VENKATA SIVA SAI MANOJ POTHUGUNTI

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SUMMARY

- Graduate student in Mechanical Engineering specializing on Automotive controls, xEV's Powertrains and Model based development.
- Expertise in Automotive Systems, Model Based Embedded Controls, EV's, ADAS systems, MBD and Rapid Control Prototyping.
- Hands-on experience in different kinds of HEV's and their powertrain control strategies, calibration tools and testing (HIL, MIL, SIL)

EDUCATION

Michigan Technological University, Houghton, Michigan. **GPA: 3.63/4**

Master of Science | Mechanical Engineering |

INTERN EXPERIENCE

Control Software Engineer-trainee| DORLE Controls *Aug 2020-Nov 2020*

Worked on MSM vehicle like golf cart for the second level Automation. Worked on Localization and Mapping from the lidar data and processing it to the 3D point clouds and building a Map using SLAM and Pose graph estimation techniques.

Job responsibilities:

- Learned about the Localization of Ego vehicle using GNSS/INS and LIDAR data. Ex: Kalman filters, EKF, UKF, particle filters.
- Gained hands-on experience in deploying motion planning/control algorithm on robotic and autonomous vehicle systems.
- Work knowledge and practical application of robotic path planning, motion planning algorithms (A*, RRT*).
- Learned about the occupancy grid map generation using LIDAR data. Coordinated with different divisions for performing the simulations.

Mechanical Engineering Intern | A.P. GENCO *May 2018-Nov 2018*

Dr. NARLA TATA RAO Thermal Power station (A.P. GENCO), Ibrahimpatnam, Andhra Pradesh Power Generation Corporation LTD, India.

Analysis of Steam Turbine

- Worked on various methods of governing in thermal power plant, used to maintain a constant steady speed of turbines, importance of the methods is that the turbine can maintain a constant steady speed under various load conditions.
- Studied boiler section and done torsional analysis on turbine shaft, Thermal and mechanical analysis on turbine blades.
- Worked under Assistant Engineer on 210MW and 500MW (unit-1&unit-7) of power generation unit in the power plant.

TECHNICAL SKILLS

MATLAB | Simulink | MotoHawk| MotoTune | MIL/SIL/HIL | LMS Amesim | OBDwiz | Adams car | AutoCAD | Solid works | C language | MS Excel | Ansys | Star CCM+ | GD&T | Microsoft Office Suite |

PROJECT EXPERIENCE

AUTONOMOUS VEHICLES:

Occupancy and Binary Occupancy Grid Mapping (DORLE Controls) *Aug 2020-Nov 2020*

- Designed a right turn driving scenario in the Scenario Builder app in MATLAB. Ego vehicle is incorporated with a LiDAR and multiple RADAR sensors. Environment surrounding Ego vehicle is scanned through the sensor's detection generators creating LiDAR point clouds and Object detections through computer vision toolbox.
- Using the developed and processed LiDAR point clouds, A Binary Occupancy Grid Map is created containing integration of sensor data and position estimates creating a spatial representation of the approximate locations of obstacles.
- Developed the Simultaneous Localization and Mapping (SLAM) algorithms for building the Occupancy grid mapping of the environment around the vehicle by using LIDAR Point Cloud data.
- Developed Occupancy grid map for a Right-turn driving scenario Using Bayesian Log-Odd Updates Rule, Logit Function and integration of the LIDAR data using Inverse Scanner Algorithm.

AUTOMOTIVE CONTROLS:

Autonomous Ground Vehicle (collision avoidance and lane assist) (ADAS) *Jan 2019-Apr 2019*

- Used an Ultrasonic sensor, Arduino Microcontroller (UNO-R3) , RC Motor Chassis, and a 4-wheel drive RC vehicle.
- Defined three states with consideration of 50 to 20 cm as safe and in verge of collision visual and audio alert is activated.
- Through the USB port the microcontroller is connected to the system and the code programmed in the Arduino IDE was tested for the collision avoidance and lane keep assist by following the considered safe distance.

Simulation and Development of Intelligent Cruise Control System (ADAS). *Jan 2020- April2020*

- Devised a velocity controller using a PI controller with a steady-state error of zero for a step input & short settling time.
- Designed an optimal Integral LQR type radar-based headway distance controller for maintaining headway distance of

three times the set cruising speed.

- Implemented an intelligent Stateflow based switching program to switch between vehicle speed and headway control to achieve a bump-less transfer of control achieved by parameter initialization in each controller during the transition.

