

# Markus Heimerl

Embedded Systems Engineer

## Contact

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## 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.

## Professional Experience

### Automotive Embedded Developer

*intive GmbH, Regensburg*

May 2024 - Present

- 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

*VECTOR Informatik, Regensburg*

Jul 2023 - Dec 2023

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

### Digital Design Teaching Assistant

*OTH Regensburg*

Mar 2022 - Dec 2022

- 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

*[github.com/markusheimerl/quad](https://github.com/markusheimerl/quad)*

2021 - Present

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

*[github.com/markusheimerl/ssm](https://github.com/markusheimerl/ssm)*

2024

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

### RISC-V Processor Implementation

*Bachelor's Thesis*

2022

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

*OTH Regensburg - Top 20% of class*

2018 - 2022

**Focus:** Embedded Systems, Digital Signal Processing, Computer Architecture

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