SAUMIL JAIN

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EDUCATION

Clemson University - Greenville, SC — Aug 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 — May 2020
Bachelor of Engineering – *Mechanical, First class with distinction* — *GPA: 8.73/10*

WORK EXPERIENCE

Deep Orange 15, Clemson University — *Jan 2023 - Present*
Lead Powertrain Intern — *Greenville, SC*

- Responsible for the system integration of a series hybrid off-road vehicle comprising of 6 PMSM MGUs and its inverters, a 42kWh HV battery along with a 2.8L diesel engine, following the systems engineering V-model.
- Developing the control architecture of the vehicle using model based development, compiling the vehicle control unit code using Simulink C code and making templates to standardize the control software development.
- Building low voltage power distribution and the communication architecture using CAN communication with safety interlocks.
- Creating an energy management controller to maintain optimal State of Charge (SoC) throughout the race by regulating the engine's power and limiting the motor torque based on cell temperature and the average power exchanged through the battery.
- Responsible for the upkeep of the git repository, resolve merging conflicts and overseeing the release of vehicle level code.
- Created forward models for 40 combinations of battery, motor, engine, and their thermals using Simscape to select components that meet requirements and minimize lap time after doing a comprehensive analysis on the drive cycle.

VIPR-GS, Clemson University — *Aug 2023 - Present*
Research Assistant, Dr. Chris Paredis — *Greenville, SC*

- Improved vehicle control software for a series hybrid tracked vehicle to make it more readable and allow ease in troubleshooting.
- Implemented a safe motion mode enabling highly precise, slow maneuvers (1cm/s), and executed a test plan for its validation.
- Debugged vehicle code and hardware implementation using data monitored on CAN based tool called RaptorCal.
- Integrated a DC/DC and on-board charger using J1939 CAN messages to add charging and export capabilities to the vehicle.

Associate Engineer | MAHLE Engineering — *Dec 2021 - July 2022*

Graduate Engineer Trainee | Varroc Engineering — *Dec 2020 - Dec 2021*

PROJECTS

Sensorless Field- Oriented Control of PMSM using a STM32 microcontroller [MATLAB Code Generation/C] — *Mar 2024*

- Developing a FOC algorithm on C that was built onto an STM G474RE microcontroller making use of ADC and timers for PWM.
- Building a sliding mode observer that uses stator voltages and currents to estimate the EMF and the position of the rotor.

Hardware in the loop testing of an Electric motor [dSPACE] — *Dec 2023*

- Built a test bench to test a Curtis AC-9 Induction motor using dSPACE RTI to interface a simulated vehicle model on a drive cycle.
- Used dSPACE control desk to create a dashboard to see the torque, speed and current of the motor in real-time.

Non-Linear Model Predictive Controller for an Electrically Assisted Turbocharger [MATLAB/Simulink] — *Dec 2023*

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

Model-based Design of an Electric Motorbike on Simulink Using Simscape [MATLAB/Simulink/Simscape] — *May 2023*

- The model consists of a PMSM motor, controller, & battery pack. Brief analysis over FTP-75 drive cycle to simulate performance.
- The battery pack is simulated by creating models using data obtained from tests. SoC was estimated using coulomb counting.

Lane Keeping and Adaptive Cruise Control on a RC Car [Arduino] — *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.

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, self-made 7kWh lithium-ion battery pack made up of Samsung 30Q cells and managed by Orion BMS.

SKILLS

MATLAB, Simulink, Stateflow, Simscape, C/C++, Raptor, dSPACE, RTOS, Python, Java, Git, svn, canDB++, CANKing, GTSuite, CATIA V5, Siemens NX, Solidworks, Ansys, StarCCM+, PSIM, LTSpice, Systems Integration, ISO 26262, Technical Reports, Literature Review