B.S. Abdur Rahman ™ Crescent Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

SIT
Society of Information Technologists

DEPARTMENT OF INFORMATION TECHNOLOGY

SOCIETY OF INFORMATION TECHNOLOGISTS

INNOVATE IN IT

FEB 2024

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ABOUT THE DEPARTMENT

The department was started in 1999 and has been offering B.Tech.-Information Technology since 1999, M.Tech.-Information Technology since 2010 and Ph.D since 2009. It has highly qualified, experienced and dedicated faculty members specialized in various areas like Artificial Intelligence, Deep Learning, Machine Learning, IoT, IIoT, Data Science, Cyber Security, Cloud Computing, Mobile Computing & Networks, Computer Networks, Ad hoc Networks and Software Engineering.

The faculty members contribute their very best to the academic environment by publishing research papers in National and International Journals. The department imparts comprehensive knowledge coupled with practical exposure, which is essential for software design, development and testing in the IT industry. To expose latest trends to the students, value-added courses, MOOC, in-house seminars, workshops, industrial visits are conducted periodically. A National level symposium 'ICON' is organized every year by the department's professional society, "Society of Information Technologists (SIT)" to enhance the technical skills of the students.

VISION AND MISSION OF THE DEPARTMENT

The Vision of the IT department

- To be a leader in providing quality education and training in the field of Information Technology at Undergraduate and Postgraduate levels and undertake Research activities thereby contributing to the progress of the country.

The Mission of the IT department

- To impart quality education and inculcate professionalism to suit the needs of the industries and society.
- To involve graduates in undertaking need based Research activities and disseminate the knowledge to develop entrepreneurial skills.
- To improve the professionalism through extension activities, industrial visits and in-plant training.
- To improve communicate effectively both in documentation and presentation.
- To create awareness of social, economic responsibilities ethically.

"The mind is not a vessel to be filled but a fire to be ignited."
—Plutarch

PROGRAMME EDUCATIONAL OBJECTIVES

The Programme Educational Objectives for students of B.Tech – Information Technology Programme within the first few years after graduation are that they will

- have core competence in mathematics, science and engineering concepts essential to formulate, analyze and solve hardware / software engineering problems
- possess good breadth of knowledge in the core areas of information technology and related engineering so as to comprehend engineering trade-offs, analyze, design and synthesize data and technical concepts to create novel products and solutions for the real time problems
- use tools and techniques for software development in different application domains and to grow as an entrepreneur.
- apply their knowledge and multifaceted skills to get immediate employment and excel in IT professional careers or awareness of the lifelong learning needed to continue their education in IT or related post graduate programmes to perform excellence, leadership and demonstrate good citizenship.
- maintain high professionalism and ethical standards, effective oral and written communication skills, to work as part of teams on multidisciplinary projects and diverse professional environments, and relate

"You don't have to be great to start, but you have to start to be great."
–Zig Ziglar

PROGRAMME OUTCOMES

On successful completion of the programme, the graduates will be able to:

- apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
- identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
- use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions
- create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
- apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

"Learn from yesterday. Live for today. Hope for tomorrow."
–Albert Einstein

PROGRAMME OUTCOMES

- understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
- apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
- function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
- recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

“He who asks a question is a fool for five minutes; he who does not ask a question remains a fool forever.”

PROGRAMME SPECIFIC OUTCOMES

- Design and conduct experiments for organizing, analyzing, interpreting data to develop skills related to information retrieval
- Identify, formulate and solve computing problems using appropriate tools & techniques to meet industrial and societal needs in different domains

“Today a reader. Tomorrow a leader.”

MESSAGE FROM HOD/IT

Dr. N. Prakash
HOD/IT

It is a great privilege and immense honor to inform you that the Department of Information Technology is publishing its annual technical magazine "INNOVATE IN IT 2024". It is reflection of student's hidden talents, skills and caliber. This magazine certainly would induce the young engineers to promote their creativity in approaching things differently. This technical magazine is a platform to exhibit the literary skills and innovative ideas of students.

I would like to thank all editorial team members for providing students a platform for creative thoughts and knowledge expansion. I express my considerable appreciation to all the authors of the articles in this magazine. I express my gratitude to all for their involvement, encouragement, support and guidance.

DEPARTMENT FACULTY

DR. N.PRAKASH
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PROFESSOR & DIRECTOR (MIS)

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PROFESSOR

DR. G.KAVITHA
PROFESSOR & DIRECTOR IN CHARGE, CITL

DR. KABEER M
ASSOCIATE PROFESSOR

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ASSISTANT DIRECTOR (IQAC)

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SOCIETY OF INFORMATION TECHNOLOGISTS

OFFICE BEARERS OF SIT

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M MOHAMED SALMAN FARIZ

JOINT SECRETARY
M CHOUMYA

JOINT SECRETARY
S MOHAMED AMEER DEEN

TREASURER
M MOHAMED IMRAN KHAN

EVENTS ORGANIZED BY SOCIETY OF INFORMATION TECHNOLOGISTS

1 INAUGURATION OF SIT AND IT TRAILBLAZERS

The event commenced with a warm welcome address delivered by Ms. A. Sonya, (Sr.Gr)/IT. Following this, Mr. M. Mohamed Salman Fariz, the General Secretary of SIT, presented a comprehensive report on the department's activities. Dr. N. Prakash, the Head of the IT Department, then delivered the presidential address. Dr. Sharmila Shankar, the Dean of SCIMS, extended felicitations to the gathering.

The Department of Information Technology conducted the inaugural function of Society of Information Technologists and IT TrailBlazers for the academic year 2023-2024 on 14.10.2023 from 10.00 am to 1.

The introduction of the chief guest, Dr. P. Gnanasekran, Assistant Professor (Sel.Gr)/IT. The much-anticipated inaugural address on "Software Development Trends in 2023/24" was delivered by Mr. Abdul Hakim, the Founder and CEO of ABR SYSTEMS PRIVATE LIMITED. Following this enlightening address, an engaging Q&A session was held. Ms. M. Choumya then introduced the office bearers of SIT, providing insights into their roles and responsibilities

Ms. M. Choumya then introduced the Executive Members of SIT, providing insights into their roles and responsibilities and Introduced the IT TrailBlazers.

