

EDUCATION

Indian Institute of Technology, Delhi	Jun'17 — Jun'21
Bachelor of Technology with Minor Degree in Robotics	Jun'21
Extra Academic in Computer Vision, Statistics & Probability and Operations Research	Jun'21

SKILLS

Programming Languages	Python(Numpy, OpenCV, gym, PyTorch), C++, Java(spring framework, Maven), SQL
Softwares and Tools	Git, ROS, Docker, Jenkins, MongoDB, MySQL, Linux, Kafka, SolidWorks
Technical Skills	Robotics, Reinforcement Learning , Machine learning, Computer Vision, DBMS, Data Structures

EXPERIENCE

Software Development Engineer	Jun'21 — Present
Times Internet	Noida, India

- **Denmark : Content Management System**
 - Optimized bulk-processing APIs by introducing **multi-threading** concept, utilized spring framework with injected security and application contexts and latching techniques for **synchronization**, thus reducing the api response time by **75%**
 - Worked with cross-functional teams to analyze the central **caching system** of **20+** newsroom websites for better responsiveness and defined efficient data contracts for supporting future dated content publishing
 - Owned the end-to-end development and deployment of **standalone spring-boot** application for **concurrently** processing batch of upto **50** events before pushing to kafka topics
 - Added **async support** for AI content generation and personalized notification service for notifying users, increasing the content creation per news channel upto **4%** and also cross-publishing of content
 - Developed the architecture for enabling the use of author-proxies (virtual authors of a content) and also their tracking for analytics, having one-to-many relationship with real authors and used **BTree indexed** table mapping for efficient search
- **GrowthRX : User Engagement Analytics Platform**
 - Worked on a **scheduler** for migration of old data into cold disk upto **5TB** efficiently in **clickhouse** (OLAP data warehouse)
 - Developed and deployed **scalable kafka consumers** in **docker** containers for processing upto **3,000** events per second and aggregate into columnar database for report generation, push notification and analytics
 - End-to-end development of **spring-boot** app to extract expiry dates of encrypted ios notification certificates and email users

PROJECT

Reinforcement Learning Project

- Leveraged gym envs and **pytorch** framework to implement **REINFORCE** policy gradient algorithm and its variants, advantage normalization, and **PPO** for multiple environments(discrete and continous spaces) i.e. cartpole and half-cheetah
- Compared PPO algorithm with vanilla policy gradient and advantage normalization under different testbeds and achieved avg score of **500** for half-cheetah and **monotonic improvement** under PPO
- Coded **DQN** algorithm with **2** separate neural networks as action-value function approximators and random memory-replay to play **minAtar breakout** game, achieved average score of **17.5** in **1 million** training steps
- Contrasted the DQN algorithm with linear function approximators vs that of neural net and found saturation in linear case while neural network performed **8-10** times better with monotonic growth.
- Trained a reinforcement learning model (**q-learning**) to play optimally the frozen-lake game using gym environment in python

Cable Driven Parallel Manipulator

- Ideated and build a **3D model** of cable driven manipulator for increased workspace, payload handling and dynamic response
- Simulated the model in **Mujoco**, **Solidworks** and **Gazebo** with different cable modelling strategies and Compared for accuracy
- Integrated **gym** environment for training **imitation RL** model on this manipulator for imitating the behaviour of agent's trajectory

Gesture Based Pick and Place

- Did POC on simulating pick and place scenario with Niryo robot in a warehouse with various objects in **Gazebo**, **Unity** for speed
- Integrated **ROS publisher and subscriber** framework in Unity for getting the sending the positions of objects to pick in ros-msg
- Created a library of different shapes of objects for instantiating in Unity environment and implemented **mouse pointer location** based gesture recognition of object initial and final position and thus, optimal trajectory estimation for robot

ToF (Time of flight) sensor based 3-D scanner

- Led a team of 3 students and built a 3D-object scanner by interfacing **ToF (VL53L0X)**, **IMU (MPU6050)** sensors with **Raspberry Pi**.
- Designed a unique prototype of the scanner in **Solidworks** and converted to URDF for simulating in Gazebo using **ROS** framework
- Calibrated sensors using least squares for bias removal and collected depth information from a programmed rotating platform
- Enforced Complimentary filter algorithm to fuse data of **accelerometer** and **gyroscope** to achieve accuracy and denoise data.
- Used **SLAM** techniques for estimation of position of the scanner and accounted for **dead-reckoning** while determining position