Bhaswanth Ayapilla

bayapill@andrew.cmu.edu | (412) 224-0713 | Portfolio | Github | LinkedIn | Pittsburgh, PA

Education

Carnegie Mellon University — Pittsburgh, USA
Master of Science in Robotic Systems Development | GPA 4.11/4.0 — *2024 – Exp. 2026*
Relevant Coursework - Visual Learning & Recognition, Learning for 3D Vision, Deep Learning, Computer Vision, Manipulation Estimation & Control, Planning & Decision Making, 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 - Digital Image Processing, Reinforcement Learning, Machine Learning, Computer Programming

Technical Skills

Languages: C++, Python, MATLAB/Simulink **Libraries:** PyTorch, TensorFlow, Keras, scikit-learn, OpenCV, PCL
Frameworks: ROS/ROS2, Gazebo, Isaac Sim/Lab, MuJoCo, CUDA, MoveIt2, Solidworks, SUMO, Git, Docker, AWS

Experience

Research Assistant, DRiverless Intelligent VEhicle (DRIVE) Lab — *August 2025 – Present*
Supervisor: John M. Dolan — *Carnegie Mellon University, Pittsburgh*

- Developing locomotion stack for CMU's first wheeled-biped robot using reinforcement learning (PPO), coupling exteroceptive perception with proprioceptive information through student–teacher privileged learning for adaptive gait switching
- Designing hierarchical navigation framework in Isaac Sim/MuJoCo, integrating perception for terrain understanding and localization, with emphasis on sim-to-real transfer, obstacle negotiation, and robustness in unstructured terrains

Robotics Engineering Intern, Milwaukee Tool — *May 2025 – August 2025*

- Spearheaded the development of robust autonomy pipelines for a wheeled mobile-manipulator, integrating localization, autonomous navigation, control and perception frameworks for reliable operation in unstructured environments
- Designed vision-integrated planning & control techniques for the robotic manipulator, enabling adaptive task-specific execution in diverse, unstructured settings

Research Assistant, Multi-Agent Robotic Motion Laboratory — *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

Relevant Projects

Language-Conditioned BEV Perception for Autonomous Driving — *Aug 2025 – Present*

- Investigating how textual context influences spatial reasoning in BEV transformer architectures for autonomous driving perception by conducting controlled experiments on BEVFormer/PETRv2 pipelines to visualize how semantic priors guide perception focus and improve interpretability
- Injecting lightweight CLIP-based language tokens into BEV queries to analyze attention shifts and interpret multimodal feature aggregation without altering the end-to-end stack

Lunar ROADSTER — *Dr. William "Red" Whittaker | Sept 2024 – Nov 2025*

- Developed an autonomous Moon-working rover, capable of finding exploration routes and grooming the lunar surface to develop traversable surface trails
- Optimized perception, navigation, planning and localization systems for precise and reliable autonomous operations using ROS2, computer vision, and sensor fusion

Accelerating Search-Based Planning for Multi-Robot Manipulation — *Aug 2025 – Dec 2025*

- Implemented CBS, ECBS, xCBS, xECBS, and RRT-Connect entirely in C++ and MuJoCo, building a full multi-arm planning stack with weighted A*, constraint-tree expansion, experience-reuse acceleration, and custom collision checking
- Designed and benchmarked planners across diverse multi-robot scenes, analyzing planning time, success rate, path quality, and collision-check efficiency

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

Leadership

- **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)