RAGHAVENDRA R RAO (CSSBB)

San Jose, CA - 95051

Cell: **+1 864-633-7740** | email: **rrrao@g.clemson.edu** | **www.linkedin.com/in/rrrao**

SUMMARY

Multifaceted and result-driven engineer entrenched in a challenging career in the mechanical & automotive domain. Equipped with reliable skills and the ability to transform ideas and concepts into robust technical designs. Expertise in creating & managing complex mechanical & hardware systems applying techniques for industry-standard procedures.

SKILLS

- UG-NX, CATIA, Solid Works, CREO
- HIL/SIL testing, dSPACE, CAN
- LMS Test lab, NI Diadem
- GD&T, Tolerance analysis
- MATLAB, Simulink
- C, C++, Python, R
- LabVIEW, GT-Power
- PLC, AmeSIM, PID controller
- ANSYS, VisualDOC, ModeFrontier
- TIA Portal, EPLAN, P&ID
- PROFINET, SCADA, RSLogix 5000

EDUCATION

- **Master of Science: Mechanical Engineering at Clemson University** SC, US | **GPA: 3.7/4.0** Dec **2020**

viz. Control Systems, Manufacturing Optimization, Dynamics, Mechatronics, FEA, Design methods, Systems engineering

- **Bachelor of Engineering**: **Mechanical Engineering at Bangalore University,** IN | **GPA: 3.67/4.0** July **2013**

WORK HISTORY

Automation & Controls Intern | Sedron Technologies | Greater Seattle, WA June **2020** – Aug **2020**

- Established toolbox & automated libraries in the TIA portal using SCL Programmable Logic Controls (PLC) algorithms.
- Developed controller for anti-surge & hysteresis tuning of a sequential compressor, ensuing improved efficiency by 6%.
- Designed Human Machine Interface modules (HMI), dashboards, and alarms for motor torque monitoring and infeed pump systems reducing downtime by 1hr/day. Effectuated control of reliable safety systems as per compliance.
- Developed Manufacturing Execution Systems (MES) & PPAP to ensure quality and efficiency in integrating controllers.
- Implemented field-oriented controller for variable frequency drive systems enhancing speed and torque management
- Facilitated neural network integration for automated identification of ammonia concentration (savings up to USD 50k).
- Collaborated in developing Piping & Instrumentation diagram (P&ID) with control devices & hardware per ISA standard.

Senior Engineer - Powertrain | General Motors | Bengaluru, India / Michigan, US Aug **2013** – Dec **2018**

- Continually improved methods & procedures for design modeling in UG-NX as per Bill of Materials, measurements, documentation & work-flow techniques from FMEA and DOE processes with a time saving of 20 hours/week.
- Collaborated with cross-functional program management teams in diagnosing potential failures & packaging issues. The design iterations and concepts were optimized to obtain up to 8% improvement in first-time quality output.
- Directed design and fabrication of prototype components for testing of engines and vehicles of varying chassis platform.
- Centralized the Design Thinking and Design for Six Sigma approach for engineering design and CFD analysis of engines.
- Facilitated tolerance stack-up and digital clearance analysis of engines with applied GD&T (ASME Y14.5) using 3DCS
- Spearheaded Lubrication & Ventilation circuit extraction, Oil slosh analysis, Oil levelcalibration & Mass Roll-up of engines for analysis and improvement in cooling efficiency by 1.5%.
- Streamlined the control system and integration of vehicle dynamics for validating the test data algorithm for hybrid operating systems using MATLAB & Simulink along with regression analysis performed for the validation results.
- Standardized test reports and trained over 200 engineers in x-SDE & HFV6 engine teardown and build mock-up sessions.

PROJECTS

Optimization of oil pan for Small Block (SB) Gen-VI engine for casting failure issues | GM Award – Work of Wonder

- High-performance Corvette oil pan to be re-designed to avoid casting failures at the supplier manufacturing facility.
- Hydrostatic pressure & ultrasonic testing proved the elimination of failure in the oil pan even when the profile tolerance was lowered to 1mm for precision. Robust design enabled the regular start of production & quality improvement of 2.4%.

State machine controller for automating operating modes in the manufacturing setup | Sedron Technologies, IN

- Led & structured automation for robust dynamic performance of the Varcor processing unit at Indiana plant.
- Modeled and deployed process automation system using feed-forward & LQR control techniques for compressor.
- Implementation of state machine led to automation of operating modes in compressor, condenser & centrifugal pumps impacting increased output by 7% to 90gpm, resulting in cost savings and expanding projects across 5 units in US.

