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School of
Mechanical
Engineering

The Technical Bulletin

MECHAZINE

This Magazine of Mechanical Engineering Department is intended to keep its readers updated with the latest changes and develoments being happening in core and related fields.

Autumn 2022

Issue III

VISION

The department envisions to be recognized globally for its outstanding technical education and research & consultancy capabilities to ethically address the ever-changing Socio-Global issues.

MISSION

M1 To develop state-of-the-art industry aligned research facilities to provide opportunities to interpret, apply, disseminate and create knowledge.

M2 To inculcate a culture of upgrading the knowledge and skills of human resources through Self-learning, E-learning and Training activities

M3 To equip the students with academic, corporate and entrepreneurial leadership, communication skill and global awareness as required by the engineering profession and society in general.

M4 To establish an environment that encourages and builds an exemplary degree of citizenship, professional and personal integrity and ethical behavior.

EDITORIAL COMMITTEE.....

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Message from the Management

Success is not a one-shot process. It is the result of a continuous improvement after each failure.

" कर्म ही दीन है। कर्म ही ईमान है।
कर्म ही पूजा है। कर्म ही धर्म है। "

Dr. O. P. Agarwal
MANAGING DIRECTOR

We believe in valuing the 21st century education system. Today when education is going through a sea change, we leave no stone unturned to match our pace with emerging trends & newer technologies. My best wishes to the Department of Mechanical Engineering for the Third issue of their Departmental Technical Magazine.

Dr. Neema Agarwal
ADDITIONAL MANAGING DIRECTOR

NIET has been helping its students to write their own stories since its inception. Committed in providing the best jobs by creating life-changing educational opportunities and collaborative learning environments. I congratulate the Mechanical Engineering Department for their 3rd and consecutive Technical Magazine.

Mr. Raman Batra
EXECUTIVE VICE PRESIDENT

Proactive scanning of the recent development in technology space, early identification of upcoming needs of the industries and curriculum designed for holistic development of the students and meticulous execution of teaching and learning process are the hallmark of our value chain to deliver "Industry ready professionals".

Mr. Praveen Soneja
DIRECTOR GENERAL

We motivate our students to dream big and ensure that right spirit and necessary talent are inculcated in the students to help them realize their objectives. We also continuously strive to instil ethical values in our wards so that they become responsible citizens of the future.

Dr. Vinod Mansiram Kapse
DIRECTOR

A person without vision is similar to a sailor without a compass. Have a vision, plan your goals, accept new challenges, work hard to achieve them and make your life worthful. ME Department is continuously making efforts in updating skills, organizing technical and cultural. events in line with latest trends in Teaching Learning process.

Dr. B. C. Sharma
DIRECTOR (ACADEMICS)

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FROM THE PEN OF CHIEF EDITOR

Dr. Praveen Pachauri
Director (Projects & Planning)
HOD - SME, NIET

The world is changing in many dimensions. The education is one of them. But it is an Axle of technology wheel to accommodate all the changes happening with the advancement of Technologies and disruptions happening in all the fields. The education system needs to change itself with the passage of time. The 21st century is dedicated to disruptive technologies and young generation has to be prepared for more disruptions. The education system must be modified to cater the need of holistic personality development.

The new national education policy released by Government of India in the year 2020 stands on four pillars. These four pillars represent the four-dimensions of human personalities. The educationists are supposed to care for all the four-dimensions which are as follows:

THE FOUR-DIMENSIONS OF NEW EDUCATION POLICY

1) COGNITIVE DOMAINS SKILLS (ज्ञान योग)

This dimension ensures the proper use of intellectual potential of students. The brain needs to be trained to create new technologies, new systems and new methodologies. The teaching learning tools should be so developed that they help to remember, understand, apply, analyse, evaluate and create new products and technologies.

2) PSYCHO MOTOR DOMAINS SKILLS (कर्म योग)

The students should be allowed to practice on existing tools and technologies is so that there sensory organs get tuned up to observe even the minute changes and take necessary actions to achieve the perfection by following imitation, manipulation, precision, articulation and naturalisation to master the psycho motor domain skills.

