

ABHINAV

DEPARTMENT OF ELECTRONICS
AND TELECOMMUNICATION



Volume 3
Issue 2

Dean's Message



Dr. Lochan Jolly
DEAN (SSW)

Dear Students,

On 17th March 2018 in TCET we organized Degree certificate distribution ceremony for 2016-17 pass out students. There we had esteemed guests from industry and Academia. They all shared their views about life and carrier which was to motivate the young graduates to live a life they should be proud of and not repent later on. I was inspired and motivated by their talks that today I want to share it with you. They talked a lot about various aspects of life and ways to expand your horizon so that world of opportunities opens up for the graduates.

There I had a chance to listen to Dr.S.Biswas, who was a professor of famous writer of 3 Idiots movie, Chetan Bhagat. The Professor said that once, when he met Chetan Bhagat after he became successful as writer he asked him, "What are you doing with your engineering degree from IIT Delhi and IIM degree?" To his surprise Chetan Bhagat said these degrees have developed his analytical and critical thinking skills, which makes his narrations different which readers appreciate. He said after meeting him now, I tell my students that even after completing engineering, if they have a cry from heart to change their fields they should not hesitate to change just because engineering study will go waste. Believe or not engineering curriculum is to develop analytical and critical thinking skills which one can apply to any field one works, whether it is literary, banking, arts etc. I also remember one of our TCET students Mr. Aman Trikha who changed his field and is a successful singer today in Bollywood. It was not easy for him but he continued to pursue with passion and conviction that today he has become successful.

You being part of millennial generation have multitasking ability; you are extremely tech savvy, honest and transparent. You should retain these values and continue to learn in the field you like whether technical or non technical. This is because you can survive and become successful today only if you keep innovated. Innovations are only possible if you keep learning and go deep down in skills or domain you like. This is very important because knowledge one gains in four years have very less shelf life and becomes knowledge of yesterday as soon as you complete graduation.

The attitude to learn and take risk will help to expand your horizon and then world of opportunities will fall your way. Remember this world is your playground, play your best shot with passion and conviction and then the world will be yours and nobody can stop you from becoming successful.

Stay blessed
Dr. Lochan Jolly

HOD's Message



Dr. Vinitkumar Dongre
HOD, EXTC

Teamwork is the ability to work towards a common goal. Teamwork is based on mutual understanding and adjustments. The passion to do the best is manifested by the hard work of faculty members and students.

This magazine reflects the technical advancements that are changing our world and making life easier. The articles are written and compiled by enthusiastic and dedicated faculty members, enthralled students and industry experts. The editorial team has left no stones unturned to make this magazine an overwhelming success. It is the perseverance and hard work of the whole editorial team which helped in bringing out "ABHIVARG 3.2." The magazine throws light and inspires innovation and gives students a determination to bring change. The interviews of the industry experts which have been included will surely enlighten the readers to go beyond their curriculum and do something extraordinary. This magazine brings out the best out of the innovative brains. "ABHIVARG 3.2" is indeed a wonderful outcome of brilliant teamwork, hard work and utter dedication of excellence. The reader of this magazine will surely be inclined with same view as that of the industries.

Concluding, I would like to say that this magazine will surely inspire the budding engineers and motivate them to do their best, wherever they go.

Faculty Incharge's Message



Ms. Megha Gupta
FACULTY IN-CHARGE

Dear Students,

You might have heard,

"We do not need magic to change the world; we carry all the power we need inside ourselves already: we have the power to imagine better."

These days while interacting with many students, I have experienced that they are losing on their spirit to work! When I tried to dig the reasons out, what I found was not very strange. It's the same old phenomenon of non-compliance with the work schedule. Many of you might be overloaded and never-ending. So, what is to be done? Get rid of anything that distracts you and allows you to procrastinate from your work. While you are studying or writing, turn off your phone's ringtones and vibrations and put it in a drawer where you won't be tempted to answer calls and messages. Allow yourself to check your phone only once per hour. Get off Facebook, Messenger, Youtube and other distractions. Save them for when you are relaxing. A checklist is a great way to ensure you stay on task, by listing your tasks and checking them off one by one once completed. It also gives you a sense of accomplishment to tick off tasks when completed. So, try this!

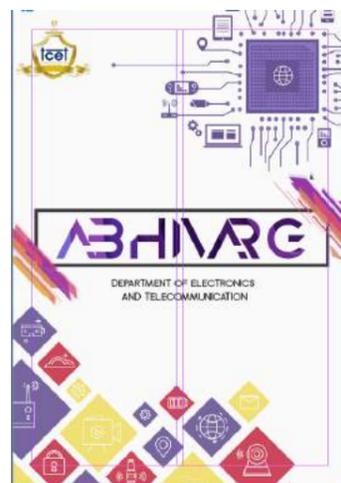
If you want to win hearts and minds, you have to lead with your heart as well as your mind. I don't believe we have a professional self from Mondays through Fridays and a real self for the rest of the time ... It is all professional and it is all personal, all at the very same time. A

Don't ever let somebody tell you ... you can't do something. Not even me. You got a dream. You have to protect it. People can't do something themselves, they want to tell you, you can't do it. If you want something, go get it.

All the best!!

Manage your time and your goal is achieved!!

Cover story



Inventive and imaginative, Ultra Violet lights the way to what is yet to come.

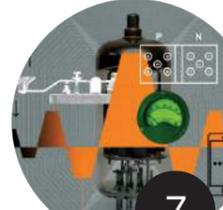
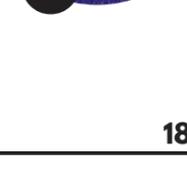


Design Thinking

What are we missing today?

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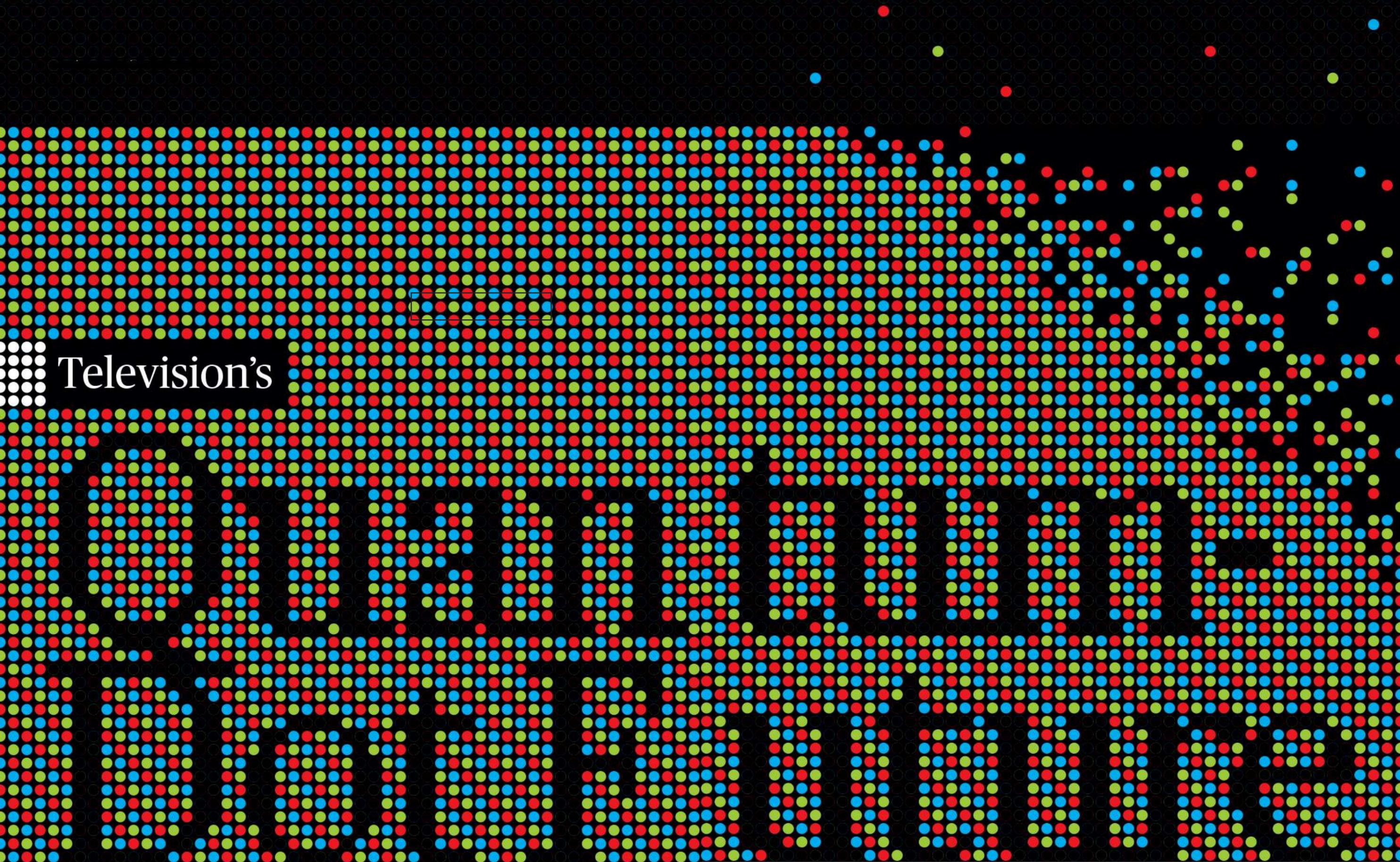
DEPARTMENT OF ELECTRONICS
AND TELECOMMUNICATION

TCET

VOLUME 3 ISSUE 1
APRIL 2018



MEET THE TEAM



Television's

Quantum dots will be the next darling of TV manufacturers

By Zhongsheng Luo, Jesse Manders & Jeff Yurek

The future of the television set was supposed to be simple. At some point in the near future, LCDs were supposed to become obsolete and give way to bright, sharp, and incredibly thin OLED displays. It turns out that the near future of TVs isn't going to be so simple—but it sure is going to be bright. The reason? Quantum dots. If you've shopped for a TV lately, you've probably been dazzled, or more likely perplexed, by the array of new acronyms being splashed around by the best-known TV makers. Perhaps you've wondered what they mean by QD, QUHD, SUHD, and ULED. We're here to help. Each of these trade names refers to a quantum-dot technology available today. We'll explain the different approaches as well as other ways quantum dots will be used in future television displays. Even if you've had your heart set on an OLED TV, we think you'll find the coming world of very-high-performance quantum-dot displays appealing. For one thing, this emerging technology is going to finally make possible the printable, rollable, and wallpaper-ready televisions that we've all been promised for the past 20 years. But to understand how televisions are going to make this, er, quantum leap, first consider why people are using quantum dots for TVs in the first place.

At just a few nanometers in diameter, a quantum dot is a tiny semiconductor, typically zinc selenide, cadmium selenide, or indium phosphide. It can do lots of useful things, but here we're mainly interested in its ability to convert short-wavelength light—typically blue (450 to 495 nanometers)—to nearly any color in the visible spectrum. When a quantum dot absorbs a photon, it generates an electron-hole pair that recombines to emit a new photon. Crucially, the color of this emitted photon depends on the size of the quantum dot: Bigger dots emit longer wavelengths, close to red (620 to 750 nm); smaller dots emit shorter wavelengths, closer to the violet end (380 to 450 nm) of the spectrum. Such "tunability" is unique to quantum dots. In other light-emitting materials, the wavelength of the emitted photon is a fixed property of the material and not affected by its dimensions. To create a quantum dot with a specific size, which determines the wavelength, manufacturers adjust the temperatures and the timing of the chemical reactions used in their production. That's how the dots work. Now what does this have to do with the image on your TV screen? Every pixel you see on the screen emits red, green, or blue light, or some combination of all three, for a total of more than a billion unique shades.

How accurately these shades match the colors recorded by the cameras on the street or in the studio depends on how exactly a TV reproduces the specified wavelengths—that is, how narrow the spectrum is for each color. Today's LCD televisions, the type you probably have in your home, produce colors using a light source—the backlight—that appears bluish white. Nowadays, that backlight is usually based on an array of white-light LEDs. (Older LCD models used fluorescent lamps rather than LEDs.) At each pixel, there are red, green, and blue subpixels. Each of these is just a tiny patch with a colored filter and a liquid crystal shutter that controls how much light streams through that filter. By varying the relative proportions of the light emitted by each of the subpixels, the pixel can create most of the colors that are reflected by the natural world. And the key point here is this: The purer the light at each subpixel, the narrower the spectrum and the more precisely colors can be mixed at that pixel. LCD television manufacturers have two ways of making sure the spectrum of light coming from each subpixel is narrow. One method uses, at each subpixel, very strict filters, which allow only a narrow spectrum through in each of the primary colors of red, green, and blue. The alternative is to tinker with your backlight. Recall that white light can simply be a mix of

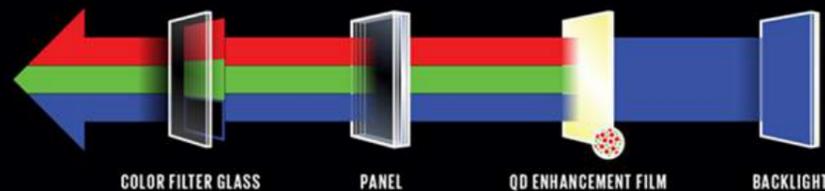
red, green, and blue light. So another option for enhancing image quality is to create a backlight whose white light is a combination of these three colors, each of which has a spectral distribution with a sharp and narrow peak. The best option by far is the latter. Narrowing the filter dims the image, never a good thing for television displays. So display engineers have focused on improving the backlight. That backlight in a budget TV today works in much the same way as the white-light LED bulbs that are increasingly ubiquitous in our homes. These white LEDs efficiently produce enough of the visible spectrum to let us readily perceive it as white. In a typical white LED backlight, a gallium nitride LED generates blue light. That light then excites an yttrium aluminum garnet phosphor, which generates yellow light. The yellow and blue together create a light that appears white but is rich in yellow and blue wavelengths and weak in green and red. When the LCD subpixels on top of the backlight filter this light into red, green, and blue components, there is simply not enough energy at the required wavelengths of red and green to produce a bright image using just that light. The filters

The Structure of a TV Display

MANY OF TODAY'S televisions use quantum dots to improve colors produced by liquid crystal displays (LCDs), backlit by light-emitting diodes (LEDs). Meanwhile, researchers are developing ways to use these dots to create even better quality television images. TVs made with organic LEDs, a competing technology long thought to be the next revolution in television, remain expensive.

