



**KSIT**  
K S INSTITUTE OF TECHNOLOGY

Kammavari Sangham (R) 1952, K.S.Group of Institutions

# K. S INSTITUTE OF TECHNOLOGY

No.14, Raghuvanahalli, Kanakapura Road, Bengaluru - 560109, 9900710055

Affiliated to VTU, Belagavi & Approved by AICTE, New Delhi, Accredited by NBA, NAAC & IEI

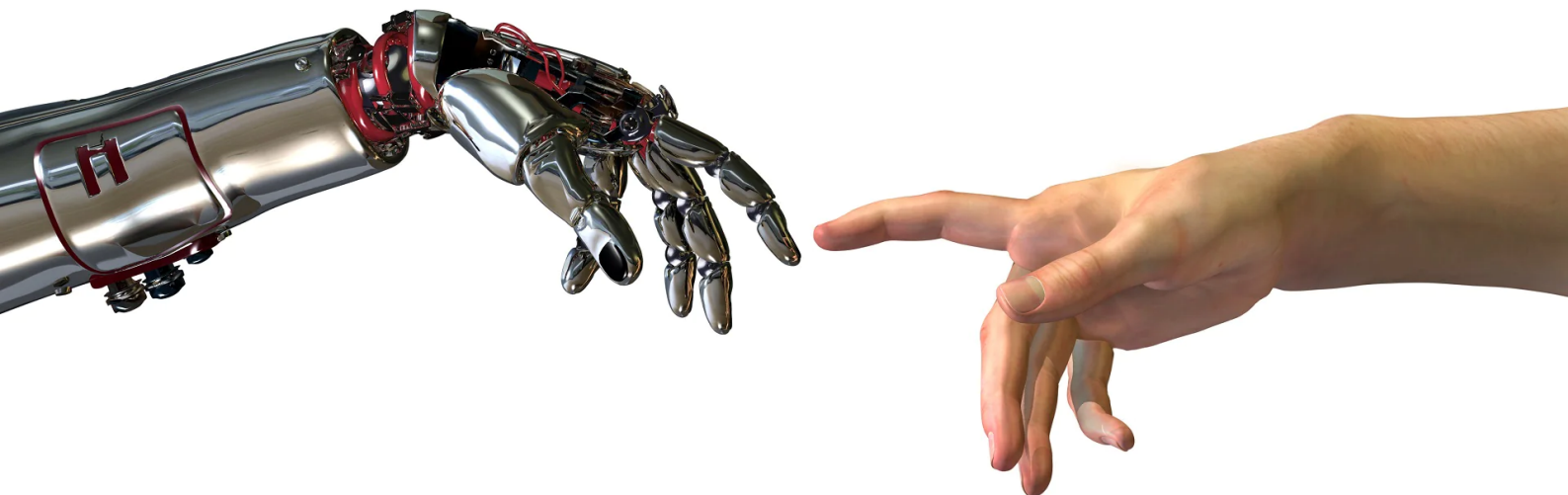
Tel : 080 - 28435723

Email : Principal@ksit.edu.in

Web : www.ksit.ac.in

# EMANATION

## DEPARTMENT OF MECHANICAL ENGINEERING



# INDUSTRY 4.0

<u>Contents</u>	<u>Page No.</u>
Introduction	02
Different Aspects of Industry 4.0	03
Alumni Interview	08
Students Achievements	10
Faculty Publications	13
After Engineering	14
Next Edition	18



**Sri R Rajagopal Naidu**  
President



**Sri R Leela Shankar Rao**  
Hon. Secretary



**Sri T Neerajakshulu**  
Treasurer

We are thrilled to extend our heartfelt congratulations to the Mechanical Engineering Department on the successful release of the 10th Vol. of the Emanation Newsletter. The insightful articles, project highlights, and achievements showcased in this newsletter not only reflect the excellence within the Mechanical Engineering Department but also contribute to the overall academic vibrancy of our institution. Well done, and may this publication continue to inspire and inform our community.



**Dr. K V A Balaji**  
CEO, KSGI

I am delighted to learn that the Department of Mechanical Engineering at KSIT is bringing out its 10th Edition of Emanation in which they very skilfully showcase all their talent. The Mechanical Engineering Students are a set of highly talented group and the Department brings out all their good work in this newsletter to make it known to all the stakeholders. I congratulate all the students, faculty and especially the editorial team for bringing out this publication and spreading the innovative spark that is there in them.

