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## Editor Speaks

We are honored to serve as the editors of The Robotic Society (TRS) of India's newsletter. We extend our heartfelt gratitude to the Governing Council for entrusting us with this responsibility. In this current volume, we are excited to introduce the newly elected members of the TRS Governing Council. We also bring to you the highlights from the sixth international conference - Advances in Robotics - hosted by IIT Ropar in 2023. This edition features remarkable robotics activities from Vellore Institute of Technology, Chennai, and pioneering work in Space Robotics at IIT Jodhpur. We share glimpses of the vibrant ROBOFEST 3.0 by GUJCOST and the innovative DD-Robocon 2024 organized by IIT Delhi. As we conclude, we proudly announce the upcoming seventh international conference of TRS at IIT Jodhpur in 2025, along with a preview of the events planned for 2024.

We encourage our readers to inform us about the research activities in their laboratories and to contribute descriptions of their work for future newsletters. Your insights are invaluable to our community.

Lastly, we invite companies and institutions to become sponsors of our newsletter. This is a unique opportunity to showcase your brand to the expansive robotics fraternity. We also welcome articles related to robotics activities from your institutions for publication in our newsletter. Together, let's drive the future of robotics in India.

**Dr Riby Abraham Boby, IIT Jodhpur (riby@iitj.ac.in)**

**Dr Vineet Vashista, IIT Gandhinagar (vineet.vashista@iitgn.ac.in)**

## Governing Body of TRS

In the general body meeting (GBM) of The Robotics Society (TRS), held on July 7, 2023 at IIT Ropar in hybrid mode, a new Governing Council was elected for the period of 2023-2026. The list of new office bearers is provided below. The new council has taken charge since August 1, 2023.

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Mr Alok Mukherjee (Retd Scientist, DRDO)

Vice President (Academic)

Dr Ashish Dutta (IIT Kanpur)

Vice President (Industry)

Mr Sangeet Kumar (Addverb)

Vice President (Research & Development)

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Dr Shital Chiddarwar (VNIT Nagpur)

Dr Tomohiro Shibata (Kyushutech, Japan)

Dr Sandipan Bandyopadhyay (IIT Madras)

Dr Ashish Singla (TIET Patiala)

Dr Suril V Shah (IIT Jodhpur)

Dr Santakumar Mohan (IIT Palakkad)

Dr Hari Kumar Voruganti (NIT Warangal)

Dr Ranjan Dasgupta, Principal Scientist - TCS Research

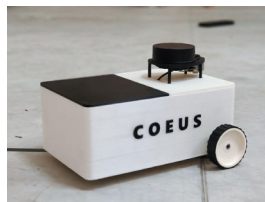
## Activities

### Robotics Activities @ Vellore Institute of Technology, Chennai

Team ATOM Robotics is one of the official robotics teams at Vellore Institute of Technology, Chennai. It is a community of UG students from different branches of engineering developing robots for various industrial and agricultural applications under the Guidance of Prof. Dr Arockia Selvakumar Arockia Doss, Design and Automation Research Group, SMEC.

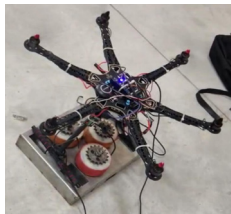
#### Project: Coeus

The 2WD SLAM robot, equipped with an RP Lidar, autonomously navigates environments. Utilizing simultaneous localization and mapping (SLAM) algorithms, it builds a map of its surroundings while accurately determining its own position. This enables the robot to perform autonomous navigation tasks with efficiency and precision in various environments.



#### Project: Agricultural Hexacopter

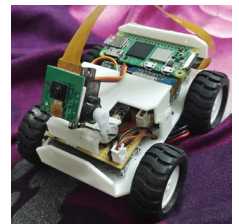
The integration of image processing and ROS2 technology in an autonomous hexacopter drone marks a significant leap in agricultural innovation. This advanced system efficiently fertilizes plants and monitors their health with unparalleled precision. Leveraging high-resolution cameras and ROS2's robust communication framework, the drone swiftly analyzes aerial imagery to identify areas requiring fertilization and administers precise doses accordingly. Simultaneously, it continuously monitors plant health metrics, detecting anomalies and optimizing interventions in real-time. This seamless integration not only enhances agricultural efficiency but also promotes sustainable farming practices



by minimizing resource usage and maximizing crop yield.

