

# ASHWIN DISA

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## Education

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### Master of Science, Robotics Engineering (4.0/4.0)

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

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Languages	C/C++, Python, MATLAB
Libraries	OpenCV, NumPy, SciPy, Matplotlib, pymavlink, YOLO
Developer Tools	Linux, Git, ROS/ROS2, MATLAB/Simulink, PyTorch, Blender, Gazebo, CoppeliaSim, L <sup>A</sup> T <sub>E</sub> X
Hardware	Pixhawk, CubeOrange, RaspberryPi 4, Arduino, Monocular Cameras, Motors (servo, BLDC)

## Experience

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### Robotics Research Center, IIIT Hyderabad

Jan 2023 - May 2023

Research Intern | Advisor - Dr. Spandan Roy

Hyderabad, India

- Developed a Path Planning algorithm in velocity space for a UAV interception system. Hardware setup included CubeOrange FCU with ArduPilot firmware and RaspberryPi 4 as the companion computer. Eliminated WiFi communication between Rpi and GCS by sending custom messages via MAVLink using the RFD900+ telemetry with a range of about 40km. [\[repo\]](#)
- Implemented Reciprocal Velocity Obstacle (RVO) for obstacle avoidance and Depth First Search (DFS) algorithm for coverage path planning of a multi-agent system. Improved performance by using an optimization function to assign optimal paths to each agent.

### E-Yantra Summer Internship Program, IIT Bombay

Jun 2022 - Jul 2022

Summer Intern

Online

- Worked on implementation of a research paper based on Proportional-Integral-Derivative (PID) controller to control an over-actuated Omnidirectional Micro-Aerial Vehicle (OMAV) in simulation environment.
- Evaluated the controller by performing 3 Dimensional trajectory tracking, resulting in the position error being consistently low achieving satisfactory performance across multiple reference trajectories along with arbitrary orientation of OMAV.

## Projects

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### State estimation using KF, EKF, UKF and PF | MATLAB

- I have experience in state estimation and object tracking using various filtering techniques, including Kalman Filter, Extended Kalman Filter, Unscented Kalman Filter, and Particle Filter. Leveraging MATLAB, I've implemented these algorithms to perform accurate estimation and tracking tasks, comparing the results with ground truth data to validate their efficacy.

### Structure from Motion (SfM) and NeRF | Python, PyTorch

- 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.
- Also implemented the modern deep learning approach using Neural Radiance Fields (NeRF) for photo realistic visualization and synthesize novel views of complex scenes.

### Panorama Stitching using classical Computer Vision | Python, OpenCV, RANSAC

- Implemented corner detection, Adaptive Non-Maximal Suppression (ANMS) for uniform distribution of corners across image, feature extraction and matching, RANSAC for outlier rejection. The inliers are used to estimate the homography between the two images. Finally warped and stitched to produce a panorama. [\[repo\]](#)

### Forward, Inverse & Velocity Kinematics of a 4 DOF manipulator | Python, ROS2, MATLAB, OpenManipulatorX

- Derived Forward and Inverse Kinematics of a 4 DOF Robotic Manipulator using it's DH parameters. The work was validated by performing pick and place of an object using a gripper mechanism.
- For Velocity Kinematics, a Jacobian was introduced to control the end-effector velocities. This was verified by giving a constant velocity input of 0.1m/s in a particular/arbitrary direction in an incremental manner. [\[repo\]](#)

### Multi-robot coverage path planning | C++, ROS, Gazebo

- Worked on coverage path planning of a multi-robot system in a rectangular grid using voronoi partitioning technique to divide and assign areas. Known static obstacles are placed in the grid and Depth First Search (DFS) is implemented for coverage. [\[repo\]](#)

## Publications

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- 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

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- 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.