

Faculty of Computer Science

At the **Institute of Computer Engineering** the **Chair of Processor Design** offers, subject to the availability of resources, two fixed term positions as

Research Associate / PhD Student

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

starting **as soon as possible**.

Research area: **Electronic design automation for designing secure circuits**

Terms: limited to February 29, 2024

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 (e.g. PhD).

Position

At the Chair of Processor Design we have the long-term vision of shaping the way future electronic systems are to be designed.

Today's societies critically depend on electronic systems. Over the last years, the security of these systems has been at risk by a number of hardware-level attacks that circumvent software-level security mechanisms. Solutions based on classical CMOS electronics have been shown to be either cost intensive due to a high area overhead or energy inefficient. One promising alternative against such hardware level attacks are security primitives based on emerging reconfigurable nanotechnologies. Transistors based on these disruptive reconfigurable nanotechnologies, termed as *Reconfigurable Field-Effect Transistors* (RFETs), offer programmable p- and n-type behavior from a single device. The runtime-reconfigurable nature of these nano-electronic devices yields to an inherent polymorphic functionality at the logical abstraction. As a result, circuits made of regular RFET blocks are able to provide a large number of possible functional combinations based on the apparently same circuit representation. The manufacturers, therefore, are able to program the desired functionality after chip production. The big difference to standard CMOS electronics is, that the actual circuit or function remains hidden since they cannot be differentiated from other possible combinations by physical reverse engineering. In this project, we will design the EDA flow to enable co-integration of CMOS and RFET transistors. In particular, tools for logic and physical synthesis will be developed.

Tasks:

- Getting a deep understanding of RFETs and the overall EDA flow,
- Creating a co-integration EDA flow for RFET / CMOS circuits with Genlib and Lef libraries,
- Developing logical and physical synthesis flow of RFET / CMOS circuits,
- Designing algorithms for optimal placement of RFET cells,
- Publishing the works in international conferences and/or journals.

Requirements:

- A university degree in computer science or electrical engineering,
- A deep understanding of the EDA flow from design specification to place and route,
- Strong background in HDL either Verilog or VHDL,
- Understanding of security principles will be an added advantage,
- Understanding of reconfigurable circuits will be an added advantage,
- Good communication skills,
- Fluency in English - written and oral.

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, Tel +49 (351) 463 39274; Email: 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 certificate, transcript of grades (i.e. the official list of coursework including your grades) and proof of English language skills preferably via the TU Dresden Secure-Mail Portal <https://securemail.tu-dresden.de> by sending it as a single pdf document quoting the reference number **PhD21-02-PD** in the subject header to recruiting.cfaed@tu-dresden.de or by post to: **TU Dresden, Fakultät Informatik, Institut für Technische Informatik, Professur für Prozessorentwurf, Prof. Akash Kumar, Helmholtzstr. 10, 01069 Dresden, Germany**. The closing date for applications is **February 24, 2021** (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.

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 200 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



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.