IHP GmbH - Leibniz-Institut für innovative Mikroelektronik

IHP is an institute of the Leibniz Association and conducts research and development of silicon-based systems and ultra high-frequency circuits and technologies including new materials. It develops innovative solutions for application areas such as wireless and broadband communication, security, medical technology, industry 4.0, automotive industry, and aerospace. IHP employs approximately 400 people. It operates a pilot line for technological developments and the preparation of high-speed circuits with 0.13/0.25 µm-SiGe-BiCMOS technologies, located in a 1500 m² cleanroom that meets the highest industrial nanotechnology requirements.

PhD Position (m/f/d) – Machine Learning for Circuit Reliability Analysis

Job-ID: 30912/26 | Department: System Architecture | Salary: as per tariff (TV-L13) | Working Time: 40h/week | Limitation: initially two years with extension option | Starting Date: as soon as possible

City: Frankfurt (Oder); Starting date (earliest): At the earliest possible; Remuneration: TV-L

Tasks

We are seeking a highly motivated PhD student to conduct research at the intersection of machine learning, electronic design automation (EDA), and electronic circuit reliability.
The position is part of a three-year research project funded by the German Research Foundation (DFG). The project aims to develop novel machine-learning methods for the analysis and prediction of circuit reliability, with the goal of making reliability assessment more efficient, scalable, and suitable for increasingly complex electronic systems.
The successful candidate will have the opportunity to investigate fundamental research questions and develop novel approaches using modern machine-learning techniques. Depending on the research direction and the candidate’s interests, possible approaches may include deep learning, graph neural networks, transfer learning, explainability of machine learning, and optimization methods.
The PhD student will have substantial freedom to develop their own research ideas within the framework of the project. The research is expected to lead to scientific publications at international conferences and in peer reviewed journals.

Your Responsibilities:

- Conduct independent research on machine learning for circuit reliability analysis
- Develop novel machine-learning methods for predicting, analyzing, or optimizing circuit reliability
- Investigate appropriate representations of electronic circuits and design data for machine-learning models
- Develop experimental frameworks and evaluate proposed methods using relevant circuit and EDA

benchmarks.
- Publish and present research results at international conferences and in scientific journals
- Collaborate with researchers from machine learning, circuit design, and EDA
- Contribute to the development of publications, and project activities

Requirements

Required qualifications:

- Master’s degree or equivalent in Computer Science, Electrical/Electronic Engineering, Data Science,
  Machine Learning, or a related field
- Strong theoretical and practical knowledge of machine learning and deep learning
- Good understanding of fundamental concepts such as optimization, generalization, and model evaluation
- Strong programming skills, particularly in Python and preferably PyTorch or a comparable machine
  learning framework
- Strong analytical and problem-solving abilities
- Ability to read, understand, and critically evaluate scientific literature
- Strong interest in scientific research and the development of novel methods
- Ability and willingness to work independently and take responsibility for your own research.
- Very good written and spoken English

Desirable qualifications:
Experience in one or more of the following areas is advantageous:

- Electronic design automation (EDA)
- Circuit reliability, fault analysis, aging, or reliability modeling
- RTL design, Verilog/SystemVerilog, FPGA, or ASIC design
- Digital circuit design or verification
- Graph neural networks and graph representation learning
- Experience with EDA tools or circuit simulation
- Previous research experience, for example through a Master’s thesis, research project, publications, or open-source contributions

A strong background in machine learning is particularly valued. Previous experience in circuit design or EDA is an advantage but is not required, provided that the candidate has a strong interest in learning the relevant domain.

What We Are Looking For:
In addition to formal qualifications, we particularly value candidates who demonstrate:

Research independence
You can identify interesting questions, formulate hypotheses, plan experiments, and make progress without requiring detailed instructions at every step.

Scientific curiosity

You enjoy exploring new ideas and understanding why a method works, rather than simply applying existing algorithms.

Critical thinking
You can critically assess assumptions, experimental results, and existing literature, and recognize the limitations of machine-learning approaches.

Persistence
You are willing to investigate unexpected results, debug complex experiments, and revise your approach when an initial idea does not work.

Interdisciplinary interest
You are interested in understanding the underlying circuit and reliability problems and are willing to learn concepts outside your primary field of expertise.

Scientific rigor
You value reproducible experiments, meaningful baselines, appropriate evaluation metrics, ablation studies, and fair comparisons.

Initiative and ownership
You actively search for relevant literature, tools, datasets, and research opportunities and take ownership of your research direction.

Communication and collaboration
You can communicate technical ideas clearly and work effectively with researchers from different disciplines.

What we offer

- A fully funded three-year PhD position within a DFG-funded research project.
- The opportunity to conduct research at the intersection of machine learning, EDA, and circuit reliability
- The freedom to develop and pursue your own research ideas within the project framework
- An interdisciplinary research environment combining machine learning and electronic design
- Opportunities to publish research in international conferences and peer-reviewed journals
- Collaboration with academic and potentially industrial research partners
- Access to relevant computational resources, software, and research infrastructure
- A supportive environment for developing both scientific and technical expertise

IHP is TOTAL E-QUALITY-certified for equal opportunities for women and men at work and actively pursues the equality of all gender and all groups of people. We promote the professional development of women and strongly encourage them to apply. Disabled applicants, qualified according to the above criteria, will be given preference over other candidates with equivalent relevant qualifications.

Further advantages:
30 days holiday | special annual payment | Company pension scheme (VBL) | Flexible

working hours, also part-time (no core working hours) | Possibility to work up to 40 % independent of location according to company agreement | Parent-child room as a possibility to work with a child in case of childcare bottlenecks | A wide range of further training opportunities in-house or within the framework of business trips | Discounted company ticket with monthly allowance of € 15 for various fare zones | Good transport connections, free parking at the institute | Canteen with breakfast and lunch | On-site health services | Company family and care guides | Free, confidential counselling by an external service provider in a wide variety of challenging private or professional situations, for example on how to reconcile work and family life or in psychosocial emergencies | Structured induction and actively supported integration into the institute (welcome workshop, intercultural workshop, joint leisure activities)

Application

Please submit:

- Curriculum vitae
- Master's degree certificate and transcript
- Short statement of motivation
- List of publications, if applicable
- Relevant software projects, GitHub repositories, or other research work, if applicable
- Contact information for academic references

In your motivation letter, please briefly describe your research interests in machine learning and/or electronic design automation and why you are interested in applying machine learning to circuit reliability analysis.
Candidates from machine learning/computer science backgrounds as well as electrical/electronic engineering backgrounds are encouraged to apply.

By internet: https://www.ihp-microelectronics.com/career/vacancies/online-application-form?job=30912/26#c977

More information at https://stellenticket.de/208893/TUD/
Offer visible until 24/12/26