NAGARJUN VINUKONDA

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EDUCATION:

Worcester Polytechnic Institute (WPI), Worcester, MA: MS in **Robotics Engineering** GPA 4.0/4.0   May 2021
Vellore Institute of Technology (VIT), Vellore, India: BS in **Mechanical Engineering** GPA 3.85/4.0   May 2019

SKILLS:

- **Programming Skills:**   C++, Python, MATLAB, HTML5
- **Software Tools:**   ROS, Simulink, OpenCV, CARLA, SolidWorks, PyTorch, Gazebo, Linux, Docker, GitHub.
- **Courses**: Motion Planning, Robot Dynamics & Controls, SLAM, Machine Learning, Deep Learning, Computer Vision.

WORK EXPERIENCE:

Perception Engineer, Robotic Research, MD, USA   Aug'22 – present
Tools: ROS, C++, OpenCV Python, Ceres Solver, gstreamer, **Jetson Xavier, Jetson Orin, Leopard**
- Developed Intrinsic Camera Calibration GUI and performed Camera quality test for the best camera properties.
- Work on trailer angle detection and latency test for gstreamer pipeline.

ADAS Simulation Engineer, Robotic Research, MD, USA   Feb'22 – July'22
Tools: ROS, C++, CarMaker, Opendrive, RoadMapEditor, Open streetmap
- Developed Simulation Architecture, maps, converting RR proprietary simulation files format to Opensource format.
- Created ROS interface for traffic sign, object and collision sensors in simulation environment.

Motion Planning Engineer, Thordrive, OH, USA   Sep'21 – Feb'22
Tools: ROS, C++, Eigen Lib, Dijkstra, KD-Tree, Rviz
- Developed Route Planner stack for Autonomous vehicle, its simulations on Rviz and Performing tests on real vehicle.
- Implemented Adaptive destination selection for reference planning and develop planning stack diagnosis system.
- Tuning Lookahead distance for pure pursuit and Stanley Controller and test on Thordrive vehicle.

Robotics Navigation Intern, Midea Group Emerging Technologies, CA, USA   July'21 – Sep'21
Tools: Python, Raspberry pi, Pycoral TPU, Linux, Tensorflow
- Developing robot simulations, perception system with NN & train in embedded systems for mobile robotics application.
- Design, implement navigation algorithms, setup experimental process & develop test scripts for robotics SLAM system.

Research Assistant, HIRo Lab, WPI, USA | **Link** | **Social Aware Navigation**   Sep'20 – May'21
Tools: ROS, Gazebo, C++, Kalman filter, AMCL, Eigen, OpenCV
- Created Dynamic Collision Avoidance algorithm using state of the art Velocity Obstacles method ORCA algorithm.
- Achieved through human motion estimation, mapping & localization using Lidar and probabilistic filtering in ROS.
- Designed well formulated APIs for continuous Integration of production quality code using data structure in C++14.
- Developed human-obstacle tracker. Incorporated Proxemics & Social Constraints and conducting pilot study.

PROJECT WORK:

Behaviour Planning for Autonomous driving | Link | Tools: MATLAB, Simulink, CARLA, C++
- Implemented vehicle Behaviour Prediction engine with integrating **Sensor Fusion** data, creating Waypoint trajectories.
- Imposed cost functions and tuned linear MPC controller for rear end drive bicycle kinematic model.
- Evaluated Motion Metrics for collision detection using Stateflow diagram and triggered decision to change lane.

Model Predictive Controller for Autonomous Vehicles | Tools: C++, CARLA
- Employing MPC on autonomous car to control lateral & longitudinal vehicle dynamics for given track & goal location.

Combining Reciprocal Collision Avoidance with Artificial Potentials | Tools: ROS, Python, RVO
- Implementing state of the art method combining Artificial potentials with RVO for obstacle avoidance.
- Created Set point Controller for tracking desired lateral waypoints using RCA to avoid static obstacles.

TurtleBot Navigation using DQN | Link | Tools: ROS, Python, PyTorch, CUDA
- Implemented DQN framework to navigate turtlebot avoiding dynamic obstacles to reach goal with 75% success rate.

Linux-based system Monitor| Link | Tools: C++14, Linux
- Implemented a system monitor to track the CPU utilization, RAM usage, activity time and base-command using C++14.

TurtleBot Path Tracking using PID Controller | Link | Tools: ROS, C++, Turtlebot 2.0
- Hardware & Software implementation of PID control for single & multi-goal points deriving Steering control performance

Route Planning on Open Street Map | Link | Tools: Python, C++14, OSM
- Performed comparative study with implementation of BFS, DFS, A*, Dijkstra and RRT* planning algorithms.
- Implemented A* on Open Street Map data and IO2D rendering library to display route map using OOP and STL.

LiDAR performance for Exoskeleton | Link | Tools: ROS, PCL, C++, SickTim571 LiDAR
- Acquired LiDAR point cloud data and performed line segmentation using RANSAC to visualize staircase.