

## Student Assistant Job for the eki-Project

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### Student Position

#### At a glance

- Work on neural network inference on FPGAs
- Contribute to scientific publications
- Bring your own ideas to the project
- Work with different technologies

Artificial intelligence (AI) has become an increasingly important and widely used tool in recent years. It is foreseeable that the use of AI will continue to grow in the coming years. Nowadays, the majority of artificial intelligence is implemented using neural networks. However, the problem is that neural networks are very computationally intensive and therefore energy-intensive. The energy consumption for training a large neural network is estimated at around 660 MWh of energy, which results in around 284 tons of CO<sub>2</sub> emissions. At the same time, it is assumed that the application phase (inference) of neural networks consumes about ten times more energy over the lifetime of the neural network.

The eki project aims to approximate the inference of neural networks on FPGA hardware and thus enable energy-efficient inference in the data center. The eki project is being carried out in collaboration with AMD and Megaware.

#### Tasks & opportunities:

- Familiarization with the FINN framework through the creation of user guides
- Optimizing the integration of the FINN framework into the Noctua 2 computing cluster
- Performance optimization & implementation of new techniques to increase the performance of neural networks on FPGA hardware
- Implementation of new components for the FINN framework from AMD Xilinx
- Involvement in scientific publications
- Contribution & development of own ideas!

#### Requirements:

- Good Python knowledge
- Basic knowledge in C/C++ and Linux
- Interest in scientific work & familiarizing yourself with (complex) new topics
- Ability to work independently and in a team
- **Nice-to-have:** Experience in neural networks or/and FPGAs

#### Further reading:

<https://eki-project.tech>

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