PHOTO-ENHANCED QUANTUM-DOT TV

In this variation of LCD technology, quantum dots inserted between an LED array and color filters purify the television's backlight to improve color reproduction. **ADVANTAGES:** Deep color at high peak luminance • Low cost • No burn-in • Manufactured using existing LCD infrastructure • Available now



OLED TV

This ultrathin display technology doesn't involve quantum dots and was long thought to represent the future of television. **ADVANTAGES:** Deep black levels • Excellent viewing angle • Fast refresh • Can potentially be manufactured on flexible substrates • Available now



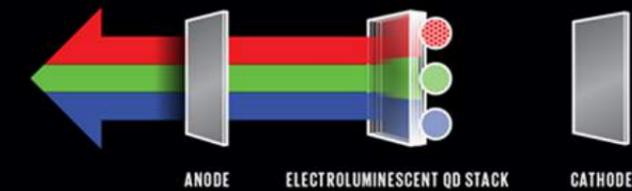
PHOTO-EMISSIVE QD TV

The quantum dots replace the filters and become the red and green subpixels themselves; the blue backlight excites the dots and creates the blue subpixels. **ADVANTAGES:** Wide viewing angle • Potential threefold jump in efficiency and brightness over LCDs • Manufacturers can use existing LCD infrastructure



ELECTRO-EMISSIVE QD TV

These quantum dots emit light themselves when an electric current is applied, so no backlight is involved. **ADVANTAGES:** Perfect viewing angle • Perfect black levels • Potential low-cost manufacturing • Fast refresh rate • Flexible substrates • No filters needed • Long lifetimes



MICRO-LED TV WITH QDS

This variation of micro-LED technology involves an array of microscopic monochrome LEDs, with quantum dots providing color conversion for the red and green subpixels. **ADVANTAGES:** Perfect viewing angle • No filters needed • Perfect blacks • Brightest technology • Fast refresh rate • Flexible substrates possible

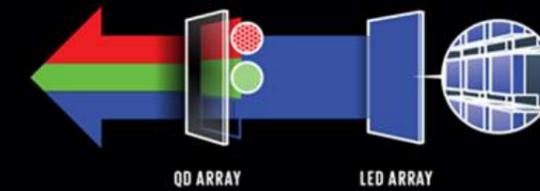


ILLUSTRATION BY James Provost

Optical Coherence Tomography

compensate for this lack of energy by letting through broader ranges of colors. So the green subpixel contains a mix of blue green through yellow green, while the red includes orange all the way through infrared. With such imperfect colors, it is impossible for the subpixels to mix light from those three primary components into the precise colors we see when we look around us at the world as lit by the sun.

That's where quantum dots come in. Inserting quantum dots between the LEDs and the filters can improve the picture by maximizing the amount of light coming through at precise red, green, and blue wavelengths, and by minimizing the energy used to produce light between those wavelengths [see diagram, "Photo-Enhanced Quantum-Dot TV," in "The Structure of a TV Display"]. A typical approach involves using an LED that emits blue light at 450 nm, paired with quantum dots coated onto a film that slides into the back of the display panel. The dots on that film are a mix of two versions: 1.5- to 2.5-nm-diameter dots emitting 527-nm green light, and 3.0- to 5.0-nm dots emitting 638-nm red light.

So in this setup, instead of using the blue LED to excite a phosphor that produces yellow light, the manufacturers use it to excite red and green quantum dots with sharp, narrow spectra, and also to directly produce the necessary blue light. This scheme more precisely matches the specifications for television color reproduction than the blue-yellow approach, and as a bonus, less light is lost when it passes through red and green filters.

This approach creates a "photo-enhanced" quantum-dot display. It gives quantum dots a supporting role in the TV display world—but it's only an interim step. The problem is that, even with the help of quantum-dot films, LCD TV displays still have some inherent flaws:

- *Their viewing angle can be narrow.* Newer liquid crystal technologies exist that overcome much of this problem, but they are expensive.

- *They waste energy.* At each subpixel, an LCD TV has to block about two-thirds of the light generated to separate red from blue and blue from green.

- *They struggle with showing deep, dark, true blacks in low-light viewing environments.* Because the liquid crystals aren't perfect light blockers, a small quantity of white light leaks through to the viewer. This can make black images appear closer to a dark gray (technically speaking, these images have "limited dynamic range").

- *They have relatively slow switching speeds.* These speeds stem from the very nature of liquid crystals. These crystals are actually twisted by an electric field, which polarizes the light coming through them. The polarization is used to block light or let it through at each subpixel. But this twisting takes time, and the lag can cause trouble for fast-motion content like sports, action movies, or gaming. The upshot is that LCDs can support a refresh rate of about 240 hertz, at best. Some state-of-the-art TV systems are already experimenting with such high refresh rates, though the traditional TV refresh rate is 60 Hz.

- *They are not foldable or rollable, at least with available technology.* That limits the form factor of today's displays.

These limitations have led many observers to conclude that LCDs will be replaced in the foreseeable future by an emissive display technology, namely organic LEDs (OLEDs). An emissive technology is one in which the sub-

pixels themselves emit red, green, and blue light, rather than creating it with colored filters in front of a white backlight. Emissive technologies have natural advantages, like deep black levels, wide viewing angles, and, with some types of emissive technologies, faster switching times. The picture quality can be quite spectacular, but OLEDs have some lingering challenges, mainly in cost, power consumption, and longevity.



LIGHT IN A BOTTLE: In future TVs, electrons could directly stimulate quantum dots, like those emitting blue light in the device shown [left]. Vials of green and red cadmium-free quantum dots glow in response to that light and an off-camera blue-light source.

Optical coherence tomography (OCT) is an imaging technique that uses coherent light to capture micrometer-resolution, two and three-dimensional images from within optical scattering media (e.g., biological tissue). It is used for medical imaging and industrial non destructive testing (NDT). Optical coherence tomography is based on low-coherence interferometry, typically employing near-infrared light. The use of relatively long wavelength light allows it to penetrate into the scattering medium. Confocal microscopy, another optical technique, typically penetrates less deeply into the sample but with higher resolution.

Optical coherence tomography is one of a class of optical tomographic techniques. A relatively recent implementation of optical coherence tomography, frequency-domain optical coherence tomography, provides advantages in signal-to-noise ratio, permitting faster signal acquisition.

Commercially available optical coherence tomography systems are employed in diverse applications, including art conservation and diagnostic medicine, notably in ophthalmology and optometry where it can be used to obtain detailed images from within the retina. Recently, it has also begun to be used in interventional cardiology to help diagnose coronary artery disease. It has also shown promise in dermatology to improve the diagnostic process.

Medical ultrasonography, magnetic resonance imaging (MRI), confocal microscopy, and OCT are differently suited to morphological tissue imaging: while the first two have whole body but low resolution imaging capability (typically a fraction of a millimeter), the third one can provide images with resolutions well below 1 micrometer (i.e. sub-cellular), between 0 and 100 micrometers in depth, and the fourth can probe as deep as 500 micrometers, but with a lower (i.e. architectural) resolution (around 10 micrometers in lateral and a few micrometers in depth in ophthalmology, for instance, and 20 micrometers in lateral in endoscopy).

Light in an OCT system is broken into two arms—a sample arm (containing the item of interest) and a reference arm (usually a mirror). The combination of reflected light from the sample arm and reference light from the reference arm gives rise to an interference pattern, but only if light from both arms have traveled the "same" optical distance ("same" meaning a difference of less than a coherence length). By scanning the mirror in the reference arm, a reflectivity profile of the sample can be obtained (this is time domain OCT). Areas of the sample that reflect back a lot of light will create greater interference than areas that don't. Any light that is outside the short coherence length will not interfere. This reflectivity profile, called an A-scan, contains information about the spatial dimensions and location of structures within the item of interest. A cross-sectional tomograph (B-scan) may be achieved by laterally combining a series of these axial depth scans (A-scan).

INTERVIEW



ROSHAN MAKKAR

BIO

Roshan Makkar is currently a Senior Scientist in Photonics Division SAMEER, Mumbai. He earned his post-graduation degree in electronics from Delhi University South Campus in 1998 and joined Optoelectronics Division of SAMEER, Mumbai as Project Associate in Nov. 1998. He is also registered for PhD program as an external candidate in Department of Biosciences and Bioengineering at IIT Bombay.

He has been involved in many R&D activities primarily related to design & development of integrated optics devices which find application in fiber optic communications & various types of sensors. He has developed high resolution imaging system using spectral domain-optical coherence tomography (SD-OCT) for biomedical and non-biomedical samples. He has significantly contributed in the development of a number of functional devices like High Frequency Electro-Optic Modulators, 1XN Power Splitters etc. and other activities such as III-V semiconductor material growth etc. His main interests are biomedical imaging and instrumentation, fiber optic communication, microwave photonics and integrated optics. He has also supervised more than fifteen M.Tech. Projects of one year duration each in the last decade. He is member of SPIE and has 40 publications to his credit in referred international/national journals and conferences/symposiums.

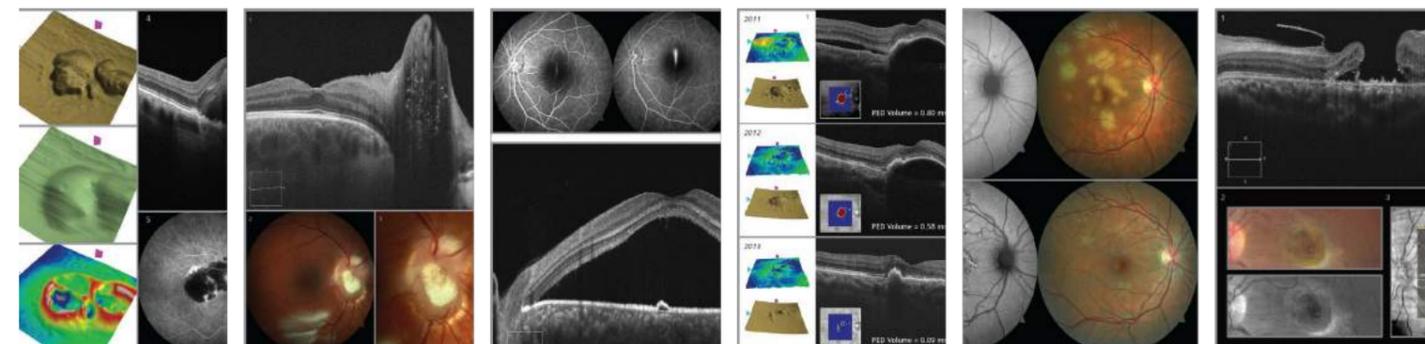
Sir, would you tell us about yourself?

I am Roshan Makkar and I work as a junior scientist in the institution of Society for Applied Microwave Electronics Engineering & Research (SAMEER). It is an autonomous research and development body, in the department of communications in IT. I have been working for the last 18+ years. I have taken activities in the area of integrated optics, high speed optical modulator, optical power Spectror, then shifting to packaging of i/o devices, sensors like bio sensors, gas sensors etc. I am currently working in biomedical unitary, Nasa had sponsored me to pursue PHD at IIT Bombay in biomedical engineering and I am on the verge of completion now. This year I will be surely getting my thesis. In last 18 odd years, I have got around 15-18 students of MTech who have done their presentation under my supervision. I have got 40 odd papers in international journal conference.

What is the most exciting aspect about your line of work?

I started out after my PG in electronics and happened to do my masters project in optics. I was very keen to work in the area of optical communication. And SAMEER gave me the opportunity to work in this area.

So, I quit my private job as an application engineer and joined SAMEER, favorably because the project I was working on which was high speed optical initially was a thrilling experience for me because I was doing something which was similar to microwave electronics like fabricating IC's using different techniques. We were making chips on optical substrate and making electrodes, on top of that I was doing the high-speed testing and for that testing I had to go to C. Delhi, Mtnl Prabhadevi, Mtnl Gandhinagar to get the live feed and see whether my moderator switched that data at that rate. So, it was not 100% success story but it gave me enough exposure and motivation to continue there and I would say that was the most exciting part of my career. For initial 3-4 years I worked like a mad man. I hardly had any time for any other things, working in the lab for fabrication testing took most of my time. So, this was my one year of service at SAMEER, when most of the seniors left for other reasons like higher studies better placements, I was the only microwave and photonics expert who remained, being the only person, I lead the entire division. My division is an infamous training ground for people. I have given training to 40 people like this. So, people come, work for 2-3 years and they leave.



So what setbacks did you face during your research and how is the market scenario in abroad different from ours?

Setback in a way is a lesson which corrects you for your future course. But to put the things in right perspective I would say that photonics is one such discipline which is not understood by people very easily. People are very afraid and incidentally these people happen to be my superiors and it becomes like breaking your head into the wall. You must have read PRBS source which stands for pseudo random binary source. So normally data string is 1010 but there is one hardware which generates some data at random. While working on this process we faced difficulties and once were through with the whole thing we found some new possibilities, it took us four years to convince the higher ups and once it was done the project was closed. The problem with Indian research labs works on buzzword searches and once government starts a policy everybody starts writing a proposal on that. Some of them get accepted and some of them get rejected. So, at the end of the day if you compare an Indian research lab with abroad, their perspective is very clear their groups keep on working in same area for 10-20 years to make some technological product out of it and to establish some concept whereas in India private industries in are not so sure. They don't invest enough money. They only expect to see a "semi cooked dish" or cooked dish. But if you tell them recipe, they will put hardly any time or resource on it.

Sir, I read your research paper on optical coherence tomography and it is mentioned that it has various biomedical applications, one of them being 'Cancer Diagnosis', with the amount of people suffering from this disease what kind of impact would oct provide?

Relief in the sense is a non-invasive diagnostic tool. See any healthy person would be having cancer or TB cells. The thing is when we keep it in our mind that we don't have it, that under no depression, then these cells are under control there is generally no issue but suppose something is bothering you mentally like for example if you are old enough to lose your spouse or you go into a sort of negative mindset which causes these cells to aggravate. So, you going to some kind of negative mindset and being self-aggravate and the aggravate. So, practice is that you take a tissue out of it and send to the labs, they will see if it is malignant or non-malignant. Then we will know at which stage the cancer is. OCT helps in a way that it doesn't let the tissue spread. First, contrast in OCT is derived from the light scattering properties of cells, stroma, and other tissue structures. As such, OCT is a label-free optical imaging modality. Second, OCT imaging utilizes longer wavelength in the near infrared region. Because scatter decreases with increasing wavelength, OCT can image at high resolutions deeper into tissues than possible using shorter wavelength optical microscopy and from that we can see any unnatural growth of any region is there.

What kind of approach should an electronics student take to design a project in microwave domain?

See I would say nothing is impossible. One student has to have good fundamental in at least one domain. It is immaterial whether you pursue your project or research in microwave or photonics. If your fundamental in that domain is not strong then you would be struggling. This is one qualification which I feel should be with every student. Secondly, I would say that the thing with electromagnetics is that it is more of an abstract domain. If I talk about microwave nothing is visible. So, you have to have good imagination and you have to have good understanding about gadgets. Some students have visualization in mind but I should say generate some general specific term. Unfortunately, what I find is students take up some assignments of microwave or photonics, they take the idea from some other paper. I understand most of the colleges don't have the facility to fabricate the structure, antenna waveguide. But unless you don't fabricate the structure your knowledge will not increase. Design and simulation both are important but if you are only good at design then for simulation you won't get to know the handle on problems with the structure.

INTERVIEW



SHEKHAR BANDHAVKAR

PROFILE



Director

Track RF Link Pvt Ltd
2001 – Present



HOD

Philips India Ltd
Oct 1985 – Mar 2001
15 yrs 6 mos

PRDOCUTS DEVELOPED

UHF long range RFID reader, NFC reader, Micro ATM, SMARTCARD reader, HAND HELD PRINTER WITH BIOMETRICS AND THERMAL PRINTER



“..THUMB RULE FOR ANY BUSINESS IS “1000 DAYS DON’T GIVE UP!” I.E. 3 YEARS. IF YOU SURVIVE THOSE 1000 DAYS, THEN NOBODY CAN STOP YOU.”



What qualities a student needs to have if he wants to be hired in a company?

Generally, students are hired by interview process and that’s where they fail. Students should first know how to give an interview.

