# Mayank Deshpande

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## Education

**University of Maryland, College Park** **Aug. 2023 – Present**
*M.Eng. Robotics, GPA: 3.97/4* *College Park, MD*

**Ramdeobaba College of Engineering and Management** **Aug. 2019 – May 2023**
*B.E. Mechanical Engineering, GPA: 9/10* *Nagpur, IN*

## Technical Skills

**Languages & Platforms:** Python, C++, CUDA, MATLAB, ROS/ROS2, Linux
**AI/ML Research Areas:** Deep Learning (PyTorch, TensorFlow), Computer Vision (Perception, Reconstruction), Reinforcement Learning, Imitation Learning, Generative Models (incl. GANs), Multimodal Models (VLMs)
**Robotics & Mapping:** SLAM, 3D reconstruction, sensor fusion, ROS/ROS2, multi-robot coordination
**Embedded & Architecture:** Linux/ARM platforms, CUDA, TensorRT, RTOS, controllers, interrupts, buses (I2C/CAN)
**Tools:** Kubernetes, Docker, Spark, Kafka, Git, Jira, bash, GitHub Actions, GPU Programming,

## Experience

**Intuitive Surgical Inc.** **May 2024 – Dec 2024**
*System Software Engineer Co-op* *Sunnyvale, CA*
- Developed and evaluated a novel deep learning approach (RAFT-based) in PyTorch for optical flow, advancing state-of-the-art accuracy by 35% on challenging low-texture simulation data for robust real-time perception.
- 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** **Jan 2024 – May 2024**
*Research Assistant* *College Park, MD*
- Led research optimizing Graph Neural Network (GCN) models for multi-agent motion forecasting, achieving state-of-the-art inference speeds (sub-2ms) essential for safe autonomous system planning.
- 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.** **May 2022 – July 2023**
*Robotics Software Engineer* *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).

**Generative World Models for End-to-End Driving Policy Learning** | *Python, PyTorch, Generative AI (Diffusion/Transformers), Simul*
- Investigated novel Generative AI approaches (Diffusion Models) in PyTorch to build world models from sensor data within high-fidelity simulation, aiming to enable sample-efficient end-to-end driving policy learning.

**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**
- Researched hybrid control methods combining deep reinforcement learning (PPO/SAC) with MPC for safe autonomous vehicle planning, demonstrating improved safety metrics (25% fewer collisions) in complex traffic simulations (SUMO).

**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.

## 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.