

Mayank Bansal

Worcester MA

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EDUCATION:

Worcester Polytechnic Institute (WPI), Worcester, MA

Master of Science in Robotics, GPA 4.0/4.0

May 2024

Relevant Courses: Hands-on UAV, Motion Planning, Robot Control, Reinforcement Learning, Robot Dynamics, Legged Robotics

Manipal Institute of Technology, (MIT), Manipal, India

Bachelors of Technology in Mechatronics, GPA 8.71/10.0

June 2022

SKILLS:

Programming Languages/ Operating System: Python, C++, C, C#, Java, Embedded C, Linux

Applications/ Software: ROS2, MoveIt, PyTorch, OpenCV, Open3D, Blender, Gazebo, Unity, AirSim, MATLAB, SimScape

Hardware Tools: NVIDIA Jetson, DJI Tello Edu drone, Arduino, Raspberry Pi, PLC

Languages: English, Hindi, German

EXPERIENCE:

Graduate Researcher, Prof. Ziming Zhang, VIS Lab

August 2023 – December 2023

- Refined **VRCNet** for robust **point cloud completion**, utilizing advanced optimizers and adaptive learning rates.
- Developed a **PointNet** classifier to categorize shapes with an **accuracy of over 85%** from the **ShapeNet** dataset.

Planning and Controls Intern, Orangewood Labs, San Francisco, California, USA

June 2023 – August 2023

- Orchestrated a joint trajectory controller for the OWL robotic arm simulation, utilizing **ROS, Gazebo, and MoveIt**.
- Designed **MoveIt** configuration files for precise OWL robotic arm **pick and place** operation.

Computer Vision Intern, Wastefull Insights, Vadodara, Gujarat, India

January 2022 – May 2022

- Trained object detection and classification models to segregate wastes on a conveyor belt.
- Deployed **YOLOv5** and **ResNet-based** color classification model on Jetson Xavier using **TensorRT and CUDA**.
- Developed the dataset and used **AWS S3** services to manage and control the flow of data in the pipeline.
- Evaluated and improved the performance of the models to obtain an **accuracy of above 90%** on both tasks.

PROJECTS:

Motion Planning for DJI Tello Drone

September 2023 – October 2023

- Developed motion planning pipeline for DJI Tello drone using **RRT* and minimum snap trajectories** in Blender.
- Fine-tuned **PID** controllers to ensure precise tracking of generated trajectories in the simulation.
- Accomplished trajectory following on the real drone using **velocity and position controller** in real-world maps.

Quaternion-based Attitude Estimation of quadrotor

August 2023 - September 2023

- Utilized **Complementary, Madgwick, and UKF filters** for precise quadrotor attitude estimation in quaternions.
- Conducted benchmarking against **Vicon Motion Capture System** ground-truth attitudes to ensure accuracy.

Robust Control of UAV

March 2023 – April 2023

- Designed a robust controller for a quadrotor in Gazebo to track a square trajectory with external disturbances.
- Utilized **sliding mode controller (SMC)** and tuned its parameters to achieve smooth and precise quadrotor motion.

DQN-based Autonomous Vehicle control

March 2023 – April 2023

- Developed a **DQN based controller** for an autonomous vehicle in a simulated environment using AirSim simulator.
- Preprocessed sensor data, trained the DQN model, and controlled the vehicle using **Python, PyTorch, and OpenCV**.
- Achieved an **average speed of 5 mph** and successfully navigated a neighborhood environment avoiding collisions.

Complete Coverage Path Planning in Unity

March 2023 – April 2023

- Implemented **complete coverage** path planning and **spanning tree coverage** path planning algorithms in C#.
- Conducted comparative analysis of the two algorithms in Unity showcasing their pros and cons.

Hexapod Walking Robot

October 2022 – December 2022

- Collaborated with a team to build a hexapod robot capable of walking using **tripod gait**.
- Implemented inverse kinematics for each leg to precisely follow the desired trajectory.