

# A.T.O.M. Robotics Lab

## Report for 2023-24

## Introduction

A.T.O.M. is the student-run robotics society of MAIT's ECE department, dedicated to fostering a community for learning and practical engineering skills through project-based initiatives. At the heart of our journey are the remarkable projects undertaken by our members, each a testament to the limitless potential of robotics. From autonomous drones revolutionising agricultural practices to AGV robots aiding in healthcare, our projects span a spectrum of industries, making tangible impacts on the world around us. The Robotic Society takes pride in its commitment to excellence, and our members' achievements, be it in international competitions or hosting valuable sessions, speak volumes about the dedication and innovation that define our community.

## Events

### 1. **Unlocking the Power of Intelligence: Introduction to Machine Learning #1 & #2 by ATOM x GDSC**



Dive into the captivating world of artificial intelligence as A.T.O.M. joins forces with GDSC (Google Developer Student Clubs) to present "Introduction to Machine Learning #1 & #2 ." This eagerly anticipated event promises to be a transformative journey into the heart of machine learning, offering participants a unique opportunity to unravel the mysteries of algorithms, data patterns, and the profound impact of this cutting-edge technology.

The session was crafted to cater to both seasoned professionals and beginners, ensuring a holistic understanding of machine learning principles. Engage with thought contributors as they share their insights, making complex concepts accessible through keynote presentations and hands-on workshops. As we reflect on this enlightening exploration, where the synergy between ATOM and GDSC undoubtedly sparked new perspectives and ignited a passion for the limitless possibilities that machine learning brings to the forefront of technological innovation.

## 2. Acceleration Robotics Hosts ROS Delhi Meetup: Fostering Collaboration and Innovation



Acceleration Robotics proudly hosted the ROS (Robot Operating System) Delhi Meetup, in collaboration with Peer Robotics, a dynamic gathering that celebrated the intersection of robotics and innovation. This eagerly anticipated event brought together enthusiasts, professionals, and industry leaders under one roof, fostering a vibrant ecosystem of collaboration and knowledge exchange.

A highlight of the event was the presence of esteemed speakers from the ATOM Society, who shared their expertise and experiences in leveraging ROS for cutting-edge projects. Their engaging presentations sparked lively discussions and inspired attendees to explore new horizons in robotics and artificial intelligence.

### 3. A.T.O.M Showcase - 16th September 2023

#### A.T.O.M Orientation - 22nd September 2023



The showcase and orientation conducted by A.T.O.M was a dynamic fusion of learning and innovation. An informative session was organised which ignited a passion for exploration and advancement in the vast field of robotics. The participants delved into discussions on the various projects done by the society, exchanged experiences and forged new connections.

An interactive session involving the participants answering basic questions about robotics. Subsequently, participants were rewarded with keychains crafted by the lab's 3-D Printer as a means of promoting their active involvement. Thus, with this blend of informative sessions and such engaging activities, we set a promising tone for the collaboration and exploration in the domain of robotics.



#### 4. Linux Install Fest - 5th October 2023

##### CAD seminar- 9th October 2023

The Linux Installation fest and the CAD seminar hosted by the society was a transformative experience and resounding success. The enthusiastic participants gathered to install Linux OS and learn more about it. The participants were engaged in practical exercises alongside the presentation to help refine their skills and expand their knowledge base alongside building their interest in the field.

We shared tips and troubleshooting techniques along the way. It was an informative event where our experienced members thoroughly guided newcomers through the process. These interactive events boosted the sense of community between the society and the tech-enthusiast participants.

#### 5. India STEM Innovation Challenge 2023



Science, Technology, Engineering and Maths (STEM) are crucial for keeping the world functioning. Keeping this vision in mind, India Stem Mission organised the India STEM Innovation Challenge 2023 on 16th October 2023.

