the structure of DLT contains main data; the hash of the previous block, a hash of current one, timestamp and other information. Main data: Depending on the kind of service in which this blockchain is applicable, for example, transaction records, bank clearing records, contract records or IOT data record. Hash: When a transaction executed, it had been hash to a code and then transmitted to each node. Because it could contained thousands of transaction records in each node's block, blockchain used Merkle tree function to produce a final hash value, and also Merkle tree root. Timestamp: Time of block produced. Other Information: Like signature of the block, Nonce value, or other data that user defines.

Blockchain technology affected the transforming of the current Internet from "The Internet of Information Sharing" to "The Internet of ValueExchange". The applications of this technology are enormous and heterogeneous. Companies such as IBM, Amazon, Samsung, Verizon wireless, Overstock are in order to take a look at the blockchain technology and uses for their own applications. Some of the biggest US banks joined with the New York based financial technology firm named as R3 for creating a framework for blockchain technology.



Communication Protocols

What is a protocol?

A protocol is a set of rules. Communications devices have to agree on many physical aspects of the data to be exchanged before successful transmission can take place. Rules defining transmissions are called as communication protocols.

Communication protocols cover authentication, error detection and correction, and signalling. They can also describe the syntax, semantics, and synchronization of analog and digital communications. Communications protocols are implemented in hardware and software. There are thousands of communications protocols that are used everywhere in analog and digital communications. Computer networks cannot exist without them.

There are many properties of a transmission that a protocol can define. Common ones include: packet size, transmission speed, error correction types, handshaking and synchronization techniques, address mapping, acknowledgement processes, flow control, packet sequence controls, routing, address formatting

Popular protocols include: File Transfer Protocol (FTP), TCP/IP, User Datagram Protocol (UDP), Hypertext Transfer Protocol (HTTP), Post Office Protocol (POP3), Internet Message Access Protocol (IMAP), Simple Mail Transfer Protocol (SMTP). Modern protocols for computer networking all generally use packet switching technique to send and receive messages in the form of packets- messages subdivided into pieces that are collected and reassembled at the destination.

Internet protocols: They are the most widely used network protocols.

Examples are: TCP(Transmission Control Protocol), UDP(User Datagram Protocol), HTTP(Hypertext Transfer Protocol), FTP(File Transfer Protocol). These are higher level protocols in the IP family which interact with applications like web browser, while lower level protocols like ARP(Address Resolution Protocol) and ICMP(Internet Control Message Protocol) interact with network adapters & other computer hardware.

Wireless Network Protocols: These protocols are needed for the proper functioning of Wi-Fi, Bluetooth & LTE.

- Sakib Parkar
EXTC Student



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