Sai Jagadeesh Muralikrishnan

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SUMMARY

Master's-level Robotics Engineer with hands-on experience in robotic manipulation, reinforcement learning, and high-fidelity control systems. Proficient in C++, Python, and ROS 2, with a strong foundation in kinematics, dynamics, and control theory. Skilled in deploying advanced learning-based models on real robots, integrating perception algorithms, and developing robust simulation frameworks for sim-to-real transfer. Currently working on middleware experiments for real-time communication in autonomous systems, focusing on ROS 2, DDS, TCP tunneling, and inter-process communication to enhance system reliability and performance.

EDUCATION

University of Maryland | College Park, MD *May 2025*
Master of Engineering in Robotics | GPA: 3.8/4.0
Relevant Coursework: *Control Systems, Machine Learning, Computer Vision, Perception, Planning*

Rajalakshmi Engineering College | Chennai, India *Jul 2022*
Bachelor of Engineering in Mechatronics | CGPA: 8.7/10.0
Relevant Coursework: *Embedded systems, Controls, Power electronics, Computer Vision*

PROFESSIONAL EXPERIENCE

Robotics Perception & Control Intern **College Park, MD**
KICK Robotics, College Park, MD *May 2024 – Aug 2024*

- Developed and optimized robotic control pipelines in C++ and Python, reducing latency by 15% in the warehouse environment.
- Optimized ROS 2-based middleware pipelines in C++ for real-time inter-process communication, reducing latency by 15%.
- Leveraged Git version control, CICD pipelines, and Docker containerization to ensure robust, maintainable code across agile.
- Authored comprehensive documentation and conducted code reviews to support system scalability and maintenance.

Embedded Systems Engineer **Chennai, India**
TuTr Hyperloop *Oct 2022 – Jul 2023*

- Engineered multi-threaded data handling systems in C++, reducing communication delays by 25% for advanced robotic application.
- Deployed scalable control systems integrating PLC and HMI technologies to automate critical processes.
- Collaborated with cross-functional teams to design, test, and refine production-ready solutions using agile methodologies and Git.

RESEARCH EXPERIENCE

Graduate Research Assistant **College Park, MD**
Maryland Robotics Center | Research Advisor: Dr. Derek A Paley *Sep 2024 – Present*

- Developed deep learning-based vision pipelines for calibrating multi-modal robotic sensors (RGB + Depth + LiDAR).
- Developed an automated annotation pipeline for object detection tasks, integrating Python and OpenCV, reducing manual annotation time by 40%.
- Implemented Monte Carlo-based simulation models for multi-agent robot collaboration in manipulation tasks.

PROJECT EXPERIENCE

Multi-Agent Robotic Exploration Using Monte Carlo Tree Search **College Park, MD**
Robotics and Autonomy Laboratory, UMD *Nov 2023 – Dec 2023*

- Developed a multi-robot fleet management system using ROS 2 and Python, enabling collaborative exploration and real-time decision-making.
- Integrated AWS RoboMaker to simulate robot behavior in cloud environments, leveraging sensor fusion (camera and LiDAR).
- Optimized computation and storage in a distributed environment, achieving 30% faster path planning.

Autonomous Navigation using Double DQN and Dueling Architecture **College Park, MD**
Maryland Applied Graduate Engineering, UMD *Mar 2024 – May 2024*

- Improved path planning using Double DQN and Dueling DQN, increasing success rates by 75% in simulated multi-obstacle arenas.
- Designed AI-driven search algorithms using Python, C++, and reinforcement learning techniques, optimizing path planning speed by 30%.
- Collaborated with data acquisition and robotics planning teams to fuse sensor inputs (camera, LiDAR) into a robust, real-time decision-making system

Adaptive Text-to-Command Translation for Robot Navigation (natural language processing) **College Park, MD**
Maryland Applied Graduate Engineering, UMD *Nov 2024 – Dec 2024*

- Architected and implemented a transformer-based model (T5-Small with LoRA) for natural language command translation in robotic navigation, achieving 98.5% accuracy while significantly reducing trainable parameters.
- Integrated the model within ROS 2 and Gazebo environments, demonstrating effective deployment for processing diverse multi-modal inputs. Deployed auto-labeling ML models on AWS SageMaker and optimized inference latency by 20%
- Utilized PyTorch and NVIDIA CUDA programming to accelerate model training and inference, ensuring scalability to handle over 1.5 million datapoints per day.

SKILLS

Programming Languages: Python, MATLAB, C, C++, Bash (Ubuntu), NVIDIA CUDA
Software & Systems: CICD, Cloud Computing (AWS, Azure, Google), Containerization, Multithreading, Agile Development, Kubernetes
OS Fundamentals: Data Structures (queues, stacks, heaps, lists), embedded Linux, Scheduling, DNS, Docker
Networking & Embedded: Socket Programming (TCP /UDP), Basic Low-Level Network Protocols, Arduino, Raspberry Pi, STM32, ESP32
Robotics & Software: Machine Learning (TensorFlow, PyTorch), Multi-Robot Fleet Management, Distributed Control Systems, Collaborative Robotics, Swarm Intelligence, Computer Vision (OpenCV), pyBullet, Isaac Gym, CAD
Soft Skills: Team Collaboration, Problem-Solving, Documentation, cross-functional, decision making, verbal and written communication skills