Department of Electronics & Telecommunication Engineering

TECHNO-SPHERE

Annual Technical Magazine
2024-25

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VISION:

To produce Electronics and Telecommunication Engineers for development of the society.

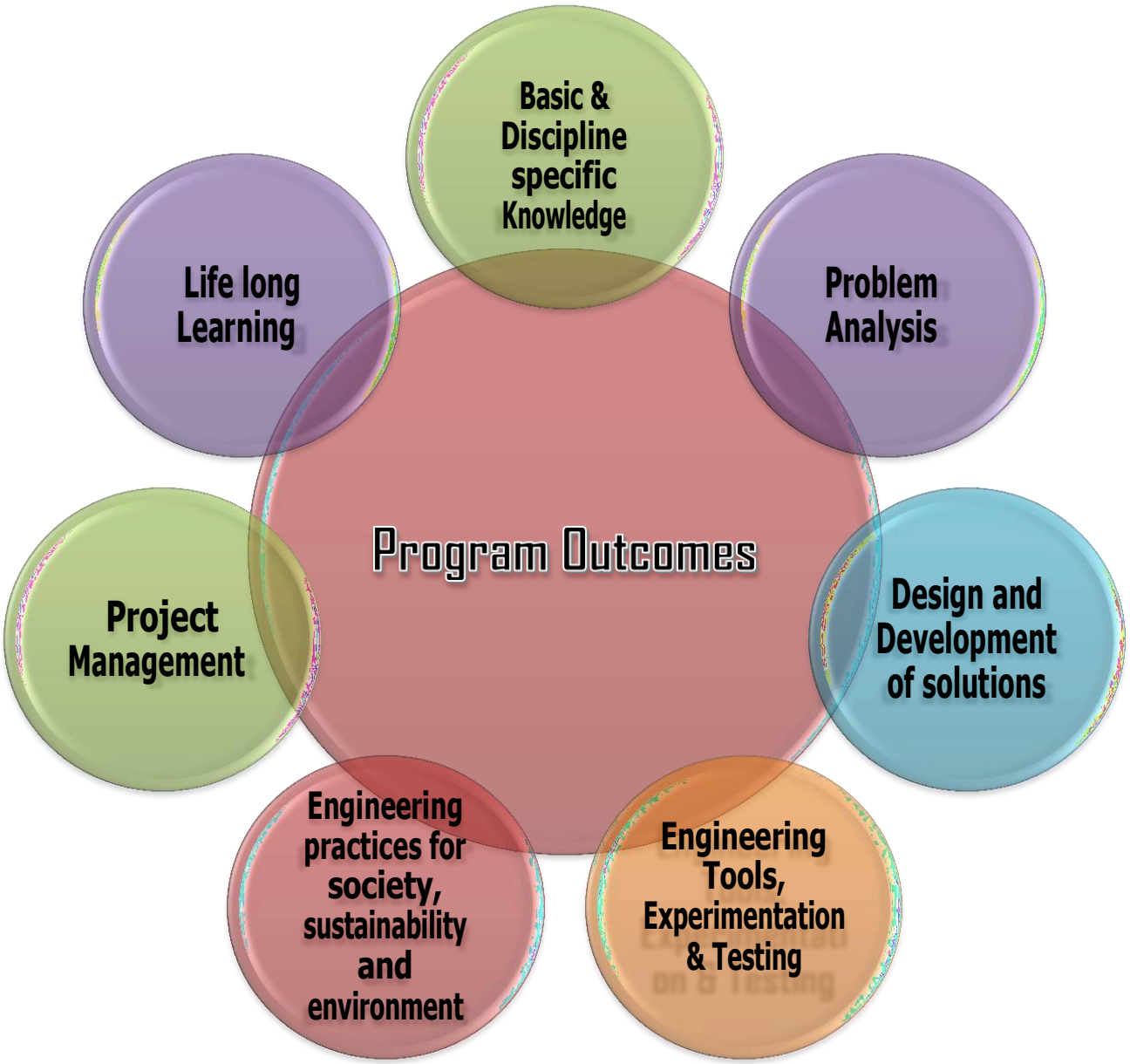
MISSION:

- To impart excellent technical knowledge through modern infrastructure and laboratories.
- To promote innovative thinking in the minds of budding engineers.
- To develop the students competent to face the challenges incorporating technical and entrepreneurship
- To inculcate moral and ethical values.

ABOUTTHEDEPARTMENT

As we step into the New Year 2025, let's first pause and thank God for keeping us in good health and spirit to be in this moment. Last few years has gone very tough. It has indeed been an emotionally testing and turbulent one and taught many lessons. I am sure the year 2025 shall bring new opportunities and hopes for all of us. Undoubtedly, everyone contributed to keeping the Educational and other activities in motion during the lockdown period. On reopening, earnest efforts were made at DETE (Dept. of Electronics and Telecommunication Engineering, Govt. Polytechnic, Sakoli) to speed up the critical tasks and make up for the time lost during the containment period. The DETE has started online classes one week before the commencement of academic activities by MSBTE. The DETE has conducted practical's using various online mechanisms, including youtube videos, live demonstrations, etc. Also, the DETE has conducted a physical workshop on "PCB Design Simulation & Implementation" by following the Govt. norms of Covid-19. DETE is doing all activities as per the guidelines of MSBTE, DTE, AICTE, and Govt, norms of Covid-19. The result of the collective efforts may not be apparent right now but shall in the near future. Our day-to-day teaching work has taken a new definition and dimension in the overwhelming challenges of COVID-19. A surge in online usage during Pandemic offered us an opportunity to develop new ways to deliver our lectures, conduct practical's and PA tests to build stronger relationships with students and the community. Of course, such technological challenges will require us to make significant changes in the ways. we operate. Still, I am happy to say DETE is undertaking the necessary steps in the direction in all possible capacities. Finally, I wish readers and their families a delighted and prosperous new year. Stay safe and beat the Pandemic with new energy.

PROGRAMOUTCOMES:



PROGRAMSPECIFICOBJECTIVES(PSO):-

1. Electronics and Telecommunication Systems: Maintain various types of Electronics and Telecommunication systems.

2. EDA Tools Usage: Use EDA tools to develop simple Electronics and Telecommunication engineering related circuits

PRINCIPAL'S DESK

Mr. S. P. Lambhade
Principal
Government
Polytechnic, Sakoli

Expressions to inherent and nurtured qualities possessed are possible through oral and written means. The communications among human beings are always by these means but sometimes may transcend these verbal or sensory means but can occur at intuitive and unspoken manner. The kind of world we live in need to dwell upon these expressions in speech or through written material. The intention to provide platform for these expressions for students of our institute is very natural need.

Techno-Sphere magazine launched by Electronics and Telecommunication department of the institutes right approach and is important milestone in this direction.

I extend my heartfelt greetings to all participants, authors, report writers, faculty, staff & students associated in this endeavor. I also appeal to all that with these upcoming new dimensions of E-World, one shall adjust oneself with exhaustive reading on internet to encourage learning by oneself. I also express the deep desire that the wonderful, beautiful& creative expressions of some individuals shall promote better human values, culture & affection among all.

HOD'S DESK

Mr. A. A. Ali
Head of Department
Electronics and
Telecommunication

It gives me immense pleasure to present the Techno-Sphere 24-25 Technical Magazine of the department. Techno-Sphere, an elusive boundary of faith trustworthiness and affection. It is the talent and outcome of our students which is reflected through this. This is one of the best platforms for our students to present multifaceted personalities and innovative ideas.

I thank all the students for their wonderful response and enthusiastic participation without whom this would not have been possible. Commendable job has also been done by the Editorial team in planning for and producing the masterpiece. I respect their efforts and really proud of them. I hope you will enjoy Techno-Sphere 24-25.

