



## At a Glance

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## Editor Speaks:

Welcome to Volume 13, Issue 1 of The Robotic Society (TRS) of India's newsletter! As your proud editors, we are grateful for the Governing Council's continued trust and are thrilled to bring you a snapshot of the vibrant activities across TRS. This issue shines a spotlight on the **Mechatronics and Robotics Society (MARS) at Thapar Institute of Engineering and Technology, Patiala** recaps a successful **One-day TRS Workshop at IIT Ropar**, and details the inauguration of **The Robotics Society – Student Chapter at Amrita Vishwa Vidyapeetham Bengaluru Campus**. You will also find comprehensive reports on the **TRS-SCALE (Student Chapter Activity for Learning and Enriching) 2024: Phase II** activities, alongside an important announcement regarding the upcoming **AIR 2025 conference** and the call for proposals for **TRS-SCALE 2025-26**. Published biannually, the TRS Newsletter serves as a platform to highlight activities under the TRS umbrella, and we strongly encourage you to share your lab's research and work descriptions for future editions, as your insights are invaluable. Finally, we invite companies and institutions to become newsletter sponsors – a prime opportunity to showcase your brand to the wider robotics community – and welcome articles about your institution's robotics activities for publication. Together, let's propel the future of robotics in India!

Dr. Vineet Vashista, IIT Gandhinagar ([vineet.vashista@iitgn.ac.in](mailto:vineet.vashista@iitgn.ac.in))

Dr. Riby A. Bobby, IIT Jodhpur ([riby@iitj.ac.in](mailto:riby@iitj.ac.in))

## Activities:

### Mechatronics and Robotics Society (MARS) at Thapar Institute of Engineering and Technology, Patiala

MARS at Thapar Institute of Engineering and Technology aims to transform inquisitive minds into capable innovators. As the institute's sole robotics society, MARS thrives on interdisciplinary teamwork, hands-on problem solving, and a commitment to real-world robotics applications. It is a vibrant community of over 150 students from Mechanical, Electronics, Mechatronics, and Computer Science backgrounds. MARS has earned recognition at prestigious competitions such as ERC, IRC, and SIH. With each system we build, we tackle complex challenges and foster an environment where young

innovators turn ideas into impactful solutions.

Our Rover Alakananda marks the third generation of our planetary rover prototype and *bagged the First Runners Up Position amongst 100+ teams at the International Rover Challenge 2025, held at BITS Goa*. It consists of four key domains: Mechanical, Electronics, Control & Automation, and Soil System. Each contributed specialised subassemblies that together formed a resilient, modular platform capable of semi- autonomous navigation and sample acquisition on unpredictable terrain.



MARS is equally committed to fostering engagement beyond the lab. We maintain active associations with industry leaders such as Addverb, WOL3D, Dassault Systèmes, and Orangewood, and provide members with exposure to industrial tools, workflows, and real world engineering practices. Events like Open Day and Alumni Conclaves foster collaboration, mentorship, and knowledge exchange among students, faculty, and former members, strengthening the continuity of learning within the MARS community.

Our portfolio spans multiple domains, united by a shared focus on iterative design and research-based development. In addition to our rover program, recent projects include:

- Marvin - an autonomous cleaning robot designed for indoor sanitation.
- Reconfigurable Robot - a modular platform adaptable to diverse task profiles.
- Gimbal Stabiliser - a motion-dampening system to enhance mobile imaging.
- Robotic Manipulator - a precision end-effector for terrestrial and planetary operations.
- Self-Balancing Robot demonstrating dynamic stability and control, essential for robotics in constrained or uneven terrains.

These projects represent our steady progression in building purposeful systems, shaped by continuous testing, thoughtful design, and cross domain collaboration.