The introduction of IT Trailblazers was skillfully presented by Ms. Aysha, the President of ITT, highlighting the achievements and contributions of these accomplished individuals

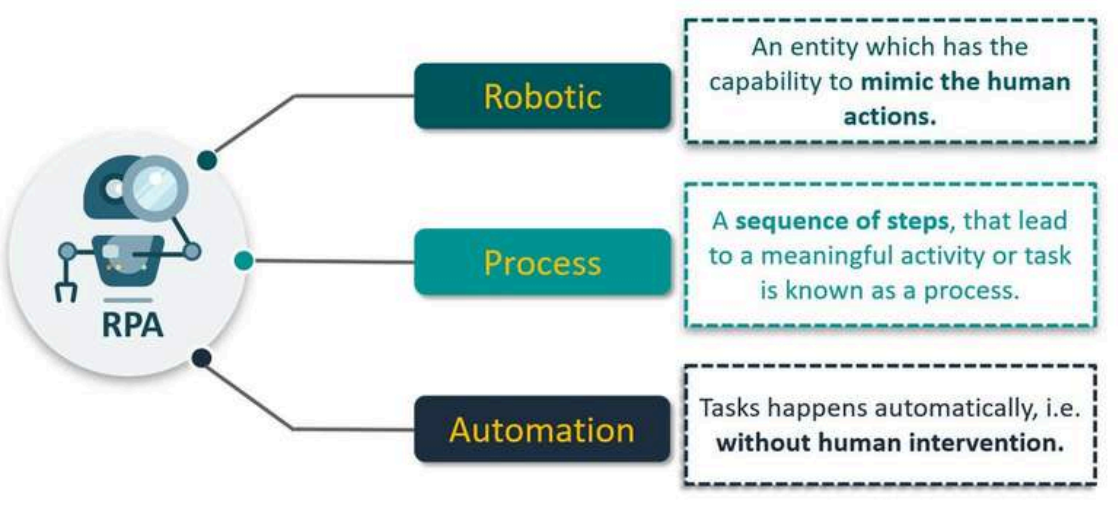
The event served as a platform for intellectual exchange and collaboration, fostering a sense of community within the department. It was a testament to the commitment and passion of the individuals who make up the [Department Name] at B.S.Abdur Rahman Crescent Institute of Science and Technology.

TECHNICAL ARTICLES

RPA AND HUMAN WORKFORCE COLLABORATION IN THE TECHNOLOGICAL AGE

WHAT IS RPA?

Robotic process automation (RPA) is a software technology that allows you to easily create, deploy, and manage software robots that mimic human motions while dealing with digital systems and software. Software robots, like people, can grasp what is on a screen, type the correct keystrokes, traverse systems, discover and retrieve data, and do a variety of prescribed activities. However, software robots can do it faster and more reliably than humans, eliminating the need to stand up and stretch or take a coffee break.



WHAT ARE THE COMMERCIAL ADVANTAGES OF RPA?

Robotic process automation simplifies operations, increasing profitability, flexibility, and responsiveness. It also improves employee satisfaction, engagement, and productivity by eliminating tedious chores from their workdays. RPA is non-invasive and may be quickly adopted to expedite digital transformation. It's also suitable for automating procedures that use outdated systems without APIs, virtual desktop infrastructures (VDIs), or database access.

INTRODUCTION

In today's changing automation world, the collaboration between Robotic Process Automation (RPA) and the human workforce has emerged as a vital focus. As we approach 2024, organizations are increasingly understanding the importance of striking the appropriate balance between harnessing RPA's efficiency and keeping human workers' particular abilities and creativity. In this article, we look at the changing dynamics of RPA and human cooperation, and how businesses are effectively navigating this revolutionary path.

WHY IS RPA THE WORLD'S FASTEST GROWING CORPORATE SOFTWARE?

When you combine RPA's quantifiable value with its ease of installation in comparison to other corporate technology, it's clear why RPA adoption is rising throughout the world. RPA can help many different sectors handle their own operational difficulties in novel and compelling ways. Leaders in functional areas ranging from finance to customer service to marketing to human resources and beyond report that RPA improves numerous operations, resulting in increased capacity, quicker throughput, and fewer mistakes for critical activities.

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When compared to other corporate technologies, an investment in RPA technology provides rapid ROI and needs less upfront cost, according to CFOs. IT leaders believe that RPA can be implemented with minimal interruption. And since software robots can readily access and work within legacy systems, RPA has emerged as a critical facilitator of digital transformation.

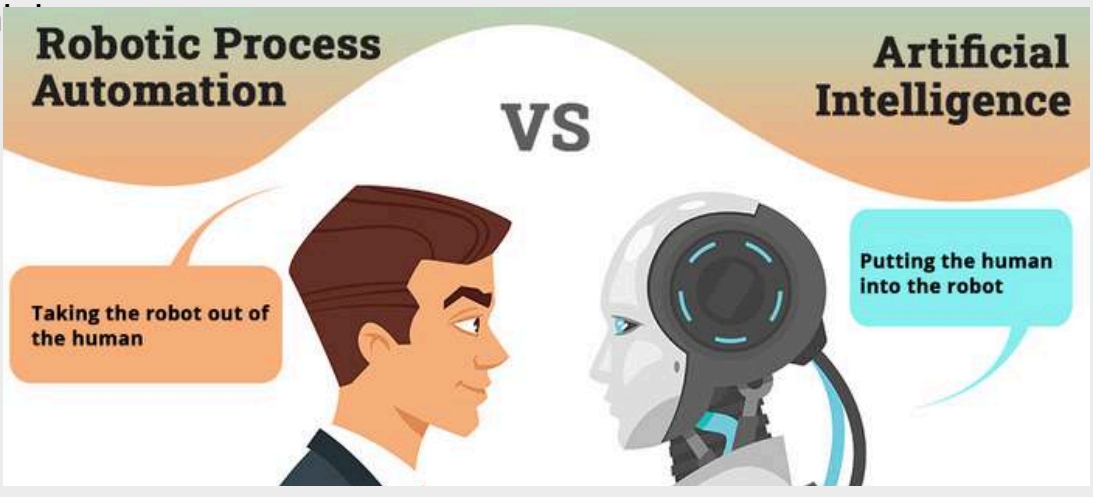
Modern RPA technology provides scalable, enterprise-ready platforms. Employees find it easy to incorporate robotic assistants into their workdays, and RPA's low-code approach allows them to become citizen developers capable of creating their own basic automations.