First of all, when student comes for an interview, after him, there is a queue of interviewees waiting outside and interviewer has to finish the interview in just 10-15 mins. So he will first see your resume and will ask you to tell about yourself. But 60% of the interviewees get rejected because they don’t know how to talk about themselves and how to present themselves. Secondly, it’s a practical industry. Not every interviewer has done PhD in the subject but they know the thumb rule of how to select the interviewee. An Interviewer has the ability to explore a student’s level of knowledge. Interviewer doesn’t generally ask anything about your grade but he asks questions on your last answer.

So, interviewee should know where to end his answer. The interviewer diverts you to your unknown subject but don’t let him do that. Half the time an interviewee starts giving 25% more answers than he actually knows and this is where he fails again. Marks and percentage speak after you have presented yourself in a good way. And then the interviewer mostly judges you by your weakness. He’ll ask you questions about that subject in which you have scored the lowest. So before going for an interview prepare for your weaknesses. Don’t contradict, and get your basics cleared.

How UHF is useful in logistics?

UHF RFID is useful in logistics. I have spent more than 17 years building products using RFID. RFID is used for identification. So in logistics wherever you want to identify something, you can use RFID. RFID is not about losses. For example, RFID will just say that 100 units were transmitted and 80 units were received. In between what happens is not RFIDs responsibility. By using logistics we get to know about when the product is manufactured, when it is sold, whether it has a warranty period or not and what does its warranty condition say. It does all this by just reading it. 80% of the brands use logistics. It is useful for identification purpose but not for security purpose.

What are the applications of NFC to cater to the newer requirements of market?

Actually, NFC is promoted by IC manufacturing companies. There’s a difference. In general, market thinks that any card they use, which works at 13.56 MHz, etc., after tapping and getting to know that reader’s distance is just few centimeters away is NFC. But NFC has many applications. It is just not about reading distance. It has the capability of that IC to act as a reader and transponder together in a single IC. It is for business purpose. NFC provides a lot of security and it has the capability to communicate peer to peer. So the real future of NFC will be peer to peer communication which will enable the transaction. Identification, recognition and authentication are 3 stages of NFC. There are no agents in NFC while transferring money. Two devices will connect to each other automatically and transfer the money.

How do you manage your company with just 10 employees?

There are so many things involved right from production to delivery to sales. The business we have chosen involves only RFID. So we work on it extensively. First, there is design and development of PCB. PCB making is a rotten job. But people don’t even know how to

mount components on PCB. They give their design to PCB making companies and get their job done. The PCB is again given to the manufacturer. When PCB is mounted then the job starts in their company. They have secured ways of storing their programs. They connect to PCB and load their programs and again it is given for final assembly. So it is the combination of in-house RFID and outsourcing.

How has your company grown since the last 17 years? Technological developments keep taking place. So your art lies in where you can anticipate the change and adapt yourself. Earlier the situation was that we were pioneers of RFID manufacturing in India. At that time cost of RFID was very high so we made our products cheap because of cost issue and to sustain in competition with other companies. When we got to know that competition is going to come faster than we thought, we decided to migrate it to make micro ATM. But it was of higher level. But we survived. We are gaining success and now we have entered in UHF”

What is the right time for a student to start his own company?

Nobody should start his company immediately after he graduates from college. Anybody who wants to start a business and has a good idea/concept, should work for at least 2 years after college and should improve himself and get industry experience. Without having industrial experience, one cannot handle business as it is far different from handling electronics or software. Thumb rule for any business is “1000 DAYS DON’T GIVE UP!” i.e. 3 years. If you survive those 1000 days, then nobody can stop you. Take a call after 1000 days.

How is RFID important for student?

Ans- RFID has its own applications. It can’t be applied in all areas. In future, applications of RFID are going to surround us so if you have knowledge, you won’t get stuck.

Do you provide internship to students?

Ans- Yes. We are already providing internships and recruiting students. Our company is open for internship.

SHAHID KHAN

Sr.Application & Sales

Engineer at Vitronics(India)



Q. How was your journey after graduation till this date?

A. I was good at embedded. Many IT related companies came to campus but I didn't want to go to IT as I was not comfortable. I did some courses in IT since some bread and butter should be started after graduation. Later, I went to some interviews of campus, on the field and off the field. I gave many interviews but it is true that somehow there is something written for you at some other place. I was struggling at that point of time because I wanted to go into core. If I would be a guy having interest in IT then I could have easily got selected in my campus interviews. After my graduation, I was struggling for one year to find a job in area of my interest. Luckily I had started something in Tests & Measurements Industries. That was the starting point of my career. Then onwards after 6 months, the responsibility of my branch of my company was on my shoulders. So this helped me learn how to manage the business, what are the key aspects, how to manage the customers which we do not face when we are doing curriculum activities. So I gradually learned how to interact with customers, how to deal with them, how to communicate with them effi-

ciently, how to solve their problems, how better I can solve their problems, how I can be the one point of contact with the customers. I learned those communication skills which are very important, what preparations you must make before visiting a customer, what skills you require while attending a customer, how to tackle a situation where a customer is frustrated with your company. So gradually I learned many aspects of management. This is the second or third switch of my career till now. Now I can meet people of higher designation, from low chart area to the key people who are in R&D, the managers and the directors. So gradually I'm learning that.

Q. As you mentioned that the placements which we get at the start, the core placements, are basically related only to IT sectors. So can you tell us the reason as to why the core companies don't come to hire Students in Thakur and other colleges?

A. There are many reasons. But primarily according to me the skilled thinking of our students is not up to that level which can match the industry criteria. The industries are moving at fast rate and the syllabus is not at par with that rate. The curriculum should be in

par with the actual trend going on in the Industries and also it should be in par with what will happen in the next 5 years. Students should have keen interest in curriculum. They should not take these 4 years just for granted or just for a degree. They should invest their time more in projects. Students should have an idea about the trends going on in market. These things are lagging according to me.

Q. So can you suggest some courses which will build the Gap between the industry and curriculum?

A. I can suggest for RF because I'm into RF and I particularly meet RF customers. The main concern for RF is that as a fresher they don't recruit any RF engineer because they need a person with domain knowledge. A guy who can readily get trained in at least 2-3 months can do his own job and be a part of their team. So that's the demand from industry if you want to pursue a job in an RF company. So for that, you can start some courses which deal with basics of RF, what are the challenges faced by RF measurements, different types of measurements with respect to different types of industries. Now there are industries which are into Telecom, base station Telecom which is related to mobile communication which is also a part of RF. So such kind of curriculum which provides a base to students can readily be acceptable by the industries with some sort of certification.

Q. At your current company, in which you are working right now, what are the opportunities which a student from EXTC department in our college can get as an internship as well as placement?

A. Yes, we do have internship facility but the company has some criteria. They will have through, rigorous testing, technical tests and then they will select internship for 1 year or 6 months accordingly. If a fresher wants to join, then there will be two kinds of jobs. One will be marketing and the other will be for technical. Technical will mostly be demonstration, installation kind of job. For marketing, it will be less of installation and more of promotion activities and field visits.

Q. Could you give a word of advice for the students like B.E. students who will be entering into the industry and the T.E. students who will go to B.E. and will be doing domain oriented studies in B.E.?

A. Your college is a good mentor. You should go to your project guide and respective faculties for the guidance. For a T.E. student, I'll suggest that just con-

centrate on your core area. If you want to continue with your studies after graduation then concentrate on one particular subject. It can be anything. Concentrate on that particular part and focus for the next one year till you complete your graduation and also on your aptitude skills which are more mandatory from the point of view of placements. For B.E. students, I'll suggest that broad yourselves to the environment which is wide for you. There is no limitation out there. You should not limit yourself to one particular thing. Don't get disappointed when you don't get something which you want. Instead try something else. At least get started with something. Get an exposure, whatever exposure it may be. After some years you may land somewhere else.

Q. In the fourth year, the students find it difficult to find a B.E. project. So could you suggest some areas of research for B.E. students where they can start their project and continue in the industry?

A. I can recommend students to first do some research on the ongoing topics, ongoing trends, ongoing things in the market and which are the IoTs related to that particular market. One good project about which we heard was for agriculture. That's a good market. Then something can be done for farming and textile too. Think about these particular markets. Pick up something from them. What are the challenges faced by them and implement something for them.

Pandharinath Mane

Experience



DIRECTOR, BUSINESS APPLICATIONS
SAN FRANCISCO BAY AREA



ROVI (FORMER MACROVISION)
ERP MANAGER



DEVELOPMENT LEAD
ELECTRONIC ARTS

1. Could you tell us about your journey after your graduation?

Looking back, my journey after graduation has been exciting and enriching. As a normal engineering graduate, I too thought of taking up a job after graduation in 1995 and started taking steps towards searching an “exciting” job. After multiple rounds of interviews in few companies, I had two opportunities in hand. One as a Sales Executive, which I felt was not my forte and hence chose the other one which was more practical oriented and involved Installation and Commissioning of Telecom equipments. As expected, this proved as a stepping stone for my career growth, as mobile communication was just starting its journey in India. Practically, the bookish knowledge till graduation was just a base and could not be directly implemented in my job. After a lot of self study, struggle and of course initial failures too, I could gain enough knowledge, strength and confidence to excel in my role.

Since my projects involved multiple customers across India, my role demanded a lot of travel which completely disturbed my work-life balance; I had to sacrifice my family life for professional growth; but I feel it was the need of the hour. My first job gave me an exposure not only to the technical field but also to various other domains like Contract Management, Supplier Management, costing & budgeting and Customer Management too. Later in 2000, I got an opportunity to work with Lucent Technologies, one of the pioneers in telecom industry and felt as if all my efforts have paid off. This job too offered a lot of challenging projects from Fixed Line, Fibre transmission, GSM, CDMA, IP Routing, etc for various customers while executing different roles of Technical SME, Rollout Management, Project Management and Program Management. Lucent Technologies merged with Alcatel to form Alcatel-Lucent and later was acquired by Nokia in 2015.

Overall, past 23 years of my life after graduation have

been very fruitful in providing me growth, both personally and professionally and in making me who I am today.

I been assigned only to one task or a project, I would have looked for a change outside Nokia. I started my career with Nokia (earlier Lucent Technologies) in 2000 as a Technical Expert for Transmission but seized on opportunities that came my way such as to work on other technologies like GSM, CDMA, DSL, etc. Meanwhile, I had developed keen interest in Project Management which was fulfilled by managing the rollout of first ever CDMA network for Reliance. Since then, I have been executing various roles of Pre-Sales Program Management, Rollout Management and Project management. Till recently I was heading the India Field Operations for rollout & maintenance across multiple technologies & for various customers and now I am handling Workforce, Competency and Cost Management for India Field Force. The kind of varied experience and the professional growth given

What were your other courses of interest instead of mobile communications?

I have completed my Bachelor of Engineering in Electronics, but also had keen interest in the field of Electrical engineering, in fact this was my elective for specialisation in the last year of graduation. But with the kind of job that I opted after graduation, my interest grew more in the telecommunication domain. One more field that attracted me was teaching, which I could partially take-up in my initial job, where I was required to impart technical training to the customer on the Nokia equipment's that we deployed in their network.

What will be the future trends in mobile communications?

Wireless communication has developed a lot over the last few decades, from just voice and SMS communication network to a highly data driven network, but there is a lot more to come. With the development of smart devices, communication does not necessarily need a human interface. Internet of Things (IoT) is one of the next big things to look for which would enable controlling and sharing of data between connected devices, practically any device, machine, vehicle and even home appliances which have the ability to connect to the internet. This requires a lot of data exchange and that too at a high speed, like 5G, the 5th

generation of mobile communication that offers up to 10Gbps. So in my view, IoT and 5G are the two things to watch in near future.

What qualities should engineer possess to work in the corporate world?

Life in the corporate world is very challenging. Again, as mentioned earlier “Change is the only constant”, a person should be capable of adapting to changing environment, changing technology, changing demands of the organisation, customer and market requirements. The market is very competitive and hence he/she has to be innovative, should be able to work efficiently and make full utilisation of the resources available. In today's price competitive market, it is more important to Get More Out of Less and that too quickly, in fact ahead of time; so innovation, efficiency and speed is a must for the engineers.

Our college encourages students to go for internships; do you have any suggestions regarding it?

“CHANGE IS THE ONLY CONSTANT...INNOVATION, EFFICIENCY AND SPEED IS A MUST FOR THE ENGINEERS.”

An internship is a bridge of transitioning from college to profession life and can surely help in putting the classroom knowledge into practice. It can help develop your skills, develop professional relations, assess own interest and skills. In my view, internship would not only help you gain experience but also help identify the right career path for yourself. Many companies look towards hiring experienced resources and engineers and with internship he/she would definitely have an edge over freshers. Unfortunately, there aren't any internship programs that are currently run by Nokia.

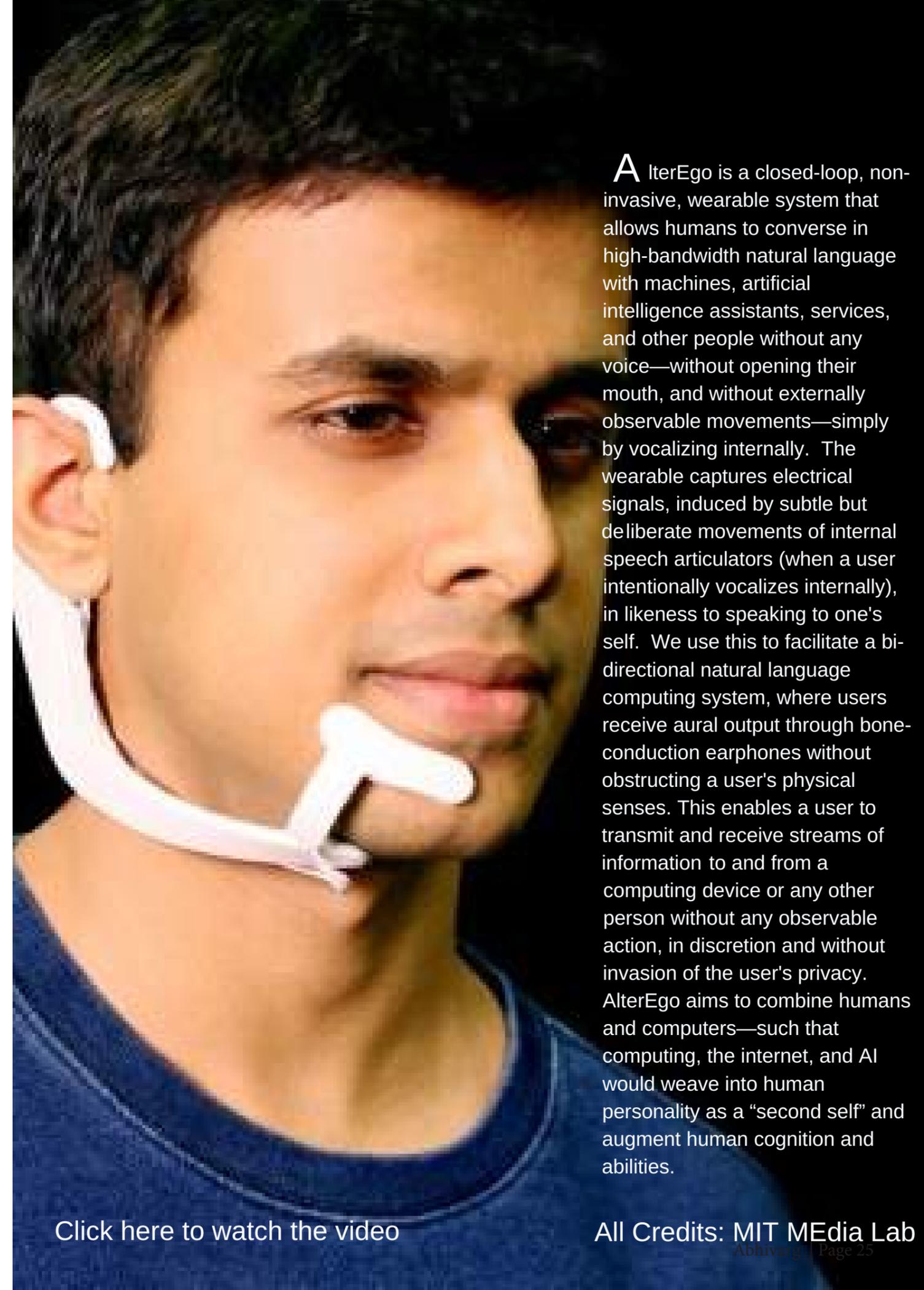
How has been your experience as Director for Nokia so far?