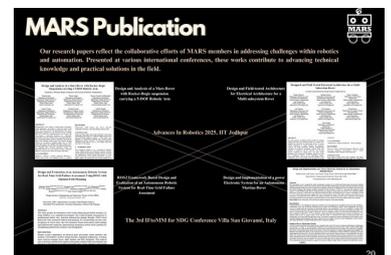
**Community Workshops:** Our outreach initiatives span a wide range from conducting STEM and Space Robotics Workshops for school students, introducing them to the fundamentals of space robotics, to delivering hands on technical sessions on prototype development and system design at premium institutes like IIT Ropar. These programs aim to inspire interest in robotics, enabling skill development at multiple levels. On our campus, we

run regular workshops for junior batches to build early familiarity with core domains such as electronics, control systems, and integration.



**MARS Magazine:** To commemorate our journey, we launched the inaugural edition of MARS Magazine in 2024-25 a curated publication that documents our evolution

from initial sketches and prototyping benches to competition arenas and international research platforms. More than just a retrospective, the magazine serves as a technical showcase, reflecting the work, mindset, and spirit of MARS. It highlights engineering breakthroughs, field experiences, and team insights offering a student driven perspective on real world problem solving. Today, MARS in the hands of students, faculty, alumni, and industry leaders alike, serving as a bridge between emerging talent and the broader robotics ecosystem. It is both a record of our progress and a platform to engage, inspire, and connect across disciplines and generations.



**Future Prospects:** Looking ahead, MARS actively sets its sights on IRC 2026, ISDC 2026, and DD Robocon 2026, while continuing our journey through hands-on engineering challenges.



# Glimpses:

## One-day TRS Workshop at IIT Ropar

Modular and Intelligent Robotics Lab [MOIR], IIT Ropar – in association with The Robotics Society (TRS) – organized a one-day workshop titled “*Practicing Robotics: A Case Study on Reconfigurable Robotics*”, on March 21, 2025, as part of a SSR activity supported by ANRF. The workshop was conceived to bridge the gap between theoretical learning in robotics and real-world applications, focusing on hands-on exposure to kinematic and dynamic modelling, reconfigurable platforms, and the Robot Operating System (ROS).



This workshop served as a dynamic platform for students, faculty, and research scholars from across domains to engage in an interactive robotics learning experience. The program blended expert lectures with live system demonstrations of the implementation potential of designed robotic systems. The event commenced with a warm welcome and inaugural address by Shri Alok Mukherjee, President of The Robotics Society and CEO of I4 Marine Technologies. He reflected on the growing importance of reconfigurable robotics in future engineering systems, emphasizing the need for modularity, adaptability, and rapid prototyping in a world where robotics is expanding across disciplines. He stressed the relevance of workshops like these in shaping a future-ready, hands-on skilled workforce.

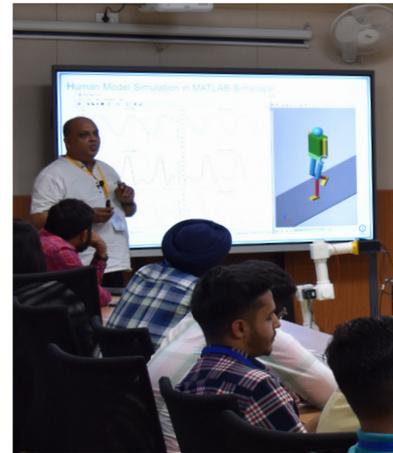
The first technical session featured Dr. Ekta Singla, Secretary of TRS and faculty at IIT Ropar, who delivered a talk on “*Importance and Application of Kinematic Frameworks*”. She elaborated on how modelling the backbone of robot optimal designs and motion planning, and how geometric frameworks translate into practical configurations for different types of manipulators. Detailed case-studies on reconfigurable systems are explained along with the formation of their digital twins.

The second session was delivered by Dr. Ranjan Dasgupta, Principal Scientist at TCS Innovation Lab, focused on *vision-based robotic systems*. Dr. Dasgupta shared multiple real-world case studies that demonstrated the difference between human vision and robotic vision, highlighting the



unique challenges faced by machines in interpreting visual data. He discussed various vision system architectures, depth perception methods, and the role of calibration, illumination, and context in vision-based manipulation tasks. His presentation sparked considerable interest, especially when he presented comparative insights from both industrial automation and assistive robotic applications. Participants gained exposure to how visual inputs affect robot behaviour, decision-making, and precision in dynamic environments.