IS RPA EQUIVALENT TO ARTIFICIAL INTELLIGENCE (AI)?

RPA is not the same as AI. However, the combination of RPA and AI opens vast new opportunities for businesses worldwide. For starters, RPA technology now allows for the integration of complex AI skills like machine learning models, natural language processing (NLP), character and picture recognition, and others into RPA robots. Giving robots these AI skills significantly improves their capacity to handle cognitive activities that involve things like:

- Understanding documents that contain semi-structured or unstructured data.
- Visualizing displays, including virtual desktops.
- Understanding speech and engaging in discussions and chats.

AI is also making it feasible to scientifically find a wide range of automation possibilities and construct a solid automation pipeline using RPA tools such as process m



UNDERSTANDING COLLABORATION DYNAMICS

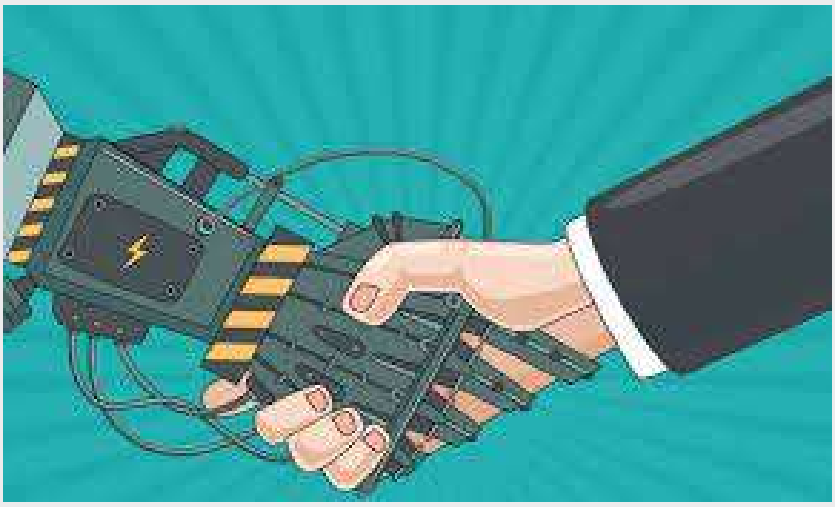
The introduction of RPA has resulted in a paradigm change in how firms handle operational procedures. While RPA excels in automating rule-based, repetitive operations with precision and speed, it is critical to acknowledge that certain jobs demand complex decision-making ability, creativity, and emotional intelligence, which people bring to the table. The objective is to design an environment in which RPA and human workers complement one another effortlessly.

IDENTIFYING COMPLEMENTARY ROLES

In 2024, effective firms will find activities that use the skills of each labor element. RPA excels in handling high-volume, rule-based tasks, freeing up human workers to concentrate on activities that demand critical thinking, problem-solving, and empathic engagement with customers and colleagues.

ENHANCING CREATIVITY WITH RPA SUPPORT

Rather than replacing human workers, RPA is being used to improve their performance. By automating repetitive and time-consuming operations, RPA frees up human workers' time to pursue creative solutions, offer unique ideas, and make strategic decisions, eventually contributing considerable value to the firm.



STRATEGIES FOR EFFECTIVE COLLABORATION

COMPREHENSIVE TRAINING PROGRAMS

It is critical to ensure that human workers have the skills required to properly engage with RPA. Comprehensive training programs that address both technical issues and the larger implications of automation promote a collaborative approach and reduce resistance to change.

TRANSPARENT COMMUNICATION

Transparent communication regarding RPA's function and influence on the workforce is critical to establishing confidence. Employees must realize that RPA is not a threat, but rather a tool meant to enhance their talents, decrease monotonous chores, and provide chances for skill development and career advancement.

DYNAMIC WORKFLOW DESIGN

Organizations are redesigning workflows to use the strengths of both RPA and human labor. This includes identifying touchpoints where cooperation is most successful, enabling a smooth turnover of activities between bots and people, and being flexible to meet changing business demands.

CONCLUSION

As we manage the complex balance between RPA and the human workforce in 2024, the emphasis is on establishing the proper balance. Collaboration between RPA and humans is not a zero-sum game; rather, it allows enterprises to leverage the capabilities of both groups to reach unparalleled levels of efficiency and creativity. By adopting this disruptive strategy, firms can create a workplace where automation and human innovation coexist, creating a future in which the total is genuinely greater than the parts.

FARIHA HIBA G R
RRN: 221272601002
M.TECH IT 2ND YEAR

PROTECTING A DIGITAL WORLD

CYBER SECURITY

in today's rapidly advancing digital age, where almost every aspect of our lives is connected to the internet, the need for robust cyber security measures has become paramount. Cyber security, defined as the protection of computer systems and networks from digital threats, has become a pressing concern for individuals, governments, and businesses. The ever-evolving landscape of technology poses numerous risks and vulnerabilities that need to be addressed to safeguard our digital world. With the increasing dependency on the internet, cyber-attacks have become more sophisticated and frequent. From individual hackers to well-funded criminal organizations, cyber criminals are constantly looking for vulnerabilities to exploit. These threats can range from stealing personal and financial information to launching large-scale attacks that cripple entire networks or infrastructure. The consequences of a successful cyber-attack can be devastating, causing financial loss, reputational damage, and, in some cases, even threats to national security.

Another major concern in cyber security is the rise of ransomware attacks. Ransomware is a type of malicious software that encrypts a user's files and holds them hostage until a ransom is paid, usually in the form of cryptocurrency. These attacks can have devastating consequences for individuals and businesses, resulting in loss of sensitive data and substantial financial damage. Regularly backing up data and implementing robust security measures are essential to mitigate the risk of ransomware attacks.