I take pride and am delighted to extend my warm greetings to each of you through this newsletter. As we navigate through another academic year, I commend the department for its unwavering commitment to excellence in education and research. Your dedication to fostering innovation and instilling a passion for mechanical engineering is truly commendable. Let's continue to inspire and empower our students, encouraging them to explore new horizons and push the boundaries of their knowledge. Together, let's make this year a testament to the exceptional standards of our esteemed mechanical department.



**Dr. Dilip Kumar K**  
Principal/Director

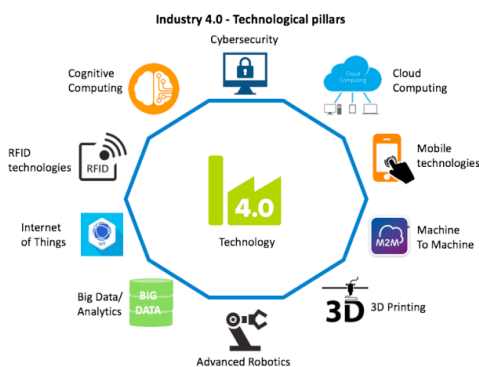


**Dr. Girish T R**  
Professor and Head of  
Mechanical Department

I am delighted to extend my heartfelt appreciation to each member of our department for their unwavering commitment and exceptional contributions. Our collective efforts have propelled us towards new heights of success, and it is with great pride that I share the latest highlights in our department's journey. Let us embrace the challenges and opportunities that lie ahead, knowing that our shared commitment will lead to continued success and recognition. Thank you for your unwavering dedication and enthusiasm. Together, we shall navigate the path to even greater achievements.

## Introduction to Industry 4.0

Industry 4.0 stands tall as a transformative force redefining how industries operate and innovate amid an ever-evolving technological landscape. Often referred to as the 'Fourth Industrial Revolution,' Industry 4.0 represents a convergence of cutting-edge technologies, such as artificial intelligence, robotics, the Internet of Things (IoT), big data analytics, and additive manufacturing, reshaping traditional manufacturing and production processes.

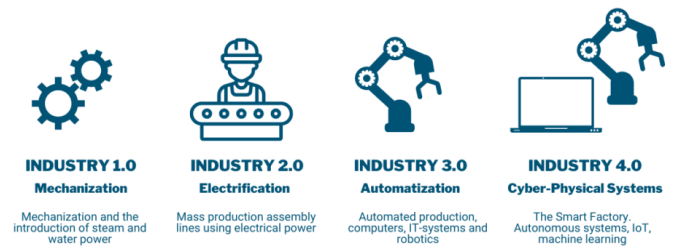


This revolution isn't merely about automation; it's a dynamic shift towards interconnected systems that leverage data-driven insights to enhance efficiency, productivity, and flexibility in manufacturing and beyond. Embracing a fusion of physical and digital realms, Industry 4.0 opens doors to unprecedented levels of connectivity, customization, and agility, paving the way for smarter, more responsive, and adaptable industries poised for the future.

## The Journey to Industry 4.0

The industrial journey from its nascent stage, Industry 1.0, to the current epoch of Industry 4.0, paints a vivid picture of humanity's technological evolution.

### THE FOUR INDUSTRIAL REVOLUTIONS



Industry 1.0, ignited by the mechanization of production through water and steam power, marked the transition from agrarian societies to mechanized manufacturing.

With the advent of Industry 2.0, powered by electricity, assembly lines and mass production transformed industries, bringing about a seismic shift in efficiency and scale.

The onset of Industry 3.0, the digital revolution, introduced computerization and automation, laying the groundwork for interconnected systems and the birth of the internet.

This led to the birth of cyber-physical systems, heralding Industry 4.0, where the convergence of technologies like IoT, AI, big data, and additive manufacturing catapulted industries into an era of smart -

- factories and autonomous systems, revolutionizing not just production but the very essence of how we perceive and interact with technology, reshaping economies, and redefining the boundaries of innovation and efficiency.

## DID YOU KNOW ?

The data explosion propelled by Industry 4.0 is staggering in its scale and implications. **By 2025**, it's estimated that the global data sphere will reach an astronomical **175 zettabytes**, a volume impossible to comprehend without context. This data tsunami is driven by the proliferation of connected devices, IoT sensors, and digital interactions across industries.

However, the sheer volume and diversity of data pose challenges. Traditional data management and analysis methods may struggle to handle this influx, demanding advanced tools and technologies for storage, processing, and analysis. Moreover, ensuring data security and privacy becomes increasingly complex as more sensitive information is generated and exchanged.

## Different Aspects of Industry 4.0

Industry 4.0 represents a significant leap forward in the realm of manufacturing and industry, characterized by several key technological advancements and shifts in operational paradigms. Unlike the previous industrial revolutions, industry 4.0 deals with the amalgamation and integration of various parts of cyber physical systems, additive manufacturing, AI and Automation, etc.