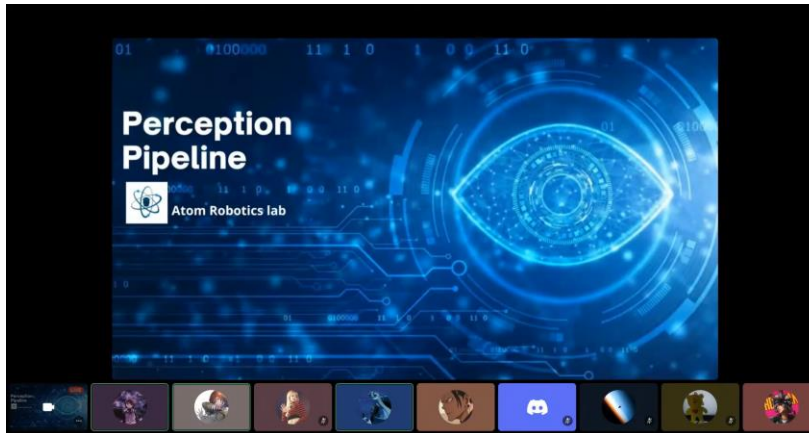
Conducted at Dr Ambedkar International Centre, New Delhi, the chief guest of the event was Shri Nitin Gadkari (Minister of Road Transport and Highways of India). Celebrating the success of Chandrayaan 3 mission, all the women scientists from ISRO joined the event and inspired us to pursue our dreams and work on innovative fields to take the nation forward.

A.T.O.M had a chance to showcase its flagship projects at the event. There we showcased our in-house CNC machine prototype and Mr Robot. One of them, a CNC machine, came into the spotlight and was highly appreciated by all the esteemed guests. Overall it was a wonderful experience for A.T.O.M

## 6. Looking Back at the Discord Town Hall Series: Exploring Innovation and Collaboration

Step back in time with us as we reflect on the dynamic sessions of the Discord Town Hall Series, where innovation and collaboration converged to shape the future of robotics and artificial intelligence. With each gathering, a lasting impression was made, guiding us toward technological progress and nurturing a global community of enthusiasts.

### Townhall #1: ROS Perception Pipeline - 22nd July 2023



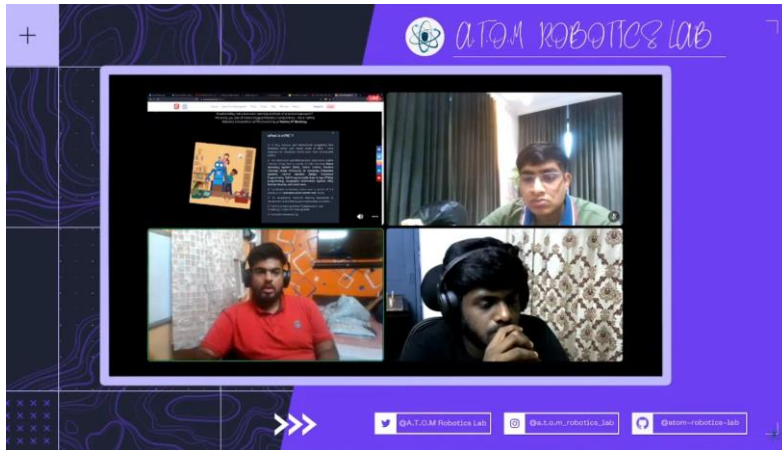
Delving into the intricacies of ROS (Robot Operating System), participants embarked on a captivating journey through the Perception Pipeline. Together, we unraveled the mysteries behind how robots perceive and interact with their surroundings, laying the groundwork for future breakthroughs in robotic perception.

### Townhall #2: Mr. Robot - 29th July 2023



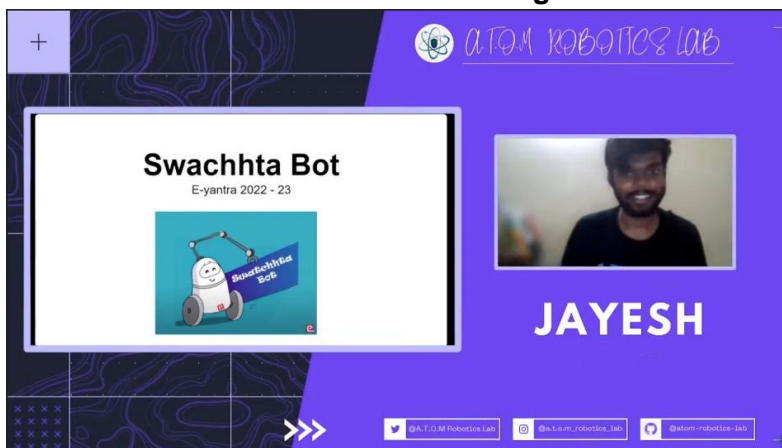
Mr Robot is an autonomous navigation robot made by A.T.O.M Robotics capable of doing multiple day to day operations such as mapping, navigation for transportation, sanitation etc. Various other operations can also be performed thanks to its modularity.