One of the biggest cyber security threats facing individuals and organizations today is the ever-growing threat of phishing attacks. Phishing involves attempting to deceive individuals into revealing sensitive information such as passwords, credit card numbers, or social security numbers. These attacks are often carried out through deceptive emails, websites, or messages that appear to come from a legitimate source. Education and awareness are key in protecting oneself from falling victim to phishing attempts.With the increasing dependency on the internet, cyber-attacks have become more sophisticated and frequent. From individual hackers to well-funded criminal organizations, cyber criminals are constantly looking for vulnerabilities to exploit. These threats can range from stealing personal and financial information to launching large-scale attacks that cripple entire networks or infrastructure.

To address these challenges, organizations and individuals need to adopt a multi-faceted approach to cyber security. It begins with implementing strong and secure passwords, as weak passwords are often the first line of defense that hackers exploit. Regular software updates are also crucial, as these updates often include important security patches that protect against newly discovered vulnerabilities. Additionally, utilizing firewalls and antivirus software can provide an additional layer of protection against malicious software and unauthorized access.

Furthermore, education and awareness play a vital role in preventing cyber-attacks. Individuals should be informed about the risks associated with their online activities and the basic measures they can take to protect themselves. Phishing scams, for example, can be thwarted by simply being cautious of suspicious emails and links. In the corporate world, training employees on cyber security best practices and implementing strict protocols can significantly reduce the likelihood of successful attacks.However, cyber security is not just an individual responsibility; governments and businesses also have a critical role to play. Governments must enact legislation that helps combat cybercrime, while also encouraging collaboration between various stakeholders, such as law enforcement agencies, businesses, and international partners. Sharing information about emerging threats and best practices can help create a united front against cyber criminals.

Businesses, particularly those dealing with sensitive customer data, must invest in robust cyber security measures to protect themselves and their clients. This includes conducting regular risk assessments, implementing strong authentication protocols, and employing encryption technologies. Failure to prioritize cyber security not only puts the organization at risk but also erodes customer trust, which can have long-lasting negative effects on the company's reputation and bottom line. In conclusion, cyber security is a critical concern in our digitalized world. The growing sophistication of cyber-attacks necessitates constant vigilance and proactive measures to protect our personal information, financial assets, and digital infrastructure. By adopting a multi-faceted approach that encompasses strong passwords, regular updates, education, and collaboration, we can mitigate the risks associated with cyber threats. Only through collective efforts can we ensure a secure digital future for all.

M MOHAMED SALMAN FARIZ
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B.TECH IT
FINAL YEAR

THE RISE OF ARTIFICIAL INTELLIGENCE

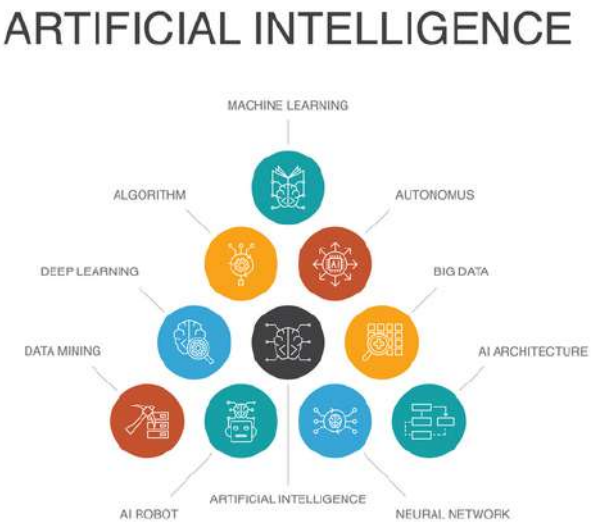
Artificial Intelligence (AI) is rapidly transforming the way we live, work, and interact with technology. With its ability to analyze vast amounts of data, learn from patterns, and make autonomous decisions, AI has become a game-changer in numerous industries. From revolutionizing healthcare and driving innovation in businesses to reshaping the workforce and raising ethical concerns, AI's impact is undeniable. This article explores the rise of AI, its implications for society, and the opportunities and challenges it presents in various sectors. Understanding AI is crucial to navigate the rapidly evolving landscape of the modern world.

A BRIEF HISTORY OF AI

The journey of AI began in the 1950s when researchers first explored the idea of creating machines that could simulate human intelligence.

Over the years, significant advancements have been made, and AI has evolved from simple rule-based systems to more sophisticated technologies like machine learning and deep learning.

However, AI has experienced highs and lows throughout its history. There have been periods of optimism followed by "AI winters" when progress seemed stagnant. But in recent years, fueled by advancements in computing power and the availability of vast amounts of data, AI has experienced a tremendous resurgence. It is now poised to revolutionize various industries and reshape our society.



AI IN INDUSTRY

AI in Manufacturing and Automation
In the manufacturing sector, AI is streamlining operations and driving efficiency. Intelligent robots are taking over repetitive and physically demanding tasks, improving productivity and reducing the risk of human error. AI-powered systems can monitor equipment health, predict maintenance needs, and optimize production schedules, leading to cost savings and increased output.

AI in Retail and Customer Service
AI is transforming the retail landscape by enhancing customer experiences. Chatbots and virtual assistants provide personalized recommendations, answer queries, and assist with purchases, improving customer satisfaction and engagement. AI algorithms also analyze customer data to predict trends, optimize inventory management, and create targeted marketing campaigns.

AI in Finance and Banking
In the finance and banking industry, AI is revolutionizing processes like fraud detection, risk assessment, and trading. Advanced algorithms can analyze vast amounts of financial data in real-time, identifying anomalies and potential risks with greater accuracy than human experts. AI-powered chatbots also streamline customer service, providing quick and efficient support.

IMPLICATIONS OF AI

Positive Impacts of AI
AI presents numerous opportunities for society. It has the potential to improve healthcare outcomes, enhance education, and contribute to scientific discoveries.
AI-driven technologies can automate mundane tasks, freeing up time for humans to focus on more complex and creative work. Additionally, AI has the potential to foster economic growth and create new job opportunities in emerging fields.

Negative Impacts of AI
However, AI also raises concerns and challenges. There are worries about job displacement as automation takes over certain roles. Ethical concerns arise regarding privacy and security, as AI relies heavily on personal data. There's also the risk of bias in AI algorithms, which can perpetuate social inequalities. It is essential to address these challenges to ensure that the benefits of AI are accessible to all and that its deployment is responsible and

ETHICAL CONSIDERATIONS

Privacy and Data Protection
As AI technologies rely on data, privacy and data protection are crucial considerations. Personal data collected by AI systems must be handled securely and in compliance with regulations. Transparency and consent are vital to ensure individuals have control over their data and understand how it is being used.

