

## GPU-related PHD positions at Eindhoven University and Twente University

We're collaborating with a few universities on formal verification of GPU code. The project is called ChEOPS: verified Construction of corrEct and Optimised Parallel Software.

We'd like to put the following PhD position to your attention:

Eindhoven University of Technology is seeking two PhD students to work on the ChEOPS project, a collaborative project between the universities of Twente and Eindhoven, funded by the Open Technology Programme of the NWO Applied and Engineering Sciences (TTW) domain.

In the ChEOPS project, research is conducted to make the development and maintenance of software aimed at graphics processing units (GPUs) more insightful and effective in terms of functional correctness and performance. GPUs have an increasingly big impact on industry and academia, due to their great computational capabilities. However, in practice, one usually needs to have expert knowledge on GPU architectures to optimally gain advantage of those capabilities.

At the Eindhoven University of Technology, we work on modelling GPU applications using a Domain Specific Language (DSL), formally verifying the correctness of the models, and automatically generating GPU code. At the University of Twente, we work on the structured optimisation of GPU code, while ensuring that functional correctness is preserved. Existing formal verification techniques, model checking and code verification, are combined to create, for the first time, a complete end-to-end development workflow for GPU applications.

Two PhD positions are available to work on the following subprojects:

**SUBPROJECT 1 (Eindhoven):** DSLs for the design of GPU applications. This subproject involves the functional verification of the resulting models, as well as model-to-code generation.

**SUBPROJECT 2 (Twente):** Building model-to-code generation, and the verification of optimisations in the form of code-to-code transformations.

We expect the two PhD students to collaborate closely within the project. In addition, there will be ample interaction with the members of the Model Driven Engineering section in Eindhoven on the model-to-code generation, and with the team building the VerCors tool set for verification of concurrent software in Twente.

For more information about the concrete subprojects, please contact Marieke Huisman: [m.huisman@utwente.nl](mailto:m.huisman@utwente.nl) or Anton Wijs: [a.j.wijs@utwente.nl](mailto:a.j.wijs@utwente.nl).

We seek two PhD students with an MSc degree (or equivalent) in Computer Science.

The candidates should be enthusiastic, and have a thorough theoretical background, a demonstrable interest in DSLs and model checking (subproject 1) or program verification (subproject 2), and knowledge about multithreaded programming (at least in Java/C/C++, experience with GPU programming is a plus).

We are looking for researchers with an independent mind who are willing to cooperate in our team. It is understood that he or she works on the topics listed above. Furthermore, we ask for good communicative and collaboration skills. Candidates should be prepared to prove their English language skills.

As a research outcome we expect publications, (prototype) tools, and a PhD thesis.

Intended starting date of the position: September 1, 2019.

We offer

Two PhD position for four years (38 hrs/week). A stimulating scientific environment. Full status as an employee at the University of Twente, or the Eindhoven University of Technology, including pension and health care benefits. Gross salary PhD student: ranging from ? 2.191,00 (1st year) to ? 2.801,00 (4th year) per month, plus holiday allowance (8%) and end-of-year bonus (8.3%). Excellent facilities for professional and personal development, such as the possibility to attend courses, summer schools, conferences etc. Good secondary conditions, in accordance with the collective labour agreement CAO-NU for Dutch universities. In Twente: A green Campus with lots of sports facilities. In Eindhoven: A campus with great sports facilities, with the Eindhoven city center within walking distance.

The PhD student in Twente will be a member of the Twente Graduate School in the research programme 'Dependable and Secure Computing'. Their research programme offers advanced courses to deepen your scientific knowledge in preparation to your future career (within or outside academia). In Eindhoven, the PhD student will be able to follow such courses in the PROOF (PROviding Opportunities For PhD students) programme. We provide our PhD students with excellent opportunities to broaden their personal knowledge and to professionalise their academic skills. Participation in national and/or international summer schools and workshops, and visits to other prestigious research institutes and universities can be part of this programme.

## **FURTHER INFORMATION**

FMT group: <http://fmt.cs.utwente.nl/SET> group:

<https://www.tue.nl/en/research/research-groups/software-engineering-and-technology/> Prof.Dr. Marieke Huisman

([M.Huisman@utwente.nl](mailto:M.Huisman@utwente.nl)): [http://wwwhome.cs.utwente.nl/~marieke/Dr.Eng. Anton Wijs \(a.j.wijs@tue.nl\):](http://wwwhome.cs.utwente.nl/~marieke/Dr.Eng. Anton Wijs (a.j.wijs@tue.nl):)

<https://www.win.tue.nl/~awijs/Project> webpage: <https://fmt.ewi.utwente.nl/research/projects/view/CheOPS/>

## **APPLICATION**

To apply for the PhD position directly, follow this link:

<https://www.utwente.nl/en/organization/careers!/685937/2-phd-positions-on-the-cheops-project-in-twente-and-eindhoven-netherlands-verified-construction-of-correct-and-optimized-parallel-software>

Deadline: July 1, 2019, or until the positions are filled. Earlier applications are welcome.

Your application should consist of:

a cover letter (explaining your specific interest and qualifications); if applicable also indicate whether you prefer the position in Twente or Eindhoven a full Curriculum Vitae; this should include a list of all courses + marks, and a short description of your MSc thesis; references (contact information) of two scientific staff members.

If you have questions regarding the project or position before contacting Prof.Dr. Marieke Huisman or Dr.Eng. Anton Wijs, feel free to [contact us](#).