Rajatsurya M

Bengaluru, Karnataka, India

 rajatsurya.github.io   rajatsurya.m@gmail.com   linkedin.com/in/Rajatsurya M

Education

Ramaiah Institute of Technology   **August 2017 − July 2021**

Bachelor of Engineering in Mechanical GPA:8.77/10   *Bengaluru, Karnataka*

- Relevant Coursework:- Robotics, Mechatronics & Microprocessors, Kinematics, Dynamics, Linear & Vector Algebra

Publications

1. Ajay, Kumar, Sandula, **Rajatsurya, M.**, Debasish Ghose & Pradipta Biswas. (2024) *Human(s) On The Loop Demand Aware Robot Scheduling: A Mixed Reality-based User Study* (RO-MAN 2024).*(accepted-may'24)*

2. Ajay, Kumar, Sandula., **Rajatsurya, M.**, Debasish Ghose & Pradipta Biswas. (2024)."Human-On-The-Loop Multi-Robot Demand-Aware Task Scheduling: A Mixed Reality Approach" [IUI 2024].*(accepted-Feb'24)*

Research Experience

Indian Institute of Science [IISc]-Robert Bosch Cyber-Physical Systems   **August 2023 − Present**

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

- Developing a mixed reality user interface using Unity, which will help users control the robots in an MR environment.
- Using ROS to Enable initial localization for Cartographer-running robots by developing a method that utilizes Pbstream, a file type storing Odom, IMU and Laser sensor data; the robot continuously reads this data to self-localize while moving
- Constructed a ROS launch file enabling simultaneous autonomous navigation for multiple robots on the same map using Cartographer localization, achieving 10-15% higher accuracy than Adaptive Monte Carlo localization (AMCL).
- Actively engaged in developing and efficiently implementing a collision-avoidance algorithm, specifically focusing on the collision cone algorithm, for collaborative robots in shared environments to effectively visualize potential robot collisions.

Industry Experience

Saint-Gobain Surface Solutions   **August 2021 − August 2023**

Business Development and Application Engineer   *Bengaluru, Karnataka*

- Collaborated with Fanuc to introduce cutting-edge robotics to a high-intensity labour market, skillfully modifying 6-axis single-arm articulated robots for weld fabrication and precise burr removal in both forged and casted materials.
- Partnered with HAL to automate their creep feed grinding process, demonstrating the potential of robotics in grinding.
- 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.
- Collaborated extensively with a major channel partner in India, diligently identifying and serving customers with ongoing projects, especially those in the manufacturing sector, while providing innovative and cutting-edge abrasive solutions.
- Achieved a significant share gain of 200 lakh (INR) by gaining customer trust and delivering tailored abrasive solutions.

DEEYEM CNC Machining Pvt. Ltd.   **July 2019 − September 2019**

Automation Intern   *Bengaluru, Karnataka*

- Contributed to a 3-month internship automation project, revolutionizing a pick-and-place application and alleviating operator workload by designing a 2-jaw gripper module equipped with pressure sensors and hydraulics.
- Achieved an impressive 30% improvement in productivity through the successful automation project, gaining valuable hands-on experience in addressing intricate challenges encountered during the implementation and design phases.

Online Certifications

- Machine Learning Specialization-Stanford Online
- ROS for Beginners: Basics, Motion, and OpenCV -Udemy
- Modern Robotics, Course 1: Foundation of Modern Robotic-Coursera
- Robotics:Aerial Robotics-Pennsylvania State University

- Matrix Algebra for Engineers-Coursera
- ROS SLAM and Navigation-Udemy
- Python Boot camp-Udemy
- Python for ML and Data Science-Udemy

Projects

For more information about my projects, please refer to my portfolio website rajatsurya.github.io/Projects.

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)

- Formulated a novel task scheduling algorithm, DARTS (Demand-Aware multi-Robot Task Scheduling), for warehouses
- Implemented simultaneous localization (AMCL) and movement (DWA planners) on a multi-robot system using ROS
- Conducted a mixed reality user study, recording time and distance for tasks performed independently and with autonomous assistance, revealing decreased task time and increased robot travel distance, which was counter-intuitive.
- DARTS competes and outperforms rate-monotonic scheduling, yielding a 7.1% time reduction in warehouse automation.

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)

- The project aimed to autonomously deploy an RF antenna system within a 2U volume for transmitting RF signals.
- Conducted dynamic and kinematic analysis on the mechanism; based on results, suitable materials were selected.
- Gained proficiency in various software tools such as Catia V5, Catia DMU Kinematic, Adam's, Fusion 360, Ansys Static Structural and Autodesk Inventor for designing and verifying the workings of the Autonomous Booming mechanism.
- Mechanism was actuated using electronic sensors and the loads were balanced vertically; the assembly was 2 kg's lighter.
- The successful deployment of the design was achieved, with antennas deploying 1.2 seconds faster than previous designs

Assembly and palletizing of Space Frame using Fanuc M10ID/12 Robot   **April 2020 – June 2020**
Advisors: Prof.Hemavathy and Prof.Sunith Babu (MSRIT)

- The project's objective was to automate the assembly of a space frame in a limited work volume with obstacles
- Used the state-of-the-art 6-axis articulated arm Robot Developed by Fanuc (M10ID/12) to automate the assembly.
- Utilized Fanuc Roboguide for simulating the Robot, Gaining insights into automating processes within a confined space.
- Designed magnetic and Vacuum Grippers to grip the magnetic and ferromagnetic materials of the Space Frame.
- Automated the assembly in 384.1 cubic meters; this volume was 5 % less than the total available work volume.
- Robot assembled 3 space frames in 17.5 seconds, which led to a 24.3 % time reduction compared to the manual assembly

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

Academic Achievements and Awards

- In 2017, achieved a Centum in Pre-University Mathematics, earning the state topper award for the subject.
- Recognized as one of the school's top students upon successfully completing the 10th-grade board exam.
- Part of the SKCHEC Quiz Team. SKPB School Tech-quiz winner and GAP Tech Quiz Runner-up (2014)
- Contributed to the MSRIT Debate Society Team, reaching the Novice Finals at the NLS Debate Tournament in 2018, and later served as a Core Adjudicator in the NALSAR and The RV Debating Tournament in 2019.

Athletic Achievements

- Attained State-level standing in Squash and reached the quarter-finals in the Bengaluru Squash League (2023)
- In 2014, played for the Karnataka DDPI State cricket team, reaching the semi-finals in the tournament.
- Achieved a silver medal in the 400m event at the 2013 district games hosted in Kanteerava Stadium.
- Participated in both inter-school and inter-house basketball tournaments during my school years (2014).

Volunteering Experience

National Service Scheme[NSS]   **June 2017 – September 2018**
Volunteer   *Bengaluru, Karnataka*

- Organized a successful blood drive that collected 300 litres of life-saving donations for medical assistance.
- Participated actively in community development, improved schools significantly, offered vocational training opportunities, conducted skill programs diligently, and contributed to environmental conservation activities.