Working with Nokia has been a great experience. I truly believe that “Change is the only constant”. Had by this organisation is the greatest experience. While working with my earlier organisation, Supreme Telecommunications, I had an opportunity of working on

Nokia equipments for more than 4 years and since then Nokia was one of my dream companies to work with. And now working with Nokia is a dream come true!

Would you like to give any advice to our future engineers?

Transitioning from an academic environment to a professional environment may not be simple for all and you may find yourself lost in the competitive job market. But to sail through and build a successful career, few points that our future engineers can inculcate are be curious, communicate well and ask a lot of questions. Technology is changing at a very fast pace so don't stop learning and if you want to be valued, you need to keep your knowledge and skill sets updated in line with the market trends. Be open to move across domains; keep yourself motivated and accept challenges. And most importantly, learn from your mistakes. Don't view failure as the end of your career; take it as an opportunity to grow and I am sure you would succeed in whatever path you choose.



AlterEgo is a closed-loop, non-invasive, wearable system that allows humans to converse in high-bandwidth natural language with machines, artificial intelligence assistants, services, and other people without any voice—without opening their mouth, and without externally observable movements—simply by vocalizing internally. The wearable captures electrical signals, induced by subtle but deliberate movements of internal speech articulators (when a user intentionally vocalizes internally), in likeness to speaking to one's self. We use this to facilitate a bi-directional natural language computing system, where users receive aural output through bone-conduction earphones without obstructing a user's physical senses. This enables a user to transmit and receive streams of information to and from a computing device or any other person without any observable action, in discretion and without invasion of the user's privacy. AlterEgo aims to combine humans and computers—such that computing, the internet, and AI would weave into human personality as a “second self” and augment human cognition and abilities.

[Click here to watch the video](#)

All Credits: MIT MEdia Lab

Power your IOT devices with Solar cell



Ms. Sonali Singh
AP, EXTC DEPT.



In recent years, much attention has been placed on the Internet of Things (IoT) and machine to machine (M2M) markets and technologies. IoT and M2M refer not only to personal computers and mobile phones connected through the Internet but to the wireless interconnection of all of the billions of "things" and devices through the Internet or local area networks, to increase efficient utilization. With those billions of things, comes billions of batteries that must be purchased, maintained, and disposed of.

Challenges in operating IoT devices using batteries:

***Battery replacement:** A lot of IoT devices for example wireless sensor nodes are installed at locations that are not easily accessible. Also, some applications like beacons that are used for asset tracking in a warehouse or to advertise promotional offers in a retail store involve several devices. So, either physical limitations or volumes make it challenging to replace batteries regularly.

***High running cost:** Initial cost of product may look attractive in a battery powered device. However, running cost may go very high due to regular cost incurred by new batteries. Also, if batteries are replaced by some maintenance engineer, it would invite additional expenses.

***Waste management:** As most batteries use hazardous material, they are not environment friendly when it comes to their disposal.

Precautions shall be taken based on the battery type that need to be disposed-off. Based on country, additional cost may be levied on new batteries to take care of disposal expenses. Irrespective of the cost, with the number of devices going high and hence number of batteries; environment is getting polluted.

The only solution to these problems is the use of renewable energy. Usage of energy harvesting devices (EHD) can help in designing battery-less system, replacing primary battery with a rechargeable battery that would need to be replaced less frequently

HOW ABOUT NEVER HAVING TO USE BATTERIES AGAIN?

than primary batteries or using supercapacitor for holding charge that does not need to be replaced. If the electricity grid can rely on renewable sources, why can't IoT-connected devices do the same? Tryst Light Energy solves just that, energy harvesting for the IoT.

Dutch battery and energy storage startup, **Tryst Energy**, has developed a product to power internet-connected devices through solar energy. The product is known as Light Energy. It aims to harvest the energy power of solar to replace the growing use of, and waste associated with, the millions of batteries that currently power IoT devices - soon to be 20 billion according to some estimates. Instead, Tryst Energy claims to have produced a model that will enable IoT devices to be powered for 75 to 100 years, at the very least, through solar energy. Batteries killing off IoT businesses.

Nick Kiran, Marketing to Business development Manager at Tryst Energy, said the idea was born out of the company's frustration at the sheer number of batteries it wasted when developing IoT hardware. "More than a few businesses in IoT get killed because of batteries that need to be replaced every three to five years. Sending someone to replace them, buying new batteries or even completely replacing entire IoT-products leads to tremendous amount of waste," Kiran said.

Light Energy, so Tryst claims, is a way around this. The small module it uses does not require direct sunlight. Instead, it is fitted with efficient light receptors that mean it can power IoT-devices even in places with little light.

"Light Energy is like solar power but on steroids," Kiran said. "It's ridiculously efficient and works from only 200 lux, or in other words: from under your desk where there is almost no light. And it provides enough power to keep your IoT-products going, including radio frequency like Bluetooth LE or LoRaWAN."

The Light Energy module is made up of a custom-made energy harvesting circuit and a solar panel 35mm to 20mm in size. Supposedly, as Kiran said, it needs just four hours of 200 lux light to operate for 24 hours, and can generate a maximum power of 25mA. Finally, it can store energy in what's called a supercap, which has the capacity to store 10 to 100 times more energy per unit volume than batteries.

"After our Kickstarter, we are going to produce Light Energy harvesters as OEM-modules as well, so every product developer, start up and enthusiast out there can start building a brighter world for tomorrow, without having to use batteries ever again," he said.

References

<http://electronicsmaker.com/power-your-iot-devices-without-batteries>
<http://core.spansion.com/article/energy-harvesting-devices-replace-batteries-in-iot-sensors>
<https://www.trystenergy.com/about/>

WHAT ARE WE MISSING TODAY??



Ms. Rutvi Thaker
AP, EXTC DEPT.



- Do we have technology? **YES**
- Do we have good lifestyle? **YES**
- Do we mostly have everything that we need? **YES**

Then what is it that is missing?

Science has taken a great place in everyone's life now a days. But it is only the **TECHNOLOGY** that we are using. Science has much more than this to give us.

How many of us Thank God? Just a casual "Thank God, I am not late!", "Thank God, I cleared my exams!" Thank God for this and that and everything. But is this genuine?

Many of us do not believe in existence of God, but we can believe in Energies, Vibes, and Auras etc. One may not enter the temple, but we can learn to enter our own soul, see the inner us. And after this if we realize the purpose of our life, only then we can say that we are fully alive. If we understand the science of God, we will know we do not need any of these technologies.

It is said that mediation is science, a science of God which we all are missing in this fast running life.

Let us see how meditation affects us, or rather improves us:

Better Focus

Meditation is an exercise in focusing our thoughts and being alert of when it diverts, this in reality improves our focus even when we're not meditating. It's a long-term effect that comes from regular sessions of meditation.

Less Anxiety

This point is technical, but really interesting. The more we meditate, the less anxiety we have, this is because we're actually relaxing the connections of particular neural pathways.

There is a section of brain called as the cortex, which passes the information relating to the physical experiences we have. There is a strong bond between bodily sensations and fear with cortex which passes message to the brain and makes us feel scared and under attack.

When we meditate, we weaken this bond. This means that we don't respond as powerfully to sensations as we would do without meditating.

Cultivate Inner Peace

When we do not clean our home for a longer time, it becomes dirty, filthy and dusty. Now imagine what will happen if we do not cleanse our soul? We pick vibes from all places around us, be it the places we visit, things we see on TV or on the news, people at work, friends and family members, stressful situations, and just about the world over.

Rather than worrying about these situations, surroundings, and people; meditation lets us help release all these negativities. It won't take away those feelings, but it makes us capable to cope with them in a more positive way.

The little things, even the larger things, don't bother us as much, so we can remain positive, happy, serene, and calm within our self.

Find More Perfect Moments

Before meditation, we easily focus on the negative energy and allow it to overpower us. Instead of reacting to people and situations, we find ourselves observing the world that is moving around us. Rather than focusing on the negative, we will find ourselves aiming for the positive thing in each moment. A smirk from a stranger, the taste of favourite meal, or even just the quiet isolation from the world will become more important to us once we could learn to release the negative energy.

Awaken Forgiveness

One more advantage of meditation is that it helps us let go of anger more easily so that we can forgive and forget. We all have been in such situation at some

point of time where we say, "I'll never forgive that person". Meditation helps us realize that forgiveness is not about giving something to others that they don't deserve. It's about giving something that we fully deserve.

Feel More Alive

All of our senses will awaken simultaneously. More clear view of the images, simple food seems tastier; happiness seems more and more happy.

We can read people better, emotionally as well as physically; we can differentiate with the body language. A power allows us to sense if someone is facing any difficulty or if they are filled with positivity.

We become more self-aware. We start getting to know what works and what doesn't work for us, how to get the best out of ourselves, productively and spiritually. All this is possible due meditation.

Meditation has more such advantages. There are numerous meditations which we can perform. Getting the right Guru does it all.

"What right has a man to say he has a soul if he does not feel it or that there is a God if he does not see him?" ~ Swami Vivekananda



eSIM

Vignesh Iyer Associate Software Engineer
Accenture Solutions Pvt.Ltd

An eSIM is an abbreviation for an Embedded SIM card. As is evident from its name, an eSIM will replace the physical, plastic SIM cards which exists in all current smartphones and feature phones with an alternative solution which will be embedded into the phone that cannot be removed.

A similar new embedded SIM technology which is called the iSIM was recently announced by ARM which is compliant with GSM Embedded SIM specifications. This technology is mainly designed for Internet of Things(IoT) devices. The primary advantage of iSIM over eSIM is that eSIM still requires a separate chip which needs to be embedded into the device whereas iSIM is built into the device's processor.

Why is it important?

One of the main benefits of an eSIM is that it is incredibly small size. To put things into perspective it is only a fraction of the size of a Nano SIM. This makes it well suited for ultra-compact devices like smart watches which don't really have that much room for a conventional SIM.

An eSIM is non-removable and is embedded among other internal components. There is no need to remove it and as a result the water resistance capability of any device won't be compromised. By using such an embedded standard, the idea is to allow the user to switch to a new operator if there arises a need, without actually swapping out the SIM cards belonging to different operators. This would make the lives of international travellers a lot easier who have

to swap SIM cards, services, or even carry more than one phone to stay connected. This is possible mainly because the eSIM is rewritable, similar to an NFC chip. The eSIM will be compatible with all major carriers, regardless of the network type used by them.



Fig 1. Multiple SIM cards
Since device manufacturers won't have to incorporate a dedicated SIM slot into their devices, it provides them with even more flexibility in terms of design. For e.g. With the SIM card being embedded into the phone's internal hardware, Phones could get a lot slimmer than they currently are without actually sacrificing the battery life, bezels could shrink theoretically.

Future of eSIMs

The organisation that represents the interests of mobile operators around the globe is the GSMA (GSM Association), and it has announced a standard for this

new kind of SIM. The network data associated with a standard SIM will be rewritable on future eSIM devices.



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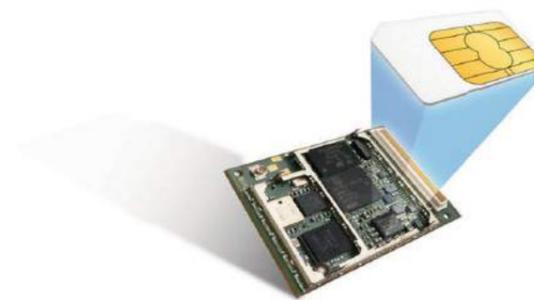
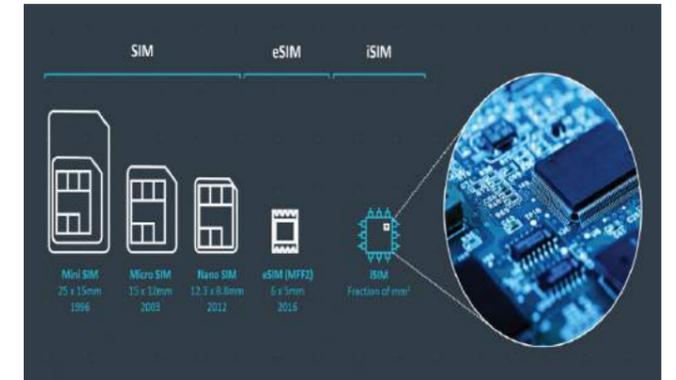


Fig.2 Embedded SIM representation
This technology is expected to make its way to smartphones in the near future due to its long list of advantages. Another problem associated with conventional physical SIM cards is that there are currently two or three sizes in practice (Mini, Micro and Nano) which is not the case with eSIM.

However, there is a catch. Before eSIMs can become mainstream every major operator/carrier has to agree to the fact that eSIMs are the future, after which phone manufacturers have to incorporate

changes accordingly. Realistically, such things take a good amount of time for approval and implementation but once done, there's no doubt that eSIMs will eventually take over completely.





ALUMNI



IP MULTIMEDIA SUBSYSTEM

Shyam Sundar CV

INTRODUCTION

The cellular networks are evolving through several generations. The first generation was based on analog technology which was used for public voice service, then came the second generation(2G)which was based on digital cellular technology and it consists of Global System for Mobile Communication(GSM) with higher bandwidth and higher data rates up to 14.4kbps, General Packet Radio Service(GPRS) was an improvement over GSM and provided rates up to 144 kbps, and then with changing time came third generation also known as UMTS which provided data rates up to 3 Mbps and finally now we have come to the fourth generation which uses Long Term Evolution(LTE) and VOLTE and provides speed up to 100Mbps. Also during this generation change, we have switched from circuit switching to Packet switching and also in the fourth generation, we have full IP based network end to end. During this transition we have also seen how initially only voice was transmitted in 1G, and then from 2G, we have both voice and data being transmitted over the network. Telephone network provides a critical task for establishing ad hoc network (call), hence we need a global IMS which allows application in mobiles to establish the peer to peer communication.



Fig1:- COMMON IMS DIAGRAM

IP MULTIMEDIA SUBSYSTEM

IP Multimedia Subsystem (IMS) is an integrated network of telecommunication carriers that use IP (internet protocol) for packet communication over wireless or landline. IMS came as a part of Third Generation Partnership Project (3GPP) release 5. IMS is an emerging architectural framework which is based on SIP and IP for providing multimedia and VOIP Services and it is supposed to be a standardized access independent IP based architecture that interworks with existing voice and data networks. It also provides support for delivery of multimedia applications and voice service over IP network. It builds a common architecture for offering services in the packet domain, allows users to establish common multimedia sessions and also signaling plane is separated from user plane.

