

JAN 2025 | VOLUME 7 | ISSUE 2

# MECHATRON



A half yearly newsletter of Dept . of Mechatronics, Manipal Institute of Technology, Manipal, MAHE

## HOD's Message

I am delighted to present the latest edition of our department newsletter. The past semester has been marked by remarkable achievements from our students and faculty alike, reflecting our commitment to excellence. Your dedication continues to strengthen our academic community, from innovative research projects to engaging classroom initiatives. As we move forward, I encourage everyone to share their accomplishments and experiences through this platform, helping us build an even more vibrant departmental culture.

Dr. DV Kamath Professor  
& HOD  
Dept. of Mechatronics



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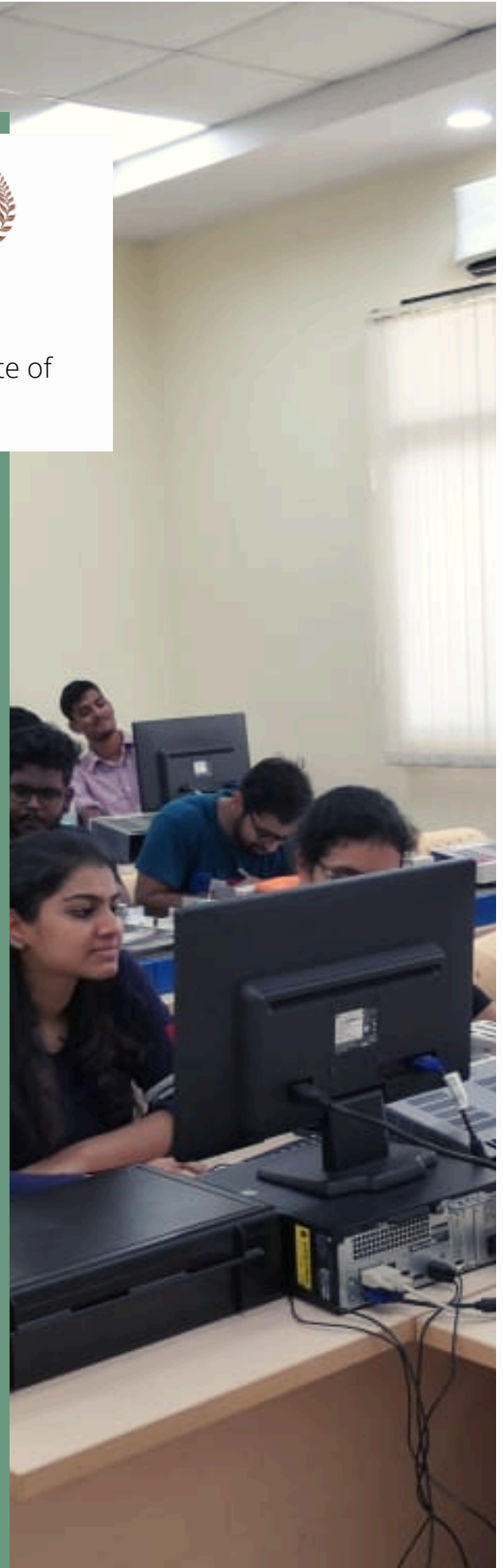
Dr. DV Kamath HOD Dept. of Mechatronics

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## Mission

Educate students professionally to face societal challenges by providing a health learning environment grounded well in the principles of Mechatronics Engineering, promoting creativity and nurturing teamwork

## Vision

Excellence in Mechatronics Education  
through Innovation and Team Work

# Department

## PROGRAM SPECIFIC OUTCOMES

At the end of the course the student will be able to

- Apply the knowledge of sensors, actuators, controls, mechanical design and modern software tools to integrate a system for performing specified tasks
- Articulate design, modelling, analysis and testing of Mechatronics products, systems and controllers using appropriate technology and software tools.
- Interface devices and elements to a central system having the capability of real time data sharing, storage, retrieval, analysis, decision making with global connectivity features for visibility and intervention

## GRADUATE ATTRIBUTES

- Engineering Knowledge
- Problem Analysis
- Design/ Development of Solutions
- Conduct investigations of complex problems
- Modern Tool Usage
- The Engineer and Society
- Environment and Sustainability
- Ethics
- Individual and Team Work
- Communication
- Project Management and Finance
- Life-long Learning

## PROGRAM EDUCATIONAL OBJECTIVES

The Mechatronics graduates:

PEO1: Are expected to apply analytical skills and modelling methodologies to recognize, analyze, synthesize and implement operational solutions to engineering problems, product design and development, and manufacturing.