Transparency and Accountability
AI algorithms should be transparent and explainable to build trust and avoid hidden biases. It is important to understand how decisions are made by AI systems, especially in critical areas such as healthcare or finance. Additionally, organizations and developers must take responsibility for the outcomes and impacts of their AI technologies.

In conclusion, AI is a remarkable force that is changing the world as we know it. It offers immense potential for progress and innovation across industries. However, it is essential to address the challenges and ethical considerations to ensure that AI benefits society as a whole and is deployed responsibly and fairly. With the right approach, AI can be a truly transformative and positive force in our lives.

AI AND THE WORKFORCE

Automation and Job Displacement
With AI on the rise, there's no doubt that some jobs will be automated. Machines are becoming smarter, and even my toaster has more computing power than I do. But before we start panicking about job losses, let's take a moment to appreciate the wonders of AI. By taking over mundane and repetitive tasks, AI can free us up for more creative and meaningful work. So, while some jobs may be displaced, new and exciting opportunities will also emerge.

New Job Opportunities and Skill Requirements
As AI takes on routine tasks, it opens up avenues for us humans to explore new areas. Jobs that require empathy, critical thinking, and creativity will be in high demand. Think about it - who wants a robot as a therapist? However, this means we need to adapt our skill sets. It's time to dust off those problem-solving skills and hone our emotional intelligence. So, fear not! The rise of AI is not the end of the workforce; it's just a chance for us to level up.

AI IN HEALTHCARE

Improving Medical Diagnosis with AI
AI is like the Sherlock Holmes of healthcare. It has the ability to analyze medical data, spot patterns, and make accurate diagnoses faster than you can say "stethoscope." With AI by their side, doctors can provide more precise treatment plans, leading to improved patient outcomes. So, next time you're at the doctor's office, don't be surprised if Dr. AI makes an appearance. Just try not to feel too threatened; they haven't quite nailed the bedside manner yet.

AI in Drug Discovery and Treatment Development
Gone are the days of laborious trial and error in drug discovery. AI is here to speed things up. With its computational prowess, AI can analyze vast amounts of genetic data and identify potential drug candidates. This means new treatments can reach patients faster, giving hope to those in need. So, when it comes to developing life-saving medications, AI is definitely a VIP - Very Intelligent Partner.

AI AND PRIVACY

Data Privacy Laws and Regulations

Ah, data privacy - the real-life equivalent of walking a tightrope blindfolded. With AI, we have access to tons of personal data, but we need to protect it like our lives depend on it. That's why we have data privacy laws and regulations in place, keeping our information secure. It's like having bouncers guarding the VIP section of a nightclub - no shady characters allowed near our personal data!

Personalized AI and User Consent

While data privacy is crucial, we also need to embrace the benefits of personalized AI. Imagine AI that knows exactly what you need and delivers it with a smile (metaphorically, of course). But here's the catch - we should have control over what information we share. User consent is paramount. Think of it like lending your Netflix password to a friend - only if you trust them, and only for a limited time. So, let's find the sweet spot between personalization and privacy, where AI can cater to our needs without crossing any boundaries.

AI IN EDUCATION

AI-based Personalized Learning

Raise your hand if you ever wished your teacher knew just what you needed to excel in class. Well, say hello to AI-based personalized learning! With AI as our study buddy, it can tailor educational content to our individual needs, making learning a breeze. No more wishing for a psychic teacher. AI's got our back!

Virtual Assistants and Intelligent Tutoring Systems

Picture this: an AI tutor who's available 24/7, never gets tired, and doesn't mind explaining quadratic equations for the hundredth time. Sounds like a dream, right? Well, with virtual assistants and intelligent tutoring systems, it's a reality. These AI-powered helpers are like having an Encyclopedia Britannica trapped inside your computer.

They can provide instant answers and guidance whenever you need it. So, forget about waiting for office hours. AI is the tutor that's always ready to assist.

As AI continues to advance at an astonishing pace, its influence will only grow stronger. It has the potential to revolutionize industries, improve our lives, and shape the future of society. However, it is essential to approach AI with a balanced perspective, considering the ethical implications and ensuring that it benefits all. By staying informed and actively participating in the conversations surrounding AI, we can harness its power responsibly and pave the way for a future where technology and humanity thrive together.

CHOUMYA M
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B.TECH IT
FINAL YEAR

Design of Gel Electrolytes for EV Using Machine Learning Technique

By
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Abstract

G*lobally, electrified transportation networks are growing quickly, which can potentially mitigate global warming by lowering carbon emissions. In practical applications, predicting the battery's Remaining Usable Life (RUL) is crucial for reducing maintenance costs and improving system dependability and efficiency. For equipment life cycle analysis, fault analysis predicting, and health management, RUL estimate is essential. Current battery operational parameters are accessible, however forecast approaches are not good enough. Achieving Sustainable Development Goals (SDGs) including Climate Action (SDG 13) and Clean and Affordable Energy (SDG 7) depends on battery management. This study uses actual battery life cycle data from the Hawaii National Energy Institute (HNEI) along with specialized machine learning techniques to improve prediction accuracy. In Google COLAB, a variety of machine learning algorithms are assessed for accuracy using Python. For every method, various error metrics such as MSE, RMSE, MAE, R2, and execution time are calculated. The results point to possible gains in battery RUL forecast accuracy.*

Keywords: Electrolyte, Machine Learning, Electric Vehicle, Battery Health Management.

Introduction

To eliminate the greenhouse gas emissions, leading manufacturers are spearheading the development of electric vehicles (EVs). Lithium-ion batteries (LIBs) are used in EVs because of their long lifespan and high energy density. Calculating these batteries' Remaining Usable Life (RUL) is essential for sustainability and safety, supporting Sustainable Development Goals (SDGs) such as Climate Action (SDG 13) and Clean and Affordable Energy (SDG 7).

Battery management and forecasting that works maximizes battery utilization, extends battery life, and reduces environmental impact. RUL prediction, which uses neural networks and statistical methods for accuracy, is crucial for system health management. For State of Charge (SOC) computing, a variety of models and estimators including Neural Networks (NN) improve voltage prediction. These techniques improve the accuracy of RUL predictions, which is important for lithium-ion battery management systems.

