SHRAVAN MURLIDHARAN

Dearborn, MI, USA, shravanm2k@gmail.com, M: (571) 587-9969, LinkedIn: www.linkedin.com/in/shravan-murlidharan,
Portfolio: shrv03.github.io/Shravan-s-Portfolio

Summary

Graduate Electrical Engineer with experience in vehicle electronics, battery systems, and system-level architecture for EV and AVs. Skilled in embedded systems, HIL testing, ADAS simulation, and ECU validation using MATLAB, Simulink, Python, and Datasets. Proficient in requirement translation, interface definition, and V-model traceability. Strong interdisciplinary exposure across propulsion, ADAS/AD, and V2X, with a focus on cross-functional collaboration and standards compliance.

Education

University of Michigan- Dearborn **Dearborn, MI**
MSE in Electrical Engineering April 2025
Coursework: Autonomous Vehicles, Vehicle mobility systems, Embedded systems, edrives, HEVs, and Auto sensors and Energy storage

Vellore Institute of Technology Chennai **Chennai, India**
Btech in Electronics and Communication Engineering April 2023

Skills

Programming Languages:	Python, C++, MATLAB
Operating Systems:	Linux (Ubuntu, ROS-based development)
Sensors & Interfaces:	LiDAR (SLAMTEC, STAMTEC), Radar Signal Processing, Sensor Calibration (Camera, AEB), Voltage/Current Monitoring
Electrical Systems:	Power Electronics, Embedded Systems, Circuit Design, PCB Design, Electrical Propulsion Systems
Modeling & Simulation:	MATLAB/Simulink, LabVIEW, Optimum LAP, CarSim, dSPACE
Hardware & Interfaces:	HIL Simulation, CAN Protocol, S32K144EVB, Sensor Integration
Development Tools:	Git, Docker, Jupyter Notebook, Microsoft Office (Excel, PowerPoint, Word)
Compliance & Safety:	EHS Standards, Fault Injection Testing, System Diagnostics
Collaboration Tools:	Google Workspace, Zoom, MS Teams – used in cross-functional teams with mechanical, quality, and purchasing stakeholders
Domains of Expertise:	Powertrain Systems, Battery Management Systems (BMS), Control Logic Implementation, System Validation, Energy Efficiency
Testing & Validation:	DVPR Planning, HIL Simulation, CAN Fault Injection, Lab Prototyping

Experience

Automotive Research *University of Michigan Dearborn, MI*
Research Lead Sep 2024 – Apr 2025
- Directed research on hybrid Visible Light Communication and C-V2X frameworks to enhance V2X connectivity and benchmarked various industry standards for communication latency.
- Developed system-level architecture diagrams describing interactions between ADAS, VLC, and V2X modules to define autonomous system architectures.
- Analyzed ADAS SoCs, sensor fusion algorithms, and MATLAB/Simulink models to evaluate interoperability across safety-critical systems.

ISSF LAB *University of Michigan Dearborn, MI*
Research Assistant Nov 2023 – Apr 2025
- Built a real-time HIL testbench using NXP's BATT-14 emulator and S32K144EVB; integrated battery models with CAN-based ECU networks for fault injection and validation under V-model framework.
- Developed system-level interface specifications and traceability matrices to support requirement allocation and system requirement interpretation for BMS.
- Conducted a comprehensive cybersecurity assessment in BMS and created a PCB for real-time monitoring of voltage, current, and temperature, improving diagnostics and reducing error rates by 25%.
- Familiar with relevant BESS/grid-related standards including UL 9540, IEC 62933, EN50549, and IEEE 1547 through academic and applied research.

ePropelled India **Chennai, India**
Intern, Electronics Department Jul 2022–Aug 2022
- Spearheaded detailed evaluations of motor controller PCB designs, resulting in a 30 percent increase in durability and easier maintenance, and visualized the motor and controller system designs to enhance battery range efficiency by 25 percent, improving predictive maintenance capabilities

Publications

- Innovative Perspectives on Hybrid Visible Light Communication with C-V2X – The survey papers explore a complementary communication strategy for C-V2X and address cyber threats and DL-based cybersecurity for Visible light communication|IEEE Internet of Things
- Battery Management System: Threat Modeling, Vulnerability Analysis, and Cybersecurity Strategy – The research explores the cyberattacks on BMS and how vulnerabilities will affect the ecosystem of an EV or an energy storage system|IEEE Access
- Network analysis and Throughput Estimation for mmWave Communication in Autonomous Vehicles – The research discusses how 5G mmwave is integrated into connected autonomous vehicles for faster V2V communication.|IEEE Transactions
- Proposed and implemented an Embedded Device Fingerprinting (EDFP) method using raw electrical noise from microcontroller PWM signals, demonstrating its efficacy in detecting counterfeit hardware.|IEEE

