

KUMARA RITVIK ORUGANTI

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PURPOSE: To pursue research and development in the field of multi-agent systems and robotics, where I can leverage my expertise to advance innovative and sustainable solutions. I am interested in a career, developing efficient algorithms and intelligent systems that utilize swarm behaviors, path and motion planning, coverage strategies, computer vision, and AI on edge devices. Through rigorous research, I aim to contribute to the development of adaptable, autonomous robotic systems that are optimized for real-world applications, with a focus on scalability and sustainability.

EDUCATION

- **PhD in Mechanical Engineering** **May 2030**
Lehigh University, Bethlehem
Advisor: Dr. Subhrajit Bhattacharya
Research: Signal Transmission on Multi Scale Graph Networks, Multi Robot Swarms, Path Planning, Motion Planning
- **Master of Engineering in Robotics** | GPA: 3.97/4.0 **May 2023**
University of Maryland, College Park
Relevant Course Work: Multi Robot Swarms, Path Planning, Software Development for Robotics, Autonomous Robotics, Computer Vision, Deep Learning, Microprocessor Based System Design, Robot Modeling, Robot Control
- **Bachelor of Technology in Electronics and Communication Engineering** | GPA: 8.65/10 **Sep 2020**
Keshav Memorial Institute of Technology, Hyderabad
Relevant Course Work: Signals and Stochastic Processes, Embedded Systems, Analog and Digital Communication, Analog and Digital IC Circuits, System Theory and Logical Design

SKILLS

- **Programming Languages:** C++, Structured Text, Python, C#, Java, Embedded C, MATLAB, Verilog, System Verilog, Go
- **Tools:** Gazebo, RViz, ROS, Eclipse, Code Composer Studio, Visual Studio, Git, TDD, Agile, Logic Analyzers, Azure Dev Ops, JIRA, Atlassian BitBucket, Docker, Altium Designer, Arduino IDE, SolidWorks, Pytorch Lightning
- **Operating Systems:** Windows, Linux, MacOS, RTOS
- **Communication Protocols:** CAN Open, I2C, UART, SPI, Sockets

WORK EXPERIENCE

- Research Assistant | AIR Lab, Lehigh University** **Aug 2025 – Present**
 - Working with Dr. Subhrajit Bhattacharya on estimating the signal transmission on multi-scale graph networks.
- Embedded Software Engineer (SDE-2) | The Raymond Corporation** **Jul 2023 – Aug 2025**
 - Part of the Autonomous New Product Development Team.
 - Contributed to multiple software releases by debugging and resolving infrequent, **critical issues identified** during comprehensive testing phases.
 - Led the **design and development** of key features, enhancing the **performance of the Autonomous Forklift Truck by 60%**.
 - Refactored core functionalities of the product codebase, focusing on **improving readability, modularity, and maintainability**.
 - Conducted **root cause analysis** to identify and resolve bugs, actively collaborating with **cross-functional teams** to ensure quality and efficiency.
 - Provided critical **code review** feedback that prevented the introduction of major software defects, **improving overall code quality**.
 - Partnered with external companies to integrate vision systems for load handling, **designed and implemented handshake using CAN** among master and slave devices, which **reduced the overall bus utilization by 10%**.
 - Developed a **real-time camera calibration accuracy** feature, ensuring consistent performance through the **software development lifecycle**.
 - Enhanced internal tools by adding new functionalities, reducing **system complexity** and streamlining **product deployment** processes.
 - Lead the software development of a **very high priority project** integrating vision system for load handling, working directly with CEOs and Founders of a partner company.
 - Travelled to customer sites to provide engineering support to the deployment team during critical stages.
 - Architected and developed the software for integrating the latest vision systems that drastically decrease pallet detection times.
- Graduate Grader | Maryland Applied Graduate Engineering** **Jan 2023 – May 2023**
 - Grader for the **Perception for Autonomous Robots** course by Dr. Samer Charifa for Spring 2023. Supporting students in their learning by evaluating projects, providing feedback, clarifying doubts, and creating assignments.

Research Assistant | Maryland Robotics Center

Sep 2022 – May 2023

- Worked under Dr. Derek Paley on Virtual Control of SPOT robot using DVPG Network, Air and Ground Vehicle collaboration for Search and Rescue operations | Collaboration with UMBC
- Integrated doodle radio, IMU, and GPS for estimation of location and pose of the robot in outdoor and indoor environments.

Robotics Success Tutor | University of Maryland

Jan 2022 – Dec 2022

- Tutor for the undergraduate Robotics and Autonomous Systems minor courses, **ENAE 450 – Robotics Programming**, **ENEE 467 – Robotics Project Laboratory**, **ENAE 380 – Flight Software Systems**, and **ENME 480 – Introduction to Robotics**.
- Hosted weekly office hours to help students develop, program and debug real-world robotics projects as a part of their coursework.