"Either write something worth reading or do something worth writing"- says Benjamin Franklin.

From the Editor's Desk……

Dear Reader,

Greetings!!!

We are pleased to present you "**Techno-Sphere 24-25**" – The technical magazine from our Department of Electronics & Telecommunication Engineering.

The name of the magazine, "Techno-Sphere" may seem difficult, but it just means "Deep Insight into the wide spectrum of Electronics and Telecommunication engineering", a clear vision. This magazine is a platform to showcase the literary skills and innovative ideas of faculty as well as students. "Techno-Sphere 24-25" presents the hard work and dedication of students and contributions of teachers. I would like to thank all my editorial team members for helping me whip up through. I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.

Thank you all !!

The Editorial Team

Mrs. S. S. Pampattiwar

Mr. N. V. Chide

FACULTY EDITOR

Mr. Mandar Nagrikar

Ms. Bhairavi Ambhore

STUDENT EDITOR

The top IC (integrated circuit) or semiconductor manufacturing industries

Global Leaders

Taiwan Semiconductor Manufacturing Company (TSMC):

The world's largest contract manufacturer of microchips, producing chips for major companies like Apple and AMD.

Samsung Electronics:

A South Korean giant and a leading global producer of semiconductors, particularly in memory chips like DRAM and NAND flash.

Intel:

A US-based company that is a long-standing leader in silicon innovation and chip manufacturing.

NVIDIA:

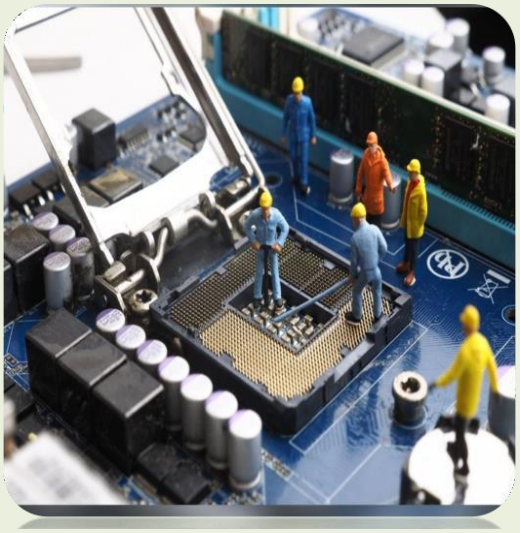
A major US company known for its Graphics Processing Units (GPUs) and System on a Chip (SoC) technologies.

ASML:

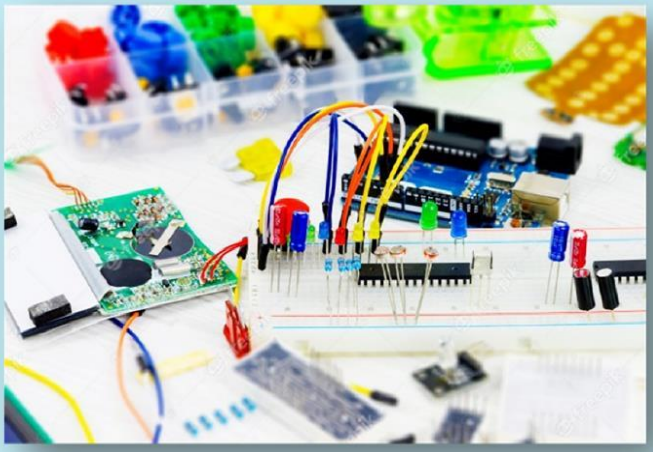
A Dutch company crucial in the semiconductor manufacturing equipment sector, essential for the production of advanced chips.

Broadcom:

A US-based company specializing in analog and mixed-signal components and infrastructure software.



Student Showcase



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Student Achievement

E&TC Toppers		
A.Y. 2023-24		
First Year	 Ms. Yukti Sharnagat	74.24%
Second Year	 Ms. Muskan Raut	71.21%
Third Year	 Mr. Jhanak Saud	82.46%

Artificial Intelligence

Mr. Harshal Karu
ETX 3rd Year

Most people are not very familiar with the concept of artificial intelligence (AI). As an illustration, when 1,500 senior business leaders in the United States in 2017 were asked about AI, only 17 percent said they were familiar with it. A number of them were not sure what it was or how it would affect their particular companies. They understood there was considerable potential for altering business processes, but were not clear how AI could be deployed within their own organizations. Despite its widespread lack of familiarity, AI is a technology that is transforming every walk of life. It is a wide-ranging tool that enables people to rethink how we integrate information, analyze data, and use the resulting insights to improve decision-making. Our hope through this comprehensive overview is to explain AI to an audience of policymakers, opinion leaders, and interested observers, and demonstrate how AI already is altering the world and raising important questions for society, the economy, and governance.

Intentionality

Artificial intelligence algorithms are designed to make decisions, often using real-time data. They are unlike passive machines that are capable only of mechanical or predetermined responses. Using sensors, digital data, or remote inputs, they combine information from a variety of different sources, analyze the material instantly and act on the insights derived from those data. With massive improvements in storage systems, processing speeds, and analytic techniques, they are capable of tremendous sophistication in analysis and decision-making.

Intelligence

AI generally is undertaken in conjunction with machine learning and data analytics. Machine learning takes data and looks for underlying trends. If it spots something that is relevant for a practical problem, software designers can take that knowledge and use it to analyze specific issues. All that is required are data that are sufficiently robust that algorithms can discern useful patterns. Data can come in the form of digital information, satellite imagery, visual information, text, or unstructured data.

Adaptability

AI systems have the ability to learn and adapt as they make decisions. In the transportation area, for example, semi-autonomous vehicles have tools that let drivers and vehicles know

about upcoming congestion, potholes, highway construction, or other possible traffic impediments. Vehicles can take advantage of the experience of other vehicles on the road, without human involvement, and the entire corpus of their achieved "experience" is immediately and fully transferable to other similarly configured vehicles. Their advanced algorithms, sensors, and cameras incorporate experience in current operations, and use dashboards and visual displays to present information in real time so human drivers are able to make sense of ongoing traffic and vehicular conditions. And in the case of fully autonomous vehicles, advanced systems can completely control the car or truck, and make all the navigational decisions.

APPLICATIONS

AI is not a futuristic vision, but rather something that is here today and being integrated with and deployed into a variety of sectors. This includes fields such as finance, national security, health care, criminal justice, transportation, and smart cities. There are numerous examples where AI already is making an impact on the world and augmenting human capabilities in significant ways.

A Good Data Visualization

Ms. Khushi Meshram
ETX 3rd Year

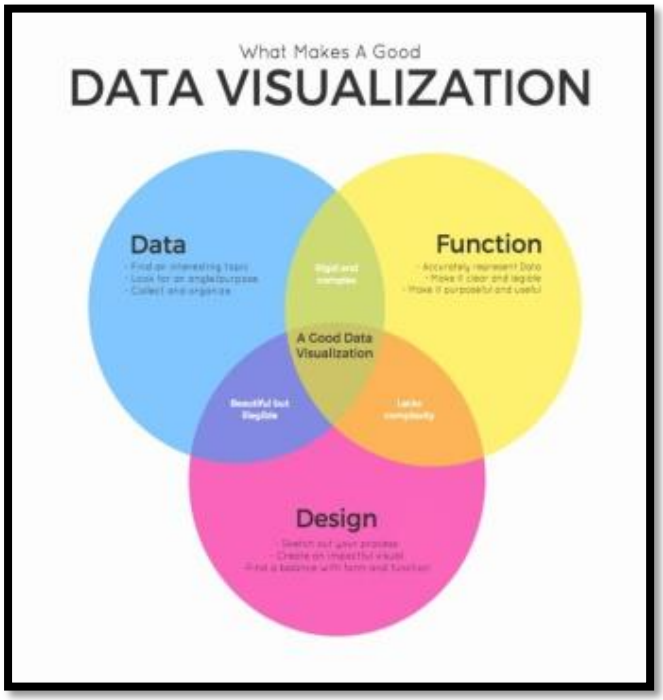
Data may mean different things to different people. Hackers might measure data as the information they input, and regular users might think of it as facts and other important pieces of information.

