VidyaVikas Education Trust's

Universal College of Engineering

(Permanent Unaided | Approved by AICTE, DTE & Affiliated to University of Mumbai)

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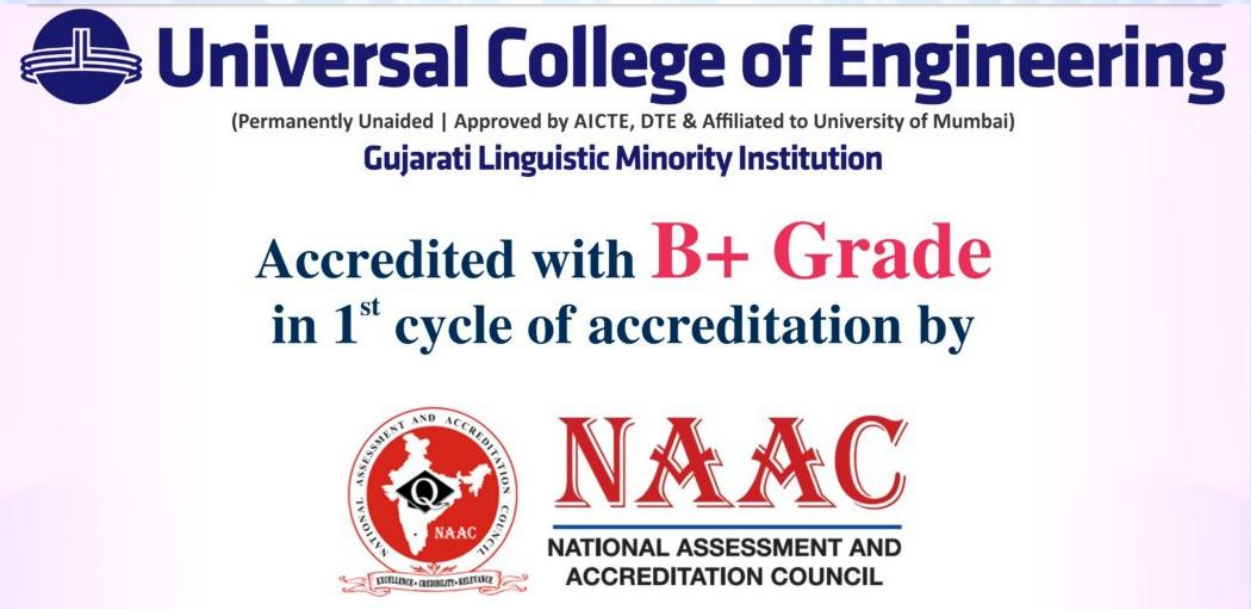
ELECTROBUZZ

ELECTRONICS DEPARTMENT

MAGAZINE



Compiled and Designed By:-

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ISSUE - 014: SEPTEMBER2019
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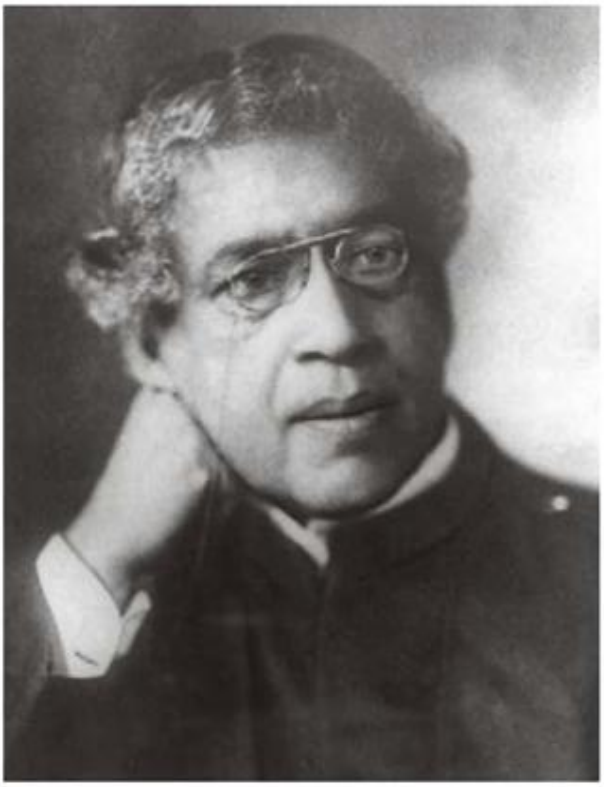
Department of Electronics Engineering

SCIENTIST OF THE QUARTER



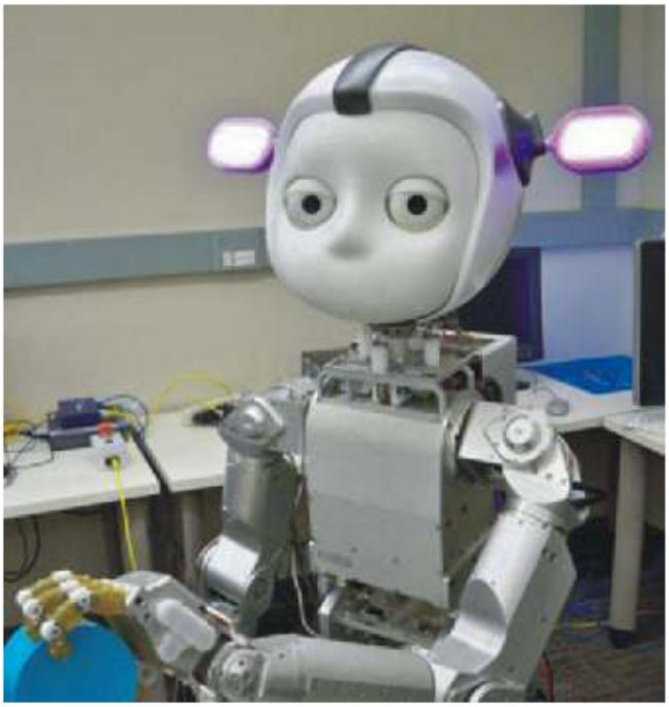
Jagadish Chandra Bose

Acharya Sir Jagadish Chandra Bose, CSI, CIE, FRS (Bengali:30 November 1858 – 23 November 1937) was a Bengal ipolymath, physicist, biologist, botanist, archaeologist, as well as an early writer of science fiction. He pioneered the investigation of radio and microwave optics, made very significant contributions to plant science, and laid the foundations of experimental science in the Indian subcontinent. IEEE named him one of the fathers of radio science. He is also considered the father of Bengali science fiction. He also invented the crescograph.