3) EFFECTIVE DOMAINS SKILLS (भक्ति योग)

To excel in professional career the students must learn the effective domains skills such as personality traits, communication skills, leadership skills, teamwork, ethics and concern for environment. They can contribute in the attainment of sustainable development goals (SDGs) defined by United Nations(UN) only if they have strong command on effective domain skills. To master them the students must practice receiving, responding, valueing, organising and characterising habits in day to day life.

4) SOCIO-PSYCHO MOTOR DOMAINS SKILLS (सांख्य योग)

This dimension takes care of an individual's behaviour in public life. The students must master empathy, teamwork, conflict resolving and design thinking to excel in this dimension. This dimension is necessary to be taken care to make our planet sustainable in all regards.

NEW TRENDS AND INNOVATION IN MECHANICAL ENGINEERING

Engineering advances to explore new concepts and solutions because engineers have a natural interest about why and how things operate.According to a report based on the proceedings of The Global Summit on the Future of Mechanical Engineering, which took place in Washington, D.C., from April 16 to 18, 2008, "Mechanical Engineers are at the forefront of developing new technology for farming, transportation, environmental remediation, safety, food production, housing, security, water resources, etc." In accordance with IBM's 2021 Digital Transformation Assessment, the pandemic had prompted a 67 percent acceleration of digital projects across manufacturers. among the respondents' list of the most significant brand-new ventures are new digital design tools being created, programming of production, logistics, and service systems for automation and improved platforms and tools for remote and collaborative work.

Engineers had to quickly build, develop and grow the digital technology and materials needed to satisfy new global demands, though, as the globe transitioned collectively toward a more digital way of life amid COVID-19 lockdowns. As engineers conceived designs remotely, the digital world of the pandemic integrated with the wave of new technologies from the fourth industrial revolution—digital twins, which were already a significant time- and resource-saving technique before 2020. In the decade, some new technologies of Mechanical Engineering domain will contribute to drive the world e.g., Diving into digital, Merging the mechanical and the digital, Additive manufacturing, CAD/CAM, Digital Twins, Automation & Smart Systems, Internet of Things (IoT) & Industrial Internet of Things (IIoT) etc.

Mechanical engineers are ideally situated to profit from the digital revolution as they are a part of the largest engineering field. Even though AI, robotics, and additive manufacturing will probably be the main technologies influencing all areas of engineering over the next ten years, software and electrical engineers typically need the assistance of mechanical engineers to actualized their plans. Mechanical engineers will be able to electronically test items and manage machinery or tools from many manufacturers thanks to digital twins. There were nearly 27.1 billion devices connected to the Internet of Things (IoT) in 2021 and that number is only expected to grow.

It has also given rise to the Industrial Internet of Things (IIoT), which is the networking and connection of industrial equipment, sensors, machines, and other instruments to each other and to the internet. It would be impossible to include every trend in mechanical engineering, particularly because the specifics depend on the industry and the expertise. The article's trends provide a clear picture of the direction mechanical engineering is moving towards. The common thread among them all is the requirement to learn programming, digital technology, sustainable manufacturing, and renewable energy sources.

Sanjay Kumar
Associate Dean (Innovation Labs & MOOCs)
Dy. HoD & Asst. Professor- SME
Convener- NIET- IIC (A MoEd. Initiative)

DIET, FITNESS, YOGA AND FUTURE THOUGHT

A positive mindset brings positive things. The future depends on what we do in the present. A survey had uncovered that practically 75% of individuals who set staying fit as their New Year's goal generally stop before they achieve results. One can only assume that the fitness goals cannot be achieved, if the diet and fitness routine is wrong and not compatible with the body type or maybe because the individual is doing it all alone by him/herself. To get interested, you can-

- Start by naming famous fitness influencers? Their stories, diets, workouts, etc...
- Draw and explain different body types and structures.
- Make a diet routine for to follow.
  # Fat and Cholesterol intakes
  # Protein requirements
  # Sugar intake
  # Vitamins, Calcium, Zinc, and Iron needs.
- Create an Exercise routine.
- Time the workouts.
- Yoga structure and poses.
- Fitness Goals.