Projects

Project Title: Trajectory Prediction of Dynamic Objects using KITTI Dataset

- Duration: June 2025 – Present
- Technologies Used: Python, LSTM, PyTorch, KITTI Dataset, Jupyter Notebook
- Description and Outcome: Developed a sequence-based deep learning model using LSTM networks to predict future positions of dynamic objects (vehicles, pedestrians) in urban environments using KITTI tracking data. Preprocessed sequential bounding box data to extract object trajectories. Trained and validated model on time-series motion patterns to achieve improved prediction accuracy. Demonstrated utility in path planning and collision avoidance for self-driving systems.

Project Title: Real-Time Object Detection using KITTI Dataset in Dockerized Environment

- Duration: June 2025 – Present
- Technologies Used: Python, YOLOv8, KITTI Object Detection, Docker, Jupyter Notebook, NVIDIA CUDA
- Description and Outcome: Built an end-to-end object detection system using YOLOv8 on KITTI dataset, deployed within a Docker container for consistent GPU-accelerated training and inference. Integrated CUDA backend for optimized model performance. Developed and executed training scripts and annotated inference pipelines using Jupyter Notebook for real-time object localization and visualization. Enabled scalable and reproducible environment for deep learning in autonomous vehicle applications.

Project Title: YOLOv8 Object Detection on KITTI Dataset

- Duration: June 2025 – Present
- Technologies Used: YOLOv8, Python, OpenCV, KITTI Dataset, Google Colab
- Description and Outcome: Developed an object detection pipeline using YOLOv8 to identify vehicles, traffic lights, and road signs from KITTI dataset video frames. Processed input images using OpenCV and generated annotated videos with bounding boxes and confidence scores. Successfully deployed and visualized the detection results in Google Colab. The project enhanced understanding of visual perception systems used in ADAS and real-time computer vision integration for autonomous driving applications.

Project Title: OpenPilot Replay and UI Integration for ADAS Visualization

- Duration: June 2025 – Present
- Technologies Used: OpenPilot, Python, Replay Logs, UI Dashboard, Ubuntu Linux
- Description and Outcome: Successfully configured and executed the OpenPilot replay module to simulate Advanced Driver Assistance Systems (ADAS) scenarios using real-world driving data. Ran UI visualizations for lane centering, vehicle detection, and engagement status. Troubleshot module errors, managed virtual environments, and interpreted replay logs to demonstrate OpenPilot's ADAS stack functionality. Gained hands-on experience with OpenPilot's software architecture, message publishing system, and user interface. Showcased ADAS visualization without hardware dependencies, strengthening my system-level understanding of autonomous driving platforms.

Project Title: Behavioral Cloning-Based Lane Keeping Assist System in CARLA

- Duration: June 2025 – Present
- Technologies Used: CARLA Simulator, Python, PyTorch, CNN, RGB Camera, Ubuntu Linux
- Description and Outcome: Designed and implemented a perception-based Lane Keeping Assist (LKA) system using behavioral cloning in the CARLA simulator. Collected real-time camera images and steering inputs from manual driving to generate a labeled dataset. Trained a convolutional neural network (CNN) to learn steering behavior and deployed the trained model for real-time vehicle control. Demonstrated smooth autonomous lane following without explicit lane detection or reliance on map waypoints. Gained practical experience in end-to-end imitation learning, model inference in simulation, and neural network-based ADAS design.

Project Title: Adaptive Cruise Control using PID Control in Stop-and-Go and Constant Speed Scenarios

- Duration: June 2025 – Present
- Technologies Used: Perplexity AI, PID Control, Python, Simulation Interface
- Description and Outcome: Designed and implemented a simulation-based ACC system using Perplexity AI to model ego and lead vehicle behavior under dynamic driving scenarios. Simulated two driving modes: a steady-state cruise with constant lead vehicle speed and a stop-and-go scenario to replicate congested traffic conditions. Optimized controller gains (Kp, Ki, Kd) to ensure smooth velocity transitions, minimize overshoot, and maintain a safe following distance.

Achieved effective system response with a tuned time gap and minimal steady-state error, validating the control model's reliability and adaptability.

