

ANKUSH DESAI

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SUMMARY & ACHIEVEMENTS

A Master's student in Robotics Technology, with over 10 hands-on projects in robotic manipulation and autonomous navigation completed. Proficiency in ROS, Python, Computer Vision systems, Reinforcement Learning, Linear Control Systems, Mechanical Design, and Electronics has been demonstrated. All India Rank 3 in ABU Robocon 2022 and Rank 4 in 2021 and 2020 were secured. Roles in Robotics, Perception, and Robotic Manipulation are being sought.

EDUCATION

University of Minnesota- Master of Science in Robotics Technology. GPA: 3.8/4 Sept. 2024-May 2026
Relevant Coursework: Robotics, Computer Vision, Machine Learning, Robot Vision, Linear Control Systems, Deep Learning, Optimal Estimation, Introduction to Nonlinear Optimization with ML & AI.

Pune University - Bachelor of Engineering in Mechanical Engineering. GPA: 3.4/4 Aug. 2019-July 2023
Relevant Coursework: CAD, Fluid Dynamics, Theory of Machines, Mechanical Design, Strength of Machinery, Thermodynamics.

EXPERIENCE

FAB ELECTRONIC ENGINEERS | Intern, Automation Engineer Jul. 2023 –Jul. 2024

- Developed an autonomous guided robot using ROS for navigation and obstacle avoidance, reducing paperwork delivery time by 90% and achieving 92% accuracy and 98% efficiency through optimized path planning and sensor integration.
- Designed and manufactured a floor-cleaning robot with sweeping and mopping capabilities, reducing cleaning time by 50% through efficient control using a DPDT switchboard and user-friendly operation.
- Programmed a UR5 robot in RoboDK using PolyScope and Python API to perform joint and Cartesian movements, accurately tracing a virtual cube and demonstrating precise workspace understanding in a simulated environment.

TEAM AUTOMATONS | Team Lead Jun. 2022-Jun. 2023

- Designed, manufactured, and tested two rugby-playing robots with 95% precision in control and coordination for an international competition, ABU Robocon 2020, utilizing ROS, computer vision, and embedded systems.
- Applied a CNN-based system to classify three distinct hand movements using EEG data, achieving 92% classification accuracy and enabling precise robotic arm control with 83% efficiency.
- Executed a system using PyTorch and computer vision to localize objects in a 3D point cloud from 2D video data, achieving 90% precision within a 15 cm range and improving inventory tracking efficiency by 40% with a processing time of 2 seconds.

PROJECTS

[Project Videos](#)

1. Indoor Mapping Using Semantic 3D SLAM in ROS (ROS, Semantic Segmentation, Visual-SLAM, 3D Mapping)

- Generated and incorporated a semantic 3D SLAM algorithm within the ROS framework for autonomous indoor navigation of TurtleBot 3 in GPS-denied environments, achieving over 95% accuracy in 3D mapping and localization.
- Enhanced the navigation system with dynamic obstacle avoidance and adaptive behavior modes, validated through high-fidelity simulations using Isaac Sim, demonstrating a 70% improvement in navigation efficiency in complex indoor scenarios.

2. Reinforcement Learning-based Robotic Manipulation with Koopman Generator (Reinforcement Learning, ROS)

- Advanced a reinforcement learning-based robotic object picking system using NVIDIA Isaac Sim and Proximal Policy Optimization (PPO), achieving a 30% improvement in task completion time and a 25% reduction in collision errors.
- Used a Koopman-based linear model to transform complex robot dynamics into a simplified linear form, achieving smoother and more stable robotic arm motions, with a 40% reduction in erratic movements.

3. Robotic Pick and Place using a Cobot (Python, Robotiq Gripper, Homogeneous Transformations, Polyscope)

- Executed gripping tasks using a UR5 robot equipped with a ROBOTIQ gripper, achieving precise grip control and force management for delicate objects such as golf and ping-pong balls.
- Created a portable algorithm for pick-and-place operations, leveraging pose estimation and transformation matrices to adapt to different tray locations and object positions.

4. Autonomous Tool Sorting using a Computer Vision Algorithm (Computer Vision, ArUco markers, Robot Programming, CNN, ML)

- Constructed a Python script integrating TensorFlow, Keras, and OpenCV to control a UR5 robot for tool identification and placement tasks using ArUco markers and a Robotiq gripper, with a success rate of 95% in accurate placement of tools into designated bins.
- Implemented a system that successfully identifies and places tools into bins, adaptable to changes in tool positions, achieving a 90% success rate in real-time robotic operations.

SKILLS

- Python, PyTorch, C, C++ , TensorFlow, MATLAB, Robot Operating System (ROS2), Docker.
- Computer Vision, Machine Learning, Deep Learning, Reinforcement learning, Robot Manipulation, Simultaneous Localization and Mapping (SLAM), Path Planning, Linear Feedback Control.
- Electrical schematics, Electronic Debugging, Sensor integration.
- 3D Computer Aided Design (SolidWorks, Fusion 360, Catia), AutoCAD, ANSYS, Shapr 3D, Rapid Prototyping,