

HET PATEL

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Education

University of Illinois Urbana-Champaign

Masters in Autonomy and Robotics (GPA: 3.83/4.0)

- Relevant Coursework: Computer Vision, Principles of Safe Autonomy, Humanoid Robotics, Mobile Robotics

Urbana, IL

August 2025 – Present

Vellore Institute of Technology

Bachelor of Technology in Electronics and Communication Engineering (GPA: 3.8/4.0)

Chennai, India

Sept 2020 – May 2024

Work Experience

Vinayak Technology

Robotics Engineer (In-Office)

- Architected and deployed a full **ROS2 autonomy stack** (perception, localization, planning, control) for a **300kg construction AMR**, enabling autonomous material transport across 200m+ routes in GPS-denied, dust-heavy construction sites.
- Developed a **construction-optimized SLAM system** using **LIO-SAM**, **FAST-LIO2**, and **NDT-based** global alignment with loop closure, maintaining <15cm localization drift across 2,000m² mapped environments with repetitive concrete geometry.
- Integrated and calibrated a **multi-sensor suite** (3D LiDAR, IMU, wheel encoders, RGB-D cameras) with custom ROS2 drivers; co-defined sensor placement and implemented online extrinsic calibration for realignment after on-site impacts.
- Built a high-fidelity **digital twin in Isaac Sim** with tuned inertia, contact, and actuator models; validated **sim-to-real transfer** achieving <5% trajectory deviation in field trials, reducing on-site commissioning time from weeks to days.

Ahmedabad, GJ

July 2024 – August 2025

Indian Space Research Organization (ISRO)

Embedded Software Engineer (In-Office)

- Engineered core firmware in **C** for a **Synthetic Aperture Radar's** data storage subsystem, enabling high-throughput reliable data acquisition from the Solid State Recorder for earth observation payloads in the **NASA-ISRO SAR Mission**.
- Developed **safety-critical** display software for the **Gaganyaan Human Spaceflight** mission's cabin display using **OpenGL-ES** and **C++**, implementing real-time HMI with deterministic rendering at 60Hz on an embedded **Petalinux/Xilinx** stack.

Ahmedabad, GJ

May 2023 – January 2024

Samsung R&D

Research and Development Intern (Hybrid) : (Excellence Award)

- Benchmarked 3 detection architectures (YOLOv4, R-CNN, BiT) on Samsung's **smart refrigerator edge**; selected and deployed YOLOv4 **optimized with TensorRT** for **96% mAP** at <100ms balancing accuracy, latency, and on-device power budget.
- Built an end-to-end **data pipeline** syncing on-device inference to a cloud backend, enabling automated inventory tracking across 200+ food categories for Samsung's smart home product line.

Bangalore, KA

Dec 2022 – June 2023

Projects

Adaptive Vehicle Control Based on Pedestrian Behavior | *Physical Hardware*

December 2025

- Deployed a predictive autonomous vehicle control framework on the **GEM e4** physical platform using **ROS2**, achieving **91% success rate** across 50+ pedestrian interaction scenarios in real-world field testing.
- Designed a **5-state behavior planner** driven by fused **LiDAR-RGB-D** perception with real-time **Time-to-Collision (TTC)** estimation, enabling graduated responses (yield, slow, stop, reroute) based on pedestrian intent prediction.
- Integrated **YOLOv11** with **DBSCAN clustering** for real-time pedestrian detection and trajectory forecasting, reducing emergency braking by 40% vs. reactive baseline through proactive planning with **Stanley Controller** and PID velocity regulation.

Language-Guided Humanoid Loco-Manipulation via VLA Models

October 2025

- Engineered a **Vision-Language-Action (VLA)** architecture for **contact-rich manipulation** by modifying HumanVLA, achieving **62.1% success on unseen tasks** (18% above baseline); integrated failure detection that triggers autonomous re-grasps via visual-linguistic confidence scoring.
- Implemented a **Teacher-Student training pipeline** using **Behavior Cloning** and **DAGger** with domain randomization, distilling expert RL policies to solve **615 long-horizon rearrangement tasks** in **Isaac Sim**.

Open-World Semantic-Based Zero-Shot 6D Pose Estimation

December 2025

- Developed an open-vocabulary **6D object pose estimation** framework extending **FoundationPose** with a fine-tuned **Moondream2 VLM** and **SAM-3**, achieving **88.3% ADD-S** on YCB-Video — enabling robotic manipulation without prior object models.
- Built a zero-shot **3D mesh generation pipeline** via Objaverse-XL (10M+ assets) with semantic retrieval and TriposR reconstruction, replacing manual CAD modeling with fully automated mesh acquisition for novel objects.

Technical Skills

Languages: Python (Primary), C++, C, MATLAB, CUDA

Robotics: ROS/ROS2, nav2, MoveIt, Behavior Trees, Gazebo, Isaac Sim, MuJoCo, URDF/Xacro

Perception & ML: PyTorch, OpenCV, TensorRT, cuDNN, SLAM (LIO-SAM, FAST-LIO2), Point Cloud Processing, Stereo Vision

Planning & Control: A*, RRT*, Trajectory Optimization, State Machines, PID, Stanley Controller, Sensor Fusion

Tools & Practices: Git, Docker, CMake, Linux (bash), pytest/gtest, CI/CD, Jira, Agile

Hardware: Jetson Nano/Orin, STM32, Xilinx FPGA, Clearpath Husky, UR3e Manipulator