VIDYAVARDHINI'S COLLEGE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Telecommunication

10th Edition, June 2020

ETA

ELECTROMAGNETICS AND OPTICS

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From the HOD's Desk

ETA committee has always fulfilled its aim of spreading knowledge in the form of articles, newsletters and magazines. The committee strongly works on the principle that "Knowledge is Power". It works not only towards the technological development of the students but also towards the soft skills by teaching students the importance of team work. It is quite gratifying to see that ETA has come up with its tenth edition of Pulse magazine i.e. PULSE'20. The PULSE this year reflects the emerging field of ELECTROMAGNETICS & OPTICS. The magazine also provides an insight to the alumni interviews, departmental activities and much more. It has been an astonishing year for EXTC department with excellent exam results as well as placement in various reputed companies like Infosys, TCS, Feed spot, BYJUs, IBM, LTI, Zeus Learning and Cognizant. Apart from this, IEEE & IETE students' chapter organized events like Product Showcase, FE Quiz, seminars and workshops for students and teachers to acquire knowledge beyond their realm of the academic syllabus. All this wouldn't have been possible without the spirit of cooperation and understanding between the staff and the students.

I would like to appreciate the efforts of Mrs. Ashwini Katkar, the staff in-charge of ETA for doing such a great job. I convey my warm regards to the entire ETA team for their relentless efforts and extend my best wishes for their future endeavors.

Dr. Vikas Gupta
Head of the Department,
Dept. of EXTC.

From the Staff In-charge's Desk

"An investment in knowledge pays the best interest"

- Benjamin Franklin

It is with great pleasure and pride I present to you the magazine, 'Pulse'!

Continuing the trend this year too ETA published informative and rich newsletters and also this year we have come with our interview series on our Instagram account where we interview students/industry people. We released our newsletters on the topic 'Flexible Electronics' and 'Cognitive Technology' for the academic year 2019-20.

We proudly present our tenth edition of PULSE Magazine i.e. PULSE'20 with the theme as **'ELECTROMAGNETICS & OPTICS'** that has been organized well by articles about Electromagnetics, its application in different fields and scope. The magazine not only includes Departmental Events, Alumni Talk and Student Achievements but also we have included Expert notes from DRDO, and various other Tier-I colleges/universities. Also I'm delighted to witness the progress of students in co-curricular and extracurricular activities.

I devote my sincere gratitude to our Principal Dr. Harish Vankudre for his valuable support and our HOD Dr. Vikas Gupta for his immense guidance and support. I would like to appreciate the work done by our **Secretary, Ms. Saili Sakpal** and her entire team. I would like to appreciate the whole 'ETA team for their valuable efforts.

Happy Reading!!!

Prof. Ashwini Katkar
Staff In-charge,
ETA.

From Secretary's Desk

"Learning gives creativity, creativity leads to thinking, thinking provides knowledge, knowledge makes you great"

Following this great thought of one of the profound personalities the world has ever witnessed, Dr. A.P.J. Abdul Kalam, ETA as a committee has always tried to nurture and spread the spirit of knowledge. It has provided the students with an opportunity to gain knowledge beyond their academic boundaries and to showcase their calligraphic talents. At the final stage for this captivating year of ETA, I take the opportunity to bring to you, ETA PULSE'20, the annual magazine of EXTC Department. This year, the magazine focuses on ELECTROMAGNETICS AND OPTICS. It describes about the applications of electromagnetic radiation in various fields. It revolves around the concept of Microwave, Infrared and Optical technology. The magazine also includes articles written by experts, worthy alumni interviews and many more.

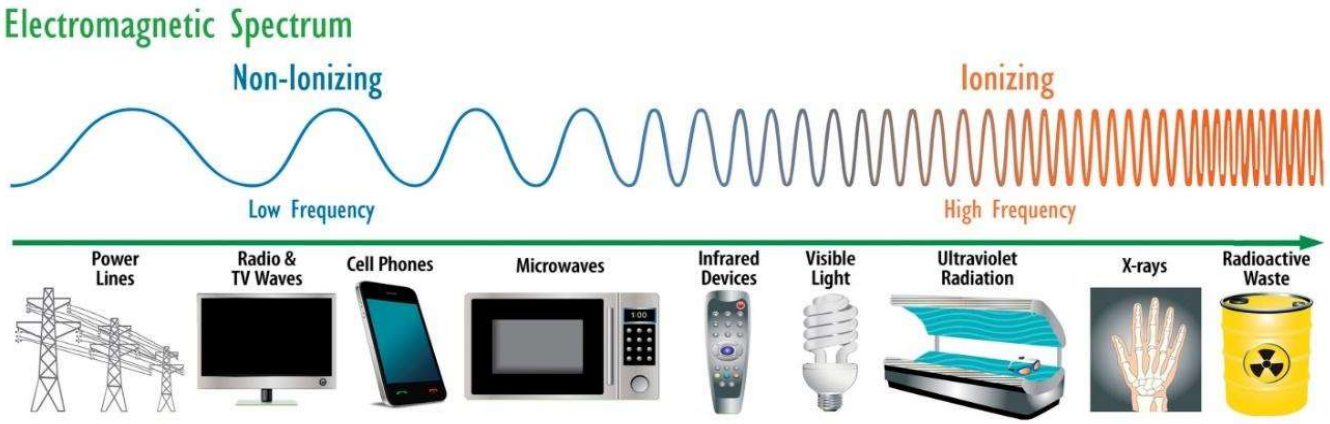
I would like to offer my sincere gratitude to our respected HOD, Dr. Vikas Gupta and our Staff-incharge Prof. Ashwini Katkar for their valuable support and guidance. I would like to thank all my dear colleagues for their relentless efforts and support in completing this edition. I wish the entire ETA team to keep working hard and excel every year. Happy reading!!

Ms. Saili Sakpal
Secretary,
ETA.

CONTENTS

INTRODUCTION TO ELECTROMAGNETICS AND OPTICS

The electromagnetic spectrum is the range of frequencies (the spectrum) of electromagnetic radiation and their respective wavelengths and photon energies.



The EM waves of the spectrum are of frequencies ranging from below 1Hz to above 10^{25} Hz, corresponding to wavelengths from several thousands of kilometers down to size of an atomic nucleus. The bands of the spectrum contain particular range of frequencies, and the EM waves within each frequency band are called different names. Waves in each of these bands have their own characteristics, features, and their practical applications. The longest wavelength is of the size of universe itself, while the shortest wavelength is the Planck length. Gamma, X-rays, and high ultraviolet rays are classified as ionizing radiation as their photons have enough energy to ionize atoms.
Electromagnetic radiation is used for communications and transmission of data. The long distance communication needed a code. Apart from the communication, electromagnetic waves are used for applications in other fields like military, medical, etc.

In this magazine, we are going to cover the three most widely used electromagnetic waves in our day to day life i.e. microwave, infrared wave and optical wave.

FUN FACTS

Electromagnetic waves are the only type of wave that can travel through empty space.

-Saili Sakpal (BE)

Ref: https://www.niehs.nih.gov/health/topics/agents/emf/index.cfm

INTRODUCTION TO MICROWAVE TECHNOLOGY

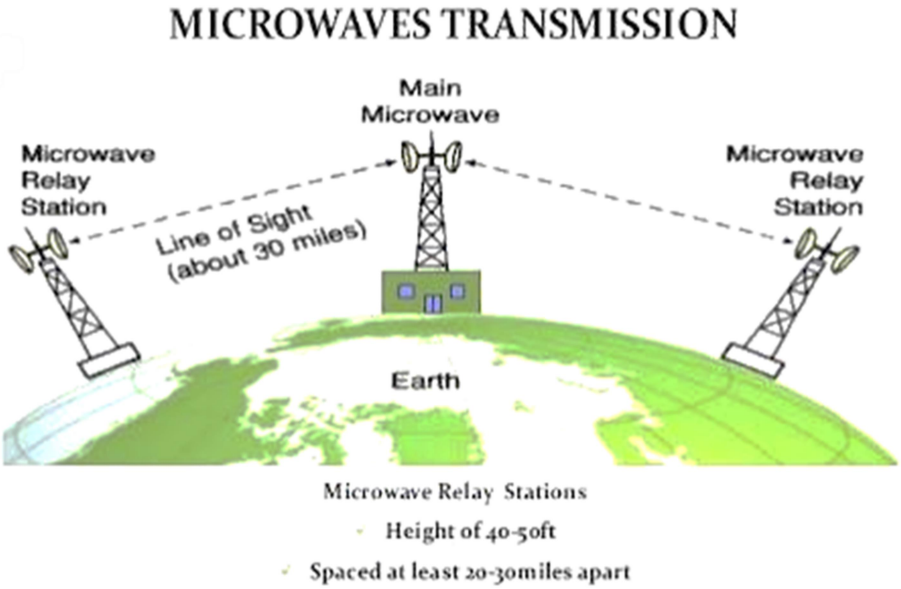
Microwave is a line-of-sight wireless communication technology that uses high frequency beams of radio waves to provide high speed wireless connections that can send and receive voice, video, and data information [1].

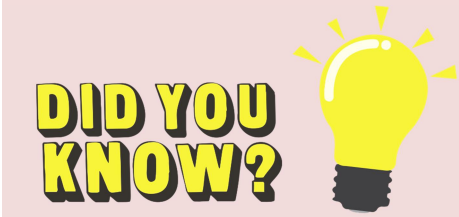
Microwave radio transmission is point-to-point communication system used on the Earth's surface, satellite communications, space communications etc. The microwave bands are also used for radars, navigation, sensor systems, and astronomy. They are classified into three categories:

1. Ultra high frequency (UHF) (0.3-3 GHz);
2. Super high frequency (SHF) (3-30 GHz); and
3. Extremely high frequency (EHF) (30-300 GHz).

Lower Microwave frequencies are used for longer links, and regions with higher rain fade. Conversely, higher frequencies are used for shorter links and regions with lower rain fade [2].

Microwaves are widely used for point-to-point communications because their small wavelength allows conveniently-sized antennas to direct them in narrow beams, which can be pointed directly at the receiving antenna.





1. Microwaves are reflected by metal.
2. The heating effect of microwave radiation was discovered accidently in 1945.

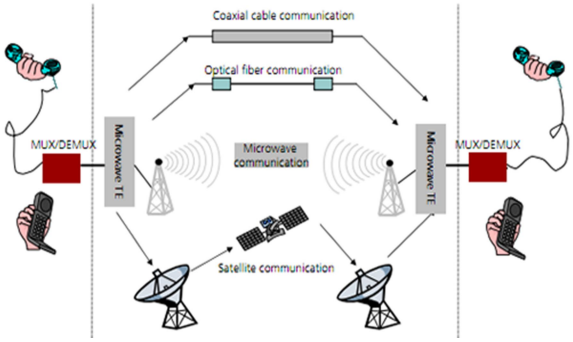
-Shamini Iyer (SE)

Ref: [1] https://www.microwave-link.com/microwave/microwave-link-technology/
[2] https://courses.lumenlearning.com/boundless-physics/chapter/the-electromagnetic-spectrum/

APPLICATION OF MICROWAVE TECHNOLOGY

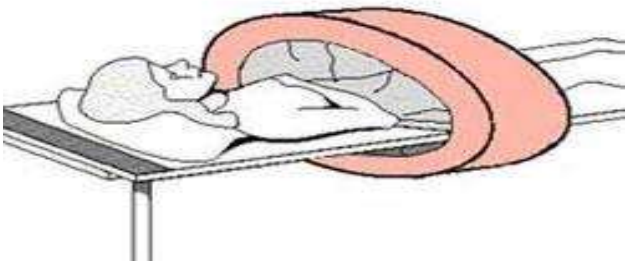
1. Microwave in Communication

Microwaves are radio signals with a very short wavelength. These signals are focused by antennas into a narrow beam. Information that shall transmit over telephone wires or coaxial cables can be transmitted over a microwave circuit as efficiently through wires and cables they supplement. Microwave signals can be transmitted and received easily through a satellite dish [2].



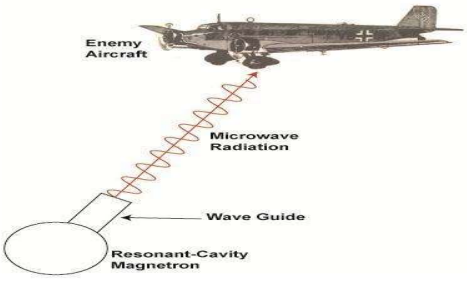
2. Microwaves in Medical

Microwaves play a vital role in the treatment against cancer, providing a new way of treating the disease. Microwave ablation is one of the mostly used techniques in the removal of unwanted tissues and also in the treatment of large tumors. Cancer patients who are poor surgical candidates can benefit from microwave ablation, as it is minimally invasive [1].



3. Microwaves in Radar

If you are going to track a fighter aircraft, a missile, or guide a high-speed missile to a target you need very fine precision and very fast up dates. Longer range early warning radars and radars designed to track targets in a large are will use lower frequency radars (microwaves) in the UHF/VHF bands (30-3000 MHz).



DID YOU KNOW?

The first microwave oven that was commercially available had 1.8 meters in height and weighed 340 kilograms. It used three times as much power as today's microwave ovens, and was water-cooled.

Fighter aircraft and missile control radars tend to be in the higher frequency X band (8-13 GHz). Most of the police speed radar is now up in the K and Ka band (~18 GHz and ~35GHz). These are all "microwaves". Specific frequencies within those bands are chosen for the exact opposite you use in your microwave oven.

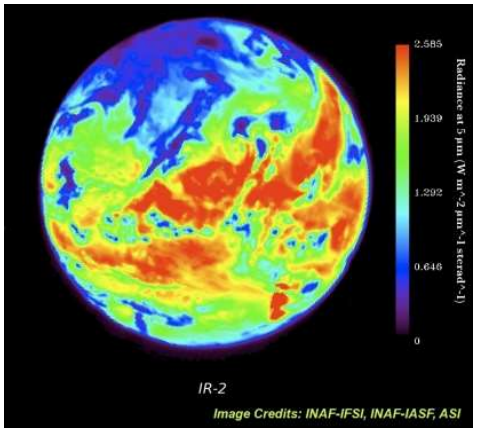
Apart from these, Microwaves are used widely in other applications such as in Navigation, Spectroscopy, spacecraft communication etc.

-Kushal Raut (FE)

Ref: [1] http://www.emblationmicrowave.com/medical_applications.html
[2] https://microwaveroad.se/microwaves-and-application-areas/

INTRODUCTION TO INFRARED TECHNOLOGY

What Is Infrared?



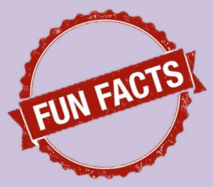
Infrared radiation (IR), or infrared emission, is a type of radiant energy that's invisible to human eyes but that we are able to feel as heat. All objects within the cosmos emit some level of IR radiation, but two of the foremost conspicuous sources are the sun and fire. IR may be a form of radiation, a continuum of frequencies results when atoms absorb and relinquish energy. The remote uses light waves just beyond the color spectrum of light i.e. infrared radiation waves to transmute channels on your TV.

