Ishir Roongta

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Education

CARNEGIE MELLON UNIVERSITY

Master of Science: Robotics Systems Development | GPA 4.11 *August 2023 - Exp. 2025*

Relevant Coursework: Computer Vision, Robot Autonomy, Visual Learning and Recognition, SLAM, Deep Reinforcement Learning

INDIAN INSTITUTE OF TECHNOLOGY KANPUR

B. Tech, Electrical Engineering | GPA 8.6/10.0 *August 2019 - May 2023*

Relevant Coursework: Embedded Cyber-Physical Systems, Control Theory, Networked Dynamical Systems, Data Structures & Algorithms

Skills

Programming: C/C++, Python, MATLAB/Simulink
Robotics: ROS/ROS2, Gazebo, PyTorch, OpenCV, PCL, Eigen, Multithreading, GAN, Transformers
Work-flow Tools: Linux, Git, Continuous Integration, Docker, Jira, AutoCAD, MeshLab, Eagle, Kanban

Work Experience

NATIONAL ROBOTICS ENGINEERING CENTER *Software Engineering Intern | May 2024 – Aug. 2024*

Supervisor: David Guttendorf

- Implemented information transport modules for UGVs and performed integration using Docker, Git, and unit testing.
- Analyzed and reverse engineered **Bluetooth protocol** for BMS and **developed utility applications** to transport Silvus radio network information for a swarm of UGVs and UAVs to a dashboard to further reduce downtime.
- Integrated 2D Lidar scan and Visual odometry using **custom implemented ROS2 wrappers** to create **global indoor mapping pipeline** using Slamtoolbox with **NVIDIA platform AGX Orin.**

Relevant Projects

SUB-CANOPY WILDFIRE MONITORING UAV SYSTEM *Project Website | Sept 2023 – Nov 2024*

- Worked on a wildfire monitoring UAV system capable of **sub-canopy navigation** and relay of **fire hotspot maps**.
- Implemented ROS module for fire hotspot segmentation and its location using **stereo vision-based depth estimation**.
- Developed a **FSM based Autonomy Manager** to integrate obstacle avoidance, path planning and exploration capabilities for the aerial platform along with appropriate failsafe conditions for **Sim2Real transfer**.

AUTONOMOUS WHITEBOARD ERASER *Report | Feb-Apr, 2024*

- Implemented **Travelling Salesman Problem** on sampled points to create stroke lines on whiteboard markings.
- Integrated **a Realsense D435i with a Franka arm** to follow generated waypoints from the TSP algorithm.
- Simulated results for motion planners like RRT and Probabilistic Roadmap **to plan collision free paths** in MuJoCo sim.

UAV-GUIDED UGV NAVIGATION CHALLENGE *GitHub | Feb-Mar, 2022*

- Developed a **road segmentation algorithm in a mountain terrain** using RANSAC to detect planes in the pointcloud.
- Spearheaded the team of 8-10 students and worked on **pipeline integration** and using PCA analysis for heading.
- Implemented the **simulation environment on Gazebo** and modified the **pure pursuit controller** for the unmanned ground vehicle to handle tight turns and hair-pin bends.

VISUAL LEARNING AND RECOGNITION *Graduate Course | Jan-Apr, 2024*

- Completed tasks like **object recognition** from PASCAL VOC dataset using **CNN and supervised FC One-stage object detection**, and image captioning using a **Transformer decoder** trained on COCO dataset.

VISION BASED OBSTACLE AVOIDANCE *GitHub | Feb-Mar, 2021*

- Developed a Voxblox based planning routine for **autonomous navigation in an unknown complex maze** environment incorporated **Aruco marker-based landing** routine.

Publications

Roongta, I., Kumar, P., & Tripathy, T. (Jan 2024). "Trajectory-Constrained Standoff Target Tracking using Barrier Lyapunov Functions," AIAA 2024-1992. *AIAA SCITECH 2024 Forum*.