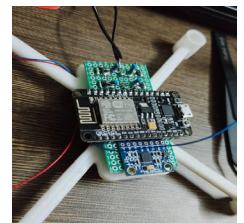
#### Project: Micronav

The 4WD robot, driven by ROS2, autonomously navigates lanes with precision. Equipped with cameras and advanced algorithms, it detects lane markings and calculates optimal paths. Its agile four-wheel drive system enables smooth maneuvering. With ROS2's robust communication, it performs lane following tasks reliably in diverse environments.



#### Project: Tanvit

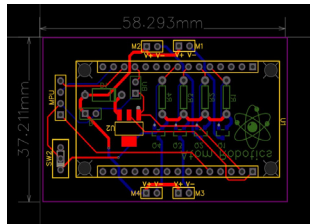
Swarm drones, featuring Si2302 MOSFETs, NodeMCU, MPU-6050, Micro-ROS, and a custom-built PCB, epitomize the forefront of unmanned aerial systems technology. These drones operate cohesively in a swarm, showcasing remarkable coordination and agility. The integration of Si2302 MOSFETs ensures efficient power management, enhancing flight performance and endurance. Utilizing NodeMCU, the drones establish seamless communication, enabling synchronized actions among the swarm members. Equipped with the MPU-6050's precise motion sensing capabilities, they navigate complex environments with unparalleled stability and responsiveness. Moreover, the custom-built PCB optimizes the drones' hardware configuration, ensuring robustness and reliability in their operations. Leveraging Micro-ROS, these drones seamlessly integrate into robotic systems, facilitating autonomous decision-making and adaptability. This innovative amalgamation of advanced technologies not only underscores the potential of swarm robotics but also sets the stage for scalable and resilient autonomous systems across various domains.



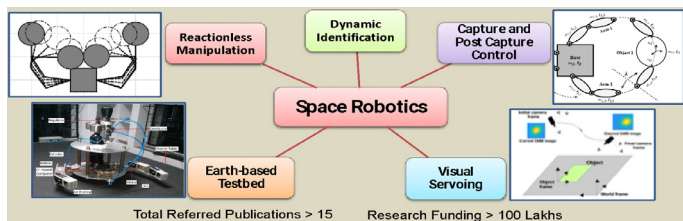
## Research Activities on Space Robotics @IIT Jodhpur

The field of On-Orbit Services (OOS) is rapidly emerging as one of the most critical areas in space science, necessitating immediate attention and commercial investment. OOS encompasses activities such as orbital debris management, satellite refurbishment and refueling, and in-space construction. The increasing number of satellites and the growing interest in OOS underscore the need for robots capable of performing these operations autonomously. Autonomous on-orbit servicing operations, using robotic arms mounted on servicing satellites, are poised to become crucial components of future space missions. These space robots not only enhance the reliability, safety, and ease of space operations but also present unique design and modeling challenges due to the microgravity environment.

The Robotics Lab at IIT Jodhpur is actively engaged in various research activities within the realm of space robotics, including reactionless manipulation, capture and post-capture control, vision-based control, dynamic identification, predictive control, and the development of earth-based prototypes. Below is a brief overview of key activities in these areas.



### Overview of Research Activities on Space Robotics



### Capture of Debris

The rapid advancement in space exploration has led to an increasing number of disabled or broken satellites, posing collision risks to operational spacecraft. Most of these satellites are in Low Earth Orbit (LEO) and travel at speeds exceeding 7 km/s. At such high velocities, collisions can fragment large objects, exacerbating the space debris problem. Effective strategies for debris removal and disposal are essential. A comprehensive framework [1] has been developed for modeling impact dynamics, post-capture stabilization, and target maneuvering using a multi-arm robotic system mounted on a servicing satellite. An adaptive reactionless control strategy has been devised to capture objects with unknown parameters.