Regions with infrared regions

Infrared is conventionally divided into 3 spectral regions: near, mid and far-infrared. The boundaries between the near, mid, and far-infrared regions aren't concurred upon and may vary. The major factor that determines which wavelengths are included in each of those three infrared regions is that the form of detector technology utilized for accumulating infrared light. The region from 8 to 15 microns (μm) is cited by Earth scientists as thermal infrared since these wavelengths are best for studying the long wave thermal energy radiating from our planet.

Spectral region	Wavelength range (microns)	Temperature range (degrees kelvin)	What we see
Near-Infrared	(0.7-1) to 5	740 to (3,000-5,200)	Cooler red stars Red giants Dust is transparent
Mid-Infrared	5 to (25-40)	(92.5-140) to 740	Planets, comets and asteroids Dust warmed by starlight Protoplanetary disks
Far-Infrared	(25-40) to (200-350)	(10.6-18.5) to (92.5-140)	Emission from cold dust Central regions of galaxies Very cold molecular clouds

DISCOVERY OF INFRARED



In 1800, William Herschel conducted an experiment measuring the difference in temperature between the colors in the visible spectrum. He placed thermometers within each color of the visible spectrum. The results showed an increase in temperature from blue to red. When he noticed an even warmer temperature measurement just beyond the red end of the visible spectrum, Herschel had discovered infrared light!

-Nihal Kumar (TE)

Ref: https://science.nasa.gov/ems/07_infraredwaves

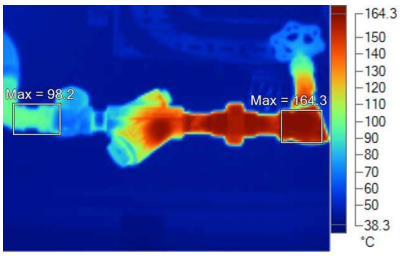
APPLICATIONS OF INFRARED TECHNOLOGY

Infrared transmission systems are widely utilized for short-range communications. The subsequent are a number of the applications of infrared technology.

1. Ultrasonic Distance Measurement

To achieve remote ultrasonic measurement system, wireless communication technology, and ultrasonic measurement techniques are amalgamated to develop an infrared-based communication technology ultrasonic distance measurement system [3].

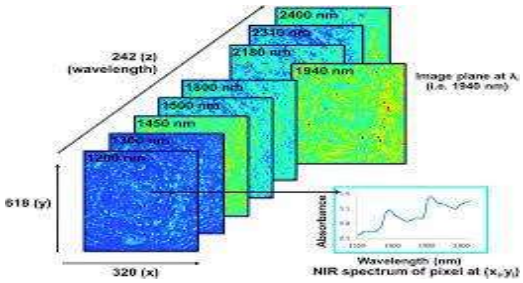
2. Infrared in Thermography



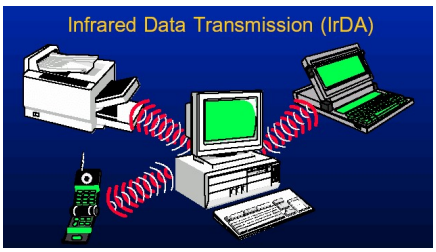
Infrared thermography is that the process of utilizing a thermal imager to detect radiation (heat) emanating from an object. Images of the detected temperature distribution are called thermo grams, and that they make it possible to visually perceive heat-engendering objects invisible to the naked eyes. It's widely-utilized in predictive maintenance and condition monitoring [1].

3. Infrared in Hyper spectral imaging

Hyperspectral imaging, like other spectral imaging, accumulates, and processes information from across the spectrum. The main goal of this, is to urge the spectrum for each pixel within the image, with the purpose of finding objects, identifying materials, or detecting processes[2].



4. Infrared in Computer Network



Utilizing an infrared (IR) connection, computers could transfer data over short-range wireless signals. IR LEDs are used to transmit IR signals, which travels through lens and concentrate on a beam of IR data. The beam source is expeditiously switched on and off for data encoding. The IR beam data is received by an IrDA device which converts the IR beam into an electrical current for processing.

Some common applications for infrared are in remote systems for televisions, VCRs, DVD players, and set-top boxes of different descriptions, tracking of objects etc.

-Prachi Purohit (FE)

Ref: [1] https://www.reliableplant.com/infrared-thermography-31572
[2] https://openei.org/wiki/Definition:Hyperspectral_Imaging
[3] Xiao Chang, Chenliang Wu, "Ultrasonic Distance Measurement Based on Infrared Communication Technology", Third International Symposium on Intelligent Information Technology Application, 2009.

INTRODUCTION TO OPTICAL TECHNOLOGY

The branch of physics which deals with the behavior and properties of light, including its interactions with matter and also the construction of instruments that use or detect it is called optics. The behavior of visible, ultraviolet, and infrared emission is customarily described by optics. Because light is an electromagnetic wave, other forms of electromagnetic radiation such as X-rays, microwaves, and radio waves exhibit similar properties.

Optical science has relevancy to and studied in several connected disciplines together with physics, numerous engineering fields, photography, and medication (particularly medical specialty and optometry). Practical applications of optics are found in a very sort of technologies and everyday objects, including mirrors, lenses, telescopes, microscopes, lasers, and fiber optics.

A glass fiber may be a transparent, flexible fiber made by silica or plastic to a diameter remotely thicker than that of somebody's hair. Optical fibers are commonly utilized as an expedient to transmit light between the two terminuses of the fiber and find wide utilization in fiber-optic communications, where transmission over longer distances and at higher bandwidths than electrical cables is permitted. Metal wires are superseded by fibers as signals peregrinate along them is with less loss; in addition, fibers are proof against electromagnetic interference, a quandary from which metal wires cannot cope. Fibers are withal utilized for imaging and illumination and are often wrapped in bundles so that they could also be acclimated to hold light into, or images out of confined spaces, as within the case of a fiberscope.

Fun Facts

Fiber is stunningly fast: In 2014, researchers from the Netherlands' Eindhoven University of Technology and the University of Central Florida demonstrated data transfer over a single multi-core optical fiber at a jaw-dropping rate of 32 TB per second. In other words, you could transfer a high definition (HD) movie file in 0.03 milliseconds at this speed.

-Hemant Chaubey (TE)

Ref: https://www.coursehero.com/file/19930003/FIBER-OPTICS/

APPLICATIONS OF OPTICS

OPTICS IN MEDICAL:

Optics has been used throughout the centuries as a technology to assist medical doctors to perform examinations of patients. Many of the medical instruments in use today rely on optics and optical components to perform their intended function. In general, many of the basic optical medical instruments have in common the goal to provide both a more direct illumination and optical magnification of the area under examination [1].

OPTICS IN ELECTRONICS:

Optoelectronics is one of the expeditious emerging technology fields that deal with applying electronic devices to the sourcing, detection, and control of light. This is often utilized for varied purposes like telecommunications, monitoring and sensing, long-wavelength Li DAR and general science. Optical Fiber is one of the most popular applications of Optical technology. It is been used widely in telecommunications across the globe for transferring data through oceans. Apart from this, some other applications are Photonic Integrated circuit, photo diodes, solar cells etc. [2].

OPTICS IN MILITARY:

1. Optical Computing

For decenniums, photons have promised to allow a higher bandwidth than the electrons utilized in conventional computers. Photons fundamentally use wave propagation and also the interference pattern of waves to regulate outputs. Data is processed while it's propagating. Thus, optical computing can solve very involute network optimization quandaries that might take centuries for classical computers. Most current research during this area is in optical networking. Dolfi is functioning on optics within the box, especially for projects in military and aerospace applications [3].

2. Surveillance

Nowhere are the benefits of fiber optics-low loss, high bandwidth, and immunity to electrical interference more paramount than in security systems, especially surveillance cameras. Connecting video cameras with fiber is kind of easy. Inexpensive adapters allow conversion of the analog or digital electrical signals from the cameras to optical signals. The utilization of fiber optic cables has permitted virtually illimitable range for cameras, centralizing recording and monitoring functions for convenience.

-Tarang Marolikar (TE)

Ref: [1] https://www.bbc.co.uk/bitesize/guides/zctmh39/revision/4
[2] https://electricalfundablog.com/optoelectronics-devices-applications/
[3] www.militaryaerospace.com

EXPERT'S NOTE

Career & Research Opportunities in Electromagnetics

Electromagnetics (EM) is the study of fundamentals of electromagnetic fields and their applications. It has many applied branches like Microwaves, RF (Radio Frequency), Antenna, Electromagnetic Interference & Compatibility (EMI-EMC), Radar, Remote sensing, Lasers, Optics and many more. Each applied branch has several applications in the areas like communication, medical, military etc.

EM is all around us. Every time we turn a power switch on, every time we press a key on our computer keyboard, every time we use our cell phone, every time we travel by aeroplane, every time we watch a weather report or every time we perform an action involving an everyday electrical device, EM comes into play. It is the foundation for the technologies of electrical and computer engineering, spanning the entire electromagnetic spectrum, from dc to light, from the electrically and magnetically based (Electro-mechanics, MEMS) technologies to the electronics technologies, to the photonics technologies. More popularly the EM spectrum can be divided into two categories; first one is 'optical window' and second one is 'RF window'. Each window of the EM spectrum has its own share in evolving technologies hence career & research opportunities, however, the scope of this article is to cover the career & research opportunities in the areas of 'RF window' of EM with a spectrum span up to 300 GHz.

One can notice that the word 'career' is used before 'research' and it is done purposefully as research always leads into a relative lucrative career, nevertheless, sometimes doing 'research' is in itself a 'career'. To get acquainted with the career & research opportunities in the RF window, let us have a glance over the figure 1 below;

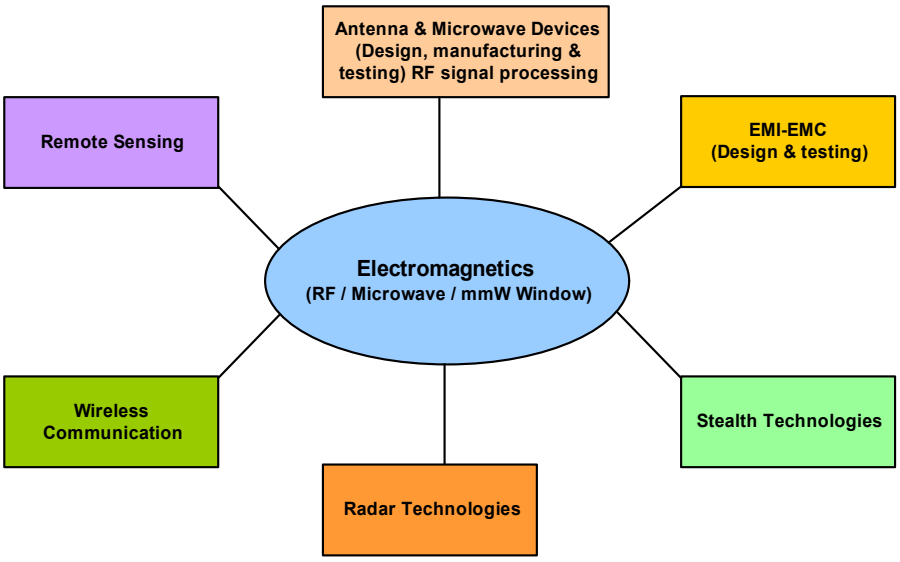


Fig.1 Career & research opportunities in the 'RF' window of EM Spectrum

One can easily see a few applied fields of EM, however they are not individual & isolated but they are interlinked. Let us examine how each applied field has immense potential for a budding RF engineer.

To start with 'Antenna & microwave devices'; it can be claimed that these are basic building blocks for the other areas. Without a proper antenna, transmitter, receiver, power combiner, isolator, directional coupler, detector, circulator, RF cable etc. one cannot imagine realization of any RF system or doing any RF activities like stealth, Radar, EMI-EMC. It is the biggest applied field and hence the greater & higher opportunities. Antenna is an integral part of each & every RF system like communication devices, Radar, EMI-EMC testing, stealth measurement & Radar Cross Section (RCS) reduction, IoT, driver less autonomous car, remote controlled drone, guided missiles and many more. Each antenna for each specific system or device needs to be designed, manufactured and then tested before putting into actual application. Each stage needs EM knowledge & skill set. One can be an antenna designer, the engineer with mechanical / production mind set can be an antenna manufacturer and a person with liking for test & measurement can be an antenna testing engineer. With acquisition of domain knowledge, multi skills and some experience, a single person can also perform all three functions. Similarly for other RF parts (e.g. Radome, dielectric materials), microwave & mmW devices, there are immense requirements for the design, manufacturing & testing part. Similarly new technologies, devices and materials are being researched continuously across the world. 'RF Energy' harvesting is just one of it, where a 'receiver' does not need a power source, the RF energy present in the environment is harvested to generate enough electricity to run a radio receiver without power, that is powerlessly. Technologies like 5G, LiFi have a tremendous scope of research and hence careers. RF signals processing (hardware and software) highly demands expert RF engineers in large numbers. In Govt. sector ISRO & DRDO are main employers while a large number of small and medium Indian industries are involved in antenna & RF systems (hardware & software) design and manufacturing. Monolithic Microwave Integrated Circuits (MMIC) sector is a big job provider for engineers with EM/RF knowledge and micro-electronics. GAETEC & AMPL are fine example of such industry.

Fig.2 Various antennas

Electromagnetic Interference & compatibility (EMI-EMC), Signal Integrity (SI), Power Integrity (PI) are applied fields of EM. There are two types of job functions, one is design and another is testing. A successful EMC designer must possess knowledge of SI&PI. Each Electronic and RF device has to be EMC compliant as per applicable regulation like military, civilian or industrial. EMC design engineers contribute towards EMC compliant design of the system using basics of EM. They use various tools like EMI prediction and analysis, EM simulation, EM prototyping and pre-compliance measurements. Most of the EMC design engineers are SI&PI experts. While EMC testing engineers, test & validate EMC compliance through set standards. The main employers in this field are government sector (DRDO, ISRO), public sector (BEL, HAL, ECIL, BHEL, SAMEER, ERTL,

ETDC etc.) and a huge number of private industries (Tata Power, Wipro, AMPL etc.) and major MNCs like IBM, Microsoft, Dell, Honeywell, Robert Bosche to name a few. For carrying out regulation compliant EMI testing large size shielded enclosures, RF absorbers, specialized test & measuring equipment, antennas, turn tables etc. are required. There are several industries which have career openings for RF/EM engineers in the field. To name a few MNCs, they are, Frankonia, Albatrosse, ETS Lindgren, Diamond Microwave Chamber etc. There are several indigenous companies in this field who have generated career openings for RF/EM engineers. There is a constant demand for service, maintenance and application engineers in the field. Design, manufacture and application of EMI suppression components (like EMI/EMP filters, shielding & RF gaskets, honeycomb windows, shielded cloths, Ferrite beads and other magnetic materials) is another big industry which requires EM engineers with special liking for material science.