The third technical session was delivered by Prof. Ashish Singla, Professor at Thapar Institute of Engineering and Technology, who spoke on “*Multifaceted Applications of Control Systems in Robotic Manipulators*”. His talk covered the essential role of dynamic modelling and control algorithms in the behaviour and stability of robots through illustrative examples, with references to industrial and research-oriented robotic platforms.



The post-lunch segment of the workshop was devoted to a structured series of hands-on demonstration sessions that provided participants with a comprehensive view of modern robotic development workflows. These sessions were carefully designed to build sequentially upon one another, starting from foundational software tools and culminating in hardware integration. The first demonstration introduced participants to the Robot Operating System (ROS). This session covered the fundamental steps required to simulate a robot using ROS, including practical exposure to tools like Gazebo and MoveIt. Participants were guided through the standard process of setting



up a robotic control architecture, learning how to configure simulation environments, visualize motion planning, and operate virtual robotic models. This session laid the essential groundwork for understanding digital twin methodologies, showcasing how virtual representations can mirror physical robotic behaviours for efficient testing and validation.

Building upon this base, the second session showcased a ROS-based Unified Modelling and Digital Twin Development environment. Here, attendees explored how digital twins can be synchronized in real-time with physical systems, enabling simulation, monitoring, and validation to occur in parallel with hardware behaviour.

The final demonstration focused on Prototype Development and Interfacing, where the spotlight shifted to the physical integration of robotic systems. Participants observed practical techniques for establishing sensor-actuator communication, implementing modular assemblies, and resolving interface-level challenges. Collectively, the demonstrations emphasized the end-to-end robotics workflow—from software simulation to real-world execution—bridging conceptual control logic with real-time system implementation.



Following the demonstration sessions, an insightful address was delivered by Shri Alok Mukherjee, President of The Robotics Society. In this session, he shared his entrepreneurial journey in founding I4 Marine Technologies, detailing the challenges and motivations behind developing marine mobile robots. He offered insights into how such technologies are transforming marine exploration and industrial inspection. The talk served as an inspiring case of innovation-driven startup culture within India's growing robotics ecosystem. He emphasized the importance of academic-industry collaboration, policy-level support, and talent nurturing to ensure that the field of robotics remains aligned with national development goals and global trends.

Following the demonstrations, a lively open discussion and feedback session were held. Participants shared their experiences, asked questions on technical nuances, and engaged in thoughtful dialogue with the speakers. The session provided a platform for attendees to clarify doubts, reflect on learned concepts, and discuss future directions

for research and development in reconfigurable robotics. The closing ceremony highlighted the workshop's success in providing meaningful exposure and practical learning. Certificates were distributed, and the organizing team was acknowledged for their efforts in curating a well-rounded and impactful program.



The workshop drew participants from diverse backgrounds, ranging from engineering students to senior academic professionals. It succeeded in demonstrating the transformative potential of modular, reconfigurable robotic systems, especially their ability to be customized and scaled for different industrial and societal needs. The hands-on nature of the event left a lasting impression, equipping attendees with the skills and curiosity to pursue further innovation.

## The Robotics Society – Student Chapter Inauguration at Amrita Vishwa Vidyapeetham, Bengaluru Campus

The Robotics Society (TRS) Student Chapter at Amrita Vishwa Vidyapeetham, Bengaluru was successfully inaugurated on March 12, 2025. The inauguration ceremony was graced by distinguished guest, Dr. Ekta Singla (IIT Ropar), Secretary, TRS.

Dr. Ekta Singla delivered an inaugural talk on "Overview of TRS and Robotics Activities at IIT Ropar" highlighting the importance of robotics education and research in today's technological landscape. She also emphasised how this student chapter brings exposure and connections to the students and the faculty.



Dr. Sriram Devanathan (Principal, Amrita School of Engineering) emphasized the importance of fundamental knowledge in the individual domains of Mechanical Engineering, Electrical and Electronics Engineering, Computing and AI, to develop a robotic system.





