

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

Intern

Centre of E- Mobility | 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 < 0.4°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

LANGUAGE	READ	WRITE	SPEAK	LEVEL
English	Yes	Yes	Yes	Intermediate
Tamil	Yes	Yes	Yes	Native
Hindi	Yes	No	Yes	Basic

PERSONAL DETAILS

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