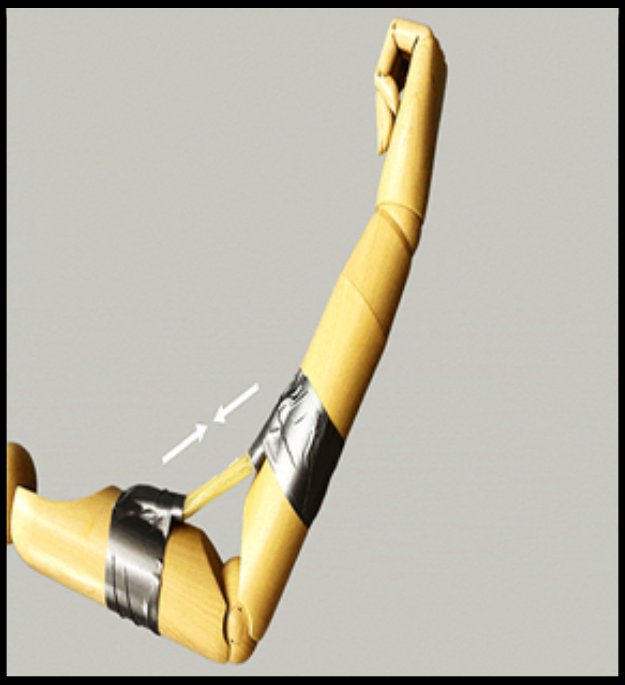
"The best sleeping pill is a clear conscience." Why is the future important? Research suggests that thinking about the future—a process known as prospection—can help us lead more generous and fulfilled lives. When you look after 'future you' - you're looking out for yourself, which is (hopefully!) a better version of you now. It's a wonderful concept - to make a bargain with the future. So why not devote some time thinking about what you want and what you're going to have, do and act to get there, to make things that you want to happen. Your future will be made by the work you put in today. Delay gratification and act now to start building the future you want!

"Live life to the fullest and focus on the positive."

Dr. S L Verma
Professor- SME, NIET

ROBOT MUSCLE FLEXIBILITY MAY BE HELPED BY A SHAPE MEMORY POLYMER

Shape memory polymers, whether stretched or distorted, revert to their original forms when heat or light is introduced. Soft robots, smart biomedical gadgets, and deployable space constructions all benefit from these materials, but they haven't been able to store enough energy until now. Researchers have now produced a shape memory polymer that stores nearly six times more energy than earlier versions, according to ACS Central Science.



ACS Central Science 2021,
DOI: 10.1021/acscentsci.1c00829

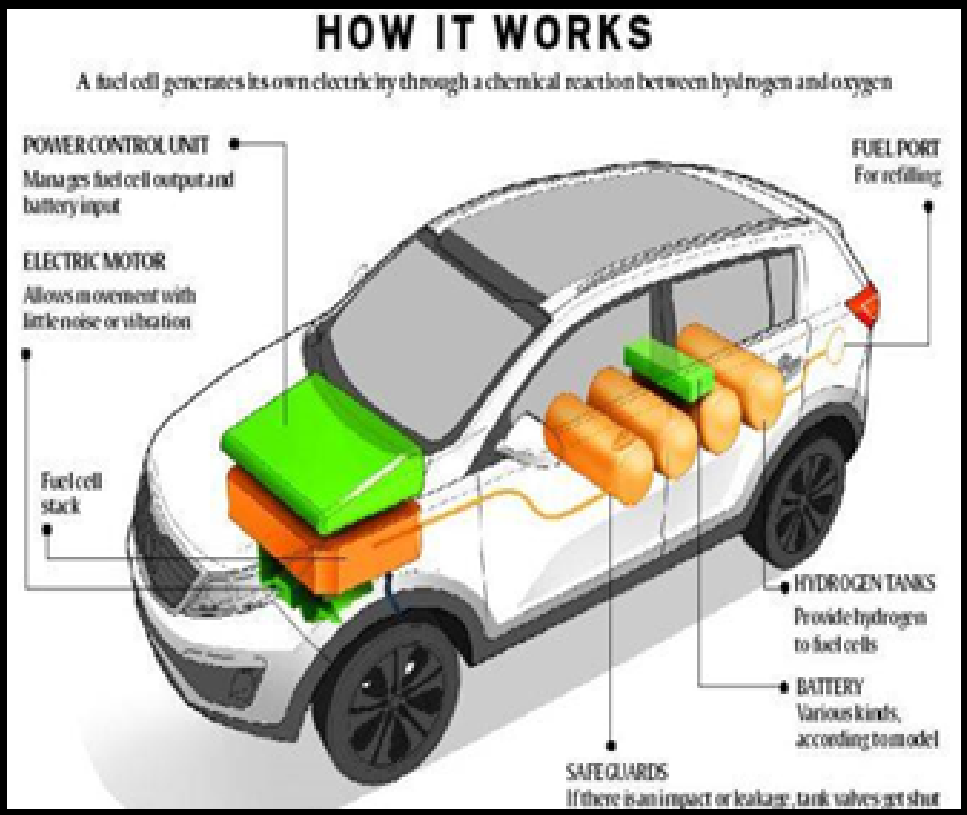
Shape memory polymers switch back and forth between their initial, undeformed state and their secondary, distorted one. Stretching the polymer causes deformation, which is maintained by molecular modifications such as dynamic bonding networks or strain-induced crystallisation, which may be reversed with heat or light. The accumulated entropic energy is subsequently released, and the polymer returns to its original state. However, scientists have found it difficult to make these polymers execute energy-intensive activities. Zhenan Bao and colleagues aimed to create a novel form of shape memory polymer that stretches into a stable, extremely elongated state and then returns to its original state, releasing enormous quantities of energy. The researchers used a poly(propylene glycol) polymer backbone to insert 4-,4'-methylene bisphenylurea units. Polymer chains were twisted and disorganised in their natural form. Stretching the chains allowed them to align and generate hydrogen bonds between the urea groups, resulting in supermolecular structures that helped to maintain the very elongated condition.

