PhD on the topic: Formal Verification for Approximate In-Memory Computing

The REACT MSCA DN Project: Self-awareness in humans is an innate capability, arising from the brain's ability to process a multitude of sensory inputs. Emulating this functionality in electronic systems—commonly referred to as neuromorphic computing—holds the potential to create highly intelligent machines capable of supporting a wide range of everyday applications, from autonomous vehicles to smart navigation systems. However, realizing neuromorphic computing in practice presents significant challenges, particularly in the areas of energy efficiency, reliability, and security.

The REACT MSCA Doctoral Network addresses these challenges by developing a neuromorphic platform that is inherently self-aware in terms of energy consumption, secure operation, and system reliability. As part of this initiative, 15 early-stage doctoral candidates (f/m/d) (DCs) will be trained through a comprehensive, interdisciplinary program spanning material science, device physics, computer architecture, hardware prototyping, compiler design, simulation and emulation tools, as well as cybersecurity, reliability, and system verifiability.

REACT offers a uniquely structured training environment, combining academic excellence with industrial collaboration. DCs will benefit from close mentorship by leading researchers and industry experts, while also developing essential skills in scientific writing, research ethics, time management, and entrepreneurship.

By the conclusion of the REACT project, participants will be well-equipped to pursue impactful careers across academia and industry, with the REACT program serving as a strong foundation for their future success.

Organization:

Open to unconventional approaches to research and teaching, the University of Bremen has retained its character as a place of short distances for people and ideas since its founding 50 years ago. With a wide range of subjects, we combine exceptional performance and great innovation potential. As an ambitious research university, we stand for the approach of research-based learning and a pronounced orientation towards interdisciplinarity. We actively shape scientific collaborations worldwide in a spirit of partnership.
Today, around 23,000 people learn, teach, research and work on our international campus. In research and teaching, administration and operations, we are emphatically committed to the goals of sustainability, climate justice and climate neutrality. Our Bremen spirit is expressed in the courage to dare to try new things, in supportive cooperation, in respect and appreciation for each other. With our study and research profile and as part of the European YUFE network, we assume social responsibility in the region, in Europe and around the world.

Within the Faculty of Mathematics and Computer Science, a 3-year interdisciplinary PhD position is available at the University of Bremen. The candidate will become a member of Prof. Rolf Drechsler's

Research Group of Computer Architecture, and will be supervised by Prof. Rolf Drechsler and Dr. Chandan Kumar Jha. The position is funded by MSCA DN for 36 months. The candidate is expected to undertake secondment(s) during the first three years of the project.

Qualification & Eligibility:

- Mobility Rule: Candidates must not have resided or carried out their main activity in "**host country**" for more than 12 months in the 3 years immediately before the recruitment date.
- PhD Rule: Applicants must not already possess a doctoral degree at the date of recruitment.
- Master degree or equivalent in Electrical Engineering, Computer Science, or related field with excellent grades.
- Sound knowledge of computer hardware design, verification, and synthesis tools (ASIC, FPGA).
- Good programming (C, C++, and Python) and scripting skills.
- Excellent English communication, presentation, and writing skills.
- Must be a team player.
- Knowledge of computing-in-memory and formal verification is an added advantage.

Conditions of employment:

- We offer you in accordance with the Research Assistant (PhD Student) (f/m/d), Salary group EG 13 TV-L, 100 % (currently equivalent to approx. 4600€) for a limited period until 31.10.2028 (in accordance with § 2 WissZeitVG) on a full-time basis (39.2 hours).
- **Intended start date:** 01.11.2025
- Part-time work is generally possible. Details may need to be agreed with the advertising department.

Application:

Please submit the following material, concatenated in a single PDF file and upload this file as your 'CV' by means of the application form at Vacancies – project-react.eu.

- A cover letter motivating your application and detailing the motivation to apply for this specific PhD project (1 page max).
- An academic CV.
- A research statement (2 pages max) describing your personal research interests and previous research projects.
- A certified list of grades from your undergraduate degree(s) up to the moment of application (in case your MSc degree has not yet been awarded).
- The names and e-mail addresses of 2 academic referees who are willing and able to write recommendation letters for you, including the supervisor of your MSc research project.

You may apply for this position until 15.08.2025, 11:59pm German local time (CET) by means of the project website Vacancies – project-react.eu Applications will be evaluated as received.

The University of Bremen is family-friendly, diverse and sees itself as an international university. We therefore welcome all applicants regardless of gender, nationality, ethnic and social origin, religion/belief, disability, age, sexual orientation and identity.

As the University of Bremen intends to increase the proportion of female employees in science, women are particularly encouraged to apply. In the case of equal qualifications, women are given priority, unless reasons relating to the person of a competitor prevail.

Disabled applicants will be given priority if their professional and personal qualifications are essentially the same.

Information

For information you can contact:

- Prof. Rolf Drechsler, drechsler@uni-bremen.de
- Dr. Chandan Kumar Jha, chajha@uni-bremen.de

Please do not use the e-mail address(es) above for applications.