

Postdoc on Integrated Optimization-based and Learning-based Control for Large-scale Hybrid Systems

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Bridging the gap between optimization and learning.

Job description

In this postdoc project we will develop integrated optimization-based and learning-based control methods for large-scale hybrid systems — in particular network systems with piecewise affine (PWA) dynamics. More specifically, the aim is to develop several approaches to combine model predictive control (MPC) and reinforcement learning in a multi-agent control setting. This also includes setting up the overall multi-agent control framework with temporal and spatial divisions of the network, setting up multi-scale multi-resolution PWA models, and developing distributed control approaches that integrate optimization-based and learning-based control.

Applications include multi-modal transportation networks and smart multi-energy networks.

The postdoc project is part of the European ERC Advanced Grant project CLariNet – a novel control paradigm for large-scale hybrid networks. The goal of CLariNet is to create a completely new paradigm for control of large-scale networks with hybrid dynamics by bridging the gap between optimization-based control and learning-based control. The breakthrough idea is to bridge that gap by using piecewise affine models and to unite the optimality of optimization-based control with the on-line tractability of learning-based control.

Department

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.

Requirements

We are looking for a candidate with a PhD degree in systems and control, computer science, applied mathematics, or a related field, and with a strong background or interest in optimization-based control and machine learning, in particular reinforcement learning. The candidate is expected to work on the boundary of several research domains. A good command of the English language is required.

Conditions of employment

Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities (salary indication € 3.491 - € 4.402 per month). The TU Delft offers a customisable compensation package, a discount 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. An International Children's Centre offers childcare and there is an international primary school.

This postdoc position has a fixed-term contract of 2 years.

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 to address challenges in the areas of energy, climate, mobility, health and digital society. For generations, our engineers have proven to be entrepreneurial problem-solvers, both in business and in a social context. At TU Delft we embrace diversity and aim to be as inclusive as possible (see our [Code of Conduct](#)). 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. Do you want to experience working at our faculty? This [video](#) will introduce you to some of our researchers and their work.

Additional information

More information on this position can be obtained from Prof. Bart De Schutter, email: b.deschutter@tudelft.nl.

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

Application procedure

Are you interested in this vacancy? Please apply by May 31, 2021 via the application button and upload your letter of application along with a detailed curriculum vitae, a motivation why the proposed research topic interests you, a list of publications, (electronic) copies of your three most relevant journal or conference publications, the abstract and/or summary of your PhD thesis, your MSc course program and the corresponding grades, names and addresses of three reference persons, and all other information that might be relevant to your application.

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

You can apply online. We will not process applications sent by email and/or post.

Acquisition in response to this vacancy is not appreciated.

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