

MAYANK DESHPANDE

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Education

University of Maryland, College Park

M.Eng. Robotics, GPA: 3.95/4

Aug. 2023 – Present

College Park, MD

Ramdeobaba College of Engineering and Management

B.E. Mechanical Engineering, GPA: 9/10

Aug. 2019 – May 2023

Nagpur, IN

Technical Skills

Languages: Python, C++, C, MATLAB

Libraries/Frameworks: ROS, PyTorch, OpenCV, TensorFlow, Arduino, CUDA, gtest

Development Platforms: Linux, Embedded robotics, Gazebo, AirSim, CARLA, CarSim, MoveIt, SUMO

Design: Solidworks, Fusion 360, Adobe Photoshop, Qt, Ultimaker Cura, Figma

Tools: Kubernetes, Docker, Git, Confluence, bash, GitHub Actions, GPU Programming

Experience

Intuitive Surgical Inc.

May 2024 – Present

SA Engineer Co-op

Sunnyvale, CA

- Automated the Ion Endoluminal robot's simulated testing with MATLAB, achieving 95% automation, reducing single-use test time by 20%, and utilised time-series analysis on data, enabling early equipment-failure predictions.
- Developed an optical-flow-based verification method to compare user commands with real-time video from catheter, addressing low-texture lung simulations by training a custom RAFT model and improving flow accuracy by 35% over classical approaches.

GAMMA AI Lab, UMD

Jan 2024 – May 2024

Research Assistant

College Park, MD

- Developed a GCN based model for pedestrian trajectory prediction that inputted the robot's planned path as future, achieving a 12% improvement in real-time performance and maintaining sub-2ms inference time, leveling state-of-the-art ADE/FDE benchmarks.
- Validated the model on a Husky robot navigating crowded environments, confirming simulation outcomes through successful real-life experiments and demonstrating robust, low-latency trajectory forecasting.

CodelatticeLabs Pvt. Ltd.

May 2022 – July 2023

Robotics Software Engineer

Bengaluru, IN

- Enhanced delivery robot navigation, reducing localization latency with submap fusion, and developed C++ firmware for IoT weight data transmission using Esp32 Node-MCU.
- Simulated and implemented multi-agent coordination algorithms and trajectory tracking methods for constrained robots, leveraging reinforcement learning for intelligent intersection management.

Projects

Temporal Coherence Evaluation in Video-Language Models | *Python, Pytorch, CLIP, Hugging Face*

November 2024

- Developed a framework to evaluate temporal coherence in multimodal foundation models for video understanding tasks, introducing metrics like CLIPGain for temporal consistency in video captioning and leveraging BERTScore for semantic analysis in video QA. The project was tested on benchmarks such as TOMATO and MSR-VTT, providing nuanced insights into temporal reasoning.

Adaptive RL-MPC for Autonomous Lane-Changing | *Python, SUMO, RL, MPC*

November 2024

- Developed a hybrid RL-MPC framework integrating SAC/PPO/TD3 for dynamic, risk-aware weight adjustment (of MPC), achieving 30% higher success rates, 25% lower collision rates, and 20% faster lane-change completion in SUMO simulations.

Visual-Encoding-Particle-Filter | *C++, Python, ROS2, DL*

May 2024

- Developed a vision-based localization and visual odometry method for drones using a particle filter with CNN, VecKM, and Histogram of Features encoders, achieving fast convergence and real-time localization in ROS, validated in a Gazebo PX4 SITL environment.

3D Reconstruction using Structure from Motion | *Python, openCV, eigen*

March 2024

- Developed a Structure from Motion (SfM) system using SIFT, matching, and bundle adjustment for 3D reconstruction, achieving accurate results validated with synthetic and real-world datasets.

MultiRobot Search and Rescue | *C++, ROS2, git, gtest*

December 2023

- Utilized nav2_utils for collaborative navigation, implemented ACO for dynamic goal assignment (10% faster), and integrated YOLOv5 for real-time human detection (95% accuracy), achieving 90% code coverage through comprehensive unit testing.

LQR and LQG controller for two pendulum crane | *MATLAB*

October 2023

- Modeled and controlled a two-pendulum crane system using LQR and LQG techniques in MATLAB

Right Invariant Extended Kalman Filter for object based SLAM | *Python*

September 2023

- Translated the theoretical RIEKF algorithm for object-based SLAM into Python, showcasing in-depth knowledge of RIEKF principles and their advantages over standard EKF in a detailed report on Yang Song et al.'s 2022 paper.

Publications

Behavioral Analysis of ROS motion planners integrated with Robotics Middleware Framework (RMF) |

Published: 2022 | IEEE

This paper evaluates the integration of the Robotics Middleware Framework (RMF) with Free Fleet, analyzing the performance of different path planning algorithms in multi-robot scenarios to enhance autonomous mobile robot fleet management.