A few of them are as follows:

### Integration of Cyber-Physical Systems (CPS)

Industry 4.0 is marked by the fusion of physical production systems and digital technologies. Cyber-physical systems involve the integration of sensors, machines, and systems with the internet and cloud computing, allowing for real-time data collection, analysis, and decision-making.

### Internet of Things (IoT)

IoT plays a crucial role in Industry 4.0, enabling devices and machines to communicate and share data seamlessly. This interconnectedness facilitates improved monitoring and optimization of processes, leading to enhanced efficiency.



### Big Data and Analytics

The massive influx of data generated by interconnected devices and systems is a cornerstone of Industry 4.0. Advanced analytics and machine learning algorithms are employed to derive valuable insights from this data, enabling predictive modeling, process optimization, and informed decision-making.

### Additive Manufacturing and 3D Printing

Industry 4.0 embraces additive manufacturing technologies, enabling the production of highly customized and complex components with reduced material waste. 3D printing allows for rapid prototyping, on-demand manufacturing, and decentralized production facilities.

### Artificial Intelligence (AI) and Machine Learning

AI-driven technologies empower autonomous decision-making in manufacturing processes. AI algorithms optimize production schedules, predict maintenance needs, and enhance quality control through anomaly detection and pattern recognition. Machine learning algorithms analyze data from IoT sensors to predict equipment failure or maintenance needs before they occur. This proactive approach minimizes downtime, optimizes maintenance schedules, and reduces costs.

**Smart Factories and Automation Industry 4.0** emphasizes the development of smart factories where machines, processes, and systems communicate and operate autonomously. Automation, driven by intelligent systems, enhances productivity, flexibility, and responsiveness to market demands.

### Cybersecurity Challenges

With increased connectivity comes the necessity for robust cybersecurity measures. Protecting sensitive data and ensuring the security of interconnected systems have become critical concerns in Industry 4.0 environments.

### Impact on Workforce

The advent of Industry 4.0 redefines the skill sets required in the workforce. It emphasizes the need for skills in data analysis, programming, robotics, and interdisciplinary knowledge to adapt to the changing landscape of manufacturing.

---

**DID YOU  
KNOW** 

Industry 4.0 is projected to have a substantial economic impact. By 2030, it's estimated that the global economic impact could range between \$3.7 trillion to \$7.1 trillion annually.

## Cloud computing

Cloud Computing stands as a pivotal pillar in the landscape of Industry 4.0, revolutionizing the way industries harness and process data. It serves as a transformative force, offering scalable and on-demand access to computing resources over the Internet. In the context of Industry 4.0, cloud computing acts as a central nervous system, facilitating the storage, management, and analysis of vast volumes of data generated by interconnected devices and systems. This technology enables seamless collaboration, providing real-time access to data analytics, machine learning algorithms, and sophisticated applications that empower decision-making and process optimization.

## Augmented Reality, Virtual Reality and Mixed Reality(AR, VR & MR)

Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) stand as transformative technologies in the context of Industry 4.0, revolutionizing the way industries visualize, interact, and innovate. AR overlays digital information onto the physical world, enhancing real-time experiences on factory floors, and aiding in maintenance, training, assembly processes. VR creates immersive, simulated environments, enabling training simulations, design prototyping, and remote collaboration, transcending geographical barriers.

MR, blending elements of both AR and VR, seamlessly integrates digital and physical worlds, allowing real-time interactions with virtual objects within physical environments. These technologies play pivotal roles in Industry 4.0, empowering workers with intuitive interfaces, enabling remote assistance, and facilitating complex problem-solving. They drive efficiency by offering interactive training modules, enabling rapid prototyping, and facilitating design iterations, ultimately fostering a more connected and agile industrial ecosystem poised for innovation and productivity enhancement.

## DID YOU KNOW?

**Agricultural Innovation:** In rural settings, Industry 4.0 technologies revolutionize agriculture. IoT-enabled sensors monitor soil moisture levels, crop health, and weather conditions, optimizing irrigation, pest control, and harvesting. Precision agriculture techniques improve yields and resource efficiency, enhancing livelihoods.

**Access to Healthcare:** Telemedicine and AI-driven diagnostics extend healthcare access to remote areas. Connected medical devices and telehealth platforms allow rural populations to access healthcare services, receive remote consultations, and access medical expertise previously unavailable.

## Implementation of Industry 4.0 throughout the world

Japan is a major player in the production of factory automation systems and robots. Five of the top 10 companies in the global market are Japanese. The country's technological prowess has been instrumental in its continuous emergence as a leader in the field of robotics.