Born in Bikrampur (present day Munshiganj District near Dhaka in Bangladesh) during the British Raj, Bose graduated from St. Xavier's College, Calcutta. He then went to the University of London to study medicine, but could not pursue studies in medicine due to health problems. Instead, he conducted his research with the Laureate Lord at Cambridge and returned to India. He then joined the Presidency College of University of Calcutta as a Professor of Physics. There, despite racial discrimination and a lack of funding and equipment, Bose carried on his scientific research. .

He made remarkable progress in his research of remote wireless signalling and was the first to use semiconductor junctions to detect radio signals. However, instead of trying to gain commercial benefit from this invention, Bose made his inventions public in order to allow others to further develop his research

Bose subsequently made a number of pioneering discoveries in plant physiology. He used his own invention, the crescograph, to measure plant response to various stimuli, and thereby scientifically proved parallelism between animal and plant tissues. Although Bose filed for a patent for one of his inventions due to peer pressure, his reluctance to any form of patenting was well known. To facilitate his research, he constructed automatic recorders capable of registering extremely slight movements; these instruments produced some striking results, such as Bose's demonstration of an apparent power of feeling in plants, exemplified by the quivering of injured plants. His books include Response in the Living and Non-Living (1902) and The Nervous Mechanism of Plants (1926).



HUMANOID ROBOTS

A Humanoid may be defined as something that resembles or looks like a human and having characteristics like opposable thumb, ability to walk in upright position, etc. These robots are called Humanoid Robots or may be simply **"Humanoids"**.

In general Humanoid robots have a torso with a head, two arms and two legs, although some forms of humanoid robots may model only part of the body, for example, from the waist up. Some humanoid robots may also have a 'face', with 'eyes' and 'mouth'.

Features of Humanoid Robots

The characteristics features of Humanoid Robots include:

. Self-maintenance
. Autonomous learning
. Avoiding harmful situations to people, property, and itself
. Safe interacting with human beings and the environment

Working and Control Mechanism

Concept of Zero Moment Point:

This concept explains the dynamic balance of humanoids during walking which requires information about the contact forces and the current and desired direction of motion.

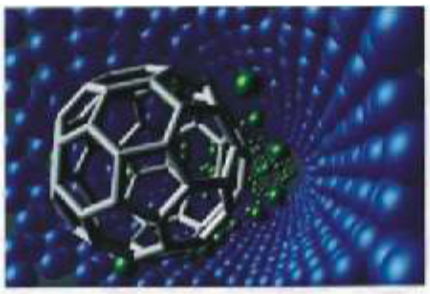
As per the ZMP Theory, the pressure under supporting foot can be replaced by the appropriate reaction force acting at a certain point of the mechanism's foot. Since the sum of all moments of active forces with respect to this point is equal to zero, it is termed as the Zero Moment Point (ZMP).

Conclusion

Though the technology has advanced much in the field of Humanoid Robotics, there are still several problems which need attention. The technological brilliance of the humanoids is required to be sharpened more and the shortcomings in the results must be dealt with properly.

NANO ROBOTICS

Nano robotics is concerned with (1) manipulation of Nano scale objects by using micro or macro devices, and (2) construction and programming of robots with overall dimensions at the Nano scale (or with microscopic dimensions but nanoscopic components) [Requicha 2003]. This covers both of these aspects. Nano manipulation is the most effective process developed until now for prototyping of Nano systems, and rapid prototyping is important to validate designs and optimize their parameters. Nano manipulation is also useful to repair or modify structures built by other means. Nano robots have dimensions comparable to those of biological cells, and are expected to have remarkable applications in health care and environmental monitoring. For example, they might serve as programmable artificial cells for early detection and destruction of pathogens. The initial research is biased towards Nano manipulation. Work on Nano robot construction has begun at a low level and will increase as the project evolves.



The reliable and accurate methods for Nano manipulation is by using the tip of a Scanning Probe Microscope (SPM) as a sensory robot, in ambient air or in liquids and at room temperature. These methods involve a human in the loop to compensate for the many spatial uncertainties involved in the manipulation and which are due to such phenomena as thermal drift or piezoelectric creep and hysteresis. Experience at LMR with assembling single electron transistors, nanowires, Nano waveguides and other Nano device prototypes has shown that automation is needed if SPM manipulation is to be used for building the complex patterns required by new nano devices and systems. The current project addresses automation issues across the board, from high-level path planning for the assembly of nanoparticle patterns, to error compensation for SPMs.

Nano manipulation is being studied in the context of concrete tasks such as assembling chemical sensors, or building of 3-D nanostructures by Layered Nanofabrication, a patented process invented in a previous NSF grant to LMR. The theoretical and experimental results of this work will contribute to the understanding of robotics in domains with large spatial uncertainties, and to the development of NEMS (Nanoelectromechanical Systems). The software will be very useful to scientists and engineers involved in nano manipulation and nanolithography.

BUBBLE POWER

Sonofusion is technically known as acoustic inertial confinement fusion. In this we have a bubble cluster (rather than a single bubble) is significant since when the bubble cluster implodes the pressure within the bubble cluster may be greatly intensified. The centre of the gas bubble cluster shows a typical pressure distribution during the bubble cluster implosion process. It can be seen that, due to converging shock waves within the bubble cluster, there can be significant pressure intensification in the interior of the bubble cluster. This large local liquid pressure (P>1000 bar) will strongly compress the interior bubbles with in the cluster, leading to conditions suitable for thermonuclear fusion. More over during the expansion phase of the bubble cluster dynamics, coalescence of some of interior bubbles is expected, and this will lead to the implosion of fairly large interior bubbles which produce more energetic implosions.

The apparatus consists of a cylindrical Pyrex glass flask 100 m.m. in high and 65m.m.in diameter. A lead-zirconate-titanate ceramic piezoelectric crystal in the form of a ring is attached to the flask's outer surface. The piezoelectric ring works like the loud speakers in a sonoluminescence experiment, although it creates much stronger pressure waves. When a positive voltage is applied to the piezoelectric ring, it contracts; when the voltage is removed, it expands to its original size.