Dr. Rajeevlochana G. Chittawadigi (TRS Student Activity Coordinator) gave a brief overview of all avenues which the student community can utilize to improve their employability, pursue higher education and also to become an entrepreneur.



Dr. Prashanth B. N. (Faculty Coordinator of TRS Student Chapter, Amrita Bengaluru) thanked all the dignitaries and students and gave an overview of the Hackathon that followed after the Inauguration.

### The Robotics Society – Student Chapter Overnight Hackathon

The inauguration ceremony was followed by "RoboHack", an overnight hackathon event, providing students with a platform to showcase their innovation and problem-solving skills in robotics. The hackathon commenced at 6:00 PM, where registered participants formed teams to develop innovative robotics solutions.

This hackathon was open to all branches, attracting a diverse group of participants. **In total, 14 teams were formed, comprising 49 participants.** The registration fee for the hackathon was Rs. 300 for TRS members and Rs. 500 for non-TRS members. Through this, many non-members became members by taking up discounted rates.



Additionally, the event was supported by 7 dedicated volunteers and 4 student organizers who helped coordinate and provide guidance throughout the competition.

The following sessions were conducted:

- Python turtle programming by Dr. Rajeevlochana
- TPBot demo and hands-on session by Ms. Bahula M., Ms. Nihaarika H., and Mr. Haiagreva P.

- Arduino programming and motor drive session by Dr. Vishnu Raj K. and Ms. Arya R.

Different stages of the Hackathon:

Stage 1: Assembly of the bot

Stage 2: Obstacle avoidance bot

Stage 3: Line follower bot



By early morning, 3 AM, the organizers had conducted evaluations at the end of every stage, and the three best teams were awarded cash prizes. The Hackathon provided an intense learning experience to all the participants and gave a befitting start to the TRS Student Chapter at Amrita Bengaluru.



## TRS-SCALE (Student Chapter Activity for Learning and Enriching) 2024: Phase II Reports

National level workshop on Next Generation of Robotics at K.S. Rangasamy College of Technology (Autonomous), Tiruchengode, Tamil Nadu

February 27-28, 2025 (2 days)

Topics Covered:

- Introduction and Applications of Robotics
- Application of AI/ML in Robotics
- Autonomous Robots for Homes and Industries
- Collaborative Robots (Cobots)
- Hands-on Session on Robotic Arm



**Coordinators:** Dr. M. Sasikumar, Dept. of Mechatronics, K.S. Rangasamy College of Technology.

## Workshop on “Trends of Robotics in India” at Jamia Milia Islamia, New Delhi

January 28, 2025 (1 day)

Topics Covered:

- Introduction to Robotics
- Model Making Competition
- Poster Presentation Competition
- Research Paper Presentation



**Coordinators:** Prof. Z. Mallick and Prof. Mohd Suhaib, Dept. of Mechanical Engineering, Jamia Milia Islamia, New Delhi.

## Workshop on Autonomous Navigation Mobile Robot using ROS at Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu

January 22-24, 2025 (3 days)

Topics Covered:

- Understanding ROS Fundamentals
- Autonomous Navigation Techniques
- Sensor Integration and Data Processing
- Hands-On Practical Experience



**Coordinators:** Dr. X. Anitha Mary and Dr. P. Kingston Stanley, Division of Robotics Engineering, Karunya Institute of Technology and Sciences, Coimbatore.

## Workshop on “Advances in Automation and Robotics” at Pravara Rural Engineering College, Loni, Maharashtra

January 27-31, 2025 (5 days)

Topics Covered:

- Introduction to Robotics
- Robot Simulation in ROS1 and ROS2.
- Robot Simulation in Gazebo
- Vision-based Robotic System



**Coordinators:** Dr. L. B. Abhang, Dept. of Automation and Robotics Engineering, Pravara Rural Engineering College, Loni.



