# Doctoral Thesis: Design of Specialized Edge AI Hardware Platform for Motor Drive Applications (f/m /div)*

## Job description

The industrial doctorate at Infineon: Pursue a doctoral degree at a university and gain professional experience simultaneously - an ideal start for your career. Advance your research with us and profit from our vast network of doctoral candidates and the expertise of a university. Mentorship is handled by both professors and dedicated Infineon employees. We are offering a doctoral thesis dealing with the Design of Specialized Edge AI Hardware Platform for Motor Drive Applications. Artificial intelligence (AI) is increasingly being adopted and applied in an increasing number of domains such as predictive maintenance, control, and sensor data interpretation. In the scope of this work the AI model has to be executed entirely at the edge device. Current deep neural networks are compute and memory access intensive. This raises the challenge of creating AI applications such that they are power efficient and demand low compute resources but are still capable of providing sufficient accurate results. In this project we aim to develop an energy efficient tiny low power compute platform with AI capabilities to save compute energy. This platform is mainly targeted towards efficient motor control which incorporate AI based control algorithm to achieve better control, reduced power consumption and enhanced motor life. As development of hardware is a complex process, we start platform design with a software model of low-power AI accelerator. This requires prototyping of hardware and embedding it in a prototype of the complete system spanning from sensor data acquisition to motor control. The thesis will be written in cooperation with Technical University Munich and under the supervision of Prof. Dr. Wolfgang Ecker.

The tasks within the thesis will consist of:

- **Defining the platform definition and requirements** after understanding the use cases
- **Developing a scalable and low-power AI accelerator** being optimized for electronic motor control
- **Creating software models** of the low-power AI accelerator.
- **Building a FPGA based hardware demonstrator**

The learnings out of the thesis will ead to

- Modelling of digital systems including software
- Deep understanding of digital chip design and development
- Understanding of energy efficient compute platform and impact of software and hardware platform

## At a glance

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| Location: | **Munich (Germany)** |
| Job ID: | **361167** |
| Start date: | **Sep 01, 2022** |
| Entry level: | **0-1 year** |
| Type: | **Full time** |
| Contract: | **Temporary** |

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## Contact

**Silke Jaschik**
Student Attraction Manager

- Model based hardware generation and understanding of different levels of abstraction in digital design

## Profile

A doctoral student is a research enthusiast,
› whose interests are scientific research combined with the passion for Infineon's innovative products and applications.
› who enjoys working in an industrial environment in combination with an Infineon partner university.
› who appreciates open communication and the contribution of an international environment.
› and is thus an excellent candidate for a further academic or industrial career after completion of their thesis.

As the ideal candidate you:

- Graduated with a master degree in **Computer Engineering, Electrical Engineering or a related field** with very good grades
- Are **interested in intersection of topics of artificial intelligence and hardware design**
- Are willing to look at a **wide spanning topic of system architecture**, following the nature of research as **interdisciplinary** with interlinked tasks that should be solved in **interaction with colleagues**
- Possess **good presentation skills** that will help you to present challenging issues clearly and simply
- **Bring curiosity and openness** as well as an i **nterest in learning and trying out** new things
- Show an **understanding of deep neural networks and associated mathematical concepts**, of **custom hardware design** such as DSP and of **prototyping** (ideally you are experienced in SystemC / C++ and Python)
- Show **good knowledge of digital design and RTL modeling** in VHDL and/ or (system) Verilog; RTL synthesis would be a plus
- Bring **very good knowledge of English and ideally German**

## Benefits

- **Munich:** Coaching, mentoring networking possibilities; Wide range of training offers & planning of career development; International assignments; Different career paths: Project Management, Technical Ladder, Management & Individual Contributor; Flexible working conditions; Home office options; Part-time work possible (also during parental leave); Sabbatical; On-site creche and kindergarden with 120 spots, open until 6pm; Holiday child care; On-site social counselling and works doctor; Health promotion programs; On-site gym, jogging paths, beachvolleyball, tennis & soccer court; On-site canteen; Private insurance offers; Wage payment in case of sick leave; Corporate pension benefits; Flexible transition into retirement ; Performance bonus; Reduced price for public transport and very own S-Bahn station; Access for wheelchairs

## Why Us

**Part of your life. Part of tomorrow.**

Infineon is a world leader in semiconductor solutions that make life easier, safer, and greener. Our solutions for efficient energy management, smart mobility, and secure, seamless communications link the real and the digital world.

The central R&D organization **„Design Enabling and Services" (DES)** provides the design environment to the different Infineon product development teams. With state-of-the-

art design methods, building blocks and a wide range of product development services DES supports Infineon's advanced IC development from early high-level system models to verified products ready for manufacturing.

** The term gender in the sense of the General Equal Treatment Act (GETA) or other national legislation refers to the biological assignment to a gender group. At Infineon we are proud to embrace (gender) diversity, including female, male and diverse.*