The flask is then filled with commercially available deuterated acetone (C 3 D 6 O), in which 99.9 percent of the hydrogen atoms in the acetone molecules are deuterium (this isotope of hydrogen has one proton and one neutron in its nucleus). The main reason to choose deuterated acetone is that atoms of deuterium can undergo fusion much more easily than ordinary hydrogen atoms. Also the deuterated fluid can withstand significant tension (stretching) without forming unwanted bubbles. The substance is also relatively cheap, easy to work with, and not particularly hazardous.

BLUE EYES TECHNOLOGY

All human beings have some perceptual capabilities, the ability to understand each other's emotional level or feelings from their facial expressions.Have you ever thou--ght, that the computer can talk with us like we talk with each other?? What if the computer knows all your mood swings? ? What if the computer tells you to calm down when you are angry?? What if the computer tells you to drink water when your are dehydrated ? ? Imagine, a world where the humans collaborate with computers ! ! The computer can talk, listen or screech aloud!!,with the help of speech recognition and facial recognition system computers gathers information from the users and starts interacting with them according to the mood variations. Computer recognizes your emotional levels by a simple touch on the mouse and it can interact with us as an intimate partner. The machine feels presence, verifies your identity and starts interacting with you and even it will dial and call to your home at any urgent situations. This all is happening with this "Blue Eyes" technology.

Blue eyes technology makes a computer to understand and sense human feelings and the behavior and also enables the computer to react according to the sensed emotional levels.

We can adapt this Blue Eyes technology in all working places, where the operator's attention is continually available. Using the Blue eyes Technology it is able to record and monitor the user's physiological condition by a technical approach. The operator's physiological condition is continually supervised by this Blue Eyes technology software. The software will respond in real time according to the operator's physiological condition. This software helps to transfer the data or information from managers to the data analyzers. Then it transfers the processed information from this data analyzers unit to the GUI controls and data analyzers. At last, the data visualization module supports a user supervisor interface section. The visualization module is in the off-line mode and it will continually fetch the information from database and also records the video, audio and physiological parameters. Thus 'Blue Eyes' software enables the supervisor to know about the physiological condition of the operators.The aim of the blue eyes technology is to give human power or abilities to a computer, so that the machine can naturally interact with human beings as we interact with each other.

AUGMENTED REALITY

Augmented reality is a view of the real, physical world in which elements are enhanced by computer-generated input. These inputs may range from sound to video, to graphics to GPS overlays and more. The first conception of augmented reality occurred in a novel by Frank L Baum written in 1901 in which a set of electronic glasses mapped data onto people; it was called a "character marker".

Augmented reality can be implemented on their own or in conjunction with each other to create augmented reality. They plays role in hardware,display and medical fields also some high level of technology where used in army to boost up.Various technologies are used in augmented reality rendering, including optical projection system, monitors,handheld devices and display systems worn on the human body.A head-mounted display (HMD) is a display device worn on the forehead, such as a harness or helmet. HMDs place images of both the physical world and virtual objects over the user's field of view. Modern HMDs often employ sensors for six degrees of freedom monitoring that allow the system to align virtual information to the physical world and adjust accordingly with the user's head movements. HMDs can provide VR users with mobile and collaborative experiences.

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ELECTRO BUZZ

AUGMENTED REALITY

The future will belong to AR when it improves task efficiency or the quality of the output of an experience for the user. This is the key challenge of the 21st century UX profession.The future will belong to AR when it improves task efficiency or the quality of the output of an experience for the user. This is the key challenge of the 21st century UX profession.Finally we reaches the end of the article not for the technology, AR or augmented reality has gone from pipe dream to reality in just over a century. There are many AR applications in use or under development today, however – the concept will only take off universally when UX designers think about how they can integrate AR with daily life to improve productivity, efficiency or quality of experiences. There is an unlimited potential for AR, the big question is - how will it be unlocked? Who knowns you can also be an AR designer.

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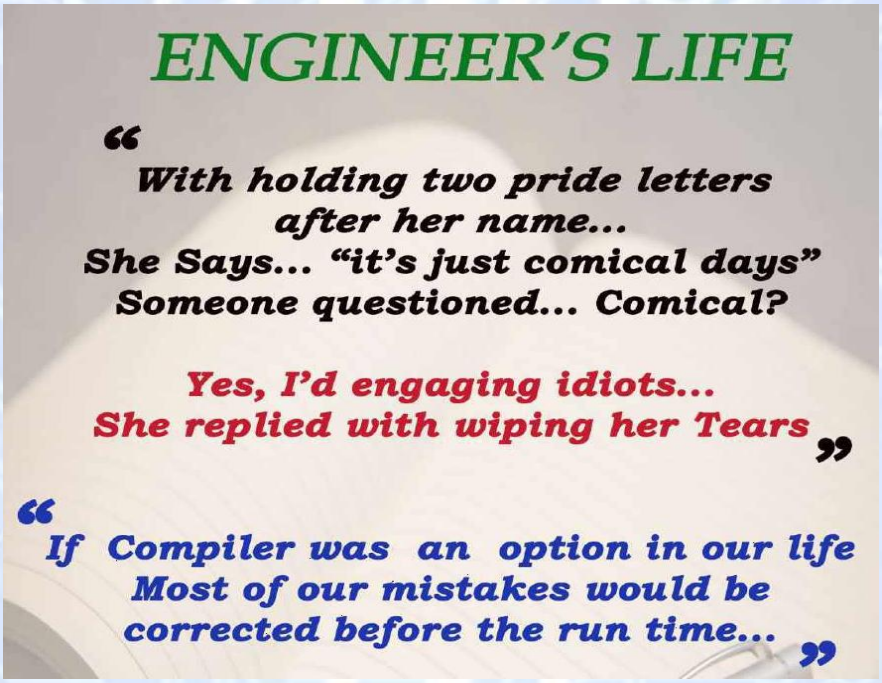