Due to the strong demand for its products, Japanese companies are expected to continue to gain market share. The increasing demand for products across various economies has prompted manufacturers to adopt robots to automate certain repetitive processes.

The industrial robots market is expected to grow at a steady rate in the next few years. The increasing number of smart factory systems is also expected to fuel the demand for industrial robots.

The emergence of Industry 4.0 has led to the development of new technologies such as collaborative robots and AI-enabled robots. These have allowed companies to improve their efficiency and reduce errors by implementing them in various processes. The increasing number of workplace safety regulations and the improving production capabilities are also expected to drive the demand for robotic systems.

As the market for industrial robots is expected to grow at a steady rate during the next few years, the increasing number of end users and technological advancements are some of the factors that are driving the market's growth.

## DID YOU KNOW?

**SAMARTH Udyog Bharat 4.0** is a government initiative in India aimed at enhancing the competitiveness of the country's manufacturing sector through the adoption of advanced technologies and strategies aligned with the principles of Industry 4.0. The initiative focuses on transforming Indian manufacturing into a technology-driven, innovative, and globally competitive ecosystem. Here are some key aspects:

**Objective:** SAMARTH Udyog Bharat 4.0 aims to catalyze the modernization and technological upgradation of small and medium enterprises (SMEs) in India. It seeks to enable these enterprises to embrace digitalization, automation, and advanced manufacturing practices to enhance productivity and competitiveness on a global scale.

**Adoption of Technology:** The initiative encourages the adoption of advanced technologies such as IoT, artificial intelligence, robotics, big data analytics, and additive manufacturing across manufacturing processes.

## Implementation of Industry 4.0 in India

Globally, Industry 4.0 has been designated as a mission. In Indian manufacturing, Industry 4.0 has reached a tipping point. Emerging markets, such as India, have accelerated digital transformation in their manufacturing sectors. It is time for industry stakeholders to see the pandemic as a chance to implement Industry 4.0 and its initiatives. It is one of the most notable times in the history of industrial revolutions for India and the world has its eyes set on us to make waves in this revolution. The Indian manufacturing sector is now under the spotlight. However, some challenges must be met for this revolution to deploy in the various Indian manufacturing and industrial sectors successfully.

Post the pandemic, the manufacturing sector worldwide and, consequently, in India, has seen a new wave of technology driven by automation and software. The Internet of Things (IoT), AI, and Blockchain technologies have played an important role in improving efficiency across the manufacturing sector and industrial development. With several new-age technologies supporting end-to-end automation, analytics, and real-time decision-making capabilities, manual manufacturing units have turned into smart factories.

Using the technologies has helped decrease costs, improve safety, and increase efficiency. Even though adopting new technologies is initially piecemeal off-the-shelf end-of-line solutions, there is a growing recognition and acceptance of the need for a holistic approach to the subject.

Even as new-age technology makes its way, one of the biggest challenges manufacturers and infrastructure builders face in India is slow networks due to industrial plants being located in areas that lack sufficient network and connectivity. This is detrimental to maintaining the highest demands of IoT and interconnected service networks. 5G will further spurn faster connections between IoT devices and more precise real-time data that can be used to make cognizant decisions in both the short and long term. Industry 4.0 aims at highly smart and connected networks that create a fully digital value chain right from inventory management to operating processes to planning and dispatch.



## ALUMNI INTERVIEW

We are proud to mention our alumni **Mr. Nithin Dinesh**. He graduated in the year 2011. He is currently working as a Technical Lead at Wipro UK Limited.



**What made you choose mechanical engineering?**

I have been an avid automobile enthusiast since my childhood. My father's old Bajaj Super used to be my experimental rat all the while. So naturally my inclination was always towards nuts and bolts. So it was obvious for me to choose Mechanical Engineering.

**How was your experience at KSIT College?**

College life was the best. I made friends for life here. I met great teachers here, with whom I still have maintained the touch. Although they were very strict inside the class, they were one among us after the class. That's what I still remember about the College.

**Which events did you actively take part in during those days?**

I was part of the **college cricket team**. So regularly I used to be part of cricket tournaments. Apart from that I was part Society of Automotive Engineering. And during the final year, I was actively involved in internships in Toyota Kirloskar Auto parts.

**Who is your Role Model?**

Don't have one. I believe all of us have our paths. Should be responsible for every role that we play in our short lifespan.

**Can you share any cherished memories in college?**

One instance that I remember the most is the last-minute revision for the internals and exams. I still wonder how we were pushing the full syllabus into our heads one night before the exams.

