



MADHAVAKUMAR K S

Post Graduate | Automotive
Technology



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PROFILE SUMMARY

Results-driven M.Tech Automotive Technology graduate with certified proficiency in CATIA and hands-on experience in vehicle design, 3D modelling, and component development. Skilled in CAD-based design workflows, Digital Twin development, and automotive systems integration. Seeking a full-time opportunity in vehicle design engineering to contribute to innovative commercial vehicle development at a leading automotive organisation.

PROFESSIONAL SKILLS

Digital Twin	CATIA
Python	MATLAB/Simulink
Multi-Physics Modelling	Real-Time Synchronisation

WORK EXPERIENCE

Centre of E- Mobility

Intern | Chennai

May 2025 - Jul 2025

- Worked on wireless charging systems at the Centre of E-Mobility (CEM) Lab, developing and implementing Model Predictive Control (MPC) algorithms to optimize charging performance, efficiency, and system stability.

EDUCATION

Diploma in Mechanical Engineering

Muthayammal Polytechnic College | Rasipuram

2018 - 2021

Design and Fabrication of Solar Panel Cleaner (Automation & IoT) • Designed the mechanical frame and motorized rotating brush assembly for an automated solar panel cleaning system, sized to traverse standard panel dimensions without surface damage. • Developed an Arduino-based control system with motor drivers for brush rotation and linear traverse motion, controlled via a Bluetooth-enabled mobile application for remote operation.

Bachelors in Engineering

Sri Krishna College of Engineering and Technology | Coimbatore

2021 - 2024

Design and Fabrication of Electric Stair Climbing Trolley (Mechanical & Vehicle Component Design) • Designed the mechanical structure and tri-star (tri-wheel) climbing mechanism in CAD, enabling stable ascent and descent of standard staircases while carrying transport loads. • Selected and sized the DC gear motor, drivetrain, and battery pack based on torque and power calculations derived from required load capacity and stair geometry (riser height and tread depth). • Developed a motor control circuit with speed regulation and direction control to ensure smooth.

Master of Technology

SRM Institute of Science and Technology, ARAI Academy | Chennai, Pune

2024 - 2026

Development of Digital Twin of a BDC Electric Motor for Monitoring Motor Performance • Designed and implemented a Secure Digital Twin Framework for a 24V, 350W BDC electric motor, integrating real-time sensor data acquisition, a physics-based MATLAB/Simulink Digital Twin, an edge-deployed Intrusion Detection System (IDS), encrypted MQTT/TLS communication, and a cloud-hosted Firebase dashboard with automatic motor control. • Built a multi-physics Digital Twin in MATLAB/Simulink (electrical, mechanical, thermal, and NVH sub-models) synchronized in real time with live sensor data from a Raspberry Pi 4B. • Designed and validated an 8-rule Host Intrusion Detection System (HIDS) in Python, detecting sensor spoofing, replay, data injection, and other attacks within 50 ms. • Implemented MQTT over TLS 1.3 with a 3-certificate PKI for mutual authentication and AES-256-GCM encrypted sensor-to-cloud communication. • Developed a live Firebase web dashboard (HTML5/JavaScript) with real-time charts, fault-alert lamps, IDS alert logging, and automatic closed-loop motor control. • Achieved Digital Twin thermal accuracy of RMSE $\leq 0.4^{\circ}\text{C}$; design aligned with ISO 26262 (ASIL D), ISO/SAE 21434 (CAL 4), AUTOSAR, and UNECE WP.29 / UN R155 standards. Development of LKA with Surface Monitoring in Concept Car (Vehicle Systems Design & Embedded Control) • Designed and implemented a Lane Keep Assist (LKA) system on a CATIA-modelled RC concept car platform, integrating a Raspberry Pi 4B and Pi Camera module for real-time lane detection using OpenCV-based image processing (edge detection, Hough transform, and perspective warping). • Developed a closed-loop PID control algorithm for adaptive steering and throttle modulation, dynamically adjusting correction gains based on detected lane curvature and lateral deviation. • Integrated surface condition monitoring via onboard IR/ultrasonic sensors to classify road surface type (dry, wet, gravel) and adapt control gains for stable lane-keeping across varying traction conditions.

KNOWN LANGUAGES

English	Read Write Speak	- Intermediate
Tamil	Read Write Speak	- Native
Hindi	Read Speak	- Basic

PERSONAL DETAILS

Date of Birth:	10 May 2003	Nationality:	India
Country:	India	Marital Status:	Single
Driving Licence:	Yes		