Manan Arora

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Education

BITS Pilani KK Birla Goa Campus **2020 – 2024(expected)**
Bachelors of Engineering in Electronics and Communications *Goa, India*

Delhi Public School, Dwarka **2018 – 2019**
Class XII *New Delhi, India*

Relevant Coursework

- Probability and Statistics
- Computer Programming
- Differential Equations
- Multivariable Calculus
- Linear Algebra
- Control Systems
- Modern Control Systems
- Non-Linear Dynamics and Chaos
- Neural Networks and Deep Learning(online)
- Reinforcement Learning(online)

Experience

Swaayatt Robots **June 2023 – Present**
Research Intern *Bhopal, India*

- Working as a Research Intern under the supervision of Mr Mr Sanjeev Sharma(Founder and CEO, Swaayatt Robots). My current Research Project focuses on Motion Planning for Autonomous Vehicles using Deep Reinforcement Learning.

MARMot Lab, National University of Singapore **February 2023 – Present**
Research Intern *Remote*

- Working as a research intern under the guidance of Dr Guillaume Sartoretti on the project 'Foothold Planning using Reinforcement Learning'.
- Worked on control algorithms using Central Pattern Generators for six-legged robot Hebi Daisy.
- Currently working on various Reinforcement Learning based Algorithms for Locomotion.

CSIR-CEERI **June 2022 – September 2022**
Research Intern *Rajasthan, India*

- Worked as a research intern under the guidance of Dr Kaushal Kishore.
- Worked on control and perception algorithms for MAV landing on a generalised moving platform without any markers.
- Designed perception algorithms for detection of the unmarked platform using 3D Lidar and a USB camera, and control algorithms to follow and land on the moving platform.

Flying Ad Hoc Networks for Disaster Rescue Operationss **September 2022 – December 2022**
Team Member *Goa, India*

- Working with Dr Sarang Dhongdi on the development of an integrated bridge framework to co-simulate the coverage planning of a swarm of disaster-deployed UAV swarms using PX4 SITL (in Gazebo, ROS) and the communication network between them using the NS3 simulator.

Project Kratos **July 2021 – February 2022**
Life Detection Subsystem Member *Goa, India*

- Implemented computer vision based onboard life detection systems.

Projects

TrotBot | *Python, ROS, Arduino, C/C++, PyTorch*[Link] **November 2021**

- TrotBot is an autonomous omni wheel based delivery bot developed by ERC.
- Worked on developing various path planning algorithms like A* for the bot.
- Worked on implementing Kalman Filter for sensor fusion to get reliable odometry from various sensors.
- Worked on Semantic Segmentation i.e categorizing various objects in the image captured by the onboard camera.

SwarmBots | *Python, ROS, Arduino, C/C++, OpenCV*[Link] **August 2022 – Present**

- In SwarmBots, we aim to build a decentralised swarm of autonomous mobile robots and implement various 'collective decision-making' algorithms on this swarm.

Octobounce | *Python, ROS, Arduino, C/C++, OpenCV*[Link] **April 2022**

- OctoBounce is a Stewart based platform for controlling the bounce of a table tennis ball.
- Implemented computer vision based ball detection algorithm.

Maze Solving Robot | *Python, ROS, Arduino, C/C++, OpenCV* [Link]   **Feb 2022**

- Developed a control and navigation stack for an omni wheel robot to solve a maze autonomously.
- Implemented a closed loop PID controller and a modified version of RRT for path planning.

UAV Landing on a Generalised Moving Platform | *Python, ROS, PX4, C/C++, OpenCV, RViz* [Link]**September 2022**

- In this work, we attempt to land a UAV on an unmarked moving platform using visual servoing. All the previous approaches usually mark the platforms with AR Tags, identification markers etc.
- A visual servoing based controller is used to perform the landing maneuvers using platforms coordinates and velocity information.
- We use contour detection and optical flow for platform detection and tracking.
- Currently the research is focused on Deep learning based methods for platform detection using 3D Lidars.
- Work done was published in the paper titled **UAV Landing on General Moving Platforms Without Markers** at IMSD-ACMD at IIT Delhi

Technical Skills

Languages: Python, C/C++, MATLAB
Tools and Frameworks: ROS, Gazebo, PyBullet, Gym, Isaac Gym, Simulink, rViz, NS3, Logisim, Autocad
Deep Learning: PyTorch, Tensorflow, NumPy, Pandas, scikit-learn
Technologies/Frameworks: Linux, Git/Github