### Reactionless Manipulation

The dynamics of space robots differ significantly from those of earth-based robots. The coupling of the arms

and the base of a space robot generates reaction forces and moments on the base whenever the arms move, causing the base to rotate and translate according to the conservation laws of linear and angular momentum. Maintaining the base's attitude relative to the sun and the earth (or other celestial bodies) is crucial for navigation, communication, and keeping the target in the sensors' field of view. A motion planning framework [2] has been proposed to capture the target at a specified time while avoiding algorithmic and Jacobian singularities with minimal attitude disturbances. This framework also accommodates additional constraints such as limits on angles, acceleration, and jerk, while avoiding collisions. This method can also determine a suitable initial configuration for a desired motion state.

### Vision-Based Control

Autonomous closing maneuvers of space robots are highly desirable due to the communication time delay between the service satellite and the ground station. A control technique utilizing the on-board machine vision facility is essential for successfully and autonomously completing OOS. A generic reactionless visual servo controller [3] has been proposed for a satellite-based multi-arm space robot. The controller is designed to visually servo the robot's end-effectors to the desired pose while minimizing attitude disturbance on the base satellite. The task function approach coordinates the visual servoing and the base satellite's attitude. Additionally, a framework for visual servoing a space robot towards an uncooperative tumbling object [4] has been developed. This framework minimizes feature error directly in image space by observing that the tumbling object's feature points follow a circular path around the rotation axis, creating an elliptical track in the image plane. A novel controller minimizes the error between the elliptical track and the desired features, ensuring the features lie on the ellipse's circumference at the desired pose.

### Dynamic Identification

Accurate inertial parameters are crucial for the motion planning and control of space robots. On-orbit operations can significantly alter these parameters after launch. A new momentum model-based method [5] has been proposed for identifying the minimal parameters of a space robot in orbit. These minimal parameters uniquely define the momentum and dynamic models. The proposed framework uniquely formulates the momentum model in a linear form of minimal parameters. A novel joint trajectory planning and optimization technique based on direction combinations of joint velocities has been proposed to estimate these minimal parameters.

These research activities have led to ongoing collaborations

with ISRO on the motion planning and control of space robots.

References

[1] <https://doi.org/10.1016/j.actaastro.2021.01.034>

[2] <https://doi.org/10.2514/1.G002405>

[3] <https://doi.org/10.1016/j.robot.2016.12.010>

[4] <https://doi.org/10.1109/IROS.2018.8594176>

[5] <https://doi.org/10.2514/1.G003541>

## Glimpses

### IIT Ropar Organized the Sixth International Conference of The Robotics Society India - 'Advances in Robotics 2023'

Advances in Robotics (AIR) is a series of biennial conference organized by The Robotics Society (earlier referred to as 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. The Conference encompasses three Plenary talks, three Keynote addresses, thirteen Technical sessions including oral/poster presentations, a Panel discussion with national and international robotics experts, and an exhibition from robotics companies and start-ups. The conference also invites unpublished research work in the various fields of Robotic. The previous editions of AIR's were held at R&DE, DRDO Pune (AIR 2013), BITS Pilani Goa Campus, Goa (AIR 2015), IIT Delhi (AIR 2017), and IIT Madras (AIR 2019), IIT Kanpur (AIR 2021). Most recent AIR 2023 Conference was held at IIT Ropar from July 5 to July 8, 2023.

IIT Ropar welcomed a large gathering of national and international delegates, including speakers from the University of Maryland, University of Leeds, Columbia University, University of Calabria, NUS Singapore, University of Wollongong Australia, various IITs and NITs, DRDO, CSIR labs at the Sixth International Conference of The Robotics Society - 'Advances in Robotics 2023' (AIR 2023). AIR is the prestigious flagship conference of The Robotics Society (TRS) that facilitates the exchange of knowledge and ideas on the latest advancements in robotics. AIR 2023 witnessed a key milestone of completing ten years of its genesis at DRDO Pune, from 4th to 6th July, 2013.

