

VIVEKANANDA SWAMY MATTAM

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EDUCATION

Masters of Science - Mechatronics and Robotics Engineering Sep 2024 - May 2026
New York University - Tandon School of Engineering

B.Tech. Mechanical Engineering Sep 2019 - May 2023
VNR VJIET, Hyderabad, India

EXPERIENCE

Course Assistant - Autonomous Mobile Robots | *NYU Tandon, Prof. Aliasghar Arab* Sep 2024 - Present

- Sole CA for graduate robotics course; developed 9 lectures, 5 assignments, and [course website](#) covering MPC, Control Barrier Functions, and motion planning.

Robotics Engineering Intern Feb 2024 - Aug 2024
Xmachines - Agricultural Robotics Startup

- Built Flask server for real-time sensor streaming integrating MPU-6050 IMU and Arducam IMX219 camera feeds for robot state monitoring during field tests.
- Developed prototype object detection tunnel for weeder robot; automated size classification and routing for sorting process. .

PROJECTS

High-Speed Autonomous Navigation in Narrow Corridors | *Bell Labs Funded, MS Project* Jun 2024 - Present

- Developed ROS 2 navigation stack for Ackermann-steered RC car achieving high-speed autonomous driving in 1.2m narrow corridors with camera-LiDAR fusion and EKF localization.

- Implemented racing line optimization utilizing 92% corridor width through outside-inside-outside cornering geometry; added optical flow-based motion tracking with ego-motion compensation for dynamic obstacle velocity estimation.
- Integrated 60+ node architecture with Nav2, SLAM Toolbox, and MPPI control; validated in Gazebo Ignition, currently deploying on physical Traxxas RC car.

Lunar Autonomy Challenge - Perception-Aware Navigation May 2024 - Nov 2024

- Built autonomous navigation for simulated lunar rover without GPS or prior maps, combining ORB-SLAM3 for visual odometry with FoundationStereo for depth estimation.

- Developed perception-aware costmap that propagates depth uncertainty through the pipeline; planner actively avoids shadowed craters and texture-poor surfaces where perception is unreliable.
- Implemented A* planning with uncertainty-weighted costs and pure pursuit control for the full autonomy loop.

Visual Navigation & Perception | *AI4CE Lab / VIP Self-Drive, NYU* 2024 - Present

- Deploying [CityWalker](#) (CVPR 2025) on FrodoBots EarthRover under [Prof. Chen Feng](#); zero-shot transfer from YouTube walking videos to sidewalk robot with full inference pipeline to motor commands.

- Built camera-only TurtleBot3 navigation using ORB visual SLAM with A* planning; maze solving with CosPlace + SuperGlue achieving 79% inlier ratio on pose verification.
- Perception pipeline from scratch: RANSAC plane fitting (66% inliers on 113K points), ICP alignment, YOLOv11+ByteTrack tracking across 12,700+ images.

Reinforcement Learning for Quadruped Locomotion | *NVIDIA Isaac Lab* Fall 2024

- Trained Unitree Go2 with PPO implementing reward shaping, Raibert heuristic gait coordination, and actuator friction modeling with domain randomization.

- Achieved 2x baseline velocity tracking on flat and rough terrain for sim-to-real transfer.

Autonomous Person Following on Boston Dynamics Spot Jan 2025 - Present

- Built real-time person-following system using visual servoing with YOLOv8 detection, computing lateral, distance, and pitch errors for smooth 10Hz velocity commands.
- Implemented body pitch control for tracking people on stairs and slopes; exploring ViNT and GNM for goal-conditioned predictive navigation.

SKILLS

Languages: Python, C++, C, MATLAB

Autonomous Navigation: ROS/ROS 2, Nav2, SLAM Toolbox, ORB-SLAM3, Visual Odometry, EKF, MPC, MPPI, A*, Pure Pursuit

Perception & ML: PyTorch, OpenCV, CosPlace, SuperGlue, YOLOv8/v11, ByteTrack, RANSAC, ICP, Open3D

Hardware & Simulation: Gazebo, Isaac Lab, Jetson Orin Nano, Arduino, TurtleBot3, Boston Dynamics Spot, Docker, Git, Linux