SHRAVAN MURLIDHARAN

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Portfolio: shrv03.github.io/Shravan-s-Portfolio

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

Software: MS 360, AWS, Openpilot, AI/ML, CarSim, CARLA, openpilot, dSPACE, Ubuntu, ROS 1, ROS 2, AUTOSAR, MATLAB, Simulink, Optimum LAP, LabVIEW, Rhino 3D
Languages: C/C++, JAVA, Python
Areas of Expertise: Automotive Technical Research, Automotive market, control logic implementation, ADAS development, Battery Management System, Cybersecurity, Connected mobility, EV Motor and Motor controller

Experience

Automotive Research **University of Michigan Dearborn, MI**
Reserach Lead Sep 2024–Apr2025
- Led the development of hybrid Visible Light Communication with C-V2X technology in AVs ensuring robust message transformation between the connected vehicles in platooning
- Directed research on a hybrid VLC-C-V2X framework with deep learning (DL) to enhance V2X connectivity and analyze cyberattacks, reducing latency by 20 percent and improving network efficiency by 15 percent
- Elaborated an in-depth study on the coexistence of Visible Light Communication (VLC) with Cellular V2X (C-V2X), ADAS, and other in-vehicle systems, analyzing interoperability and electromagnetic compatibility.
- A comprehensive research of ADAS technology was conducted, encompassing algorithms, ADAS SoCs, MATLAB/Simulink models, sensor fusion techniques, and calibration procedures

ISSF LAB **University of Michigan Dearborn, MI**
Research Assistant Nov 2023–Apr2025
- Built a real-time HIL testbench using NXP's BATT-14 emulator and S32K144EVB; integrated battery models with CAN-based ECU network for validation and fault injection
- Conducted a comprehensive cybersecurity review in BMS, identifying critical gaps and entry points to achieve a projected error reduction of 25 percent, and created a tailored PCB for monitoring voltage, current, and temperature, improving diagnostics, and reducing troubleshooting time
- Renovated an automotive cybersecurity test bench with 10 low voltage ECUs connected using CAN communication for DOS cyberattack demonstration

Hyundai Motor India **Chennai, India**
Intern, Materials Handling Department May 2022–Jul 2022
- A collaborative roadmap was developed by the team for integrating technologies like 5G, drones, and autonomous robots to achieve a staggering 5x increase in vehicle production potentially
- Acquired practical experience with ADAS Level 1 technology, including vehicle assistance features by executing tests on Lane Keeping Assist and Blind Spot Monitoring systems to demonstrate proficiency in vehicle operations
- Created an obstruction detection system employing an ultrasonic sensor and Arduino board in a forklift to address a real-time issue to lessen accidents in the warehouse

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: OpenPilot Replay and UI Integration for ADAS Visualization

- Duration: June 2025 – Present
- Technologies Used: OpenPilot, Python, Replay Logs, UI Dashboard, Ubuntu
- 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
- 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
- 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: 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: 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.