

KARTHIK RENGARAJAN

Ph: +1 (979) 985-8582 | Email: karthik.rengarajan3@gmail.com VISA STATUS: H1B Holder since Oct 2021 |

SUMMARY

Highly analytical and results-oriented Control Systems Engineer with a strong background in vehicle dynamics, nonlinear controls, systems engineering and functional safety. Proven ability to lead full-cycle verification and validation efforts, develop automated test procedures, analyze complex data, and identify root causes for electro-mechanical systems. Seeking to leverage expertise in test planning, execution, and analysis to contribute to cutting-edge autonomous vehicle systems.

WORK EXPERIENCE

Nuro, Mountain View, CA

Feb 2026 - Present

Senior Controls Engineer

- Develop low-latency Motion Control and Trajectory Processor algorithms hand-coded in bare-metal C to ensure deterministic execution on embedded hardware targets.
- Interact with Vehicle OEMs to define System Requirements, establish physical subsystem boundaries, and reconcile performance characteristics of external vendor components.
- Follow ISO-26262 Functional Safety standards to implement safety-critical SSRs by decomposing vehicle-level TSRs down to the firmware layer, ensuring rigid fault-containment boundaries.
- Leverage AI and advanced machine learning models at every step to optimize control loop optimization, automate data parsing, and dramatically boost performance and tuning speed.
- Work on improvements of Vehicle Modeling by executing empirical System Identification (SysID) and performance identification to capture non-linearities like friction, backlash, and compliance.
- Work on a custom simulation stack using C++, building high-fidelity physics functions and object-oriented models to run highly accurate Software-in-the-Loop (SIL) regression testing.

Nexteer Automotive, Auburn Hills, MI

System Controls Engineer II

Aug 2022 - Feb 2026

- Led the full-cycle verification and validation of critical Steer-by-Wire (SbW) features, including End of Travel Management, Misalignment Management, ADAS command integration, and Vehicle Disturbance Rejection, from software architecture to in-vehicle testing.
- Validated core SbW control algorithms (Rack Position Target Generator, Robust Misalignment Management) through comprehensive MIL, HIL, and in-vehicle testing, ensuring robustness and performance.
- Developed advanced chassis control strategies using nonlinear methods (Sliding Mode Control, Backstepping) within a Carsim-MATLAB co-simulation environment, with a focus on testability and analysis.
- Enhanced ADAS performance by creating novel algorithms to manage Torque Steer, Brake Pull, and dynamically modify driver feel during understeer/oversteer conditions, followed by rigorous testing and performance analysis.
- Designed a critical safety algorithm for Pinch Detection in electronically stowable steering columns, incorporating design for safety and repeatability in test procedures.
- Executed software integration and build processes for prototype deployment within an AUTOSAR framework, utilizing Vector DaVinci tools and hand-coding in C, with a focus on test automation and debugging.

TuSimple, Tucson, AZ

Vehicle Controls Engineer - Integration

Feb 2022 - Aug 2022

- Managed longitudinal control, power management, and power bridge controls for autonomous trucks, including integration testing and performance verification.

FEV North America, INC, Auburn Hills, MI

Control Systems Engineer - Electrified Powertrain

Feb 2019 -

Feb 2022

- Developed and verified Torque Management Control Strategies for hybrid systems using mathematical modeling in an Agile workflow.

- Designed and improved Motor Speed PID Control modules governing engine and clutch slip speed for PHEV and MHEV programs, including validation against requirements.
 - Collaborated in Agile environments, managing software releases via GitHub and tracking issues in JIRA.
 - Acted as focal point for Engine Start-Stop Controls, coordinating with Systems and Calibration Engineers to define test scope and acceptance criteria.
 - Authored DV test cases, defined acceptance criteria, and executed DVP&R testing for electrified powertrain systems.
 - Conducted functional testing on MIL/SIL/Component-HIL/System-HIL platforms and vehicles, debugging issues using dSPACE-ControlDesk and ETAS-INCA.
 - Participated in DFMEA during system and sub-system requirements development, demonstrating understanding of systems engineering principles and formal verification methods.
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TECHNICAL SKILLS

Expertise: Vehicle Dynamics, Nonlinear Adaptive Controls (Sliding Mode, Backstepping), Control System Theory, State Estimation (Kalman Filters, Particle Filters), Hybrid and Electric Powertrains, Functional Safety (ISO 26262), ASPICE, AGILE methodologies, Machine Learning, Deep Neural Networks.

Tools & Languages:

- **Programming:** MATLAB/Simulink/Stateflow, Python, C/C++
 - **Test & DAQ:** dSPACE-ControlDesk, ETAS-INCA, Vector CANoe, Vector CANape, Vector Davinci Developer & Configurator, CAN/LIN protocols
 - **Version Control & Project Management:** GIT, IBM DOORS, IBM Jazz, JIRA
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ACADEMIC WORK / CERTIFICATIONS

- **Automotive Functional Safety Professional Certification – ISO 26262** (SGS TUV)
 - **SAE – The Fundamentals of Vehicle Dynamics**
 - **C++ Nanodegree – Udacity:** Focus on Object-Oriented Programming, Memory Management, and Concurrency.
 - **Self-Driving Car Engineer Nanodegree – Udacity**
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EDUCATION

- **Doctor of Engineering – Computer Engineering**, University of Michigan, Dearborn – **Started Jan 2025 ***
- **Master of Engineering – Mechanical Engineering (Specialization: Controls)**
Texas A&M University, College Station, TX | **Dec 2018** | GPA: 3.88/4.0
- **Bachelor of Technology – Mechanical Engineering**
Amrita University, India | **Jun 2016** | GPA: 9.38/10