The conference featured three plenary talks and three keynote lectures. The Plenary talk was delivered by Prof. Pietro Valdastrì from the University of Leeds, UK, Prof. Giuseppe Carbone from the University of Calabria, Italy and Prof. Gursel Alici from the University of Wollongong, Australia. The three keynote lectures were delivered by Prof. Dinesh Manocha from the University of Maryland, USA, Dr Naresh Chandra Murmu, Director, CSIR-CMERI, Durgapur and Mr. Sangeet Kumar, CEO, Addverb Technologies.

Day 1 of the conference featured three workshops on various state-of-art robotics systems by eminent researchers and industry leaders. Workshop 1 was represented by Dr Prabakaran Veerajagadheswar, SUTD, Singapore on the topic 'Design of Reconfigurable Robot using Smorphi', Prof. Ashish Dutta and Dr Vineet Vashista share their thoughtful insights on the topic 'Rehabilitation Robotics and Assistive Technologies' in Workshop 2. Workshop 3 was conducted by Mathworks officials on 'Development of Robotic System using ROS and MATLAB'. In addition to workshop, Doctoral Symposium was also held on the same day wherein the early-stage PhD scholars presented their work and received feedback from experts in their field.



The inaugural ceremony of the AIR 2023 was held on July 5, 2023. Dr Ekta Singla, Associate Professor, Department of Mechanical Engineering, IIT Ropar and Program Chair of AIR 2023, welcomed the speakers, authors, senior TRS leadership, scholars and guests from the industry. Prof. Rajeev Ahuja, Director of IIT Ropar, delivered the presidential address where he spoke about the aspirations of IIT Ropar as a young IIT to play a key role in the development of robotics technologies in the country and in the state of Punjab. The presidential address was followed by the address of Dr Prabhat K. Agnihotri, HoD of Mechanical Engineering and general chair of the conference. The inaugural address was delivered by the chief guest of the ceremony, Dr Shailendra V. Gade, Distinguished Scientist & Director General (ACE), DRDO, Pune, wherein Dr Gade provided an overview of the various robotics technologies being developed at DRDO and discussed the core robotics challenges for the academia to work on. During the inauguration, Prof. Santanu Chaudhury, TRS president and director of IIT Jodhpur, highlighted the role of the AIR conference series in bringing together researchers from academia and from the Industry to a common platform. The vote of thanks was delivered by Dr Anupam



Agrawal, Associate Professor, Department of Mechanical Engineering, IIT Ropar and Program Co-chair of AIR 2023.

The technical sessions were held from Day 2 that covered various topics such as ML and AI for Robotics, Rehabilitation, Assistive Devices, Humanoids, Reconfigurable robotics, Virtual reality and Haptics, among others. Attendees had the opportunity to learn about cutting-edge research and exchange ideas with other experts in their respective fields. Hackathon was also organized by Addverb on the theme of “Mixed Palletisation and Optimization Challenge.” The conference included a panel discussion on Day 3 wherein highly reputed experts from academia and industry shared their views on the future of robotics in India and the complete ecosystem. GBM of the Robotics Society was also held during the conference.



The AIR 2023 conference experienced a remarkable surge in submissions, with a total of 179 received. Among these, 88 submissions were accepted, comprising 49 for paper presentations and 39 for poster presentations. Distinct sessions were dedicated to honoring excellence, with awards conferred for the Best Paper and Best Poster categories during their respective sessions. Notably, the prestigious Overall Best Paper Award was bestowed upon Manivannan et al. titled “Efficient Area Coverage with Optimal Morphologies of Reconfigurable Smorphi Robot” for their outstanding contribution. All 88 accepted papers from AIR 2023 have been published in the ACM proceedings, with the link ([dl.acm.org/doi/proceedings/10.1145/3610419](https://dl.acm.org/doi/proceedings/10.1145/3610419)) provided for easy access to the comprehensive compilation of research findings.



