

# Rohan Khaire

+13128749299   rohannkhaire@gmail.com   <https://www.linkedin.com/in/rohan-khaire/>   Tempe, AZ

## EDUCATION

### MS in Robotics and Autonomous Systems

Arizona State University, [GPA 3.71/4.0](#)

08/2022 - Present

### B.Tech in Mechanical Engineering

Savitribai Phule Pune University, [GPA 8.0/10.0](#)

05/2015 - 06/2019

## TECHNICAL SKILLS

**Programming Languages & Frameworks:** C++, Python, Matlab & Simulink, ROS, ROS2, Cmake, Git, Docker, Linux.

**Libraries, Simulations:** TensorFlow-Lite, TensorFlow-keras, PyTorch, OpenCV, CARLA, LGSVL, Gazebo, Gym.

**Optimization Software:** Acados, CasAdi, Fmincon, OSQP, CVXPY, CVXOPT, YALMIP

## PROFESSIONAL EXPERIENCE

### Implementing real-time Non-linear Model Predictive Control for path tracking of an AGV

[Arizona State University \(Thesis\)](#)

08/2023 - Present

- Identified and tested C-code based Non-Linear Model Predictive Control optimization tools for real-time performance in Matlab/Simulink.
- Designed a trajectory tracking NMPC scheme for lateral control of an Autonomous Vehicle.
- Explored dSPACE's MicroAutoBox II capabilities and bridging for Matlab/Simulink interface.
- Performed Software-in-the-loop tests of the NMPC algorithm with CarSim simulator.

### Master's Opportunity for Research in Engineering

[Arizona State University](#)

05/2023 - 07/2023

- Investigated, Analyzed, and Assimilated research in tackling non-linear Model Predictive Control technique.
- Improved the computation time by removing the terminal constraints by 30% for Non-linear MPC for cart-pole system.
- Performed and compared simulations on several architectures of Non-linear MPC in Matlab and Simulink.

### Robotics Software Engineer

[Conigital Group](#)

03/2021 - 07/2022

- Implemented an artificial potential field like cost function for hybrid A\* algorithm for reliably maneuvering around static obstacles.
- Programmed a Linear Model Predictive Controller with error dynamics for lateral control of an AGV rendering up to 2 cm tracking accuracy.
- Crafted a geometric algorithm for safe maneuver of an autonomous vehicle on road intersections around traffic.
- Developed a localization module based on iterative closest point and lane detection for regions with sparse point clouds.
- Created a script for Continuous integration of software stack for updating the docker image.

## PROJECT EXPERIENCE

### Mission and Motion planning modules for Autonomous vehicle.

12/2023 - Present

- Successfully programmed ROS2 nodes for bridging CARLA and Autoware Universe's software stack.
- Designed a Lanelet2 map based mission planner in ROS2 for global path planning.
- Coded hybrid A-star algorithm for motion planning on a discretized grid space.

### Digital Twin and Augmented Reality for Autonomous Vehicles

11/2023 - Present

- Generated Pointcloud map of the Arizona University campus using recorded ROS2 bags via LIO-SAM algorithm.
- Developed OpenDrive and Lanelet2 map of the ASU campus using roadrunner and tier4/assure mapping tools.
- Implemented the injection of virtual objects from CARLA into Autoware.Universe's software stack.
- Designed and tuned a PID Ackermann controller for controlling the vehicle in CARLA.

### Energy optimization of Two-motor Battery Electric Vehicle

10/2023 - Present

- Designed a Non-Linear Model Predictive Control(NMPC) scheme for optimizing State-of-Charge(SOC) of the battery.
- Proposed a minimum motor efficiency exponential cost function for optimizing battery SOC.
- Coded the NMPC algorithm using fmincon non-linear optimization tool using SQP algorithm.
- Implemented Simulink simulation using Matlab function block with variable step size sampling.

### Driver Monitoring System for Embedded Devices

10/2023 - 12/2023

- Trained a Convolutional Neural Network(CNN) to achieve 82% accuracy on custom and mobilenetv1 architecture.
- Cross-compiled OpenCV for armhf architecture for DNN inference module on Beaglebone Black.
- Performed OpenCV's DNN inferences on TensorFlow's saved model by freezing the Neural Network's graph.
- Successfully live-streamed camera feed(from bytes to images) from Arduino Nano's OV767x camera module.