Heating broke the bonds, causing the polymer to compress back to its original disordered condition.vThe polymer could be stretched up to five times its original length and store up to 17.9 J/g energy in experiments, which is over six times higher than prior shape memory polymers. When heated, the stretched material could lift items 5,000 times its own weight, according to the researchers. They also created an artificial muscle by connecting pre-stretched polymer to a wooden mannequin's upper and lower arms. The material contracted when heated, forcing the mannequin's arm to bend at the elbow.

Dr. Ankit Manral
Assistant Professor- SME, NIET

HOW HYDROGEN-POWERED VEHICLE ACTUALLY WORK?

Hydrogen car run by the use of " Fuel Cell ". The fuel cell is a device that takes chemical energy, in the form of hydrogen, and turns it into electricity that can power an electric motor, just like a battery. So, a hydrogen-powered car is powered with an electric motor. Recently Toyota Mirai , launched by Union Minister Nitin Gadkari on March 16, is India's first Fuel Cell Electric Vehicle (FCEV). According to the car manufacturer, Mirai can travel up to 600 km on a full tank. The car, which is a pilot project is being looked at as a step towards promoting green hydrogen.



How does it work?
First, hydrogen stored in a tank (that is thick-walled and crash-tested, and usually under the rear seat) is mixed with air and pumped into the fuel cell. Inside the cell, a chemical reaction extracts electrons from the hydrogen .The leftover hydrogen protons move across the cell and combine with oxygen from the air to produce water. Meanwhile the electrons create electricity, which charges a small storage battery used to power an electric drivetrain (just like in an electric vehicle).

This is why the vehicles are called Fuel Cell Electric Vehicles (FCEV), as compared to the battery electric vehicles (BEV) which are seen increasingly on our roads already. Electric cars run on batteries charged electrically, But hydrogen-powered cars produce their own electricity. They have their little power plant on board – that's the fuel cell. So, unlike a combustion engine, which produces carbon dioxide, the only end products of this hydrogen-powered reaction are electricity, water and heat. The only exhaust products are water vapour and warm air.

Saurabh Goswami
4th Year Student- SME, NIET

HOW TO ATTAIN CARBON NEUTRALITY?

Let’s take a look how Infosys managed to attain carbon neutrality 2 decades ahead of schedule for year 2050!

The quantity of carbon dioxide (CO2) emissions connected with all of a person's or other entity's actions are referred to as their carbon footprint (e.g., building, corporation, country, etc.). It comprises direct emissions from fossil-fuel combustion in manufacturing, heating, and transportation, as well as emissions connected with the production of power for goods and services used. In addition, other greenhouse gases such as methane, nitrous oxide, and chlorofluorocarbons are frequently included in the carbon footprint idea (CFCs). More than 45% of Infosys Limited’s carbon footprint emission is met by solar energy, which drastically reduces cost of electricity consumption of the company. And while that is an achievement in itself, it does not fully cut it.