Hybrid and Electric vehicle (HEV) unit test case vehicle controller validation | GM - Cross-functional Integration

- HIL/SIL testing were performed for the initial build of control systems for HEV on multiple platforms of vehicle build.
- Validation of unit-level test cases for Start/Stop condition using LabVIEW and MATLAB with Model-In-loop attesting 1.2% improvement in real-time.

Design and optimization of PCV separator for TAVERA per BS-IV emission compliance | GM - Black Belt project

- The positive crankcase ventilation separator for Tavera SUV was optimized for the increase in flow efficiency by 2.3%.
- Modal analysis was performed for max and min load conditions of the component and the calibrated results were translated in BIW manufacturing to improve bay-to-bay breathing in the crankcase of the engine by 1.5%.

E-thermal extraction of engines for thermal management & efficiency improvement | GM - Single point of contact

- Airflow patterns around the engines were studied and fluid flow extraction was performed to analyze the performance.
- Lubrication and Ventilation systems within the engine were extracted and analysis was performed for CSS 675T & 45T, DMAX, HFV6, LGE and SB engine families of GM.
- The extraction and CFD analysis data were used to improve the performance and cooling efficiency of up to 0.8%.

Anti-surge controller for turbo-air centrifugal compressors with variable speed drives | Sedron Technologies

- Mobilized the team to develop an anti-surge controls algorithm for the dual-stage compressor (3600 kW) causing back pressure affecting the coupled heat exchangers and de-gas towers.
- The compressibility factor and flow co-efficient were parameterized to improve the performance curve and surge line.
- The torque assisted controller integrated with feed-forward and model predictive algorithm fixed the errors in output signals & reduced overheating resulting in improved volumetric efficiency & energy savings up to 4%.

Develop & integrate perception algorithm using ADAS controls for self-driving vehicle framework | Dorle Controls

- Modeled the driving scenarios for autonomous vehicles by developing HD occupancy grid maps using Baye's rule.
- Formulated simultaneous localization & mapping (SLAM) algorithm using Velodyne lidar point cloud, odometry, GPS & IMU data in C++ & MATLAB. Implemented the algorithm & validated the test results using Veloview & Simulink.
- The project resulted in successful testing of research papers certifying accuracy up to 97% during simulations.

Testing brushless DC motor (BLDC) & permanent magnet synchronous motor (PMSM) for EV-Hybrid vehicles

- Trapezoidal controls algorithm was developed for BLDC motor with six-step commutation and multiple pole-pair combinations. PID controller was implemented with a pulse-width modulation generator for system stability.
- Field-oriented controller (Vector) was used for the variable frequency drive (VFD) control of the AC synchronous motor.
- Both tests conducted proved responsive & controlled outputs with an ability to generate full torque. The dynamic performance efficiency improvement during motor characterization was 1.4% against the peak torque of 110 Nm.

Develop an Arduino controlled robotic arm to perform pick-and-place material movement for industrial purpose

- SainSmart 6-axis robotic arm was used to develop and test the algorithm for material movement considering parameters in compliance with industry automation level 4 where the requirements were characterized for multiple scenarios.
- Sensors like Xbox 360 Kinect camera, RGB, proximity sensors and accelerometers were integrated for robust operation.
- High-level sensor fusion and computer vision integration helped to train the robot using Machine learning techniques and was used in the University laboratory for segregation and material selection resulting in cost saving.

CERTIFICATION

- Six sigma certification – Black Belt (lead & coach for 4 critical projects) | **General Motors**
- PLC programming | **Udemy**
- Electronics and PCB design, Power electronics simulation & analysis
- Motion planning for self-driving cars | **Coursera**
- Self-Driving Car | **Udemy**
- HMI & SCADA
- Automotive overhaul | **GD Naidu Institute**

INTERN

- Engineering Intern at **Volvo** and **Bosch (2012)**
- Manufacturing Intern at Rail wheel and Axle factory **(2013)**

CO-CURRICULAR

- Active member of SAE and IEEE. Organized various conferences, Auto exhibition shows, and product launch events
- Trained cross-functional teams with tech talks, engine teardown sessions and technical presentations for engineers
- Participated in various Design, Build and Race events, as the lead member which helped me hone my leadership skills