

# RAJATSURYA MADHUSUDHANA

Ann Arbor, Michigan, USA

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## Education

### University of Michigan - Ann Arbor

August 2024 – May 2026

Master of Science in Robotics GPA: 4.0/4.0

Ann Arbor, Michigan

Relevant Coursework:- Mathematics for Robotics, Programming for Robotics, Controls for Robotics & Robotics Laboratory

### Ramaiah Institute of Technology

August 2017 – July 2021

Bachelor of Engineering in Mechanical GPA: 3.96/4.0

Bengaluru, Karnataka

## Industry Experience

### Saint-Gobain Surface Solutions

August 2021 – August 2023

Application Engineer

Bengaluru, Karnataka

- Collaborated with Fanuc to introduce robotics, modifying 6-axis robots for welding and burr removal in forged parts.
- Implemented IoT technology and anomaly detection systems for grinding components at BOSCH-Bidadi and Sansera.
- The implementation resulted in a significant 15-20% reduction in defects and a 10% improvement in product finish.
- Achieved a significant share gain of 20 million (INR) by gaining customer trust and delivering tailored IoT solutions.

## Research Experience

### University of Michigan - Ann Arbor - Robotics Department

September 2024 – Present

Research Assistant, Advisor: Prof. Robert Gregg, Locomotor Control Systems Lab

Ann Arbor, Michigan

- Developing a knee exoskeleton to reduce bone contact for arthritis, integrating a 4-bar mechanism into an existing brace.
- Simulating and designing the exoskeleton with MATLAB, SolidWorks, optimizing motor torque to reduce effort.

### Indian Institute of Science - Robert Bosch Cyber - Physical Systems

August 2023 – August 2024

Associate Research Fellow, Advisor: Prof. Pradipta Biswas, I3D Lab

Bengaluru, Karnataka

- Designed a six-wheel rover with a rocker-bogie mechanism capable of climbing a 15% slope and carrying a 25 kg payload. Implemented Cartographer SLAM technique, which proved 15-20% more accurate than conventional G-mapping SLAM.
- Collaborated with a team of four to evaluate SLAM algorithms like LSD, ORB, and Gaussian Splatting SLAM—using a monocular camera, finding GS SLAM superior by reducing SLAM time by 15% and achieving 5x higher resolution.
- Integrated GS SLAM with ROS by visualizing splatting in RViz and using Depth Anything models to provide depth data to the SFM model, producing point cloud data for the splatting algorithm, which enhanced robot localization by 15%

## Projects

For more information about my projects, please refer to my portfolio website [rajatsurya.github.io/Projects](https://rajatsurya.github.io/Projects).

### Human(s) On The Loop Demand aware Robot Scheduling

December 2023 – April 2024

Advisor: Prof. Pradipta Biswas, I3D Lab, Indian Institute of Science (IISc)

- Developed a mixed reality interface using Unity and HoloLens, allowing multiple users to control robots while integrating Cartographer SLAM for environmental analysis and real-time mapping of dynamic environments for enhanced interaction.
- Conducted a user study showing that visual aids improved task scheduling time by 15% and reduced collisions by 30-40%
- Results were published at the International Conference on Robot and Human Interactive Communication (RO-MAN).

### Human-On-The-Loop Multi-Robot Demand aware Task Scheduling

August 2023 – November 2023

Advisor: Prof. Pradipta Biswas, I3D Lab, Indian Institute of Science (IISc)

- Developed DARTS (Demand-Aware multi-Robot Task Scheduling) algorithm for warehouse automation, implementing it alongside simultaneous localization (AMCL) and movement (DWA planners) on a multi-robot system using ROS.
- DARTS outperformed rate-monotonic scheduling, achieving a 7.1% reduction in task time for warehouse operations.
- The project's significant results were published in the ACM Conference on Intelligent User Interfaces (IUI 2024).

### Design and Manufacture of an Autonomous Cube-Sat Antenna Booming Mechanism

July 2020 – July 2021

Advisor: Suresh Kumar HN, Indian Space Research Organization (ISRO) and Raji George (MSRIT)

- Designed and verified an autonomous RF antenna deployment mechanism within a 2U volume, using tools such as Catia V5, Adam's, Fusion 360, and Ansys Static Structural, while selecting materials based on dynamic and kinematic analysis.
- Successfully achieved a 2 kg weight reduction and 1.2-second faster antenna deployment compared to previous designs.

## Technical Skills

**Languages:** Python, Matlab, C++, C#

**Tools:** VS Code, Sublime Text Editor, CATIA V5, ROS, ROS-2, AutoDesk, RoboGuide, Fusion 360, Ansys, GIT, Unity

**Frameworks:** Linux, TensorFlow, PyTorch, OpenCV, NumPY, Docker