Session Initiation Protocol (SIP) establishes, manages and terminates a call, it is independent of the transport layer and can run on UDP, TCP AND SCTP. SIP consists of INVITE, BYE, ACK, OPTIONS, CANCEL AND REGISTER. INVITE is used for the connection establishment using three-way handshaking, ACK is used for acknowledgment, and BYE is used for terminating a call which is used to end the session between two parties.

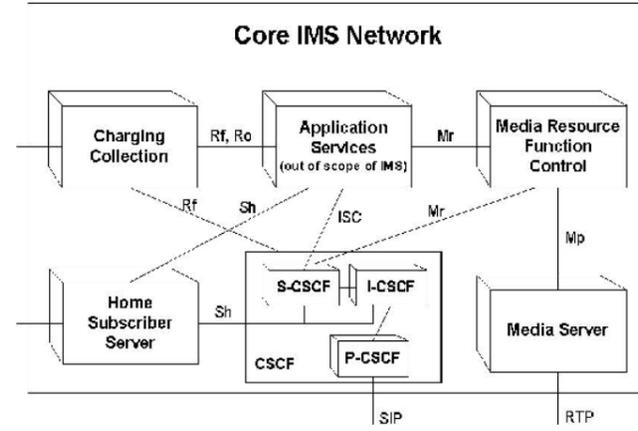


Fig2: BASIC IMS DIAGRAM

IMS ARCHITECTURE

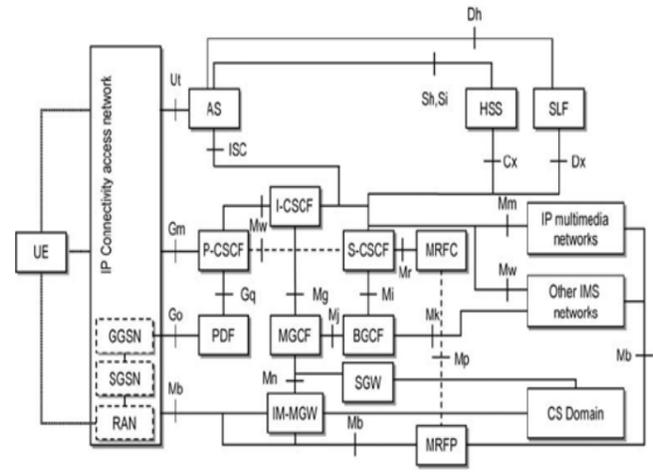


Fig3:IMS ARCHITECTURE

IMS Architecture is divided into 6 categories such as session management and Routing(CSCFs), Databases(HSS, SLF), Internetworking elements(BGCF, MGCF), Services(Application session, MRFC, MRFP), Support Entities(THIG, SEG, PDF) and Charging. We will discuss the important categories. Routing and Session Management consists of Call Session Control Functions(CSCF) which has Proxy CSCF(PCSCF) which is the first point of contact of UE, all the SIP from UE goes through PCSCF, it sends accounting details to charging collection function, executes media policing. Interrogating CSCF

(ICSCF) obtains the name of S-CSCF from HSS, assigns SCSCF based on received capabilities, routes requests to SCSCF or AS acts as SIP proxy server. Serving CSCF (SCSCF) handles registration process, stores service profile, makes a routing decision and maintains session state, performs authentication of users.

Services consist of three functions such as Multimedia Resource Function Controller(MRFC) which provides a mechanism for bearer related services, handles SIP communication to and from SCSCF, controls MRFP. Multimedia Resource Function Processor (MRFP) mixes incoming media streams for multiple parties and also processes media stream source for multimedia announcements. The application server provides value adds multimedia services, processes incoming SIP Sessions from SCSCF; originate SIP requests, also sends accounting information to Charging function.

Internetworking functions are required for exchanging signaling and media between IMS and core network. Breakout Gateway Control Function (BGCF) selects from where IMS originated call breaks to PSTN, one BGCF is located in the home network and another in the visited network also generated charging records. Multimedia Gateway Resource Function(MGRF) translates SIP to ISUP over IP, controls IMS media gateway.

1G	2G	3G	4G
1 ST GENERATION wireless network	2 ND GENERATION wireless network	3 RD GENERATION wireless network	4 TH GENERATION wireless network
• Basic voice service	• Designed for voice	• Designed for voice with some data consideration (multimedia, text, internet)	• Designed primarily for data
• Analog-based protocols	• Improved coverage and capacity	• First digital standards (GSM, CDMA)	• IP-based protocols (LTE)
	• First mobile broadband	• True mobile broadband	
2.4 kbps	64 kbps	2,000 kbps	100,000 kbps

HD 720P 1G, 2G, 3G, 4G, 5G

TELCOMA AN ISO CERTIFIED COMPANY



SMART IRRIGATION

Dinesh Prajapati

Hi,
I, Dinesh Prajapati, Alumni of Thakur College Of Engineering & Technology is presenting a Technical Article. I have completed my engineering from Electronics & Telecommunication Department. My Article is on Smart Irrigation And Monitoring System (SIMS) via IOT(Internet of Things).

SIMS was developed to have an optimal utilization of valuable asset i.e Water. Water is an important non-renewable resource. SIMS was designed to minimize the problem of drought (Lack of water) and Water-Logging (Excess of water). The main purpose of using SIMS was to preserve its asset for the future generation. The main advantage of SIMS was to share the data over a long distance to avoid the problem of manual intervention of manually monitoring and controlling the parameters of field. SIMS was designed to continuously monitor and control the field parameters. It helps you to reduce the human error and avoid the delay in taking the instant steps required. SIMS was designed on IOT (Internet of Things). IOT means human to machine and vice-versa interaction. SIMS is used to monitor various parameters such as Temperature, Humidity, Water Level of the tank, etc. and accordingly perform the required actions.

Raspberry Pi is the heart of SIMS. Raspberry Pi is a mini-computer having the latest features which can perfectly configure the software with the hardware. For measurement of temperature and humidity,

Temperature and Humidity Sensor module was used. The data from the site was displayed on the web site in a graphical form. For continuously monitoring of the field, Web Cam was installed on the field.

SIMS is used to measure the temperature, humidity of the field, water level of the tank and send the data to the web site. There are two threshold levels set, Lower Level (LL) & Upper Level (UL). If the water level of the tank crosses the LL of the tank then the motor is triggered and water is pumped to the field so as to avoid insufficiency of water. Similarly if the level of water crossed UL, then the motor is turned off thus providing the adequate amount of water. Thus SIMS maintained the optimal utility of water, protecting the soil fertility.

The future enhancement of SIMS is to minimize the delay in gathering the information so as to have no wastage of water. Similarly SIMS can be modified to measure the Atmospheric Pressure, monitor the Climatic conditions and accordingly take the required steps.

Finally I would advise the future graduates to have the hunger for learning with understanding. Try to experiment with your ideas and implement it in your project. Keep yourself updated about coming technologies. Take maximum support and guidance from your colleagues, seniors, mentors and faculties. Read Technical articles and keep yourself motivated.

Thanks & Regards,

Dinesh Prajapati



Hello,

I, Roshan Jha, working at Accenture wants to share my experience in the form of an article. I started my engineering journey from Thakur College of Engineering & Technology. I completed four years of Engineering from Electronics & Telecommunication department with the help and support of faculties. College life was full of learning, enjoyment and many activities. This journey came to an end when I got placed in Accenture.

I was excited to start my career at Accenture and this would become easy with the friendly environment along with working environment which I got at Accenture. Initially, we were given orientations and introductions about the company and then it continued with the training. Basics were the first thing taught to us which included HTML, CSS, etc. Later on followed by JAVA, DOT NET.

I had to appear for test only after which I could be deployed to the project. The happiness of clearing the test gave me more confidence to work harder. Here, the environment is completely different from college. People are more concerned about their work. Team includes different individuals from various regions of country. Team spirit is the first quality that is being instilled in you when you join the organization.

Something that I was concerned about was the travelling issue. This again was sorted when I came to know about the Shuttle service provided by Accenture. There are various Pick up and drop points and employees can choose from it according to their convenience.

There is also some entertainment when you need some refreshment in the form of indoor games like carrom, table tennis, pool, etc. This shows that Accenture focuses on overall development of an individual. The recreational facility is equally available to all genders. When you are busy with your work, Accenture takes care that your health doesn't become a barrier between you and your success. For the same purpose gymnasium is provided. All equipment are kept so that you can maintain your health.

Finally, I would like to suggest few things to the future minds before entering into the industry. Mould yourselves as a team player, you should be able to work in a team and develop your interpersonal skills because here you will have to interact with various people. Keep learning and develop innovative ideas. You may face failure at first instance but don't get depressed and keep the hunger alive and work harder.

Regards,
Roshan Jha



SOLAR POWER

Riddhi Mhatre

I. INTRODUCTION

Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect. Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by an off-grid rooftop PV system. Commercial concentrated solar power plants were first developed in the 1980s.

II. WHY SOLAR....?????

As the cost of solar electricity has fallen, the number of grid-connected solar PV systems has grown into the millions and utility-scale solar power stations with hundreds of megawatts are being built. Solar PV is rapidly becoming an inexpensive, low-carbon technology to harness renewable energy from the Sun. The current largest photovoltaic power station in the world is the 850 MW Longyangxia Dam Solar Park, in Qinghai, China. Unlike fossil fuel based technologies, solar power does not lead to any harmful emissions during operation, but the production of the panels leads to some amount of pollution. Solar power includes plants with among the lowest water consumption per unit of electricity,

and also power plants with among the highest water consumption (concentrating solar power with wet-cooling systems). Only wind power, which consumes essentially no water during operations, has a lower water consumption intensity. The median water consumption during operations of concentrating solar power plants with wet cooling was 810 gal/MWhr for power tower plants and 890 gal/MWhr for trough plants. This was higher than the operational water consumption for nuclear, coal, or natural gas.

III. WHAT ARE THE IMPACTS OF SOLAR PANELS LOCALLY?

The issue of water consumption is heightened because CSP plants are often located in arid environments where water is scarce. The four dry-cooled systems were the three power plants at the Ivanpah Solar Power Facility near Barstow, California, and the Genesis Solar Energy Project in Riverside County, California. Of 15 CSP projects under construction or development in the US as of March 2015. The production of solar energy in cities is clearly a way to diminish our dependency on fossil fuels and is a good way to mitigate global warming by lowering the emission of greenhouse gases. To evaluate their influence on urban weather, it is necessary to parameterize their effects within the surface schemes that are coupled to atmospheric models. Solar panels in the Town Energy Balance scheme, taking account of the energy production (for thermal and photovoltaic panels), the impact on the building below and feedback toward the

urban micro-climate through radiative and convective fluxes. A scenario of large but realistic deployment of solar panels on the Paris metropolitan area is then simulated. It is shown that solar panels, by shading the roofs, slightly increase the need for domestic heating (3%). In summer, however, the solar panels reduce the energy needed for air-conditioning (by 12%) and also the Urban Heat Island (UHI): 0.2 K by day and up to 0.3 K at night. The use of thermal panels (that are more efficient than photovoltaic panels) and the geographical position of Paris, which is relatively far from the sea. This means that it is not influenced by sea breezes, and hence that its UHI is stronger than for a coastal city of the same size. But this also means that local adaptation strategies aiming to decrease the UHI will have more potent effects. The deployment of solar panels is good both globally, to produce renewable energy (and hence to limit the warming of the climate) and locally, to decrease the UHI, especially in summer, when it can constitute a health threat.

IV. OPPORTUNITIES FOR ENGINEERS

When it comes to solar energy, there is no shortage of opportunities for engineers. The advancement and success of solar technology depend on the hard work and innovation of engineers, and as a result, the demand for engineers, of all kinds, will only continue to increase. Engineers may choose to work within the private or public sector, as a consultant for people interested in setting up solar power in their home or business. They can assist clients in developing a plan for creating the most productive and efficient system for them. Many engineers will seek work in the solar energy sector itself. With new solar companies popping up every day, there are many positions available to engineers looking to make an impact on the industry. We engineer having many opportunities in the solar power world. While material engineers test the materials being used, electrical engineers focus on the electrical components that make solar systems work. Along with testing these elements, electrical engineers also design and create them. They are responsible for developing the electrical circuitry for the solar panels, their wiring systems, and the devices that support them. The first question we should consider before we talk about the technology is 'why should we move towards floating solar technology when the land-based ones perform well?' Well! One simple yet strong explanation can be limited availability of land for land-based solar plants. It is known that solar plants take up a large amount of land which almost can be put to no other use and in countries where cities are dense and agricultural land is limited, installing land-based solar plants are not

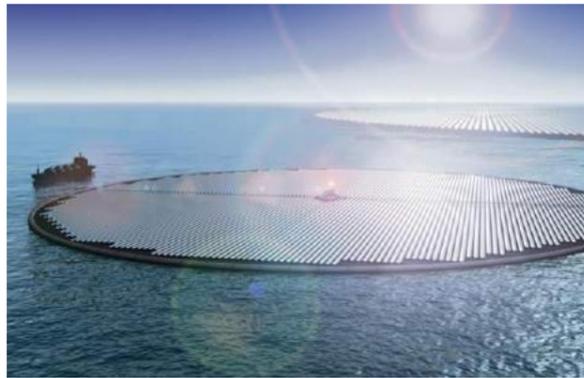
a wise solution. Rather, installing water-based solar power or floating solar power plant is alternative to harness the solar power, without taking up extra space on land.

V. THERE ARE SOME OPPORTUNITIES PRESENT IN INDIA FOR SOLAR POWER.

The land is scarce in India, and per-capita land availability is low. Dedication of land for the installation of solar arrays must compete with other needs. The amount of land required for utility-scale solar power plants is about 1 km² (250 acres) for every 40–60 MW generated. One alternative is to use the water-surface area on canals, lakes, reservoirs, farm ponds and the sea for large solar-power plants. These water bodies can also provide water to clean the solar panels. Highways and railways may also avoid the cost of land nearer to load centers, minimizing transmission-line costs by having solar plants about 10 meters above the roads or rail tracks. Solar power generated by road areas may also be used for in-motion charging of electric vehicles, reducing fuel costs. Highways would avoid damage from rain and summer heat, increasing comfort for commuters. The architecture best suited to most of India would be a set of rooftop power-generation systems connected via a local grid. Such an infrastructure, which does not have the economy of scale of mass, utility-scale solar-panel deployment, needs a lower deployment price to attract individuals and family-sized households. Photovoltaics are projected to continue their cost reductions, becoming able to compete with fossil fuels. Greenpeace recommends that India adopt a policy of developing solar power as a dominant component of its renewable-energy mix since its identity as a densely-populated country in the tropical belt of the subcontinent has an ideal combination of high isolation and a large potential consumer base. In one scenario India could make renewable resources the backbone of its economy by 2030, curtailing carbon emissions without compromising its economic-growth potential. A study suggested that 100 GW of solar power could be generated through a mix of utility-scale and rooftop solar, with the realizable potential for rooftop solar between 57 and 76 GW by 2024. During the 2015-16 fiscal year NTPC, with 110 MW solar power installations, generated 160.8 million kWh at a capacity utilization of 16.64 percent (1,458 kWh per kW)—more than 20 percent below the claimed norms of the solar-power industry. It is considered prudent to encourage solar-plant installations up to a threshold (such as 7,000 MW) by offering incentives. Otherwise, substandard equipment

with overrated nameplate capacity may tarnish the industry. The purchaser, transmission agency, and financial institution should require capacity utilization and long-term performance guarantees for the equipment backed by insurance coverage in the event that the original equipment manufacturer ceases to exist. Alarmed by the low quality of equipment, India issued draft quality guidelines in May 2017 to be followed by the solar plant equipment suppliers conforming to Indian standards.