### Townhall #3: eYRC 2023 - 5th August 2023



The excitement was palpable as we celebrated the eYRC (e-Yantra Robotics Competition) 2023, showcasing the ingenuity and creativity of budding robotics enthusiasts. Witnessing the innovation of tomorrow's leaders left an enduring impression, igniting a sense of hope and inspiration for the future of robotics.

### Townhall #4: Swachhata bot - 13th August 2023



In our collective pursuit of a cleaner tomorrow, the Swachhata bot took center stage, demonstrating how robotics can be leveraged to address environmental challenges. The session highlighted the transformative power of technology in building a sustainable future, inspiring attendees to take action in their communities.

## 7. Reflecting on the Past: Orangewood Robotics Community Meetup ()



Let's rewind to the memorable atmosphere of the Orangewood Robotics Community Meetup, where enthusiasts, professionals, and innovators gathered for a day of discovery and cooperation.

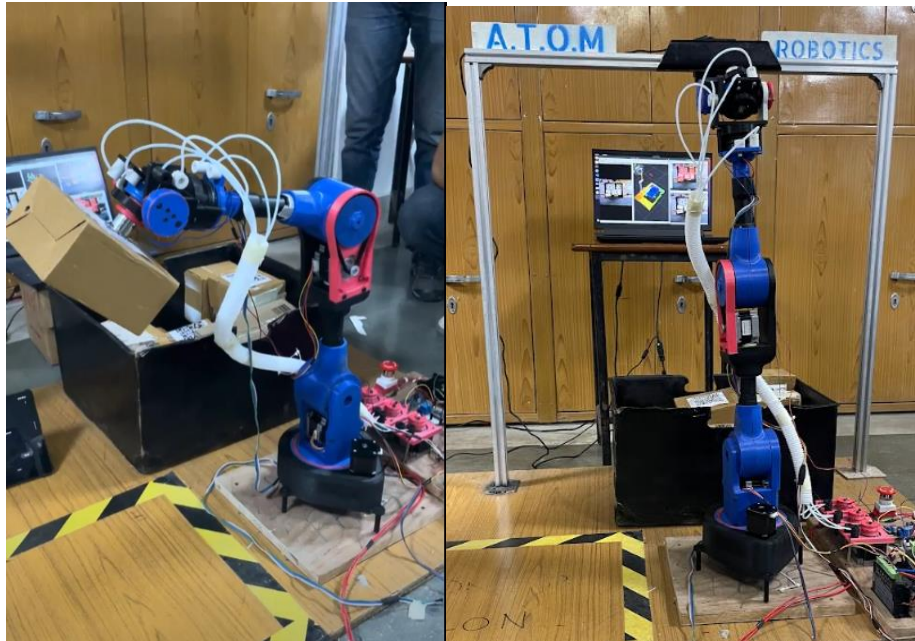
Participants enjoyed a diverse array of experiences, including lively discussions, interactive workshops, and captivating demonstrations. Together, we explored the latest developments in robotics, exchanging ideas and forming connections that would shape the trajectory of our field.

## **Achievements**

### **1. Flipkart GRID 5.0**

Flipkart GRID (Graduate Rotational Internship Program Development) is a comprehensive internship program offered by Flipkart, one of India's leading e-commerce platforms. It is Flipkart's Flagship Engineering Campus Challenge which provides students with the opportunity to apply their technical knowledge and skills, to compete and complete key challenges and work their way to solve a real world problem. Our 6 Degrees of Freedom (6DOF) robotic arm with a modular end effector, designed for precision and versatility across various applications secured a position in finals of the competition. Key features include triple disk cycloidal gearboxes (28:1 reduction ratio) for shoulder and elbow joints, an eccentric cycloid gearbox (30:1 reduction ratio) for the base joint, and an integrated actuator for external control of the wrist joint's three axes. This design ensures the arm's ability to emulate the dexterity and range of motion of the human arm, making it adaptable for a broad spectrum of tasks.





## **2. Reign'23 - IGDTUW (April 2023)**

In April 2023, at REIGN'23 organised by Indira Gandhi Technical University for Women, our team, consisting of Arjun K Haridas, Jasmeet Singh, and Naman Malik, achieved an impressive 3rd position. Their project, "Automate," showcased a robotic arm that exemplifies the application of robotics and machine learning in hospital environments. A commendable achievement!