Data is a piece of information or facts. Visualization is when you create scenarios in your mind by image.

Data combined with visualization provides new insights. These insights bring clarity to a situation and enable better decisions. Data visualization is used to create statistical graphics, plots, and other tools to communicate data. Visualization can be used in various ways to suit the task at hand. For example, tables are commonly used where users will look up a specific measurement, while charts may be more relevant when looking for patterns or comparisons.

Data visualization is a graphic design process that communicates ideas and information to users in the form of graphics. If data visualization is very beautifully designed, this may take away from its function and decrease its effectiveness. It should be aesthetically pleasing but also effective at communicating ideas by having a balance of beauty and function.

Data visualization is an active field of research. It combines a data visualizer's skills and a scientist's information with interactive graphics.



Stephen Few states that there are two types of data needed for a meaningful analysis or visualization: statistical data and explanatory data. Statistical data gathers raw numerical values and results from studies, while explanatory data provides explanations on why the statistics are what they are.

Nominal variables group different types of objects. These variables don't rank what they're grouped into. Categorical variables are ranked. Examples include gender and favorite color.

What data visualization types exist and what they do. They are of six types: Data, Information, Concept, Strategy, Metaphor and Compound.

Lastly, good data visualization tells a story to the audience, usually in images, graphs, or charts using language and ideas that they understand.

Artificial Intelligence - World At Next Level

Hello Friends!

Before 1950's it was impossible for mankind to develop an intelligent machines like human was a hypothetical concept, but after some years research began in this field and now it has affected our lives to a great extent.

In simple words, it (AI) is the process of inserting human intelligence and emotions in machines.

Mr. Tushar Kayte
ETX 3rd Year

It has broad applications in the field medical, agriculture, entertainment, social media etc.

- Facebook uses the deep learning and machine learning to detect facial features and tag your friends.

- Plantix uses the image recognition to identify defects and nutrient deficiencies in soil through images.
- 75% of the movies that are watched by viewers are recommended by Netflix.

Talking about future of AI, MNCs like Amazon and Google is implementing AI to achieve the better and efficient results in their tasks.

As we know every coin has two sides, this technology has also its own pros and cons. Research is going on to develop the super intelligent systems which will surpass human intelligence. But, some technical experts has already expected that it may become threat to humanity.

By my opinion, AI should be used to perform high risk tasks such as installing electricity transmission lines, mobile towers etc. So, research should be done in order to develop such machines for bright future of our mankind.

Humanoid robots as Teachers

Ms. Ravina Petkule
ETX 3rd Year

This article will discriminate between kinds of robots, points to its burgeoning Development and application in the home and workplace, and describe its growing use in the classroom as a teacher. It will describe it's for Potential to support, for instance language development, social and emotional training for example what children with an anesthetic spectrum disorder, and teaching as a assessment and it will review research, teachers, students I'm parents response to this use. Some of these responses recognize the potential usefulness of humanoid but also as awareness that digital through even not same as human thought grammar and show some concern about using robot as a teacher.

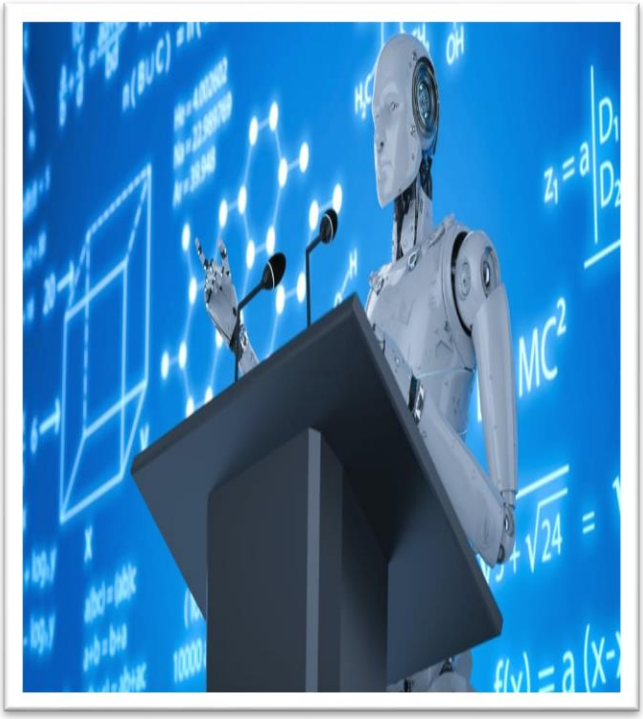
Introduction

Automation the replacement of people in the workplace buy machines is not something new, but digital technology has increased the capability of these machines enormously (eg . Fletcher and Webb 2017).For instance machines in factories manufacture cars wireless preciously and equally and these cars are increasingly able to drive themselves and at the same time present urgent ethical challenge.

Humanoid robots are intended to look and behave some words like people and they usually have some means of communicating with them.

Human reflections

What do people think about robots as teacher car is needed here as experience of classroom robot is, as eight, relatively limited, and not exist in some parts of the world. Some students some studies have views of those without direct Experience. Any express willing to interact with Robert teacher made due to their novels, and may decline with familiarity.



Two pan Europeans survey found the general public to be broadly positive about robot application in general, but with some very variation, largely for northern to southern countries with the former tending to more favorable than the latter. While four out of 10 people were comfortable using robots in education more than three out of 10 had reservation and you saw it's a priority .Younger people, Maine, and those with more years in full-time education tended to be more favorable (Opinion and social2012 and 2015)As far as children is considered, this opens a window into what parents response might be.

Those from Southeast Asia where more positive about the prospect of robots teaching their children than those for other parts of the world.

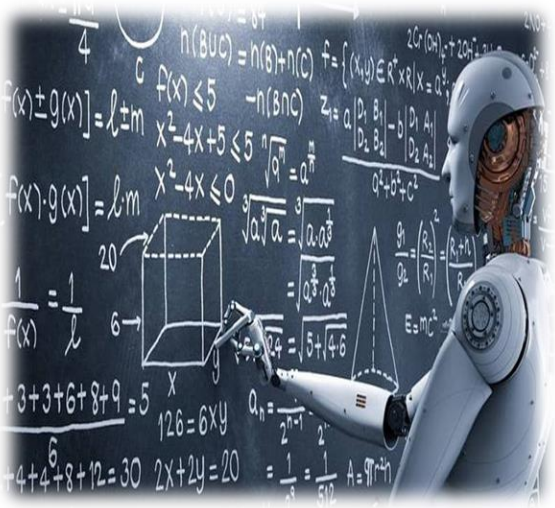
It's to teaching and learning are not, of course, new, textbooks for instant on longstanding surrogate teachers which have found wide application around the world but no one has

corners that children will behave like a book. Humanoid robots, however are the more active even proactive unlike the passive test book they can respond at and adapt to each student, tailoring teaching to particular needs there is a clear evidence that they how up potential to support learning, as in teaching children about their medical conditions developing and researching learning, and testing it they can also take teaching role with human teachers may find time consuming uncomfortable inhibiting Or unfeasible. For example they can patiently help us students practice a skill or produce patient practice conversation in foreign language or act dumb and thought by students.

