





MANAN ARORA

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Education

BITS Pilani KK Birla Goa Campus

Bachelors of Engineering in Electronics and Communication

2020 – 2024(expected)

Goa, India

Relevant Coursework

Probability and Statistics, Linear Algebra, Computer Programming, Data Structures and Algorithms, Control Systems, Non-Linear Dynamics and Chaos, Modern Control Systems, Information Theory and Coding, Game Theory, Machine Learning, Reinforcement Learning

Experience

Stoch Lab, IISc Bangalore

Research Intern

January 2024 – Present

Bangalore, India

- Advised by [Prof Shishir Kolathaya](#)
- Research in **Locomotion in Quadrupeds using Offline Reinforcement Learning**.
- Implemented various Offline Reinforcement Learning algorithms for locomotion in Quadrupeds. Currently working on training Diffusion Models for locomotion tasks.
- Tech Stack: Python, Pytorch, C++, Numpy, IsaacGym, Unitree GO1/A1

Swaayatt Robots

Research Intern

June 2023 – September 2023

Bhopal, India

- Advised by [Mr Sanjeev Sharma](#)(Founder and CEO, [Swaayatt Robots](#))
- Research in **Motion Planning for Autonomous Vehicles in Highly Stochastic Environments using Deep Reinforcement Learning**.
- Implemented Reinforcement Learning environments and Reinforcement Learning algorithms for training agents to navigate through dynamic and static obstacles.
- Tech Stack: Python, Pytorch, C++, Numpy, Gazebo

MARMot Lab, National University of Singapore

Research Intern

February 2023 – June 2023

Remote

- Advised by [Dr Guillaume Sartoretti](#)
- Research in **Foothold Planning using Reinforcement Learning**
- Implemented control algorithms using Central Pattern Generators for six-legged robot Yuna and Reinforcement Learning algorithms for learning legged locomotion
- Tech Stack: Python, Pytorch, Pybullet, IsaacGym, C++, Numpy

BITS Pilani Goa Campus

Undergraduate Researcher

September 2022 – Present

Goa, India

- Advised by [Dr Sarang Dhongdi](#)
- Research in **Flying Ad-hoc Networks**
- Working on a bridge framework to co-simulate the coverage planning of disaster-deployed UAV swarms and the communication network between them.
- Tech Stack: Python, C++, PX4 SITL, ROS, Gazebo, NS3

CSIR-CEERI | [Code](#) | [Paper](#)

Research Intern

June 2022 – September 2022

Rajasthan, India

- Advised by [Dr Kaushal Kishore](#).
- Research on **UAV Landing on a Moving Platform without any Markers**
- Implemented control algorithms to follow and land on the moving platform and perception algorithms for detection of the unmarked platform using 3D Lidar and a USB camera
- Tech Stack: Python, C++, PX4 SITL, ROS, Gazebo, OpenCV, RViz
- Work done was published in the paper titled **UAV Landing on General Moving Platforms Without Markers** at IMSD-ACMD at IIT Delhi

Projects

Rapid Motor Adaptation | *Python, Pytorch, IsaacGym*

[Github Link](#)

- Implemented the paper [RMA: Rapid Motor Adaptation for Legged Robots](#) using Isaac Gym Legged Gym framework.
- Implemented the Teacher-Student training framework for the training of main policy and adaptation module.

DreamWaQ | *Python, Pytorch, IsaacGym*

[Github Link](#)

- Implemented the paper [DreamWaQ: Learning Robust Quadrupedal Locomotion With Implicit Terrain Imagination via Deep Reinforcement Learning](#) using Legged Gym framework.
- Implemented Asynchronous Actor-Critic and Beta Variational Autoencoder for terrain embeddings using observation history.

Batch Constrained Deep Q-Learning | *Python, Pytorch*

[Github Link](#)

- Implemented the paper [Off-Policy Deep Reinforcement Learning without Exploration](#). from scratch.
- Included modifications to speed up the algorithm's training. Achieved an approximately 75 percent speedup when compared to author's implementation.

Proximal Policy Optimisation | *Python, Pytorch*

[Github Link](#)

- Implemented clipped objective Proximal Policy Optimisation Algorithm from scratch using Pytorch and reproduced the results in LunarLander and BipedalWalker OpenAI gym environments.
- Included modifications like Generalised Advantage Estimate, Entropy Regularisation etc. in order to match the performance offered by StableBaseline3's PPO.

Obstacle avoidance using RL | *Python, Pytorch, Pygame*

[Github Link](#)

- Implemented Reinforcement Learning environment and agent from scratch to learn to reach the goal pose while avoiding obstacles.
- Implemented clipped objective Proximal Policy Optimisation algorithm from scratch to train the agent.

Technical Skills

-13pt

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

Extracurricular

Robotics Hackathon 2022

July 2022 – August 2022

Hackathon Mentor

BITS Pilani KK Birla Goa Campus

- Designed a [robotics hackathon](#) for 100+ undergraduate students, with the objective of developing an autonomous cleaning robot. Helped students by clearing their doubts and troubleshooting on various subjects like ROS, Path Planning, Control Theory etc.

Quark Summer Technical Project 2022

July 2022 – August 2022

Mentor

BITS Pilani KK Birla Goa Campus

- Designed and mentored a [summer robotics course](#) for 100+ undergraduate students, involving development of a maze solving robot.