

SAUMIL JAIN

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EDUCATION

Clemson University - Greenville, SC

May 2024

Master of Science - *Automotive Engineering*

GPA: 3.95/4

Courses: Automotive Systems Integration, Advanced and Electrified Powertrains, Automotive Electronics Integration, Advanced Estimation, Electric & Hybrid Powertrains, Automotive Control Systems, Robust Predictive Control

Savitribai Phule Pune University - Pune, India

April 2020

Bachelor of Engineering – *Mechanical, First class with distinction*

GPA: 8.73/10

EXPERIENCE

Lead Powertrain Engineer | Deep Orange 15, Clemson University

Jan 2023 - Present

- Developing an autonomous series hybrid off-road rescue vehicle for King of the Hammers.
- Modeling powertrain in Simulink to help select sub-system components that meet vehicle requirements and minimize lap time.
- Building control software for the integration of 6 YASA MGUs, 6 Cascadia CM200 Inverters, 42kWh battery along with a Cummins R2.8 engine using a rapid control prototyping module and MATLAB C code generation.
- Building a predictive algorithm to minimize engine on/off switching when at high battery SoC thresholds.
- Built a CAN network and made use of J1939 and OEM dbc structures to establish communication among 15 nodes.
- Creating a rule-based supervisory controller to maintain optimal State of Charge (SoC) throughout the race by regulating the diesel engine's power output while ensuring immediate response to the driver's power demands at any point in the race.
- Came up with a novel control architecture using model-based design that allowed ease in transition from MIL to HIL to production.

Research Assistant | VIPR-GS, Clemson University

Aug 2023 - Present

- Improved vehicle control software developed on MATLAB Simulink and Stateflow for a series hybrid autonomous tank.
- Designed a tracked vehicle controller with PI and feedforward for optimal torque distribution based on velocity and yaw.
- Programmed the control module to display system states and fault codes onto a safety remote controller using CAN messages.

Associate Engineer | MAHLE Engineering

Dec 2021 - July 2022

Graduate Engineer Trainee | Varroc Engineering

Dec 2020 - Dec 2021

PROJECTS

Non-Linear Model Predictive Controller for an Electrically Assisted Turbocharger

Nov 2023

- Modelled an electrically assisted turbocharger that recovers wasted heat for a parallel diesel hybrid on MATLAB Simulink.
- Cost function penalizes torque deviation from demand and fuel consumption, with turbo motor torque as the optimizing variable.

Stochastic planner for control of a Microgrid

Nov 2023

- A scenario-based approach for implementing a stochastic MPC for an islanded microgrid that aims to minimize the energy cost.

System Identification of The Human Body During Cycling

Aug 2023

- Identified aerobic power and anaerobic work capacity using test data and a nonlinear model with Least Square Estimation.
- Developed a test rig consisting of a cycle dynamometer and pedal power sensors interfaced with MATLAB using Bluetooth.

Lane Keeping and Adaptive Cruise Control on a RC Car

Dec 2022

- Implemented a simple Kalman filter along with a discrete PID to optimally control throttle and steering.
- Tuned the PID controller to achieve centering of vehicle and distance from forward object within a settling time of 1 second.

Model-based Design of an Electric Motorbike on Simulink Using Simscape

May 2023

- The model consisted of a PMSM motor, controller, & battery pack. Brief analysis over FTP-75 drive cycle to simulate performance.
- Checking torque against a reference, a PID output was converted into ABC phase currents using inverse Park and Clark transforms. PWM control of inverters was achieved by comparing the output of the PID & actual phase currents of the motor.

Parallel Hybrid Powertrain Model on Simulink

Dec 2022

- Modelled a parallel hybrid for a cargo van and achieved 133% increase in fuel economy compared to conventional powertrain.
- A BSFC look up map was used to find out the optimal torque for any given RPM, the remainder of the torque demand is absorbed by the motor generator units. A rule-based strategy on Stateflow that minimizes the BSFC for any power demand was used.

Lap Time Simulator for a Series Hybrid Vehicle

June 2023

- Lap time simulation by modeling simple point mass kinematics and motor curves to generate vehicle acceleration.
- Considered the different peak and continuous power output of the battery to estimate the peak power delivery.

Formula SAE | Team Acceleracers | Vice-Captain | Powertrain head

Nov 2017 - Feb 2020

- Responsible for sub-system specification of E-powertrain. Worked on component selection & integration of Motenergy ME1616, Kelly KLS motor controller and 7kWh lithium-ion battery pack made up of Samsung 30Q cells and managed by Orion BMS.
- Designed and built 4 Formula SAE cars over the tenure. Won multiple national awards and competed internationally.

SKILLS

MATLAB, Simulink, Stateflow, Simscape, C/C++, Raptor, Python, Java, VectorDB++, CANKing, CATIA V5, Siemens NX, Solidworks, Ansys Workbench, StarCCM+, Ricardo, Arduino IDE, Systems Integration, Technical Reports, Literature Review, Prototyping, Reverse Engineering, Project Management, SAP ECTR