Chandramouli Gnanasambandham, Dr.-Ing.

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Vehicle Performance Modelling Engineer

Advancing Automated Driving with Expertise in Vehicle Dynamics and Model Validation

Motivated and Experienced Vehicle Dynamics Engineer with 12+ years of experience in vehicle dynamics and object-oriented programming with C++. Skilled in physics based simulation, computational methods, and scalable software architectures. Strong background in safety critical systems and vehicle model validation, with a proven track record of leading international, cross-functional teams.

- ✓ **Led development of vehicle dynamics models** (300+ users) using test-driven development in C++.
- ✓ **Collaborated with OEMs and domain experts** to develop scalable model validation strategies.
- ✓ **Integrated real-time models into a complex robotics project** for V&V, ensuring ISO-26262 compliance.
- ✓ **Proficient in Git, DevOps and Containerization tools** for scalable and maintainable software solutions.
- ✓ **Led collaborative design and development** of a cutting-edge integration-test-platform for models in Python.
- ✓ **Played a vital role in providing simulation expertise** to tune control algorithms for safety-critical systems.

TECHNOLOGIES & TOOLS

Languages: C/C++, Python, BASH, MATLAB
Project & Collaboration: Atlassian (JIRA, Confluence)
Operating systems: Linux (Debian/Ubuntu), Windows
GUI Frameworks Qt, MATLAB-GUI, Plotly, Streamlit
DevOps Tools: GitLab CI/CD, Jenkins, GitHub actions

Testing frameworks: pytest, Google test
Vehicle Dynamics: ObjectSim, CarMaker
Debuggers/Profilers: `gdb`, `calgrind`, Intel VTune
Build Systems CMake, Bazel
Standards: ISO-26262

PROFESSIONAL EXPERIENCE

Torc Europe GmbH, Stuttgart, Germany   04/2023 - present

Staff Software Engineer

Led development of highly-scalable vehicle models in C++17 using OOP and CI/CD methodologies.

Reported to: Director, Simulation   **Direct reports:** 1 Staff, 2 Senior Engineers and 2 Interns

- Converted and validated Simulink models into high-performance, real-time capable C++ software components.
- Led interactions with cross-functional teams to identify target use cases and requirements for the vehicle models.
- Collaborated with OEMs and ext. partners to develop ISO-26262 compliant vehicle model validation strategies.
- Mathematical modeling and simulation of electromechanical components of an autonomous vehicle.
- Auto-generated documentation, including control system block-diagrams from code based on Git-events.

Daimler Truck AG, Stuttgart, Germany   08/2021 - 03/2023

Vehicle Model Engineer

Developed multi-fidelity vehicle models using MATLAB/Simulink and C++14.

Reported to: Product Owner, Simulation   **Direct reports:** 1 Senior Engineer and 2 Interns

- Developed and evaluated multi-fidelity vehicle models in MATLAB/Simulink, to enable controller tuning.
- Implemented a TCP/IP co-simulation interface in C/C++ to integrate high-fidelity truck models, including CAN bus simulations, with AD stack, showcasing expertise in system integration and networking.
- Developed diagnostic and debugging workflows using packet sniffers such as Wireshark and Python scripting.

Institute of Engineering and Computational Mechanics, Stuttgart, Germany   05/2016 - 04/2021

Academic Researcher

Academic Researcher in Particle Dynamics, Software Development, and Experimental Mechanics.

- Conducted experiments and simulations to determine the optimal particle shape for enhanced dissipation, using CAD/3D printing technology for validation.
- Planned and conducted measurement campaigns on vibrational structures using Laser-Doppler Vibrometry.
- Developed a Hall-effect sensor-based linear position measurement system on an Arduino embedded platform.

EDUCATION

Ph.D. in Mechanical Engineering, University of Stuttgart, 2021
Grade: Magna Cum Laude | *Thesis*: Particle Dampers - Enhancing Energy Dissipation using Fluid/Solid Interactions and Rigid Obstacle-Grids.

M.Sc. in Commercial Vehicle Technology, Technical University of Kaiserslautern, 2016
Grade: 1.9 | *Focus*: Automotive Software Engineering, Embedded Systems, Real-Time Systems and Simulation.

B.Eng. in Production Engineering, Anna University, Chennai, India, 2012
Grade: 8.3/10 (equivalent to a German grade of 1.3)

AWARDS & HONOURS

Best Presentation Award 2015
An adaptive approach to real-time estimation of vehicle dynamics parameters using kalman filtering.

Best Presentation Award 2014
Optimization of vehicle parameters based on lap-time simulations using multi-objective evoluation algorithm.

CERTIFICATION & PROFESSIONAL DEVELOPMENT

Demonstrated cross-cultural team leadership | Implemented ISO-26262 functional safety requirements.

LANGUAGES

English (Proficient) | German (Proficient) | Tamil (Native) | Hindi (Advanced)

ADDITIONAL PROJECTS

Custom PCB for Bluetooth Remote – DIY Electric Skateboard   2023

✓ Designed and built a custom PCB for a Bluetooth remote to control a self-built electric skateboard.

Raspberry Pi Powered Smart-Home Network   2020

✓ Built a versatile Raspberry-Pi smart home network with remote-access, custom file storage server with automatic backups using rsync, Zigbee/MQTT server for controlling IOT devices using siri/google-nest and custom automations.

Machine Learing Suite   2015

✓ Implement a deep convolution neural network for optical character recognition as part of a freelance software project in MATLAB. Used MEX API to increase performance.

Driver-in-the-Loop Simulator   2014

✓ Implemented a driver-in-the-loop simulator by coupling IPG CarMaker and MATLAB/Simulink.

SELECTED PUBLICATIONS*

Gnanasambandham, C.; Fleissner, F.; Eberhard, P.: Enhancing the dissipative properties of PDs using rigid obstacle-grids. Journal of Sound and Vibration, 2020.
Gnanasambandham, C.; Stender, M.; Hoffmann, N.; Eberhard, P.: Multi-scale dynamics of PDs using wavelets: Extracting particle activity metrics from ring down experiments. Journal of Sound Vibration, 2019.

***for a complete list of publications, visit my Google Scholar Profile