Ankit Talele

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Interests: Perception, Robot Path planning, Robot Controls

EDUCATION

Worcester Polytechnic Institute *Aug 2022 - May 2024*
M.Sc. Robotics, **CGPA: 3.75/4.0**
Courses: Aerial Robotics, Motion Planning, Robot Controls, Swarm Intelligence

University Of Mumbai, VESIT *Jul 2017 - Jun 2021*
B.Tech, Electronics Engineering, ***CGPA:*** **8.68/10** | *Roles: Team Lead DrishTI*
Courses: IOT, VHDL, Embedded Systems, Linear Integrated Circuits, Digital Circuit Design

SKILLS

Programming Languages : Python, C++, MATLAB, Buzz
Software and Environments : ROS, Git, Gazebo, ARGoS, Blender, Pytorch, Tensorflow

DIRECTED RESEARCH

Medical FUSION Lab, WPI | Advisor: Dr. Haichong Zhang *Jan 2024 - Ongoing*

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

- Developed a 3D CNN model to work both in spatial and temporal frames because we are trying to compare if video training the model will extract more information for gesture recognition.
- Plan to improve the model by transformer networks and future work includes estimating the force of finger movements which can then be passed on to prosthetic devices.
- Tools Used – Tensorflow, Docker, Ultrasound Probe, 3D printed arm to take readings.

RELEVANT PROJECTS

Navigating the Unknown- Optical flow based structure-less gap detection for drone flight Link *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 traversal.
- Applied post-processing techniques to optical flow data for accurate contour mapping of navigational paths.
- Tools Used – Python, Tello EDU, NVIDIA Orin Nano, Blender, pytorch

The Perception Saga- Sim2Real Quadcopter Perception Stack Link *Nov 2023-Dec 2023*

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

Unscented Kalman And Madgwick Filter for Sensor Fusion Link *Aug 2023-Sep 2023*

- Implemented UKF and Madgwick filter to estimate attitude of a quadrotor using IMU rawdata.
- Tuned parameters so that filter output will follow the ground truth estimation.

Robust Trajectory Tracking for Quadrotor UAVs using Sliding Mode Control Link *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 Link *Feb 2023- May 2022*

Built 2D simulation environment of a warehouse.

- Implemented **Global and Local planner using WHCA*** for robots loading and unloading items.
- Block like grid was used for navigation assuming robots on rails.
- Tools Used – Python, Matplotlib

Firefighting Using Robot Swarms Link *Mar 2023- Apr 2023*

Simulated forest fires and compared swarm behavior by creating a simulation environment.

- Tackled forest fires using robot swarms using 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