

# Ankit Talele

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## EDUCATION:

### Worcester Polytechnic Institute

M.Sc. Robotics, CGPA: 3.77/4.0

Aug 2022 - May 2024

### University Of Mumbai, VESIT

B.Tech, Electronics Engineering, CGPA: 8.68/10 | Roles: Team Lead DrishTI

July 2017 - Jun 2021

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## EXPERIENCE:

### Deep Learning Research Student | Medical FUSION Lab, WPI | Advisor: Dr. Haichong Zhang

Jan 2024 – May 2024

Designing a custom 3D CNN model for Gesture Recognition using Ultrasound Imaging

[Selected for presentation at the *IEEE International Ultrasonics Symposium (IUS) 2024 Conference*]

- Developed a 3D CNN model from scratch to work both in spatial and temporal frames to compare information processed through video frames in the training data instead of image snippets.
  - Achieved 98% accuracy on an 11 Class classification model with our self-created data set.
  - Currently tackling the issue of identifying finger force estimation
- Tools Used – Pytorch, Tensorflow, Docker, Ultrasound Probe, 3D printed jig with vicon markers and sensors, Git

Sep 2019 - Feb 2020

### System Controls Automation Intern | Electronic Control System | Nagpur, India

- Designed and implemented SCADA systems for a milling factory to optimize and monitor operations effectively.
- Developed and fine-tuned PID controllers for milling robots, ensuring precise and stable control of the robotic milling processes.
- Programmed PLC ladder logic on Philips PLCs tailored to meet the specific needs of individual clients, enhancing operational efficiency and customization.
- Configured and programmed DC servo motors using PLCs for a garment factory, improving automation and control in the production process.

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## RELEVANT PROJECTS:

### Navigating the Unknown- Optical flow based structure-less gap detection for drone flight [GitHub](#)

Oct 2023-Dec 2023

- Developed an autonomous navigation system for the DJI Tello EDU drone to traverse irregular-shaped windows.
  - Implemented optical flow detection to identify and maneuver through the largest available gaps in obstacles.
  - Enhanced quadcopter guidance with visual servoing, aligning the drone's image center with gap centers for precise navigation.
  - Applied post-processing techniques to optical flow data for accurate contour mapping of navigational paths.
- Tools Used: PyTorch, Tello EDU, NVIDIA Orin Nano, Blender, Python

### The Perception Saga- Sim2Real Quadcopter Perception Stack [Video](#) [GitHub](#)

Oct 2023-Dec 2023

- Engineered a perception stack for the DJI Tello EDU, enhancing drone navigation precision using **sim2real** techniques and YOLOv8 for window detection.
  - Conducted camera calibration to determine camera intrinsics for the **Perspective-n-Point (PnP) algorithm**.
  - Generated custom synthetic training data for neural networks to identify and segment windows in complex environments.
  - Implemented the **Perspective-n-Point (PnP) algorithm** for real-time pose estimation, ensuring safe flight through multiple windows.
- Tools Used: PyTorch, Tello EDU, NVIDIA Orin Nano, Blender, Python

### Unscented Kalman And Madgwick Filter for Sensor Fusion [GitHub](#)

Aug 2023-Sep 2023

- Implemented the **Unscented Kalman Filter (UKF)** and **Madgwick filter** to estimate the attitude of a quadrotor using IMU raw data.
- Tuned parameters to ensure the filter output closely follows the ground truth estimation.

### Robust Trajectory Tracking for Quadrotor UAVs using Sliding Mode Control [GitHub](#)

Nov 2022-Dec 2022

Generated quintic polynomial trajectory using set waypoints and traced a track in Gazebo.

Tools Used: Gazebo, Python, ROS, Crazyflie 2.0 platform, MATLAB

### Multi Robot Motion Planning for warehouse management using WHCA\* [GitHub](#)

Feb 2023- May 2022

- Built a 2D simulation environment of a warehouse.
  - Implemented global and local planners using WHCA\* for robots loading and unloading items.
  - Used a block-like grid for navigation, assuming robots on rails.
- Tools Used: Python, Matplotlib

### Firefighting Using Robot Swarms [GitHub](#)

Mar 2023- Apr 2023

- Simulated forest fires and compared swarm behavior by creating a simulation environment.
  - Tackled forest fires using robot swarms with A\* path planning and dynamic obstacle avoidance.
- Tools Used: Python, Pygame

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## ACTIVITIES:

**Texas Instruments Organized DrishTI Innovation Challenge** – Secured 3<sup>rd</sup> place in the DrishTI Innovation challenge as a team-lead on team “UAV” with the topic of painting high rise buildings using UAV’s.

**Embedded C using ESP32 and Internet of Things** – Participated in IOT and Embedded C workshop in college organized by Tech-Tinkerers Lab

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