VI. FLOATING SOLAR POWER PLANTS.



Unlike land-based solar plants, floating solar power plants are installed on water reservoirs like dams, lakes or rivers which really solve the problem of occupying the land. The solar panels will be mounted on floating platforms that are anchored tightly so that they do not get damaged even under the worse weather conditions.

The solar panels installed on land face reduction of yield as the ground heats up and affect the rear surface of the solar panel. If the rear surfaces of solar panels are kept cooler, then their ability to generate power goes up by as high as to 16%. This advantage is leveraged by installing solar panels on water bodies which keeps the panels cooler and solves the problem of heating to a great extent. When placed on top of the water the solar panels will be able to cool themselves more efficiently which means they will last longer and produce more energy. Likewise, installation of floating solar panels on the water bodies is not expected to affect the ecology of the water body. Rather, it proves to be beneficial to the water itself as they reduce water evaporation and discourages the growth of the algae thus, help preserve water levels during extreme summer conditions. There are disadvantages as well as challenges too as you move towards installing and commissioning them in real-life. These problems include corrosion due to the presence of high moisture content and adverse

environmental conditions, stability in times of inclement weather. Besides, safely transporting the power from the floating objects is another challenge which is solved by utilizing shock-proof materials.

India's first floating solar plant technology was developed by India's Renewable Energy College under the chairmanship of solar power expert SP Gon Choudhury. The funding for the project was provided by the Ministry of New and Renewable Energy (MNRE).

VII. GUJARAT SETTING UP SOLAR POWER PROJECTS OVER NARMADA CANALS.



On 24 May 2014 Gujarat is set to tap the potential of the 19,000 km-long canal network of the Sardar Sarovar Narmada Nigam project across the state for setting up solar panels so as to give a big boost to use of renewable sources for power generation in the state. Prime Minister-designate Narendra Modi will inaugurate a 1-megawatt pilot project, the first of a series of this project the Canal Solar Power Project, on Narmada branch canal near Chandrasan village of Kadi taluka in Mehsana district on Tuesday. Besides this solar power unit, which is already commissioned, Modi also last week inaugurated a 600-MW solar power project spread across 11 districts, which also includes a 214-MW solar power park, the largest such generation center at a single location in Asia. The pilot project will generate 1.6 million units of clean energy per annum while helping to prevent evaporation of 90 lakh liters of water annually from the canal, thereby ensuring energy and water security. While the estimated cost of the project is around Rs.10-11 crore, the actual cost of power generation would be much less in this case as the two banks of the canal will support the installation of solar power panels, reducing costs of basic infrastructure and land acquisition. The main canal of the Sardar Sarovar Narmada Nigam Ltd (SSNNL) alone is about 458 km long, while the total canal length, including sub-branches, is about 19,000 km. When completed, the

SSNNL's canal network will be about 85,000 km long. This initiative is an extension to the state governments programmed of utilizing wastelands in the northern districts of the state and rooftops in towns and cities for solar power generation. Also, independent solar power producer Azure Power has announced a 2.5 MW rooftop project in Gandhinagar, Gujarat, which invests nearly Rs2, 000 crores a year on renewable energy, has attracted investments of Rs9,000 crore so far on solar energy projects. The pilot project on the Narmada canal covering a 750-m stretch of the canal has been built by Gujarat State Electricity Corporation (GSECL) with support from Sardar Sarovar Narmada Nigam Ltd (SSNNL), which owns and maintains the canal network. It is estimated that about 10 percent of the existing canal network of 19,000 km is enough to support the installation of 2,200 MW of solar power generating capacity while also helping to conserve 11,000 acres of land and saving about 20 billion liters of water annually.

VIII. CONCLUSION

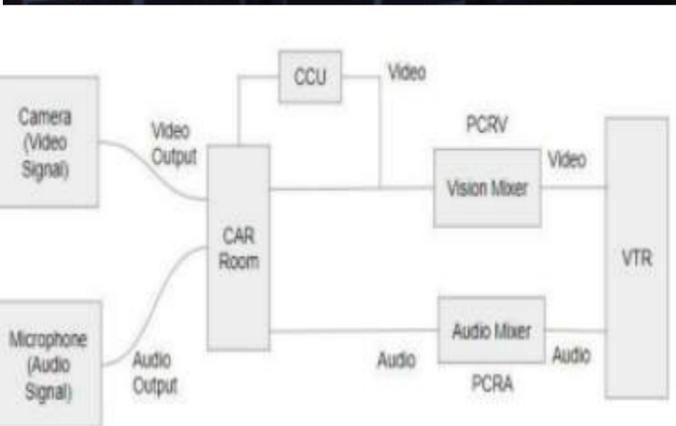
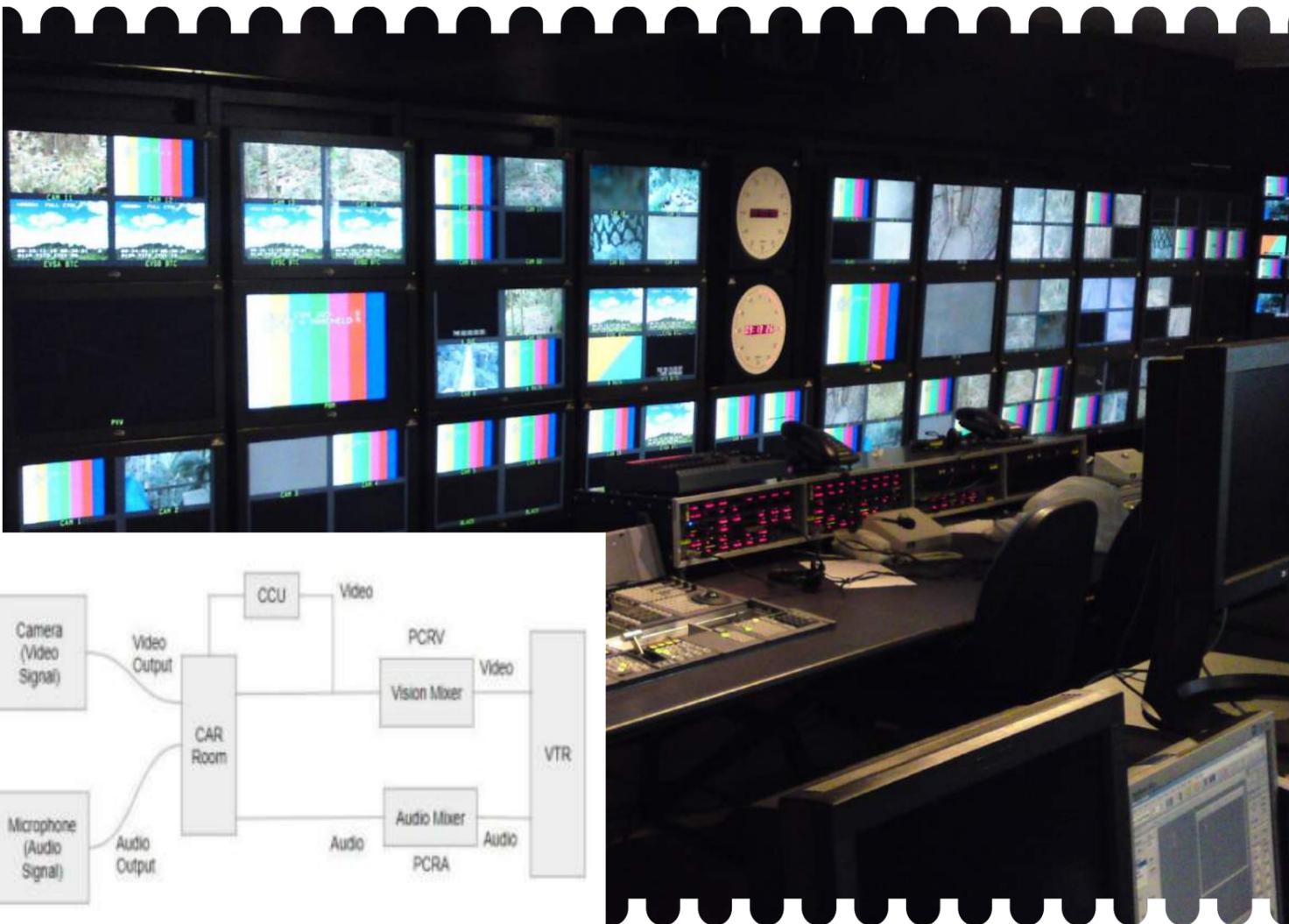
Naturally, there are many benefits for businesses and homeowners looking to make the switch to solar energy. It not only helps reduce the dependence on fossil fuels and improves one's impact on the environment, but it also reduces the cost of monthly energy bills. Depending on the location where the solar system is being installed, there may also be substantial government subsidies and tax incentives available.

The future appears to be very bright for the solar energy movement, as well as for the engineers helping it to grow.

IX. REFERENCE

<https://economictimes.indiatimes.com/industry/energy/power/nptc-installs-indias-largest-floating-solar-pv-plant-in-kerala/articleshow/57577004.cms>
<http://techstory.in/floating-solar-technology-india/>
http://www.domainb.com/industry/power/20140524_narmada_canals.html

TELEVISION BROADCASTING @DOORDARSHAN



PRANAY VORA

Everyone needs a little inspiration throughout their career. Inspiration is what keeps us motivated and passionate about what we do. One of the most important things you can gain from an internship is newfound knowledge. This can include knowing how to fulfill tasks that are relevant to your desired career path and sharpening the skills that you already possess. So, here is the experience of Pranay Vora, a student of Thakur College of Engineering and Technology at Doordarshan Kendra, worli Mumbai. I got to know about the internship through my colleges TnP cell. I wanted to apply for it because Doordarshan is one of India's largest public broadcasting organization and it has a great part of electronics and communication involved from the transmission to the reception of a signal where lies my field of interest.



On the first day, we were introduced to our mentor Mr. Dastagir Shikalgar and Mrs. Ruchi Gupta, who has an ocean of knowledge and Art of simplified Teaching, gave us a brief idea about the setup of the production house and studio, how the cameras, shooting, other electronic types of equipment work etc.

From the next day till the sixth day, we were given training on topics like Camera, Camera Lighting, Microphone, Audio system, CAR room, Production Control Room, PlayBack, Tape Library, Master switching room, and Earth station, etc.

We had also experienced live shooting of Anchor based show, Entertainment show and Newsroom broadcasting which covered a concept of Chroma, Digital studio and practical lessons as well.

The experience is boosted when our only group had shot for a promo of DD National and DD Sahyadri program which is to be broadcast on 31st of December, 2017. It has made a learning experience more amazing.

On the last day, we all 60 students from different colleges have shared our views and experience with our mentors and realized that we can watch TV not only as a "Dabba", but from whole different vision.

What is the background process before shooting? How is the program edited live on a single console? How the news program is broadcasted live? How the practical difficulties solved in real life?.....in short, A TO Z of Television Broadcasting.

I believe finding a job without an experience can be a real challenge. It's a nasty catch that can be difficult to get around but an internship is a good way to do it. My internship provided me the opportunity to gain hands-on work experience. It helped me in building my confidence and I am immensely indebted to Doordarshan faculty for the invaluable help that they rendered at every step of my internship. It is a wonderful experience to be a part of Doordarshan where we worked under brilliant minds.

This internship has improved my skills a ton, both off a paper and on paper. I didn't realize it all of this time, but this position served not only as a positive learning experience but a resume builder as well. I have learned many technical skills and improved another set of existing skills. But more important things I learnt is The only way to do great work is to love what you do. If you haven't found it yet, keep looking. **Don't settle. As with all matters of the heart, you'll know when you find it.**

Intern life can be tough, and you only get a short time to make a lasting impression. However, it is a great opportunity to gain experience, make friendships and learn. So work hard and enjoy your internship!

@ HINDUSTAN SHIPYARD LIMITED

AJAY YADAV
TE EXT C B

OBJECTIVE:

To observe and learn about Navigation and Communication equipment in ships. To learn about power transmission and control of a vessel.

To observe the assembling, installation and maintenance of highly sophisticated state of the art military communication, navigation and propulsion equipment.

To learn basic boating terms and ship directions.

DESCRIPTION: Hindustan Shipyards Limited (a Govt. of India Undertaking - MoD) abbreviated as HSL is one of the nation's premier shipbuilding organization catering to the needs of shipbuilding, ship repairs, submarine construction and refits as well as design and construction of sophisticated state-of-the-art offshore and onshore structures.

As an intern at HSL we were assigned to Electrical Dept. which satisfies all the electrical and electronic needs of the vessels, be it from a microwave oven to esoteric radars, each and every thing had to be configured, assembled, installed and maintained by Electrical Department.

We were assigned to an Indian Coast Guard patrol vessel which was about to be delivered to Indian Coast Guard for sea trials. **On-board, we learnt about:-**

- ~ Navigational systems such as Magnetic compass.
- ~ Speed log device like Integrated bridge system (IBS), Gyro compass, Echo Sounder, GPS, RADAR, ECDIS, AIS, Autopilot.
- ~ Communication System like PA systems, Auto telephone system, Sound powered telephone, VHF, MH/HF, SAT-C, FBB, GMDSS, SART.
- ~ Lighting systems like General lighting, Emergency lighting, Transient lighting. Power generation, power distribution and emergency power. Propulsion systems.

CONCLUSION: Internship at HSL provided me with the knowledge and experience that will be definitely valuable in upcoming years. It gave me the opportunity not only to learn about the latest technology in the field but also to interact with many experts who shared their immense knowledge and experience. It also made me realise how basic theoretical concepts are manifested into advanced sophisticated technologies.

CENTRE FOR EXCELLENCE IN TELECOM TECHNOLOGY & MANAGEMENT@MTNL



Objectives:

1. To understand the basics & working of Telecommunication Network services provided by MTNL i.e., fixed-line, mobile services, broadband etc.
2. To know about the upcoming future trends and challenges in Telecom industry in India.

Methodology:

Mahanagar Telephone Nigam Limited (MTNL) was established as a public state-owned enterprise by Government of India in 1986 to oversee the telephone services of Mumbai and Delhi. MTNL provides landline, mobile, broadband & FTTH services to its customers. Each service has a vast backbone network through which the voice and data traffic is transferred from the sender to the receiver.

Description:

Public Switched Telephone Network (PSTN) i.e., landline is a fixed telephone network which provides voice communication. It consists of telephone lines, optical fibre cables, microwave transmission links, cellular networks, undersea

telephone cables and communication satellites, all interconnected by switching centers i.e., telephone exchanges, thus allowing most telephones to communicate with each other. This is a service with toll quality. A Telephone Exchange needs to carry out the functions like Switching, Signaling, Control, Charging & Billing of voice calls. MTNL uses OCB283 from Alcatel, France to switch or route the calls between the sender & receiver at the respective telephone exchanges.

Public Land Mobile Network (PLMN) is the network established and operated by the telecom operators to provide land mobile communication services to the public. The MTNL network comprises of 3 Mobile Switching Centers (MSC), 700 Base Transmission System (BTS) or mobile towers and 60 Base Station Controllers (BSC).

I also learnt that the Next Generation Networks is the integration of PSTN & PLMN networks because the present telecom networks are very expensive to add additional services, integration of services on a single subscriber access line is not available & multiple bills.

