Chandramouli Gnanasambandham, Dr.-Ing.

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Control Engineer for Humanoid Robots

Advancing Humanoid Robotics with Expertise in Dynamical Systems and Scalable Software Architectures.

Experienced Robotics and Software Engineer with 12+ years of experience in simulation tool development, real-time control and C++ programming. Specialized in physics based simulation, control of dynamical systems, and scalable software architectures. Strong background in safety critical systems (ISO-26262) and software validation with a proven track record of leading international teams and collaborating with OEMs.

- ✓ **Led development of physics based vehicle models** (300+ users) using test-driven development and C++.
- ✓ **Integrated vehicle models into ROS2 simulator** for virtual validation, ensuring ISO-26262 compliance.
- ✓ **Proficient in Git workflows and DevOps tools** for scalable and maintainable software solutions.
- ✓ **Implemented co-simulation interface to connect truck models** with virtual drivers for real-time testing.
- ✓ **Authored 6 peer-reviewed papers** in international journals, showcasing expertise in multi-physics simulation.

TECHNOLOGIES & TOOLS

Languages: C/C++, Python, BASH, `MATLAB`, Julia
Operating systems: Linux (Debian/Ubuntu), Windows
Simulation: Simulink, IPG CarMaker, COMSOL
Linear algebra libraries: PETSc, EIGEN
DevOps Tools: Git, Docker, Jenkins, GitHub actions
Testing frameworks: `pytest`, Google test
Debuggers/Profilers: `gdb`, `calgrind`, Intel VTune
Networking: ROS1, ROS2, TCP/IP
Standards: ISO-26262

PROFESSIONAL EXPERIENCE

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

Staff Software Engineer

Led development of highly-scalable simulation tools in `C++` *using TDD and CI/CD methodologies.*

Reported to: Director, Simulation **Direct reports:** 3 Senior and 1 Staff Engineers **Budget Oversight:** $300,000

- Integrated vehicle models in a ROS2 simulator for validation of autonomous vehicles.
- Championed software best practices, including code formatting, linting, and peer reviews.
- Collaborated with external stakeholders to develop a scalable model validation strategy as per ISO-26262.
- Scripting for auto-generating documentation, incl. 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`.

Reported to: Product Owner **Direct reports:** 1 Senior Engineer and 1 Co-op. **Budget Oversight:** $100,000

- Developed multi-fidelity vehicle models in `MATLAB/Simulink`, to enable tuning of motion control parameters.
- Designed and implemented a TCP/IP-based co-simulation interface in C++ to integrate high-fidelity truck models with virtual drivers, showcasing expertise in system integration and networking

University of Stuttgart, Germany **05/2016 - 04/2021**

Academic Researcher

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

- Development and administration of the particle simulation software Pasimodo in C++.
- Planning and execution of measurement campaigns of virbational structures using Laser-Doppler Vibrometry.
- Organisation und assistance for the lecture vehicle dynamics and supervision of lab workshops

Fraunhofer Institute (ITWM), Kaiserslautern, Germany **10/2015 - 04/2016**

Intern

Implemented innovative simulation tools to automate vehicle drive data analysis.

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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***: Control Theory, Dynamical Systems, Automotive Software Engineering and Embeded Systems.

B.Eng. in Production Engineering, Anna University, Chennai, India, 2012
Grade: 8.3/10

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

Raspberry Pi Powered Smart-Home Network **2020 - present**

- ✓ Built a versatile Raspberry-Pi smart home network with remote-access, custom file storage server with automatic backups using `rsync`, Zigbee2Mqtt 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