Ankit Talele

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EDUCATION:

Worcester Polytechnic Institute   *Aug 2022 - May 2024*
M.Sc. Robotics, CGPA: 3.77/4.0

University Of Mumbai, VESIT   *July 2017 - Jun 2021*
B.Tech, Electronics Engineering, *CGPA:* **8.68/10** | *Roles: Team Lead DrishTI*

EXPERIENCE:

Robotics Software Engineer | Void Robotics   *Aug 2024 – Now*
Creating a GPS Navigator for a Custom Rover using ROS 2
[Developed for simulated environments]
• Developed a GPS-based navigation system enabling accurate localization and path planning in ROS 2.
• Built a simulation environment in Gazebo to test and validate navigation algorithms.
• Optimized URDF files to address odometry drift issues, improving localization accuracy.
• Implemented autonomous navigation using Nav2 goals with real-time feedback.
Tools Used – ROS 2, Gazebo, Python, C++, Git, Docker

Deep Learning Research Student | Medical FUSION Lab, WPI | Advisor: Dr. Haichong Zhang Poster Paper Link   *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.**
- Used **Vicon markers** for **motion capture** used for the finger angle detection for our data set.
- Tools Used – Pytorch, Tensorflow, Docker, Ultrasound Probe, 3D printed jig with vicon markers and sensors, Git

System Controls Automation Intern | Electronic Control System | Nagpur, India   *Sep 2019 – Feb 2020*
- **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.

RELEVANT PROJECTS:

- **Navigating the Unknown- Optical flow based structure-less gap detection for drone flight** GitHub
- **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
- **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
- **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
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
- **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

- 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

ACTIVITIES:

Texas Instruments Organized DrishTI Innovation Challenge – Secured **3ʳᵈ 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