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, 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*
Minor in Robotics and Automation
Relevant Coursework - AI for Robotics, Robotics, Digital Image Processing, Reinforcement Learning, Machine Learning, Modern Control Systems, Internet of Things, Computer Programming

Research 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 for analyzing the performance and motions of Autonomous Underwater Gliders (AUGs)
- Executed simulations of sawtooth and spiral motions, with PID implementation for precise control of pitch, heading, and trajectory tracking

Multi-Agent Robotic Motion Laboratory, NUS — June 2023 – Sept 2023
Supervisor: Dr. Guillaume Sartoretti — *National University of Singapore, Singapore*
- Formulated solutions for dual phase selection and duration control problem for multi-agent traffic signal control using reinforcement learning
- Designed a novel reward function by incorporating dynamic vehicle information through V2V/V2I technologies

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
- Utilized MATLAB to simulate temperature-dependent battery models and generated relevant data for ML training

Relevant Projects

Swarm Robot Coordination — Jan–May, 2023
- Simulated a fleet of swarm 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–Dec, 2022
- Developed a reliable vision system using depth camera to be used in challenging underwater environments
- Performed underwater camera calibration, localization, depth estimation and object detection

Thruster Control of AUV Using LQR — Aug–Dec, 2022
- Employed PID and LQR control for achieving precise positional and velocity control of a 6-DOF AUV
- Used MATLAB to model linear and non-linear systems; conducted rigorous result comparisons to show robustness of LQR

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

Autonomous Ground Vehicle — 2022 – 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

Technical Skills

Languages: C/C++, Python, MATLAB/Simulink **Frameworks:** ROS, Gazebo, MoveIt, Arduino, Onshape, SUMO, Git, Jekyll
Libraries: pandas, NumPy, Matplotlib, PyTorch, TensorFlow, Keras, scikit-learn, OpenCV