Optimal Idle speed controller for a Spark Ignition Engine. *Jan 2020- April2020*

- Designed an Idle speed control model using Simulink, developed a non-linear engine model considering the physical dynamics of fuel dynamics, rotational dynamics, throttle dynamics. The idle speed controller for a spark ignition engine generates control signals by using the measured idle speed and the measured (or computed) intake manifold pressure.
- The idle speed is controlled by controlling the Spark timing which changes the torque in the on next combustion event. Developed the model of PID controller and an optimal LQR with integral action using MATLAB/ Simulink by changing the throttle position and spark timing for maintaining the idle speed for the engine.

Chassis Control-(Active Suspension Design). *Jan 2020- April2020*

- Optimized actuator effort and achieved bump-less control using LQR technique. Implemented Active Suspension control to improve ride characteristics.
- Used Linear Quadratic Gaussian and Luenberger observer techniques for state estimation of suspension travel.

DISTRIBUTED EMBEDDED CONTROL SYSTEMS:

Development of Hybrid Electric Vehicle (HEV) Powertrain Controller. *Jan 2020- April2020*

- Developed a powertrain controller for a Series-Parallel (Powersplit Configuration) HEV using Simulink Stateflow.
- By using the Hybrid Electric Vehicle Powertrain Controller, the vehicles various modes are validated for the range of vehicle velocities such as Motor only mode, Engine Only mode, Blending mode, Regeneration mode.
- Developed rule-based powertrain controller to switch driving modes, minimize energy consumption & maintain SOC level in all driving modes. Implemented Engine Auto start/stop feature to save fuel by idling elimination.
- By controlling the inputs, the outputs were generated for the Engine Torque, Motor Torque, Brake Torque, Regen Torque, Battery Protection and Charge State.

Embedded Systems: Digital controller (Closed-Loop Electronic Throttle controller)-HIL. *Jan 2020- April2020*

- Developed a Feedback position control system for an electronic throttle body by using a Discrete Controller.
- Accelerator Pedal was used as a throttle command and by using the APPS and Throttle Position Sensor the opening angles of the throttle body are controlled by designing a Linear Interface between the sensors.
- Developed an error detection model for minimizing the error between the Dual APP's and Throttle Position Sensors.

Embedded Systems: Fuel Injection Control by using Real-time calibration-HIL. *Jan 2020- April2020*

- Developed a Simulink Model for the Fuel injection control in the cylinder by using calibration tools like MotoHawk and MotoTune rapid Prototyping system.
- Using a Hall-effect sensor, a fuel injector, and a DC motor the fuel injection was controlled. The injection control was RPM based control by varying the two parameters Injection Duration and Start of Injection.

Embedded systems: Communication between ECU's using CAN Communication-HIL. *Jan 2020- April2020*

- Modeled and established communication between ECU's using design procedure of CAN communication.
- Built model, message definition block, defined endianness, payload manipulation, Baud rate, ID filtering, CAN bus monitoring, and real-time calibration of CAN communication. Used CANking to monitor parameters while transmitting between two ECUs. Developed working knowledge of communication protocols such as SPI, I2C, etc.

ELECTRIC AND HYBRID ELECTRIC VEHICLES:

Powertrain and Propulsion System- Hybrid Electric Vehicles *Sept 2019- April2020*

- Developed various Powertrain models for various HEV configurations and hybridization level using LMS AMESim.
- Simulated the models over EPA drive cycles to test for Energy consumption, Fuel Economy and Fuel Consumption.
- Simulated the models over various EPA drive cycles to obtain Motor efficiency and engine BSFC curves, modified blend strategy to increase powertrain efficiency, resized components to meet performance requirements of all drive cycles.
- Performed vehicle testing on Volt, Fusion, Malibu following EPA,SAE J1263 coastdown procedures using OBDwiz.
- Performed calibration on the Powertrain's blending strategy- Charge Depletion and Charge Sustaining modes in Prius, Chevy Volt and Chevy Malibu which are of different HEV config. for Max. AER in City and Highway drive cycles.

Powertrain and Propulsion System- Electric vehicles (Tesla Model-S)

- Modelled individual subsystems like vehicle, Traction Motor (Induction), Inverter (4S3P), Transmission, Battery, Driver model using reduced order modelling. Performed subsystem integration.
- Simulated the models over various EPA drive cycles to obtain Motor efficiency, modified strategy to increase powertrain efficiency, resized components to meet performance requirements of all drive cycles.
- Validated the manufacturer published performance specifications, Fuel consumption and energy consumptions.