IMPORTANT WEBSITES

http://www.ieee.org/india
http://www.engineering.careers360
http://www.technologyreview.com
http://www.mathworks.in/products/matlab
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https://www.ece.org
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http://www.engineering.stanford.edu/announcement/stanford-announces-16-online-courses-fall-quart
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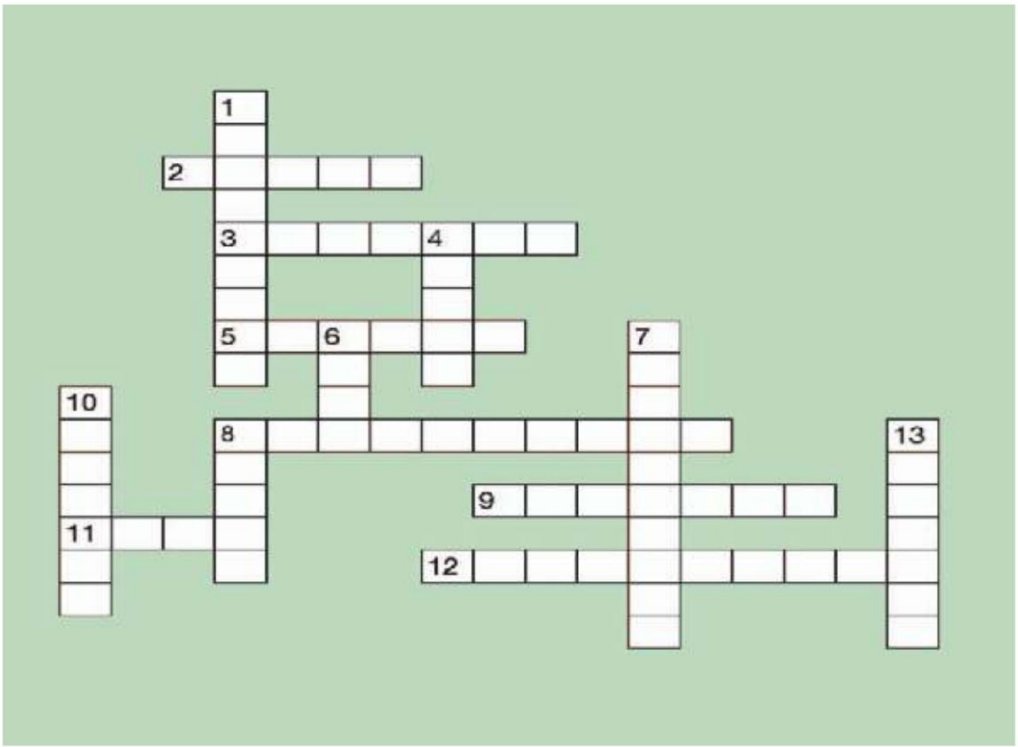
CROSSWORD PUZZLES

ACROSS

2) Multiple antennae arranged in an
3) 'Spread Spectrum' AKA Frequency
5) Diode like the Chunnel
9) waveguide (metric)
10) plot = imaginary vs. real frequency response
12) plot = magnitude vs. phase
13) The inverse of impedance

DOWN

1) Next after gigahertz
4) % Modulation AKA Modulation
6) Zero Vector
7) Opposite of amplifier (-dB)
8) Similar to a LASER (operates with microwave frequencies)
11) dB
14) James Clerk (think coffee)



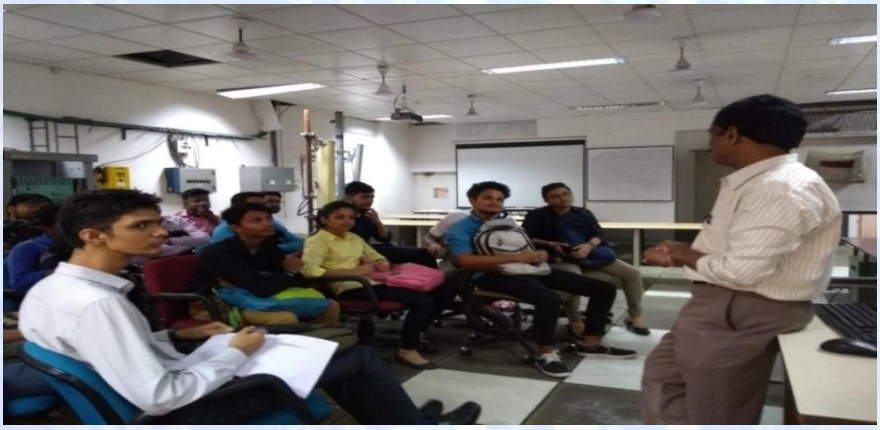
DEPARTMENTAL ACTIVITIES

2 August' 2019

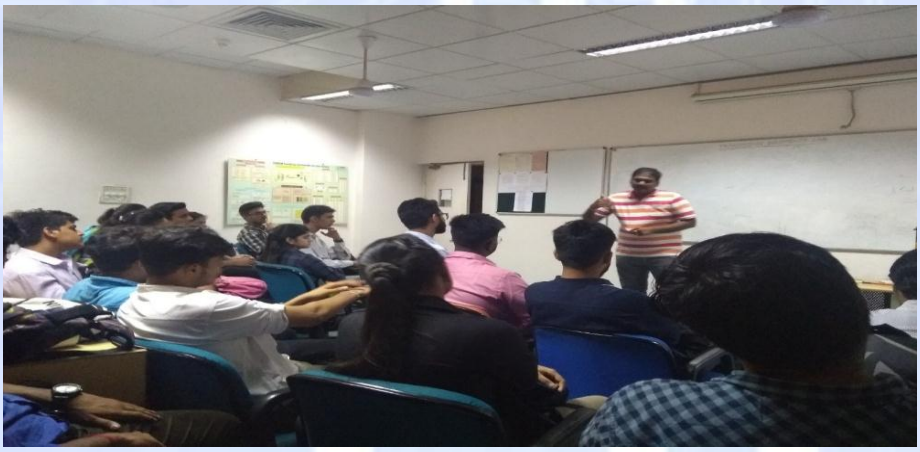
Industrial visit to MTNL, POWAI

Faculty Coordinate: 1)Sushant Gawade, 2) Sandeep Dubey

In the GSM cabin, MTNL faculty addressing to the students on different topics such as RF bands, UHF communication, 5G, WRC, TDM, FDM, UMTS 3G, LTE 4G, restrictions on Maximum power transmitted, different types of antenna.



