Sanjuksha Nirgude

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INTRODUCTION

Self-driven and ambitious Robotics Software Engineer working in an inter disciplinary team on real-world robotics applications. Writing complex algorithms and production level code in a collaborative and fast-paced environment everyday. Looking forward to working in a role and environment which brings out the best in me.

TECHNICAL SKILLS

Languages: C++, Python, MATLAB, HTML
Softwares: ROS, Linux, Git, Gazebo, Rviz, Latex, Doxygen, SolidWorks, MoveIt
Libraries & packages: PyTorch, OpenCV, TensorFlow, Keras, GTest
Courses & Concepts: Localization, Path Planning, Perception, Algorithms, Mobile Robotics, Robot Controls & Dynamics, Swarm Intelligence, AI, OOP, SLAM, CARLA, Behavior Trees, Autonomous Driving, Obstacle Avoidance, Navigation, Data Structures, RabbitMQ, Sensor Fusion, State Machines, Triaging, Debugging, PubSub.

EDUCATION

Worcester Polytechnic Institute (WPI) — Worcester, MA
Master of Science in Robotics Engineering — GPA: 4.0/4.0 — May 2019

University of Pune (UoP) — Pune, India
Bachelor of Mechanical Engineering — Percentage: 71/100 — June 2016

WORK EXPERIENCE

Open Robotics *Software Engineer-Robotics* — Aug 2022 – Present
- Verified and implemented the build instructions & tutorials for ROS/Gazebo(garden release), while understanding the architecture of Gazebo packages.
- Implemented bug fixes in Gazebo rendering packages regarding lens flare from wide-angle camera, as a part of the NASA VIPER team.
- Reviewed and tested code from individual open-source contributors for gazebosim.

Symbotic LLC *Advanced Controls Engineer* — Aug 2019 – Aug 2022
- Worked on automated mobile robots for warehouse automation with case under pick ability.
- Analyzed sensor data to create tools for diagnosing real-time issues with the AMR.
- Calculated, applied and tested improvements to several existing features considering future expansion of the robot's capabilities.
- Improved scalability of code while handling robot peculiarities in simulation of over 100 robots at once.
- Enhanced the performance of the robot by tracking down the reason behind the current limitations of the robot in certain scenarios and came up with a solution for the same.
- Debugged and solved a localization problem while working with multiple teams to verify results.
- Development and deployment of pick/place algorithms based on conventional and AI based control strategies.
- Worked in a test driven environment while collaborating with the test team to validate algorithms.
- Implemented features for improving pick/place ability by programming, unit testing, debugging and troubleshooting.

Waypoint Robotics Inc *Robotics Intern* — Aug, 2018 – Dec, 2018
- Assembled an AMR and developed its behavior using LIDAR data & digital IO to provide feedback to bystanders about the robot's intention.
- Expanded the robot's programming environment functionality by sensor fusion, motion planning and contributed new elements to the product GUI.
- Integrated detection DL algorithm on live video input from a mobile robot camera and developed a motion algorithm for the robot depending on this input.

Cere Labs Pvt Ltd *Machine Learning Intern* — March, 2016 – June, 2016
- Demonstrated application of Reinforcement Learning (RL) method, specifically the Q-learning algorithm by making a crawling robot move towards a wall by itself using ultrasonic sensor data and Raspberry Pi controller.
- Documented the entire process of building the robot and implementation of reinforcement learning algorithm by publishing multiple posts on the company blog.

PROJECTS (URL)

Atlas's Escape *Humanoid Robotics* Jan – May, 2019

- Developed Atlas's behavior by combining perception, locomotion and manipulation to detect a door and walk towards it in Gazebo using ROS and C++.
- Used BGR images from the camera and LiDAR point cloud data to sense the door.

Automated Cinematography using an UAV *Motion Planning* Aug – Dec, 2018

- Used a hector quadrotor to do a 360 degree view of a human subject in simulation for cinematography purposes.
- Implemented a local RRT* path planner to avoid obstacles on a quadrotor using ROS and captured images of the Gazebo environment using RViz.

Facial Key-point Detection *Computer Vision Nanodegree (Udacity)* May – Aug, 2018

- Created CNN to detect 68 facial key points using image processing and deep learning.
- Used Haar Cascade face detector for faces and PyTorch to develop a 3- layered CNN for feature detection.

Fuzzy Logic Controller for Indoor Navigation of Mobile Robots *Robot Control* Jan – May, 2018

- Designed and implemented fuzzy logic controller (TFLC & OAFLC) on TurtleBot2 using Kinect generated stereo-vision, point-cloud & laser-scan data from RViz.
- The Takagi-Sugeno-Kang fuzzy inference technique and the Centroid defuzzification methods were used to implement the controller.

Collective transport of Concave objects using a robot swarm *Swarm Intelligence* Jan – May, 2018

- Implemented occlusion based collective transport strategy for transport of concave objects in C++ by converting them to convex objects by filling the concavity by swarm of Khepera IV robots in ARGoS.
- The robots have no prior knowledge of the object to be moved and they do not communicate with each other explicitly.

Detection, Recognition, Pose Estimation of Objects *Deep Learning for Perception* Aug–Dec, 2017

- Achieved 98% accuracy in object recognition and an average of 85% in angle estimation on TableTop dataset.
- The images in the dataset were captured from 8 different angles and 2 different heights.

COMPETITION

Badminton Playing Robot *ABU RoboCon 2015* March, 2014 –March, 2015

- Designed a mechatronic solution for two badminton playing robots to detect and localize shuttle using pure visual information.
- Worked in a team of 40 and score 5th position in the national level competition.

Hybrid and Eco Robot *ABU RoboCon 2016* March, 2015 –March, 2016

- Designed an underactuated eco robot which is being driven by an autonomous Hybrid robot using wireless charging through a predefined path.
- The eco robot uses line following capability to traverse through the path.
- The Hybrid robot uses a 3-jaw chuck mechanism to climb a pole.

VOLUNTEER EXPERIENCE

Co-Organizer Women in Robotics Boston Chapter March, 2020 – July, 2022

- Women in Robotics is a global community to which I contribute as an organizer of a local chapter.
- Organizing events ranging from interviews of inspiring women working in the field to technical events digging to the core of various robotics concepts.

Robotics Outreach Program March, 2015 – Dec, 2016

- Organized workshops in over 40 middle schools in India to share the knowledge of robotics in order to promote robotics engineering as a career prospect for students.

ADDITIONAL PROJECTS (Team Size, Framework, Languages)

Face Recognition using neural networks *(3,Keras, Python)* Aug, 2017 – Dec, 2017
Baxter Kinematics and Dynamics Library *(5, Python)* Jan, 2018 – March, 2018
Teleoperation of a robotic arm using IMU *(5,Arduino, Python)* Aug, 2017 – Dec, 2017
Robot Learning From Demonstration via MoCap *(5,Trinia, Python)* Jan, 2018 – March,2018
Image Captioning using nueral networks (Udacity) *(1, Python)* June, 2018 – Aug,2018
Landmark detection and Robot Tracking (Udacity) *(1, Python)* June, 2018 – Aug,2018