Mayank Deshpande

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Education

University of Maryland, College Park **Aug. 2023 – Present**
M.Eng. Robotics, GPA: 3.95/4 *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: Python, C, C++, MATLAB
Libraries/Frameworks: OpenCV, ROS, TensorFlow, PyTorch, Arduino, CUDA, gtest
Development Platforms: Linux, Embedded robotics, Gazebo, AirSim, CARLA, CarSim, MoveIt
Design: Adobe Photoshop,Qt, Fusion 360, Solidworks, 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 simulated testing pipeline for the Ion Endoluminal robot, achieving 95 % automation and reducing test time by 20 %, using MATLAB. Implemented time series analysis and machine learning to predict equipment failure.
- Developed a system to maintain intuitive video feed orientation by compensating for mechanical camera rotation inside the robot catheter using optical flow techniques, integrating both classical and deep learning approaches.

GAMMA AI Lab, UMD **Jan 2024 – May 2024**
Research Assistant *College Park, MD*

- Developed a novel deep learning model using Graph Convolutional Networks and bidirectional-GRU to predict pedestrian paths, improving robot navigation in crowded areas.
- Achieved top-tier ADE/FDE metrics with an inference time of less than 2ms, and successfully tested the model on a Husky robot, confirming simulation results with real-world experiments.

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

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.

AutoPano | *Python, openCV, git* **April 2024**

- Developed an automatic panorama stitching solution using traditional techniques and deep learning models (HomographyNet), achieving high-quality results with supervised and unsupervised learning, validated on synthetic and real-world image sets.

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
Evaluated ROS motion planners integrated with Robotics Middleware Framework (RMF) in complex scenarios, providing insights into the performance of various path planning algorithms in real-world tests.