As a result, the corporation set up an internal carbon pricing scheme. Consider it this way: There is a cost involved with emitting carbon. The general public is normally responsible for this cost. It's on you if their crops die as a result of climate change. It's on you if their healthcare expenditures rise as a result of polluted air. It's also your responsibility if sea levels rise and damage the environment. And, ideally, you should be able to assign a monetary value to all of the harm you committed. You can raise internal awareness after you have a pricing system in place. Perhaps different departments should be rewarded for reducing CO2 emissions. However, this does not completely solve the problem. Sometimes you'll be forced to use power generated by polluting coal plants. In which case, it is quite unrealistic to keep pursuing the lofty ambition of eliminating all emissions. Instead, you can plan to offset it by funding projects that reduce emissions elsewhere.

Companies, similar in terms with Infosys, can pay to decrease the global greenhouse gas emissions rather than going carbon-free themselves. In terms of reducing the company's (Infosys’) carbon footprint, it has the same effect. As a result of leveraging all of these efforts, Infosys currently claims that the sum of all greenhouse gases it produces into the atmosphere equals the CO2 it removes from the atmosphere, effectively making the firm carbon neutral.

Akshat Srivastava
4th Year Student- SME, NIET

EVOLUTION OF MECHANICAL ENGINEERING

Before we come to the topic we have to understand what is engineering and how mechanical engineering different from other engineering. Engineering is a scientific field and Job that involve taking our scientific understanding of the natural world and using it to invent, design, and build things to solve problems and achieve practical goals. And if we define mechanical engineering we can define it as an engineering branch that combines engineering physics and mathematics, principles with material science, to design, analysis, manufacture, and maintain mechanical systems including tool, engines and machines.

History of mechanical engineering

Development of physics and machines tools during the 19th century allowed the separation of mechanical engineering from engineering. This actually leads to the manufacturing of machines and engines, in order to power them. But mechanical engineering emerged as a field during the industry revolution in Europe in 18th century; however, it's development can be traced back several thousands year around the world. James Watt is father of mechanical engineering and Sir Mokshagundam Visvesvaraya is known as father of Mechanical Engineering in India.

How mechanical engineering changed the world

Virtually every product or service in modern life has probably by touched in some way by a mechanical engineer to help human kind. This includes solving today's problem and creating future solution in healthcare, space exploration, climate change and many more. During World war II especially, mechanical engineers contributed to the design and improvement of fighter airplanes, tanks, vehicles, machines, and many more.

Future of Mechanical Engineering

The future and scope of mechanical engineers in India and abroad are very bright. Students who complete mechanical engineering have a plethora of opportunities in the areas of aerospace, automobile, chemical manufacturing plants, railway coach factory, oil exploration, research and development, among others.

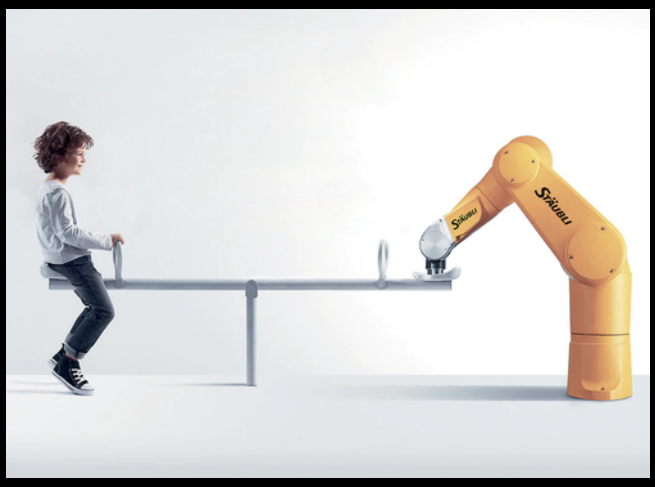
In the years ahead, mechanical engineers are expected to be integral in using nanotechnology to: Create stronger composite materials. Develop superior renewable energy storage systems. Create advanced biomedical devices. Employment of mechanical engineers is projected to grow 7 percent from 2020 to 2030, about as fast as the average for all occupations. About 20,200 openings for mechanical engineers are projected each year, on average, over the decade.

