

PhD Position AI for Intelligent and Reliable Imaging Systems for Quantitative Bioimaging

Challenge: *Developing fast computational algorithms to incorporate and extract information from imaging data*

Change: *More advanced imaging methods such as electron microscopy, ultrasound imaging, fluorescent nanoscopy*

Impact: *Deciphering biological function across scales*

Job description

Artificial intelligence (AI) concepts are propelling nearly all computer vision-intensive applications in life science, biomedical research, space exploration, high-tech manufacturing, and security technology. While traditional image processing methods are based on linear space-invariant assumptions, neural networks are inherently non-linear and have the potential to outperform these methods. Neural networks are trained to perform a certain task using very large sets of data. The feature of adapting to data by extracting the essential information and using it to form decisions or make predictions in a “black box” is what makes this approach so useful for many applications. For scientific applications, however, this black box causes a serious dilemma: what is gained in performance is lost in interpretability of the solution. Also lost is the ability to integrate existing physical knowledge of the system. The aim of the IRIS lab is to open the black box of AI and develop methodologies for context-independent, knowledge-based learning of imaging systems that will address fundamental challenges in all quantitative imaging applications. The proposed AI-technology will be applied to electron, optical, and ultrasound imaging to unravel dynamic molecular processes in living organisms: conformational ensembles of proteins, single-molecule dynamics in thick tissue and super-resolved vasculature mapping in real-time.

Department

IRIS Lab is a Delft Artificial Intelligence Lab. Artificial intelligence, data and digitalisation are becoming increasingly important when looking for answers to major scientific and societal challenges. In a DAI-lab, experts in ‘the fundamentals of AI technology’ along with experts in ‘AI challenges’ run a shared lab. As a PhD, you will work with at least two academic members of staff and three other PhD candidates. In total, TU Delft will establish 24 DAI-Labs where 48 Tenure Trackers and 96 PhD candidates will have the opportunity to push the boundaries of science by using AI. Each team is driven by research questions which arise from scientific and societal challenges and contribute to the development and execution of domain specific education. Instead of the usual 4-

year contract, you will receive a 5-year contract. Approximately a fifth of your time will be allocated to developing ground breaking learning materials and educating students in these new subjects. The experience you will gain by teaching will be invaluable for future career prospects. All team members have many opportunities for self-development. You will work in a multi-disciplinary and diverse team and be a member of the thriving DAI-Lab community that fosters cross-fertilization between talents with different expertise and disciplines.

Requirements

- A master's degree or equivalent in bioinformatics, computer science or similar.
- Experience in programming and a passion for tinkering with code
- Strong interpersonal and communications skills (verbal and written) in English
- Prior experience in artificial intelligence/machine learning is a plus, but not required.
- Wide-ranging interdisciplinary interests, affinity for biophysical methods and numerical data analysis and intellectual curiosity for biology and the life sciences.
- An affinity with teaching and guiding students.

For more information click [here](#).

Conditions of employment

TU Delft offers DAI-Lab PhD-candidates a 5-year contract (as opposed to the normal 4-years), with an official go/no go progress assessment after one year. Approximately a fifth of your time will be allocated to developing ground breaking learning materials and educating students in these new subjects.

Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities, increasing from € 2395 per month in the first year to € 3217 in the fifth year.

As a PhD candidate you will be enrolled in the TU Delft Graduate School.

The TU Delft Graduate School provides an inspiring research environment with an excellent team of supervisors, academic staff and a mentor. The Doctoral Education Programme is aimed at developing your transferable, discipline-related and research skills.

The TU Delft offers a customisable compensation package, discounts on health insurance and sport memberships, and a monthly work costs contribution. Flexible work schedules can be arranged. For international applicants we offer the Coming to Delft Service and Partner Career Advice to assist you with your relocation.

Other benefits:

- Paid vacation 232 hours (when working 38 hours a week).
- Partially paid parental leave.

- On TU Delft campus there is an international day care centre and an international primary school.
- The international secondary school is located close to campus.

TU Delft (Delft University of Technology)

Delft University of Technology is built on strong foundations. As creators of the world-famous Dutch waterworks and pioneers in biotech, TU Delft is a top international university combining science, engineering and design. It delivers world class results in education, research and innovation. For generations, our engineers have proven to be entrepreneurial problem-solvers both in business and in a social context. TU Delft offers 16 Bachelor's and 32 Master's programmes to more than 23,000 students. Our scientific staff consists of 3,500 staff members and 2,800 PhD candidates. Together we imagine, invent and create solutions using technology to have a positive impact on a global scale.

Challenge. Change. Impact!

Faculty Mechanical, Maritime and Materials Engineering

The Faculty of 3mE carries out pioneering research, leading to new fundamental insights and challenging applications in the field of mechanical engineering. From large-scale energy storage, medical instruments, control technology and robotics to smart materials, nanoscale structures and autonomous ships. The foundations and results of this research are reflected in outstanding, contemporary education, inspiring students and PhD candidates to become socially engaged and responsible engineers and scientists. The faculty of 3mE is a dynamic and innovative faculty with an international scope and high-tech lab facilities. Research and education focus on the design, manufacture, application and modification of products, materials, processes and mechanical devices, contributing to the development and growth of a sustainable society, as well as prosperity and welfare.

Click [here](#) to go to the website of the Faculty of Mechanical, Maritime and Materials Engineering.

Delft Center for Systems and Control

The department Delft Center for Systems and Control (DCSC) of the faculty Mechanical, Maritime and Materials Engineering, coordinates the education and research activities in systems and control at Delft University of Technology. The Centers' research mission is to conduct fundamental research in systems dynamics and control, involving dynamic modelling, advanced control theory, optimisation and signal analysis. The research is motivated by advanced technology development in physical imaging systems, renewable energy, robotics and transportation systems.

Additional information

For information about this vacancy, you can contact Carlas Smith, Assistant Professor, email: iris.lab-tnw@tudelft.nl.

For information about the selection procedure, please contact Irina Bruckner, HR Advisor, email: application-3me@tudelft.nl.

Application procedure

Interested applicants should send to application-3me@tudelft.nl.

- their detailed curriculum vitae,
- the names of two professional referees,
- a list of courses taken with grades obtained in their BSc and MSc program,
- a list of publications (if any),
- a summary of their MSc thesis,
- and a cover letter stating their motivation

When applying for this position, please refer to vacancy number TUD00259.

The deadline is December 18th.

A pre-employment screening can be part of the application procedure.

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