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TULSIRAMJI GAIKWAD-PATIL
College of Engineering & Technology

(Approved by AICTE, New Delhi and Govt. of Maharashtra & Affiliated to MSBTE, Mumbai)

POLYTECHNIC



“YANTRIK”

DEPARTMENT OF MECHANICAL NEWSLETTER

2022-2023

ODD SEMESTER

HUMAN ROBOT COLLABORATION IN SMART FACTORIES



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Human Robot Collaboration (HRC) in Industry 4.0

The emergence of **Industry 4.0** marks a profound transformation in the manufacturing sector, driven by digitization, automation, and smart connectivity. Among its most revolutionary developments is **Human–Robot Collaboration (HRC)** a model where humans and robots work together within the same environment, combining human intelligence with robotic precision. Unlike traditional automation, where machines operate in isolation, HRC integrates advanced robotics with artificial intelligence (AI), the Internet of Things (IoT), and cyber-physical systems to create truly **smart and adaptive factories**.

Concept and Significance:

Human Robot Collaboration redefines industrial operations by enabling robots to interact safely and intelligently with human operators. Collaborative robots, known as co-bots, are equipped with sensors, vision systems, and AI algorithms that allow them to recognize human presence, share workloads, and assist in real-time decision-making. In this model, humans contribute creativity, critical thinking, and adaptability, while robots offer precision, consistency, and strength. This synergy enhances productivity, operational flexibility, and worker safety the three pillars of modern manufacturing excellence.



**“Vision that Inspires,
Mission that Empowers”**

Vision of Institute

**To emerge as a learning Center of Excellence In the
National Ethos in Diploma In Engineering.**

Mission of Institute

M1: To elevate the standards of students through ethical practices.

M2: To provide facilities and services to meet the challenges of Industry and Community.

M3: To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

Innovating for a Better Tomorrow, Leading with Purpose.

VISION OF DEPARTMENT

To be a premier center for producing competent Mechanical Engineers to cater the ever- changing industrial demands and societal needs.

MISSION OF DEPARTMENT

- ☐ **To provide better environment to the students and faculty members, creating an ambience conducive for excellence in Mechanical Engineering education.**
- ☐ **To strengthen industry institute interaction to made the challenges of industry and society.**
- ☐ **To impart quality technical education to inculcate moral values, professional ethics and entrepreneurial qualities.**

Programme Educational Objective

PEO1: Provide socially responsible, environment friendly solution to mechanical engineering related broad base problem adopting professional ethics.

PEO2: Adapt state of the art, mechanical engineering broad-based technologies to work in multi disciplinary work environment.

PEO3: Solve broad-based problems individually and as team member communicating effectively in the world of work.

Programme Specific Outcomes:-

PSO1: Modern Software Usage: Use latest mechanical related software for simple design, drafting, manufacturing, maintenance and documentation of mechanical components and processes.

PSO2: Maintenance and selection of machines, equipment, instruments: Maintain and select appropriate machine, equipment and instrument in field of Mechanical Engineering.

PSO3: Manage Mechanical Process: Manage the mechanical process by selection and scheduling right type of machinery, equipment, substrates, quality control techniques, operational parameters and software for a particular mechanical process or job for economy of operations

Programme Outcome

1. Basic and Discipline specific knowledge: Apply the knowledge of basic mathematics, science, engineering fundamentals, and an engineering specialization to solve the engineering problems.

2. Problem analysis: Identify and analysis well-defined engineering problems using codified standard methods.

3 Design/development of solutions: design solution for well-defined technical problems and assist with the design of system components or processes to meet specified needs.

4. Engineering tools, experimentation and testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

5. Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.

6. Project Management: Use engineering management principles individually, as a team member or a leader to manage project effectively communicate about well defined engineering activities.

7. Life-long Learning: Ability to analysis individual needs and engage in updating in the context of technological changes

Gateway to Innovation"



ABOUT TGPCET

Tulsiramji Gaikwad Patil College of Engineering and Technology (TGPCET) second shift Polytechnic was established in the year 2013 by VidarbhaBahu-uddeshiya Shikshan Sanstha(VBSS), a registered society. It is self- financed Private Polytechnic, which is affiliated to Maharashtra State Board of Technical Education (MSBTE).Mumbai and is approved by All India Council for Technical Education, New Delhi.