In the transmission room, MTNL faculty addressing to the students on different topics such as Medium of transmission, Optical, Wi-Fi, Bluetooth, Radio, Satellite, Microwave, quality wired, MUX, DeMUX, MIXER.



In the Switching room, Switching to MTNL is likely to save you money! It will also allow you to reduce or eliminate roaming charges if you switch to another mobile phone operator. As mobile phone technology improves and becomes cheaper, and with increased competition among the mobile phone operators, the result is cheaper mobile phone tariffs. If you want to move from your current mobile phone network to MTNL you will be able to keep your mobile phone number using MNP - mobile number portability.

Take advantage of the new MTNL mobile phone tariffs that are now available since the implementation of MNP. With the introduction of MNP - mobile number portability - take advantage of the fact that you will now be able to keep your existing mobile phone number.

Switching Room

Broadcast Room

7 August' 2019

Industrial visit to WINAIR compressor limited

Faculty Coordinate: 1) Kaveri Sawant 2) Harsha Rewatkar 3) Sushil Dube

The aim of the visit was to understand the logic and the mechanism behind the different types of air compressors. speaker explained that how does an compressor work, how does it generates pressure(of air and fluid), how it is stored in the storage tanks, at how much pressure the air or fluid in stored in the storage tanks, the crucial temperature which has to be maintained to have an desired pressure at the output.

Storage tanks Control panel for compressor

INNOVATION CELL

Session: Innovation Cell inauguration

Session Date: 9'August 2019

Session timing: 11-1

Faculty Coordinator: Sonal Borse.

Innovation cell: this is joint initiative of Department of Electronics and Department of Electronics and Telecommunication Engineering.

Aim behind this is to have a tie up with the companies. Students get awareness of new/upcoming technologies and hands on experience, so they are ready for industry, also inculcating team work and leadership.

The event was commenced by our Campus director sir and the HODs by lightening the Bluetooth controlled lamp made by the innovation cell. The termination of the event was followed by an expert lecture conducted by **Mr. Rishu Jha.**

Faculties present at the event

ROBOTICS WORKSHOP IN RAVAL COLLEGE, MIRAROAD

Session: Robotics Workshop

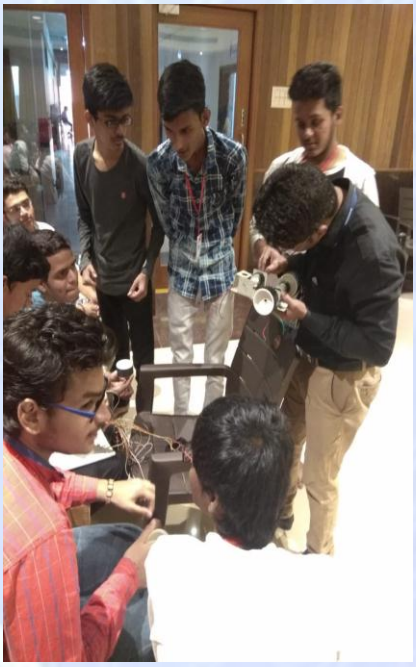
Session Date: 10'August 2019

Faculty Coordinator: Sushant Gawade, Gaurav Shetty

The faculty coordinator Sushant Gawade and Gaurav Shetty faculty of EXTC DEPT conducted Robotics workshop session in the Raval College, Miraroad (East) for 11th and 12thstandard Bifocal students.

Sushant sir has given breef idea to the students about wired and wireless robo and practical session for wired nd wireless robo was conducted by Gaurav Shetty, where sir had covered about Zigbee , Bluetooth. In this session, students performed the practicals for wired as well as wireless Robo.Practicals conducted on Robo such like Zigbee, Bluetooth were performed using arduino uno programming software.

The main moto of arranging the Robotics Workshop was to create an awarness about the Robotic environment and the trending technologies in today's era.



FIRST YEAR STUDENTS VIST ELECTRONICS AND TELECOMMUNICATION DEPARTMRNT DURING INDUCTION PROGRAM

Session: Virtual Lab

Session Date: 28'August 2019

Session timing: 2-5

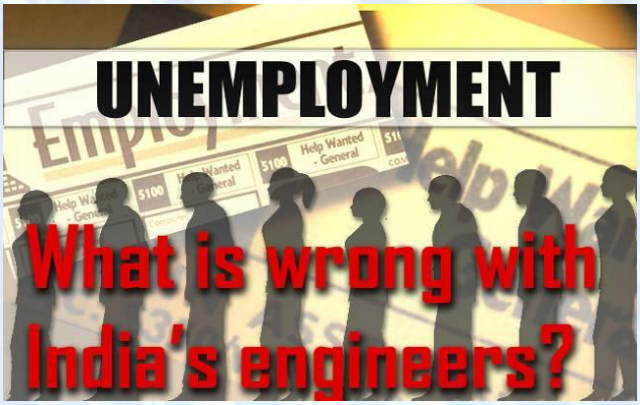
Faculty Coordinator: Swarali Narvekar

The first year students visit to EXTC DEPT during Induction Program. Virtual Lab Coordinator Swarali Narvekar conducted session on virtual lab even she conducted experiments session of virtual lab for BEE subject.

The session covered the different types of virtual labs available. One of the benefits of Virtual lab is instead of using different hardware and software to perform the practical, we can perform that practical with the help of Virtual lab by accessing different parameters for the input and it will be easier to obtain the output for various input combination. Even for developing Virtual labs IIT Bombay organize bootcamps which is of 8-12 days session, where students develop the specific practical or Lab for that particular subject.

In the Hands-on training students can perform the different experiments and giving feedback about the experiments performed using Virtual Labs. The Program was concluded by feedback from the students. The necessity of feedback session, if particular college wants to stay as Nodal Coordinator for Virtual Lab than that particular college has to perform at least 8000 experiments per year and for that respective practicals feedback should be generated, through those feedback only IIT Bombay will come to know that particular college has conducted how many experiments.

INDIA TODAY REPORT



A New Delhi-based employment solutions company, Aspiring Minds, conducted an employability-focused study based on 150,000 engineering students who graduated in 2013. The findings were rather shocking.