One of the major features of the conference was the huge participation of the Industry partners. Our Platinum Sponsors ADDVERB Ltd supported holistically to enhance the overall experience for all attendees. Our Silver sponsors were MathWorks, Qualisys, Myuki Technologies Pvt Ltd contributed significantly in elevating the event. The contributions from the Bronze Sponsors TCS, TRSL, SERB INDIA, have made a significant impact in the conference. Delsys and Nugenix was our Regular sponsor, and showcased their advanced products with impactful demonstrations in the Industry exhibition arranged during the conference. Last but not the least, the Technical partners – ACM, CSIR, Association for Machines and Mechanisms (AMM), and Thapar Institute of Engineering

and Technology, Patiala’ had supported in all respects in conducting the technical sessions, thorough paper-reviews, manuscripts management and integration tasks. The start-ups exposition participants include Sensetechno Solutions, SVR Infotech, Edurob Technologies, IHFC Delhi, and Orangewood. Their work and respective stalls did attract many attendees, to enthusiastically get information about advanced infrastructure in Robotics, e.g. ‘Haptic Devices for Cobots’ demonstrated by Nugenix, Indigenous Robotic Automation System presented by SVR Infotech, and ‘Demonstration of Reconfigurable Robot: Smorphi’ presented by EDUROB TECHNOLOGIES. The exhibitors shared their expertise and insights with attendees and fostered knowledge exchange.

The attendees praised the quality of the research presented and the opportunities for networking and collaboration with participants across IITs, NITs, IIITs, CSIR labs, DRDO, Industry and international delegates. The conference aimed to provide insights into new horizons that can shape the future of robotics research in the country and provide a platform for national and international experts to share their knowledge and explore new ideas. Overall, the conference was a resounding success, and AIR 2023 programme chairs and co-chairs Dr Ekta Singla, IIT Ropar, Prof Carbone, University of Calabria, Dr Ashish Singla, Thapar Institute of Engineering and Technology Patiala and Dr Anupam Agrawal, IIT Ropar received huge applause and appreciation for the grand success of the biennial conference. The conference concluded on Day 4 with the valedictory address by TRS Secretary Prof T Ashokan, IIT Madras. During the valedictory ceremony, it was announced that the AIR 2025 will be held at IIT Jodhpur.



## **ROBOFEST - Gujarat: Engineering the Future, A Journey from Concept to Creation**

In alignment with the Government of Gujarat's vision to promote Science, Technology, and Innovation, the Gujarat Council on Science and Technology (GUJCOST), under the aegis of the Department of Science and Technology, organizes the ROBOFEST - Gujarat competition for STEM students.

Launched in 2020 as a state-level event, ROBOFEST-Gujarat has now evolved into a national-level competition in its fourth year, ROBOFEST-Gujarat 4.0, attracting STEM students from across India, including premier institutions like IIT Madras, IIT Kanpur, NIT Tiruchirappalli, IIT

Dhanbad, and IIT Bombay. The competition boasts a substantial incentive of Rs. 5.00 Crore.

### A Journey, Not Just an Event

ROBOFEST-Gujarat is designed to be more than a competition; it is a comprehensive journey from idea conception to tangible prototype creation, embodying the dreams of budding engineers. The event covers seven categories: two-wheeled self-balancing robots, underwater robots, rover robots with cameras and GPS, hexapod robots, swarm robots, maze-solving robots, and application-based robots.



### Beyond Competition

ROBOFEST-Gujarat is also a platform for learning and development. The event includes orientation programs with AI and Robotics experts, providing insights into cutting-edge technologies, advancements in robotics, and career opportunities. These sessions aim to inspire and educate students, fostering a deeper interest in robotics beyond the competition.

### Networking and Collaboration

Participants have the unique opportunity to network and collaborate with eminent scientists and robotics enthusiasts. Interacting with peers from different regions, they can exchange ideas, gain valuable insights, and establish lasting connections within the robotics community. This fosters camaraderie and promotes teamwork.



### Objectives

- Promotion of R&D: Focus on Robotics, Artificial Intelligence, and the Internet of Things.
- Sustaining Interest: Encourage young students' interest in engineering sciences, especially robotics.
- Learning and Innovation: Engage students in innovative projects, from idea conception to prototype development
- Market Value: Promote entrepreneurship and start-ups in robotics, leading to the design and development of new robots.