Outcomes:

The overall course experience was very unique. I am able to discover about the future opportunities in telecom industry. I am able to integrate the academic theory and practical knowledge learnt here. It will be very beneficial for me to apply this knowledge in my upcoming or distant future projects. It has developed my interest to know more about the telecommunication systems and explore it further.



Vikas Tiwari S.E. EXTC-B,49
Aasawari Shete SE EXTC B,18

State of the Art Vibration Monitoring System
Introduction

In this developing era to achieve world class infrastructure the state are going under large-scale development. For this development we are paying hefty amounts by staying in noisy residential areas.



Due to which there has been deteriorating effects on human, or rather we can say on the living beings on this earth. For humans this has led to problems of noise pollution, causing hearing loss, cardiovascular diseases, psychological stress and several harmful effects.

To minimize this effects a device is invented called "Muzo"

What is MUZO?

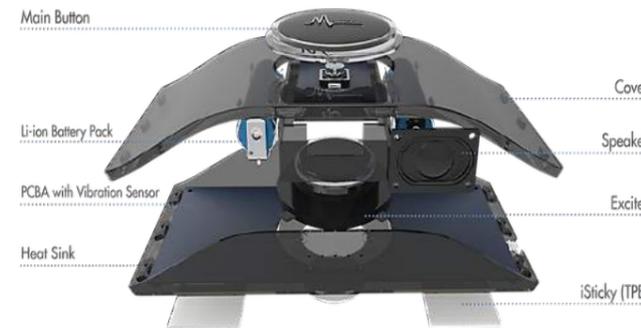
Muzo is the first acoustic device that applies Anti-Vibration Technology for smooth surface. This Exclusive Technology prevents objects from vibrating to minimize any unwanted disturbances nearby. Besides, Muzo utilizes Billion sound Technology (Powered by BST) to generate dynamic realistic sounds. These vivid sounds set the scene and drown out intrusive noises. Whether you wish to enjoy a piece of serenity or to become engulfed in the tranquil sounds of nature.

Working : of the devices is constituted buy the signal processing system. A complicate Algorithm is applied in order to handle a huge amount of signal data .A powerful processor and vast accurate components are required to carry

out such a heavy computation. It is dedicated anti-vibration device.



Technical specification



Sensor	Vibration Sensor
Audio	10 Bilionsound Technology Exicter
Connectivity	Bluetooth LE
Ports	Powered & Firmware Updated by Micro USB
Duration	20 Hrs
Dimension	L165mm x W75mm x H32mm

Heart of the system

Exciter (Exciter is the soul of Muzo)

It is basically a vibrational loudspeaker without a membrane .Unlike a common loudspeaker that couple vibrations to the surrounding air , the exciter uses the movement of the oscillating mass inside to apply force towards mounting surface. Thus, the whole excited surface will emit the sound signal. That's why the sound properties of the excited surface are variation in different material types.

Future Prospects

Insomnia can sometimes be worse than nightmares. Sleep disturbances can drastically affect your life quality. Muzo is not only an expert device for Anti-Vibration, but also a Great Sleep Analysis and Management Device.

There are 3 modes for different scenarios:

- Serenity mode: to create a silent place by Anti-Vibration
- Sleep mode: to achieve better sleep quality by Scene Creation
- Secret mode: to protect speech privacy by Sound Masking

With Muzo's Personalized Acoustic Sleep Therapy, you probably won't even know what insomnia is. From thousands of smoothing sounds we picked out a specific mixing sound which will get you sleepy in no time. All sound tracks in Sleep mode can slip into your mind unconsciously and make you fall into a deep sleep.

Pros and cons

Muzo is a smart gadget that turns almost everything, whether it's a windowpane or your desk surface, into a personalized acoustic environment. Muzo allows you to customize your surroundings by blocking out unwanted noise disturbances and replacing it with dynamic realistic sounds. But is this noise-canceling device to good to be true? With thousands of soothing sounds, this is first acoustic smart device that applies anti-vibration technology to a nearby surface. In other words, fasten Muzo to your desktop surface at work and seamlessly drown out the distracting office noises like

phone calls and copy machines with Serenity Mood sounds, like a river stream or winter wind. You have full control over your environment allowing you to transform intrusive sounds into welcomed ones - all from your smartphone. However this technology uses anti-vibration i.e. a counter vibration system, which can be done with the help of smartphones using specific apps which produce vibration patterns to counter the outside noise.

Overall Review:

- Design:
- Technology: vv
- Durability:
- Price:
- Performance:
- Availability:

PLC based Automatic Train Wash System

Sahil S. Shah (TE EXTC-A 66) Pushkar H. Bagayatkar (TE EXTC-A 72)
Advait P. Samant (TE EXTC-A 78)

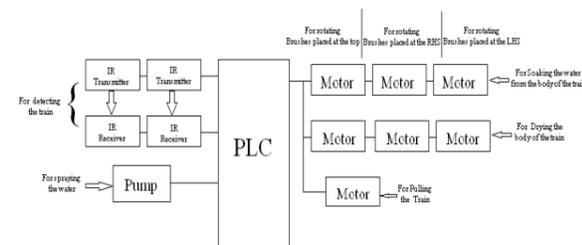
The Solution:

This problem can be solved by using an automated system which can withstand the rough exterior conditions. That's where the PLC based Automatic Train Wash System comes into play.

This system is designed to overcome the limitations of the conventional cleaning methods

such as improper cleaning, wastage of water on an extensive scale and possible accidental Shorting or Arcing of the Overhead Electrical Traction System.

Block Diagram of PLC based ATWS:



The Block Diagram consists of several motors, a set of IR sensors, a hydraulic pump and a PLC, as shown above. Their functioning is explained in the next section.

Working:

The system works in 4 different stages:

- i. Detecting the arrival of a train.
- ii. Spray cleaning.
- iii. Thorough Brush/Scrubber cleaning.
- iv. Rinsing & automatically turning OFF the pumps & motors after the train has exited the system.

Introduction:

WHAT is a PLC?

PLC stands for Programmable Logic Control.

It is a digital computer used for the automation of various electro-mechanical processes in Industries.

A PLC consists of a microprocessor which is programmed using a programming language called the Ladder Diagram.

Why a PLC?

The main difference from most other computing devices is that PLCs are intended-for and therefore tolerant-of more severe conditions (such as dust, moisture, heat, cold), while offering extensive input/output (I/O) to connect the PLC to sensors and actuators. PLC input can include simple digital elements such as limit switches, analog variables from process sensors (such as temperature and pressure), and more complex data such as that from positioning or machine vision systems. PLC output can include elements such as indicator lamps, sirens, electric motors, pneumatic or hydraulic cylinders, magnetic relays, solenoids, or analog outputs. The input/output arrangements may be built into a simple PLC, or the PLC may have external I/O modules attached to a fieldbus or computer network that plugs into the PLC.

Problem Statement:

We all have seen how the trains are being washed & how much the workers work hard to clean the trains.

Well, normally during train wash so much of water is being wasted. But still the train is not neatly cleaned.

Last but not the list time is getting wasted. To clean each & every bogies of train.

1. Detecting the Arrival of a Train:

This can be achieved by various methods. The current method uses a weight sensor at every railway signal post.

For our Demo model we've used 2 IR sensors placed at a specific distance from each other to sense the train.

2. Spray Cleaning:

This is done by simply spraying water jets using a static spraying system which basically consists of a pipe with tiny holes from where the water is sprayed onto the train.

3. Thorough Brush/Scrubber Cleaning:

A set of rotating brushes/scrubbers will brush away and/or loosen the dust particles from the body of the train.

4. Rinsing the Train:

This is the final step of the cleaning process where all the leftover dirt is removed by a water spray.

Once the entire train has been washed, the entire system goes into standby mode to minimize wastage of resources like electricity and water.

Here, we have used a PLC which has 4 input ports, 4 output ports and 3 Timers to meet our requirements.

Advantages:

This system has its own conveyor system which pulls the train. Hence, providing isolation from the Overhead Electrical Traction System (which has a potential difference of 25,000V A.C. with respect to Ground level) thus preventing any accidental shorting or arcing.

This system is water efficient as it uses less water than the conventional cleaning methods.

The conventional cleaning methods require a large space as the train needs to be parked for the cleaning process. In this system, the train never stops that is, the entire rake keeps moving forward through the cleaning plant at a fixed speed. Therefore, this system requires relatively less space than the conventional cleaning methods.

This system is completely automated, thus eliminates, human error.

Broadcasting Evolution of Television in

India

PARTH C.SHAH TE EXTC B JATIN K.RAI TE EXTC B
RAHUL B.SHARMA TE EXTC B MIHIR S.TANDEL TE EXTC B

Abstract—India is a key emerging player in the global entertainment industry. It consists of mass media forms such as television, radio, print, film, gaming, Internet advertising etc. which have boosted the growth of this industry in past few decades. This article illustrates the journey of television in India which evolved for promoting development among the people and the way it commercialised after the advent of private players in the industry.

Keywords— Entertainment industry, Television in India, Commercialisation of television.

I. INTRODUCTION

While the invention of television dates back to late 19th & early 20th century, there was no evidence of television in India until 1959 when Doordarshan, which was a part of All India Radio at that time made the first experimental telecast in Delhi with the help of UNESCO. The project was purely based on the model of European public broadcasting.

It was during that time after independence, when the Indian political leaders recognized the importance of information which could be used to boost up development in the nation.

II. DOORDARSHAN – THE PUBLIC BROADCASTER

After the leaders started realising the potential of television, the government started working on a model of public broadcasting dedicated to educate, entertain and inform people. Through the Ministry of Information & Broadcasting, Doordarshan was formed under All India Radio in 1959.

Since then massive changes took place in the television scenery of India. Soon in 1967, a pilot project was initiated by Ministry of Information & Broadcasting in collaboration with Indian Agriculture Research Institute and All India Radio for farmers called “*Krishi Darshan*” which used to air on Wednesdays & Fridays for 20 minutes, serving 80 villages around Delhi using the community television sets installed in 1959.

Like there are two sides of a coin, in the same way, on

one side television was used as a tool to educate and promote development and on the another side it was misused as a union government propaganda to remain in power, since Doordarshan was under the central power during its inception years with Delhi being the seat of political power, the television programmes those days were particularly in Hindi and much of the news was about the happenings of Delhi. By 1972-1975, the broadcasting stations were extended to Mumbai, Amritsar, Calcutta, Madras, Srinagar & Lucknow.

A paper was published in 1969 at New Delhi, by Vikram Sarabhai, the father of Indian Space Programme in Society for International Development Conference to use television as advanced communication technology for rapid economic growth and social transformation in backward countries. This was the breakthrough of the advent of satellite television when ISRO with the help of NASA’S ATS-6 satellite broadcasted educational messages in over 2400 villages in six states like Andhra Pradesh, Madhya Pradesh, Rajasthan, Orissa, Bihar & Karnataka. The experiment (SITE) was successful, as it played a major role in helping develop India’s own communication satellite program, INSAT. Till 1975, Doordarshan (DD National) was the only television channel in India.

In 1976, Doordashan was separated from All India Radio and this event was recognized as a boost to public broadcasting sector.

With the success of SITE, Doordarshan went on to become the national broadcaster with the first live colour tele-coverage of Independence Day Speech on Raj Ghat in 1982 by the then Prime Minister - Smt. Indira Gandhi followed by 9th Asian Games in Delhi (Nov 1982) using INSAT-1A satellite through a network of about 1400 terrestrial transmitters.

After this, Doordarshan slowly changed its prospects towards entertaining people and so, it came up with the first Indian television soap opera & drama series “*Hum Log(1984)*” followed by the greatest mythological epics “*Ramayana(1986)*” and “*Mahabharata(1988)*”, all of which turned out to be so mass-favoured that whenever they were aired, most of the roads got empty.

PRIVATIZATION OF TELEVISION IN INDIA

In the earlier days, Doordarshan had a monopoly as it

was the only channel available to the Indian television audience. Advent of private channels in India took place in 1990’s with the coverage of Gulf War by American news channel CNN which propelled the arrival of satellite television in India. Satellite dishes were used to catch the CNN signals and thus the cable operators took to satellite broadcasting immediately. Zee TV became the first privately owned Hindi satellite channel of India when it entered into an agreement with Hong Kong based STAR (Satellite Television Asian Region. In February 1995, Supreme Court declares that ‘airwaves’ are a public property and it should be controlled and regulated by a Public Authority. This judgment granted autonomy for “Prasar Bharti” and opens broadcasting to private players. The number of private satellite channels increased from zero in 1990 to approximately 882 till May 2017.

IV

REFERENCES

1. Retrieved from <http://www.caluniv.ac.in/global-media-journal/Winter%20Issue%20December%202011%20Commentaries/C-1%20Sen%20Shitak.pdf>
2. Retrieved from <http://download.nos.org/srsec335new/ch13.pdf>

HUBBLE: A JOURNEY BEYOND SPACE

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Abstract- Optical Astronomy is one of the most interesting yet the most challenging field in Astronomy. As visible light can get obstructed or diffracted very easily, it is extremely difficult to get accurate data of any object in this spectrum. Earth's atmosphere further degrades the quality of the image making the analysis part more difficult. Hence a dire need for Optical Space Telescopes motivated various organizations to launch them. This paper discusses one of the most celebrated and most impactful Space Telescope-Hubble. The paper gives a brief overview about the working, instruments and observations made by Hubble.

Keywords- Optical Astronomy, Hubble, Space telescopes, Spectroscopy, Dark Energy, Galaxies, Stars, Universe, Nebula.

I. INTRODUCTION

Galileo Galilei was an Italian Astronomer, Physicist, Engineer and Mathematician. He is called the "Father of Observational Astronomy". He was responsible for affirming and reinforcing the Copernican Theory of Heliocentrism. Galileo also confirmed the Phases of Venus by observing them through his Optical Telescope. The discovery of four largest moons of Jupiter and observation of Saturn's rings was done by him. All in all, Galileo Galilei was a pioneer in the field of Observational Astronomy and Modern Physics [1]. Optical Astronomy also known as Visible-light Astronomy or Observational Astronomy has three distinct aspects to it. They are Photometry (Reproduction of an image of celestial object from the observational data), Spectroscopy (Measurement and Plotting the Curve of distribution of light with respect to wavelength) and Polarimetry (Measurement of polarisation state of the light) [2].

The celestial objects that can be observed in the optical range are Stars, Planets, Exoplanets, Galaxies, Nebulae, Supernovae, Binary Star Systems, etc. All of these objects provide the fascinating information about the early Universe, its current state and its eventual fate. The physics behind these objects is mind-boggling and extremely difficult to imagine.

There are several ground-based and space-based optical observatories to observe these amazing and exotic objects. The Ground-based observatories are Keck

Observatory, Mauna Kea Observatory, Indian Astronomical Observatory and Very Large Array Telescopes. All of these observatories contributed majorly in the field of Optical Astronomy. Other types of observatories are Space-based like Kepler Space Observatory, Gaia Space Telescope, ASTROSAT and Hubble Space Telescope.

The main contributor to observational astronomy is Hubble Space Telescope (HST). It follows a geocentric low earth orbit and was launched in 1990. HST has undergone five servicing missions and will be operational till 2030-2040.



Figure 1: Hubble Space Telescope

The first section of the paper focuses on the working and instruments of HST and gives a brief overview about it. The second section of the paper is about the various observations made by HST and what different stages did it see. The third section explains about how an image is reconstructed once it is received by Earth stations. The final section is about the future scopes in Optical Astronomy.

