

# Vaibhav Suresh Parekh

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## EDUCATION

### Carnegie Mellon University

Master of Science in Mechanical Engineering (concentration in Robotics & Control) – Research | GPA: 3.80/4.00

Pittsburgh, PA

May 2026

### University of Mumbai (K. J. Somaiya College of Engineering)

Bachelor of Technology in Mechanical Engineering | GPA: 9.14/10.00

Mumbai, India

May 2022

## SKILLS

**Tools:** Simulink, Linux, Ubuntu, ROS, ROS2, Gazebo, Nvidia Isaac Sim, Webots, Git, SolidWorks, ANSYS, AutoCAD, Blender, Docker

**Languages & libraries:** C++, Python, MATLAB, CMake, OpenCV, MediaPipe, YOLO, PyTorch, CUDA

## WORK EXPERIENCE

### Lightspeed Robotics

Glenview, IL (Remote)

*Software and Robotics Engineering Intern*

Sep 2025 - Dec 2025

- Built an **LLM-based parser** for BTLx (XML schema for timber fabrication) to translate design data into robotic panel-cutting instructions, enabling AI-driven construction automation.
- Developed simulation of a mobile manipulator in **NVIDIA Isaac Sim** integrated with **Movelt** (manipulation) and **Nav2** (navigation) in ROS2, incorporating vision modules for scene understanding.

### Inductive Robotics

Seattle, WA (Remote)

*Robotics Engineer Intern*

Jul 2025 - Aug 2025

- Authored **URDF** and built a **ROS2**-integrated simulation environment in **Blender** and **NVIDIA Isaac Sim** to enable autonomous docking of a Clearpath Jackal robot with an inductive charging station.
- Generated **synthetic dataset** of a parking lot in Isaac Sim by scripting randomized camera viewpoints, vehicle models, scene illumination, and vehicle taillight states.
- Trained a **YOLOv11** model to segment vehicles and detect reversing behavior through taillight-state classification, achieving **92% accuracy** on robot-captured real-world images.

### Tata Power Renewable Energy Limited

Mumbai, India

*Lead Associate*

Jun 2022 - Aug 2024

- Performed financial and energy modeling using Plexos and Excel to integrate over **6 GW** of energy from wind, solar, and ESS for optimizing power plant capacities to meet diverse power requirements.
- Led a cross-functional project to customize and **fine-tune a GPT-3.5 model** for summarizing, assessing risks, and comparing lengthy tender documents, **reducing TAT** for tender analysis from about 45 minutes to less than 10 minutes.
- Erected and commissioned 3 solar power plants totaling **375 MW**, helping organizations meet renewable energy obligations.

## ACADEMIC PROJECTS

### Graduate Research (Computational Engineering & Robotics Lab)

Oct 2024 - Present

- Devised an unsupervised approach to identify keypoints on multi-viewpoint objects from single RGB image using stacked Hourglass CNNs, achieving **PCK@10 accuracy of 82.8% and 69.5%** for intra- and cross-instance correspondences.
- Rigged robot models in Blender for simulation in Nvidia Isaac Sim, enabling visual **SLAM** implementations and testing.

### F1TENTH Autonomous Racing

Jan 2026 - Present

- Engineered a **LiDAR-based ROS2 navigation stack** (PID Wall Following, Follow-the-Gap, Pure Pursuit, RRT) deployed on **Nvidia Jetson** for an F1-Tenth racecar, utilizing SLAM Toolbox for **mapping** and Particle Filter for **localization**.
- Achieved 1st place among 9 teams with a **36% lower lap time** than the overall average.

### Self-Docking Autonomous Robot

Jan 2025 - May 2025

- Led the perception stack to develop a wall-outlet detection pipeline using **YOLOv8** with custom dataset on **Intel RealSense D435**, deployed on **Raspberry Pi 5** and integrated via **ROS2** for localization and planning.

### Planning for Multi-UAV Search and Rescue

Oct 2024 - Dec 2024

- Formulated and simulated an **NBV (next-best-view) planner** algorithm in **MATLAB** leveraging LiDAR-based occupancy maps to identify intermediate goal positions, maximizing UAV coverage efficiency in disaster zones.
- Deployed **RRT algorithm** for efficient UAV navigation to intermediate goal points, enabling faster search-and-rescue coverage.

### Controller Design for an Autonomous Buggy

Oct 2024 - Dec 2024

- Programed **PID, LQR, and Kalman** filter-based controllers for a car to accurately follow predefined trajectories in **Webots**.
- Implemented **A\*** for path planning, and **EKF SLAM** for localization and controlling the vehicle in GPS-denied environment.

### Computer Vision based Pen Tracking and Writing System

Oct 2024 - Dec 2024

- Developed a surface-agnostic writing solution using **Lucas-Kanade Optical Flow** method with Intel RealSense D435 for depth-based pen tip tracking and AprilTags for boundary calibration, allowing digital writing on any surface.
- Integrated **MediaPipe**-based hand gesture recognition to toggle between writing modes, enhancing intuitiveness.