

JUSTIN VARGHESE JOHN

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SUMMARY

Master's student **researching robot motion planning**, with a strong foundation in **autonomous navigation, multi-robot systems, embedded systems, real-time control, and intelligent perception**. I thrive at the intersection of research and practical deployment, having built systems that move from simulation and **digital twins** into real-world testing. My projects span from collaborative exploration and maze-solving manipulators to real-time evasive robots optimized for edge hardware. Driven by curiosity and a long-term vision, I am particularly interested in advancing robotics through **AI-driven solutions**.

EDUCATION

Master of Science in Robotics and Autonomous Systems (AI)

Ira A. Fulton Schools of Engineering
Arizona State University, Tempe

GPA: **3.94/4.0**

August 2024 - Expected May 2026
AZ, USA

Bachelor of Technology (Honors) in Robotics and Automation

Minor in Computer Science and Engineering (AI)
APJ Abdul Kalam Technological University

CGPA: **3.721/4.0**

August 2019 - August 2023
Kerala, India

KEY SKILLS

Technical Skills

- **Programming Languages:** Python, C++, C, MATLAB, SQL
- **Machine Learning & AI:** Deep Learning, Machine Learning, Computer Vision, Neural Networks, TensorFlow, PyTorch, AI for Perception, Model Fine-tuning & Optimization, Large-scale Data Processing, AI Deployment/Real-time Systems, Embedded AI
- **GPU & Inference Systems:** CUDA, cuDNN, TensorRT, vLLM,
- **Robotics & Simulation:** ROS, SLAM, Gazebo, Simulink, OpenCV, Autonomous Systems, PLC, SCADA, PID Control, Robotic Hardware
- **Software & Tools:** Linux, SolidWorks, Arduino IDE, Edge Computing

Soft Skills

- Communication skills, Critical Thinking, Leadership skills, Teamwork, Problem-solving, Project Management, Adaptability, Creativity, Decision-making, Resilience, Time management.

Leadership & Volunteerism:

- Robotics Department Representative, SESA | May 2020 – Apr 2021.
- National Service Scheme (NSS): Active volunteer (2017-2019).

Certifications

- Fundamentals of Engineering Project Management from Arizona State University
- Inter-Personal Skills in Engineering Project Management from Arizona State University

EXPERIENCE

Artificial Intelligence Intern

Acmegrade

February 2023 - April 2023
Bangalore, India

- Learned machine learning algorithms, neural networks, and natural language processing through intensive AI training, garnering advanced skills in data analysis and predictive modeling.
- Collaborated with professionals to implement AI solutions, acquiring hands-on experience in real-world applications.

Process Automation and Robotics Intern

ABB India Ltd

October 2022
Bangalore, India

- Collaborated with engineers on **industrial automation workflows**, acquiring proficiency in PLC and SCADA systems.
- Garnered hands-on experience with professional engineers in robotics and automation.

College Research Affiliate

International Institute of Information Technology

December 2021 - May 2022
Hyderabad, India

- Conducted hands-on experimentation with **IoT protocols** to optimize communication between devices, contributing to research findings.
- Gained practical experience in IoT systems, bridging theoretical research with practical applications.

PROJECTS

ReflexDodgeBot: Real-Time Evasion Using Monocular Vision on Embedded Hardware

January 2025 – May 2025

- **Developed ReflexDodgeBot**, a real-time object evasion system using monocular depth estimation and Kalman-based motion tracking, enabling sensor-free, reflex-like responses to approaching obstacles on NVIDIA Jetson Nano.
- **Achieved efficient edge deployment** by optimizing perception and control pipelines for real-time performance under hardware constraints, with potential scalability to more advanced AI models.

Autonomous Drone Landing System & Custom MATLAB Simulator

January 2025 – May 2025

- **Designed and deployed an autonomous drone landing system** using MATLAB Simulink, enabling real-time tracking and precision landing on a moving platform with vision-based control.
- **Built a custom MATLAB-based drone simulator** capable of modeling and simulating various drone types and flight scenarios, supporting control algorithm testing and mission planning.

Autonomous Maze-Solving Robot System

August 2024 - December 2024

- Designed and implemented a **digital twin** simulation for **MyCobot Pro 600** in **MATLAB-Simulink**, validating **forward and inverse kinematics** to optimize robotic motion planning for **autonomous maze solving**.
- Developed a **vision-based robotic system** integrating **BFS pathfinding**, **inverse kinematics**, and **real-world execution**, enabling the MyCobot Pro 600's end effector to autonomously navigate and solve a maze.

Multi-Robot Exploration and Mapping

August 2024 - December 2024

- **Developed a multi-robot exploration system** integrating **modified Lévy walk strategy** with **potential field navigation**, ensuring efficient coverage, collision avoidance, and seamless map merging.
- **Validated over 90% map coverage efficiency** and system stability through **MATLAB-based simulations**, optimizing multi-robot coordination for autonomous exploration.

Real-Time Incident Detection for Intelligent Transportation

July 2022 - June 2023

- Trained a **Deep Learning model** using **TensorFlow** on a **high-performance server**, enabling high-accuracy road incident detection with **95% precision**.
- **Optimized the model for edge deployment** using **Edge Impulse**, reducing its size by **75% while maintaining accuracy**, and deployed it on **Arduino Nano 33 BLE**, enhancing real-time emergency response efficiency and scalability.

Road Marking System Simulation

January 2023 - June 2023

- **Developed a MATLAB-based road marking system** utilizing **semantic segmentation** to identify and highlight lane boundaries on unmarked rural roads, enhancing autonomous driving capabilities and improving navigation safety.
- **Designed and implemented a lane departure warning mechanism**, leveraging image processing techniques to detect vehicle position relative to generated lane markings, significantly reducing the risk of unintended lane deviations and improving road safety in unstructured environments.

Autonomous Surveillance Vehicle

January 2022 - June 2022

- Developed an **autonomous vehicle** using **Nvidia Jetson Nano**, implementing **ML-based scene understanding** with a camera for **road-following**, **collision avoidance**, and **environmental monitoring**.
- Designed and integrated an **embedded system for real-time motor control**, utilizing **Python** and **deep learning models** to process visual inputs and enable adaptive navigation.