MARC NEU

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PROFESSIONAL SUMMARY

Digital Systems Engineer with experience in real-time data processing on FPGA and SoC platforms. Skilled in implementing machine learning models using efficient pipelined architectures and familiar with CGRA concepts, state-of-the-art FPGAs, and hardware software co-design. Published researcher with practical experience in System Verilog, Python, digital signal processing, high-speed interfaces, verification, prototyping, and laboratory measurements.

PROFESSIONAL EXPERIENCE

PhD Candidate
2022 – 2026

Institute for Information Processing Technologies, Karlsruhe Institute of Technology (KIT), Karlsruhe

- Designed, implemented, and commissioned an FPGA-based Graph Neural Network (GNN) module for the Belle II electromagnetic calorimeter, achieving a sustained throughput of 8 million frames per second with sub-microsecond latency.
- Developed deployment strategies for hardware-accelerated Graph Neural Networks (GNNs) and Point Cloud Networks (PCNs) tailored to large-scale scientific experiments.

Research Assistant
2020 – 2021

Institute for Information Processing Technologies & Institute of Radio Frequency Engineering, Karlsruhe

- Designed and verified digital memory module with PCI-E for the Tandem-L satellite project
- Simulated broadband bondwire transitions at 240 GHz
- PCB layouts and simulations for high-frequency applications

Working Student in Application Engineering
2019 – 2020

Infineon Technologies AG, Munich

- Performed circuit simulations in PSpice for power electronics applications
- Compared concepts for interfacing IGBT gate drivers and with Infineon power management ICs

Intern in Hardware and Logic Engineering
2019

Airbus Defence and Space, Ottobrunn

- Contributed to a proof-of-concept development for a novel atomic clock
- Completed Bachelor thesis in cooperation with Karlsruhe Institute of Technology

EDUCATION

M.Sc. Electrical Engineering and Information Technology
2019 – 2022

Grade 1.1, Karlsruhe Institute of Technology (KIT), Karlsruhe

Thesis: Design and evaluation of a Track Segment Finder for the Belle II particle accelerator based on machine learning methodology

B.Sc. Electrical Engineering and Information Technology
2016 – 2019

Grade 1.7, Karlsruhe Institute of Technology (KIT), Karlsruhe

Thesis: Design of a digital controller for a novel atomic clock

General Abitur
2015

Grade 1.6, Bildungszentrum Markdorf Gymnasium, Markdorf

SELECTED PUBLICATIONS

M. Neu, I. Haide, T. Justinger, T. Rädler, V. Dajaku, T. Ferber, J. Becker, "Real-Time Graph-based Point Cloud Networks on FPGAs via Stall-Free Deep Pipelining", in *Proc. IEEE SBCCI*, Manaus, Brazil, 2025.

M. Neu, C. Karle, P. Schmidt, J. Höfer, T. Harbaum, J. Becker, "A Dynamically Pipelined Dataflow Architecture for Graph Convolutions in Real-Time Event Interpretation," in *Proc. IEEE SOCC*, Dresden, Germany, 2024.

M. Neu, J. Becker, P. Dorwarth et al., "Real-Time Graph Building on FPGAs for Machine Learning Trigger Applications in Particle Physics," *Computing and Software for Big Science*, vol. 8, no. 8, 2024.

M. Neu, C. Karle, B. Nuss, P. Groeschl, J. Becker, "A Scalable and Cost-efficient Antenna Testbed using FPGA-Server Compound Structures for Prototyping 6G Applications," in *Proc. IEEE DCOSS-IoT*, Coral Bay, Cyprus, 2023.

TECHNICAL SKILLS

Programming

System Verilog, Python, C++, Scala, Tcl

Tools & Software

AMD Vivado, AMD Vitis, Cadence Virtuoso, Make, Git, Linux

Digital System Design

Strong focus on FPGA firmware development with Hard IP Cores such as GT transreceivers, AD converters, or CMACs, Digital Signal Processing (DSP), measurements with oscilloscopes or network analyzers, soldering

AWARDS & HONORS

Leadership Talent Academy Scholarship 2021
Karl Schlecht Foundation

Germany Scholarship 2021
Federal Ministry of Research, Technology and Space

Abitur Prize 2015
German Physical Society

VOLUNTEERING & ADDITIONAL EXPERIENCE

Student Model Advisor 2022 – 2025
Supported students in their course selection for their study programme

Mu-Zero Hyperloop e.V. Member 2020 – 2021
Developed control system concept for a linear motor

Academic Tutor 2017 – 2022
Optimization of Dynamic Systems, Linear Electrical Networks, Higher Mathematics II

Erasmus Exchange 2018
University of Southampton, United Kingdom