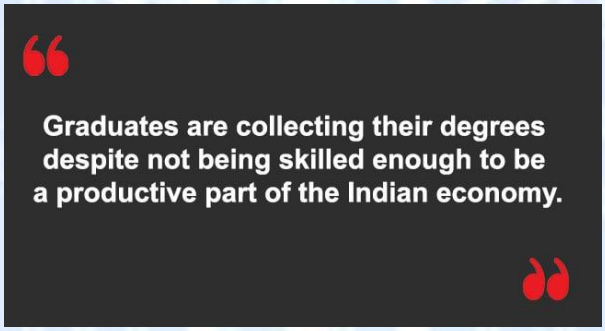
As many as 97 percent of graduating engineers want jobs either in software engineering or core engineering. However, only 3 per cent have suitable skills to be employed in software or product market, and only 7 per cent can handle core engineering tasks.

According to the HRD ministry, India has 6,214 engineering and technology institutions which are enrolling 2.9 million students. Around 1.5 million engineers are released into the job market every year. But the dismal state of higher education in India ensures that they simply do not have adequate skills to be employed.

> **As many as 97% of graduating engineers want jobs either in software or core engineering.**
>
> **But, only 3% have suitable skills to be employed in software or product market and only 7% can handle core engineering tasks.**

So, what can happen when such a large population of youth do not get jobs? Experts say that this may cause serious instability in the economic and social conditions in the country, along with wide scale dissatisfaction and disillusionment.

Though the quantity of universities, colleges and programmes are going on increasing in the country, the lack of quality education persists. Profit-hungry managements, lack of skill education, resplendent corruption, focus on rote-learning methods, and shortage of faculty (both in quantity and quality) are the major issues plaguing higher education. Graduates are collecting their degrees despite not being skilled enough to be a productive part of the Indian economy.



India Today got together with ***Siddarth Bharwani, Vice President at Jetking Infotrain Limited***, an IT and IMS training institute, to know more about the issues contributing to such a dismal picture.

Factors working behind an engineer's employability:

According to Bharwani, the following factors decide whether an engineer is employable:

- "The **ability to apply the concepts learnt** to constantly develop innovative things and find solutions to complex problems are main factors working behind the employability of an engineer."
- "The **state of the economy** also plays a major role for employment generation. Industry insiders say that in a strained economic condition, companies do not want to spend much on training and would prefer candidates with some skill sets who can be made billable soon."
- **Location factor:** According to the Aspiring Minds report, in Tier-1 cities such as Mumbai, Bangalore and Hyderabad, 18.26 per cent of software engineers are job ready, while in Tier-2 cities such as Pune, Nagpur and Surat, 14.17 per cent are employable

  This shows that the candidates from lower tier cities are not getting the same opportunities as those hailing from Tier-1 cities, even if they are equally qualified and skilled. The chances of finding a job for such a person is 24 per cent lower and the earning per-year salary would also be Rs 66,000 lesser.
- "**Problems with English language** along with **issues in computer programming** make these students ineligible for employment. The difference in English and cognitive skill modules may only be a function of the input quality of the students. There is a consistent trend that the maximum gap is in computer programming, followed by cognitive skills and English and least in other domain skills."
- Basically the Tier 3 cities are the one with the lowest employability rate. This is because of the insufficient infrastructure for developing skilled specific knowledge.
-

> The state of the economy also plays a major role for employment generation. Industry insiders say that in a strained economic condition, companies do not want to spend much on training and would prefer candidates with some skill sets so that they can be made billable soon.
>
> *- Siddarth Bharwani, Vice President, Jetking Infotrain Limited*

Major problems with engineering education in India

1. Syllabus not updated regularly:

The course contents do not focus on areas which will actually help in the job industry after employment. There is a big gap between what the market needs and what Indian education equips its future employees with. Despite exponential changes in science and technology round the world, the syllabus is hardly ever updated.

"For instance, while mobile computing is proving to be the next growth driver for the industry, the curriculum does not reflect it," says Bharwani.
Even when new branches of engineering are added, the structure remains traditional-this simply does not work anymore!

"The traditional education sector in India has not evolved at the same pace as the industry. The expectations that the companies have from their candidates and the skills that engineering graduates bring in, do not match," he adds.

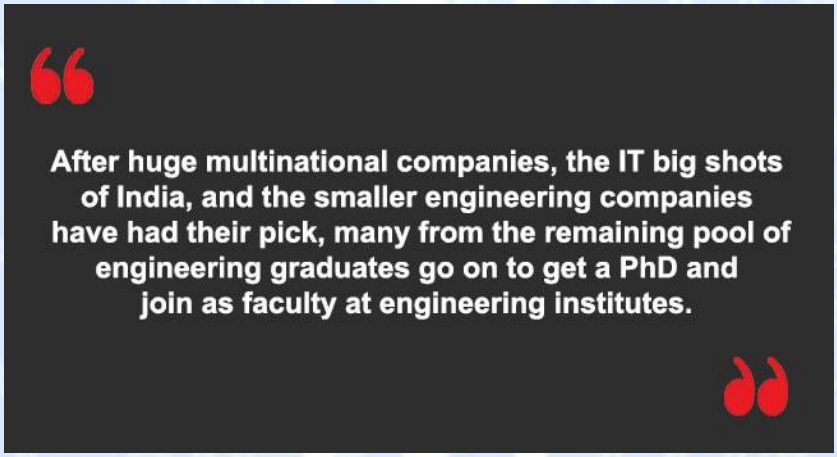
> The traditional education sector in India has not evolved at the same pace as the industry. The expectations that the companies have from their candidates and the skills that the engineering graduates bring in do not match.
>
> *- Siddarth Bharwani, Vice President, Jetking Infotrain Limited*

2. Lack of quality teachers:

There are more than 33,023 colleges in India granting degrees. There are not enough quality teachers for all of these educational institutes.

After multinational companies, the IT big shots of India, and the smaller engineering companies have had their pick, many from the remaining engineering graduates go on to get a PhD and join as faculty at engineering institutes. Thus, unlike other parts of the world, the Indian faculty is not comprised of the very best of the industries who have the skills to create brilliant students.

Most educated engineers join teaching as a profession not because of passion, but because they have to earn a livelihood. The few good professors prefer administrative positions because of lower intellectual demands coupled with higher pay packages.