### Benefits to Students

- Practical Learning: Students apply theoretical knowledge in practical scenarios.
- Increased Curiosity: Awards aim to boost enthusiasm for technology and robotics.
- Skill Development: Participants learn programming, coding, and other software-based skills.
- Personal Growth: The competition fosters determination, resilience, goal-orientation, leadership, and collaboration.

### Competition Levels

- Level 1: Ideation/Concept Note Stage - Teams submit concept notes detailing mechanics, methodology, components, and design.
- Level 2: Proof of Concept Stage - Selected teams create functional prototypes within 4-6 months.
- Level 3: Prototype Submission - Teams develop and submit fully functional prototypes over 5 months.
- Level 4: Installation and Commissioning - Teams provide detailed component descriptions and demonstrate the commissioned prototype.

### Robofest-Gujarat 3.0 Highlights

- Participation: 629 registrations, 224 ideas reviewed, 151 teams reached Proof-of-Concept Stage, with 67 prototypes showcased.
- Orientation Program: Held at Gujarat Science City, Ahmedabad, guiding 151 teams.
- Grand Finale: Held from December 29-31, 2023, at Gujarat Science City, featuring 67 teams and 330 students showcasing their robots.
- Evaluation: Conducted by the Technical Advisory Committee, chaired by Dr Debanik Roy from Bhabha Atomic Research Centre (BARC).
- GUJCOST has filed Provisional Patent for 57 projects in favour of the respective team members and institutions.
- Awards: Along with Level I, Level II, 31 teams awarded at Level II Grand Finale, with cash prizes of Rs 10.00 lakh, Rs 7.50 lakh, and Rs 5.00 lakh for first, second, and third places respectively, and consolation prizes of Rs 2.5 lakh each.

## DD-Robocon 2024: Cultivating Innovation and Unity

DD Robocon India 2024, powered by IIT Delhi, stands as the beacon of the national stage for the Asian-Oceanian college robot competition (an event fostered internationally by the esteemed Asia-Pacific Broadcasting Union). In this thrilling contest, robots face off in a race against time, striving to conquer complex tasks within precise windows. Beyond mere competition, DD Robocon is a crucible for forging lasting bonds. It serves as a melting pot for visionary young minds, united by their drive to lead their nations towards a vibrant 21st century. More than friendship, this contest is a conduit for propelling engineering and broadcasting technologies to unprecedented heights in the region. Join us in this celebration of innovation and unity, where the future is shaped by circuits and connections. Welcome to DD Robocon India 2024!

## Event Overview

<b>Event Address</b>	Thyagraj Stadium, New Delhi, India
<b>Date</b>	Saturday-Sunday, 13-14 July 2024
<b>Theme</b>	Harvest Day

### Key dates for the DD-Robocon 2024 were as follows:

<b>08-Feb-2024</b>	Solution ideas (Proposal) submission
<b>20-Apr-2024</b>	Proof of Concept (video) submission
<b>17-Feb-2024</b>	Shortlisting of Stage - 1 Proposals
<b>15-May-2024</b>	Stage - 2 Shortlisting
<b>13-14 July-2024</b>	National DD Robocon 2024

**Sponsors:** Autodesk, MathWorks

**Knowledge Partners:** IHFC (I-hub Foundation for Cobotics), FSM (Foundation for Smart Manufacturing)

The ABU Asia-Pacific Robot Contest (ABU Robocon), founded in 2002 by Asia-Pacific Broadcasting Union, aims to foster camaraderie among young talents and propel technological advancements in the region.