Totally version-based and statistics-driven approaches are often utilized to forecast the RUL of lithium-ion batteries. Equations that are primarily version-based sometimes involve an extension of differential, algebraic, and empirical equations. Three types of RUL prediction algorithms are distinguished: hybrid, facts-driven, and fully version-based. A comprehensive analysis of the RUL prediction techniques is shown in Fig. 1.

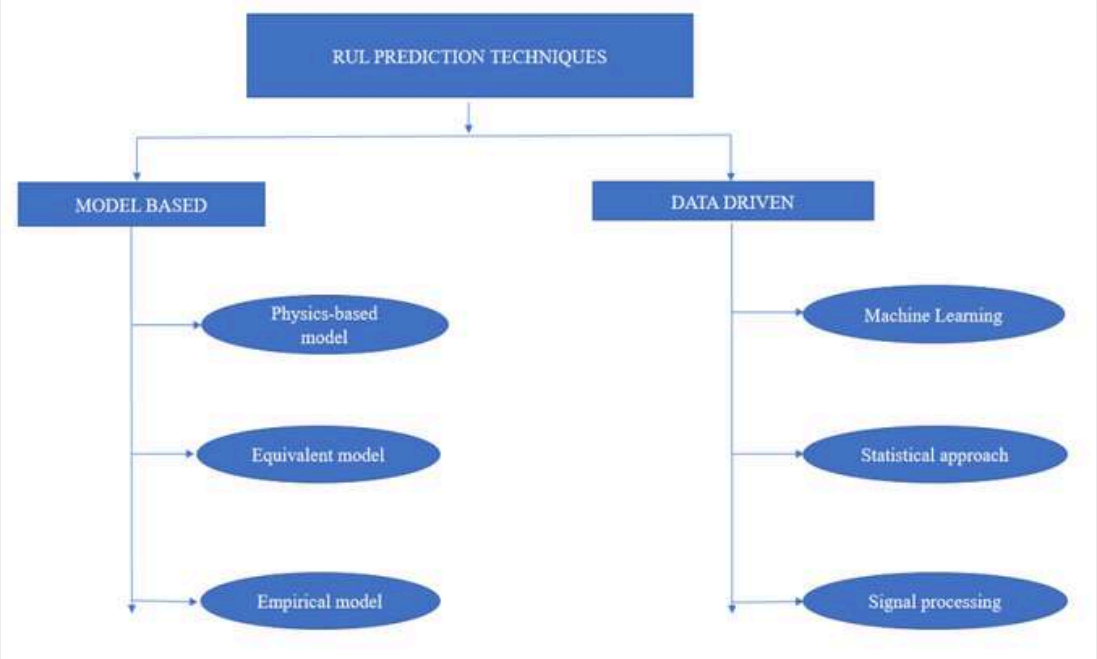

Fig. 1. Classification of Lithium-ion Battery RUL Prediction Methods

2. Methods Dependent on Models

A. Physics-Based Model:

Predicts battery degrading behavior by utilizing physical and electrochemical phenomena. provides information about SOC and SOH. Although the basic principles are clearly understood, accuracy is low in comparison to other methods.

B. Equivalent Circuit Model:

Built using electrical components that mimic the characteristics of a battery. predicts the generation of heat, power, and electricity. makes use of electrochemical impedance spectroscopy to forecast RUL.

C. Empirical Model:

Forecasts trends in degradation by using empirical data. uses dual EKF and logarithmic variations to provide reliable predictions. offers a more straightforward method of identifying parameters than previous models.

3. Data-driven Methods for RUL Forecasting

A. Machine Learning (ML):

Makes use of direct statistical extraction or historical data. difficulties in modeling sophisticated equipment because it requires a great deal of experience. looks into ANN and linear regression for prediction accuracy.

B. Statistical Approach:

For RUL prediction, statistical modeling is used. Grey model methodology and Autoregressive integrated moving average (ARIMA) are two methods. increased accuracy through parameter tuning.

C. Signal Processing Approach:

Makes use of signal processing methods to extract important data. makes use of the discrete wavelet transform to forecast battery RUL. focuses on elements such as voltage drop, internal resistance increase, and capacity loss.

An Overview of Metaverse

The metaverse is described as the inevitable evolution of the internet. But what exactly is the metaverse, and what will it become? Learn what businesses need to know now. Imagine a virtual world where billions of people live, work, shop, learn and interact with each other -- all from the comfort of their couches in the physical world.

In this world, the computer screens we use today to connect to a worldwide web of information have become portals to a 3D virtual realm that is palpable -- like real life, only bigger and better. Digital facsimiles of ourselves, or avatars, move freely from one experience to another, taking our identities and our money with us. This is known as the metaverse.

Why is the metaverse important?

"Metaverse" became a household word when Facebook rebranded its corporate identity to Meta in October 2021 and announced plans to invest at least $10 billion in the concept that year. In addition to Meta, tech giants including Google, Microsoft, Nvidia and Qualcomm are also investing billions of dollars in the concept. Management consultancy McKinsey & Company has bullishly predicted that the metaverse economy could reach $5 trillion by 2030. E-commerce is expected to be the dominant engine, with gaming, entertainment, education, and marketing in the metaverse also becoming important sectors.

Today, companies use the term to refer to many different types of enhanced online environments. These range from online video games like Fortnite to fledgling virtual workplaces like Microsoft's Mesh or Meta's Horizon Workrooms to virtual dressing rooms and virtual operating rooms. Rather than a single shared virtual space, the current version of the metaverse is shaping up as a multiverse: a multitude of metaverses with limited interoperability as companies jockey for position. Other futurists, however, argue that while it is early days for the metaverse and fundamental technical barriers still exist, the metaverse will happen. And, it will arrive with a big bang.

"It is clear that it is one of the most highly anticipated technology evolutions of the coming decade," Dave Wright, chief innovation officer at IT provider ServiceNow, told TechTarget writer George Lawton in "History of the metaverse explained."

