RAJATSURYA MADHUSUDHANA

Ann Arbor, Michigan, USA

🖥 rajatsurya.github.io ✉ rajatsm@umich.edu 📞 +1 (734) 210-8222 in linkedin.com/in/Rajatsurya Madhusudhana

Education

University of Michigan - Ann Arbor   **August 2024 – May 2026**
Master of Science in Robotics GPA: 4.0/4.0   *Ann Arbor, Michigan*
<u>Relevant Coursework</u>:- Mathematics for Robotics, Programming for Robotics, Controls for Robotics & Robotics Laboratory

Teaching Experience

Saint-Gobain Surface Solutions   **August 2021 – August 2023**
Application and Business Development Engineer   *Bengaluru, Karnataka*
- Conducted monthly training sessions in machine shops to educate 50-60 technicians on workplace safety related to the usage of abrasive products and IoT solutions, focusing on safety checklists and Standard Operating Procedures (SOPs).
- Developed simple training modules to help technicians easily remember and consistently implement safety practices.

Indian Institute of Science - Robert Bosch Cyber - Physical Systems   **August 2023 – August 2024**
Associate Research Fellow, Advisor: Prof.Pradipta Biswas, I3D Lab   *Bengaluru, Karnataka*
- Assisted as a tutor for ROS in the Motion Planning Algorithms course at IISc under Professor Pradipta Biswas, providing hands-on support in setting up ROS and debugging technical issues during students' course projects.
- Managed doubts and organized extra sessions to demonstrate ROS capabilities to over 40 students during the semester.
- Conducted comprehensive demonstration sessions for BHEL and HAL industry professionals, showcasing the advanced capabilities of multi-robot systems in controlled environments and the seamless integration of robots with mixed reality.

Research Experience

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, proving 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

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