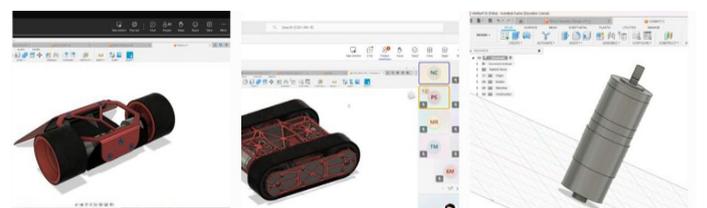
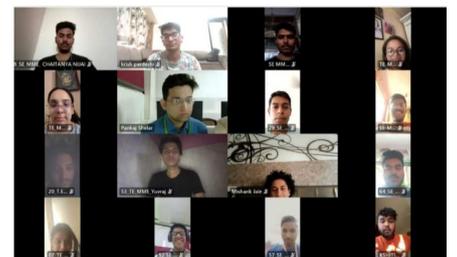
## Robotics Bootcamp - From Design to Deployment at Thakur College of Engineering and Technology, Mumbai, Maharashtra

February 17-20, 2025 (4 days)

Topics Covered:

- Product Design using Fusion 360
- Electronics and PCB Design using TinkerCAD and KiCAD
- Programming and Sensor Integration using XOD and TinkerCAD
- Applications of AI in Robotics

**Coordinators:** Dr. Archana L. Belge, Department of Mechanical Engg., Thakur College of Engg. and Tech., Mumbai.



# Innovative Design and Applications of Mobile Robots and its Control at Thiagarajar College of Engineering, Madurai, Tamil Nadu

Feb 22, 2025 (1 day)

Topics Covered:

- Introduction to Robotics
- Introduction to Micro-controllers, Sensors and Mobile Robots
- Line Follower Robot Competition



**Coordinators:** Prof. G. Kanagaraj, Department of Mechatronics, Thiagarajar College of Engineering, Madurai.



## Upcoming Events:

### The Robotics Society-Student Chapter-Activity for Learning and Enriching (TRS-SCALE) Call for Proposal 2025-26

The Robotics Society (TRS), India encourages the TRS Student Chapters (TRS-SC) to submit proposals for conducting robotics activity/ workshops that focus on hands-on or novel application domains of robotics for learning and enriching the skills of students. TRS-SC

faculty advisors are encouraged to submit/ apply for financial support for conducting the activity in the TRS-SC. The general guidelines for financial support are available here [at this link](#). The steps to be followed by TRS and TRS-SC are given below, along with **important dates**:

Call for Proposals from TRS-SC is announced by TRS	Phase-I: July 1, 2025 Phase-II: January 1, 2026
TRS-SC Fills up the Proposal (Annexure I) and submits to TRS	Phase-I: July 31, 2025 Phase-II: January 31, 2026
TRS shortlists and announces the accepted proposals	Phase-I: August 15, 2025 Phase-II: February 15, 2026
TRS-SC to conduct the proposed activity	Phase-I: Sept. 1, 2025 – Dec. 31, 2025 Phase-II: April 1, 2026 – July 31, 2026
TRS-SC to settle the financial accounts and submit a two-page completion report	Phase-I: January 1-31, 2026 Phase-II: September 1-30, 2026

The following are some of the generic guidelines that have to be followed by TRS-SC:

#### Producing a Call for Participation (CFP)

Organizers are responsible for publicity of the activity such as distributing the CFP to relevant newsgroups and mailing lists, and especially to potential audiences from the robotics community. Organizers are encouraged to

maintain their own web site with updated information about the activity/ workshop.

#### Selecting participants

Workshop attendance is by invitation of the organizers. Selection of attendees will be made by the organizers on the basis of submissions. Workshop organizers should not charge any fee from the TRS- SC members.

## Proposal Submission

Please submit your activity/ workshop proposals (Annexure I) to the Secretary, The Robotics Society (TRS) through an Email to [ekta@iitrpr.ac.in](mailto:ekta@iitrpr.ac.in) (marking a copy to [info@rs-india.org](mailto:info@rs-india.org)) with a covering letter addressed to the Secretary, TRS, India as per the Important Dates above.