"Robots can free up precious time for human teachers, allowing teachers to focus on what people still do best: Providing comprehensive empathetic and rewarding educational experience. "Bert, beyond a married division of Labor, there is likely to be increased potential for productivity collaboration between HI and AI.

Conclusion

GRIN technology (Genomics, Robotics, Information, and nanotechnologies) are changing the way we learn, play, work and interact. Robot teacher offer opportunities but also challenges



for teachers, unlikely the classroom aides of the past, on the one hand, they make new ways of teaching and learning possible, and their preference helps to prepare children for a word of AI individual products with which they will have to interact daily on the other hand, robot make diggers human interaction, encourage laziness in thinking, and narrow what is exercised Two hot robots can do. They are novelty is attractive but there are understand reservations about their use in the classroom.

Humanoid robots teacher have the potential to make a useful contribution in the classroom, and they will become more autonomous and more capable overtime, but they do not think and feel like people. Those who work with them will need to think in different ways about what they do come. But one thing they should bear in mind is the need for children to learn to be human.

Heart Failure Detection Using Ai In A Single Heartbeat

Mr. Vijay Meshram
ETX 3rd Year

Hey Readers!!!

Artificial Intelligence (A.I.) is a multidisciplinary field whose goal is to automate activities that presently require human intelligence. The primary goal is to improve computer behavior so that it can be called intelligent. It is a field of study based on the premise that smart thought can be regarded as a form of computation one that can be formalized and ultimately mechanized. The major problem areas addressed in A.I. can be summarized as Perception, Manipulation, Reasoning, Communication, and Learning.

The success of AI:

Artificial Intelligence has revolutionized the diagnosis of cancer. The supercomputer of IBM Watson is already able to see deviations in the health of the individual. Statistically, it is found that about 30 % of cases Watson puts patients with an additional diagnosis which is generally missed by medical people. Even more impressive results achieved by AI at the Houston Methodist Research Institute in Texas. Artificial intelligence is used to explore the millions of mammograms (the speed of analysis is 30 times more than human) and gives on solutions with 99% accuracy. A driver in the US, who suffered a pulmonary embolism while driving was saved by the Tesla Autopilot system to drive him to a nearby hospital. Microsoft has demonstrated that AI caught up with the man in the efficiency of automatic speech recognition. The company used the so-called high-precision with recurrent neural networks to achieve result.

Congestive Heart Failure:

Nearly 10% of adults with age above 65 suffer from some congestive heart failure (CHF). There are a variety of different causes for CHF but the fundamental chronic condition generally results from the heart being unable to pump blood effectively through the body. X-rays, blood tests, and ultrasounds all offer clinicians useful ways to diagnose CHF, but one of the more common methods involves using

electrocardiogram (ECG) signals to determine heart rate variability over several minutes or even multiple measurements over days. An impressive new approach has now been demonstrated, using a convolutional neural network (CNN) that can identify CHF nearly instantly by checking ECG data from just one heartbeat.

How it can be detected using AI:

Applying artificial intelligence to the electrocardiogram (ECG) enables early detection of left ventricular dysfunction and can identify individuals at increased risk for its development in the future. The research published in Nature Medicine found that the accuracy of the AI/ECG compares favorably to other standard screening tests like prostate-specific antigen for prostate cancer and mammography for breast cancer. Asymptomatic left ventricular dysfunction (ALVD) is characterized by the presence of a weak heart pump with a risk of heart failure. It is present in 3% to 6% of the general population and is associated with reduced quality of life and longevity. However, it is treatable when found. Currently, there is no inexpensive, non-invasive, painless screening tool for ALVD available for diagnostic use. To address this, Paul Friedman and colleagues tested whether ALVD could be reliably detected in the ECG by a properly trained neural network. The team used paired 12-lead ECG and echocardiogram data, including the left ventricular ejection fraction (a measure of contractile function), from 44,958 patients at the Mayo Clinic, and trained a convolutional neural network to identify patients with ventricular dysfunction, defined as ejection fraction less than 35 %, using the ECG data alone. ―This suggests the network detected early, subclinical, metabolic or structural abnormalities that manifest in the ECG,‖ says Friedman. He trained and tested the CNN model on large publicly available ECG datasets featuring subjects with CHF as well as healthy, non-arrhythmic hearts. As Massaro proposes, the team‘s system is currently reporting an incredible 100 % accuracy rate, but the research is not without some limitations. Most importantly, the data used in the current study only consisted of ECG readings from either severe CHF patients or healthy subjects.

When tested on a set of 52,870 patients, the network model yielded values for the area under the curve, sensitivity, specificity, and accuracy of 0.93, 86.3 percent, 85.7 percent, and

85.7 percent, respectively. In patients not having ventricular dysfunction, those with a positive AI screen were at four folds the risk of incurring future ventricular dysfunction as compared to those with a negative filter. **"This suggests the network detected early, subclinical, metabolic or structural abnormalities that manifest in the ECG"** says Friedman.

100% Accuracy in Detection!

"We trained & tested the CNN model on publicly available large ECG datasets featuring subjects with CHF and healthy as well, non-arrhythmic hearts. Our model delivered a hundred percent accuracy by checking only one heartbeat; we can detect whether a person has heart failure or not. Our model is also the first to be able to identify the ECG's morphological features associated with the severity of the condition accurately." says Sebastian Massaro, from the University of Surrey

As Massaro suggests, the team's system is reporting an unbelievable hundred percent accuracy rate, but the research is not without any limitations. The data used in the study consisted of ECG readings from severe CHF patients or healthy subjects only. The researchers do note results might not be as correct for patients with milder CHF. Therefore much work certainly needs to be done to verify a broader spectrum of CHF diagnoses before the technology is used out in clinical practice.

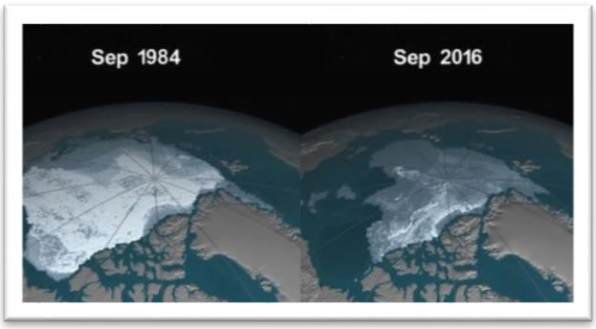
PLANET EARTH

Mr. Purvav Waghare
ETX 3rd Year

People nowadays are running behind their desires and their own needs like Money, property etc. They are just leaving the materialistic life nothing else. Everyone is wasting their time on Useless things, but they are not understanding the dangerous and drastic change that is going to occur due to the actions they are taking these days. Resources that are present on earth are depleting day by day rapidly. Pollution is increasing too much from past 50 years, purity of oxygen is decreasing day by day from the Polluted gases, the harmful chemicals &harmful waste that are coming out from the factories. Because of the chemicals those are coming out from the factories and the waste is being released in water aquatic life is getting hurt.

60 to 70 years ago **NOW**

As we can this are the images of same river, we can observe very drastic change in water quality The river water is very fresh and clean 60 to 70 years ago but now it is completely polluted and brown in color, recently in 2021 total population of planet earth is 7.87 billion and the amount of fresh water is only 3%.Because this issues we are creating many hazardous problem for ourselves.



We are cutting tress for building many houses, industries &factories and increasing the amount of carbon-dioxide instead of oxygen and we completely ignore the fact that if there are no tress the life on the earth is impossible.

Arctic sea ice.

