Markus Heimerl

Embedded Systems Engineer & AI Implementation Specialist

info@markusheimerl.com github.com/markusheimerl
markusheimerl.com linkedin.com/in/markusheimerl
* +49 176 78227914

Professional Summary

Results-driven Embedded Systems Engineer with expertise at the intersection of hardware and software development. Specialized in implementing AI algorithms in constrained environments, from state space models to neural networks. Demonstrated success optimizing complex codebases and creating reliable, performant systems across automotive and aviation applications. Proven track record of improving system performance through deep technical understanding and innovative problem-solving approaches.

Professional Experience

Automotive Developer 01/2024 - Present
intive GmbH *Regensburg, Bavaria*

- Lead optimization of "Carmen," a critical visualization tool for BMW's ECU network communications, resulting in 30% improved performance
- Refactored complex legacy C++ codebase, implementing SOLID principles to enhance maintainability and reduce technical debt
- Designed and implemented automated testing infrastructure that increased test coverage from 40% to 85%
- Coordinated cross-functional teams to align development priorities across engineering disciplines

Software Development Engineer 01/2023 - 12/2023
VECTOR Informatik *Regensburg, Bavaria*

- Architected and implemented secure flash bootloader for automotive ECUs, ensuring robust OTA update capabilities
- Enhanced testing framework using Google Test, strengthening reliability of safety-critical components
- Collaborated on AUTOSAR Classic implementations, ensuring standards compliance while optimizing performance
- Spearheaded Git workflow improvements that reduced merge conflicts by 45% across development teams

Academic Tutor - Digital Design 03/2022 - 12/2022
Ostbayerische Technische Hochschule Regensburg *Regensburg, Bavaria*

- Mentored engineering students in digital logic design, VHDL implementation, and processor architecture
- Developed hands-on workshops that increased practical understanding of digital system design
- Created supplemental materials on circuit implementation that improved student exam performance by 15%

Technical Projects

Quadcopter Control System 01/2021 - Present
Personal Research Project *github.com/markusheimerl/quad*

- Engineered complete flight control system including custom PCB design, firmware, and simulation environment
- Implemented state space models and imitation learning for autonomous flight capabilities
- Developed real-time control algorithms optimized for resource-constrained embedded systems
- Created comprehensive test environments and CI/CD pipelines to ensure system reliability

State Space Model (SSM) Implementation 02/2024 - Present
Open Source Contribution *github.com/markusheimerl/ssm*

- Developed efficient C implementation of state space models for embedded applications
- Optimized matrix operations for memory-constrained environments while maintaining numerical stability
- Achieved 3x performance improvement over existing implementations through careful algorithm design

Small Language Model (SLM) 01/2024 - Present
Open Source Contribution *github.com/markusheimerl/slm*

- Created lightweight language model implementation suitable for deployment on edge devices
- Optimized inference pipeline to operate within strict memory and computational constraints
- Integrated quantization techniques to reduce model size by 75% with minimal accuracy loss

Education

Bachelor of Science in Computer Engineering 2018 - 2022
Ostbayerische Technische Hochschule Regensburg *Grade: 1.x/1.0*

- Thesis: *"Development of a RISC-V RV32I Processor with VGA Interface using VHDL"*
- Key coursework: Embedded Systems Design, Digital Signal Processing, Computer Architecture, Operating Systems, Robotics
- Activities: Organized TEDxOTHRegensburg, participated in the university's Buddy Program for international students

Technical Expertise

- **Programming Languages:** C/C++, Python, VHDL, Assembly
- **Embedded Systems:** RTOS, Bare-metal, ARM, RISC-V
- **AI/ML:** State Space Models, Neural Networks, Imitation Learning
- **Hardware Design:** PCB Design, Digital Logic, FPGAs
- **Software Engineering:** Git, CI/CD, TDD, SOLID
- **Automotive:** AUTOSAR, ECU Development, Diagnostics
- **Tools:** Google Test, Jira, Altium, ModelSim
- **Web Technologies:** HTML/CSS, Tailwind, SupaBase

Languages

German (Native) English (C1, TOEFL iBT 105/120)

Certifications

- **Aerial Robotics** - Coursera (2021)

Volunteer Experience

Event Organizer 03/2019 - 08/2019
TEDxOTHRegensburg *Regensburg, Bavaria*

- Recruited and coached speakers, including Dr. Max Plach on CRISPR technology
- Implemented online ticketing system using WordPress, streamlining attendee experience
- Secured sponsorship from InterNetX GmbH through effective relationship building