

1 PhD/Postdoc position in distributed safety-critical Cyber Physical Systems

Staff Category	PhD/Postdoctoral
Department	Department of Electrical Engineering
Full time equivalent (FTE)	1.0
Starting date	As soon as possible (preferably before the end of 2021)
Number of positions	1 PhD position or 1 Postdoc position
Application closing date	As soon as the position is filled

Eindhoven University of Technology (TU/e, <https://www.tue.nl/en/>) is one of Europe's top technological universities, situated at the heart of a most innovative high-tech region, with a wealth of collaborations with industry and academic institutes. Since 2009, the TU/e is Europe's best-performing university in terms of research cooperation with industry (according to CWTS Leiden Ranking). TU/e has around 3,000 employees and 2,300 PhD students (half of which international, representing about 70 nationalities).

Project description

The envisioned research is part of the recently granted ECSEL Joint Technology Undertaking (JTU) project TRANSACT, coordinated by Philips. The goal of TRANSACT is to develop a universal distributed solution architecture for the transformation of safety-critical cyber-physical systems from local, stand-alone systems into safe and secure distributed solutions. To that end TRANSACT will leverage edge and cloud eco-systems to lower CPS' cost, increase their pace of updates, and improve applications and solution-oriented services.

The Electronic Systems group of the Electrical Engineering department at TU/e calls for applications for a PhD/Postdoctoral position funded in the TRANSACT project. The focus of the work will be on model-based approaches to analyze and manage timing performance in distributed edge/cloud platforms for safety-critical applications.

PhD/Postdoc position

The TRANSACT project copes with industrial distributed cyber-physical systems that run partly on a cloud platform, for which accurate performance models are not readily available. The goal of this project is therefore to infer performance models from the logging data obtained from the CPS running on a cloud platform.

Some of the research questions to be answered are as follows: *how can we obtain and/or predict the end-to-end response-time of a cyber-physical application that is partly executing on a given commercial cloud? How can we detect and/or predict anomalies in the timing behavior of such application? How do configuration/variation parameters of the application and the cloud service platform impact the end-to-end response time of the application?*

This project will i) identify the required models-of-computations (MoCs) based on industrial use-cases on cloud platforms, ii) formalize them with respect to syntax and semantics, and iii) develop automated inference techniques (possibly based on Machine Learning) to obtain model instances in the different MoCs.

If you apply for a postdoc position, you will also have an integral role in the project and actively collaborate with the (already hired) PhD candidates and with external project partners. The goal is to develop a method to guarantee safety and performance in distributed edge/cloud platforms for safety-critical CPS, based on the model inference, performance analysis and performance management techniques developed in project. This includes the demonstration and validation of the method on the TRANSACT use cases.

Requirements

We are looking for highly motivated candidates with very good English proficiency. Candidates must have strong analytical skills, affinity for formal models and semantics, algorithmic solutions, as well as software engineering practices and good programming skills.

- PhD candidates need to have obtained a relevant master's degree (Computer Engineering, Informatics or Computer Science, Electrical Engineering - ideally with a focus on cyber-physical systems) with excellent grades. Knowledge on **machine learning, cloud computing, real-time systems, and/or cyber-physical systems design will be considered as a plus.**
- Postdoc candidates must have a relevant PhD degree and excellent communicative skills.

Conditions of employment PhD positions

We offer a challenging job in a dynamic and ambitious university through a fixed-term appointment for a period of 4 years. The research must be concluded with the attainment of a PhD degree. As an employee of the university you will receive a competitive salary as well as excellent employment conditions. The salary starts at € 2222.- per month (gross) in the first year, increasing up to € 2840.- per month (gross) in the last year. Moreover, an 8% holiday allowance and 8,3% end-of-year allowance is provided annually.

Assistance for finding accommodation can be given. The university offers an attractive package of fringe benefits such as excellent technical infrastructure, childcare, savings schemes, and excellent sports facilities. TU/e also offers you the opportunity for personal development by developing your social and communication skills. We do this by offering every PhD student a series of courses in the PROOF program as an excellent addition to your scientific education.

Conditions of employment Postdoc positions

We offer a challenging job in a dynamic and ambitious university through a fixed-term appointment for a period of up to 3 years. This PostDoc position will have an integral role in the project and will collaborate with the three PhD candidates in the project. As an employee of the university you will receive a competitive salary as well as excellent employment conditions. The salary starts at € 2222.- per month (gross) and increases every year in accordance with the collective agreement for the Dutch universities (CAO). Moreover, an 8% holiday allowance and 8,3% end-of-year allowance is provided annually. Assistance for finding accommodation can be given. The university offers an attractive package of fringe benefits such as excellent technical infrastructure, child care, savings schemes, and excellent sports facilities. TU/e in addition offers you the opportunity for personal and professional development.

Application procedure

Applications can be sent via email to m.nasri@tue.nl or submitted through the link that will become available on the TU/e vacancy website: <https://jobs.tue.nl/en/vacancies.html>

Please submit at least the following information (**only pdf files are accepted**):

1. **Cover letter**, including availability (starting date), and statement of interests. The letter should mention which of the position(s) you are interested in.
2. **Curriculum vitae**, including full education and employment histories, publication record, proof of proficiency in English, and the names of at least three references that can be contacted.
3. **Scans of certificates showing BSc, MSc, and other courses followed, with grades and rankings.**
4. **Up to two selected publications** (e.g. MSc thesis, conference paper) in English of which you are the first or main author.

More information

For more information about the advertised positions, please contact:

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Dr. Mitra Nasri, m.nasri@tue.nl

Electronic Systems group at the TU/e

The Electronic Systems (ES) group consists of five full professors, two associate professor, six assistant professors, several postdocs, about 30 PDEng and PhD candidates and support staff. The ES group is world-renowned for its design automation and embedded systems research. It is our ambition to provide a scientific basis for design trajectories of electronic systems, ranging from digital circuits to cyber-physical systems. The group is strongly involved in the electrical engineering bachelor and master programs of the TU/e, as well as in the automotive bachelor program and the embedded systems master program. The group has excellent infrastructure that includes individual computers, computer servers, state-of-the-art FPGA and GPU farms, sensor- and ad-hoc networking equipment, a cyber-physical systems lab, an electronics lab and a comprehensive range of electronic-design software. ES has strong collaborations with industry, research institutes and other universities. Eleven of its staff members have a second affiliation besides their TUE-ES affiliation.

The ES group has been very successful in attracting funding for its research through national and international projects and collaborations (EU programs: H2020, ITEA, CATRENE, ECSEL, PENTA, Marie Curie; national programs: NWO, RVO, contract research), for a total budget of around 2M euro per year. The ES group is a multicultural team, with staff members of five different nationalities and students from all over the world.