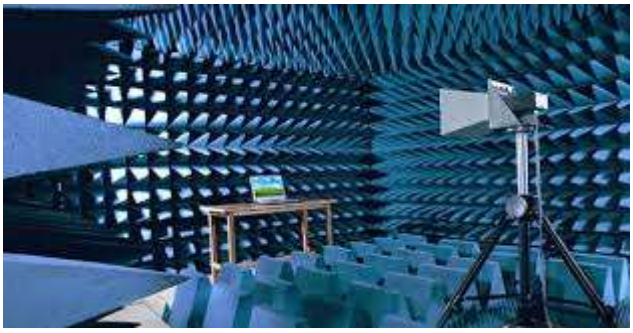


Fig.3 A typical EMI EMC measurement setup

Fig.4 EMI suppression components

Radar are used everywhere, in military weaponry, air traffic control, weather tracking, autonomous vehicle, medical imaging, altimetry etc. There are radar technologies in almost every band of 'RF' window right from VLF to mmW. Size wise they vary from a palm top to a football ground size. A radar design, manufacturing, operation & maintenance cannot be imagined without an EM/RF engineer. Antenna being the main element in any Radar, makes it a highly dependable 'RF' engineer's job. The major employers in radar market are FLIR Systems, ASELSAN, Lockheed Martin, Raytheon, L3, Hensoldt, Saab AB, Israel Aerospace Industries, Honeywell, Thales etc. In India, apart from Govt sector (DRDO, ISRO, BEL) several private industries are also involved in radar and its various sub systems mostly concentrated in Hyderabad and Bangalore region but not limited to it.

Fig.5 A military, an Air Traffic Control (ATC,Bangalore) & a weather radar (Vizag)

Similarly RCS measurement & RCS reduction and stealth technologies requires RF/EM engineers. Important employers in this specialized field are Govt (DRDO) in India and major MNCs abroad like Lockheed Martin, Boeing, Raytheon, BAE systems and nation wise defence companies and their subsidiaries. A good understanding of EM fundamentals along with material science, mechanical design skills would make a successful career for an engineering graduate with EM subjects. In India, most of the jobs in stealth technologies are concentrated in Govt sector but not limited to it.

Fig.6 A RCS measurement Range

Fig. 7 a stealth aircraft

Apart from listed applied fields, automobile and aerospace industries require qualified and skilled RF/EM engineers. While aerospace uses radars, altimeters and communications since its evolution, automobiles too started using 'RF' technologies for safety, autonomous operation, entertainment and communication. Industries like HAL, Airbus, Boeing employ 'RF' engineers for design and development while aviation industry takes 'RF' engineers for safety, maintenance and air traffic control. Automobile giants in India, foreign origin or an Indian one, employs 'RF' engineers on a regular demand basis.

Communication & remote sensing has been pivotal for the human development. Communication, whether it is military or civilian has been important link for integrated and seamless operations. Communication equipment manufacturing companies employ a large no. of engineers with good EM/RF knowledge. While communication service provider companies too have been a job provider to EM/RF engineers for operation & maintenance of the communication equipment. Radio (AM / FM) & television broadcasting companies too require EM/RF engineers.

Fig. 8 Communication is 'core' of human life

Remote sensing which acts as an eye in the space, has been very powerful tool for various development plans of a nation. The applications of the remote sensing are only limited by the human ability to put them into use. The biggest employer of remote sensing in the country is ISRO and then various private industries which are sub-contractors for sub-systems of a remote sensing satellite.

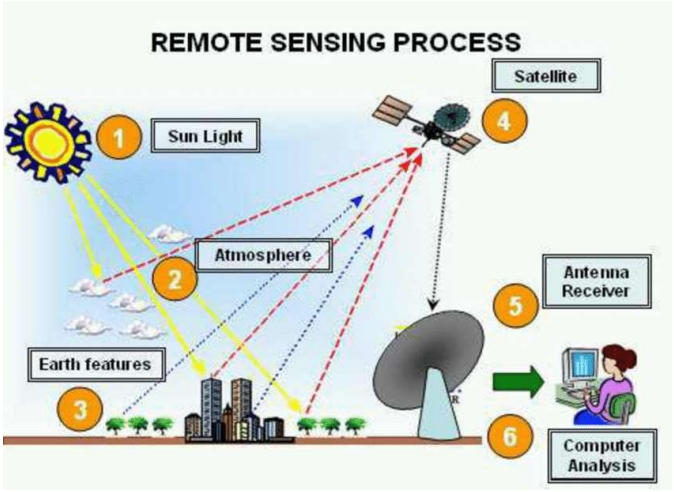


Fig.9 Remote sensing – 'An eye in the sky'

Computational Techniques have potential applications in the field of Electromagnetics. Computational electromagnetics (CEM), computational electrodynamics or electromagnetic modelling is the process of modelling the interaction of electromagnetic fields with physical objects and the environment. It typically involves using computationally efficient approximations to Maxwell's equations and is used to calculate antenna performance, electromagnetic compatibility, radar cross section and electromagnetic wave propagation etc. A specific part of CEM deals with electromagnetic radiation scattered and absorbed by small particles. In general CEM codes are available in the form of commercial software. CEM software industry is multimillion industry and has been a lucrative career option specially in the era of information technology. There are two types of job openings for an EM student, either a 'coder' to design CEM software specific for an application or a 'user' of the software. Giants like Altair (Feko), CST, Ansys. EM have been large employers since many years**.**

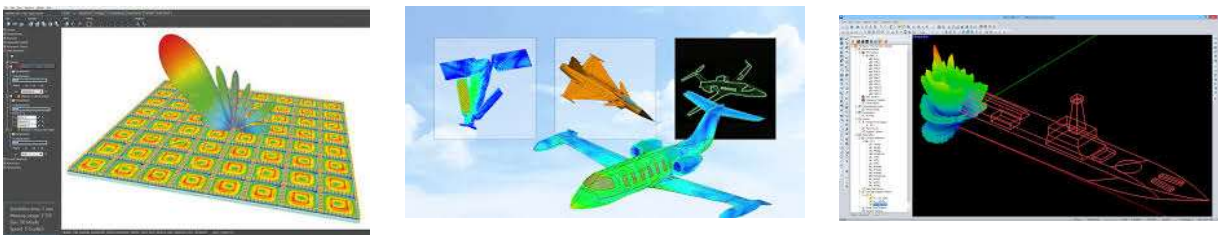


Fig. 10 Few examples of commercial CEM software for specific application

Most of the MNCs have their Indian operations within the country while many times they recruit the right candidate for their off shore foreign locations. There are several research avenues in each applied or basic field of EM. Almost all top ranked engineering & science institutes in the country and abroad have separate and dedicated departments for EM. Higher studies in the EM field fetches good rewarding careers in industry or academia. Having discussed the opportunities, we must discuss about the domain knowledge & skill set of a prospective EM/RF engineer aspiring for a career or a research position in the above mentioned fields. In India, for UG degree, in general there will be 5-6 subjects related to the EM/RF like Basic EM theory, Communication, Antenna, Engineering Materials etc. It is expected that an EM engineer has a solid fundamental knowledge about these subjects with a good command over basic mathematics. Concept and gist of Maxwell equations, RF propagation, antenna & microwaves must be crystal clear. On the skill set side, a prospective EM engineer must be familiar or fluent in at least one EM simulation software. Basics of coding & learning of computer aided design (CAD) software can be an added skill. An analytical mind set is an advantage and highly desirable for every kind of job or research.

The aim & objective of this article is not to create a directory of 'RF' job provider or employer but giving an impression that 'RF' window of the EM has an immense potential in the job market as well as in the research field. One can easily observe that there is prospective job market & research openings for an EM engineer in India and abroad but very demanding in the form of domain knowledge and skill set. In the beginning one may observe the disparity in the pay and perks comparing to a software job opening but in the long run the 'RF' jobs give better monetary benefits with higher job satisfaction as one may work with a latest and rare technology, may work with a prestigious organization like ISRO, DRDO, may be part of a world recognized innovation. The article is written to give you a 'taste' of the EM/RF field so that prospective students get tempted to adopt fascinating field of Electromagnetics. It is highly recommended to read the article given in ref.[1]. All the best for your bright career!

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Sandeep M. Satav is a scientist with RCI, DRDO with 25 years of experience in EMI-EMC of complex military projects and in design and development of EM sensors, electronic Test & Measuring Instruments for EMC pre compliance. He is a BE graduate in Electronics Engineering from Amravati University, M.Tech. from IIT-Bombay in Electronics System Design and has a post-graduate diploma in Business Management from DAVV, Indore. He has several publications in IEEE transactions, conferences and IEEE EMC magazine. He is recipient of Gold medal of 'Scientific Advisor to Defence Minister' for science day oration, and two 'Technology Group Award' at DRDO level. At present he is Scientist-G and Technology Director for Directorate of Electromagnetics in RCI, a pioneer missile lab in DRDO. He is chair for the MTT/AP/EMC Jt. chapter of IEEE Hyderabad Section for the year 2019 and 2020. He is an avid reader and an amateur photographer. He can be reached at **sandeepm.satav@rcilab.in** for a mutual topic discussion.

Ref:[1] "Why Study Electromagnetics?", Prof. Rao, University of Illinois at Urbana. Available online.
[2] World Wide Web for pictures for education purpose

James Clerk Maxwell

James Clerk Maxwell, a Scottish physicist is best known for his formulation of electromagnetic theory. He is regarded by most modern physicists as the scientist of the 19th century and ranked with Sir Isaac Newton and Albert Einstein for the fundamental nature of his contributions. He had the greatest influence on 20th-century physics. In 1931, on the 100th anniversary of Maxwell's birth, Einstein described the change in the conception of reality in physics that resulted from Maxwell's work as "the most profound and the most fruitful that physics has experienced since the time of Newton."

The advent of electromagnetic radiation originated with Maxwell, and his field equations, based on Michael Faraday's observations of the electric and magnetic lines of force, paved the way for Einstein's special theory of relativity, which established the equivalence of mass and energy. Maxwell's ideas also ushered in the other major innovation of 20th-century physics, the quantum theory. His description of electromagnetic radiation led to the development (according to classical theory) of the ultimately unsatisfactory law of heat radiation, which prompted Max Planck's formulation of the quantum hypothesis—i.e., the theory that radiant-heat energy is emitted only in finite amounts, or quanta. The interaction between electromagnetic radiation and matter, integral to Planck's hypothesis, in turn has played a central role in the development of the theory of the structure of atoms and molecules

Early Life

Maxwell was from a simple middle-class background. His parents had married late in life, and his mother was 40 years of age at his birth. After spending some time at Edinburgh, the family moved to Glenlair, the country house on the Middlebie estate.

Maxwell's mother died in 1839 from abdominal cancer, the very disease to which Maxwell was to succumb at exactly the same age. His father, worried about his studies, hired an uninspired tutor who claimed that James was slow at learning, though in fact he displayed a lively curiosity at an early age and had a phenomenal memory. Maxwell's aunt Jane Cay fortunately rescued him from the tutor and sent him to school Edinburgh Academy. Maxwell's thought behind the school syllabus. His first scientific paper, published when he was only 14 years old, described a generalized series of oval curves that could be traced with pins and thread by analogy with an ellipse.

This fascination with geometry and with mechanical models continued throughout his career and was of great help in his subsequent research.

Maxwell published two more scientific papers at 16 years of age while being admitted to the University of Edinburgh. In 1850, he went to the University of Cambridge, where his exceptional powers began to be recognized. His mathematics teacher, William Hopkins, was a well-known "wrangler maker" (a wrangler is one who takes first-class honors in the mathematics examinations at Cambridge) whose students included Tait, George Gabriel (later Sir George) Stokes (from Stokes' theorem), William Thomson (later Baron Kelvin), Arthur Cayley (from Cayley-Hamilton theorem), and Edward John Routh. Of Maxwell, Hopkins is reported to have said that he was the most extraordinary man he had ever met, that it seemed impossible for him to think wrongly on any physical subject, but that in analysis he was far more deficient. This shrewd assessment was later borne out by several important formulas advanced by Maxwell that obtained correct results from faulty mathematical arguments.

In 1854, Maxwell was second wrangler and first Smith's prizeman (the Smith's Prize is a prestigious competitive award for an essay that incorporates original research). He was also elected to a fellowship at Trinity, but, preferred to return to Scotland owing to his father's deteriorating health. In 1856 he was appointed to the professorship of natural philosophy at Marischal College, Aberdeen, but before the appointment was announced his father died. This was a great personal loss, for Maxwell had had a close relationship with his father. In June 1858 Maxwell married Katherine Mary Dewar, daughter of the principal of Marischal College. The union was childless and was described by his biographer as a "married life…of unexampled devotion."

In 1860 the University of Aberdeen was formed by a merger between King's College and Marischal College, and Maxwell was declared redundant. He applied for a vacancy at the University of Edinburgh, but he was turned down in favour of his school friend Tait. He then was appointed to the professorship of natural philosophy at King's College, London.

The next five years were unequivocally the best of his career. During this period his two classic papers on the electromagnetic field were published, and his demonstration of color photography took place. He was elected to the Royal Society in 1861. His theoretical and experimental work on the viscosity of gases also was undertaken during these years and culminated in a lecture to the Royal Society in 1866. He supervised the experimental determination of electrical units for the British Association for the Advancement of Science, and this work in measurement and standardization led to the establishment of the National Physical Laboratory. He also measured the ratio of electromagnetic and electrostatic units of electricity and confirmed that it was in satisfactory agreement with the velocity of light as predicted by his theory.

Later Life

In 1865 Maxwell resigned his professorship at King's College and retired to the family estate in Glen lair. He continued to visit London every spring and served as external examiner for the Mathematical Tripos (exams) at Cambridge. But most of his energy during this period was devoted to writing his famous treatise on electricity and magnetism. The research that established Maxwell among the great scientists of history was that on electromagnetism. Michael Faraday was working on the relationship between the now called electric and magnetic fields. However, he lacked the

mathematical acumen for it. In the preface to his *Treatise on Electricity and Magnetism* (1873), Maxwell stated that his major task was to convert Faraday's physical ideas into mathematical form. In attempting to illustrate Faraday's law of induction (that a changing magnetic field gives rise to an induced electromagnetic field), Maxwell constructed a mechanical model. He found that the model gave rise to a corresponding "displacement current" in the dielectric medium, which could then be the seat of transverse waves. On calculating the velocity of these waves, he found that they were very close to the velocity of light. Maxwell concluded that he could "scarcely avoid the inference that light consists in the transverse undulations of the same medium which is the cause of electric and magnetic phenomena."

