JUSTIN VARGHESE JOHN

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SUMMARY

Master's student with a strong passion for advancing robotics through **AI-driven solutions**. Experienced in **computer vision**, **deep learning**, **robotic perception**, **embedded systems**, and **real-time control**. Proficient in **semantic segmentation**, **LiDAR-based perception**, and **3D scene understanding** for **autonomous navigation**. Skilled in training **large-scale vision models**, optimizing **machine learning pipelines**, and deploying **real-time perception systems**. Committed to enhancing **robot-environment interaction** through **3D reconstruction** and **multimodal sensor fusion**, with a focused interest in **humanoid robotics**.

EDUCATION

Master of Science in Robotics and Autonomous Systems (AI) **August 2024 - Expected May 2026**
Ira A. Fulton Schools of Engineering **AZ, USA**
Arizona State University, Tempe
GPA: **3.94/4.0**

Bachelor of Technology (Honors) in Robotics and Automation **August 2019 - August 2023**
Minor in Computer Science and Engineering (AI) **Kerala, India**
APJ Abdul Kalam Technological University
CGPA: **3.721/4.0**

KEY SKILLS

Technical Skills

- **Programming Languages**: Python, C, MATLAB, SQL, C++.
- **Machine Learning & AI**: TensorFlow, Machine Learning, Deep Learning, Computer Vision, PyTorch, AI for Perception, AI Deployment/Real-time systems, Large-scale data processing, Optimization, Neural Networks, Embedded AI.
- **Robotics**: ROS, SLAM, Gazebo, Simulink, PLC, SCADA, PID Control, Autonomous Systems, OpenCV, Robotic Hardware
- **Software & Tools**: SolidWorks, Linux, 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).

EXPERIENCE

Artificial Intelligence Intern **February 2023 - April 2023**
Acmegrade **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 **October 2022**
ABB India Ltd **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 **December 2021 - May 2022**
International Institute of Information Technology **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.

RESEARCH INTERESTS

- **Vision-Language Models for Robotics**
- **3D Perception & Scene Understanding**
- **Autonomous Navigation & Multi-Robot Systems**
- **Humanoid Robot Perception & Learning**