II. WORKING AND INSTRUMENTS

The Hubble travels at 8km per second and completes one revolution around the Earth every 97 minutes. It is a Cassegrain type of reflector which consists of a Primary (or main mirror) and Secondary mirror. Initially, the light strikes the primary mirror which reflects it to a secondary mirror. Secondary mirror, then, directs the light towards a hole in the center of the primary mirror. The light is then finally collected by the telescope's science instruments. HST gives a better image quality and more accurate data of the celestial object, because atmospheric interference

is absent, as compared to ground-based telescopes.

The HST comprises of various scientific instruments among which the currently working instruments are Wide Field Camera 3 (WFC3), Cosmic Origins Spectrograph (COS), Advanced Camera for Surveys (ACS), Space Telescope Imaging Spectrograph (STIS), Near Infrared Camera and Multi-Object Spectrometer (NICMOS) and Fine Guidance Sensors (FGS) [3].

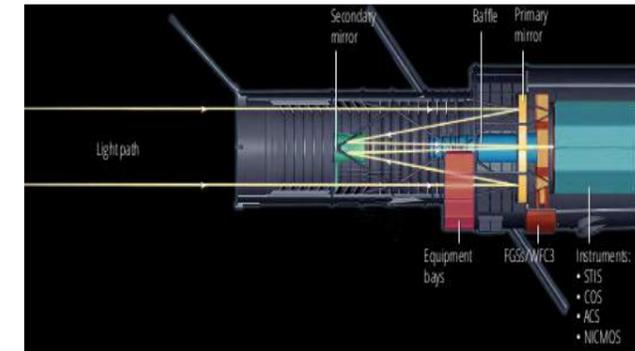


Figure 2: Internal Working of HST

A) WFC3:

The instrument has greater resolution and field of view compared to its other instruments. It is sensitive to the near-ultraviolet (UV), visible and near-infrared (IR) ranges. It primarily focuses on areas like Dark Energy, Dark Matter and distant galaxies.

B) COS:

It acts like a prism, separating the UV light from its other components. It is responsible for detection of wavelength and calculating the temperature, chemical composition, density, and motion from it.

C) ACS:

It observes in the visible spectrum and searches for massive planets. It also studies the evolution of clusters of galaxies.

D) STIS:

An instrument which detects light in the UV, visible and near-IR range, has the ability to detect black holes, stars and quasars.

E) NICMOS:

It is sensitive to IR and hence, acts as HST's heat sensor. It gazes the objects occulted by Interstellar dust like stellar birth sites.

F) FGS

The device's main task is attitude control and also measures distance between stars and their relative motions.

HST uses solar arrays to harness solar power and convert it into electricity. When it is occulted by the Earth HST relies on backup power stored in the batteries. The data from the telescope is transferred in the following way:

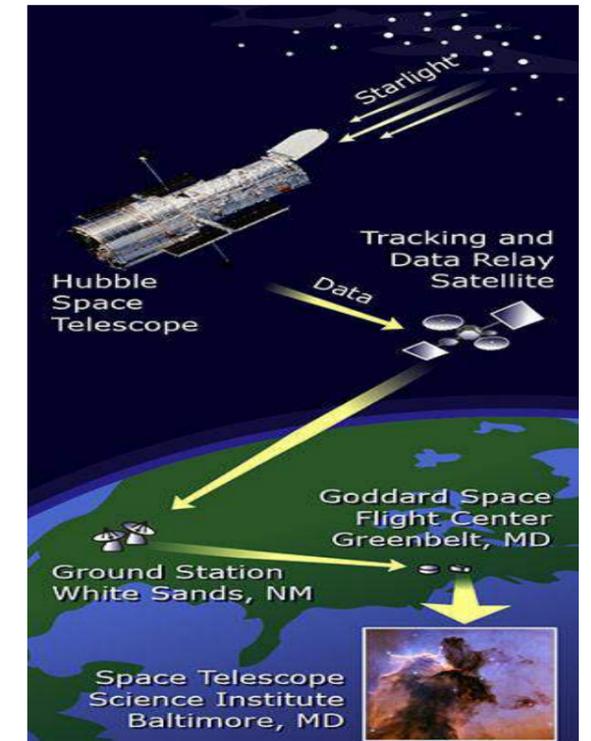


Figure 3: Data Transfer from HST to Earth

III. OBSERVATIONS

A) Stars:

HST has observed various types of star clusters and has also provided us a spectral view of different stages of star formation. The star is formed from a Nebula when the gases in the Nebula collapse and form the Protostar. The gravity of the Protostar then pulls the gas inwards, however, gas in the star exerts a pressure outwards. This balance between the push and pull is essential in the formation of the star [4]. Then these stars form a cluster in space. HST observed Cepheid variables (stars that change their brightness periodically), Pulsars (highly magnetized stars), Brown dwarfs (fusion-less small stars), and Star Clusters (open and globular type).

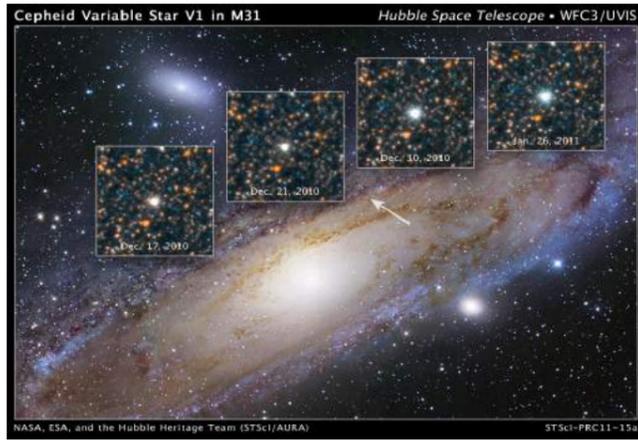


Figure 4: Cepheid Variables

B] Galaxies and Nebulae:

Galaxies are formed when billions and billions of stars, after Big Bang, came close together due to gravity forming giant structures. Nebulae are structures of interstellar dust and ionized gases that majorly contains Hydrogen and Helium [5]. The observed galaxies are Sombrero galaxy, Whirlpool galaxy, Large Magellanic Cloud and merger of two different galaxies.



Figure 5: Sombrero Galaxy

It has also observed various nebulae like Bubble Nebula, Eagle Nebula, Crab Nebula and Horsehead Nebula.



Figure 6: Bubble Nebula

C] Exoplanets:

Exoplanets are formed when dust coagulates and forms the core of a planet. This core then attracts more dust and small amount of gas thereby forming the mantle and crust eventually. Various elements on the planets are due to the asteroids and meteors that crash on the planet. TRAPPIST-1, WASP-12b and Fomalhaut System were observed by HST.



Figure 7: TRAPPIST-1 System

D] Quasars and Black Holes:

Black Holes are formed when massive stars collapse into infinitesimally small objects but with infinite mass. Their gravity is so strong that even light can't escape it. When black holes emit energetic rays in form of directed jets, they are called as Quasars. Bright Quasar 3C 273 is one of the quasars observed by HST [6].

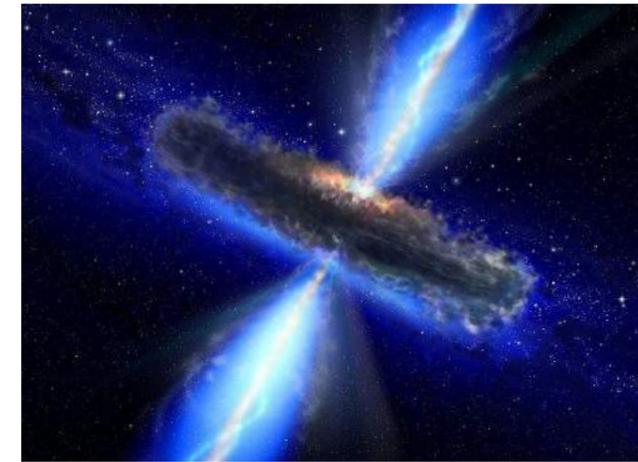
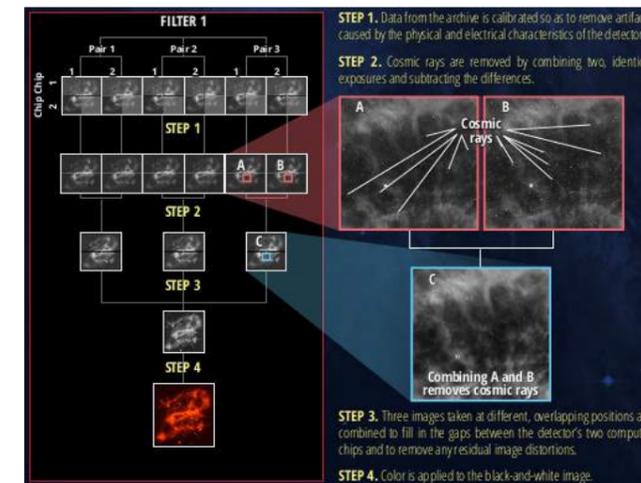


Figure 8: Quasar

IV. IMAGE RECONSTRUCTION

The images observed by HST are monochrome in nature. Different filters in different wavelength are used to record these images. The images from different filters are initially broken down in pairs and instrument noise is removed from both of them. The two images in their respective pairs are then combined to eliminate the Cosmic Ray background. The different pairs are combined to give the contribution of each component of the electromagnetic spectrum. Finally a composite image is formed using all the component images [7]. The steps for reconstruction from this data are given by the following image:



FUTURE SCOPE

The future of Optical Astronomy lies with the James Webb Space Telescope (JWST). It will have the capability to look deeper into the space thereby viewing the Earliest Universe. The images obtained will have higher resolution and better quality. This is due to the fact that its primary mirror has a diameter more than HST.

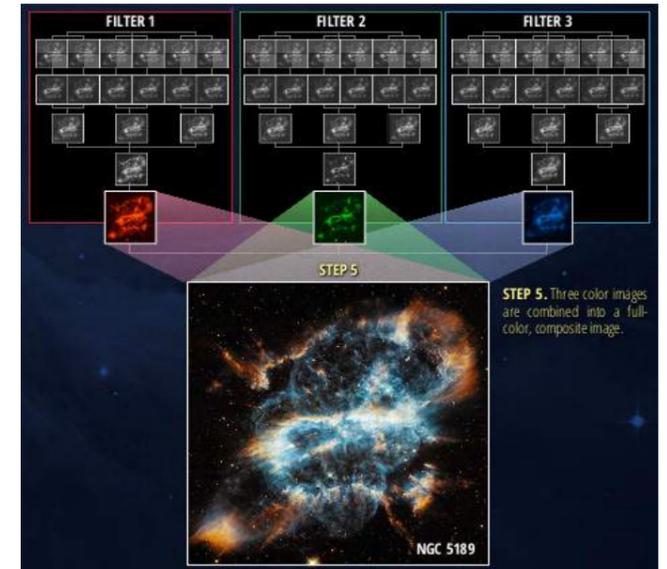


Figure 9: Image Reconstruction steps

V. ACKNOWLEDGMENT

We take this opportunity to express our deepest gratitude towards Dr. Lochan Jolly our project guide, who has been the driving force behind this project and whose guidance and co-operation has been a source of inspiration for us. We would also like to thank Mr. Vinitkumar Dongre for valuable support whenever needed. We are very much thankful to our professors, colleagues and authors of various publications to which we have been referring to.

We express our sincere appreciation and thanks to all those who have guided us directly or indirectly in our project. Also, much needed moral support and encouragement was provided on numerous occasions by our whole division finally we thank our parents for their immense support.

VI. REFERENCES

[1] https://en.wikipedia.org/wiki/Galileo_Galilei (Feb, 2018)
 [2] https://en.wikipedia.org/wiki/Visible-light_astronomy (Feb, 2018)
 [3] http://hubblesite.org/the_telescope/hubble_essentials/ (Feb, 2018)
 [4] <https://www.space.com/57-stars-formation-classification-and-constellations.html> (Feb, 2018)
 [5] <https://en.wikipedia.org/wiki/Nebula> (Feb, 2018)
 [6] <https://www.space.com/17262-quasar-definition.html> (Feb, 2018)
 [7] "Hubble: An Overview of the Space Telescope"-Hubblesite.org (Feb, 2015)

Testimonials

Dhairya Upadhyay | Editor

Being a part of the magazine committee was creatively enriching and wonderful, as in the process of making we interacted with various people from industry and got to hear their opinions and views. They gave us a different approach to look on the same topics which we thought we had mastered. While working on this magazine I was pitted with students who were creatively sound and we all were passionate about one thing which was to deliver content to the students so that they were updated on new technological advancement in our stream and also provide a platform to showcase their knowledge on the subject in the most visually appealing way!!



Pranay Vora | Editor

It gives me great pleasure to say with pride that department gave me an opportunity to work with team of amazing people at ABHIVERG 3.2. The experience of editor has taught me to focus on how the thematic consistency of an article rather the individual quips I generally default to. I've learned the power, and necessity, of a good Title/Intro sentence, documentation and designing e.t.c. which has helped me to grow better professionally and personally.



Sanya Sinha | Editor

Being a part of the college magazine has been a beautiful journey where I have grown as a writer and as an editor. In this process of being an editor I realized working with great people who have the same drive and creative mind as me has made my journey incredible, enlightening and exciting. I have also met and interviewed amazing people with brilliant ideas which has built in me and others a hope for Better Life, Beautiful Tomorrow. I must confess I often lost track of time reading article after article, and I found myself immersed in all creative, enlightening, path breaking, innovative ideas. We hope you too experience the same joy and share it with your loved ones.



Vandini Yadav | Research Assistant

Working for our departmental magazine (ABHIVARG) was enlightening for me. I got to explore new technologies and research on them as I was in Research and Curation. It was interesting enough to interview Mr. Pandharinath G Mane (the Director of Nokia- earlier Lucent Technologies). After exploring so much I also learnt about recent start-ups. It diverted my mind to think innovatively which is the main requirement of future development. My colleagues taught me a new fascinating software too. It was a knowledgeable experience to be more precise.



Anushka Rane | Editorial Assistant

Being a member of team Abhivarg has been and continues to be a rewarding experience. It was a great experience creating questionnaires, working on technical articles from industry experts and sharing innovative ideas for the magazine. I will be looking forward to the next one.



Vaishnavi Shetty | Editor

Working with team Abhivarg has been an enlightening experience that I'll always cherish, it has given me the confidence and motivation to broaden my horizons as a writer and editor.



Aasawari Shete | Editorial Assistant

It was fun working in magazine department. Got to learn new things, what really goes into making of magazines, concepts, ideas, research, design and so much more. It was a fulfilling experience with timely management and sense of responsibility.



Harshit Savani | Editor

Abhivarg has given me a platform to develop my skills. Working with the editing team was a great learning experience. I learnt a great deal of team work, so now I am looking forward to lead teams in professional spaces. Me and my team were responsible for polishing and refining the articles to produce best results. All the decisions were made after brainstorming with my teammates. I have improved my soft skills as well. All in all Abhivarg has given me memories to cherish forever



Prachi Phatale | Editorial Assistant

I have taken interviews in school life also but here in department magazine I got the whole new experience and new vision. I got to know how to deal with industrial people and editing on a new level.





MEET THE TEAM

Students:

Shobit Mishra ,Anushka Rane,Vandini Yadav,Aasawari Shete,Prachi Phatale,Sanya Sinha,Vaishnavi Shetty,Harshit Savani, Chinmay Tompe,Pranay Vora,Ajay Yadav

Faculty:

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