Akshar Chavan

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Summary

Innovative, impact-driven engineer with 4+ years of experience developing intelligent embedded and autonomous systems. Proficient in real-time simulation, embedded software, and sensor integration using ROS, Gazebo, Python, and C++. Demonstrated expertise in model-based design, HIL/SIL testing, and energy-aware control strategies for mobile robotics. Skilled in systems architecture, CAN bus communication, and algorithm development—highly relevant to ADAS feature development, validation, and vehicle integration workflows.

Technical Skills

Machine Learning: TensorFlow, Keras, Reinforcement Learning
Systems: Embedded Systems, Autonomous Mobile Robots, Linux
Simulation and Testing: Software-in-the-Loop (SiL), Hardware-in-the-Loop (HiL), Gazebo, ROS
ADAS Tools & Processes: HIL/SIL Testing, Model-Based Design, Performance Validation
Automotive Systems: CAN, CAN-FD, Vehicle ECU Communication, DFMEA, DRBFM (basic familiarity)
Perception Systems: LiDAR, Camera Integration, Sensor Fusion
Languages & Tools: Python, C++, Embedded C, MATLAB Simulink, ROS, Gazebo, Arduino, Git, Bash, Slurm, OpenMP, MPI

Education

Ph.D. in Electrical and Computer Engineering - GPA: 3.7/4.0 — Jan 2024 - Present (Exp. Summer 2026)
The Ohio State University — Columbus, OH, USA

Ph.D. in Computer Science - GPA: 3.67/4.0 (*Transferred to OSU*) — Aug 2020 – Dec 2023
Wayne State University — Detroit, MI, USA

M.S. in Industrial Engineering - GPA: 3.51/4.0 — Aug 2018 – May 2020
Wayne State University — Detroit, MI, USA

B.E. in Mechanical Engineering - GPA: 3.27/4.0 — Aug 2011 – May 2014
University of Mumbai — Mumbai, India

Work Experience

Robotics Intern — Zebra Technologies — Sept 2025 – Present

- During live warehouse AMR operations, maintained robot uptime by continuously monitoring fleet behavior, performing rapid diagnostics, and executing on-site interventions, helping ensure missions ran with minimal disruption.
- When robots encountered navigation or system faults, took ownership of fault resolution by gathering logs, reproducing issues, and preparing clear reports for engineering teams, which reduced troubleshooting time and strengthened cross-team responsiveness.
- In a high-volume warehouse environment, improved overall flow efficiency by tracking AMR task queues, identifying operational bottlenecks, and reporting process gaps, contributing to workflow adjustments that enhanced day-to-day smoothness.
- During early-stage testing of navigation and behavior updates, supported engineering validation efforts by conducting structured tests and documenting detailed performance observations, enabling refinements that improved reliability and navigation accuracy.

Industrial Engineering Intern — Aerostar Manufacturing — Aug 2019 – Aug 2020

- Streamlined production planning by implementing a continuous monitoring system for part availability, ensuring accurate order acceptance and improving on-time deliveries for enhanced customer satisfaction.
- Leveraged Kanban, 5S, and Lean Manufacturing principles to continuously identify opportunities for enhancing manufacturing time and cost, providing metrics that supported data-driven process improvements.
- Developed and implemented a Python-based inventory tracking system that provided real-time, accurate quantities of raw, finished, WIP, RTV, and scrap materials, significantly reducing manual counting time and providing precise data for production scheduling.

Research Experience

Safety Ensured Energy Management for Autonomous Mobile Robots (AMRs) — Aug 2023 – Present

- Conducted rigorous Software-in-the-Loop and Hardware-in-the-Loop testing to validate autonomy behaviors under real-time constraints—aligned with ADAS and AV system validation workflows.
- Designed and deployed an autonomous mobile robot (AMR) using ROS with integrated LiDAR and camera systems, implementing perception pipelines for real-time obstacle detection and path planning—mirroring self-driving vehicle autonomy stacks.
- Developed and tested predictive navigation and safe motion planning algorithms using real-world dynamic obstacle scenarios; focused on reducing latency and improving reaction time across deployment conditions.
- Conducted real-world experiments showing that increasing robot speed from 0.4m/s to 2.4m/s caused a 222% increase in latency and an 1829% rise in reaction distance; developed regression models to support safe, energy-efficient navigation.
- Currently validating system performance across diverse scenarios, targeting reduced task times, enhanced energy efficiency, and aiming for publication in *IEEE Transactions on Robotics* (Aug 2025).