**What were the crucial decisions/steps you took to help change/start your career.**

I was a mechanical engineer with zero coding knowledge. Slowly I realised the importance of computers and coding. It's more than a necessity in today's world to code. The scenario is changing very rapidly. AI and ML are changing the world at a rapid pace. So learning to code in the college itself will be a giant stride in a student's career.

### What were your ideal steps to crack interviews?

I used to solve a lot of puzzles during my college days right from my first year. It was more of a hobby. That helped my thinking abilities and retrain my brain.

### Thoughts about the core industry during this recession?

Recession is part and parcel of one's career. The only way to evade it is to be the best at what you do. Be so good that no one can ignore you. Excellence beats everything.

### How have core jobs changed concerning the increase in the jobs in the IT/Software sector?

Core jobs have evolved over the period. It will evolve even further. So it's advisable to be updated with new tech at every step. The core field will eventually merge even more into computer tech in the future.

### What advice would you give to someone starting their career in mechanical engineering?

Get ready for an exciting life ahead of you. You will see a lot of lows. You will see a lot of breakdowns. But it will harden you to face anything in life. You will be tough as a diamond in your future.

### One message to all Mechanical engineers?

We are built differently. We can overcome any hurdles in life. Remember that. God Bless you all.

## DID YOU KNOW ?

**Digital twins** represent a groundbreaking concept within the realm of **Industry 4.0**, offering a transformative bridge between the physical and digital worlds. These **virtual replicas of physical assets**, products, or systems replicate their real-world counterparts in intricate detail, leveraging real-time data and simulations for analysis and optimization. In Industry 4.0, digital twins serve as dynamic, **data-rich mirrors** that provide unparalleled insights into the performance, behavior, and condition of physical entities. They capture a comprehensive view, amalgamating information from sensors, IoT devices, and historical data to simulate, predict, and optimize processes. Whether it's a manufacturing plant, a complex piece of machinery, or an entire supply chain, digital twins empower industries to conduct virtual experiments, test scenarios, and predict outcomes without real-world implications. This technology acts as a digital sandbox, allowing for innovation, predictive maintenance, and continuous optimization, thus revolutionizing decision-making processes and fostering a new era of efficiency and resilience within industrial operations.

## STUDENTS ACHIEVEMENTS

1. **Kushal Kadam** of the 7th Semester, Department of Mechanical Engineering Represented the college at the VTU State Level Athletic Meet held at Chikballapur during the academic year 2021-22.



2. **Kushal Kadam** of the 7th Semester, Department of Mechanical Engineering Represented the college at the VTU State Level Athletic Meet held at Belagavi during the academic year 2022-23.

3. **Haryank V Kashyap** of the 7th Semester, Department of Mechanical Engineering presented a paper published by Dr. Nirmala L, Associate Professor, and Mrs. Tejaswini M L, Assistant Professor, Department of Mechanical Engineering, Titled “**An Investigation on the Mechanical and Durability Properties of Concrete structures incorporated with Low Carbon Steel – Industrial Waste**” at the 21st Indian Society for Mechanical Engineers (ISME) International Conference on “Advances in Mechanical Engineering” held at PES University on 13th July 2023.

4. **TECHNOTSAV 2K22** Organized on 14th December 2022 by the Department of Mechanical Engineering in association with **Team Redline Racing and SAE INDIA**. Inauguration Graced by: Dr. Dilip Kumar K, Principal, KS Institute of Technology, Bangalore. Description of the Event: Technical competitions (Four) and Non-Technical Competition (Three). Objectives / Key Highlights: Provide a platform for students to showcase their talents in technical competitions No. of Participants: 356 Students (internal/external): 290 KSIT and 66 from KSSEM, Bangalore



5. **Students of KSGI (KSIT and KSSEM)** participated in the Mega ATV Championship held in Goa on 15-05-2022 and won three trophies:

- Overall Championship**, 2nd All India Ranking
- Flat Dirt Race: 2nd Place
- Night Endurance Race: 2nd Runner-up