3. Lack of innovation and research:

Students need to be motivated enough to innovate or think for themselves. As the new HRD minister Prakash Javadekar recently said, "Why do we lack innovation in India? Because, we don't allow questioning. We don't promote inquisitiveness. If a child asks questions in school, he is asked to sit down. This should not go on. We need to promote inquisitiveness, children should ask questions."

Students must be given the space and scope to think and innovate, to question and come up with solutions. This applies to both school education and higher education.

Such are Indian students trained right from their primary education that they never learn to question or innovate. Rote learning instils in students a sort of complacency for more than 12 years of education and they are unable to make the shift from un-questioning learners to innovators in the job market.

> Rote learning instils in students a sort of complacency for more than 12 years of education and they are unable to make the shift from un-questioning learners to innovators in the job market.

4. Faulty education system:

Semester systems and the process of continuous evaluation are not fulfilling their desired roles as the students are not interested in continuous learning-they only want good grades. Unless the specific purpose of such initiatives is properly understood by faculty and students alike, these methods likely would not work.

5. Lack of skill-based education:

Skill-based education is another immediate need. Engineering students need to have hands-on training on the basis of the problems they are likely to encounter in the real world.

"One of the major problems facing the fresh graduates is their insufficient understanding of basic concepts. The lack of in-depth understanding of technical information, lack of client-handling skills and insufficient knowledge across domains are the major skill gaps in the area," says Bharwani.

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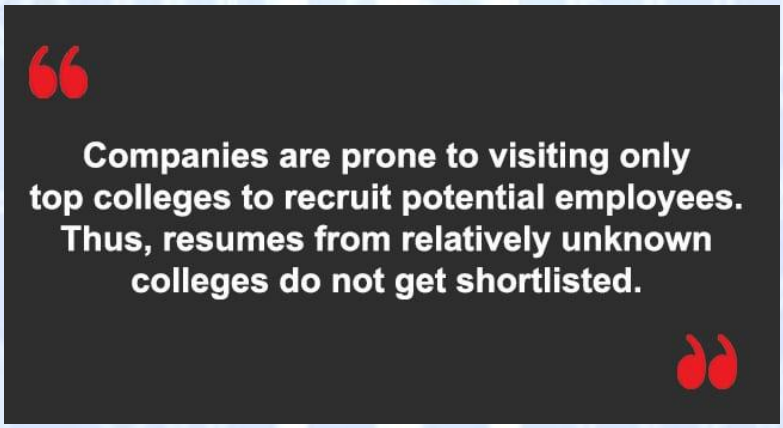
>
> *- Siddarth Bharwani, Vice President, Jetking Infotrain Limited*


While the vast numbers of engineering students in the country study their textbooks, give their exams and collect their degrees, it is only when they encounter the real world problems do they realise their shortfall. By then, they have to take extra time in order to skill themselves or suffer unemployment.
"Initiatives like the Start-up India and Make in India are positive efforts taken by the government in this direction to boost employment opportunities for engineers," he adds, however.

6. Importance of college name:

According to the Aspiring Minds report, companies are prone to visiting only top colleges to recruit potential employees. Thus, resumes from relatively unknown colleges do not get shortlisted.
This not only creates a lack in equal opportunities, but also causes a deficiency of quality employees as this process ignores a huge number of meritorious students who do not study in top tier colleges.



7. Ease of permission from state governments:

A major cause of mushrooming engineering colleges is the ease with which state governments grant permission to little-known barely-trained educational trusts and organisations to set up the same.
Karnataka's Visvesvaraya Technological University (VTU) oversees as many as 200 engineering colleges, while in all the 50 US states combined, there are about 1,000 accredited engineering colleges.

8. The IT 'employability':

The Aspiring Minds report says that despite the fact that the IT sector carries out the highest number of recruitments from the pool of engineers, only 18.43 per cent engineers are skilled enough to work there, while, for IT product roles, the numbers are as low as 3.21 per cent.
Due to comparatively higher employment in the IT sector, students even from other disciplines take up IT-related courses. Thus, the end result of this inadequate education creates engineering graduates who are not well-versed in their core subjects, nor in IT.

> Despite the fact that the IT sector carries out the highest number of recruitments from the pool of engineers,
>
> only 18.43% engineers are skilled enough to work there, and only 3.21% candidates are suited for IT product roles.

9. Lack of proper English skills:

The study attributes the lack of English communicative skills, which they found in 73.63 per cent of candidates, and low analytical and quantitative skills, which they discovered in 57.96 per cent of candidates to be other main reasons for unemployment.

Even the IT sector requires employers who are fluent and well versed in English, as within around two years of experience on the job, they would have to communicate with international customers. Thus, if the quality of engineering graduates do not improve, IT sector hiring will also go down.

> The lack of ability of the individual to deliver his views effectively at the interview leads to rejection of even the most brilliant candidate. This is because training institutes do not make an effort to ensure that the candidates develop their skills in a wholesome manner which can contribute towards client-handling and team communication skills.
>
> *- Siddarth Bharwani, Vice President, Jetking Infotrain Limited*

10. Disregard of essential soft skills:

Soft skills have become very important in the present job industry, but they are routinely ignored in educational institutes.

"This is perhaps the trickiest issue," says Bharwani. "The lack of ability of the individual to deliver his views effectively at the interview leads to rejection of even the most brilliant candidate. This is because training institutes do not make an effort to ensure that the candidates develop their skills in a wholesome manner which can contribute towards client-handling and team communication skills."

The Government of India needs to sit up and take notice of the issues that are threatening the very future and stability of our country.

THE ECONOMIC TIMES

Report

Employability Survey 2019

"Jobs slip away from the ill-equipped Indian engineer"

Any changes to education system have been at best ad-hoc, which has kept unemployability numbers very high.

By ET Online | Updated: Mar 25, 2019, 02.02 PM IST

The general quality of India's engineering graduates is exactly where it was a decade ago, with next-gen tech skills still a chimera, the new Annual Employability Survey 2019 by Aspiring Minds has revealed.

On top of a shocking series of revelations is the finding that 80% of Indian engineers are not fit for any job in the knowledge economy.

Any changes whatsoever to the education system have been at best ad-hoc, which has kept the unemployability numbers very high and stubborn, the survey has found. The survey provides many dead giveaways about the Indian engineer's ability to code — which basically is bread and butter for everyone in the techie profession. "Good coding skills (the ability to write functionally correct code) are possessed by only 4.6% of Indian job applicants," goes one major finding that shows Indian engineering education for what it is.

