

Rohan Maan

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EDUCATION

Master of Engineering – Robotics May 2024

University of Maryland, College Park

Courses: Computer Processing of Pictorial Information, Intro to Robot Programming, Control of Robotics Systems

Research Assistant: [Perception and Robotics Group](#), UMD

Bachelor of Technology – Robotics and Automation Engineering May 2022

Maharashtra Institute of Technology, World Peace University, India

Courses: Machine Vision Systems, Artificial Intelligence, Unmanned Aerial Vehicle, Robotic System Simulation GPA 9.13/10

Leadership: [MIT Robocon Tech Team Leader and Technical Head](#)

SKILLS

LANGUAGES: C, C++, Python, MATLAB

SOFTWARE Development: OpenCV, PyTorch, Numpy, CUDA C++, scikit-learn, Tensorflow, Linux, Git, Docker, CMake

ROS/ROS2: Gazebo, Rviz, MoveIt, roscpp, rospy, services, rosbag, matplotlib, PX4

ML & DL: Regression, Transfer Learning, CNN, K-NN, Kernel SVM, K-means

COMPUTER VISION: Multiview 3D Geometry, 3D reconstruction, Optical Flow, Image Classification, Edge Detection

EXPERIENCE

Research Intern, Indian Institute of Technology, Delhi, India July 2021 – March 2022

- Integrated Aerial Manipulator capable of carrying a payload of 800gm. Improved stability by **63%** compared to conventional ArduPilot/PX4 Firmware using the modified four-element controller, also simulated in **Gazebo**. [Link](#)
- Performed pose estimation of drone using **ArUco** markers and implemented **PID-based pose correction** before autonomous precision landing with an **accuracy of 11cm**

Director and CTO, Autwn Private Limited, Pune, India Sep 2020 – Feb 2021

- Designed and developed Health monitoring **IoT** **consists** of an automated sanitizer dispenser and UV-based bag sanitization reducing the risk by **76%**. [Link](#)
- Performed automatic attendance system **Keras** based **OpenCV** and **MySQL** database **Python** and health parameter checks achieving an accuracy of **87%**.

PUBLICATIONS

- Kaushal Kishore, Sagar Dalai, Yash Jangir, Samarth Singh, Rohan M, Shashank D, Sree S S Katta, Saha S K, "3D Pure Pursuit Guidance of Drones for Autonomous Precision Landing", 2022 13th Asian Control Conference (ASCC), 2022 [Link](#)
- Debadrata Sarkar, Aman Arora, Soumen Sen, Sree S S Katta, Shashank D, Rohan M, Saha S K, "Development of an Autonomous UAV Integrated with a Manipulator and a Soft Gripper", 2022 13th Asian Control Conference (ASCC), 2022 [Link](#)
- R. Maan, A. Madiwale and M. Bishnoi, "Design and Analysis of 'Xenia: The Medi-Assist Robot' for Food Delivery and Sanitization in Hospitals," 2021 2nd Global Conference for Advancement in Technology (GCAT), 2021, pp. 1-7, doi: 10.1109/GCAT52182.2021.9587776. [Link](#)

PROJECTS

Multiview Geometry Depth Estimation – (OpenCV, Numpy, Matplotlib) Nov 2022

- Estimated the **fundamental matrix** iteratively (SIFT feature points of two images) using **RANSAC** and **Eight-point algorithm**.
- Estimated the **essential matrix** and decomposed it to obtain the rotation and translation and then **rectified** the images to make the **epipolar lines parallel** and estimated the **depth maps**.

Image Stitching Using RANSAC – (OpenCV, Numpy, Matplotlib) Oct 2022

- Detected and matched keypoints (**SIFT Descriptors**) in multiple images and then estimated **homography** using **RANSAC** and stitched using cv2 **warp perspective**.

A*, RRT* and Dijkstra's path planning – (ROS, Gazebo, OpenCV, Numpy) Nov 2022 - Dec 2022

- Developed custom ROS Package to simulate **A* path planning** algorithm on **turtlebot3**. Additional considerations were made for differential drive. Simulated the planned path in Gazebo environment with variable obstacles.
- Implemented **RRT* Dijkstra's algorithm** to find optimal path for the robot using OpenCV visualisation.

Driver Drowsiness Detection using Transfer Learning – (Tensorflow, Scikit-Learn, Numpy, CNN) Oct 2022 - Nov 2022

- Used pretrained **Haar Cascade classifier** to detect faces and then eyes, this data is fed to **esnet** model.
- Trained a **esnet** based classifier, that takes eyes as inputs and recognizes drowsiness with an **accuracy of 96%**.

Facial Recognition using YOLO v4 – (Tensorflow, OpenCV, scikit-learn, dlib, CUDA C++) Sep 2022 - Oct 2022

- Used **K-means++ algorithm** to cluster prior frames from the **YOLOv4** model. Selected smaller prior frames in order to detect small face targets in scenes, addressing the issue of missing detection.
- Mobile lightweight network** model improves the backbone network structure, reducing parameters and hence speeding up.

Rugby Ball Passing Robot – (Code Composer Studio) (MIT Robocon Tech Team) Sep 2019 - May 2020

- Designed an embedded system for complete control of a three-wheel holonomic drive capable of grabbing a rugby ball and passing it to another robot using **motors and pneumatic valves**. [Link](#)
- Performed sensor fusion with **Encoders** and 2D Lidar & **distance sensors** array for localization with **errors less than 2cm**.
- Represented India in International ABU Robocon 2020 ([Mathworks - The Winner's Circle](#) - Robotics section)