Bhaswanth Ayapilla

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Education

Carnegie Mellon University — Pittsburgh, USA
Master of Science in Robotic Systems Development — *2024 – Exp. 2026*
Relevant Coursework - Computer Vision, Manipulation Estimation Control, Robot Mobility, Systems Engineering

Birla Institute of Technology and Science Pilani — Hyderabad, India
B.E. in Electronics and Communication Engineering | GPA 8.62/10.0 — *2020 – 2024*
Relevant Coursework - AI for Robotics, Robotics, Digital Image Processing, Reinforcement Learning, Machine Learning, Modern Control Systems, Internet of Things, Computer Programming

Technical Skills

Languages: C++, Python, MATLAB/Simulink **Frameworks:** ROS/ROS2, Gazebo, Arduino, Solidworks, SUMO, Git, Linux
Libraries: PyTorch, TensorFlow, Keras, scikit-learn, OpenCV **Fabrication:** Soldering, Machining, 3D Printing, CNC Milling

Experience

Institute for Systems and Robotics — June 2023 – Jan 2024
Supervisors: Dr. David Cabecinhas and Dr. Pedro Batista — *Lisbon, Portugal*
- Developed an open-source Python-based simulator to analyze Autonomous Underwater Glider performance and motions
- Executed simulations of sawtooth and spiral motions, with PID implementation for precise control of pitch, heading, and trajectory tracking
- Designed controller for precise trajectory tracking and velocity control of Autonomous Surface Vehicle on MATLAB

Multi-Agent Robotic Motion Laboratory, NUS — June 2023 – Sept 2023
Supervisor: Dr. Guillaume Sartoretti — *National University of Singapore, Singapore*
- Formulated dual-phase selection and duration control solutions for multi-agent traffic signals using reinforcement learning
- Designed a novel reward function by incorporating dynamic vehicle information through V2V/V2I technologies, implementing a Hybrid PPO algorithm using PyTorch and simulating the results on SUMO simulator

CSIR - Central Electronics Engineering Research Institute — May 2022 – July 2022
Supervisor: Dr. Bhausaheb Ashok Botre — *Pilani, India*
- Performed analysis of batteries in low power Electric Vehicles using Machine Learning techniques for State of Charge (SOC) estimation and load forecasting, obtaining an accuracy of over 90%
- Utilized MATLAB to simulate temperature-dependent battery models and generated relevant data for ML training

Relevant Projects

Swarm Robot Coordination — Jan 2023 – May 2023
- Simulated a fleet of multi-agent robots, orchestrating seamless coordination to achieve complex tasks including aggregation, dispersion, precise line formation, and shape configurations, and visualize results in 2D plots

Underwater Localization and Depth Estimation — Aug 2022 – Dec 2022
- Optimized depth camera performance in underwater environments by developing and implementing underwater camera calibration, localization, depth estimation, and object detection techniques to enhance reliability

Thruster Control of AUV Using LQR — Aug 2022 – Dec 2022
- Employed PID and LQR control for achieving precise positional and velocity control of a 6-DOF AUV
- Implemented MATLAB models for both linear and nonlinear systems, rigorously comparing results to demonstrate the robustness and effectiveness of LQR controllers

Autonomous Underwater Rover — Aug 2022 – May 2023
- Led a team of 20 for the development of an AUV for the Singapore Autonomous Underwater Vehicle Challenge (SAUVC); performing autonomous navigation, visual identification, and manipulation
- Orchestrated design and fabrication of the AUV; leveraging ROS for simulations encompassing navigation, control and path planning; applying object detection techniques for precise target acquisition

Autonomous Ground Vehicle — Aug 2022 – Mar 2023
- Engineered an open-source wheeled mobile robot proficient in mapping unknown environments with LiDAR and Depth Camera; performed autonomous navigation and path planning using SLAM
- Incorporating Visual SLAM using ROS, coupled with utilization of computer vision techniques for targeted object detection

Positions of Responsibility

- **Team Lead** for Amazon ML Challenge 2023, team BARD.BITS; led a team of 4 and secured Rank 4 in India (2023)
- **President** at Automation and Robotics Club, BITS Pilani India, steering a community of like-minded robotics enthusiasts, fostering collaboration and innovation within the club (2022 – 2023)