PEO2: Will be able to work in national and international companies as engineers who can contribute to research and development and solve technical problems by taking an initiative to develop and execute projects and collaborate with others in a team.

PEO3: Shall be capable of pursuing higher education in globally reputed universities by conducting original research in related disciplines or interdisciplinary topics, ultimately contributing to the scientific community with novel research findings.

PEO4: Are envisioned to become technology leaders by starting companies based on societal demands and national needs.

PEO5: Shall develop flexibility to unlearn and relearn by being in pursuit of research and development, evolving technologies and changing societal needs thus keeping themselves professionally relevant.

## Department AT A GLANCE

- Inception 2012
- 7+ MOUs with Industry and Academia
- 10 State of Art Labs
- 5 Student Startups

## PROGRAMS OFFERED

- B.Tech-Mechatronics Engineering(2006)
- M.Tech-Industrial Automation and Robotics (2015)

## ACCREDITATION

- The National Board of Accreditation has accredited the "B-Tech in Mechatronics" program for a period of 6 years (2019 - 2025) and "M-Tech in Industrial Automation & Robotics" for 3 years (2024-2027).
- Department of Mechatronics also applied for the Institution of Engineering and Technology (IET) Accreditation UK for its B.Tech and M.Tech courses.

## PROGRAM OUTCOMES

The POs are exemplars of the attributes expected of a graduate of an accredited programs

PO 1-Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2-Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3-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.

PO 4-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.

PO 5-Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6-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.

PO 7-Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8-Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9-Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10-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.

PO 11-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.

PO 12-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.



# Department Activities

## Mechatronics Department Hosts Advanced Workshop on AI and Simulation in Engineering

The Department of Mechatronics, in collaboration with MIT, IEEE CAS, and IAC Electrical stream, successfully conducted a two-day workshop on "Simulation and AI in Engineering" on August 22-23, 2024. Led by Mr. Sushil Mane, Senior Technical Director at Altair Bangalore, the workshop covered cutting-edge topics including AI-powered physics predictions, model-based design approaches, and multi-body dynamic systems.

**MANIPAL** **CASxMT** **MANIPAL** **CASxMT**

Cordially invites you to

### WORKSHOP ON SIMULATION & AI IN ENGINEERING

Organized by  
Department of Mechatronics, MIT Manipal in Association with Industry Advisory Committee Electrical Stream

22 & 23 AUG 2024  
PG LAB, AB1

**MR. SUSHIL MANE**  
SA TECHNICAL DIRECTOR  
SIMULATION AND OPTIMIZATION TECHNOLOGY  
ALTIR INDIA

#### PROGRAM SCHEDULE

22nd August, 2024 2 PM - 5 PM	<b>AI Powered Fast Physics Predictions with Synthetic Simulation Data</b> Explore AI-driven engineering design with hands-on sessions on Regression, Classification, and GNN. Learn to use synthetic data and Altair tools for rapid simulations in Mechatronics, Mechanical, and Aerospace engineering.
23rd August, 2024 10 AM - 12 PM	<b>Model Based Design Approach to Design Complex Multidisciplinary Systems</b> High-level overview of model-based design using hybrid 1D/3D techniques for complex systems like batteries. Learn with Altair Tools, Twin Activate, and Simlab. Ideal for Mechatronics and Mechanical Engineers.
23rd August, 2024 2 PM - 4 PM	<b>Design of Multi Body Dynamic Systems using Mixed 1D and 3D Approach</b> Introductory hands-on session on 1D modeling and 3D co-simulation for multidisciplinary systems design using Altair Tools. Ideal for Mechatronics and Mechanical Engineers interested in systems simulation.

Faculty members and students participated in hands-on sessions exploring various AI algorithms, engineering design techniques, and simulation methods. The workshop provided valuable insights into using artificial intelligence to accelerate product development and implementing hybrid modeling approaches for complex system design.

## MIT Manipal Commemorates World Hydrogen Day with Green Innovation Seminar



The Department of Mechatronics at MIT Manipal successfully hosted a seminar titled "Celebrating Green Innovations (CGI)" on October 8, 2024, focusing on "Hydrogen RCCI Engines - The New Frontier of Clean Engine Combustion."