What is the metaverse?
(A short history)

The metaverse is a vision of what many in the computer industry believe is the next iteration of the internet: a single, shared, immersive, persistent, 3D virtual space where humans experience life in ways they could not in the physical world. Some of the technologies that provide access to this virtual world, such as virtual reality (VR) headsets and augmented reality (AR) glasses, are evolving quickly; other critical components of the metaverse, such as adequate bandwidth or interoperability standards, are probably years off or might never materialize.

How does the metaverse work?

the metaverse is largely unbuilt, there is little agreement on how it will work. Broadly speaking, however, the metaverse is a digital ecosystem built on various kinds of 3D technology, real-time collaboration software and blockchain-based decentralized finance tools. Factors such as the degree of interoperability among

virtual worlds, data portability, governance and user interfaces will depend on how the metaverse pans out.

Lauren Lubetsky, senior manager at Bain & Company, speaking in a session on the metaverse at the 2022 MIT Platform Strategy Summit, outlined three possible scenarios:

- The metaverse remains a domain of niche applications, used by consumers for entertainment and gaming but stopping well short of an all- encompassing virtual reality.
- The metaverse is controlled by large competing ecosystems -- for example, Apple and Android meta worlds -- with limited interoperability.
- The metaverse is a dynamic, open, and interoperable space, much like the internet but in 3D.

NON-TECHNICAL ARTICLES

Hyper-globalism is threat to human prosperity

Globalization is the mechanism by which knowledge, ideas, information, goods and services are broadly dispersed throughout the world and is is operated by blending cultural and economic systems. This concurrence aids and develops in increased alliance, intercommunication, collaboration, integration and interconnection among nations. The world becomes globalized when countries in different parts of the world are interwoven economically, politically and culturally. It expands the assimilation of economies around the world through trade and financial flows to get optimized returns and for the wellbeing of people. Globalization resulted in the rising interdependence of the world's economies, cultures and populations proposed by trans-border trade in technology, people, goods, services, information and investments.

The period of hyper globalization has been associated with the most dramatic turnaround in the economic fortunes of developing countries. Hyper globalization is based on the concept of homogenous global culture throughout the world. It has led to the flooding of multinational companies in the global market. GDP rose from 15 percent to 26 percent during the period 1992-2010 from merchandise exports alone as a result of hyper globalization. Exports alone contributed to 33 percent of GDP. The Information and Technology (IT) sector witnessed sharp decline in their costs but there was no much decrease in travelling costs.

The existence of hyper-globalization is clearly implied through substantial rise in Foreign Direct Investment (FDI). Global FDI as a percentage of world GDP has grown seven-fold. Dematerialization of globalization – Important is considered more to services than material. Hyper globalization lead to more widespread and democratic output available to businesses throughout the world. It has lead to bilateral relationships between countries and different regions in the form of trade agreements. Through hyper globalization, countries are able to produce things where they have a comparative advantage and import those that can be made at a lower opportunity cost. Hyper-globalization and leveraging comparative advantage work well in a world without geopolitical frictions or natural disasters.

Hyper globalization has a lot of advantages which created much benefits to the nations worldwide. But it has also affected human prosperity negatively in terms of culture, economy, ecology, politics and technology. It lead to economic imbalance among nations where one country benefits at the expense of another. Developed countries capitalize developing countries which results in wide disparities between rich or affluent and poor countries, people within these countries also experience a huge division amongst themselves. This has resulted in countless crime cases happening recently between rich and poor. Developing industries and increased pollution is dangerous for the survival of human population. Unemployment created due to lack of technical knowledge which is essential in world of competency and skill are some of the reasons that hinder human prosperity.

Hyper globalization cannot be completely considered as threatening factor to human prosperity. The impact of globalization in different countries and how they are implemented in each of these nations matter how threatening they are. When things are desired discreetly and achieved rigorously the end result would bring negative impacts. Hyper globalization should be trailed rapidly where positive effects offset negatives.

Globalization can be strived swiftly at the current pace or even at higher pace but these changes need to be proceeded cautiously by considering sustainable development, culture and needs of the nations. The major reason for hyper globalism to become a threatening factor is because it increases inequality among individuals and creates huge difference between rich and poor. If all these factors are taken care of, then hyper globalization brings more benefits than challenges.

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VALUE OF GAMES IN EDUCATION

Education aims at full development of the human personality. The human personality has several sides and it is the purpose of education to develop all these sides so that the individuals may attain his full stature. Man has a body, a mind and a spirit. According to education aims at the physical development, intellectual development and the spiritual and more development of man. It is a very narrow view of education to think that educations merely give knowledge to a human being and thus fits him for the purpose of earning his livelihood but educations does much more than this.

Games and sports develop a sound mind in a sound body. They strengthen our muscles, make our bodies strong, increase our capacity for work and develop our power and alertness. They are excellent training in concentration and endurance. While playing a game a player is constantly being attacked by his opponents, so he remains always alert. Game and sports infuse in us a sense of cooperation- esprit de corps. They teach us the important lesson- all for one and one for all. We learn team spirit. No player can play only for himself, he must obey his captain. He must place the interests of the team above everything else. A player may score a goal or a run, but it is the team that wins. In addition to this, games and sports teach us the presence of mind, fellow - feeling and discipline. The lesson of the spirit of sportsmanship is brought home to us. It is to win without pride and to lose without bitterness.

Players learn self-control. They are not swayed by sudden fits of anger or passion. Games teach them cool-mindedness and courage. If we have constantly to compete with others in the open field, we shall develop mainly courage. Sportsmanship means a calm, forgiving and cheerful view of life. Game and sports provide a healthy outlet for our surplus energy. They promote international understanding. They open before us a new world of competition and struggle when they are over. We feel closer to our comrades in other parts of the world.

Games make a man tough and thus enable him to withstand the sling and arrows of fortune. Games teach retain other lesson as well. They teach team-spirit or the spirit of mutual cooperation. They teach the value of unity or united effort. They teach the necessity of always obeying the orders of the captain or the leader. All these are valuable lessons which prepare man to live correctly and nobly. Education aims at building up character and character includes all the qualities mentioned above. In spite of their defects, games and sports are essential to our healthy growth. They invigorate our bodies, refresh our minds and help us grow into healthy and upright citizens. Games and sports, in short, play an important part in giving us complete education. Education means the all-round development of the learners. Games contribute a lot towards this end. Thus the value of games in forming and molding character is very great. Education aims too at developing qualities of leadership in human beings. The qualities of leadership are developed most effectively and fruitfully thought games.