## EVENTS ATTENDED BY FACULTY

1. **Dr. Nirmala L of K. S. Institute of Technology, Bengaluru** has participated in in Five Days Faculty Development Program on **“The Challenges and Opportunities for Women in Science, Technology, Engineering & Mathematics (STEM)”** from 17th to 21st October 2022 conducted by K S School of Engineering and Management.
2. **Mrs. Tejaswini M L of K. S. Institute of Technology, Bengaluru** has participated in the Five Days Faculty Development Program on **“The Challenges and Opportunities for Women in Science, Technology, Engineering & Mathematics (STEM)”** from 17th to 21st October 2022 conducted by K S School of Engineering and Management.
3. **Mr. Rajesh G L** participated in the Five Days Faculty Development Program on **“Data Visualization and Standardized Programming Language for Mechanical Engineers”** from 4th to 8th July 2022 conducted by K S School of Engineering and Management.
4. **Mr. Nagabhushan M** has attended a 4 Days FDP on **“Python Programming and its Applications”** organized by the Department of Electronics and Communication Engineering, K S Institute of Technology from 27th March to 1st April 2023
5. **Mr. Prasad K** attended a 4 Days FDP on **“Python Programming and its Applications”** organized by the Department of Electronics and Communication Engineering, K S Institute of Technology from 27th March to 1st April 2023
6. **Dr. Nirmala L** attended a 5-day offline Workshop on **“Human Values Education: Why ? and Have ?”** organized by the Department of Management Studies and Research Center, Bangalore from 15th to 19th May 2023
7. **Dr Nirmala L** attended an online 3-Day FDP on **“Research Grants, Publications and Consultancy skills for Academicians”** organized Department of Electronics & Telecommunication Engineering and Skill Development Centre, Bangalore Institute of Technology from 6th to 8th March 2023

## EVENTS ATTENDED BY FACULTY

8. **Mrs. Tejaswini M L** attended a Two day online FDP on “**New Generation Construction Materials & Technologies**”, organized by the Department of Civil Engineering, Sir M Visvesvaraya Institute of Technology, Bengaluru from 5th Jan 2023 to 6th Jan 2023.

9. **Mr. Rajesh G L** has participated **IP Awareness/Training program under the National Intellectual Property Awareness Mission** from 4th to 8th July 2022 conducted by K S School of Engineering and Management.

10. **Mr. Rajesh G L** attended One Week Online National Level Faculty Development Program on "**Innovation, Research and IPR - Journey Towards Excellence**" held from 1st March 2023 – 5th March 2023 organized by BVB's Sardar Patel College of Engineering, Mumbai & HSM's Shri. Sant Gadge Baba College of Engineering & Technology, Bhusawal in collaboration with SAE India Western Section, Institution's Innovation Council, Indian Institution of Industrial Engineering and Federation of Education Leaders and Administrators under IQAC of SPCE, Mumbai, and SSGBCOE&T, Bhusawal.

11. **Mr. Rajesh G L** attended the One Week Faculty Development Program (FDP) on “**Data Visualization and Standardized Programming Language for Mechanical Engineers**” from 04th to 08th of July 2022, organized by the Department of Mechanical Engineering, Nitte Meenakshi Institute of Technology, Bangalore-64, Karnataka, INDIA.

12. **Mr. Rajesh G L** attended the workshop on “**Data Science and AI in Manufacturing**” on 17th April 2023 organized by Aegis, School of Data Science and Cyber Security, Navi Mumbai.

13. **Mr. Manjunatha B R** has attended a week online AICTE – VTU joint Teacher Training Programme on “**Introduction to Python Programming and its Applications**” from 13th to 17th March 2023 organized by VTU, Center for PG Studies, VIAT, Muddenahalli, Chikkabalapur (Dist).



## EVENTS ATTENDED BY FACULTY

**15. Mr Ranganath N** has attended One Week online AICTE – VTU joint Teacher Training Programme on “**Introduction to Python Programming and its Applications**” from 13th to 17th March 2023 organized by VTU, Center for PG Studies, VIAT, Muddenahalli, Chikkabalapur (Dist) – 562101.

**16. Mr. Anil Kumar A** has attended One Week online AICTE – VTU joint Teacher Training Programme on “**Introduction to Python Programming and its Applications**” from 13th to 17th March 2023 organized by VTU, Center1 for PG Studies, VIAT, Muddenahalli, Chikkabalapur (Dist) – 562101.

**17. Mr Harish U** has attended One Week online AICTE – VTU joint Teacher Training Programme on “**Introduction to Python Programming and its Applications**” from 13th to 17th March 2023 organized by VTU, Center for PG Studies, VIAT, Muddenahalli, Chikkabalapur (Dist) - 562101.

## PUBLICATIONS BY FACULTY

**1. Prof Dr. Nirmala L, “Effect of Pre-Oxidation on Microstructure and Hardness Of Low Carbon Steel During Nitrocarburizing”** IJSR, Vol 11, Issue 8, Pp 556-559, ISSN – 23197064, August 2022.

**2. Prof Dr. Saleem Khan, “Design and Fabrication of Air Brake System Using IC Engine Exhaust Gas”,** International Journal of Science and Research Archive, Vol 7, Issue 2, Pp 161-167, 13th Nov 2022.

