

# Bhavana B Rao

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## EDUCATION

### University of Maryland- College Park

Master of Engineering, Robotics, GPA:4.0/4.0

Relevant Coursework: Control Theory, Robot Modeling, Planning, Perception, Autonomous Robots

College Park, MD

Expected May 2025

### Ramaiah Institute of Technology

Bachelor of Engineering, Electronics & Communication, GPA:9.56/10

Relevant Coursework: Linear Algebra, Engineering Mathematics, Control Theory, VLSI, Machine and Deep Learning

Bengaluru

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

Research Assistant, selected to participate in Pathways to the PhD program

- 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.

College Park, MD

January 2024 – Present

### Indian Institute of Science

Research Intern (Coordinated Robotics Lab, Electrical Dept)

- 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%.

Bengaluru

August 2022 – April 2023

## 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.

### Efficient VLSI Design of a Low-Power 8-bit Multiplier| Virtuoso

December 2022

- Designed a 8-bit multiplier, applying low-power techniques and performance optimizations within Cadence Virtuoso.

### 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, CI/CD

**Engineering:** SolidWorks, Fusion 360, PCB Design, LabVIEW, Cadence Virtuoso