ABOUT DEPARTMENT

The Dynamic Realm of Mechanical Engineering: Where Innovation Meets Precision

The Department of Mechanical Engineering stands as a cornerstone of technological evolution — a discipline that merges creativity with scientific rigor to shape the machinery of modern civilization. Often referred to as the “mother branch” of engineering, Mechanical Engineering transcends traditional boundaries, empowering students to design, analyze, and innovate systems that define human progress.

A Vision in Motion: Message from the DEAN



Dr. Aasif Baig
Dean, Polytechnic

It gives me immense pleasure to extend my warm greetings on the release of our department's latest newsletter, themed "**Human-Robot Collaboration (HRC) in Industry 4.0.**" This edition highlights the dynamic transformation taking place in the modern industrial landscape, where the synergy between human intelligence and robotic precision is redefining the future of manufacturing. In the era of **Industry 4.0**, innovation is no longer confined to automation alone; it thrives on collaboration. The integration of **smart technologies, artificial intelligence, and advanced robotics** has created new possibilities where humans and machines coexist as partners in productivity. This collaboration not only enhances operational efficiency but also upholds safety, flexibility, and creativity at every stage of industrial development.

Our institution takes great pride in nurturing students who are prepared to lead this technological evolution. Through experiential learning, research initiatives, and industry partnerships, we aim to equip our learners with the skills and vision necessary to contribute meaningfully to the world of **smart and sustainable manufacturing**.

I commend the editorial team, faculty members, and students for their dedicated efforts in curating this insightful edition. May this newsletter inspire readers to explore the limitless potential of human-robot collaboration and to embrace innovation as the foundation of a progressive future.

Message : *Shaping Future Innovators for an Intelligent Tomorrow.*

FROM HOD DESK



Dr.Niteen Kakade
HoD, Mechanical Department

It is a moment of pride and pleasure to announce the publication of our department's newsletter on the theme **“Human–Robot Collaboration (HRC) in Industry 4.0.”** This theme is of great importance as it reflects the future direction of global manufacturing, where human creativity and robotic intelligence work together to achieve excellence in productivity, precision, and safety. The concept of HRC emphasizes the harmony between technology and human capability—where automation enhances, rather than replaces, human potential. In the era of Industry 4.0, such collaboration is vital for developing smart, flexible, and efficient production systems. I appreciate the sincere efforts of the editorial team, faculty, and students for bringing forward this insightful edition that encourages our learners to explore the emerging frontiers of innovation and sustainable engineering.

**Message: Message: Engineering the next revolution :
Human and Robot, Hand in Hand**

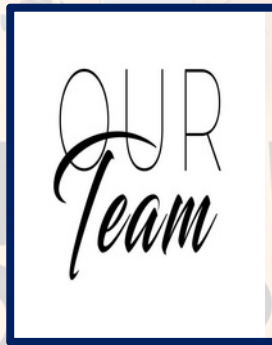
EDITORIAL



Dr.Niteen Kakade,
Chief Editor



MR.YOGESH RAMTEKE
FACULTY COORDINATOR

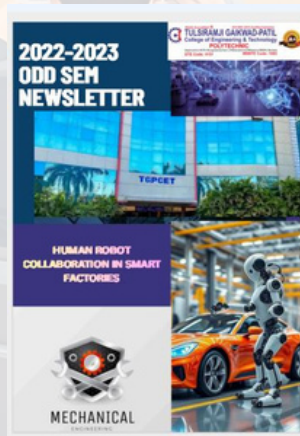


Mr.Manoj Gautam
STUDENT COORDINATOR



Mr.Prajwal Dhote
STUDENT COORDINATOR

OUR THEME



Ms.Mansi Gajbhiye
STUDENT COORDINATOR



Industry 4.0 represents the current and fourth major industrial revolution, characterized by the fusion of the physical, digital, and biological worlds through advanced technologies. It transforms traditional manufacturing and industrial practices by fully embracing **smart technology** and data integration. The core concept is the creation of "**smart factories**" where machines, products, and humans communicate with each other in real-time via the **Internet of Things (IoT)** and **cyber-physical systems**. This interconnectedness allows for processes to be managed and optimized autonomously, enabling **decentralized decision-making**, extreme **flexibility** in production (mass customization), and immediate response to supply chain changes or equipment failure. Key enabling technologies include **Artificial Intelligence (AI)**, **Machine Learning**, **Big Data Analytics**, **Cloud Computing**, **Additive Manufacturing (3D printing)**, and **Robotics**, leading to unprecedented levels of efficiency, productivity, and sustainability in the global manufacturing sector.