Maxwell's theory suggested that electromagnetic waves could be generated in a laboratory, a possibility first demonstrated by Heinrich Hertz in 1887. However, Maxwell would not live long enough to see this. The resulting radio industry with its many applications thus has its origin in Maxwell's publications.

In addition to his electromagnetic theory, Maxwell made major contributions to other areas of physics. While still in his 20s, he demonstrated his mastery of classical physics by writing a prizewinning essay on Saturn's rings, in which he concluded that the rings must consist of masses of matter not mutually coherent—a conclusion that was corroborated more than 100 years later by the first Voyager space probe to reach Saturn.

Apart from his Maxwell also worked on relations of equality between different partial derivatives of thermodynamic functions which are included in every standard textbook on thermodynamics. He is also known for the modern kinetic theory of gases, testing the three-color hypothesis of Thomas Young, demonstrating the first color photograph and Maxwell's demon.

In 1871 Maxwell was elected to the new Cavendish professorship at Cambridge. He set about designing the Cavendish Laboratory and supervised its construction. Maxwell had few students, but they were of the highest caliber and included William D. Niven, John Ambrose (later Sir John Ambrose) Fleming, Richard Tetley Glazebrook, John Henry Poynting, and Arthur Schuster.

During the Easter term of 1879 Maxwell took ill on several occasions; he returned to Glenlair in June, but his condition did not improve. He died on November 5, at a tender age of 48 years, after a short illness. It is unfortunate that Maxwell received no public honors and was buried quietly in a small churchyard in the village of Parton, in Scotland.

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Ref: https://www.britannica.com/biography/James-Clerk-Maxwell

High Power Microwave Systems: Introduction and Applications

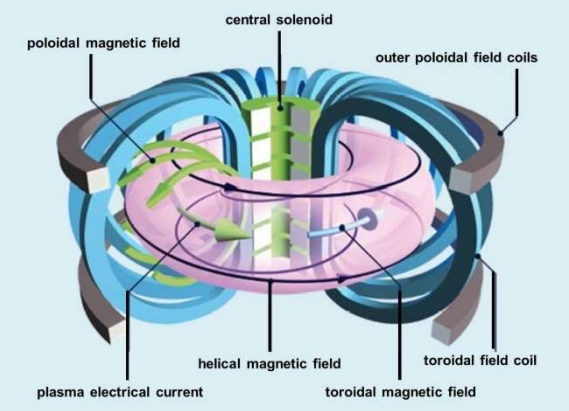
High Power Microwave systems have a very rich history of several decades. Despite of this, it has not yet made its way to the undergraduate studies as a whole package course. The main reason being the vast coverage of the said subject. I was personally ignorant about the existence of such area during my undergraduate days. For this purpose, I thought this magazine would be a perfect medium to introduce this area to everyone and how the different subjects that we learn in our engineering course are used in microwave systems. The motive of this article is to produce a brief introduction to the area of microwave systems (particularly high power) and its applications.

Microwave systems are intensely complex having a combination of specially designed components. Being a high technology area, all the applications are very specific and need careful designing of each of its subsystem. These components generally include pulse or continuous wave (CW) power sources, isolators, protection circuits, mode converters, antennas and multitude of passive components. All these different categories of subsystems have to work in complete synchronicity and compatibility to carry out the intended task faithfully. Some applications of microwave systems are broadly classified below with a couple of examples in each.

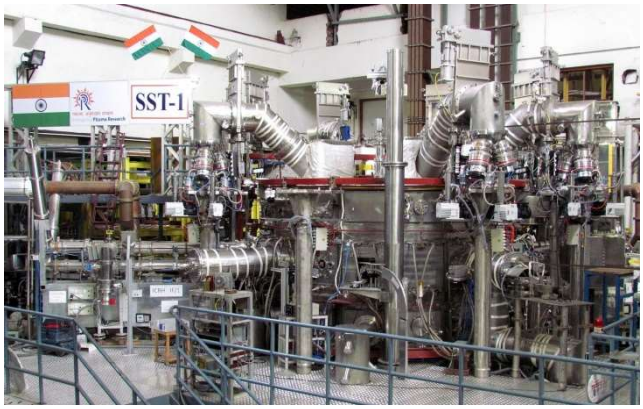
Societal Applications

Engineers have always strived to work for the betterment of society by their inventions and innovations. As the world faces energy crisis with the existing conventional methods, scientists and engineers have been exploring options of alternative power sources since long. One such dream is to produce energy using the fusion mechanism that powers the sun and stars. In 1930s, first fusion experiments were conducted followed by multiple efforts for the same worldwide in different laboratories. The major benefits of fusion power out of many are that it doesn't involve any radioactive elements like in nuclear fission. Hence, it is very safe to operate such reactors as compared to fission reactors. Also, there are no harmful by-products or pollutants of the fusion process. In this sense, it becomes a very attractive prospect for energy generation. Very high temperatures and plasma confinement are required for successfully attaining fusion. The major breakthrough occurred in 1968 in the Soviet Union when they could achieve both of these requirements using a donut shaped machine called tokamak. Many nations followed suit to build their own machines in a race to achieve clean and sustainable power. But to obtain a literal 'sun' in the box is no easy task. It was soon evident that to accomplish such a colossal feat would require pooled finances, resources and expertise from various nations. In 1985, an idea of joint international experiment called ITER was launched with the member nations – China, the European Union, India, Japan, Korea, Russia and the US. Currently, world's largest tokamak fusion reactor called ITER is being built in south France with involvement of thousands of engineers and contributions from around 35 nations. tokamaks require very high RF and microwave power to be fed to obtain high temperature plasma.

This involves use of high frequency and high-power tubes like klystrons, gyrotrons, etc. Many electronic and high voltage electrical protection systems are also used in such system. To deliver the power from the source to the tokamak, many waveguides and passive components like circulators, matched loads, phase shifters are used. All the contributing nations are involved in different aspects of research in designing such components to contribute to ITER. The goal for the ITER is to produce 500 MW of fusion power from 50 MW of input heating power. The magnitude of this power can be appreciated by the fact that many of our house lights use few tens of watts or less and many appliances run on few hundreds of watts. So, it is interesting to imagine how many households can 500 MW of power run! Several nations have their own small scaled tokamaks that are used for research that will ultimately contribute in making of ITER. India has two such tokamaks called ADITYA and SST-1 at Institute for Plasma research (IPR), Gandhinagar.



(a)



(b)

Fig. 1 (a) Torus shaped tokamak vessel [1] (b) India's SST-1 tokamak in IPR, Gandhinagar [2]

Another novel energy harvesting technique is called a Solar-based solar power (SBSP) system. As considerable portion of sunlight is absorbed by the earth's atmosphere, the surface receives only a fraction of power emitted from the sun. Also, time is lost during night due to absence of sunlight. To circumvent these problems, SBSP system involves launching of satellites that will collect solar power in space. This will avoid the losses and downtime experienced on the land. The collected solar power will then be converted to microwave energy using magnetrons at 8.5 GHz, 10 GHz and 35 GHz, which will be beamed to receivers at earth stations through wireless power transfer. The received energy will then be converted to electrical energy to be distributed commercially. Currently, this idea is being pursued mainly in China, Japan and Russia. Numerous other societal applications of microwave systems consist of medical linear accelerators (LINAC) for cancer treatment, industrial heating, medical equipment sterilization, pest control, increasing crop production, etc.

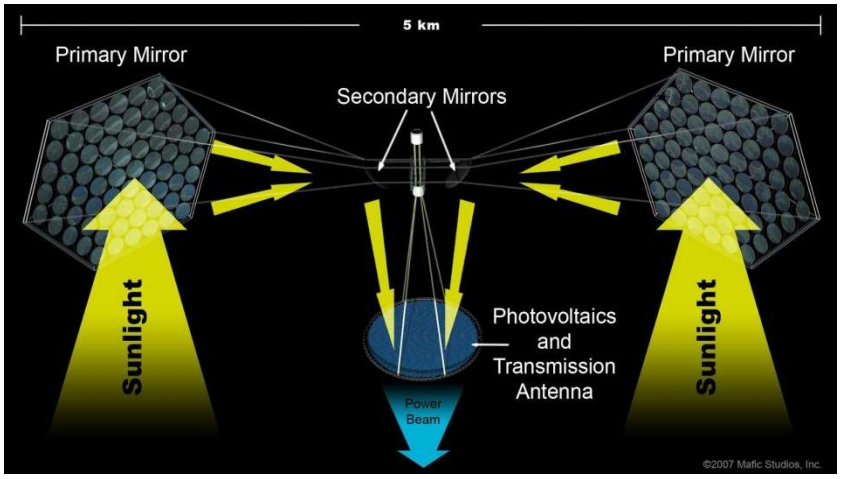


Fig. 2 Representation of SBSP system [3]

Strategic Applications

HPM (High Power Microwave) systems find many applications for use in military and defence. HPM systems can be used as weapons to deliver tailored RF power transmissions that damage the enemy vehicles, electronics or infrastructure. The advantages of such systems are that they are precise, provide fast action and can be used multiple times. High power focused energy beams are emitted by devices called Directed Energy Weapons (DEWs) to target enemy personnel, vehicles, missiles, etc. DEWs use high energy short pulses to damage the target. Such systems are often mounted on different platforms like trucks, aircrafts, ships, etc. depending on the application. Keeping this in mind proper power sources have to be designed. Generally, power from continuous power sources like diesel generators, batteries, fly wheel generator and magnetic flux compression generator are converted to high voltage pulses using Marx Generators. Such high power, high voltage pulses induce high currents in enemy electronics and damage them permanently. EMI/EMC concepts are useful for hardening of components against such attacks. Indian agencies DRDO and BARC through joint collaboration are developing possible DEW named KALI (Kilo Ampere Linear Injector). Allegedly, it is intended to emit powerful pulses of Relativistic Electron Beam (REB) towards any enemy missile and destroy it. The radiations emitted by KALI-5000 are in the 3-5 GHz range.

Fig. 3 India's KALI-5000 under development [4]

The microwave heating capability can also be used for crowd control or perimeter security. Active Denial System (ADS) is a non-lethal weapon developed by the funding of United States Department of Defence. The ADS system works by sending around 95 GHz frequency waves at high powers of around 100 kW. These bursts of energy penetrate to very small depths of the skin layer. The microwave energy creates intense heat on the skin causing severe discomfort to the target. This may cause some burns on the target but is mostly intended to be a deterrent towards hostile and violent crowd. As such, it is advertised to be an excellent weapon for mob control. Primarily developed in US, some other countries are trying to develop their own versions of ADS.

Fig. 4 ADS system mounted on a vehicle [5]

As mentioned previously, microwave systems are highly complex. Designing some of the entire systems would require application of knowledge of electrical, electronics, electromagnetics, signal processing and much more. Also, it may involve use of mechanical concepts like stress, fluid flow at certain instances. Though only few applications are mentioned in this article, the actual number of areas in which such systems are used is large. Because development and research of such devices requires huge capital costs, currently engagement of mostly government agencies is observed. But with government policies like 'Make in India' and the growing demand to reduce our reliance on certain foreign countries, it is expected to create more opportunities for the engineers in such high technology areas.

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Ref: [1] https://www.iter.org/newsline/-/3037
[2] https://www.iter.org/sci/tkmkresearch
[3] http://www.maficstudios.com/gallery_sbsp.html
[4] https://defenceupdate.in/kali-5000-indias-top-secret-weapon-pakistan-china-fears/
[5] https://www.wired.com/2009/02/pain-beam-getti/

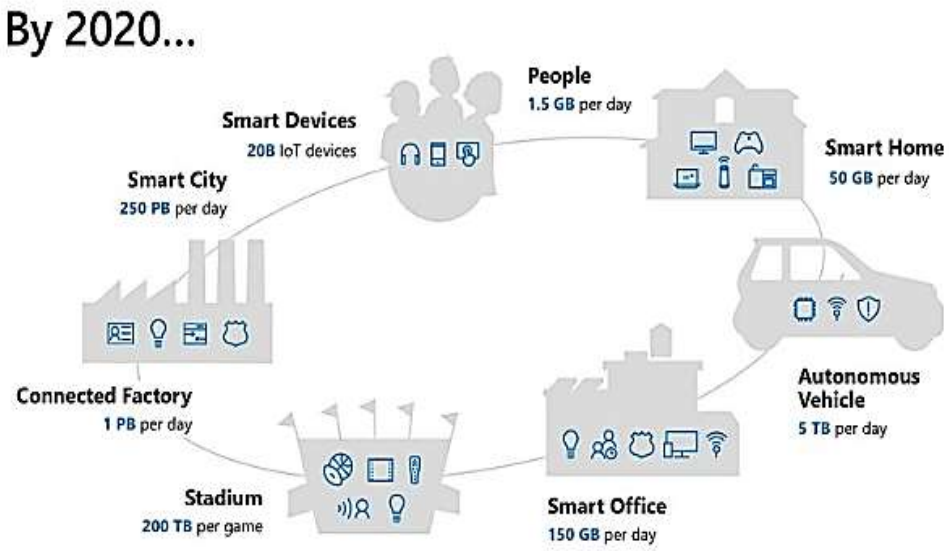
NEXT GENERATION INTELLIGENT OPTICAL NETWORK

Nowadays, the field of IT sector is expanding rapidly. Currently, the number of Internet-connected devices is around 31 billion, which is four times the world population. Because of which, the measure of traffic on the Internet has enormously expanded. Cutting edge optical systems are required to give enormous limit so as to help up and coming traffic increments. The exclusive feature of NGON is that it is

- Expected to go beyond the intelligent network.
- It has cognitive capabilities.
- Future optical network would be more cognitive through all the way it functions.

Next Generation Intelligent Optical Networks assembles optical networks and network security. As the optical system developed it has become the network of choice and it is relied upon to remain so for long ages to come, for both coordinated and offbeat payloads, voice, information, video, intuitive video, games, music, content, and that's only the tip of the iceberg. It presents an integrated approach for the treatment of secure optical networks, including fiber to the home (FTTH) and free-space optical (FSO).

