

# NISHIT POPAT

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## EDUCATION

**Northeastern University**, Master of Science in Robotics, Boston, MA Graduating 05/2025  
(Control Systems Engineering, Foundations of Artificial intelligence, Mobile Robotics, Robot Sensing and Navigation)  
**MPSTME, NMIMS University**, Bachelor of Technology in Mechanical Engineering, Mumbai, India 07/2019 - 05/2023  
(CAD/CAM, Engineering Mechanics, Finite Element Analysis, Heat Transfer, Programming, Theory of Machines)

## SKILLS

**Tools:** SolidWorks, Ansys, Gazebo, RViz, Git, Nav2, Isaac Sim, MATLAB, Simulink, ROS Noetic/ROS2, Linux (Ubuntu), Docker  
**Programming Language:** Python, C++, C, Bash scripting  
**Libraries and Frameworks:** TensorFlow, PyTorch, NumPy, Pandas, Matplotlib, PyBullet, PCL, MoveIt, OpenAI Gym, CUDA, GTSAM  
**Robotics Algorithms and Techniques:** SLAM, Path Planning, Sensor Fusion, Kalman Filter, AprilTag Detection, Trajectory Optimization  
**Machine Learning and Computer Vision:** OpenCV, YOLO, Mask R-CNN, Semantic Segmentation, Object Detection, Deep Learning Architectures (e.g., CNNs, RNNs), Reinforcement Learning Algorithms

## PROFESSIONAL EXPERIENCE

**Mechanical Engineering Intern**, Shree Khodiyar Industries Pvt. Ltd. (MUMBAI) 05/2022 –08/2022

- Designed 6 industrial Molds for manufacturing industries, improving robotic arm compatibility and reducing wear by 20%
- Conducted structural and thermal analysis of Molds to ensure durability with robotic arms under high-load operations
- Collaborated with the Controls Engineering team to refine Mold designs, achieving a 15% increase in robotic gripper precision
- Researched and applied vision-based machine learning techniques, improving defect detection accuracy by 37%

**Robotics Engineer**, Marlin Racing Team, NMIMS University (Mumbai) 01/2021– 06/2021

- Awarded Best Design and Overall Runner-Up in the GKDC Concept 2021 EV category for developing a lightweight EV Go-kart
- Performed predictive algorithms for tire wear analysis, enabling precise tuning for extended performance in virtual races
- Applied a telemetry system to monitor critical performance parameters, enabling data acquisition and diagnostics
- Utilized regression-based machine learning models to forecast performance metrics, optimizing race strategies for a top 3 finish

**Control Systems Engineer**, Phoenix Racing Team (FSAE), NMIMS University (Mumbai) 08/2019–11/2020

- Implemented PID-based braking control algorithms, enhancing stability and minimizing skid during high-speed maneuvers
- Integrated data from LIDAR and IMU sensors to improve real-time vehicle dynamics and optimize performance during races
- Fine-tuned the electronic differential system increasing traction and cornering efficiency by 11% during competitive runs
- Assembled and integrated drivetrain components to ensure optimal power delivery and system compatibility

## ACADEMIC PROJECTS

### Obstacle Detection Using Human-Safety-Area Algorithm and Autonomous Navigation

- Built a human-aware navigation system on Clearpath Jackal using YOLO, RGB-D, and LIDAR with HSA giving 95% accuracy
- Developed autonomous navigation pipelines using SLAM, AMCL, and A\* for real-time path planning and obstacle detection
- Constructed a dynamic safety zone around humans, ensuring comfort and navigation efficiency in shared environments

### Autonomous Navigation Using Traditional and AI-Based Approaches

- Built an AI navigation system with YOLOv8 & 3D point cloud fusion for adaptive terrain analysis & efficient obstacle avoidance
- Captured and labelled 250+ images using CVAT, created a dataset, and achieved 92.6% precision in terrain classification
- Achieved 12% faster traversal & 35% lower computing load in AI-based navigation compared to traditional A\* path planning

### Comparative Analysis of Harris, ORB, and SIFT Algorithms for Image Stitching

- Compared ORB, Harris Corner, and SIFT algorithms, achieving up to 95% accurate feature matching across varied conditions
- Implemented RANSAC-based homography with OpenCV, producing seamless panoramas from up to 5 stitched images
- Tuned algorithm parameters, improving processing speed by 30%, enabling performance under low-light and rainy conditions

### Control of Ball and Table System Using Linear State Feedback and Integral Action

- Designed PD and PID controllers, achieving a 40% improvement in ball-balancing accuracy by fine-tuning control parameters
- Optimized system stability through precise center-of-mass adjustments, enhancing robustness and reducing instability by 30%
- Analysed controller performance, showcasing a 25% increase in responsiveness under varying ball masses and conditions

### Design and Development of an RC-controlled Mini Forklift

- Engineered a robust chassis and drive system, incorporating load sensors and precision gearing for efficient material handling
- Applied inverse kinematics models for accurate fork positioning, improving load stability and reducing handling errors by 25%
- Automated pallet handling using ROS-based state-space controllers for smooth motion transitions and enhanced load stability