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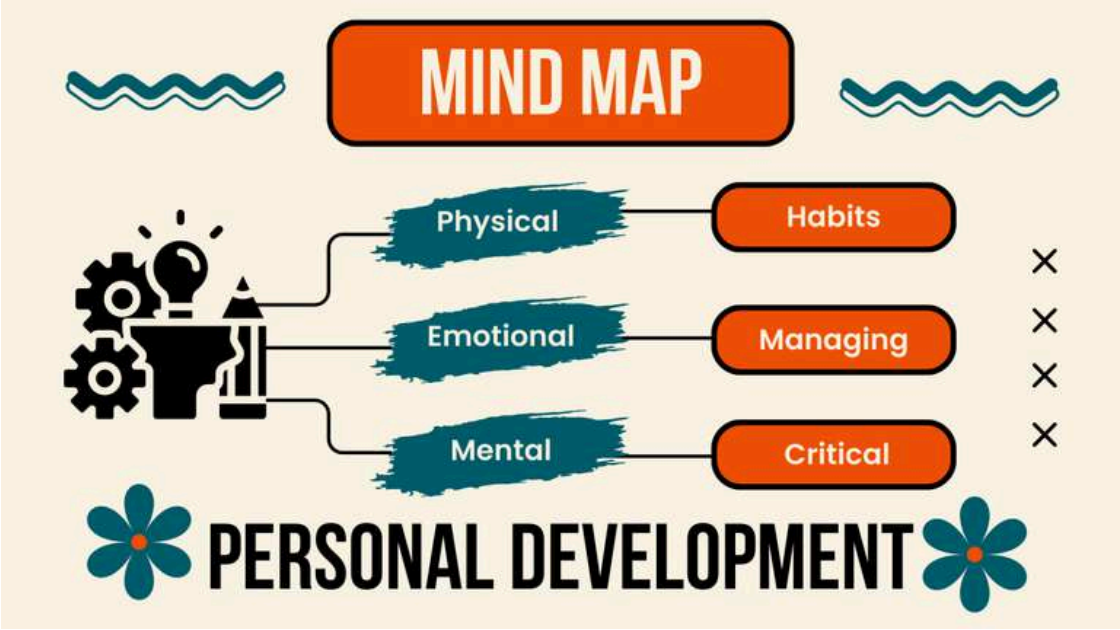
THE ART OF GROWING: UNCOVERING THE GALLERY OF PERSONAL GROWTH

In the fabric of life, each individual is an artist creating their own masterpiece. However, personal growth is a never-ending process rather than a goal. As we go over the enormous terrain of self-discovery, we find the minute strokes that create our personality, goals, and perseverance.

Imagine your life as a blank canvas, full with possibilities. Each decision, accomplishment, and failure contributes to the complex artwork that is your own development. It's an art form that goes beyond the ordinary routines and explores the deepest core of who we are and who we want to become.



ACCEPTING THE UNFINISHED MASTERPIECE

Personal growth, in contrast to societal forces that frequently drive us toward preset conceptions of success, is a private affair. It is about accepting flaws, admitting shortcomings, and realizing that the canvas's beauty rests in its progress. The trip is equally important as the goal, if not more so.d a little bit of body text

THE PALETTE FOR LEARNING

The ever-expanding learning palette is an important aspect of this artistic process. Lifelong learning is more than just a term; it's the injection of color that adds vitality to our self-portraits. Whether from formal schooling, experiences, or the wisdom gained from failures, each shade adds depth and complexity to the work in progress.

THE BRUSHSTROKES OF RESILIENCE

In the face of hardship, the real artist uses the brushstrokes of resilience. Challenges become chances for progress, failures become stepping stones, and each act of bravery contributes to the unwavering spirit that defines human development. It is resilience that changes the canvas from a mere collection of moments into a tenacious story of success.

FINDING HARMONY IN SELF-REFLECTION

Personal development necessitates reflection, much as a great artist does when looking back at their work. The calm of self-reflection helps us to discover inner harmony — the congruence of values, ambitions, and passions. During these calm times, we understand the next strokes to be painted on our expanding canvas.

FRAMING THE FUTURE

The beauty of human progress is seen not only in the canvas's current condition, but also in the expectation of its future. It is about articulating ambitions, desires, and possibilities yet to be realized. The artist within us imagines a future self, devising a plan that combines personal development with the pursuit of meaningful goals.

So, while you stand before the painting of your life, take a time to admire the work in progress. The brush is in your hands, and the colors of personal growth await your stroke. With each conscious stroke, you form not just your tale, but also the collective masterpiece of mankind, a tapestry woven with strands of perseverance, wisdom, and the never-ending search of becoming.

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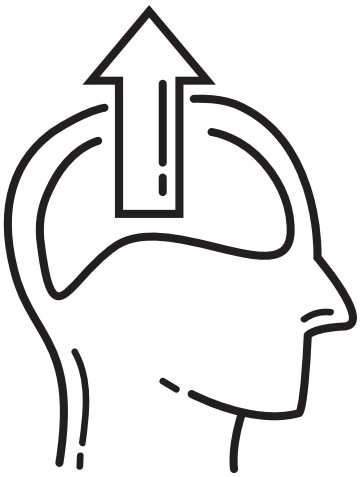

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INDUSTRIAL VISIT TO MYSORE

Our final year students of B.Tech IT & M.Tech IT 2020-2024 batch went to an industrial visit to Kaynes Technology India Private Ltd Mysore, Karnataka.

Kaynes Technology India Private Ltd, Mysore, India is a leading domestic player in the Electronics System & Design Manufacturing Services Space with Global footprint. Apart from its mother plant and additional manufacturing facility at Mysore it has five manufacturing plants at Bangalore, Chennai, Manesar, Parwanoo, and Selaqui.

The Services offered by Kaynes mainly include Systems Design & Engineering, Equipment Installation and Commissioning including Support for On Board Systems, Overhauling and Maintenance of Electronic and Electrical Equipments, Component level Electronic Card Repair and Re-Engineering/ Obsolescence Management, PLC Programming and System Commissioning and Systems Integration Activities.

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