Fresh water is found in glaciers, lakes, reservoirs, ponds, rivers & groundwater. The biggest source is glaciers but because of global warming atmospheric temperature is increasing

Because of that our very prestigious source of water is melting down and depleting. If the ice melts down at this speed and tress will get depleted there will be sudden rise in temperature catastrophic change human being will experienced.

IF such activities continues end of the world is not very far , but if we want to make our upcoming generations to take the experience the life we have taken on this one and only heaven called as planet earth we have to save our mother earth from agony we are giving her by exploiting it.

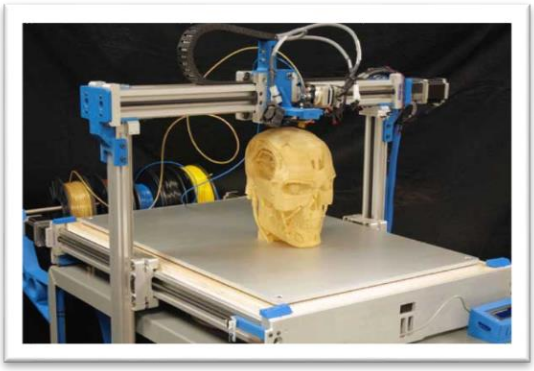
3D Printing

Ms. Sanika Kalkar
ETX 2nd Year

A method of manufacturing known as 'Additive manufacturing', due to the fact that instead of removing material to create a part, the process adds material in successive patterns to create
The desired shape.

- Main areas of use:
- Prototyping
- Specialized parts – aerospace, military, biomedical engineering, dental
- Hobbies and home use
- Future applications– medical (body parts), buildings and cars

3D Printing uses software that slices the 3D model into layers (0.01mm thick or less in most Cases). Each layer is then traced onto the build plate by the printer, once the pattern is completed, the build plate is lowered and the next layer is added on top of the previous one. Typical manufacturing techniques are known as 'Subtractive Manufacturing' because the process Is one of removing material from a preformed block. Processes such as Milling and Cutting are Subtractive manufacturing techniques. This type of process creates a lot of waste since; the Material that is cut off generally cannot be used for anything else and is simply sent out as scrap. 3D Printing eliminates such waste since the material is placed in the location that it is needed only, the rest will be left out as empty space.



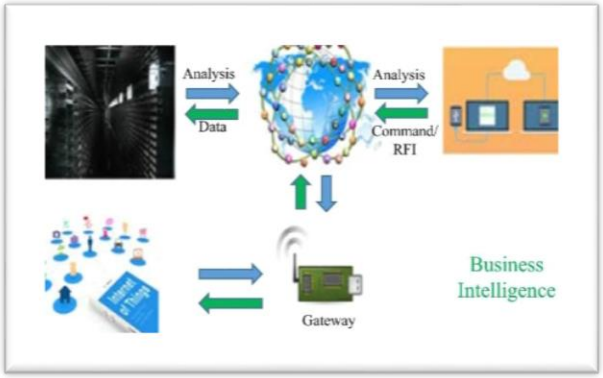
Biomedical Engineering

In recent years scientists and engineers have already been able to use 3D printing technology to create body parts and parts of organs.
The first entire organ created through 3D Printing is expected to be done in the coming years. The process of creating the organ or body part is exactly the same as if you were to create a plastic or metal part, however, instead the raw material used Are biological cells created in a lab. By creating the cells specifically for a particular patient, one can be certain that the patient's body will not reject the organ.

Internet of Things is a revolutionary approach for future technology enhancement

Mr. Mayur Laswante
ETX 2nd Year

Internet of Things (IoT) is a new paradigm that has changed the traditional way of living into a high tech life style. Smart city, smart homes, pollution control, energy saving, smart transportation, smart industries are such transformations due to IoT. A lot of crucial research studies and investigations have been done in order to enhance the technology through IoT. However, there are still a lot of challenges and issues that need to be addressed to achieve the full potential of IoT. These challenges and issues must be considered from various aspects of IoT such as applications, challenges, enabling technologies, social and environmental impacts etc. The main goal of this review article is to provide a detailed discussion from both technological and social perspective. The article discusses different challenges and key issues of IoT, architecture and important application domains. Also, the article bring into light the existing literature and illustrated their contribution in different aspects of IoT. Moreover, the importance of big data and its analysis with respect to IoT has been discussed. This article would help the readers and researcher to understand the IoT and its applicability to the real world.



In an Internet of Things (IoT) ecosystem, two things are very important: the Internet and physical devices like sensors and actuators. The bottom layer of the IoT system consists of sensor connectivity and network to collect information. This layer is an essential part of the IoT system and has network connectivity to the next layer, which is the gateway and network layer.

Recent advancements in IoT have drawn

attention of researchers and developers worldwide. IoT developers and researchers are working together to extend the technology on large scale and to benefit the society to the highest possible level. However, improvements are possible only if we consider the various issues and shortcomings in the present technical approaches. In this survey article, we presented several issues and challenges that IoT developer must take into account to develop an improved model. Also, important application areas of IoT is also discussed where IoT developers and researchers are engaged. As IoT is not only providing services but also generates a huge amount of data. Hence, the importance of big data analytics is also discussed which can provide accurate decisions that could be utilized to develop an improved IoT system. Thank you!.

Solar Power Technology

- **What Is Solar Power Or Energy**?

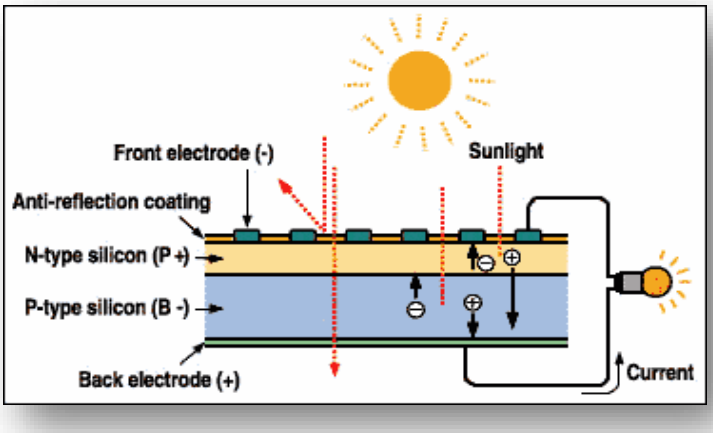
Ms. Anushka Vaidya
ETX 2nd Year

Solar energy is radiant light and heat from the Sun that is harnessed using a range of technologies such as solar power to generate electricity, solar thermal energy including solar water heating, and solar architecture. Solar is a clean, renewable source of energy that can help reduce carbon dioxide emissions and lower our impact on the natural environment.

- **History Of Solar Power Technology?** In 1839, French physicist Edmond Becquerel discovered the photovoltaic effect while experimenting with a cell made of metal electrodes in a conducting solution.2 He noted that the cell produced more electricity when it was exposed to light.

Later in 1873, Willoughby Smith discovered that selenium could function as a photoconductor.

Just three years later, in 1876 William Grylls Adams and Richard Evans Day applied the photovoltaic principle discovered by Becquerel to selenium. They recorded that it could, in fact, generate electricity when exposed to light.