## **3. TechWeek - Feb 2023**

In February 2023, at Techweek 2k23 Hackathon at NSUT, our outstanding team "Brain Byte," comprising Prakhar Sharma, Saksham Kumar, Gagan Kalra, and Pranav Arora, clinched the coveted 1st position. Their remarkable achievement earned them a substantial reward of cash and prizes worth Rs. 50,000, along with exclusive Microsoft merchandise. A truly exceptional win!

## **4. Learn in Hack - Feb 2023**

In February 2023, during LeanInHacks4.0 organised by IGDTUW, our talented team "TINKERERS," composed of Shlok M Sharma and Gauri, achieved the prestigious 1st position. Their remarkable achievement earned them a well-deserved cash prize of Rs 15,000. Congratulations to the TINKERERS team.

## **5. Build for Future- Feb 2023**

In February 2023, at the BUILD-FOR-FUTURE competition organised by IGDTUW and DTU, our exceptional team "Devils," featuring Abir Thakur, Chanmeet Singh Sahni, Subhasish Panda, and Ishaan Minocha, secured the prestigious 1st position. Their remarkable achievement earned them a substantial cash prize of Rs 25,000. Their innovative project website offers four key features: VR classroom, AR learning,



Disaster Experience, and Monument Venture, using a versatile tech stack of Blender, Wonderland Engine, HTML, CSS, and JS. A significant win for the Devils team.



#### **6. InnovateX - March 2023**



In March 2023, during InnovateX organised by Nasscom Foundation, our team Tech Innovators secured 1st position. The project focused on an intelligent AI powered traffic management system that can help streamline the traffic flow using input from a variety of sensors and using insights from powerful Artificial Intelligence Models. It also helps Emergency Response Vehicles navigate faster through traffic congestions so that they can reach their destinations faster.

#### **7. Code Booth - April 2023**

In April 2023, Techsurge and Mridang organised by MAIT, Abir Thakur, secured the prestigious 1st position in Codebooth, a DSA competition.

#### **8. Code Feud - April 2023**

In April 2023, Techsurge and Mridang organised by MAIT, Abir Thakur, secured the prestigious 1st position in Code Feud, a Rapid fire quiz competition.

### **9. Esummit - April 2023**

In April 2023, during ESummit, our dynamic team, consisting of Prakhar Sharma and Saksham Kumar, clinched the prestigious 1st position in "ZERO TO ONE AT IIIT D." Their remarkable achievement earned them a well-deserved cash prize of Rs. 15,000.

### **10. BitBox 3.0 Hackathon - April 2023**

In April 2023, at IIIT, our dynamic team Devils, clinched the prestigious 1st position in "BitBox 3.0 Hackathon". An earthquake simulation metaverse that is a cutting-edge application of virtual reality technology to solve a real-world problem. The metaverse allows users to "experience" an earthquake in real-time, seeing and feeling the effects of seismic activity in a way that is both educational and engaging.

### **11. Vihaan - April 2023**

In April 2023, during VIHAAN 6.0 at DTU, our exceptional team secured the coveted 1st position in Asia's largest hackathon. Their remarkable achievement earned them a substantial cash prize of Rs. 40,000. Their project, "P.A.L.M." (Post Accident Life-saving Module), is an all-in-one system that enhances vehicle safety and provides immediate assistance in the event of accidents. The project includes features like live speed tracking, real-time location monitoring, crash detection alerts, driver alcohol detection, engine overheating warnings, and an SOS button for emergencies. The team members, Prakhar Sharma, Shlok Sharma, Kartik Sharma, and Preet Yadav, truly excelled. Congratulations to the team!

### **12. InnovateX - 20th-21st May 2023**

In May 2023, at InnovateX at NSUT, our remarkable team secured the prestigious 1st position in the Security theme of Asia's largest hackathon. Their exceptional achievement marked a significant win. Their project, "Discover BS²," is a groundbreaking IoT-based Bank Security System, transforming how financial institutions safeguard their assets. It instantly alerts security teams, locks down server rooms, and deploys hidden microphones for swift action. Congratulations to the team, comprising Prakhar Sharma, Shlok Sharma, Kartik Sharma, and Preet Yadav, for their innovative contribution!

### **13. Hack With MAIT - October 2023**

In October 2023, at MAIT our team HAcK, secured the 1st position in the Hack with Mait competition. They were able to bag a winning amount of Rs 10,000.



#### **14. Code4Cause - October 2023**

In October 2023, at Code4Cause, our team secured the prestigious 1st position in the Edtech theme and Open Innovation category of MSIT. Their exceptional achievement marked a significant win. Congratulations to the team!



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