

# 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, Matplotlib, PyTorch, NumPy, SKLearn, OpenMP, SolidWorks, Ansys, Fusion 360

**Platforms:** ROS, Git, Linux, Docker

## WORK EXPERIENCE

### Biorobotics Lab, CMU Robotics Institute

Pittsburgh, PA

Graduate Research Assistant

August 2023 – Present

- Contributed to the implementation of an **Inverse Kinematics-based optimization** framework for optimal communication node placement
- Spearheaded the development of a **MANET framework** using DDS and ROS to ensure communication fidelity in heterogeneous robot convoys, perform 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 among robots over radio, 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 algorithms enabling intersection rendezvous and coordinated return for exploration missions
- 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**

## PUBLICATIONS

Charles Noren\*, **Sahil Chaudhary\***, Burhanuddin Shirose, Bhaskar Vundurthy, Matthew Travers, "Communication Network Construction Behaviors for Robotic Convoys" Submitted to **GVSETS 2025**

## PROJECTS

### PinBot – Reinforcement Learning on a Pinball Machine [\[Website\]](#)

Pittsburgh, PA

Carnegie Mellon University – Course Project

September 2024 – Present

- Trained a **PPO** agent with Unity ML-Agents to play pinball, achieving **amateur-level performance** 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 Gazebo, 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 **EKF-based state estimation**, modeling IMU measurements in the state vector to address **IMU saturation**