INDIA ECONOMIC CHRONICLE

SEPTEMBER 25, 2024

Editor's Note: Acknowledging the Transformative Impact of 'Make in India'

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The '**Make in India**' initiative, officially launched by **Prime Minister Narendra Modi on September 25, 2014**, represents a critical strategic intervention by the Government of India aimed at repositioning the nation as a premier global manufacturing and design hub. This program is not merely a promotional campaign but a comprehensive policy framework designed to fundamentally reform industrial operations. Its core objective is multi-faceted: to **facilitate foreign and domestic investment**, stimulate **innovation**, significantly enhance **skill development** across the workforce, secure **intellectual property rights**, and systematically construct **world-class manufacturing**



infrastructure necessary for global competitiveness. The initiative's guiding principle is encapsulated in the slogan "**Zero Defect Zero Effect (ZED)**," which mandates that products manufactured under its purview must meet stringent global quality standards (Zero Defect) while simultaneously ensuring minimal adverse impact on the environment (Zero Effect). The strategic oversight and operational implementation of this transformative effort are managed by the **Department for Promotion of Industry and Internal Trade (DPIIT)**, operating under the Ministry of Commerce and Industry.



Transforming Knowledge into Real-World Impact"

Date : 17 September 2022: The essence of Industrial Robotics and automation and opportunities for diploma holders

Industrial Robotics and Automation represent a transformation advancement in modern manufacturing and production systems. This field integrates mechanical engineering, electronics, computer science, and control systems to design and operate intelligent machines capable of performing tasks with precision, consistency, and efficiency. Industrial robots are widely utilized in various sectors such as automotive, electronics, aerospace, and logistics to enhance productivity, ensure quality, and reduce human intervention in repetitive or hazardous operations. Automation, when combined with robotics, facilitates smart manufacturing processes that align with the principles of Industry 4.0 enabling real-time monitoring, data-driven decision-making, and optimized resource utilization. The lecture emphasized how understanding these technologies equips diploma holders with practical insights and essential competencies to contribute effectively to the evolving landscape of industrial innovation and technological advancement



Moment that inspire



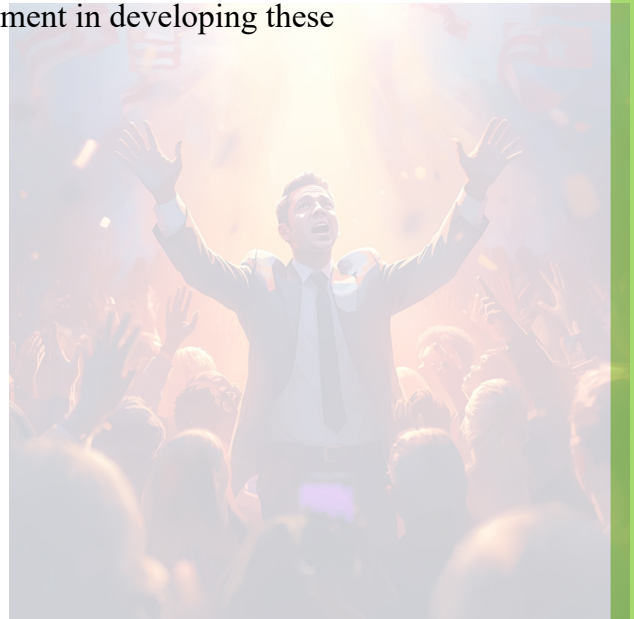
Transforming Knowledge into Real-World Impact"

Dated: 2 December 2022 *"Leadership & Qualities of a Successful Leader"*

The expert lecture, delivered by **Dr. Nitin Chore**, provided an engaging and insightful exploration of the concept of leadership and the qualities that define successful leaders in various professional contexts. Dr. Chore emphasized that leadership is not merely about occupying a position of authority but about the ability to **guide, influence, and inspire individuals or groups** toward the achievement of a common goal. He elaborated on diverse **leadership styles and traits**, highlighting the significance of **effective communication, empathy, decision-making, integrity, and adaptability** as the cornerstones of strong leadership.



Throughout the session, **real-life examples from corporate environments** were presented to help students understand how leaders address challenges, resolve conflicts, and motivate their teams to perform effectively. The lecture also included **interactive components**, encouraging students to reflect on their personal leadership potential and to recognize the importance of continuous self-improvement in developing these skills.