Growth of IP Traffic:

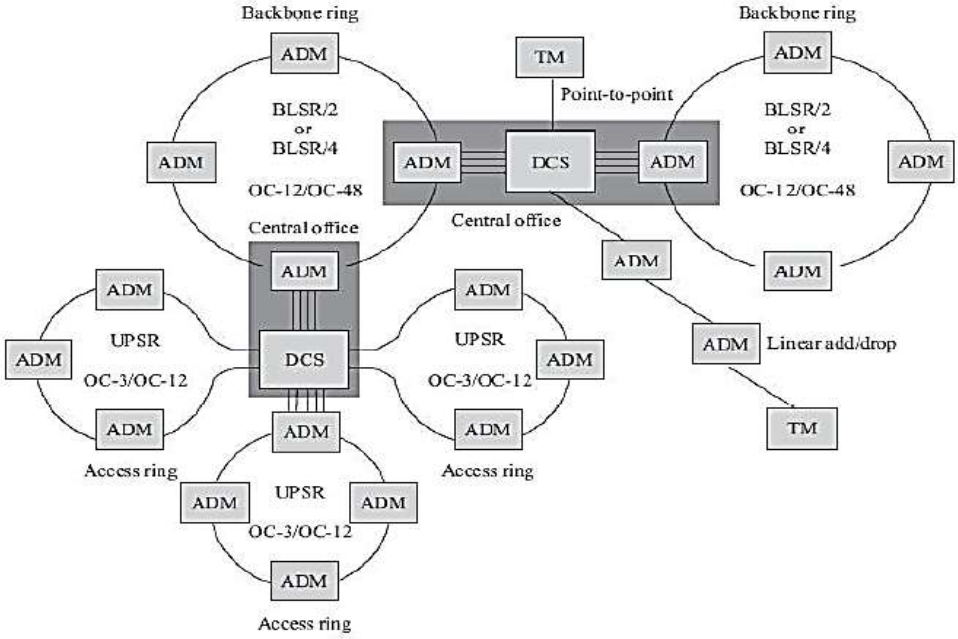


The expeditious magnification of internet traffic, audio/video streaming, and mobile applications have resulted in a dramatic increase in the demand for transmission bandwidth, imposing a requirement for high-speed broadband networks. The above figure shows the magnification of IP traffic over the years. Within a period of 5 to 6 years, it had multiplied more than 10 times.

First Generation SONET Architecture

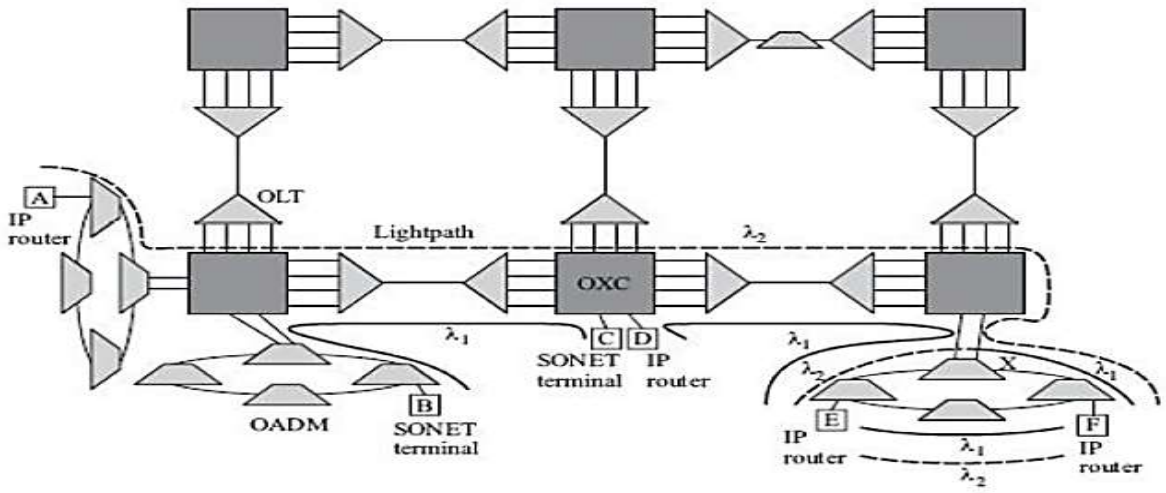
A first-generation optical network uses optical fiber as the transmission medium. It is just an antiquate for copper cable for transferal at higher bit rates over longer distances. They are single wavelength systems where all the switching, processing, and routing functions are performed utilizing electronic equipment.

The First-gen optical systems include coordinated optical system, a synchronous optical network (SONET), synchronous digital hierarchy (SDH), and asynchronous transfer mode (ATM) networks. It incorporates fiber circulated information interface (FDDI) systems, generally conveyed in the neighborhood (LANs), and metropolitan area networks (MANs). The limitation of these systems is that the switching and routing functions are a bottleneck to the speed of the network. This is the prompt for peregrinating to the second generation wavelength routing network.



Second Generation Wavelength Routing Network

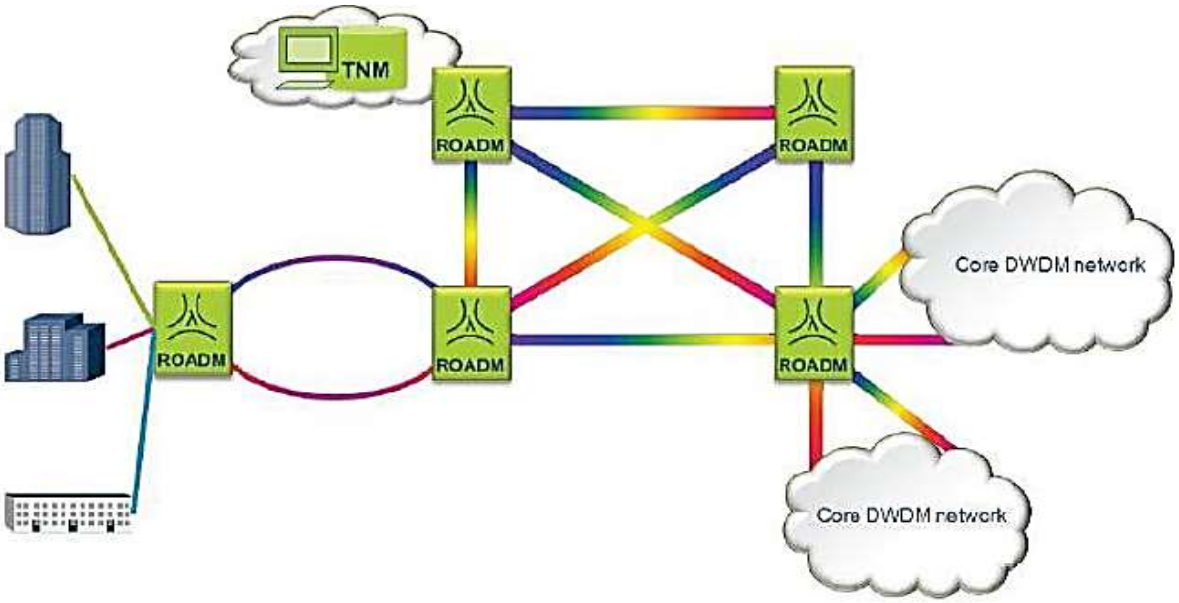
The optical layer of the second-gen optical system contains directing, exchanging, and perspicacity. Optical systems predicated on this are currently being deployed. The architecture of the system has shown in the figure. The primary system components that approve optical systems administration are optical line terminals (OLTs), optical integrate/drop multiplexers (OADMs), and optical cross-connects (OXCs). Anyway, these segments perform exchanging and directing in optical area, the slope to have adjusted frequency provisioning and steering and the system isn't adaptable.



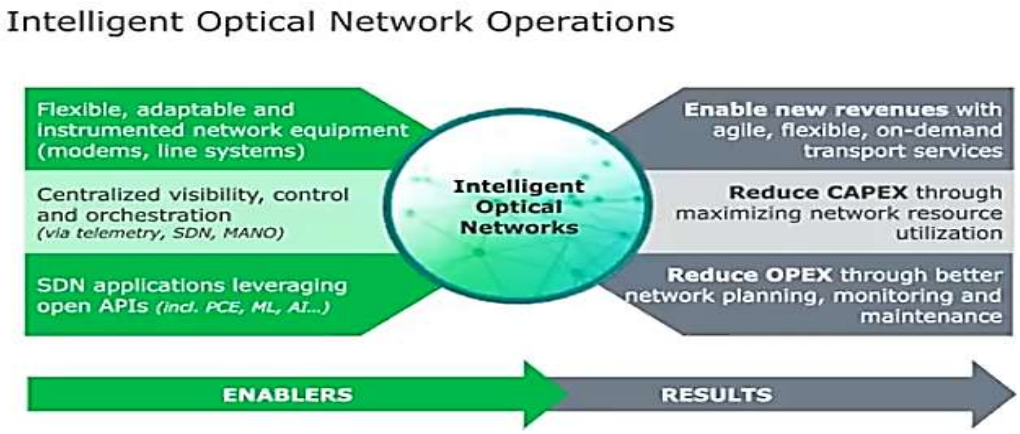
Third Generation Intelligent Optical network

The drawback of static wavelength provisioning and routing in a second-generation optical network is overcome with the emergence of reconfigurable components that offer flexibility to the third generation optical network. This makes the third-generation optical network more intelligent. These systems are commonly cited as Intelligent optical networks. An incipient type of transfer network is required, predicated on intelligence, dynamic network elements. As the next generation of intellective optical networking emerges, it evolves from the subsisting fine-tuned point-to-point optical links to a dynamic network. Intelligent optical network (ION), enabled by high capacity cross-connects with software intelligence, grants incipient methods for managing high capacity core optical network.

IONs will withal provide on-demand service deployment, sanctioning for more flexibility. All traffic no longer needed to pass through an electronic switch fabric to enable local integrate/drop as in first-generation network or wavelength integration in the second generation. Any wavelength can be integrated or dropped depending upon the service requirements which is the major benefit of third-generation intelligence optical network.



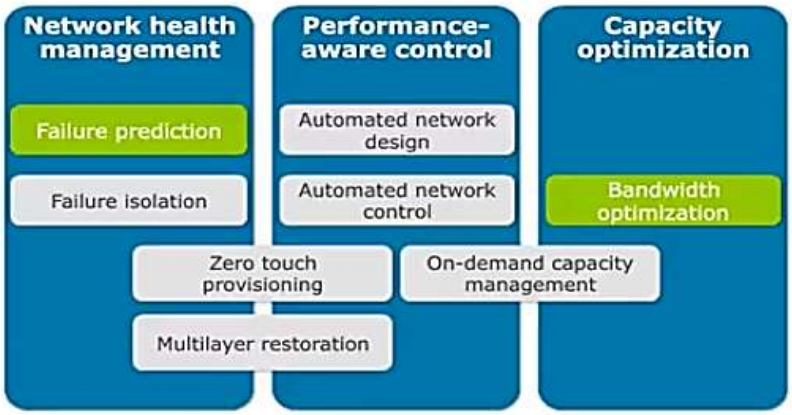
Enablers of Intelligent Optical network



The major particular functions of optical network intelligence are connecting with optimal solutions of such tasks in the network like finding, routing, connecting, conveying, and providing safety and quality. The entelechy of these tasks is connected with the fulfillment of several conditions, in the network of the next generation.

Deployment Applications

The deployment applications by solution area are as follows:



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Ref: https://shodhganga.inflibnet.ac.in/bitstream/10603/23921/7/07_chapter2.pdf

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Area of Interest: Wireless Communication

3. Prof. S. Jadhav
Ph.D. Pursuing
Area of Interest: Wireless Networks.

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NON-TEACHING STAFF

Mrs. Bhagyashree Rane
Lab Technician

Mrs. Diksha Save
Lab Technician

Mrs. Madhu Lade
Lab Technician

Mr. Prakash Bhobhate
Peon

Mr. Hemant Patil
Peon

Mr. Sudhir Patil
Peon

STAFF ACTIVITIES

- Prof. Shaista Khanam and Prof. Trupti Shah got minor research grant 30000/- on - title of "Smart Solar Tracker with IoT based Energy Monitoring System".
- Dr. V. Gupta and Prof. Ekta Naik attended a 5 days training program on AC and DC Drives organized by Siemens from 1st July to 5th July 2019.
- Dr. V. Gupta and Prof. Ekta Naik attended a 5 days training program on Siemens S7 1200 PLC Drives organized by Siemens from 8th July to 12th July 2019.
- Dr. Amrita Ruperee's paper title "Time Shifted Pilot Signal Transmission with Pilot Hopping to Improve the Uplink Performance of Massive MIMO System for NGN" was published in KSII Transactions on Internet and Information Systems in 2019, ISSN 1976-7277.
- Prof. Sunayana Jadhav's paper title "Tri-Variate Copula Modeling for Spatially Correlated Observations in Wireless Sensor Networks" was published in Journal of Communication in 2019, ISSN 1796-2021.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, Prof. Shraddha Gosavi, Prof. Sandhya Supalkar, Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik and Prof. Trupti Shah attended a one week STTP on Emerging Trends in Embedded System and DSP applications organized by VCET from 1st July to 6th July 2019.
- Prof. Shaista Khanam, Prof. Shraddha Gosavi, Prof. Sandhya Supalkar Prof. Ashwini Katkar, Prof. Ekta Naik and Prof. Trupti Shah attended one day workshop on eSim, a First Course in the IoT series for teachers organized by Teaching and learning centre, IIT Bombay on 21st Sept 2019.
- Prof. Shaista Khanam, Prof. Shraddha Gosavi, Prof. Sandhya Supalkar, Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik, Prof. Trupti Shah attended one day workshop on Arduino on 8th Feb 2020 organized by IIT Bombay.
- Prof. Shaista Khanam, Prof. Shraddha Gosavi Prof. Sandhya Supalkar, Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik, and Prof. Trupti Shah attended a one day workshop on Python on 22 June 2019 organized by IIT Bombay.
- Prof. Shaista Khanam and Prof. Trupti Shah conducted workshop on hands on training on "Embedded system and IOT " under Texas instruments from 2nd to 4th March 2020.
- Prof. Shaista Khanam and Prof. Trupti Shah conducted workshop on 3rd n 4th February 2020 in RGIT College on "IOT and Raspberry Pi".
- Prof. Shaista Khanam and Prof. Trupti Shah conducted workshop on hands on training on "Embedded systems and IOT" under Texas instruments innovation lab from 18th to 20th October 2019 in VCET.
- Prof. Shaista Khanam and Prof. Trupti Shah conducted workshop in RGIT EXTC department On "Embedded System, IOT and DSP "from 19th and 20th August 2019.
- Prof. Shaista Khanam conducted guidance seminar for TI IICDC 2019 competition on 14th October 2019.