**3. Prof Dr. Saleem Khan, “Influence of Hot Extrusion Process on Tensile Properties and Microstructures of Aluminium 6061 Hybrid Composite”,** SAE Technical Paper 2023-01-0986, 2023, <https://doi.org/10.4271/2023-01-0986>, ISSN - 0148-7191, e-ISSN: 2688-3627, 7th Mar 2023.

**4. Prof Dr. Nagaprasad K S, “Characterization of Briquette fuel prepared from corn cob”,** I ISRSET23103213, Volume 10, Issue 4, July-August 2023.

# Massive Open Online Courses (MOOC)

A Massive Open Online Course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums to support community interactions among students, professors, and teaching assistants, as well as immediate feedback to quick quizzes and assignments. A few of the top MOOC providers are:

1. EdX (US)
2. Coursera (US)
3. SWAYAM (India)
4. MéxicoX/(Mexico)
5. Udacity(US)
6. FutureLearn (UK)
7. XuetangX (China)
8. Kadenze (US)

SWAYAM is India's national MOOC platform. It offers over 2,150 courses taught by close to 1,300 instructors from over 135 Indian universities. One aspect that sets it apart from other providers is that it allows students in India to earn academic credit online. The courses hosted on SWAYAM are in 4 quadrants-(1) video lecture. (2) specially prepared reading material that can be downloaded/printed (3) self-assessment tests through tests and quizzes and (4) an online discussion forum for clearing the doubts.

Courses delivered through SWAYAM are available free of cost to the learners, however, learners wanting a SWAYAM certificate should register for the final proctored exams that come at a fee and attend in person at designated centers on specified dates. Eligibility for the certificate will be announced on the course page and learners will get certificates only if these criteria are matched

# Massive Open Online Courses (MOOC)

Universities/colleges approving credit transfers for these courses can use the marks/certificates obtained in these courses for the same. To ensure that the best quality content is produced and delivered, the National Programme on Technology Enhanced Learning (NPTEL) has been appointed as the National Coordinator for the Engineering programme. The National Programme on Technology Enhanced Learning (NPTEL) is a Government of India-sponsored collaborative educational programme. By developing curriculum-based video and web courses the programme aims to enhance the quality of engineering education in India. It is being jointly carried out by 7 IITs and IISc, Bangalore, and is funded by the Ministry of Human Resources Development of the Government of India. NPTEL offers a wide range of courses during every academic semester across all domains of engineering categorized into three types based on the duration of the course and their respective credits:

i) 4 weeks (1 credit) ii) 8 weeks (2 credits) iii) 12 weeks (3 credits)

Choose a specific course that suits your interest especially if you are preparing for higher education or a job switch or want to expand your intellect in a structured way.

Benefits of these courses and certifications:

- It helps in professional growth.
- The certificate adds up the reputed college tag on the CV.
- It keeps one motivated to complete the course.

Moreover, it sends a message to the interviewer that you are a self-driven individual, and highly motivated towards your work. Learn and gain knowledge on subject matters that are not included in the regular curriculum.

<https://swayam.gov.in>

<https://nptel.ac.in>

# AFTER ENGINEERING

Well, there are many sectors like aerospace, aeronautical, aviation, automotive, construction, oil and natural gas, consulting firms piping, etc. where a lot of mechanical engineers work. But more or less the lives of most of these engineers are the same.

First thing, it depends on what exactly you want to do in the future.

**1. Higher Studies** - If you want to pursue higher studies, again there are various options available.

- a) Technical-MTech (GATE) or M.S. (GRE)
- b) Management-MBA(CAT, MAT etc.)

**2. After Engineering courses:**

**a) Postgraduate Diploma in Human Resource Management:** This is the oldest and most prestigious programme. The program targets expanding HR leaders by challenging critical thinking and concentrating on renovations in these fields. You will learn from the basics functions such as devising and organizing to compensation management and performance categorization.

**b) PGDM in Digital Marketing:** The PGDM in Digital Marketing course assists scholars in understanding the ideas and tools that will help companies digitize themselves. After completing a PGD in Digital Marketing students can make their career as successful Digital Media Marketer. Post Graduate Diploma holders in Digital Marketing will earn an average salary from 3lacs to 6lacs per annum.

**3. Machine Learning:** Experts predict that Artificial Intelligence is the future. Machine learning is a subfield of computer science that evolved from the study of pattern recognition and computational learning theory in artificial intelligence.

# AFTER ENGINEERING

Further information about various exams:

**1. GATE:** A national-level examination, GATE (Graduate Aptitude Testing Engineering) is a qualifying exam for admissions to post-graduate programs (eg-ME, M Tech, direct PhD) in Indian Institutes of higher education with financial assistance provided by MHRD and other Government agencies.