## For More Information

Inquiries concerning submissions and suggestions for the workshop program may be directed to:

[nkakoty@tezu.ernet.in](mailto:nkakoty@tezu.ernet.in)

[rg\\_chittawadigi@blr.amrita.edu](mailto:rg_chittawadigi@blr.amrita.edu)

AIR 2025



# ADVANCES IN ROBOTICS (AIR) 2025



7th International Conference of The Robotics Society

Indian Institute of Technology (IIT) Jodhpur Rajasthan, India

July 2 - 5 2025

Advances in Robotics (AIR) is a series of biennial conferences organized by The Robotics Society (earlier referred to as the Robotics Society of India). The conference aims to create a forum to present and exchange new ideas by researchers and developers from India and abroad working in the fields of robotics and its applications. This edition of AIR will have 40 oral presentations and 52 poster presentations selected from an overwhelming number of 174 submissions, 3 workshops, 4 tutorials, Doctoral Symposium, Expert Talks and Industrial Session on exciting new topics of research in robotics from across the world.

For more details about AIR 2025  
SCAN ME !



CHIEF GUEST



**SHRI E. S. PADMAKUMAR**  
DIRECTOR, IISU, ISRO

For Registration AIR 2025  
SCAN ME !



WORKSHOPS

**Workshop 1: Reinforcement Learning for Robotics using MATLAB and Simulink**

Organized by Mathworks

Timings: 9:30 AM – 11:30 AM on Day 1: July 2, 2025

**Workshop 2: Advances in Medical Robotics**

Presenters: Prof. Deepak Raina, Prof. Nirav Patel & Prof. Bhivraj Suthar

Timings: 9:30 AM – 1:00 PM on Day 1: July 2, 2025

**Workshop 3: Dynamics of Robotic Systems: Theory and Practice**

Presenters: Prof. S. K. Saha & Prof. Paramanand

Timings: 3:00 PM – 6:00 PM on Day 1: July 2, 2025

**Session: Mini Drone hands-on sessions**

Organized by Mathworks for Students

Timings: 11:30 AM – 6:00 PM on Day 1: July 2, 2025

For more detail about Workshops  
SCAN ME !



For schedule of AIR 2025  
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TUTORIALS

**Tutorial 1: Probabilistic Robotics 2.0: Uncertainty in Deep Neural Networks**

Jongseok Lee, DLR, Germany

Timings: 12:00 PM – 1:00 PM on Day 1: July 2, 2025

**Tutorial 2: Challenges in On-ground Validation of Orbital Robotic Missions**

Dr. Marco De Stefano, DLR, Germany

Timings: 2:00 PM – 3:00 PM on Day 1: July 2, 2025

**Tutorial 3: Deep Reinforcement Learning in Making Robots Intelligent**

TCS Research

Timings: 3:00 PM – 4:30 PM on Day 1: July 2, 2025

**Tutorial 4: Surgical Robotics – Ingredients of Clinically Driven Robotics Research**

Julian Klodmann, DLR, Germany

Timings: 5:00 PM – 6:00 PM on Day 1: July 2, 2025

PLENARY SPEAKERS



**Prof. Takafumi Matsumaru**  
University Professor  
Waseda University, Japan  
Research Area: Bio-Robotics & Human-Mechatronics



**Dr. S. E. Talole**  
R & DE (Engr)  
DRDO, Pune  
Research Area: Advanced Robotics & Nonlinear Control Systems



**Prof. Venkat N Krovi**  
University Professor  
College of Engineering, Computing and Applied Sciences, Clemson University  
Research Area: Human-Autonomy Synergy & Distributed Physical Interaction



**Prof. Evangelos Papadopoulos**  
University Professor  
National Technical University of Athens, Greece  
Research Area: Robotics & Mechatronics



**Prof. Christian Ott**  
University Professor  
Technische Universität Wien, Vienna, Austria  
Research Area: Robotics & Automatic Control



**Shri. Abishek Kumar**  
Division Head  
MDD/SMG URSC, ISRO  
Research Area: Spacecraft Mechanism Design & Development

KEYNOTE SPEAKERS

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