The event featured keynote speaker Dr. Abhishek Paul from NIT Silchar, who shared valuable insights into hydrogen-based engine technologies and their role in sustainable transportation. Commander (Dr.) Anil Rana, Director of MIT Manipal, graced the occasion as the chief guest. Faculty members and students actively participated in the interactive sessions, gaining comprehensive knowledge about Reactivity Controlled Compression Ignition engines and their potential in reducing environmental impact. The seminar, held at MV Seminar Hall, reinforced MIT Manipal's commitment to advancing green technology education and research.





# Department Activities

## 3 Days FDP on “Elevating Perspectives: Build, Capture, and Process UAV Data with AI Tools

The Departments of Mechatronics and Civil Engineering at MIT Manipal, in collaboration with MSDC and IEEE GRSS Bangalore Chapter, successfully conducted a Faculty Development Program on "Elevating Perspectives: Build, Capture, and Process UAV Data with AI Tools" from July 15-17, 2024. The program, inaugurated by MIT Manipal Director Commander (Dr.) Anil Rana, attracted 33 participants from various institutions, with 48.5% representing MAHE institutions. The three-day program featured comprehensive hands-on training in drone assembly and operation on day one, led by MSDC trainers Mr. Rishi Jain and Mr. Dharshan Devadiga.



Day two focused on drone calibration, flight simulation, and data analysis using WebODM, with sessions conducted by Dr. Chandan MC and Dr. Jagadeesha Pai B. The final day explored advanced applications, featuring sessions on construction industry applications by Dr. Raghavendra K Holla, drone-based mapping by Dr. Pruthviraj U from NITK, and drone computing by Dr. SN Omkar from IISc, successfully bridging theoretical knowledge with practical applications in UAV technology.

## UAV Control Simulations and Simscape Multibody Robotics



The Departments of Mechatronics and Aeronautical and Automobile Engineering at MIT Manipal, in collaboration with MathWorks, successfully conducted a comprehensive Faculty Development Program on "UAV Control Simulations and Simscape Multibody Robotics" from September 23-25, 2024.

The three-day program, held at the PG Lab in Academic Block 1, attracted 22 faculty members and researchers from various engineering disciplines. Led by MathWorks experts, the program featured specialized sessions: Mr. Venkat S guided participants through modeling rigid-body mechanical systems using Simulink and Simscape Multibody on day one, Mr. Pramod Lad focused on robotic algorithms and Gazebo simulator integration on day two, and Mr. Venkatasubramanian covered embedded code generation for UAV control with Parrot mini drones on the final day.

The program, which required participants to complete pre-requisite self-paced courses in MATLAB and Simulink, concluded with a valedictory ceremony attended by department heads Dr. Dattaguru V. Kamath and Dr. Dayananda Pai, along with chief guest Dr. Sriram K. The successful integration of theoretical knowledge with hands-on experience marked another milestone in MIT-Manipal's commitment to advancing engineering education and research in robotics and automation.



# Third International Conference on Robotics, Control, Automation, and Artificial Intelligence (RCAAI 2024)

The 3rd International Conference on Robotics, Control, Automation, and Artificial Intelligence (RCAAI 2024) was held with great enthusiasm and success from October 14-16, 2024, at the Manipal Institute of Technology (MIT), India. Organized in collaboration with Malaviya National Institute of Technology (MNIT), Jaipur, the conference provided a dynamic platform for knowledge sharing, fostering innovation, and networking among global experts, researchers, and industry leaders.

The conference aimed to address pressing global challenges by encouraging the integration of sustainability into cutting-edge automation technologies. Dr. Ishwar Bhiradi, convenor of the conference, stressed the importance of maintaining material circularity where a materials never go as a waste while developing new systems and called for collaborative efforts between academia and industry to meet environmental challenges.

Over a period of three days seven Keynote addresses delivered by experts in the field highlighted the significant advancements in automation and its role in sustainable development.



The event featured presentations across eight tracks, in 10 sessions with 86 of the best papers selected for presentation from a pool of high-quality submissions. The hybrid mode of the conference facilitated participation from global speakers and researchers, enriching the discussions on automation, control systems, and AI.

The conference was inaugurated by Dr. P. Giridhar Kamath, Registrar of MAHE, who underscored the importance of ingraining sustainable practices in students' lives, ensuring that they carry forward this mindset in their professional journeys. Dr. Anil Rana, Director of MIT Manipal, in his presidential remarks, applauded the organizing team for crafting a well-structured event, covering a wide range of mechatronics domains under the unifying theme of sustainability. Dr. D. V. Kamath, Head of the Department of Mechatronics, welcomed the participants, while Dr. Rajeev Agrawal, Co-Convenor from MNIT Jaipur praised the successful collaboration between the institutions and highlighted case studies demonstrating the efficiency and effectiveness of sustainable practices in industry.