- Prof. Ashwini Katkar conducted workshop on Virtual-Lab for First year EXTC, Civil, Instrumentation and Second year EXTC students of VCET in March 2020.
- Prof. Trupti Shah conducted a workshop on Verilog in July, 2019.
- Prof. Shaista Khanam conducted "Arduino Workshop" under IEEE SB on 26th Feb, 2020.
- Prof. Shaista Khanam Organized a 1 Week AICTE ISTE STTP on "Emergency Trends in Embedded System and DSP Application" from 1st July to 6th July 2019.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, Prof. Neha Gharat, attended a one day workshop on R language on 9th Nov. 2019 organized by Teaching and learning Centre, IIT Bombay.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, Prof. Sandhya Supalkar Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik, Prof. Trupti Shah and Prof. Mamta Patil attended a WhatsApp OBE FDP on Outcome Based Education organized by D.Y. Patil College of Engineering, Akurdi, Pune from 24th March 2020 to 14th April 2020.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, Prof. Shraddha Gosavi, Prof. Sandhya Supalkar Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik and Prof. Trupti Shah attended a Spoken Tutorial on Moodle Learning Management System organized by IIT Bombay in May 2020.
- Prof. Sandhya Supalkar successfully completed 12 week NPTEL course on "Microelectronics: Devices and Circuits" in October, 2019.
- Prof. Ashwini Katkar successfully completed 12 weeks NPTEL course on "Fiber Optic Communication Systems".
- Prof. Neha Gharat successfully completed a 12 weeks NPTEL course on "Microwave and Theory Techniques".
- Prof. Mamata Patil successfully completed a NPTEL course on "Matrix Analysis with applications" with a consolidated score of 75% in October, 2020.
- Prof Shaista Khanam and Trupti Shah successfully completed 12 weeks NPTEL course on "IoT and Applications".
- Prof. Shaista Khanam, Prof Shraddha Gosavi, Prof. Sandhya Supalkar Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik and Prof. Trupti Shah completed a two week faculty development program on Virtual lab organized by Instrumentation Department, VCET in association with COEP from 18th May to 27th May 2020.
- Prof. Ashwini Katkar completed Workshop on "Effective and Efficient Online Teaching in the age of Corona" hosted by IITB in May 2020.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, Prof Shraddha Gosavi, Prof. Sandhya Supalkar Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik, and Prof. Trupti Shah attended Webinar series on Recent Trends in Instrumentation, Control & Automation organized by Instrumentation Department, VCET in May 2020.
- Prof. Neha Gharat and Prof. Ekta Naik's paper "8:1 Radio frequency high power combiner" accepted in international conference icese-2020.

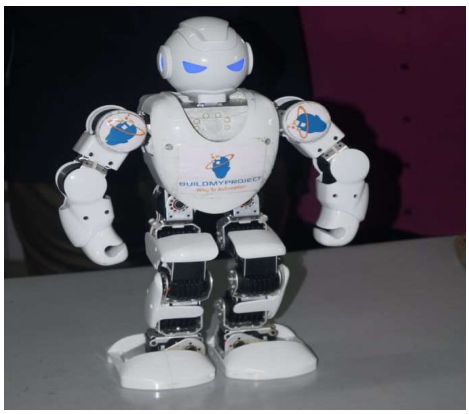
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, Prof. Shraddha Gosavi, Prof. Ashwini Katkar, Prof. Neha Gharat, Prof. Ekta Naik, and Prof. Trupti Shah attended Webinar "Online National Level FDP on Decoding Examination During and Post COVID 19" in May 2020.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, Prof. Neha Gharat and Prof. Trupti Shah Webinar on "IPR for revenue generation" organized by A. C. Patil COE Navi Mumbai in May 2020.
- Prof. Sandhya Supalkar attended a four days FDP on "Research, Funding, Projects and IPR"organized by K.C College of Engineering in May, 2020.
- Prof. Mamata Patil participated in the webinar on "THE MAN WHO KNEW INFINITY" organized by Department of Mathematics, St. Xavier's College for Women, Aluva, Kerala on 26th April, 2020.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav, Prof. Shaista Khanam, and Prof. Trupti Shah attended webinar on "MATLAB based Teaching-Learning in Mathematics, Science & Engineering" organized by RAIT,Nerul in May 2020.
- Prof. Shraddha Gosavi, Prof. Ashwini Katkar, Prof. Ekta Naik, and Prof. Trupti Shah webinar series on "IT and IPR 2020" organized by IQAC, Shree. L. R. Tiwari College of Engineering, in May 2020.
- Prof. Shaista Khanam, Prof. Shraddha Gosavi, Prof. Neha Gharat, Prof. Ekta Naik and Prof. Trupti Shah attended a Webinar on "Machine Learning" organized by IETE PANTECH in May 2020.
- Dr. Amrita Ruperee, Prof. Sunayana Jadhav and Prof. Shaista Khanam coordinated four days Webinar series on "Technological Advancement in the field of Electronics and Communication Engineering" in association with VCET IEEE SB and IETE SF from 7th May to 9th May 2020.
- Prof. Ashwini Katkar and Prof. Shraddha Gosavi coordinated online event "Discussion Forum-What after BE?" for SE, TE and BE EXTC students of VCET on 19th May 2020.
- Dr. Amrita Ruperee and Prof Sunayana Jadhav coordinated Online Quiz "ILTT- International TECH TRIVIA" (2nd June – 5th June 2020) in association with IEEE VCET student branch.
- Prof. Shaista Khanam, Prof. Ekta Naik and Prof. Trupti Shah coordinated Webinar series "Vogue of Embedded Systems" in association with Texas Instrument Innovation Lab from 27th May to 29th May 2020.

Fiber is a green technology, due to its reduced energy consumption compared to other connection types. It is sustainable; it is made from Silicon Dioxide, the second-most abundant element on Earth after Oxygen.

DEPARTMENTAL EVENTS

PRODUCT SHOWCASE'19

Product Showcase also known as ANVESHAN is one of the annual event held by the IEEE and IETE committee of EXTC department. It showcases products from major industries as well as local industries in the neighboring area. We host around 50 companies every year displaying their products throughout our event. With a footfall of more than 750 students from across different streams, it is one of the most anticipated events organized by EXTC department. The event was kick-started by EXTC's very own ETA committee by publishing the newsletter on the topic "Flexible Electronics". The event was organized by Mr. Prasad Patnaik, the CEO of Oditronics Technologies Pvt. Ltd.



Products ranged from Smart lights and elevator panels to Humanoid robots and 3D printers. This event bridges the gap between the students and companies, which also helps students with their projects and future ventures.

F.E. QUIZ

IEEE VCET SB organized an exciting FE QUIZ Competition for all the first-year students on 3rd and 4th of March 2020.It was a two-day event in which nearly 30 teams participated. The final round was held in seminar hall on 4th of March. The students from all the departments were enthusiastic audience to witness this exciting event. All students were at the edge of their seats to know the answer and the participants were very active. The event concluded with prize distribution ceremony. The quiz truly was a learning experience, for both audience and the participants.

VNPS'19

VNPS is a national level project showcase competition organized by all the committees of VCET. The project showcase allows the students to implement the technical knowledge gained during their course of engineering. It serves as a common platform where all the engineering projects being worked on by students across India are showcased. The students design and implement the project and presented the outcome of their work. The projects simulate a real-world work environment in a variety of engineering and science fields. The students

apply theory and develop practical skills such as teamwork, professionalism and leadership.

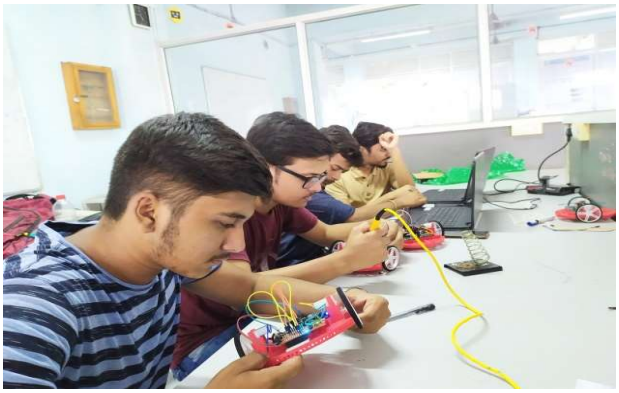
The enthusiasm, ardour, zeal and energy of the students helped them making engineering all-round experience for them.

IEEE DAY

VCET IEEE SB celebrated IEEE day on 1st August, 2019 by conducting an interactive session for the students of N.G. Vartak Jr. College. A seminar was conducted on the topic "Communication Engineering: The Essence of Technology" where the students learned the importance of communication. After seminar, the students were taken to the labs where they were learned about the electronic components and instruments. The workshop was conducted by the students of VCET.

The students were exposed to various other sessions on topics robotics, electronics, and satellite communication. Overall it was a very interactive session for the students.

TRAINING SESSION ON IOT CONDUCTED BY TEXAS INSTRUMENTS



Training for students was planned from 18th to 20th June, 2019 on "Embedded Systems" by Expert from Edgate Technology (Texas Instruments University Program). The main aim of workshop was to bridge the gap between academics and industry. Students got hands on training on various micro controllers and learned how to program and build a small IoT system. Industries prefer students having more practical knowledge along with theoretical knowledge. TI Innovative Lab assisted students to come up with their own new project ideas and build them using TI kits.

SEMINAR ON MICROWAVE ENGINEERING

A seminar on application of Microwave Engineering was organized on 29th August by IEEE and IETE of EXTC department. It was conducted by an alumni itself Dr. Harish Dixit who is currently a lecturer in BITS Hyderabad campus. The seminar started off by providing the basic and all fundamental Electromagnetic Engineering. The seminar distinctly covered many topics from basic to advance focused towards major application of microwave engineering.

TRAINING ON EMBEDDED SYSTEMS AND IOT

A 3-day training session was conducted by Prof. Shaista Khanam, under Texas Instruments on Embedded system and IoT from March 2, to March 4, 2020. Students were given hands on training on few advanced microcontrollers such as MSP430 and Tiva boards; along with it they also learned the importance of IoT. During training, they made mini projects based on Iot and microcontrollers. Overall it was an informative session for all the students.

WORKSHOP ON DRONES

A drone workshop was organized on 28th and 29th September by IEEE VCET in collaboration with DRONA Aviation and Eduvance to give a first and Second Year students. It was very much needed considering the momentum it has caught among the masses. The workshop held in presence of two faculties from Eduvance Mr.Dushyant Pal and Mr. Paramshivam Konar.

SEMINAR ON PATHWAY AFTER ENGINEERING

A seminar was conducted by VCET IEEE SB for the students of VCET to guide them for their career after engineering. The speaker of the seminar was Ms. Swati Khedkar, who works as a Business Consultant at Deflytics.

SEMINAR ON IMPORTANCE OF RESEARCH FOR UNDERGRADUATES

VCET IEEE SB conducted a seminar on the importance of research for under graduate students. The seminar was delivered by Dr. Satyanarayana, TIFR Scientist. Around 182 students along with professors attended this seminar. It proved to be very effective for students as it gave them a glimpse of career in R&D field.

ONLINE DISCUSSION FORUM ON "WHAT'S AFTER B.E.?

An Online Conference on "WHAT AFTER BE?" was held on 19th May 2020 for the students of Dept. of EXTC, VCET. The esteemed delegates were Alumni - Mr. Sourabh Kulkarni joined in from Florida, Mr. Jinesh Panchal and Mr. Parth Shah from Mumbai. Students from first to fourth year had attended the conference. Platform for the conference was Google Meet. The agenda of the conference was to discuss the placement, higher studies and entrepreneurship. Speakers motivated students for effective utilization of lockdown phase. The students found this session very informative and helpful as they got an insight of what skills are necessary in corporate world.

OTHER SEMINARS AND WORKSHOPS

SEMINAR ON SCOPE OF VLSI

VCET IETE-SF organized a seminar on scope in VLSI after engineering, dated 27 January, 2020. It was conducted by Mr. Chaitanya Amin. Students showed their active participation by wisely attending this seminar. The talks ranged from importance of VLSI to its scope after engineering. The seminar provided an interactive avenue to the participants to interact freely with the expert during the session.

WORKSHOP ON ARDUINO

VCET IEEE SB committee of EXTC department organized a 2 day workshop on Arduino. The workshop was conducted by two experts, Prof. Shaista Khan and Prof. Trupti Shah. Overall learned the basics of working with arduino and gained basic knowledge of arduino.

INDUSTRIAL VISIT TO AMUL DAIRY

The students of third year of EXTC department were taken to Amul Factory for the industrial visit. Mr. Shah, the HR of the organization explained the students about the workflow and basic framework of AMUL. The backbone of the industry"SCADA" on which all the monitoring of the industry takes places was also explained by him. Students acknowledged the tour of main production line which comprised of conveyor belts, packing, distribution and hi-tech robots.

INDUSTRIAL VISIT TO TATA INSTITUTE OF FUNDAMENTAL RESEARCH

The students of third year and final year of EXTC department were taken to the Tata Institute of Fundamental Research, Mumbai for the industrial visit. Upon reaching, the students were taken to the seminar hall where they a short seminar on introduction to VHDL followed by a seminar on insights of TIFR was given. After the seminar, the students were taken to lab where they were shown different chips, circuits built by the researchers of TIFR. The students realized the scope of higher education in field of Electronics. Overall it was a wonderful experience for the students in TIFR.

WEBINAR SERIES

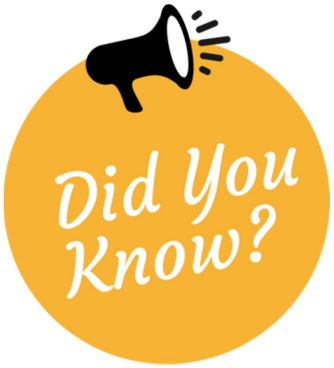
Dept. of EXTC in association with VCET IEEE SB and VCET IETE SF conducted a series of Webinars on Technological Advancements in the field of Electronics and Communication Engineering from May 5 to May 9, 2020. This Webinar Series provided the audience with an insight into the latest industrial standards and applications on the desired domain. The guest speakers of the webinar were Dr. Saurabh Mehta, Mr. Maneesh Singh, Dr. Rita Jain, Dr. Harish Dixit and Mr. Pratik Tirodkar. More than 500 students/professors from all over Maharashtra joined the live session.

INDUSTRIAL MEET

Industry Interaction Meet 2020 an event conducted by Training and Placement Committee of Vidyavardhini's College of Engineering and Technology flagged off with great enthusiasm and zeal on 7th February 2020. This event was conducted in order to deepen college ties with companies and also to gain valuable insights of various industrial delegates on employability of engineering students and skills they seek in engineering graduates. More than 40 companies took part in this event. This event was primarily organized for core branches such as EXTC, Mechanical, Instrumentation and Civil. Dr. N.S. Kale visited EXTC department and paved way for many students regarding employability after completing EXTC engineering with his enlightening words.

INTERNATIONAL LEVEL TECH TRIVIA

Dept. of EXTC of VCET in association with VCET IEEE SB organized a Tech Intellect quiz from Basic to Advance Level from June 2 to June 5, 2020. The main aim of this event was to give the participants a glimpse of what lies in the world of Applications of Modern Science and Engineering and give a peek into the upcoming future. A large number of students participated in this event.



1. There are almost 300 communications cables running across the bottom of the ocean.

2. 99 percent of internet data is transmitted undersea through cables.