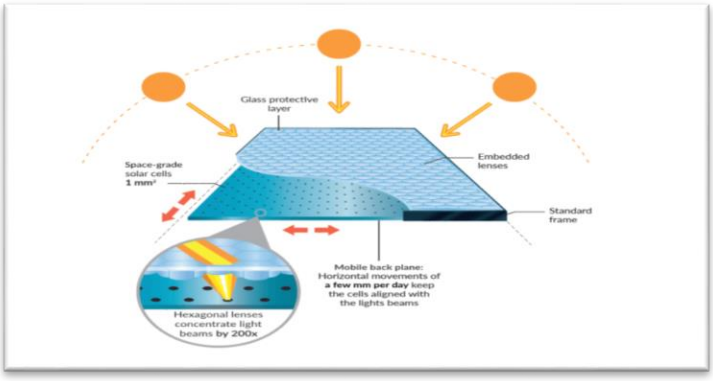
Almost 50 years after the photovoltaic effect's discovery, in 1883, American inventor Charles Fritz created the first working selenium solar cell. Though we use silicon in cells for modern solar panels, this solar cell was a major precursor to the technology used today.

Solar cells are converters. They take energy from the sunlight and convert that energy into electricity.

- Most solar cells are made from silicon, which is a "semi-conductor" or a "semi-metal"
- Solar cells are made by joining two types of semi-conducting material: P-type and N-type.
- At the atomic level, light consists of pure energy particles, called "photons".

• Solar Power Systems And Technologies

Active solar systems use solar collectors and additional electricity to power pumps or fans to distribute the sun's energy. The heart of a solar collector is a black absorber which converts the sun's energy into heat. The heat is then transferred to another location for immediate heating or for storage for use later. The heat is transferred by circulating water, antifreeze or sometimes air.



Solar energy technologies harness the energy of solar irradiance to produce electricity. Currently, there are principally two technologies employed: photovoltaic (PV) and concentrating solar power (CSP) technologies.

- **Photovolataics Cells (Pv)**

Solar cells convert sunlight directly into electricity. They are made of semiconducting materials similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the photovoltaic (PV) effect.

- **Concentrating Solar Power (Csp)**

A dish/engine system uses a mirrored dish (similar to a very large satellite dish). The dish-shaped surface collects and concentrates the sun's heat onto a receiver, which absorbs the heat and transfers it to fluid within the engine. The heat causes the fluid to expand against a piston or turbine to produce mechanical power. The mechanical power is then used to run a generator or alternator to produce electricity.

- **Why Solar?**

- ✓ reduce our dependence on imported fuels
- ✓ stimulate our economy by creating jobs in the manufacturing and installing of solar energy systems
- ✓ diversify our energy supply
- ✓ offset greenhouse gas emissions

Electronic Walking Stick for Blind……..

Abstract- is a great for any type of movement or walking within area or out of the particular area ,they use only their natural senses such as touch or sound such as touch or sound for identification walking .To overcome all these problem of blind people, need to develop a project by using simple available technologies. This walking stick for blind people which have multiple sensors, with the help of sensors it has

Ms. Falguni Titarmare
ETX 1st Year

possible to enhance more features to the walking stick.

Introduction –In this project, a simple, cheap, user friendly, smart blind walking stick is designed and implemented to improve the mobility of both blind and visually impaired people on streets. The feature is to detect the obstacle for collision avoidance, fire sensor, water-level sensor, light sensor, GPS tracking and emergency SMS. Sensors play a key role to make walking free obstacles for the blind people.

Scope Of The Project:

The project mainly includes:

1) Power generation for sensor circuits
2) Sensors: Obstacle detection using ultrasonic waves, Fire sensor, Water-level sensor, Indicate presence of blind person in the dark by LEDs
3) Send SMS to family member during emergency by push button
4) Person can be traced on Google Map by family

Application-Visually impaired persons will be able to travel places alone comfortably without any human assistance. Due to power generation by generator while working, there is no need of replacing batteries. Person does not need to search for a mobile to call help; just a push button and family will be informed about it. Family member can trace the person location.

Future Scope-This electronic stick can be further enabled with Voice assistance, Google voice search and voice navigation for a pre-defined location. A particular path will be set by the family and the navigation will be sent to the visually impaired person.

Advantages-

- It can detect any obstacle with the help of ultrasonic sensors.
- It can provide correct location of obstacle by using GPS system.

Conclusion-

This paper describes about an electronic walking stick to provide assistance to visually impaired persons while walking on streets. This will replace the current walking stick with electronic smart stick with various sensors. It would help to avoid accidents of visually impaired persons and help them to walk freely without human assistance.

Space Elevator

Mr. Preshit Sonkusare
ETX 1st Year

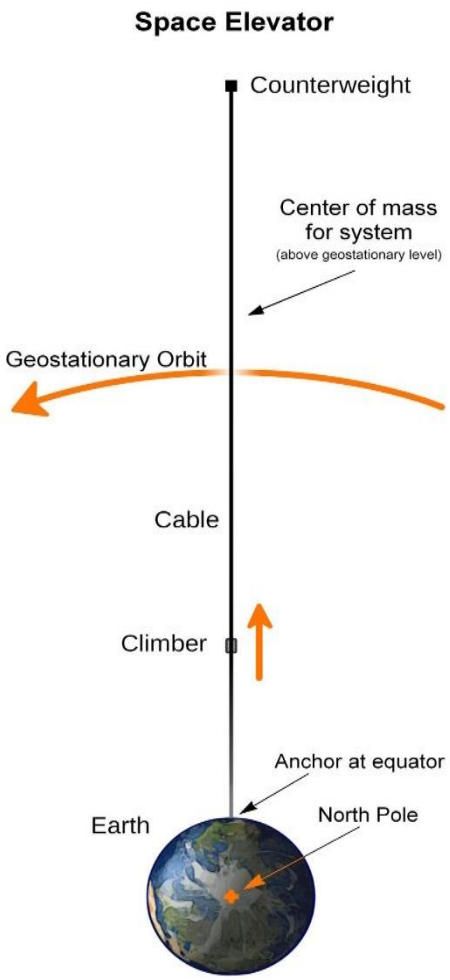
Hello Readers....

What do you think about Space Elevator?

Will Space Elevator be possible?

Yes, it can be possible with today's technology. Until now it's not reality but it will. Huge reduction in the cost for reaching the space, one idea is to build called as Space Elevator. The main component for the concept would be Cable. The cable would need to be incredibly strong.

The concept is that a cable stretching from earth to orbit that provides a way to climb into the space. For stability a counterweight at the upper end keeps the centre of mass well above geostationary orbit level.



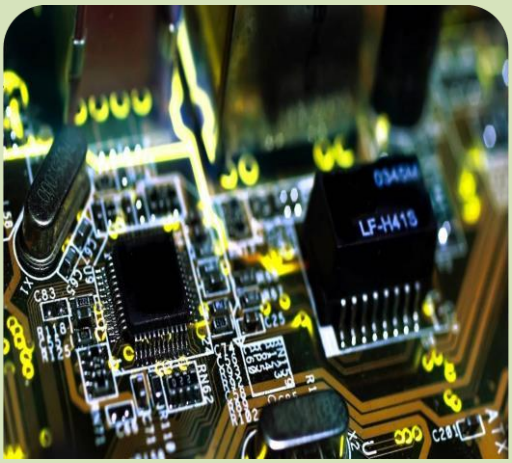
Climbers carry up and down the cable

This will be beneficial if becomes reality.

This is a technology which could cross the divide of science fiction to science reality if we somehow improved on existing technologies.

After all Necessity is the Mother of Invention!

It will be real soon.



Faculty Section

TABLE OF CONTENT

The Importance of Digital Communication in Engineering

Introduction

Mrs. P. P. Kotangale

In the modern era, engineering is no longer confined to blueprints, hardhats, and on-site work alone. The advent of digital technology has transformed every aspect of the engineering process, and communication is no exception. Digital communication has become a vital component of successful engineering practices across all disciplines—from civil and mechanical to software and electrical engineering. This article explores the significance of digital communication in engineering, its benefits, challenges, and future implications.

What is Digital Communication in Engineering?