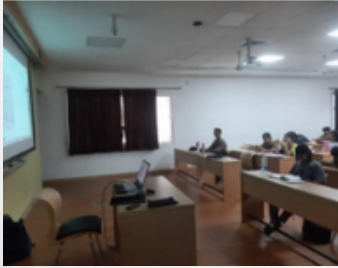


# Department Activities

## Innovations in MEMS Pressure Sensing: Expert Insights from Industry Leader



The Department of Mechatronics at MIT Manipal hosted an enlightening guest lecture on "A Highly Sensitive MEMS-based Pressure Sensor for Low-Pressure Applications" on October 29th, 2024, via MS Teams. The session was led by Dr. Hithesh Kumar Gatty, an accomplished scientist who serves as both an adjunct faculty member at MIT Manipal and CEO of Gatty Instruments, Sweden. Dr. Gatty, who holds a doctorate from KTH Royal Institute of Technology and completed postdoctoral research at CNRS, Toulouse, brought his extensive expertise in MEMS-based sensor development to the discussion.



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## UAV Control SimulatiNAIP-2024: Bridging Theory and Practice in Robotics, Cybersecurity, and Mechanical Engineeringons and Simscape Multibody Robotics

The Manipal Institute of Technology successfully hosted the National Academic Immersion Program (NAIP-2024) from July 8-14, 2024, welcoming 88 students and 5 faculty members from Dr. Vishwanath Karad MIT World Peace University (WPU). The week-long program provided comprehensive training in Robotics, Cybersecurity, and Mechanical Engineering Science, featuring technical sessions and hands-on training conducted by experts from the Departments of Mechatronics and Mechanical and Industrial Automation.

Inaugurated by MIT Director Cdr. Dr. Anil Rana, the program was coordinated by Dr. Ankur Jaisawal, Dr. Shiva Kumar, and Dr. Umesh Kumar Sahu. Participants engaged in various activities, including an industrial visit to Varahi Underground Power House Hosangadi and tours of cultural sites like the Hasta Shilpa Heritage Village Museum and Krishna Mutt.



Through its diverse blend of academic, industrial, and cultural experiences, NAIP-2024 successfully achieved its goal of providing an immersive educational experience that bridged the gap between theoretical knowledge and practical application.



# Faculty Corner

## Abhishek Kumar Kashyap Leads Team to Victory in Faculty Club Staff Cricket Tournament 2024

In the Faculty Club Staff Cricket Tournament 2024, Abhishek Kumar Kashyap delivered a spectacular all-round performance, representing a team from the Mechatronics and EEE departments. He won the Man of the Match award in all three matches, including the thrilling final, where his brilliance with bat and ball secured the championship for his team. Abhishek's exceptional consistency earned him the prestigious Man of the Series award, making him the star of the tournament. Congratulations, Dr. Abhishek, on an unforgettable triumph!



# Student's Corner

## MIT Manipal's Underwater Robotics Team Shines at IROS 2024



The ProjectAUV team from the Department of Mechatronics, MIT Manipal, achieved remarkable success at their debut international competition, the IROS 2024 held at Khalifa University, Abu Dhabi. Mr. Sumanth Bhat and Mr. Uttam Varma students of Mechatronics Department led the team to secure fourth position globally in the UWR Challenge finals after two days of intense competition.

Adding to their accomplishments, the team was honored with "The Gulf Spirit Award" for the best Business & Technical Pitch. Their outstanding performance among ten qualifying teams demonstrates MIT Manipal's growing excellence in underwater robotics and technological innovation.

## Mechatronics Students Clinch First Place in Bosch's National EV Competition



MIT Manipal's Mechatronics students Ms. Pragya Sujit Kumar and Mr. Srikar Bharadwaj R clinched first place at the Bosch Global Software Technologies Capstone Project Competition on December 13th, 2024, in Bengaluru. Their project, "Design of Onboard Charger for E-Bike application," was selected from among 900 participants nationwide after completing an 8-week EV Master Class by BGSW and IEEE Kerala. The team presented their Simulink-based design to experts from Bosch, MathWorks, and IEEE Kerala, demonstrating MIT Manipal's excellence in engineering innovation.