Kumar Lokesh
3rd Year Student- SME, NIET

HUMAN & MACHINE: A NEW ERA OF AUTOMATION IN MANUFACTURING

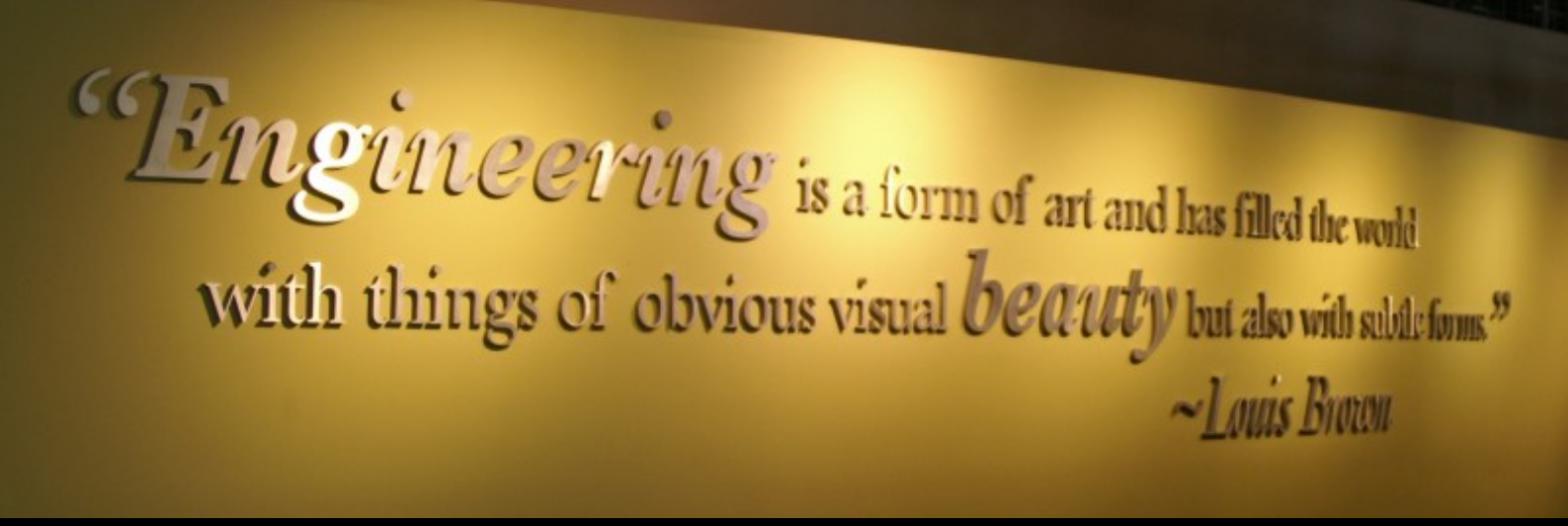
"When we imagine a manufacturing facility, we think of conveyor belts, robotic arms, elaborate machinery, and human workers in protective gear ensuring the entire system's functioning correctly and putting the finishing touches on goods before shipment".

Automation is, simply put, built into our conception of "how modern manufacturing operates", But recent technological advances have fundamentally changed what automation can accomplish, and what we once envisioned as the factory of the future is in many ways already here today. This new era of automation will disrupt and displace old models of production and permanently change not only manufacturing, but product development, supply chain management, and sales and marketing. This post explains how we got here, what this new technology means for automation, and how forward-thinking manufacturers can apply it to their own operations. Automation in manufacturing has been transforming factory floors, the nature of manufacturing employment, and the economics of many manufacturing sectors. Today, we are on the cusp of a new automation era: rapid advances in robotics, artificial intelligence, and machine learning are enabling machines to match or outperform humans in a range of work activities, including ones requiring cognitive capabilities.



Industry executives—those whose companies have already embraced automation, those who are just getting started, and those who have not yet begun fully reckoning with the implications of this new automation age—need to consider the following three fundamental perspectives: what automation is making possible with current technology and is likely to make possible as the technology continues to evolve; what factors besides technical feasibility to consider when making decisions about automation; and how to begin thinking about where —and how much—to automate in order to best capture value from automation over the long term.

Dheeraj Kumar Jha
4th Year Student- SME, NIET



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