PhD: Deep Robot Action and Control

Published: yesterday  
Deadline: 30 Nov  
Location: Delft

JOB DESCRIPTION

This project aims to develop a comprehensive toolkit that will allow roboticists to apply DRL in a way similar to how currently methods like computed-torque control or RRT can be used. One of the biggest hurdles is coming up with appropriate network architectures and associated hyperparameters. To this end, we will design and integrate automatic hyper-parameter tuning, while also providing guidelines for parameter tuning. DRL suffers from instability and the huge number of required iterations. Both can be addressed by including prior knowledge. We will investigate how prior knowledge from the control domain can be incorporated, by embedding controller structures in the network architecture.

This vacancy is part of the project Open Deep Learning Toolkit for Robotics (OpenDR). The aim of OpenDR is to develop a modular, open and non-proprietary deep learning toolkit for robotics. We will provide a set of software functions, packages and utilities to help roboticists develop and test robotic applications that incorporate deep learning. OpenDR will enable linking robotics applications to software libraries such as TensorFlow and the ROS operating environment. We focus on the AI and cognition core technology in order to give robotic systems the ability to interact with people and environments by means of deep-learning methods for active perception, cognition and decisions making. OpenDR will enlarge the range of robotics applications making use of deep learning, which will be demonstrated in the applications areas of healthcare, agri-food and agile production. The project is funded by the EU Horizon 2020 program, call H2020-ICT-2018-2020 (Information and Communication Technologies), 2019 – 2022.
REQUIREMENTS

The candidate has a very good MSc degree in systems and control, mechanical engineering, applied mathematics, artificial intelligence, machine learning, electrical engineering, computer science, or a related field. The candidate must have strong analytical skills and must be able to work at the intersection of several research domains. A very good command of the English language is required, as well as excellent communication skills. Candidates having exhibited their ability to perform research in control, optimization, robotics, and/or machine learning are especially encouraged to apply.

CONDITIONS OF EMPLOYMENT

Fixed-term contract: Temporary, 4 years.

TU Delft offers a customisable compensation package, a discount for health insurance and sport memberships, and a monthly work costs contribution. Flexible work schedules can be arranged. An International Children’s Centre offers childcare and an international primary school. Dual Career Services offers support to accompanying partners. Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities.

As a PhD candidate you will be enrolled in the TU Delft Graduate School. TU Delft Graduate School provides an inspiring research environment; an excellent team of supervisors, academic staff and a mentor; and a Doctoral Education Programme aimed at developing your transferable, discipline-related and research skills. Please visit www.tudelft.nl/phd for more information.

TU Delft creates equal opportunities and encourages women to apply.
Technische Universiteit Delft

Delft University of Technology (TU Delft) is a multifaceted institution offering education and carrying out research in the technical sciences at an internationally recognised level. Education, research and design are strongly oriented towards applicability. TU Delft develops technologies for future generations, focusing on sustainability, safety and economic vitality. At TU Delft you will work in an environment where technical sciences and society converge. TU Delft comprises eight faculties, unique laboratories, research institutes and schools.

Faculty Mechanical, Maritime and Materials Engineering

The faculty Mechanical, Maritime and Materials Engineering (3mE) trains committed engineering students, PhD candidates and post-doctoral researchers in groundbreaking scientific research in the fields of mechanical, maritime and materials engineering. 3mE is the epitome of a dynamic, innovative faculty, with a European scope that contributes demonstrable economic and social benefits.

The main focus of the Cognitive Robotics department is the development of intelligent robots and vehicles that will advance mobility, productivity and quality of life. Our mission is to bring robotic solutions to human-inhabited environments, focusing on research in the areas of machine perception, motion planning and control, machine learning, automatic control and physical interaction of intelligent machines with humans. We combine fundamental research with work on physical demonstrators in areas such as self-driving vehicles, collaborative industrial robots, mobile manipulators and haptic interfaces. Strong collaborations exist with cross-faculty institutes TU Delft Robotics Institute and TU Delft Transport Institute), our national robotic ecosystem (RoboValley, Holland Robotics) and international industry and academia.
ADDITIONAL INFORMATION

If you have specific questions about this position, please contact Dr. Laura Ferranti, email: L.Ferranti@tudelft.nl, Dr. Jens Kober, e-mail: J.Kober@tudelft.nl, or Prof. Robert Babuska, email: R.Babuska@tudelft.nl. Please do not send application emails here, but use the specified address below.