Manas Desai

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Education

University of Maryland, College Park, USA Aug 2024 – May 2026
MEng Robotics | Coursework: Perception & Planning for Autonomous Robots, Robot Modeling *CGPA: 3.72/4*

BITS Pilani, India Aug 2019 – May 2024
B.E. Mechanical Engineering & M.Sc.(Hons.) Physics *CGPA: 8.3/10*

Technical Skills

Languages: Python, C, C++, MATLAB
Libraries/Frameworks: Numpy, Scipy, OpenCV, Scikit-Learn, Pandas, Matplotlib, PyTorch, TensorFlow, CI/CD
Robotics/Simulation: Linux, ROS1/ROS2, Docker, Gazebo, MuJoCo, RViz, OpenAI Gym, SUMO
Machine Learning & AI: Reinforcement Learning, Computer Vision, LLMs, AWS, Google Cloud, Azure, CUDA

Experience

Graduate Research Assistant | Perception & Robotics Group May 2025 – Present

Monocular 3D Reconstruction for Neural strain fields | Advisor: Dr. Yiannis Aloimonos

- Fine-tuned a Large Multi-View Gaussian model for 3D scene density estimation by regressing to TSDF values, achieving a 22% improvement in reconstruction accuracy over baseline NeRF models.
- Built a unified RGB-tactile neural scene representation that improved interaction-cost prediction accuracy by 30% and generalized to 100% of unseen object categories tested.
- Developed a 0.3 mm–precision multimodal calibration pipeline and collected/processed 40 aligned RGB–tactile samples to support training and deployment of large reconstruction models.

ML/AI Intern | Clutterbot Dec 2023 – May 2024

Optimizing Annotation and Segmentation Pipelines for Mobile Robots Using Advanced ML Techniques

- Boosted YOLOv8 mAP for object detection by 20% using a Cleanlab assessment pipeline to refine dataset quality and eliminate annotation errors.
- Increased mean IoU by 25% by developing a SAM-based auto-annotation pipeline, efficiently generating precise masks for Clutterbot's Segmentation Dataset.
- Reduced training setup time by 30% by porting SeaFormer to a pure Pytorch implementation, eliminating dependencies on unsupported packages within the new cloud infrastructure.

Research Assistant | MARMot Lab, National University Of Singapore Jan 2023 – May 2024

Cooperative Multi-Agent Reinforcement Learning for Urban Traffic Signal Control | Advisor: Dr. Guillaume Sartoretti

- Improved state-of-the-art RL algorithms by 10% for urban traffic decongestion by implementing CTDE paradigm-based QMIX in a large-scale traffic simulation.
- Reduced average queue length by 30% and cumulative delay by 20% by introducing a normalized gradient entropy loss term in the original loss function of Vanilla QMIX.
- Innovated and deployed QMIXLight, a refined variant of the QMIX and SocialLight algorithms, achieving a 5% enhancement over leading-edge RL algorithms across all evaluated traffic performance metrics.

Projects

ARIAC: Developing Warehouse Automation solutions using AGVs | Github Feb 2025 – May 2025

- Completed kitting tasks using both floor and ceiling robots with 98% order fulfillment precision.
- Built a multi-threaded ROS2 package for ARIAC to automate order fulfillment and agility challenges using services, actions, parameters, and pub-sub, reducing task latency by 35% through real-time execution and modular design.
- Configured RGB, RGBD, and logical cameras at optimal locations to detect all parts and bins with minimal cost.

Autonomous Coffee Making Robot | Github | Presentation Oct 2024 – Dec 2024

- Derived forward and inverse kinematics for the UR10e 6-DOF manipulator using DH parameters.
- Integrated a contour detection algorithm for cup detection, achieving seamless communication between the camera and mover ROS2 nodes via the publisher-subscriber model.
- Optimized homing and coffee-making sequences for the robotic arm in a Gazebo simulation, reducing coffee preparation time by 20% through efficient task scheduling.