

ASHWIN DISA

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Education

Master of Science, Robotics Engineering (3.71/4.0)

Worcester Polytechnic Institute (WPI)

Aug 2023 - May 2025

Worcester, MA

Bachelor of Technology, Aeronautical Engineering (8.67/10)

Manipal Institute of Technology

Aug 2019 - May 2023

Minor in Fundamentals of Computing

Udupi, India

Technical Skills

Languages Python, C++, MATLAB

Tools & Libraries Linux, Git, ROS2, Docker, L^AT_EX, PyTorch, TensorFlow, OpenCV, Numpy, wandb, pymavlink

Hardware Realsense D430i stereo & L515 LiDAR, OAKD-Lite, RaspBerryPi 4, CubeOrange FCU

Experience

Nokia Bell Labs, Autonomous Inventory Monitoring Service (AIMS) Venture

Feb 2025 - Present

Robotics Software Co-Op

Murray Hill, NJ

- Working on an **optimization problem** for autonomous drone-based warehouse inventory monitoring system.
- Implemented a objective function that accounts for traversal and scanning priorities, significantly improving efficiency in inventory updates utilizing **Mixed-Integer Linear Programming (MILP)** to formulate and solve complex routing and scheduling challenges using the commercial **Gurobi** optimizer.

Perception & Autonomous Robotics Group (PeAR), Worcester Polytechnic Institute

Jul 2024 - Present

Research Assistant | Advisor - Dr. Nitin Sanket

Worcester, MA

- Developing depth map prediction models from ultrasound (ICU30201 sensor) in TensorFlow. A **ResNet** based **encoder-decoder** neural network architecture with ground truth depth from Realsense D430i stereo camera and L515 LiDAR is trained.
- The loss function is **MAE** with **L2 Regularization**. The baseline model **SSIM** and **PSNR** are found to be **0.19** and **7.6 dB** respectively.
- Completed **multi-camera calibration** to determine extrinsics with **re-projection error** of **0.17 pixels**, coordinate transformations for **point cloud stitching** to generate a unified depth map with an expanded field of view (FOV), data collection, post-processing (time sync) and dataset generation, training on HPC cluster.

Relevant Projects

Road scene understanding and 3D visualization from a single monocular camera

- Leveraged deep learning techniques for autonomous driving, including **YOLO**, **DETI**C for object detection (cars, road signs, traffic signals), **Marigold** for monocular depth estimation.
- OSX for pedestrian pose estimation and **mask RCNN** for lane detection and classification and RAFT for **optical flow** to create a 3D representation of the driving scene. Integrated this data into Blender for visualization. [\[report\]](#)

Structure from Motion (SfM) and NeRF

- Implemented an end-to end pipeline for Structure from Motion to reconstruct a 3D scene from a set of images and simultaneously obtain the camera poses of the monocular camera with respect to the given scene.
- Steps involved Feature Matching and Outlier rejection using **RANSAC**, Estimating Fundamental using epipolar constraint and Essential Matrix, Estimate Camera Pose and Cheirality condition using Triangulation, PnP and Bundle Adjustment. The **re-projection error** is **6.8 pixels**. Reconstructed the same scene using **COLMAP**.
- Trained deep learning model with **Neural Radiance Fields (NeRF)** for photo realistic visualization and synthesize novel views of complex scenes. The **SSIM** and **PSNR** values are **0.88** and **25.5 dB** respectively on the test set. [\[repo\]](#)[\[report\]](#)

State Estimation for Object Tracking

- Developed object tracking algorithms utilizing **Kalman Filter**, **EKF**, **UKF**, and **PF** in MATLAB to estimate robot's position and velocity. **MSE** performance metric to compare estimated values against the ground truth to validate tracking accuracy and robustness. The error is found to be consistently below **4%** of the ground truth.

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, pp. 1-6, doi: 10.1109/INDISCON58499.2023.10270190. [\[paper\]](#)

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 deaprtment, WPI.
- Graduate Teaching Assistant** - Grader for RBE550 (Motion Planning) at WPI for Fall 24.
- Undergraduate Assistant** - Proctor for make-up exams at WPI for Spring, Fall 24.