Speeding-up Graph Algorithms via Graph Restructuring Aug 2022 – Jul 2025

- Developed novel graph restructuring techniques to tackle scalability bottlenecks in global-connectivity dependent graph algorithms such as matching and all-pairs shortest paths (APSP) by preserving complete path connectivity.
- Designed a deterministic sequential Clique Partition based Graph Restructuring (CPGR) algorithm and a Parallel Randomized Clique Partition based Graph Restructuring (PAR-CP), both restructuring graphs into tripartite forms and reducing edge count by $O(\log n)$ asymptotically.
- Implemented CPGR in C; achieved up to 59% edge reduction and 2.07× speedup for Dinitz's algorithm for matching, and 1.68× speedup for APSP on synthetic and real-world datasets.
- Implemented PAR-CP using MPI in C, optimized for multi-core architectures on the Pittsburgh Supercomputer with up to 128 cores; PAR-CP achieved up to 74.4% edge reduction and resulted in up to 2.06× speedup for Dinitz's algorithm, with APSP achieving a speedup up to 213.34×.

Battery Degradation-Aware Task Offloading in Edge-Assisted Mobile Computing Jan 2025 – June 2025

- Designed and developed a novel task offloading algorithm for edge-assisted mobile computing to mitigate premature battery failure in mobile devices (e.g., delivery robots) by incorporating battery State of Health (SOH) awareness.
- Integrated real-time energy and performance constraints into task scheduling logic—analogous to energy optimization and load balancing in embedded ADAS ECUs.
- Executed 2-year simulations in an AMR-based food delivery scenario, demonstrating a 23% increase in battery lifespan (131-day extension) and 8% growth in projected revenue through SOH-aware, adaptive task offloading.

Joint Task and Charging Scheduler for High-Quality Battery Life Aug 2020 – Sept 2022

- Developed a Python-based Mixed Integer Non-Linear Programming (MINLP) model using Gurobi to jointly schedule tasks and charging for AMRs, reducing energy waste and preserving battery health by enforcing SOC thresholds.
- Designed a high-performance greedy algorithm (Task and Charging Schedule Manager – TCM) to approximate the MINLP model in real time (0.015s vs. 2837.6s), achieving a 1.15 approximation ratio for efficient fleet-level scheduling.
- Validated via simulation, showing a 99.3% reduction in SOC violations and 22.36% lower energy waste, significantly enhancing AMR battery reliability and lifespan.

Predictive Maintenance for Connected Vehicles Feb 2019 – Aug 2019

- Developed a predictive maintenance framework using ECU sensor data to anticipate component failures and reduce vehicle downtime.
- Modeled a mixed-fleet dynamic vehicle routing problem (DVRP) in Python, incorporating drone and logistics constraints for just-in-time part delivery.
- Improved maintenance planning efficiency by synchronizing part availability with scheduled service, minimizing delays and enhancing fleet uptime.

Project Experience

RL-Driven Task Allocation Optimizing Battery SOH in Mobile Robots Feb 2024 – Apr 2024

- Designed a Q-learning task scheduling algorithm for autonomous mobile robots to optimize battery usage based on State of Health (SOH) and State of Charge (SOC).
- Achieved near-optimal performance in reducing battery degradation and maximizing task efficiency by defining a custom state-action space and reward function.

ADAS Feature Simulation and Testing Dec 2021 - May 2022

- Simulated and evaluated lane-keeping, object detection, and emergency handling behaviors using Gazebo + ROS with LiDAR and stereo camera fusion; benchmarked performance for system latency, false positive rates, and safe maneuvering.
- Built a perception pipeline integrating LiDAR and stereo cameras to detect obstacles and lane boundaries.

Robotic Arm Control via MATLAB Aug 2021 – Dec 2021

- Developed a MATLAB Simulink control system for a 3-DOF robotic arm to simulate Tic-Tac-Toe interaction.
- Validated simulation-based control on hardware via Hardware-in-Loop (HIL), commanding actuators in real time.
- Demonstrated actuator control strategies analogous to ADAS system validation processes.

Teaching Experience

Instructor — Wayne State University, Detroit, MI, USA Aug 2023 – Dec 2023
Graduate Teaching Assistant — Wayne State University, Detroit, MI, USA Aug 2022 – Dec 2022
Lecturer — St. John College of Engineering and Management, Palghar, MH, India Jul 2015 – May 2018

Fellowship, Awards & Honors

- Thomas C. Rumble University Graduate Fellowship Award, Wayne State University. Aug 2023
- Overall First Place in Formula Kart Design Challenge (FKDC 2018) Mar 2018
- Overall Third Place in Formula Kart Design Challenge (FKDC 2017) Feb 2017

Leadership & Teamwork

- Team Guide for Formula Kart Design Challenge (FKDC), Palghar, MH, India. Jun 2016 - May 2018
- Team Manager for SAE INDIA Baja 2013 & Formula Student (Supra) 2014, MH, India. May 2012 - Feb 2014