Software Developer Associate | Teleparadigm Networks, Hyderabad, India

Aug 2020 – Jul 2021

- Designed control circuit, GUI, and Algorithmic Flow for **3D Printed Microscopic Whole Slide Scanner** for biopsy slides | (IP Technology)
- Mentored a **Google Summer of Code** developer on Integrating Microscopic Stage and a Camera | Collaboration with Food and Drug Administration, US
- Designed **IoT Starter Kit** for sophomores of Keshav Memorial Institute of Technology, India, and exported the kits to the underprivileged students in South Africa for training purposes. | Altium Designer, Schematics, PCB Design
- Developed a **Real-time Light Intensity Detection Module for Liquid Biopsy Samples** | Raspberry Pi, MATLAB

INTERNSHIPS

SoC Design Verification Intern | Sion Semiconductors, Hyderabad, India

Jul 2019 – Feb 2020

- **Designed modules** for counters, flip flops, **UART** and **I2C** Communication protocols | Verilog, System Verilog

Summer Intern | Indian Institute of Technology, Bombay, India

May 2018 – Jul 2018

- **Interfaced GPS** module with Texas Instruments microcontroller and processed data for **Ground Penetration Radar** | Data and Signal Processing
- Developed programs for **ADC**, **DAC**, **SPI**, and **UART** Communication for 8051 microcontroller using Scilabs IDE

CERTIFICATIONS

- **TRIZ – Level 1** | The International TRIZ Association, 2021
- **Oracle Certified Associate – Java SE8 Programmer** | Oracle, 2019

PROJECTS

- **Frontier Based Coverage using Multiple Agents** to develop a map in a decentralized, resource limited and communication restrictive environment by following the principles of Boids Algorithm for Swarm Formation | Python
- **Path planning** for a TurtleBot3 Robot using **Dijkstra**, **A*** and **RRT*** algorithms. Addressed the problem of dynamic obstacles by using the Multi Objective model for path planning | Python, ROS, Gazebo, OpenCV
- **Autonomous Robot** for transporting specific objects in cluttered environment | Raspberry Pi, Arduino, OpenCV, Python, IMU, SONAR, Actuators
- **Inverse Kinematics Path Planner for KUKA Manipulator** | C++, Unit Testing, GitHub CI, Coveralls, Agile, Test Driven Development
- **Deep Learning Model Training Framework**, a self initiative to provide a starter code base to create custom deep learning models and architectures that can be trained on custom data for the community | Python, Docker, Pytorch Lightning
- Worked under the guidance of Prof. Ratnesh Tiwari, Department of Mechanical Engineering, University of Maryland, on developing a **Gstreamer Pipeline for real-time inferencing** of Drone video data. Deployed **YOLOV4 Tiny** model to achieve **24 fps** with **one second delay** over the network on Jetson Nano | Jetson, Python, Wireless Data
- Analysis of **Semantic Segmentation of Ground Plane** for Smart Wheel Chairs using MobileNet, ResNet and EfficientNet models. Reduced training time by 95% by utilizing the techniques of data augmentation and EDA and deployed the models on custom built robot | Python, TensorFlow, Jetson TX2, Pytorch Lightning, OpenCV, Raspberry Pi, RPi Camera, Teleoperation
- **MARIO-COM** – A mobile autonomous robot that simulates the collection of medical waste in biohazardous environment | C++, ROS2, Gazebo, Rviz, Googletest, GitHub CI, Integration Testing, Codecov, Agile Iterative Process
- **Lane Detection**, **Image Stitching**, **K-Means Clustering**, **Cube Projection on AR Tag** and Depth Estimation using Stereo Vision | Python, OpenCV
- **Autonomous Colored Object Detector and Follower Robot** | Pixy cam, Arduino, and Raspberry Pi, SPI and UART
- Designed circuit and PCB for **Automatic Head Light Dipper** | 555 Timer, Altium Designer

ASSOCIATIONS

- Reviewer for IEEE Transactions on Automation Engineering and Science

Jan 2026 – Present

LEADERSHIPS

- **Club Head** | AALAP – KMIT’s Music Club, Hyderabad, India **Jan 2019 – Jul 2020**
Started as a senior advisor and became the club head within two months – managed nearly 39 students from different musical backgrounds, enhancing collaboration and team spirit
- **Students’ Council Member** | KMIT, Hyderabad, India **Jul 2019 – Jul 2020**
Worked closely with the President of the Student’s Council to formulate rules and regulations, collaborated with Organizing Committee and Public Relations team to conduct musical events. Played a crucial role in music auditions for the events.