

PhD Position

“Smart and analyzable scheduling solutions for real-time systems”

Job description

The project focuses on designing analyzable machine-learning (ML) based scheduling solutions for real-time systems (i.e., systems that require both functional and temporal correctness). What makes this project distinct from the existing learning-based scheduling solutions is that it focuses on the analyzability of the solution so that the result can be used in safety-critical real-time systems, where the end-to-end worst-case response time (WCRT) of each system functionality must be smaller than its deadline to ensure the system’s safety.

To reach this objective, the project focuses on designing scalable and accurate analysis techniques and tools to derive the WCRT of a learning-based scheduler. This can be achieved by defining effective system abstractions that allow performing a scalable yet accurate reachability analysis on the space of all possible system behaviors that could be observed under the proposed smart scheduler.

Our group has experience on designing similar types of analysis for a wide class of scheduling policies such as job-level fixed-priority scheduling policies (we call it “schedule-abstraction based analysis”). If you are interested to know more about the project and our team, please visit the following links:

<https://www.es.ele.tue.nl/~m.nasri/> or https://www.es.ele.tue.nl/~m.nasri/rtslab/SAG_position

Required skills. The candidate should have excellent mathematical, computer science and engineering skills and have affinity with scheduling and real-time systems. Experience on formal methods (or knowledge about system verification) is definitely a plus.

The candidate should be highly motivated and eager to learn new topics and be able to acquire the knowledge she/he needs very fast to be able to achieve good results in this project.

This project targets a challenging yet very hot topic in safety-critical systems and hence provides ample opportunities for the candidate to accomplish impactful scientific results that are highly visible. If you like to take this challenge and you think you have the right skills, then you may just be the candidate that we are looking for.

Eindhoven University of Technology

Eindhoven University of Technology (TU/e, <https://www.tue.nl/en/>) is one of Europe's top technological universities, situated at the heart of the high-tech industry in the Netherlands, named the Brainport region. Eindhoven is the fifth largest city in the Netherlands and including suburbs it has about 420,000 inhabitants. TU/e is a highly ranked university both in research and education. Our training and research programs are highly regarded, and we foster close relationships with companies, organizations and research institutes in the Brainport region and beyond. Fundamental and applied research are equally

valued at TU/e. The high rank of the TU/e is due to the impact of its scientific research, and also due to its scientific co-publications with industry. TU/e is a social and inspiring university with a fine culture. You will quickly feel at home, surrounded by people who share your scientific ambitions. The TU/e currently has nine departments, with over 12,000 students in total.

Department of Electrical Engineering

With almost 100 (assistant, associate and full) professors, over 200 PhD and PDEng students, about 800 Bachelor students and 300 Master students, the Department of Electrical Engineering (EE) is one of the largest departments of the TU/e. By performing top-level fundamental and applied research, offering high-quality educational programs, and maintaining strong ties with industry, EE aims to contribute to science and to innovation in and beyond the region. EE currently offers a Bachelor and Master program in Electrical Engineering and participates in several multi-disciplinary masters, such as Systems and Control, Automotive Technology and Embedded Systems, all taught fully in English.

The department's relationship with the high-tech industry in the Brainport region means that staff and students can contribute directly to the development of technological innovations with real-world relevance. The unique positioning in one of Europe's leading tech regions also means excellent job opportunities for spouses.

Electronic Systems group at the TU/e

The Electronic Systems group is one of nine groups within the department of Electrical Engineering and consists of about 20 scientific and support staff, several postdocs, an about 40 PDEng and PhD candidates. The ES group is world-renowned for its design automation and embedded systems research. The ambition is to provide a scientific basis for design trajectories of electronic systems, ranging from digital circuits to cyber-physical systems. ES research is organized in three subprograms that cover the engineering, system and circuit perspectives: model-driven engineering, smart electronic systems, and digital nano-electronics. The group has an excellent lab infrastructure that includes individual computers, computing servers, 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. The group is a multi-cultural team, with staff members and students from all over the world.

Job requirements

We are looking for candidates that match the following profile:

- A Master's degree in Computer Engineering, Computer Science, Electrical Engineering, or related disciplines.
- Strong expertise in one (or more) of the followings: **machine learning**, **real-time systems**, **scheduling**, **reachability analysis**, and/or **formal verification**.
- Expertise in or strong affinity with **scheduling** and **machine learning**.
- Good programming skills in C++ (or equivalent programming language).
- Goal-oriented, highly ambitious, hardworking, self-driven, positive and proactive problem-solving attitude, with good communication and time-management skills.

- Excellent English language skills (writing, speaking, and presenting).

Conditions of employment

We offer a fixed-term position for 4 years in a dynamic and ambitious university and a stimulating research environment. Salary and benefits are in accordance with the Collective Labor Agreement for Dutch Universities, including:

- A gross monthly salary between € 2325,- (first year) and € 2972,- (last year)
- Additionally, 8% holiday allowance and 8.3% end-of-year allowance
- A minimum of 41 holidays per year (excluding bank holidays, for a full-time employment of 40 hrs/week)
- Additional benefits, including excellent technical infrastructure, childcare, holiday savings schemes, and excellent sports facilities
- Assistance for finding accommodation
- A personal development program to develop your transferable skills (see: <https://www.tue.nl/PROOF3TU>).

Information and application

- For more information about the advertised position and any informal enquiries, please contact Dr. Mitra Nasri (m.nasri@tue.nl).
- For more information on working at the TU/e and employment conditions, see <https://www.tue.nl/en/working-at-tue/> or contact Linda van den Boomen, HR (email: l.j.c.v.d.boomen@tue.nl)

Application

If interested, please use 'apply now'-button at the top of this page. You should upload the following:

- A cover letter explaining your motivation and suitability for the position;
- A detailed Curriculum Vitae (including a list of publications and key achievements);
- A written scientific report in English of which you are the main author (MSc thesis, traineeship report or scientific paper);
- Contact information of two references;
- Copies of diplomas with course grades (transcripts).

Candidates will be selected based on grades and proficiency at university including consideration of the reputation of the university, relevant experience and skills, writing skills and publications, work experience, spoken English and presentation skills, as well as performance in relevant modeling exercises and interviews.

Application deadline: 15 March 2022

If you are interested, please apply as early as you can.