**Contest Venue:** Dai Yen Multi-Purpose Gymnasium, Quảng Ninh, Vietnam

**Date:** Sunday, 25<sup>th</sup> August 2024



### Harvest Day Challenge

Inspired by the theme of Harvest Day, DD Robocon 2024 presents a series of agricultural tasks mirroring the essence of a bountiful harvest:

**Task 1:** Seedling Planting

**Task 2:** Rice Grains Transferring

**Task 3:** Rice Grain Storing in the Silos

In the initial stage of DD Robocon India 2024, 69 teams submitted proposals. After rigorous evaluation, 66 teams advanced to Stage 2. Subsequently, 56 teams showcased their robots' capabilities in videos, setting the stage for an intense competition. Now, 52 teams are shortlisted for Stage 3, ready to demonstrate their robots' skills. Additionally, four teams will exhibit at the contest

venue. After the competition, one team will represent India in ABU-Robocon 2024, Vietnam, showcasing our commitment to global innovation. At ABU-Robocon 2024, teams worldwide will compete, fostering camaraderie and competition. The event will crown the international winning country, highlighting the power of innovation and unity.

Readers are invited to take part in the event either physically or through Doordarshan's live telecast of the finals in their DD-Sports channel.



*This article is prepared by Mr. Munna Pati with inputs from Prof. S.K. Saha, IIT Delhi.*

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

The Robotics Society (TRS) Student Chapters have been formed at more than 35 institutes all over India with a mandate to foster participation of students in learning and excelling in the domains of robotics. To streamline the activities, TRS Governing Council approved a dedicated fund to help Student Chapters conduct scheduled training programs and workshops. A call for application was made in February 2024, and 16 Student Chapters applied. Upon screening, 8 proposals were accepted for their events between March and August 2024. A second call for applications will be available by September 2024 for the activities to be conducted from October 2024 to February 2025. More details about Student Chapters and TRS-SCALE can be found at <https://rs-india.org/student-chapter/>.

Student Activity Coordinators: Dr Rajeevlochana G. Chittawadigi (Amrita, Bengaluru) and Dr Nayan M. Kakoty (Tezpur Univ., Assam).

## Upcoming Events

### TRS Workshop 2024

TRS workshops for 2024 were awarded to IIT Gandhinagar and Amrita Vishwa Vidyapeetham, Bengaluru. Corresponding conveners Dr Vineet Vashista and Dr Rajeevlochana G. Chittawadigi will announce the dates and final plans shortly.

### Robofest - Gujarat 4.0

During the Grand Finale of Robofest - Gujarat 3.0, Smt. Mona Khandhar, IAS, Principal Secretary, Department of Science and Technology (DST), Government of Gujarat, launched Robofest - Gujarat 4.0, continuing the journey of innovation and excellence in robotics.

### IPRoMM - 2024 (19<sup>th</sup> - 21<sup>st</sup> December, 2024)

Department of Mechanical Engineering, NIT Jamshedpur, under the aegis of the Association for Machines and Mechanisms (AMM) is organizing IPRoMM-2024 at NIT Jamshedpur. AMM is the Member Organization (MO) of IFToMM (International Federation for the Promotion of Mechanism and Machine Science). The conference aims to bring together researchers, industry experts, and students working in various aspects of design and analysis of machines and mechanisms. The conference also includes an industrial visit on 19th December for all participants of this event. Website: <https://ipromm2024.ammindia.org/>



# AIR 2025

@ IIT JODHPUR



## ADVANCES IN ROBOTICS

The Indian Institute of Technology (IIT) Jodhpur, in collaboration with The Robotics Society (TRS), is pleased to declare the schedule for the **7th International Conference on Advances in Robotics (AIR)** to be held at IIT Jodhpur in 2025. This conference, organized biennially by The Robotics Society, is a significant event in the field of robotics. The committee joyfully discloses that the conference is scheduled to take place from **July 2-5, 2025**.

## THEMES

- Artificial Intelligence in Robotics
- Human-Robot Interaction
- Robotics in Healthcare and Medicine
- Autonomous Systems and Robotics
- Bio-inspired and Soft Robotics
- Robotics in Industry 4.0 and Manufacturing
- Ethical and Societal Implications of Robotics

## TENTATIVE DATES

- Workshop & tutorial proposals **OPEN** : Nov 15, 2024
- Paper submission deadline : Dec 15, 2024
- Acceptance notifications for workshops/tutorials : Feb 28, 2025
- Acceptance notification for papers : May 1, 2025
- Camera-ready submission : May 15, 2025