INTERNSHIPS

Summer Internships 2019:

No. of students: 27

- AlterEgo
- BOLT
- Tarapur Atomic Power Station
- Manpower Services Seva. Sah. Sanstha
- Electrical Training Centre
- Hindustan Petroleum Corp. Ltd.
- Embedded Power Automation
- Vishay Semiconductors Pvt. Ltd.
- Doordarshan Sahyadri

Winter Internship 2019:

No. of students: 46

- Oditronics
- Securizen Systems Pvt. Ltd.
- Evergreen Engg. Co. Pvt. Ltd.
- Doordarshan Sahyadri
- Logiq Embedded Systems India Pvt. Ltd.
- Electrical Training Centre
- Stelmec
- Larsen and Toubro
- Coca-Cola
- TATA Steel Global Wires

TOPPER'S LIST (ACADEMIC YEAR 2018-2019)

BE (2018-2019): DEPT. RESULT = 100%

Topper's name	CGPI	Rank
Negi Pratik	9.28	1st
Patelia Vrutika	9.13	2nd
Pal Priyanka	8.76	3rd

TE (2018-2019): V SEM RESULT = 71.64%
VI SEM RESULT = 86.36%

Topper's Name	V Sem SGPI	VI Sem SGPI	Average	Rank
Kudva Ajay	9.22	9.20	9.21	1st
Dubey Alok	9.11	9.04	9.07	2nd
Garg Garvit	9.56	8.4	8.98	3rd

SE (2018-2019): III SEM RESULT = 56.41%
IV SEM RESULT = 70.12%

Topper's Name	V Sem SGPI	VI Sem SGPI	Average	Rank
Pitodia Abdulmateen	10	10	10	1st
Ansari Mustakim	9.52	9.65	9.58	2nd
Joshi Anushka	9.04	8.85	8.94	3rd

GATE Qualified:

1. Sourodipto Das - 30.67
2. Komal Saini - 30.67
3. Shubham Mantri - 27

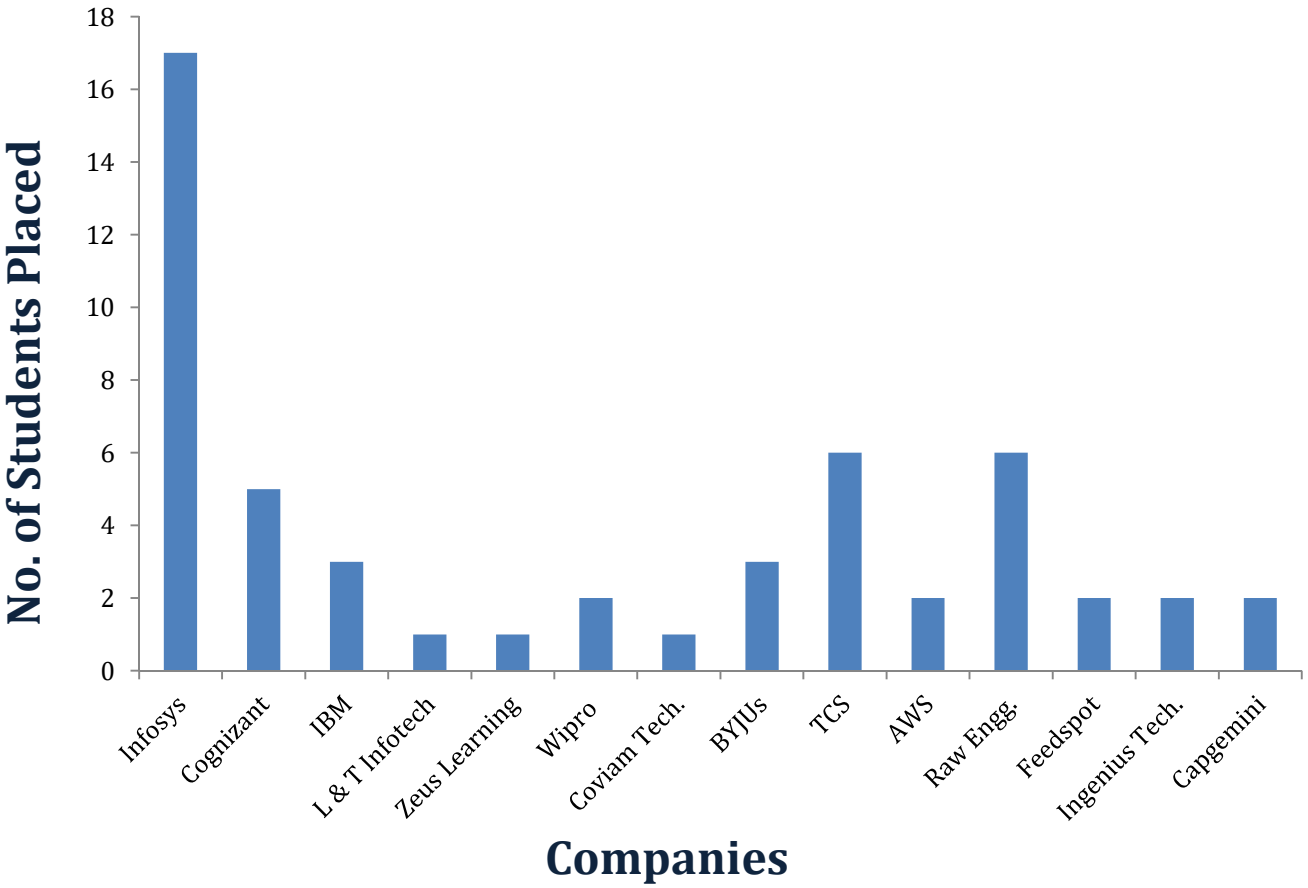
Congratulations!

PLACEMENTS (2019-2020)

Total Students placed: 33

Total offers: 53

TILL DATE MAY 25, 2020



Avahan 2020

ACHIEVEMENTS

CHESS CLASSWISE (GOLD)
Brijesh Shukla
Apeksha Jain
Raj Pandya

GIRLS KABADDI DEPARTMENTAL (SILVER)
Priti Rane
Mugdha Raut
Anagha Raut
Shraddha Karanjekar
Bhakti Raigawali
Bhumika Bhoir
Jyoti Paswan

BOYS KABADDI DEPARTMENTAL (SILVER)
Omkar Salunkhe
Rohit Salunkhe
Rahul Bera
Kunal Thakur
Diptesh Bendre
Dhanush Shetty
Vedant Walavalkar

TABLE TENNIS SINGLES (SILVER)
Sakshi Dhanmeher

SHOTPUT (SILVER)
Shriraksha Kotegar

CHESS SINGLES (GOLD)
Raj Pandya

CHESS DEPARTMENTAL (GOLD)
Brijesh Shukla
Shubham Mantri
Raj Pandya

FOOTBALL CLASSWISE (GOLD)
Pranjal
Viraj Rasal
Manoj Thakur
Meghan Yesji
Sahil Patil

CARROM SINGLES (SILVER)
Parth Waikul

CARROM DOUBLES (SILVER)
Parth Waikul
Shreyas Ubale

CARROM DEPARTMENTAL (SILVER)
1. Gauravi Shetty
   Shubham Mantri
2. Shreyas Ubale
   Naman Pandey
   Parth Waikul

CHESS INTER SINGLES (GOLD)
Raj Pandya

Zeal 2020

ACHIEVEMENTS

DUET DANCE (RUNNER UP)
Priti Rane
Deeksha Kamath

DUET SINGING (RUNNER UP)
Shamini Iyer
Aishwarya Nair

DUMB CHARADES (RUNNER UP)
Gauravi Shetty
Ashwini Rathod
Deeksha Kamath
Omkar Samant

POPULAR VOCALS (RUNNER UP)
Shamini Iyer
Sahil Patil
Shubham Mantri
Kaustubh Gokhale

AD-MAD SHOW (WINNERS)
Shubham Gurav
Rohit Patil
Kunal Patwa
Shreyas Ubale
Deepak Shigwan
Hritk Gaikwad

NATYAMAY (WINNERS)
Yash Kumthekar
Priti Rane
Deeksha Kamath
KetakeeModak
Urja Patil
Dhananjay Bhavsar
Kranti Bhoye
Nikita Patil
Siddhesh Satpute
Sitanshu pandey
Sayali Salvi
Chinmay Mhatre
Jayshree Mhatre
Siddhi Raut
Sanskruti Talgaonkar
Raj Gajera

STREET PLAY (WINNERS)
Deeksha Kamath
Yash Kumthekar
Dharmin Sheth
Ashwini Rathod
Priti Rane
Urja Patil
Dhara Bhadani
Nikita Patil
Kranti Bhoye
Dhananjay Bhavsar
Mughda Raut

Heartiest Congratulations!!!

ALUMNI TALK

“All of us do not have equal talent. But, all of us have an equal opportunity to develop our talents.”

……. says Mr. Alok Shastri who is our alumni of 2012 batch. He is currently working as 5G System Software Integrator in Nokia in Europe. He has an experience of 8 years in the field of Telecommunication.

1. If someone wants to get on similar lines as that if you, what course trajectory would you suggest?

1. Learn core subjects related to Telecommunication in depth.
2. Try to learn the new technology coming up in the Telecom domain.

2. What would u suggest EXTC student, what courses should they consider doing?

Just studying for exams won't help in the actual world. I would recommend that every EXTC student should know at least one programing language in depth. (Certifications on any programing language). Knowledge about Data Structure and Algorithm is a must. If someone is interested in Networking then one should consider doing CCIE certification.

3. Apart from getting into core what else a student can focus on?

Spend some time on your hobby. It really helps in the overall development of your personality.

4. What are the three important things that you focus on daily, in order to improve yourself to become a better and industry sustainable employee?

Keep a track of current technological changes going on in the industry Update yourself with some certifications Try to participate in some hackathons and work on some personal project to showcase during interviews.

5. We would love to hear advice that can help budding engineers to do even better?

From the Academics point of view, I recommend that just try to maintain your aggregate percent above 70% as most of the good companies have criteria of 70% aggregate. Be connected with your Seniors and friends as networking will help you going forward. Last but not least enjoy your college days as this time won't come back in your life.

-As interviewed by Omkar Chaudhari & Sanskruti Talgaonkar.

"Success is no accident. It is hard work, perseverance, learning, studying, sacrifice and most of all, love of what you are doing or learning to do."

We are extremely pleased to interview Mr. Vinit Kalvinde who is 2017 batch pass out student from VCET. He pursued his MS in Telecommunication from University of Colorado, Boulder. He is currently working as a Network Engineer in Google.

1. How does it feel to be working with Google?

Working with Google is super exciting. The best thing to work at Google is you get surrounded by lot of smart and motivated people. I get chance to work on latest technologies which helps me to enhance my knowledge. Apart from this, the work culture is great which motivates me to keep working.

2. What is your job, could you elaborate a bit about it?

I am a Network Engineer at Google. I work on Google's backbone network to make sure that it is working efficiently. Additionally, I work on automating network configuration and development. I also work on projects related to Software Defined Networking (SDN). Most of the time I spend time on writing a code to manage, configure and troubleshoot the network.

3. How did networking helped you get a job in Google?

The placement process in USA is very different from India. Campus placement doesn't exist. Students need to search for the jobs on their own and get the interview calls. Building a professional network helps to know more about the job opportunities. LinkedIn was helpful for me to expand my professional network. It is a great platform to look for various jobs matching to your profile.

4. How does working in Google differ from working with other brands?

First of all, Google is one of the most popular tech companies (FAANG). Working with these top companies definitely adds value to your profile.

Secondly, Google is implementing or has already implemented latest technologies that other companies haven't even heard about. This gives you an opportunity to work on new technologies.

Additionally, the work culture at Google is great. They really care about the employees. Also, the benefits and perks are amazing at Google as compared to other companies.

5. How was your MS Journey, why did you choose telecommunications to be your MS subject?

During my bachelor's degree, I had a couple courses/ subjects related to network engineering. There I started developing interests in the field of networking and decided to pursue MS in telecommunications.

Initially, it was difficult to cope up with the studies because I had little or no prior experience and most of my classmates had average of 4 years of work experience.

However, coursework at University of Colorado, Boulder was great which helped me to understand basic concepts and I also got chance to work on networking devices.
During summer, I got chance to work with Charter Communications as a Network Engineer Intern. I worked on multiple projects during my internship which helped me to gain good amount of experience.

6. Every student wishes to work with big brands, what are the prime qualities required to bag that job?
1. You should meet the basic degree requirements- BS or MS degree in the field of Computer Science or related field.
2. You should have technical knowledge related to your field. Most of the times, these companies focus on your coding/programming skills along with networking and Linux knowledge.
3. Apart from technical knowledge, big tech companies also focus on behavioral skills like leadership qualities. Working in a team on a project really helps to improve leadership skills.
4. In addition to this, it is important to get yourself out of the comfort zone.

7. Your lowest phase of life, how did you handle the adversity?
My lowest phase of life was during my job search. Due to COVID-19 situation and hiring freeze it was hard to get interview calls for a job. However, I used this period as an opportunity to improve my skills and I kept applying for jobs. Finally, I got 3 job offers.

8. Apart from technical skills what other skills should student imbibe in order to be better employee?
As I mentioned, apart from technical skills, companies also focus on behavioral skills. They also conduct separate interview rounds to check candidate's behavioral skills like communication, leadership, time management, work/life balance etc.
These skills also help employees to grow while working in the company.

9. What is the difference in pursuing masters from India or abroad?
There is a difference in culture and education system. Here in USA, the education system focusses more on basic concepts and practical stuff. Professors don't spoon-feed students. Instead, they try to encourage them to learn on their own. This seems difficult at first, but helps students to research a particular topic. Additionally, universities are equipped with cutting edge technologies and devices. Students get hands on experience in the labs.
Moreover, syllabus is also up to date. Professors design their own syllabus according to the industry requirement. This helps students to crack the interviews and get the jobs.

10. What is your advice to budding engineers?
As an engineer, I would say keep updating your knowledge because technology is advancing. Learn new stuff and try to implement it at the same time. Add more value to your profile/ resume by doing personal projects or certifications.

-As interviewed by Omkar Chaudhari & Mustakim Ansari.

"The backbone of success is hard work determination, good planning and perseverance."

…..are the words of Ms. Swati Khedkar who is a pass out student of 2015 batch of VCET. She pursued her MBA from Welingkar Institute of Management. During her MBA studies she worked as an Operations Intern at Mattel, Currently working as an Associate Business Consultant in Deflytics.

1. What is the MBA college culture like?
MBA college culture is totally different than your undergrad college be it teaching be it assignments be it exams be it orals anything. MBA was a roller coaster for me. You really have to be professional in everything that you do in MBA because that's what you are being trained for. In MBA you get very few or no individual assignments, it's always a group project and handling the whole group, finishing the project on time, taking initiative, doing that extra bit for the group is something that you'll learn. Additionally, professors in MBA are industry experts and leaders who you will probably face at interviews or later in the industry hence a casual attitude will not work here.

