

# MAYANK DESHPANDE

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## Education

### University of Maryland, College Park

*M.Eng. Robotics, GPA: 3.97/4*

**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*

## Experience

### Intuitive Surgical Inc.

*System Software Engineer Co-op*

**May 2024 – Dec 2024**

*Sunnyvale, CA*

- Developed and evaluated a novel deep learning perception algorithm (RAFT optical flow) in PyTorch, improving accuracy by 35% and enhancing robustness for efficient real-time motion analysis crucial for tracking and understanding.
- Developed an end-to-end testing pipeline in MATLAB for the Ion Endoluminal robot, integrating real-time data logging and time-series analysis to proactively detect equipment failures. Achieved 85% automation and reduced single-use test time by 20%.

### GAMMA AI Lab, UMD

*Research Assistant*

**Jan 2024 – May 2024**

*College Park, MD*

- Developed a GCN-based pedestrian trajectory prediction model for multi-agent systems, improving real-time performance by 12% and achieving sub-2ms inference crucial for high-throughput robotic navigation benchmarks.
- Rigorously validated forecasting model performance using both simulation and real-world robot experiments in complex environments, demonstrating robustness and low-latency predictions.

### CodelatticeLabs Pvt. Ltd.

*Robotics Software Engineer*

**May 2022 – July 2023**

*Bengaluru, IN*

- Optimized multi-robot localization performance by designing a submap-fusion approach to reduce system latency, and developed efficient C++ firmware on Esp32 for real-time data transmission, enhancing overall resource utilization.
- 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**

- Conducted research evaluating temporal reasoning in state-of-the-art multimodal foundation models (VLMs) using PyTorch, introducing a novel metric (CLIPGain) for coherence analysis (potential publication focus).

### Humanoid Robot Imitation Learning from Human Videos | *Python, PyBullet, PPO, GAIL, OpenPose*

**March 2025**

- Researched imitation learning for complex robotics, implementing Generative Adversarial Imitation Learning (GAIL) and RL (PPO) in Python/PyBullet simulation to learn realistic humanoid locomotion from video data.

### 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.

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

**November 2024**

- Engineered an RL-MPC pipeline for self-driving planning (lane-changing), improving safety (25% fewer collisions) and robustness in complex traffic simulations (SUMO) using Python and RL techniques (PPO/SAC).

### Human detection and Tracking | *C++, OpenCV, MiDAS Resnet, GoogleTest, CMake*

**October 2023**

- Developed and tested (gtest) a C++ deep learning perception module using ResNet for robust real-time human detection and tracking from monocular camera input for autonomous systems.

## Technical Skills

**Languages:** Python, C/C++, MATLAB

**AI/ML:** Deep Learning (PyTorch), Computer Vision, Reinforcement Learning, Imitation Learning, Generative Models (incl. GANs), Multimodal Models

**Robotics:** SLAM, 3D reconstruction, sensor fusion, ROS/ROS2, multi-robot coordination

**Embedded & Architecture:** Linux/ARM platforms, CUDA, TensorRT, RTOS, controllers, interrupts, buses (I2C/CAN)

**Tools:** AWS/GCP, Kubernetes, Docker, Spark, Kafka, Git, Jira, bash, GitHub Actions

## 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.