Ashwin Disa

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Education

Master of Science in Robotics Engineering **Aug 2023 - May 2025**
Worcester Polytechnic Institute (WPI) Worcester, MA
Courses: RBE549 Computer Vision, **CS541** Deep Learning, **RBE595** Advanced Autonomous Navigation
RBE550 Motion Planning, **AE6093** Multi-Sensor Configuration, Fusion & Estimation

Technical Skills

Languages	Python, C++, MATLAB
Tools & Libraries	Linux, Git, ROS2, Docker, PyTorch, TensorFlow, OpenCV, wandb, PuLP, LaTeX
Hardware	RealSense D430i stereo & L515 LiDAR, OAKD-Lite, Jetson Orin Nano, RaspBerryPi 4

Experience

AIMS - A Nokia Venture, Nokia Bell Labs **Feb 2025 - Present**
Robotics Software Co-op Murray Hill, NJ

- Worked on **trajectory optimization** using **Mixed-Integer Linear Programming (MILP)**.
- Contributing to the navigation stack focusing on **waypoint generation**, implementing core helper functions designed for use across multiple modules in **Docker**.

PeAR - Perception & Autonomous Robotics Group, WPI **Jul 2024 - Present**
Research Assistant | Advisor - Dr. Nitin Sanket Worcester, MA

- Developed a **ResNet** based **autoencoder** neural network for depth estimation from ultrasound in **PyTorch**.
- Data collection, post-processing (time sync), dataset generation and model training on HPC cluster.
- Multi-camera **calibration** (mean **re-projection error** of **0.17 pixels**) & **sensor fusion** (Point cloud stitching).

Relevant Projects

Road scene understanding inspired by Tesla's dashboard

- Leveraged deep learning models - **YOLO, DETIC** for object detection, **Marigold** for monocular depth estimation.
- **Mask RCNN** for lane detection and classification and RAFT for **optical flow** to create a 3D representation of the driving scene in **Blender** for visualization. [project]

SfM - Structure from Motion

- Implemented feature matching and outlier rejection using **RANSAC**, estimating Fundamental and Essential matrix.
- Linear and nonlinear **Triangulation** & **PnP**, visibility matrix for **Bundle Adjustment** for scene reconstruction and camera pose estimation. [project]

NeRFs - Neural Radiance Field

- Trained an **MLP** for photo realistic visualization and novel view synthesis of a scene. The **SSIM** and **PSNR** values are **0.88 and 25.5 dB** respectively on the test set.
- Reconstructed the same scene using **COLMAP**. [project]

Panorama Stitching using classical Computer Vision

- Corner detection, **Adaptive Non-Maximal Suppression (ANMS)** for uniform distribution of keypoints, feature extraction and matching, RANSAC for outlier rejection.
- The inliers are used to estimate the **homography**, warped and stitched to produce a panorama. [project]

Structure-aided navigation

- A simple structure-aided navigation system based on **visual servoing** with no robot state information.
- A project focusing on good software development practices. [github]

Publications

- **A. Disa** and V. G. Nair, "Autonomous Landing of a UAV on a Custom Ground Marker using Image-Based Visual Servoing," 2023 IEEE 4th Annual Flagship India Council International Subsections Conference (INDISCON), Mysore, India, 2023 [publication]

Team Achievements and Positions of Responsibility

- **Winner** out of 242 teams, in the E-Yantra Robotics Competition 2021-22, hosted by IIT Bombay. [certificate]
- Ranked 18th overall and **2nd best** in Flight Readiness Review out of 71 teams in the AUVSI SUAS Competition 2022.
- Awarded **Dr. Glenn Yee Graduate Student Project Award** by the RBE department, WPI.
- **Graduate Teaching Assistant** - Grader for RBE550 Motion Planning at WPI for Fall '24, Spring '25.
- **Undergraduate Assistant** - Proctor for make-up exams at WPI for Spring & Fall '24.