NAGARJUN VINUKONDA

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OBJECTIVE:

Seeking for Full-time/Co-Op Spring 2021 Motion Planning and Controls Software Development application to Robotics.

EDUCATION:

- **Worcester Polytechnic Institute** (WPI), Worcester, MA: MS in **Robotics Engineering**   GPA 4.0/4.0   May 2021**(expected)**
- **Vellore Institute of Technology** (VIT), Vellore, India: BS in **Mechanical Engineering** CGPA 8.86/10   May 2019

SKILLS:

- **Programming Skills:** C++, Python, MATLAB, HTML5
- **Software Tools:**   ROS, Simulink, OpenCV, Gazebo, CARLA, TensorFlow, SolidWorks, Ansys, Linux.
- **Courses**: Motion Planning, Robot Controls, Advanced Robot Navigation, Deep Learning, Computer Vision, Robot Dynamics.

EXPERIENCE:

Graduate Student Researcher, WPI, Worcester, USA | **Link** | **Tools:** ROS, Gazebo, C++, Kalman filter, AMCL   Sep '20 - present
- Working at Human-Inspired Robotics (HIRo) Lab with Prof. Zhi Li on creating **Dynamic Collision Avoidance system** using Velocity Obstacles method ORCA (Optimal Reciprocal Collision Avoidance) algorithm.
- Implementing state of the art method ORCA for **Social Aware Navigation** of freight robot in hospital environment.
- Modelled & Integrated human and obstacle tracking modules for Multi-Human and robot Collision avoidance detection.
- Integrated RVO2 libraries into ROS environment and tunning & testing ORCA hyperparameters for robust navigation.

Research Assistant, University of Plymouth, UK | **Link** | **Tools:** MATLAB, Simulink, C++, Openvibe   Jan '19 – June '19
- Worked at Interdisciplinary Centre for Computer Music Research with Dr Eduardo Miranda.
- The research focuses on **Brain Computer Interface with Prosthetic Hand** using SSVEP(Steady State Visually Evoked Potentials)
- Studied BCI methods and developed a real-time integrated system that connects brain waves to prosthetic arm enabling severe motor impairment patients to play musical instruments using prosthesis.

SELECTED PROJECT WORK:

Behaviour planning for Autonomous driving | Link   Sep '20 – Dec'20
Tools: MATLAB, Simulink, driving scenario app, CARLA
- Implemented vehicle behaviour prediction engine and Integrating Sensor fusion modules with MPC controller to detect MIOs.
- Determined cost functions to create constraints for decision making module in Lane changing task with MIOs.
- Evaluated Motion Metrics for collision detection in Simulink using stateflow diagram and triggering decision to change lane.

TurtleBot Path Tracking using PID Controller | Link   June'20 – Aug'20
Tools: ROS, Gazebo, C++, Turtlebot 2.0
- Hardware and software implementation of Turtlebot path tracking system using PID controller.
- Experimented on single and multi-goal points determining steering control at each instant of time while navigation.

Indoor 3D mapping using RGBD camera | Link   Jan '20 –May '20
Tools: ROS, Python, Gazebo, Dijkstra Navigation stack
- Generating 2D occupancy grids and 3D point cloud data while navigating mobile robot in gazebo using RTAB mapping.

Route Planning on Open Street Map   May'20-Aug'20
Tools: Python, C++, OSM
- Performed comparative study with implementation of BFS, DFS, A Star, Dijkstra and RRT Star planning algorithms.
- Implemented A* search algorithm on Open Street Map using OOP and STL.

Motion Planning for Self-Driving cars | **Link**   Dec '20 –Jan '21
Tools: Python, CARLA Simulator, Linux
- Implemented hierarchical motion planner to avoid static obstacles, following a lead vehicle and safely navigate an intersection.
- Calculated time to collision(static), velocity profiles, designed state machine transitions between lane following, deceleration.
- Generated occupancy grid using lidar measurements, iteratively constructed a probabilistic occupancy grid from log odds updates.

Shared Autonomy in Motion Mapping Teleoperation | Link   Feb '20 –May '20
Tools: ROS, Python, OpenCV, Gazebo, Baxter robot
- Implemented Autonomous, Semi-Autonomous functions for moving 7 DOF Baxter robot arms in ROS.
- Created Meshed, Cone and Take Control Methods for Semi-autonomous function reducing human fatigue while teleoperation.
- Programmed Aruco Marker detector for identifying cups in gazebo environment using OpenCV bridge.

Dynamic Step planning for Exoskeleton Stair Climbing | Link   Sep '19 – Dec '19
Tools: ROS, PCL, C++, Python, Solid Works, Vicon Nexus
- Investigated DMPs and assisted to train the DMPs generating trajectories for determined joint angles.
- Implemented path planning approach algorithm for stair climbing and generated step trajectories.
- Worked on LiDAR data acquisition, line segmentation of point cloud data using RANSAC and visualization of staircase.

PUBLICATION:

- Review on Contemporary Trends in Radiator Design and Testing of Automobile Radiators - International Journal of Mechanical Engineering & Technology, ISSN Online: 0976 – 6359, Vol.9, Issue 12, December 2018.