Vaibhav Suresh Parekh

+1-412-626-1062 | vsparekh@andrew.cmu.edu | vaibhavparekh9.github.io | linkedin.com/in/vaibhavparekh9

EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Mechanical Engineering (concentration in Robotics & Control) | GPA: 3.70/4.00 — May 2026
Courses: Deep Learning, Computer Vision, Learning for 3D Vision, Mechatronic Design, Planning and Decision Making in Robotics, Robot Localization and Mapping, Modern Control Theory

University of Mumbai (K. J. Somaiya College of Engineering) — Mumbai, India
Bachelor of Technology in Mechanical Engineering | GPA: 9.14/10.00 — May 2022

SKILLS

Tools: Simulink, Linux, Ubuntu, ROS, ROS2, Gazebo, Nvidia Isaac Sim, Webots, Git, SolidWorks, ANSYS, AutoCAD, Blender, Docker
Languages & libraries: C++, Python, C, OpenCV, MediaPipe, YOLO, CMake, PyTorch, MATLAB, Arduino, Raspberry Pi

WORK EXPERIENCE

Lightspeed Robotics — Glenview, IL (Remote)
Software and Robotics Engineering Intern — Sep 2025 - Present
- Contributing to AI-driven construction automation by integrating **ROS2/MoveIt Pro** robotic systems with LLM-based agents, vision models, and automated assembly planning APIs.

Inductive Robotics — Seattle, WA (Remote)
Robotics Engineer Intern — Jun 2025 - Aug 2025
- Developed a simulation environment in Blender and **Nvidia Isaac Sim,** integrating it with ROS2 for simulating autonomous docking of a Clearpath Jackal robot to an inductive charging station.
- Generated **synthetic dataset** of a parking lot in Isaac Sim by scripting randomized camera viewpoints, vehicle models, lighting conditions, and vehicle taillight states.
- Trained a YOLOv8 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 — Jul 2023 - 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.

Graduate Engineer Trainee — Jun 2022 - Jun 2023
- Erected and commissioned 3 solar power plants totaling 375 MW, helping organizations meet renewable energy obligations.
- Conducted **testing of mechanical structures** and heavy electrical equipment to ensure first-time-right quality and reliability.

ACADEMIC PROJECTS

Graduate Research (Computational Engineering & Robotics Lab) | Carnegie Mellon University — Oct 2024 - Present
- Develop a **6-DoF pose estimation** pipeline for articulated warehouse vehicles using a fine-tuned **YOLO** keypoint detection model and nonlinear **PnP solver**, improving pose accuracy by optimizing for moving keypoints.
- Rig robot models in Blender for simulation in Nvidia Isaac Sim, enabling visual **SLAM** implementations and testing.

Self-Docking Autonomous Robot | Carnegie Mellon University — Jan 2025 - May 2025
- Led the perception stack to develop a wall-outlet detection pipeline using **YOLOv8** with a custom dataset on **Intel RealSense D435,** and integrated it with hardware and software subsystems via **ROS2** for localization and planning.

Planning for Multi-UAV Search and Rescue | Carnegie Mellon University — 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.

Computer Vision based Pen Tracking and Writing System | Carnegie Mellon University — 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.

Controller Design for an Autonomous Buggy | Carnegie Mellon University — 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.