Sagar Krishna

Senior Research Engineer, Robotics

Contact

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Proficient in

Python, ROS 1&2, Bash, Gazebo, SLAM, Autonomous Navigation, Robot Middleware Framework, NodeRed, Turtlebot, Crazyflie/ Crazyswarm, DJI Drones.

Familiar With

C++, MATLAB, Sensor Fusion, CM Labs' Vortex Studio , MiR, Clearpath Robotics' Husky A100, SLAM and Autonomous Navigation, Meta Quest VR Dev

Technical Disclosures

May 2024 (ARTC)	Decentralized multi-robot planning and negotiation system for fleet management system
May 2023 (ARTC)	GPS-Denied UAV-UGV Relative Positioning System via Vision-IMU-UWB Fusion and Event-triggered tracking
Mar 2023 (ARTC)	System for Remotely Operated Earthworks
Sep 2021 (NTU)	A Resilient Real-Time AGV Fleet Management Method (R2FM) for Efficient Material Handling

As a Robotics Development Engineer, I bring dedicated expertise in mobile robot navigation and multi-robot heterogeneous fleet management. With a strong focus on innovation, I have successfully deployed practical and effective solutions in the warehouse and medium-level industries. Proficient in software development and simulations, I ensure thorough testing and seamless deployment of robotics systems. Passionate about pushing the boundaries of technology, I am driven to contribute to advancements in robotics.

Education

2018-08 - 2019-07

Master of Science: Computer Control And Automation

Nanyang Technological University - Singapore
Coursework with a thesis in Data Driven Extraction of Challenging Situations for Autonomous Vehicles, using Visual and CanBUS vehicle data.

2013-07 - 2017-05

Bachelor of Technology: Applied Electronics And Instrumentation

College of Engineering Trivandrum - University of Kerala, Kerala, India
Internship at Bharat Petroleum Corporate Limited.

Work History

Jul 2021 - Current

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Agency for Scientific Technology and Research

- **Enterprise Adapter in Supply Chain 4.0:** I developed an enterprise adaptor for fleet management that efficiently controls mobile robot fleets in warehouses. The adapter serves to function in a warehouse ecosystem encompassing numerous machines and 3 robot fleets of different brands and modules to integrate building infrastructures like doors and lifts.
- **UAV UGV Detection and Tracking System:** I developed and implemented a AI detection and tracking system to track a drone tethered to a land-based unmanned guided vehicle (UGV) to facilitate its landing on top of the UGV, with a performance improvement of over 80% in detection time over detection based systems.
- **Simulation Test for Remotely Teleoperated Earthworks Excavator:** I led testing and integration efforts for the Remote teleoperation of an Earthworks Excavator project in addition to integrating a Unity based simulation test bed. The solution completely replaces human spotters in construction sites thereby reducing fatal accidents.
- **Technical Lead in Technical Upliftment:** I developed and deployedCreated 3D simulations for Autonomous Mobile Robots (AMR), enhancing testing efficiency and safety. I developed and deployed a physics based simulation test bed, using 3D mesh of in-house AMR, for software testing and development that aided local robotics manufacturer's deployment efforts.
- **Technical Expertise Showcase:** I implemented custom navigation stack and motor control software as part of software upgradation for a local logistics and robotics manufacturer.
- **Industry Deployment Project:** I am currently developing and deploying a simulation (Gazebo) that can run over 100 mobile robots and integrated into a fleet management system to showcase an improved commercial

Relevant Courseworks

Robotics, Control Systems, Computer Vision and Pattern Recognition, Sensors, Biomedical Instrumentation, MEMs, Image Processing, Digital Signal Processing, Algorithms, Linear Algebra, Project Management Fundamentals.

Relevant Test Scores

TOEFL	
Reading	27
Listening	26
Speaking	26
Writing	27
TOTAL	106
GRE	
Quant	164
Verbal	161
Writing	3.0
TOTAL	325

Airport Baggage Handling System for Singapore Changi Airport operations.

- **Co Principal Investigator in Biomedical Grant:** I am leading the development as co-principal investigator in development of a novel robotized automation system to perform cleaning and disinfection in Pharmaceutical Manufacturing Cleanroom Environments, in collaboration with Singapore University for Technology and Design (SUTD). I will be leading development for a Robotized Vertical Surface Cleaning module using a Mobile Manipulator. The system will serve to alleviate labor costs and reduce operational costs for medtech giants like GSK, Sanofi, etc.
- **Multi-robot Optimal Task Allocation:** I researched and developed a modified Job Shop Scheduling algorithm for optimizing Multi Robot Task Allocation. The machine task allocation algorithm was modified for a robotic fleet accounting for additional constraints like chained tasks and robot payload capacities.
- **Multi Robot Teleoperation and Control Module for Cities of Tomorrow:** I developed and integrated a module for switching teleoperation control amongst a robotic fleet in a fleet control system for better control in dynamic manual risk prone areas.
- **Optimal Volume Fill Rate module for PnG:** I developed and aided in optimisation efforts on a module to generate loading patterns for Stock Keeping Units (SKU) into trucks. The resulting module is in the pipeline to be adopted by PnG Pakistan for their operations.

Jul 2021 - Dec 2019

Research Engineer

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Peer-Reviewed Publications

Aug 2023	GPS-Denied UAV-UGV Relative Positioning System Via Vision UWB Fusion	***ICIEA 2023***
Sep 2023	A novel interoperability evaluation framework for the warehouse management system	***IECON 2023***

Other Achievements

- The paper I co-authored, GPS-Denied UAV-UGV Relative Positioning System via Vision-UWB Fusion, secured the award for the best Research Paper in the conference, ICIEA 2023.
- I was involved in the Showcasing the setup of the remote teleoperation of the earthworks excavator at the National Robotics Programme Expo, Singapore, 2023; held at Singapore University for Technology and Design.
- My team achieved the runner-up position at the Singapore Startup Weekend Hackathon 2022 as part of a cohesive team, highlighting effective teamwork and problem-solving abilities.
- I have curated and participated in musical performances for the TEDxNTU chapter, demonstrating creativity, presentation skills, and the ability to engage and captivate an international audience.