Digital communication in engineering refers to the use of electronic tools, platforms, and systems to share information, collaborate on projects, and coordinate tasks. This includes emails, instant messaging, cloud-based project management tools, video conferencing, CAD software with collaborative features, IoT systems, and more.

Importance of Digital Communication in Engineering

1. Enhanced Collaboration

Engineering projects often involve multidisciplinary teams spread across different geographical locations. Digital communication tools enable seamless collaboration among engineers, architects, contractors, and stakeholders. Tools like Microsoft Teams, Slack, and Zoom allow real-time interaction, minimizing misunderstandings and improving decision-making.

2. Faster and More Efficient Workflow

Digital communication speeds up the exchange of information. Engineers can instantly send blueprints, models, or data reports to clients or colleagues. This drastically reduces delays

compared to traditional methods like physical mail or in-person meetings, helping projects stay on schedule.

3. Improved Documentation and Traceability

Digital platforms automatically document conversations, design iterations, and decisions made during the engineering process. This creates a reliable archive that can be referred to in case of disputes, audits, or future project planning. Tools like Trello, Asana, and Jira ensure accountability by tracking every change or update made.

4. Real-Time Problem Solving

Engineering problems often require immediate attention. With digital communication, teams can troubleshoot issues in real-time. For example, a site engineer can send images or videos of an on-site problem to the design team, who can respond with guidance within minutes, thus reducing downtime.

5. Global Collaboration and Remote Work

The COVID-19 pandemic accelerated the shift toward remote work. Even in engineering—a traditionally on-site profession—remote collaboration became possible thanks to digital communication tools. Engineers can now contribute to global projects from anywhere, increasing flexibility and access to a wider talent pool.

6. Integration with Modern Tools

Modern engineering increasingly relies on advanced software like AutoCAD, SolidWorks, MATLAB, and simulation platforms. These tools often come with built-in digital communication features, allowing teams to share models, review annotations, and provide feedback directly within the platform. This tight integration streamlines the design and review process.

7. Sustainability and Cost Savings

Reducing the need for paper documentation, physical meetings, and travel contributes to environmental sustainability and cost savings. Digital communication lowers the carbon footprint of engineering operations while also cutting overhead expenses.

Challenges of Digital Communication in Engineering

While the advantages are significant, digital communication in engineering does come with its challenges:

- **Data Security**: Engineering projects often involve sensitive data. Secure communication channels and encrypted systems are crucial.
- **Miscommunication**: Without visual cues, messages can sometimes be misinterpreted, especially in multicultural or multilingual teams.
- **Technical Issues**: Network problems or software glitches can disrupt communication at critical moments.
- **Learning Curve**: Some professionals may struggle to adapt to new tools, especially older generations of engineers unfamiliar with digital platforms.

Future of Digital Communication in Engineering

The future promises even more integrated and intelligent digital communication systems. Artificial Intelligence (AI), Augmented Reality (AR), and Virtual Reality (VR) are expected to revolutionize how engineers collaborate and communicate. Digital twins—virtual replicas of physical systems—will enable real-time monitoring and discussion of engineering systems, while blockchain could ensure secure and transparent communication and data sharing.

Moreover, the rise of the Internet of Things (IoT) and 5G will facilitate ultra-fast, real-time data exchange between devices and teams, further enhancing the collaborative capabilities of engineers across the globe.

Conclusion

Digital communication is no longer optional—it is essential in modern engineering practice. It enhances collaboration, speeds up workflows, improves documentation, and enables global cooperation. While challenges exist, the benefits far outweigh the drawbacks. Engineers who embrace digital communication are better equipped to tackle complex

projects efficiently and innovate in ways that were previously impossible. As technology continues to evolve, so too will the methods by which engineers connect, create, and construct the world around us.

IFSO (Indoor Free Space Optical Links) Systems

Mr. R. B. Sathe

The purpose of an IFSO system is to build a wireless optical communication link between a base station tower fitted over the ceiling inside a room with number of users within the room. Since the atmosphere inside the room is undisturbed i.e. not affected by atmospheric effects such as wind flow, fog, snow, rain etc, the channel characteristics is not similar as in outdoor free space optical channel. However, line of sight signal may be blocked by the roaming users inside the room and therefore an alternative arrangement using diffusing optics is used for uniform illumination inside the room.

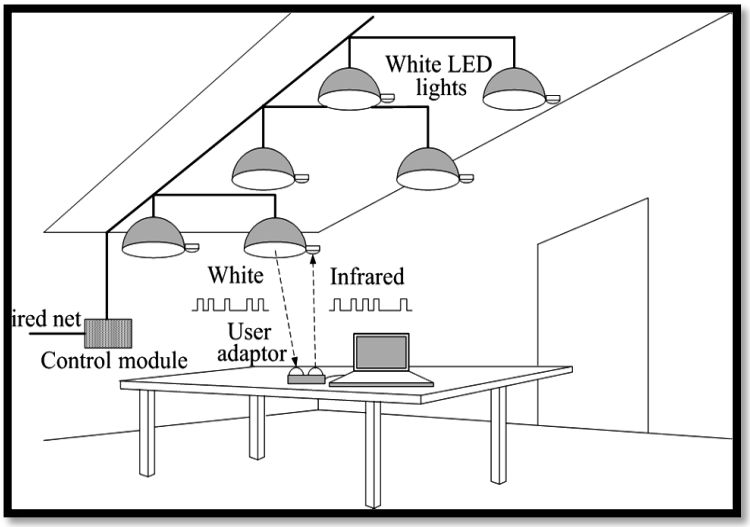


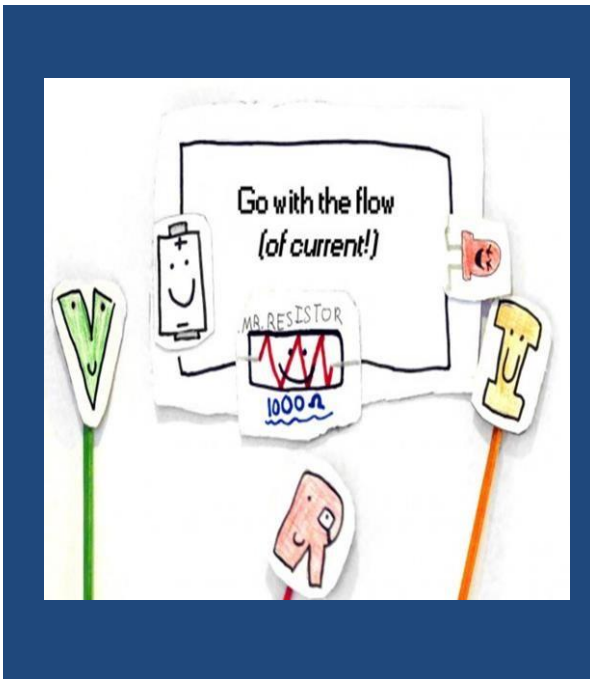
Figure : LED-based duplex channel optical wireless communication system

The block diagram represents the principle of operation of LED based duplex channel wireless communication link employing white LED lights and infrared LEDs for indoor internet access as shown in Fig. The diagram shows white LEDs acting as optical transmitters and photodiodes as optical receivers. The white light LED will act as source for illumination as well as for communication with the user inside the room. The downlink comprises of white lights from LED which is modulated by signals from the wired net. A PIN photo-detector is used to detect these incoming modulated signals. The uplink section comprises an infrared LED and a photo-detector to detect downlink signals. Both links

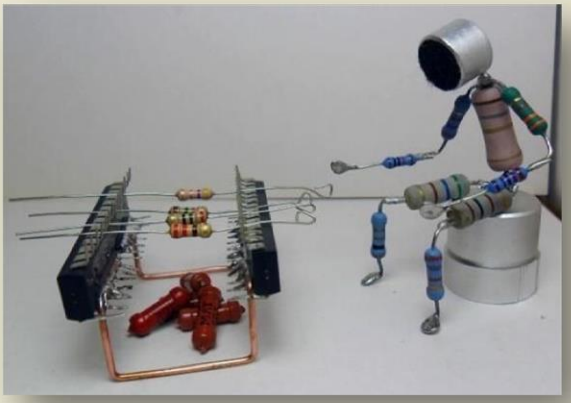
adopt intensity modulation with direct detection (IM/DD) techniques. On-off keying (OOK) is one of the preferred modulation techniques employed in IFSO communication due to its good bandwidth efficiency and ease of implementation.