2. Your experience with Welingkar Institute of Management must have been a splendid one; we would like to know about it.
Welingkar has a good alumni base and also has pretty good placements. Placements depend on the students and not fully on the college and vice versa. While choosing an MBA college I had first thing very clear as to which stream I want to go which was Operations. Hence it made my choice simpler. Welingkar has some outstanding professors for almost all subjects and there are a lot of domestic as well as international internship opportunities, foreign exchange programs. Hence all these factors made me choose Welingkar.

3. What extra courses are helpful for students after B.E., according to you?
I would definitely recommend an advanced excel and Macros course for everyone after BE. This is something everyone will be using in their career at some point. Apart from that there are a lot of courses depending on which career path you want to go with.

4. Have you utilized the alumni network both as a student and/or as an alumnus?
Never really, but as I am progressing with my career and my academics I am feeling the importance of alumni. Even when I wanted to pursue my PGDM I had taken a lot of reviews from the welingkar alumni's about the program and college and placements too because those are the only reliable source. I feel you should always keep in touch with your seniors and your batch mates because in some or the other point in your career or your academics and they will meet u and you will have something different to ask them.

Referrals play an important part in getting a person the job. Any only your batch mates or Senior working there who knows you will refer you. So always keep your connections updated.

5. How did college prepare you for your career?

Welingkar is quite strict college in terms of attendance hence we were disciplined right from the first day of college. Formals were compulsory in college which made us feel like professionals every day. All programs in welingkar had Harvard case studies as assignments. Hence we actually solved the real industry issues. We went under rigorous 6 months of Global citizen leadership project which a worldwide known organization. Last year we were being allotted personal mentors to make us ready for placements. We had mock interviews and group discussions. Other than all this the curriculum for some programs is outstanding you really learn a lot of things theoretically and practically as well.

6. What would you suggest an EXTC student?

Talking about my undergrad college VCET, it gave me a good start to my career as I got placed on the very first day in L&T InfoTech. I always enjoyed all my subjects in EXTC though I never got a chance to use my EXTC knowledge anywhere in my job. Undergrad college is really important to shape your career in future.

Even after your post-graduation the company coming for placements still have a criteria of 65% average in all semester in undergrad and at that point it's very late for you to realize. Hence my advice would be do not take your undergrad lightly because if you have KTs or an average less than 65 you have already lost few opportunities in the future. Plus undergrad is the college where you spend 4 years of your life which is a lot of time hence make good utilization of that time and always be good to your teachers because you won't find such hardworking teachers in your higher studies.

4. What sort of projects are you currently working on?

Currently I am working as a Business Consultant at Deflytics Powai. I am into planning Analytics using Ana plan technology; it's the most powerful tool and technology for planning. My current project involved Manpower planning of 8000 employees from all over the world for a giant pharmaceutical company. We have reduced their 25% of time that they spent on legacy IT tools for planning and fully automated their HR planning process using Planning analytics.

- As interviewed by Sneha Jaiswal & Atique Ansari

The longest phone cable in the world connects the United States and Japan – it is 16800 miles long and is known as FLAG – Fiber Optic Link around the Globe. It has the capacity to transmit 600,000 calls at once.

"Success depends on your satisfaction with the job well completed"

……is what Mr. Jinesh Panchal has to say who is our alumnus from batch 2013. He was a Trainee Engineer in Larsen and Turbo for 7 months and at Aplab Limited for 6 months, currently working with JIO at the post of Deputy Manager.

1. Please enlighten about your work and responsibilities as a Deputy Manager at Reliance Jio.

As we all are aware JIO is one of the biggest telecom operator globally and has more than 350 million (>35 Crore) users, and look after them is very challenging task. Size of data is humongous and beyond our imaginations. I am a part of the task force where we use data analytics and automation to figure out customer experience using automation, use cases. Still that will not suffice the requirement to make them happy. So we also have to measure the network experience to improve the network, extend the network and optimized the network.

2. Which new engineering-specialty skills have you developed during past years?

I am very fortunate that, I studied Telecom and work in telecom domain. In course of last 6 year, I realized that, we have 2 types of people. The one who is SME's in telecom like me, other one who is SME's in computer science. All the works or automation carried out by computer science people. That is huge gap in the system. We need mediator, and if not mediator then one of the either has to learned the skills of other for effective outcome. Now Computer science cannot learn telecom in short period but telecom person can easily learn computer science skills. So I had started learning data science, Data Visualization, Statistics using Spark (Big Data) since past 3 year (Not from the developer point of view). I have also started learning machine learning.

3. What would you suggest an EXTC student, what extra courses should they consider along?

It all depends. Wherever they get the jobs, they should become master in that, for an example, when I started working on Jio I started reading all about 4G because that was my role demanding. After then I started working on automation and analytics, so brush up my skills as my roles required. Still I suggest them to go through the Data science courses from UDEMY, COURSERA websites along with any specific language such as python, sql etc. These sites are providing free courses and if not free then it's very cheap with certifications so any one can afford. But again I want to reiterate, learning should be fun and not force.

4. I am sure on this journey you must have had many obstacles, so how was your mind-set to cope with difficulties & stay motivated and move ahead?

As of now I have not face any obstacles as such and I assume that you will also not face any

obstacles in initial years if you are on right job, but as we are growing (Not by financially but by emotionally in organization) we also have to become silent learner to become leader. Because now I found that there is a possibilities of obstacles on my path after 6 years and I need to equipped with skills to handle this. You have to observe people, understand them, cooperate them, making healthy relationship with team, calming yourself. These are the skills which are not taught anywhere, and you have to develop it in practical environment. Motivation from outside will work for few hours, days or month, but I believe we should be always self-motivated which is the key. Our state of mind should be control by us only.

5. What are the most valuable lesson/skills you have learnt in your work experience?

I should know everything (in and out) on which I am working. That is only possible if I start loving my work. This is also making me fearless and boosting my confidence.

6. How did the college help you prepare for your career?

I do not recollect strongly, but as long as I remember we were around 20 people from EXTC above 70% Aggregate were called from JIO to our College. Honestly speaking I don't even know what Jio was all about on that moment. Because Jio launch post we joined JIO. So we were very fortunate enough to be part of VCET and college has taken the responsibility to make sure we should not run here and there for the jobs.

7. As it is said that "Experience makes a man perfect". Do describe an experience with a difficult working condition and how did you overcome it?

To be honest, Technical skills is mandatory but least required in practical life because everyone is equipped with technical skills, All we need is emotional ability to cop of with situations which we don't like (work, people, environment etc..) but have to face every day. This Experience of winning over that NOT LIKED situations and make yourself distant from negative influence will lead to perfect man which I believe. Experience of overcoming your weakness will always help you to improve yourself and making your towards perfectness.

8. Lastly, what is your advice to the budding engineers?

If we can survive engineering life then we can survive anything in upcoming life of ours, so first of all don't worry. So, Getting jobs may looks difficult now, but trust me this will not be the most difficult thing in life. Many of you will not agree but still I would like to say, "Everyone will get the job, not necessarily as per your choice, because that is not even possible practically. But once you are on-board in any company just love your job and forget the past, and start creating future instead of blaming on college, society, parents etc…"

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-As interviewed by Sakshi Dhanmeher & Yash Mehta

The sun gives off half of its total energy as IR, and much of the star's visible light is absorbed and re-emitted as IR, according to the University of Tennessee.

"A clear vision, backed by definite plans gives you a tremendous feeling of confidence and personal power"

We are extremely pleased to interview Mr. Devendra Bilaye who is 2012 batch pass out student from VCET. He has pursued his Master's degree in Microelectronics from Birla Institute of Technology and Science, Pilani. He is currently working as a Lead Engineer in Samsung Semiconductor R&D India.

1. What is your current job profile?

I am currently working in the semiconductor industry in VLSI domain. Currently, I am employed with Samsung Semiconductor India R&D (SSIR), Bangalore. My current job profile is design verification.

2. If someone wants to get on similar lines as that if you, what course trajectory would you suggest?

Well, as per my experience in this industry thus far, there are 3 ways to enter this industry.

a. Campus placements: Companies in semiconductor domain usually first visit the tier 1 institutes in the country for campus placements. That would mean IITs, NITs, BITS Pilani campuses. Here, I am referring to students pursuing both B.Tech and M.Tech degrees. For B.Tech, students from Electronics/Electronics and communication background are usually preferred, while post-graduate students pursuing specialization in VLSI/Microelectronics are sought after, during the recruitment process.

b. Internships: Candidates, who unfortunately are unable to join this field in campus placements, opt for internships. These can be either on-campus, or in few cases, off-campus. If the candidate proves his worth during the internship which usually lasts for around 6-8 months, he/she stands a chance for full-time employment by getting absorbed in the company.

If once comes from a renowned institute, once can apply off-campus as well to the companies, in their hiring drives.

c. Via training/consultancy services: There are few institutes like RV VLSI(Bangalore) which provide training with the required skill set demanded in the VLSI domain. Few of them may have tie-ups with some companies to provide employment opportunities. It is not always a guarantee though. I am not much aware of the job opportunities that would be available with this approach, so would rather ask to do some research of your own, before opting for this. People from such training institutes are largely employed in service-based companies, at-least in the beginning of the careers, though there can be exceptions always. They can work as consultants for product-based companies while employed with service-based companies (like Sankalp semiconductor, Test & Verification solutions, etc.), and can end up with a job in product-based companies itself, provided they develop themselves, gaining expertise in their domain.

Personally, I feel the first option is the best and easiest way to enter this field. The other 2 ways may be relatively tedious and time-consuming too, to set foot in proper product-based companies (like Nvidia, Intel, Samsung, Google, Qualcomm, etc.).

3. Apart from getting into core what else student can focus on?

My advice would be to focus on the basics of whichever field you choose. Trying to understand the logic and having proper analytical reasoning will always place you in good stead in whichever field you pursue related to engineering. Apart from this, I would say one should focus on his/her personality development as well.

4. One incident which happened during your college days which is very close to your heart.

There were quite a lot of them worth mentioning really. A couple of things however which I cherish upon many a times was the IV class tour, and the Nexus robotics competition which I participated in with my friends. We had a very much memorable IV tour, which I think brought my class more close to each other. Another memorable moment was the Nexus robotics competition, which I had participated with my friends to build a line-follower robot for a particular problem-statement involving a maze-solver. We had ended up as winners from the west-zone and ended up beating the IIT team, to qualify for the nationals. That was indeed a great achievement for us, considering the time-frame and guidance available to us.

5. What are the three important things that you focus on daily, in order to improve yourself to be become a better and industry sustainable employee?

1. Planning: - First would be planning undoubtedly. Usually, there is multiple work-related stuff that you need to handle, as you progress in the industry. For this, I always had a habit of having notes at the beginning of the day, listing down the tasks to be done. The next step would be deciding the deadlines and priorities for the same, and ticking off them one by one accordingly. This has always helped me to finish all the stuff adhering to the deadlines, without missing out anything, and without feeling pressure of other pending tasks, while working on one at a time.

2. Learning: - Make it a point to learn something new, daily or at-least every week. This can be related to your work or maybe not, doesn't matter. But, it helps to give you a sense of achievement, and doesn't make life monotonous.

3. Hobbies:- Pursuing your hobbies is I feel the best way of recreation, and relaxing the mind and body. This can be sports, music, fitness, gaming or anything, which helps to takes your mind off work, keeping the mind afresh.

6. Your advice to your juniors?

Well, I would say as you go ahead with your education, try to explore all the options which are available. This will help you choose what you really like, and what you are really passionate about. I was lucky to have great colleagues and seniors with whom we used to discuss the various opportunities in front of us. Accordingly, most of us I believe ended up with what they actually wanted to pursue. Other than this, I would advise everyone to educate yourselves, regarding basics of investing and financial-planning. This I believe will help anyone who is working in any domain, as he/she will ultimately end up earning in one way or the other in his life. Lastly, I would tell my juniors to enjoy the college-days to the fullest be it sports-fest, Zeal, project competitions, last-minute preps with colleagues, project stuff, Anveshan, IEEE/IETE events, various days being celebrated in college, hanging out with your friends, everything. This will be a golden-time the memories of which you will cherish you entire life.

-As interviewed by Kaustubh Gokhale & Swapna Khade

A GUIDE FOR ALL ENGINEERS

Top 11 Sites for your career

1. LinkedIN
2. Indeed
3. Careerealism
4. Job-Hunt
5. JobBait
6. Careercloud
7. GM4JH.com
8. Talentsjobs.in
9. Jibberjobber
10. Glassdoor
11. Naukri.com

Top 10 Tech Skills in demand in 2019

1. Machine Learning
2. Mobile Development
3. SEO/SEM Marketing
4. Data Visualization
5. Data Engineering
6. UI/UX Design
7. Cyber-security
8. Cloud Computing/AWS
9. Blockchain
10. IOT

Top 9 Sites for Free Online Education

1. Coursera
2. edX
3. Khan Academy
4. Udemy
5. iTunesU Free Courses
6. MIT OCW
7. Stanford Online
8. Codecademy
9. Open Culture Online Courses

Top 10 Sites to review your resume for free

1. Zety Resume Builder
2. Resumonk
3. Resume dot com
4. VisualCV
5. Cvmaker
6. ResumUP
7. Resume Genius
8. Resumebuilder
9. Resume Baking
10. Enhancv

Top 10 Sites to learn Excel for free

1. Microsoft Excel Help Center
2. Excel Exposure
3. Chandoo
4. Excel Central
5. Contextures
6. Excel Hero
7. Mr. Excel
8. Improve Your Excel
9. Excel Easy
10. Excel Jet

Top 10 Sites for Interview Preparation

1. Ambitionbox
2. AceTheInterview
3. Geeksforgeeks
4. Leetcode
5. Gainlo
6. Careercup
7. Codercareer
8. InterviewUp
9. InterviewBest
10. Indiabix

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FE Quiz

Oscillations'19

IEEE Day

VNPS'19

Convocation Day, Batch 2019

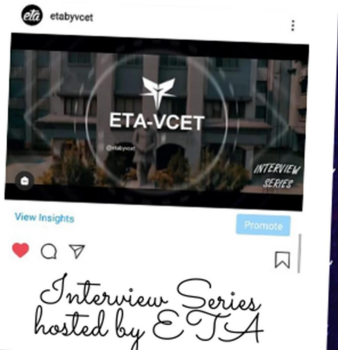
ETA ACTIVITIES

Annual Magazine Release

ETA Wall

Even sem Newsletter Release

Odd sem Newsletter Release



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Seminar on Microwave and its Applications

Seminar on Pathway after Engineering

Importance of Research for Undergraduates

Seminar on Telecommunication Engineering for Junior College Students

WORKSHOPS/TRAININGS

Workshop on Drones

Training by Texas Instruments

Workshop on Arduino

Session on Electronics for students of junior College

Workshop on Embedded System and IoT

Virtual Lab Session

INDUSTRIAL VISITS

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FOX Domotics

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-STEVEN MAGEE