**2. The GMAT:** (Graduate Management Admission Test) is a 3.5-hour standardized exam designed to predict how test takers will perform academically in MBA (Masters in Business Administration) programs. GMAT scores are used by graduate business schools to make admission decisions.

NOTE: Schools that do not require GMAT or GRE scores generally have relatively lenient admission standards and/or are located outside North America.

**3. GRE/TOEFL/IELTS:** For pursuing MS in the US, AUSTRALIA GERMANY, UK. So this is no longer country-specific but university-specific. TOEFL is a language test and is preferred in the US but in most other countries including all European countries prefer IELTS. GRE is often not required outside the US.

## THOUGHT FROM EDITORS

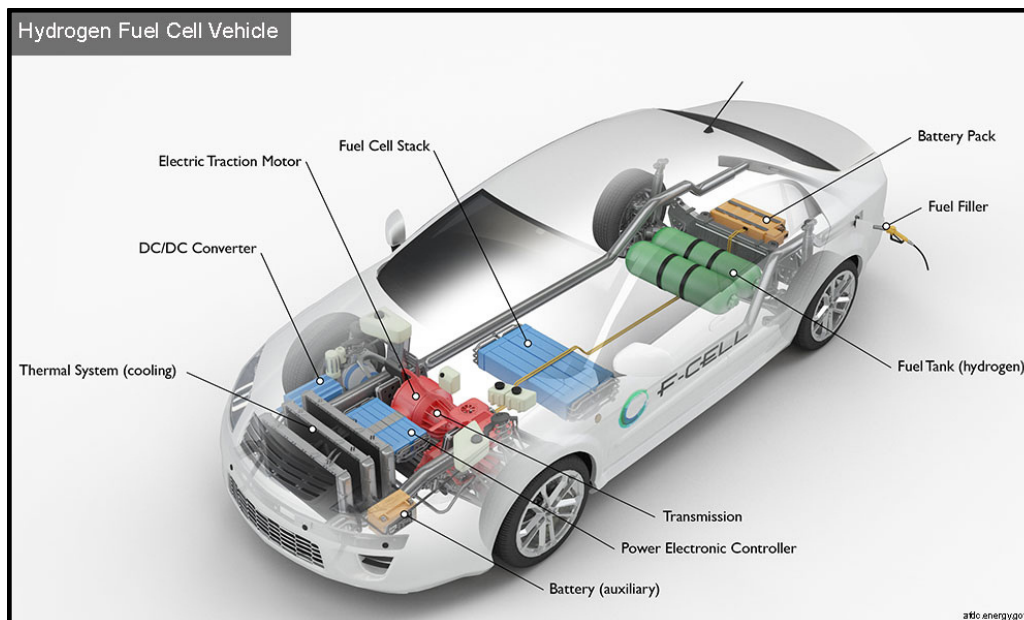
Greetings and a warm welcome to our Tenth Edition of “EMANATION”. “Engineering the Future” is a motto that the community of mechanical engineers vehemently believes in. We strive towards that possible future by learning to grow our horizon, expanding from a strictly core field of expertise. We’ve tried to convey this message in this issue of our newsletter, including articles, interviews with alumni, research papers, and more. We sincerely hope you enjoy reading this issue. We welcome any suggestions or constructive criticism.

**Lastly, we thank all the members who contributed their part to this edition.**



# NEXT EDITION

## HYDROGEN FUEL CELLS



Hydrogen fuel cells stand as a beacon of innovation in the realm of sustainable energy. These marvels of engineering harness the potential of hydrogen, the most abundant element in the universe, to generate electricity through an electrochemical process. At their core, hydrogen fuel cells operate by channeling hydrogen gas to the anode and oxygen (usually from the air) to the cathode, separated by an electrolyte. Through this process, hydrogen atoms split into protons and electrons, with the electrons creating an electric current that powers devices or motors. Remarkably, the only byproducts of this process are water vapor and heat, making hydrogen fuel cells a clean and eco-friendly energy source. Beyond their environmental benefits, the versatility of fuel cells extends to various applications, from powering vehicles—ushering in the promise of emission-free transportation—to serving as backup power sources for homes, businesses, and even space missions. While challenges such as hydrogen production and infrastructure development exist, the promise of hydrogen fuel cells as a sustainable, efficient, and scalable energy solution continues to captivate researchers, industries, and policymakers globally.

# EDITORIAL COMMITTEE

**Dr. Girish T R**

**Prof. Anil Kumar A**

**Dr. Nagaprasad K S**



# STUDENT COMMITTEE

**Haryank V Kashyap**

**Talapaneni Manoj**