SAHIL T CHAUDHARY

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EDUCATION

Carnegie Mellon University *Pittsburgh, PA*
Master of Science in Mechanical Engineering – Research | **GPA:** 4.0/4.0 *May 2025*

- **Coursework:** Planning and Decision-making, Introduction to Robot Learning, Optimal Control and Reinforcement Learning, Robot Localization and Mapping, Modern Control Theory, Machine Learning, Robot Dynamics and Analysis
- **Scholarship:** Fully funded Master's student
- **Course assistant** for Machine Learning and Artificial Intelligence for Engineers (24787)

Vellore Institute of Technology *Vellore, India*
Bachelor of Technology in Mechanical Engineering | **GPA:** 9.05/10.0 *May 2022*

SKILLS

Programming Languages: C++, Python, MATLAB, Julia
Tools: Gazebo, OpenMP, Matplotlib, PyTorch, NumPy, SKLearn, SolidWorks, Ansys, Fusion 360
Platforms: ROS, Git, Linux, Docker

WORK EXPERIENCE

Biorobotics Lab, CMU Robotics Institute *Pittsburgh, PA*
Graduate Research Assistant *August 2023 – Present*

- Spearheaded the development of a **MANET framework** using DDS and ROS to ensure communication fidelity in heterogeneous robot convoys, implement network topology repair and recovery behaviors, and enforce a communication boundary
- **Comms-Aware Planning:** Designed a novel algorithm attaining **99% success rate** to maintain communication fidelity over radio among robots in convoy, by formulating a modified Max-Min Spanning Tree, and validated the algorithm through extensive hardware testing
- **Heterogeneous Convoy Framework:** Developed a decentralized convoy framework integrating RC cars and quadrupeds like Boston Dynamics' Spot, and an algorithm enabling rendezvous at intersections and coordinated return as a convoy, as part of exploratory features
- Enhanced the operational efficiency of the **Local Planner by up to 29%**, through waypoint optimization and trajectory smoothing, reducing unnecessary deceleration between waypoints and improving overall robot speed and motion continuity
- **Payload Redesign:** Engineered a modular, serviceable payload for RC cars and quadruped robots, accomplishing a **7% weight reduction** and lowering the center of gravity while ensuring optimal sensor field-of-view and accessibility, and incorporating sensors such as LiDAR, IMU, cameras, onboard computer, motor controller, and circuit boards

ArcelorMittal Nippon Steel India Limited *Hazira, India*
Graduate Engineer Trainee – Corex Operations *June 2022 – March 2023*

- Collaborated with field engineers to troubleshoot problems such as malfunctioning, errors, or issues with the equipment and machinery, ensuring the safety and productivity of the Plant, supporting operations valued at **USD 2.25 million daily**

PROJECTS

PinBot – Reinforcement Learning on a Pinball Machine [Website] *Pittsburgh, PA*
Carnegie Mellon University – Course Project *September 2024 – Present*

- Formulated a Proximal Policy Optimization (PPO) agent using Unity ML-Agents to play a game of pinball, attaining performance comparable to an amateur human player in 10k epochs
- Applying transfer learning to adapt the agent for a physical pinball machine (ongoing work)

Quadruped Path Planner for Dynamic Environments [Website] *Pittsburgh, PA*
Carnegie Mellon University – Course Project *September 2024 – November 2024*

- Demonstrated a global path planner using C++ and ROS, that accounts for dynamic obstacles and the z-height of the robot
- Executed Lazy-PRM with D-Star Lite and kinodynamic constraints in a Gazebo simulation environment, achieving a 93% success rate

Model Predictive Path Integral Control [Website] *Pittsburgh, PA*
Carnegie Mellon University – Course Project *February 2024 – April 2024*

- Implemented MPPI using C++ and ROS in simulation, with obstacle avoidance leveraging a Voxel Grid Costmap
- Benchmarked MPPI against an existing iLQR controller, demonstrating faster path generation of up to 21%

Point-LiDAR Inertial Odometry [Website] *Pittsburgh, PA*
Carnegie Mellon University – Course Project *February 2024 – April 2024*

- Engineered the Point-LIO algorithm using C++, ROS and GTSAM, addressing the limitations of scan-based LiDAR processing
- Performed state estimation using an Extended Kalman Filter (EKF), and handled IMU saturation by modeling IMU measurements as part of the state vector