

## Faculty of Computer Science

At the **Institute of Computer Engineering**, the **Chair of Processor Design** offers a position as

### **Research Associate (m/f/x)**

(subject to personal qualification employees are remunerated according to salary group E 13 TV-L)

starting **01.10.2022**.

*Research area:* **Robust and low-power machine learning at the Edge**

*Terms:* The position is initially limited for two years subject to extension upon positive evaluation. The period of employment is governed by the Fixed Term Research Contracts Act (Wissenschaftszeitvertragsgesetz – WissZeitVG). The position offers the chance to obtain further academic qualification.

### **Position**

Machine learning (ML) algorithms are becoming imperative in modern applications such as personalized healthcare, precision agriculture, and smart factories. However, these algorithms are computationally intensive and have high memory and energy demands. To alleviate these challenges in utilizing ML models for resource-constrained embedded systems, we would like to develop a framework for implementing high-performance and energy-efficient accelerators for machine learning models for edge devices. These accelerators should not only be used for inference but also for training. Federated learning principles will be employed to enable robust distributed learning on multiple edge devices.

### **Tasks**

The successful candidate will:

- develop novel techniques for federated machine learning,
- identify mechanisms for partitioning learning and inference operations on edge devices,
- develop accelerators using FPGAs for low-power and high-throughput design,
- demonstrate the efficacy of the framework using real-life application, and
- publish the works in international conferences and/or journals.

### **Requirements**

We aim at attracting the best talent in the respective research fields and expect the following:

- an outstanding university degree (Master's degree or equivalent) in computer science, electrical engineering or a related field;
- good understanding of machine learning, in particular, artificial neural networks;
- good programming skills (especially on scripting, assembly-level and C languages) as well as good hardware-design skills (especially using VHDL/Verilog and component-based design);
- very good interpersonal and communication skills; in particular, the ability to effectively work in collaborative research efforts;
- strong background in mathematics;
- fluency in English – written and oral.
- Experience with high-level synthesis and multi-objective optimization techniques will provide an added advantage, in using FPGAs for design and knowledge of German would be an advantage.

## What we offer

You will join a team of enthusiastic researchers who pursue creatively their individual research agenda. Other ongoing projects at the Chair of Processor Design can be found at <https://www.cfaed.tu-dresden.de/pd-about>. The chair is a part of the “Center for Advancing Electronics Dresden”, which offers plenty of resources and structures for career development.

Informal enquiries can be submitted to Prof. Dr. Akash Kumar, Email: [akash.kumar@tu-dresden.de](mailto:akash.kumar@tu-dresden.de)

Applications from women are particularly welcome. The same applies to people with disabilities.

## Application Procedure

Please submit your comprehensive application (**in English only**) including the following: motivation letter, CV, copy of degree certificates, transcript of grades (i.e. the official list of coursework including your grades) and proof of English language skills preferably via the TU Dresden SecureMail Portal <https://securemail.tu-dresden.de> by sending it as a single pdf document quoting the reference number **PhD22-06-PD** in the subject header to [akash.kumar@tu-dresden.de](mailto:akash.kumar@tu-dresden.de) or to: **TU Dresden, Fakultät Informatik, Institut für Technische Informatik, Professur für Prozessorentwurf, Herrn Prof. Akash Kumar, Helmholtzstr. 10, 01069 Dresden, Germany**. The closing date for applications is **September 2, 2022** (stamped arrival date of the university central mail service applies). Please submit copies only, as your application will not be returned to you. Expenses incurred in attending interviews cannot be reimbursed.

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**Reference to data protection:** Your data protection rights, the purpose for which your data will be processed, as well as further information about data protection is available to you on the website: <https://tu-dresden.de/karriere/datenschutzhinweis>.

## About cfaed

*The cfaed is a Central Academic Unit which brings together 300 researchers from TU Dresden and ten other research institutions in the areas of Electrical and Computer Engineering, Computer Science, Materials Science, Physics, Chemistry, Biology, and Mathematics. The cfaed addresses the advancement of electronic information processing systems through exploring new technologies which overcome the limits of today's predominant CMOS technology. [www.tu-dresden.de/cfaed](http://www.tu-dresden.de/cfaed)*



## About TU Dresden

*The TU Dresden is among the top universities in Germany and Europe and one of the eleven German universities that were identified as an 'elite university' since 2012. As a modern full-status university with 17 faculties it offers a wide academic range making it one of a very few in Germany.*