Markus Heimerl

Embedded Systems Engineer

Contact

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markusheimerl

Technical Skills

Programming
C/C++ (bare-metal), Python, VHDL/Verilog, Assembly

MCU/Processors
ARM Cortex-M, RISC-V, STM32, ESP32

Signal Processing
State Space Models, Kalman Filters, Real-time DSP

Hardware
PCB Design, Oscilloscope, Logic Analyzer, JTAG/SWD

Safety-Critical
AUTOSAR, MISRA C, Fault-tolerant Design

Protocols
SPI, I2C, UART, CAN, BLE

Languages

German
Native Speaker

English
C1 Level (TOEFL iBT 105/120)

Certifications

Aerial Robotics
University of Pennsylvania (2021)

Professional Summary

Embedded Systems Engineer with demonstrated expertise in developing safety-critical, power-constrained systems. Strong background in signal processing algorithms, bare-metal firmware development, and hardware-software co-design. Passionate about pushing the boundaries of embedded systems and eager to contribute to revolutionary brain-computer interface technology.

Professional Experience

Automotive Embedded Developer May 2024 - Present
intive GmbH, Regensburg

- Developing safety-critical ECU network diagnostic and visualization tool for BMW
- Leading refactoring effort to improve performance and maintainability
- Coordinating cross-functional collaboration between hardware and software teams

Embedded Software Engineer Jul 2023 - Dec 2023
VECTOR Informatik, Regensburg

- Contributed to bootloader development with OTA capabilities for automotive MCUs
- Implemented fault-tolerant firmware update mechanisms with rollback protection

Digital Design Teaching Assistant Mar 2022 - Dec 2022
OTH Regensburg

- Taught FPGA development and digital signal processing fundamentals
- Created practical labs for real-time system design and hardware debugging

Exceptional Technical Projects

Real-Time Flight Control System 2021 - Present
github.com/markusheimerl/quad

Designed complete autonomous quadcopter featuring custom PCB, bare-metal firmware, and experimental state space model implementation for state estimation. System integrates IMU sensor fusion, motor control and vision.

High-Performance State Space Models 2024
github.com/markusheimerl/ssm

Implemented optimized C/CUDA state space models for embedded deployment, achieving significant performance improvements while maintaining numerical stability.

RISC-V Processor Implementation 2022
Bachelor's Thesis

Designed complete RV32I processor in VHDL with custom peripherals, VGA controller, and DMA. Implemented hardware debugging interface and achieved stable 100MHz operation on Xilinx Artix-7 FPGA with comprehensive testbench verification.

Education

B.Sc. Computer Engineering 2018 - 2022
OTH Regensburg - Top 20% of class
Focus: Embedded Systems, Digital Signal Processing, Computer Architecture

Relevant Coursework: Real-Time Systems, VLSI Design, Control Theory