Transforming Knowledge into Real-World Impact"

Moment that Inspire



Transforming Knowledge into Real-World Impact"

Date: 8th October 2022: Industrial Visit at Sakhi Auto Products Pvt. Ltd., Butibori, Nagpur.

The **industrial visit to Sakhi Auto Products Pvt. Ltd., Butibori, Nagpur**, organized by the Department of Mechanical Engineering in collaboration with **IEI** and **ISTE**, provided students with valuable practical exposure to the manufacturing operations of the automotive components industry. The visit enabled participants to gain a comprehensive understanding of various stages of production, including machining, assembly, quality control, and packaging, thereby enhancing their knowledge of how precision, efficiency, and quality assurance are maintained in high-volume industrial environments. Students had the opportunity to observe advanced machinery, automation systems, and safety practices implemented in the plant, which broadened their perspective on modern manufacturing technologies and industrial standards. The session also offered insights into **supply chain management** and the coordination required to meet the demands of major automotive clients. It was noted by the faculty coordinator, **Mr. Khandagale**, that students utilized the travel time effectively to research the company and understand its background, reflecting their enthusiasm and commitment to learning. The experience provided hands-on exposure to different production sections and emphasized the importance of continuous analysis, evaluation, and improvement in meeting user needs. Overall, the visit successfully bridged the gap between theoretical knowledge and industrial practice, significantly contributing to students' **technical competence, professional growth, and readiness for future engineering careers.**



Transforming Knowledge into Real-World Impact"



Moment that inspire



**industrial visit to Sakhi Auto Products Pvt. Ltd., Butibori,
Nagpur,**

Transforming Knowledge into Real-World Impact"

Date: 14 November 2022 Industrial Visit at Jayaswal Neco Industries Ltd. Butibori , Nagpur.

The industrial visit to Jayaswal Neco Industries Ltd., Butibori, Nagpur, organized by the Department of Mechanical Engineering under the banner of IE(I)ISTE, and the Robust Forum, provided an enriching learning experience for third- and fifth-semester students. The visit offered comprehensive exposure to the advanced technologies and processes employed in the production of high-quality steel and cast components. Students observed various stages of manufacturing, from raw material handling to final product finishing, gaining a deeper understanding of industrial workflows, quality assurance, and environmental sustainability practices. The session included insightful interactions with industry experts, notably **Mr. Veer Tikoo**, HR Manager, who elaborated on the **casting technology** and the role of different cores in preparing large castings, and **Mr. Snehal Ramteke**, Senior Quality Control Engineer, who discussed the functioning of key sections such as pattern making, venting, sand mixing, and quality control measures implemented at each stage. The visit emphasized the importance of innovation, precision, safety, and sustainability in modern industrial operations while also highlighting potential career opportunities for Mechanical Engineering students in the casting and manufacturing sectors. It was further observed by the faculty coordinator that students utilized their travel time productively by researching the company's background and understanding its historical and industrial relevance. Overall, the visit effectively bridged theoretical knowledge with practical industrial exposure, enhancing students' **technical competence, professional awareness, and readiness for future engineering challenges.**

