Bhavana B Rao

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EDUCATION

University of Maryland- College Park — College Park, MD
Master of Engineering, Robotics, GPA:4.0/4.0 — Expected May 2025
Relevant Coursework: Control Theory, Robot Modeling, Planning, Perception, Autonomous Robots

Ramaiah Institute of Technology — Bengaluru
Bachelor of Engineering, Electronics & Communication, GPA:9.56/10 — July 2019 – July 2023

PUBLICATIONS

- **Analysis of a zipliner robotic system to assist astronauts on lunar and Martian terrains**, International Astronautical Conference, Paris, 2022.
- **An Overview of Determining Fish Population Using Image and Acoustic Approaches**, IEEE, 2022.
- **Computer Vision for Space Exploration**, International Journal of Engineering Research & Technology, 2020.

WORK EXPERIENCE

Maryland Robotics Center — College Park, MD
Research Assistant, selected to participate in Pathways to the PhD program — January 2024 – Present

- Currently researching collective behavior in fish, employing computer vision techniques such as YOLOv8, perception algorithms, OpenCV, and dimension estimation models to track individual fish trajectories and quantify behavioral aspects, reducing manual scoring time for behavior analysis by 50%.
- Utilized OpenGL to enable the visualization of complex behavioral patterns in aquatic environments.

Indian Institute of Science — Bengaluru
Research Intern (Coordinated Robotics Lab, Electrical Dept) — August 2022 – April 2023

- Accomplished a 40% reduction in data transmission latency by establishing bidirectional communication between central server and multiple 3pi+ robots, by implementing TCP/IP communication protocols.
- Engineered a closed loop controller for velocity and displacement control of a ZUMO32U4 robot, resulting in a 15% improvement in trajectory tracking accuracy.
- Optimized unsignalized intersection management, reducing congestion & increasing traffic flow efficiency by 20%.

PROJECTS

Autonomous Navigation and Perception Robot | Python, ROS2, SolidWorks — December 2023

- Integrated various sensors and a gripper mechanism on a 4-wheeled robot, enhancing its ability to navigate and interact within a cluttered environment through accurate pose estimation and 3D reconstruction techniques.

Sliding Mode Control based on backstepping for UAV | MATLAB, SciPy, Python — December 2023

- Employed a sliding mode controller to mitigate system non-linearities, significantly improving predefined trajectory tracking. Employed the BFGS Algorithm to optimize system parameters, achieving error reduction to less than 1%.

Design of LQR and LQG controller for an inverted dual-pendulum crane | MATLAB — December 2023

- Analyzed and controlled the dynamics of an inverted dual-pendulum crane, encompassing system definition, linearization, and the design of LQR and LQG controllers. Evaluated controllability and observability aspects, resulting in a 15% increase in system stability and a 20% decrease in response time.

Intelligent Customer Support Assistant| Python, NLP, LLM — January 2023

- Designed and implemented an intelligent customer support system by leveraging Natural Language Processing (NLP), integrating Large Language Models (LLMs) to provide instant, context-aware responses, thereby streamlining service operations and enhancing response times in high-traffic environments.

Sustainable Development of Intensive Aquaculture| ML, Python, C++, GPU — February 2022- May 2023

- Implemented a Machine learning algorithm for fish classification (precision of 82.8%), weight and disease prediction (accuracy of 92%) for real-time analysis.
- Utilized CUDA to accelerate the processing of vast databases and real-time imaging analysis, optimizing the system.

SKILLS

Programming: Python, C++, MATLAB, Arduino IDE, Assembly, Bash(Linux CLI)
Graphics: OpenGL, GPU, CUDA
Frameworks & Tools: ROS, Gazebo, OpenCV, NumPy, PyTorch, TensorFlow, pandas, Keras, Git, LLM, NLP, scikit-learn
Engineering: SolidWorks, Fusion 360, PCB Design, LabVIEW, Cadence Virtuoso