Kavit Nilesh Shah

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EDUCATION

Worcester Polytechnic Institute, *Worcester, MA, USA*
Master of Science in Robotics Engineering   *GPA: 4.00 / 4.00*   *Expected 2021*
Relevant Courses: Motion Planning, Controls, Navigation, Computer Vision

Sardar Patel College of Engineering, *Mumbai, India*
Bachelors of Technology in Mechanical Engineering   *GPA: 8.82 / 10.00*   *May 2019*
Relevant Courses: Industrial Robotics, Mechatronics, Computer Graphics

WORK EXPERIENCE

Worcester Polytechnic Institute, *Worcester, MA*
Student Researcher - Motion Planning - Human Robot Interaction   *August. 2020 – Present.*
- Successfully accomplished a robust dynamic motion planner with active collision avoidance using velocity-based planning algorithm for autonomous mobile robot and AV navigation using C++11. [Github-Link]
- Achieved this by mapping and localization, human detection and motion estimation using LiDAR sensing for perception with probabilistic filtering in ROS.

SKILLS

- **Programming Language**   C++ (high proficiency), Python (fluent)
- **Software and Tools**   ROS, Git, OpenCV, MATLAB, Gazebo, OpenAI Gym, CUDA, Pytorch, AutoCAD.

ACADEMIC PROJECTS

Combining Motion Planning methods for autonomous mobile robot navigation
- Lead a team to develop a real-time robot motion planning algorithm for autonomous mobility and locomotion of mobile robots. [Github-Link]
- Developed a scalable algorithm design with well formulated APIs for continuous integration of production quality code using data structures & object-oriented programming in C++14
- Tested the system components on robot hardware in ROS & simulated entire system in physics modeling software Gazebo

Global route planner for car on-road navigation
- Programmed a path planning module using A* based on the OpenStreetMap framework and IO2D visualization library in C++11 .[Link]

MPC Controller for Autonomous Vehicles
- Implemented MPC based controller for combined automotive steering and velocity control by empoying bicycle kinematics.
- Tested module in MATLAB and currently working on module development in C++ to be used in ADAS for AV stack.
- Platforms used: MATLAB, C++, CARLA

Autonomous Robot Navigation with Machine Learning
- Achieved dynamic motion planning for autonomous mobile robots using reinforcement learning with PyTorch and Cuda
- Successfully trained the robot using Deep Q-Learning and DDPG framework with 70% and 90% respective success rates.

Implementing and Visualizing motion planning algorithms from scratch
- Implemented algorithms in C++ from scratch - (A*, Dijkstra, BFS and DFS) [Github-Link]

Traffic Signal Detection for Autonomous Driving Systems
- Achieved real-time, robust traffic signal detection in different illumination conditions with 95% accuracy using Deep Learning framework YOLOv3 in Python. [Github-Link]
- Employed computer vision techniques namely SIFT, SURF, Hough Transform, Top Hat Filter,etc based on linear algebra.

ABU Robocon Competition
- Lead a team of 8 students from varying engineering discipline for developing, troubleshooting and testing hardware along with the software to control the hardware system.
- Developed control system for actuators while co-designing system infrastructure with wide use of sensors.
- Achieved an All-India Rank of 13 out of 115 participating teams, while successfully managing multiple deadlines.

Extra-curricular Projects

- Linux System Monitor : As a part of C++ software development Nanodegree, built an app-performance monitoring application for Linux operating systems using C++ 14. GitHub-Link

- Virtual Reality in NDT : Developed and demonstrated a novel data visualization framework for crack modeling of 3D data using AR and image processing with OpenCV