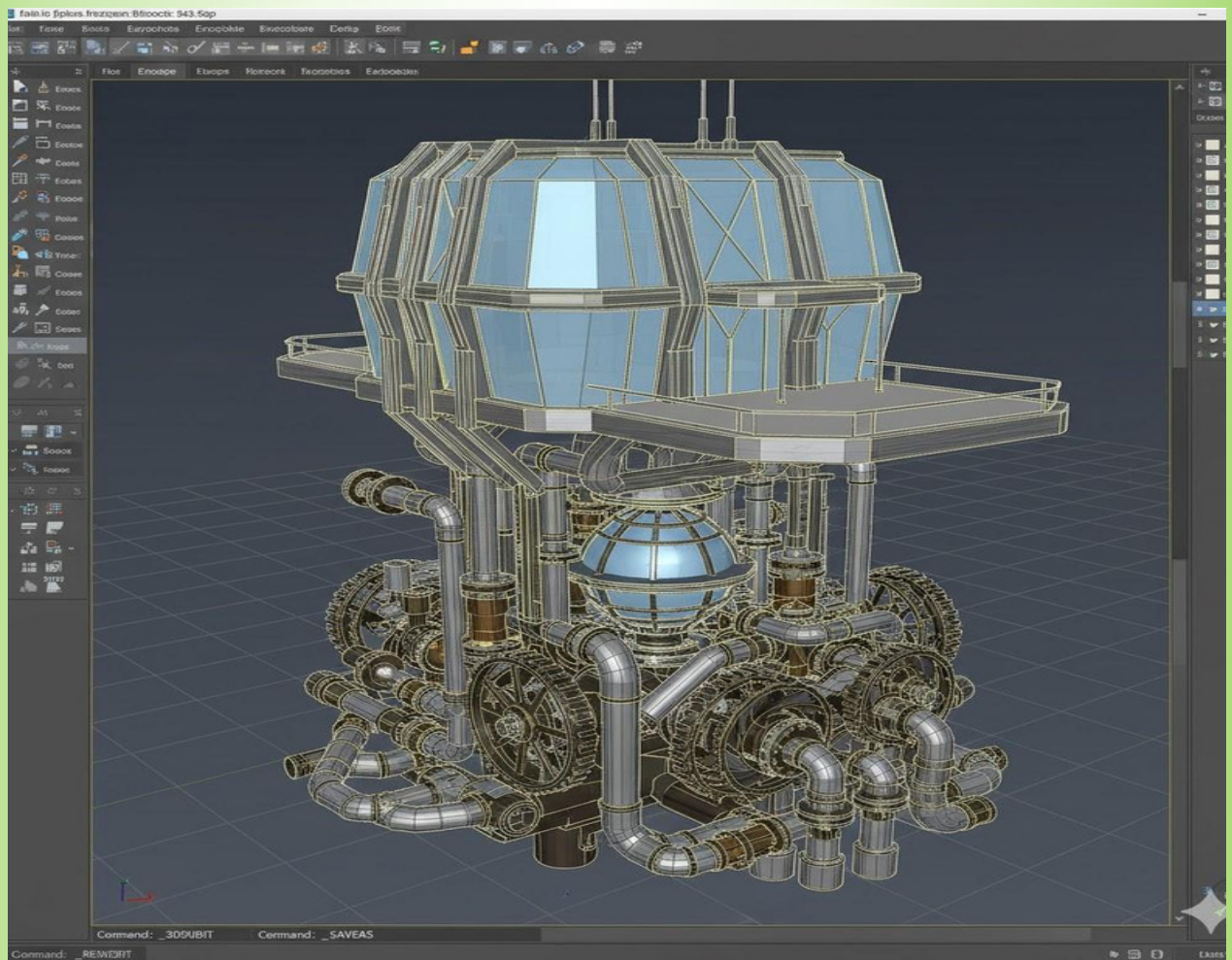


Transforming Knowledge into Real-World Impact"

Moment that inspire



Perspective That Matter



Name: Ritik Parihar
Enrollment No: 16830155

Our Outstanding Performers

1 st sem



Name: Manoj Pranav Gautam
Enrollment no- 2216830060
Percentage: 76.43%



Name: Mayuresh Khedekar
Enrollment no: 2216830059
Percentage : 75%

3rd sem



Name : Prajwal Nilkanth Dhote
Enrollment No: 2116830063
Percentage : 81.05%



Name : Mansi Siddharth Gajbhiye
Enrollment No: 2116830107
Percentage : 80.95%



Name : Lokesh Baliram Sahare
Enrollment No: 2116830573
Percentage : 78.84%

Our Outstanding Performers

5th Sem

Name :Abhishek Tiwari Enrollment No :
2016830237
Percentage : 81.33



**Thank you, India for
shaping minds, fueling
dreams, and inspiring
progress.”**

From our newsletter, we extend our sincere gratitude to the nation and specifically acknowledge **Prime Minister Narendra Modi**, who launched the transformative '**Make in India**' concept on September 25, 2014. This initiative has yielded profound benefits for India by strategically **reorienting the national economy** towards the manufacturing sector. By facilitating substantial **Foreign Direct Investment (FDI)** and streamlining processes to enhance the **Ease of Doing Business**, the policy strengthens domestic industrial capacity, which is crucial for accelerating **sustainable employment generation** and maximizing our large demographic dividend. Ultimately, 'Make in India' is successfully integrating the nation more robustly into global supply chains while fostering a culture of quality and competitiveness crucial for future prosperity.

- EDITORIAL TEAM

