

Seeking opportunities in systems design and engineering of autonomous vehicles and automated driving

Summary

- **Education:** Ph.D, Mechanical Engineering (with concentration in Applied Math), Clarkson University
- **Experience:** 3 years in autonomous driving and 10 years in automotive systems engineering and testing
- Good understanding of various domains of autonomous driving: neural nets (CNN), computer vision, sensor fusion, localization, planning, controls, and the autonomous vehicle software stack
- Experience in systems level verification, validation, and testing of battery electric and conventional vehicles
- Proficient in requirements gathering, analysis, and harmonization using agile workflow frameworks, ensuring efficient and effective project management
- Well-versed in scripting languages such as Python, as well as SQL and other analytical tools, enabling the analysis of large datasets for both quantitative and qualitative insights

Industry Experience

b14.ai

Jul 2023 - Current

A new and novel deterministic global optimization method

- Invented and strategized a new deterministic global optimization technique to solve complex real-world optimization problems, ensuring optimal solutions in challenging and high-dimensional parameter spaces.
- Leveraged the new algorithms to efficiently navigate multimodal landscapes and converge to global optima with significantly improved efficiency compared to traditional methods.
- Demonstrated expertise in implementing and adapting these new novel techniques, showcasing a commitment to pushing the boundaries of optimization research and practical application.

Arriver Software Inc., Automated Driving Team

Dec 2020 - Jun 2023

Senior Engineer: Systems and Requirements

- Developed component-level requirements (both software and hardware), including analyzing requirements, creating test cases, and devising verification plans
- Documented the system architecture in a clear and unambiguous manner, ensuring that teams meet customer expectations
- Gathered, evaluated, and prioritized requirements from various stakeholders to define product roadmaps
- Defined projects and tasks based on identified requirements, and efficiently managed them through an agile workflow process, focusing on key performance indicators (KPIs) and performance metrics
- Supported creation of detailed interface specifications, functional architectures, and software descriptions
- Perform system validation testing, to ensure system functionality, compliance, and performance. Testing activities consisted of planning, triage, documentation, and reporting
- Exposure to different test environments: simulation, closed closure, on-road and test modalities: SIL, HIL, MIL, VIL

- Developed software modules for data logging, analysis, and visualization to support system evaluation and debugging
- Utilized various data analytical tools for quantitative and qualitative analysis, generating valuable product insights
- Collaborated with internal and external stakeholders to identify potential improvements, features, and new product opportunities
- Stayed up-to-date with the latest advancements in computer vision techniques, deep learning, and machine learning models

Sabbatical

Jan 2019 - Nov 2020

Medical sabbatical leave.

Lucid Motors, CA

Aug 2015 - Dec 2018

Senior Engineer, Systems

Lucid Motors created a new electric vehicle platform, by building a new vehicle from the ground up

- Joined Lucid Motors when it was a start-up, approximately 150+ employees when I joined. Gained exposure to 3+ years of fast paced startup environment
- Planned and managed project specifications, resources, objectives, and goals for systems modeling, testing, data collection, and validation of control and thermal hardware of electric vehicles
- Strategized and established functional requirements, cost and timing targets, component: sizing, specifications, and vendor selection
- Coordinated with other teams and stake holders to meet requirements and resolve conflicts at system and packaging level, while achieving functional, cost, and time targets
- Planned, coordinated, and executed vehicle testing, including performance, durability, safety, and compliance tests
- Developed test plans, protocols, and procedures for various vehicle systems, ensuring adherence to industry standards and regulatory requirements
- Conducted on-road and laboratory testing, analyzed test data, and provided recommendations for design improvements
- Collaborated with engineering teams to troubleshoot issues, root-cause analysis, validate system performance, and verify compliance with specifications
- Coordinated with external test facilities, suppliers, and cross-functional teams to ensure smooth execution of test programs
- Developed prototypes, test-bucks, testing strategies, data collection, and test plans to support design and validation
- Utilized python to build data pipelines, data preprocessing, data modeling, and analytical predictive tools

Scripting, Simulation, and Packages

- **Languages:** Python, SQL, MATLAB
- **Systems Modeling:** MATLAB, Simulink, CARLA, ADVISOR (Advanced Vehicle Simulator)
- **Packages:** Anaconda, TensorFlow and Keras, OpenCV, Robot Operating System (ROS)
- Tensorflow Object Detection API and Object Detection Model Zoo
- **Agile Workflows and Systems Engineering:** Confluence, Jira, codeBeamer, SystemWeaver
- **Other Tools:** Docker, OxTS NAVsuite, LIN/CAN Protocols using LabVIEW or Vector

Self-Driving Car Projects @ Udacity

2019

Part-1: Computer Vision, Deep Learning, and Sensor Fusion

Applied Computer Vision and Deep Learning techniques to autonomous driving problems. Train vehicle to detect lane lines, predict steering angle, etc., all based on just camera data. Followed by Sensor Fusion: to use an array of sensor data to perceive the environment around the vehicle.

- **Project 1:** Use Python and OpenCV to find lane lines in images and video stream
- **Project 2:** Write a software pipeline to identify the lane boundaries in a video
- **Project 3:** Using Deep Neural Networks and Convolutional Neural Networks classify traffic signs. Train and validate a model so it can classify traffic sign images using the German Traffic Sign Dataset
- **Project 4:** Using Deep Neural Networks and Convolutional Neural Networks clone driving behavior. Train, validate and test a model using Keras. Model outputs a steering angle to drive the car autonomously around the track
- **Project 5:** Implemented Extended Kalman Filter in C++. Used Kalman filter in conjunction with lidar and radar measurements to track bicycle's position and velocity

Part-2: Localization, Path Planning, Control, and System Integration

Expand on sensor knowledge to localize and control the vehicle. Evaluate sensor data from camera, radar, lidar, and GPS, and use these in closed-loop controllers that actuate the vehicle. Followed by localization, path planning, control, and system integration

- **Project 1:** Kidnapped Vehicle (Sparse Localization): Localize relative to a sparse set of landmarks using particle filters. Implemented a 2 dimensional particle filter in C++
- **Project 2:** Highway Driving (Path Planning): Developed a path planner in c++ to safely navigate around a virtual 3 lane highway with other traffic that is driving at 50 MPH speed limit
- **Project 3:** PID Controller: Implemented a PID controller in C++ to maneuver the car around a test track. The car and race track simulator provides cross-track-error and velocity to compute steering angle correction. Corrected steering angle maintains the car stay inside of the track lane
- **Project 4:** Programming a Real Self-Driving Car: A system integration project to drive Carla, the Udacity self-driving car, around a test track. For this project, Robot Operating System (ROS) was utilized to implement core functionality of the autonomous vehicle system: traffic light detection, control, and waypoint following