Project Title: Autonomous Emergency Braking (AEB) System Calibration and Validation

- Duration: June 2025 – Present
- Technologies Used: Perplexity AI, AEB Logic, Simulation Interface, Python
- Description and Outcome: Designed and implemented a simulation-based AEB system using Perplexity AI to evaluate braking responses under dynamic lead vehicle behavior and unexpected pedestrian crossings. Calibrated AEB activation thresholds and stopping distances to meet safety requirements. Performed validation through varied obstacle configurations and successfully demonstrated real-time system responsiveness and hazard mitigation.

Project Title: Sensor Fusion Enhancement using nuScenes Dataset

- Duration: May 2025 – Present
- Technologies Used: nuScenes Dataset, Sensor Fusion, Python, OpenCV, LiDAR-Camera Integration. Ubuntu Linux
- Description and Outcome: Analyzed object detection performance by fusing LiDAR and camera data from the nuScenes dataset to improve perception accuracy in autonomous vehicles. Achieved better object classification and detection reliability across varying urban traffic conditions.

Project Title: LKA Scenario Simulation using CARLA

- Duration: May 2025 – Present
- Technologies Used: CARLA Simulator, Python, Autonomous Vehicle Control, LKA Logic, Ubuntu Linux
- Description and Outcome: Simulated real-world approach scenarios to evaluate how early LKA (Lane Keep Assist) should activate based on centering the vehicle in the right lane. Helped validate steering angle thresholds and improve reaction timing for critical safety interventions.

Project Title: Motion Planning and Perception Analysis using Waymo Open Dataset

- Duration: May 2025 – Present
- Technologies Used: Waymo Open Dataset, Waymax, Motion Forecasting, Perception Stack
- Description and Outcome: Explored real-world trajectory prediction and motion planning tasks using Waymo's motion and perception datasets. Gained industry-relevant insights into behavior prediction and scene understanding for urban autonomous driving.

Project Title: LiDAR Signal Distortion Analysis for ADAS Evaluation

- Duration: May 2025 – Present
- Technologies Used: STAMTEC LiDAR, Signal Processing, Python, Simulink
- Description and Outcome: Conducted controlled LiDAR signal distortion tests, including induced blinking, to assess impact on ADAS functions. Revealed system vulnerabilities and informed design refinements for robust ACC, LKA, and AEB performance.

Project Title: LiDAR Sensor Placement and Object Detection Simulation

- Duration: Mar 2025 – Present
- Technologies Used: Simulink, LiDAR Modeling, MATLAB
- Description and Outcome: Simulated LiDAR sensor placements (front, center, and rear roof-mounted) to analyze object detection performance and blind spots on curved roads. Enabled design recommendations for optimal sensor placement, improving perception coverage by 25 percent

Project Title: Real-Time Object Tracking for Lane Assistance

- Duration: May 2025 – Present
- Technologies Used: OpenCV, Python, Video Stream Processing
- Description and Outcome: Developed tracking algorithms to monitor dynamic and static traffic objects, supporting LKA and path planning. Reduced tracking errors by 30 percent in high-density scenarios.

Project Title: ADAS Level 2–3 Handover Scenario Analysis

- Duration: Jan 2025 – Present
- Technologies Used: Custom Driving Datasets, Python, Data Analysis
- Description and Outcome: Analyzed vehicle handover between human and AI in varying environments, focusing on transition safety and decision-making logic. Insights supported smoother driver-to-system transitions and reduced latency in Level 3 automation scenarios.

Project Title: Low-Cost Object Detection and Digital Twin System via V2V Communication

- Duration: Jan 2025 – Apr 2025
- Technologies Used: SLAMTEC RPLIDAR A1M8, ELP USB Camera, Point Cloud Visualization, AWS 5G Wavelength, ROS, OpenCV, Python
- Description and Outcome: Designed and implemented a low-cost real-time object detection system integrating LiDAR and camera data for point cloud generation. Leveraged AWS 5G Wavelength for high-speed V2V communication to enable real-time digital twin creation of surrounding environments. Demonstrated significant improvement in environment mapping latency and system affordability, reducing deployment costs by over 40 percent compared to conventional systems.

Project Title: Localization and Mapping using ROS with KITTI Dataset

- Duration: Sept 2024 – Dec 2024
- Technologies Used: ROS Noetic, KITTI Dataset, PCL, OpenCV, Python
- Description and Outcome: Built advanced localization and object detection systems with LiDAR point clouds and bounding boxes for urban environments. Achieved centimeter-level accuracy in real-time mapping and obstacle detection.