However, more Indian engineers (4.6%) can code correctly compared to their Chinese peers (2.1%), the survey found. That, however, is poor consolation for India, because a far higher number of American candidates (18.8%) can write correct codes.

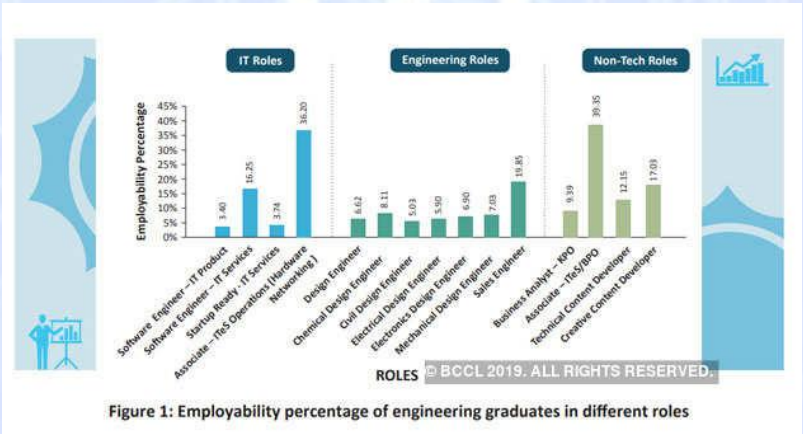


Figure 1: Employability percentage of engineering graduates in different roles

The India-China techie math has a significant catch, though. "If we consider only those candidates who can write correct code with few errors, the gap between China and India narrows (8.6% vs. 9.8%, respectively)," says Aspiring Minds.

Interestingly, while the percentage of Indian engineers who code well is greater than the number of Chinese engineers, a much higher proportion of Indian engineers (37.7%) cannot write a compliable code compared to Chinese engineers (10.35%). This means that India must do more to educate its general population in proper coding skills, the survey suggests.

So how does US compare in this area? "By comparison, the US engineers perform four times better than Indian engineers in coding: only 4% of the US candidates cannot write compilable code despite the fact that the base of the engineering population in the US is approximately four times smaller than in India."

ROLE	EMPLOYABILITY
Design Engineer	
Chemical Design Engineer	8.11%
Civil Design Engineer	5.03%
Electrical Design Engineer	5.90%
Electronics Design Engineer	6.90%
Mechanical Design Engineer	7.03%

Table 2: Employability percentage of sub-categories in design engineer role

At a time when artificial intelligence is taking root as the very basis of new-age tech, just 2.5% of Indian engineering graduates have the relevant skills to make a career out of it. Tech industry now requires skills like machine learning and data science, things that are way beyond the vast majority of desi engineers, the findings underline.

But that's not all. "Only 1.5% - 4.5% of engineers possess the necessary skills in data engineering, while only 2.8% - 5.3% are qualified in wireless technologies. These figures pale compared to the percentage of engineers (5.5%) that are qualified for basic programming," it says.

As if these numbers are not shocking enough, the real unemployability figures are even more abysmal. For data sciences, the number of the employable stands at " only 50% - 60% of these numbers (or 1.5% total) when we factor in other skills such as cognitive and language that are key for career success".

How have things come to this pass, and is there any way out of this pathetic state of affairs? The survey sheds ample light on the first part of the question: "Engineering education is mainly theory-based. Only 40% of students perform internships while only 36% undertake projects beyond their required coursework."

The survey hits the nail on the head when it analyses the reason behind this galling lack of ability. "Students are trapped in a college bubble. They have little industry exposure. Only 47% of students attend industry talks. Sixty percent of faculty do not discuss how engineering concepts apply to industry."

So, will the future be any better for Indian engineers who join the jobseekers' queue in millions every year? "These issues can be addressed by a mix of counseling programs and technology including artificial intelligence. Tools that help students assess their skills, find company matches and prepare for interviews will come in very handy," the survey points out.

INDIA TODAY

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The only feasible and effective solution

Every professional program out there has an inbuilt deep experiential learning component without which the program is incomplete.

In Medicine, every doctor has to undergo a compulsory extended duration of hands-on' learning where the young doctor learns under the guidance and mentorship of the experienced doctors- this is called Residency'.

Similarly, in Chartered Accountancy, there is Article-ship' and in Law, there is Apprenticeship'. While the periods of learning are different, in each profession the understudy learns while doing herself.

This experiential learning that is inherently expected and hence built into these professional programs ensures quality and relevant skill application of the talent.

ELECTRO BUZZ


What can we learn from these models of learning? We learn that in order to develop a truly professional and deep impact tech talent, he/she has to be skilled using the following elements:
a) Deep experiential learning on live or live simulated environments with real deliverables which matter
b) Hands-on and Do-it-Yourself approach
c) Industry experts as mentors.
It is important that for the technology space we learn and evolve a solution in a similar manner.

Engineering does have an industry project built into the curriculum however for various reasons this does not give the student enough exposure and hands-on experience to make them confident coders.

Also, engineers may be in non-computational fields to start with hence their projects may not be relevant to a coding job.

The second problem of variable and mixed requirements can therefore be solved by having a program which has the above 3 elements and is further based on the exact requirements of the specific industry or corporate or product.

How to impact the employability pool

Using the 3 elements of a) live or live simulated environments with real deliverables which matter b) Hands on and do it yourself approach c) Industry experts as mentors in addition to making each program specific to the job requirements will ensure that we are able to increase an employable base of engineers and also maximise job opportunities.

This kind of customization has been seen in many similar fields where big data and AI/ ML have made it a possibility with minimum effort.

The simplicity of this solution is easily evident when we apply this to re-skilling of experienced engineers -- the same four elements as mentioned above can further allow these engineers to have strong and long careers in their respective domains.

Throughout history, times of significant innovation have been marked by a transitional period of job losses as redundant processes were filtered to accelerate a new dawn in human socio-economical behaviour.

We are at the onset of the fourth, digitized Industrial Revolution now, that results in augmentation of each process and experience and motivates human employability to rise above the mundane and apply their most significant abilities to achieve the highest individual as well as collective productivity and efficiency.

-Authored by Narayan Mahadevan, Founder at BridgeLabz