LEDs present wider emission beams than laser diode, which makes them the preferred option of the indoor non-directed and the hybrid configurations. In addition, they are generally considered safer to eyes, which mean that they can be used at higher emission powers than laser diodes. Further, they are more robust and cheaper than laser diode, which favors their use for indoor applications.

Other important features of LEDs include lower sensitivity to temperature variations (compared to laser) and simplicity of the driver circuit associated with them. Laser diodes, on the other hand, require more complex driver circuits and are more sensitive to temperature fluctuations. Despite of these limitations, laser diodes can be modulated at higher speeds than LEDs, which makes them the only option in applications that require a very high data rate. Moreover, the fact that their emission beams are very narrow means that they can be used over longer distances, which favors their use in directed-LOS outdoors links for high-speed data communication.



Fun With Electronics



- DID YOU KNOW?
- CROSSWORD PUZZLE
- FUN FACTS

Did You Know?

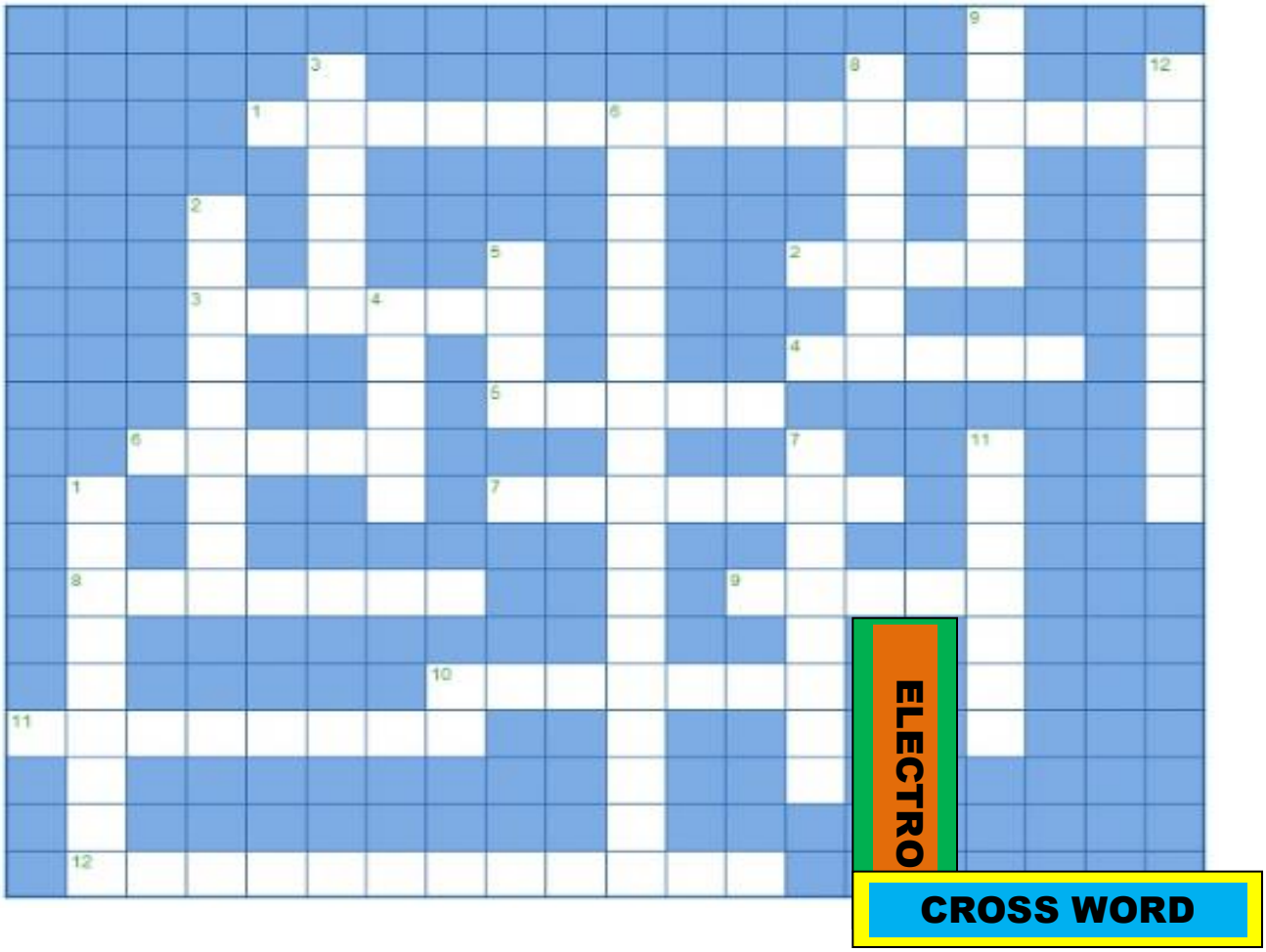
1. Samsung was founded 38 years before Apple.
Samsung was founded in 1938 as a grocery store while Apple was founded in 1976

2. The first computer mouse was rectangular and made of wood

3. The first ever computer virus was developed in 1971, named Creeper

4. In 1936, Russia built a computer that ran on water

5. 'Baby Shark Dance' holds the record for most views on YouTube



Across

1. Two resistors connected together, across a power supply (9, 7)
2. Process used to remove unwanted copper from a PCB (4)
3. Colour band used to indicate the number 7 (6)
4. Colour band used to indicate the number 0 (5)
5. Connects the components together on a PCB (5)
6. A component which allows current to flow only in one direction (5)
7. Makes a sound (7)
8. A collection of components, connected together (7)
9. The L in LED (5)
10. Flows through a circuit (7)
11. Electronics that works with real voltages (9)
12. Type of capacitor, which is polarised (12)

Down

1. Shape of the schematic symbol for a resistor (9)
2. Stores charge (9)
3. Electrically joints components to a PCB (6)
4. Energy that allows the electronics to work (5)
5. Check the board works, after construction (4)
6. A chip / part with two row of pins (10, 7)
7. Component with coloured bands to determine it's value (8)
8. Something that can only be true / false, 0 or 1 (7)
9. Used to turn things on and off (6)
10. Letters used to mark commercial electronics sold in Europe (2)
11. Measured across components such as batteries (7)
12. A component that acts like an electronic switch (10)


Some SMT Machines are capable of placing 136,000 components an hour.
Creation Technologies' first manufacturing facility in North Vancouver, Canada is now a bike shop.
According to Moore's Law, microchips double in power every 18 to 24 months. Gordon E. Moore, a founder of Intel, proposed the concept in 1965.
Surface mount designed PCBs are up to one tenth of the size of through-hole circuits.
Fun Facts
Florecent lighting generates so much heat that manufacturing facilities need more HVAC systems in order to maintain a constant temperature inside the building.
Foxconn builds 540,000 iPhone units for Apple per day.
Electronics comprised 40% of car component costs in 2015.
Instead of wires, PCBs use copper traces to transport electrons.

SAETE

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