

SAMEER SINGH

+1 (313) 266-1679 | samsin@umich.edu | www.linkedin.com/in/sameersingh94

Experienced automotive engineer with 3 years of combined experience in Automotive Product development, manufacturing, testing & calibration, Li-ion Battery Management Systems, CAN, MIL/HIL Testing, Model based development.

WORK EXPERIENCE

Powertrain Engineer, FSAE- Electric UM-Dearborn, (Aug'18- Jun'20)

- Performed Model- In- Loop test on EV powertrain and calibrated 80 KW AC motor with RMS P100D motor controller.
- Implemented CAN protocol using Teensy 4.0 microcontroller, calibrated speed encoders & infrared distance sensor.
- Designed and manufactured powertrain test-bench, 3-D mounts and performed FMEA on battery pack.

Research Assistant UNIV. OF MICHIGAN-DEARBORN, (Jan'20- May'20)

- Conducted energy audit and supported operations team in identifying energy efficiency projects for UM-Dearborn.
- Reduced electricity consumption by 8% and natural gas consumption by 10% over a period of 5 years by saving cost by 33% with an average payback period of 4 years by optimizing HVAC compressor, lightening and pumps.

GIS Design Engineer, CYIENT LIMITED, (Aug'16- Jul'18)

- Designed GPS maps for navigation devices with features as road map, and man-made infrastructure data sets.
- Advanced usage of web mapping APIs like Google Maps, Bing Maps, OpenStreetMap etc.
- Coupled LIDAR and Camera sensor data with vertical and oblique imagery allowing to be cataloged in 2-D maps.

Manufacturing Intern, BHARAT HEAVY ELECTRONICS LTD., (Jun'15-Aug'15)

- Cycle time reduction - Reducing the cycle time of bottle neck process in assembly line by 10% by making changes to the workstation to improve ergonomics and efficiency.
- PFMEA of ceralin Assembly line(individual 7 stations)- Process mapping, documentation and analyzed the possible failure modes and their after effects on the further assembly process and improved the mortar preparation time and made changes in work station which further the improved the assembly efficiency by 3%

Powertrain Intern, IMMORTALS PVT. LTD., (Jan'15-Jun'15)

- Designed catalytic convertor & Performed FEA, thermal analysis ,Emission test on Dyno test bench of gasoline engine.
- Optimized performance of Catalytic convertor by reducing the heat-up time from 496 to 343 seconds reducing 7% of CO and HC emission.

SKILLS

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|----------------------|-----------------------------------|-----------------------------|
| • Embedded C, Python | • Object detection, Camera, LIDAR | • FMVSS, NCAP test protocol |
| • MATLAB/Simulink, | • Root-cause analysis, 8D | • FMEA, DVP&R, V-model |
| • MIL, HIL, MBD | • CAN, I2C, SPI, UART, RS232 | • COMSOL, Autodesk Inventor |

PROJECTS

Product Development for Ford Expedition Full Size SUV MY 2024

- Developed Benchmarking and Pugh diagram to compare Full Size SUV attributes with competitor's vehicle.
- Conducted interface and QFD analyses to relate customer voice with functional specification of vehicle.
- Developed a Business Plan, V-model timing plan and gateways, risks and challenges for the proposed vehicle.
- Decided trade-offs, developed DVP&R and technology plan to be considered in designing sub-system of vehicle.

Algorithm for Battery Management Systems- SOC Estimation

- Studied Li-ion battery chemistry and requirements of Battery Management System - current and voltage sensing, ground fault isolation, battery diagnostics and performance management.
- Identified both static and dynamic parameter values of an equivalent -circuit model.
- Performed laboratory tests to determine the open circuit voltage & its variation with battery SOC & temperature.
- Implemented Kalman Filter, Extended Kalman Filter and Unscented Kalman Filter as state estimator for SOC estimation.

Modelling and Simulation for Hybrid Electric Vehicle

- Developed mathematical model of HEV powertrain, battery, motor and engine in Matlab.
- Computed size of each main components in Series HEV with vehicle data and performance requirement and DOH.
- Estimated fuel efficiency, SOC, and CO2 emission by implementing thermostat control algorithm & regenerative braking on different EPA standards for city, hwy, us06, and wltc in Matlab.

Modelling and Simulation of Li-ion Thevenin Battery Management System

- Developed Li-ion based BMS Simulink model, performed MIL & benchmarking study of cell based on electrochemistry .
- Validated BMS model & formulated algorithm to predict cell behavior (discharge rate, SOC) under different test cases.
- Provide novel solutions of battery management control system to optimize dischargeable capacity, cycle life.

Model based development and Simulation of Electric Vehicle Powertrain

- Modelled EV Powertrain to determine Motor Torque and Power according to vehicle performance requirement.
- Performed motor map sizing and battery sizing required for the given range using MATLAB script.
- Optimized the EV range and cost by using Pareto charts for standardized EPA test cycles-City,Highway,US06,wltc

Simulation and Gear Shift Analysis of a 6-Speed FWD Automatic Transmission

- Performed model based development and MIL testing for 6-speed AT powertrain model in MATLAB/Simulink.
- Simulated the launch by developed general and state variable control algorithm equations for torque and inertia phase for Transmission control unit.
- Calibrated clutch torque profile to reduce the Torque hole and overshoot for smoother shift in 0.67 seconds.

Programmed TI TIVA microcontroller for Analog & Digital Sensors using Embedded C & ARM language

- Developed code to initialize buzzer tone for defined frequencies in ARM assembly language & performed debugging
- Programmed TIVA microcontroller to read ultrasonic sensor data using UART communication protocol in C language.
- Programmed microcontroller to read analog infrared sensor and converted raw voltage data into digital signal.

Modelling and Study of Lead-Acid Battery Discharge and Self-Discharge

- Developed Lead-Acid Battery model using COMSOL - Multiphysics and simulated at three different discharge rate high 1200A, low (3A), and long term self-discharge behavior (0A).
- Studied Electrode SOC, Electrolyte salt concentration, Discharge cell voltage profile at different discharge rates.

Self-Driving Projects(Python)

Longitudinal and Lateral Control for Self-Driving Cars

- Developed PID controller for longitudinal and Pure Pursuit controller for lateral controls to navigate a self-driving car around a racetrack waypoint in the CARLA simulation environment.
- Constructed control strategies in Python for longitudinal and lateral control of the vehicle model.

Visual Odometry (VO) for Localization in Autonomous Driving

- Performed object detection, extraction to self-driving camera images & distinguished feature detectors & descriptors.
- Matched image feature using Brute-force matching algorithm with SIFT Descriptors and Ratio test.
- Estimated camera motion between subsequent photographs & improved VO performance through outlier rejection.

State Estimation and Localization for Level 1 & 2 Autonomous Cars

- Developed motion state & predicted state using IMU data in Python & verified by Carla Simulator ground truth data.
- Estimated vehicle state by predicted state & sensor fusion technique from GNSS & LIDAR data by applying ES-Kalman Filter algorithm.

EDUCATION

UNIVERSITY OF MICHIGAN-DEARBORN, MS Automotive Systems Engineering,
UTTAR PRADESH TECHNICAL UNIVERSITY, B.Tech, Mechanical Engineering,

(April,2020)
(May,2016)