PhD Position Integrated optimization- and learning-based control for smart transportation networks

Job description

This PhD 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 (i.e., systems with a combination of continuous dynamics and event-driven dynamics or switching) by bridging the gap between optimization-based control and learning-based control.

The aim of this PhD project is to develop an integrated control framework for smart transportation systems that combines the best features of optimization-based control (optimality, ability to deal with constraints, …) and of learning-based control (fast online execution, ability to deal with uncertainty, ...). We will in particular focus on combining model predictive control and reinforcement learning control. In addition, by focusing on the application in smart transportation systems we will be able to leverage the specific properties and features of such systems to gain additional improvements w.r.t. integrated optimization- and learning-based control for general networked systems.

The type of smart transportation systems we consider in this context are multi-modal transportation networks containing both intelligent vehicles (with various levels of autonomy) and other modes of transportation (public transportation, mobility-on-demand solutions, cyclists, pedestrians). A further extension would be to consider the special features and requirements of transportation systems with fully electric vehicles.

If you are selected for the position, you will join our machine learning and optimization team at the Delft Center for Systems and Control (DCSC) of the faculty of Mechanical, Maritime, and Materials Engineering (3mE). At the DCSC, our mission is to conduct fundamental research in systems dynamics and control, involving dynamic modeling, advanced control theory, and optimization with societally relevant application fields including energy, transportation, and sustainability.

Requirements

This position is perfect for you if you have an MSc degree in systems and control, applied mathematics, AI, computer science, electrical engineering, or a related field, and a strong background or interest in systems & control and/or machine learning. You are also expected to work on the boundary of several research domains.

Doing a PhD at TU Delft requires English proficiency at a certain level to ensure that the candidate is able to communicate and interact well, participate in English-taught Doctoral Education courses, and write scientific articles and a final thesis. For more details please check the Graduate Schools Admission Requirements.

Conditions of employment

Doctoral candidates will be offered a 4-year period of employment in principle, but in the form of 2 employment contracts. An initial 1,5 year contract with an official go/no go progress assessment within 15 months. Followed by an additional contract for the remaining 2,5 years assuming everything goes well and performance requirements are met.

Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities, increasing from € 2541 per month in the first year to € 3247 in the fourth 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.

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 as one of our core values and we actively engage to be a university where you feel at home and can flourish. We value different perspectives and qualities. We believe this makes our work more innovative, the TU Delft community more vibrant and the world more just. Together, we imagine, invent and create solutions using technology to have a positive impact on a global scale. That is why we invite you to apply. Your application will receive fair consideration.

Challenge. Change. Impact!

Faculty Mechanical, Maritime and Materials Engineering

From chip to ship. From machine to human being. From idea to solution. Driven by a deep-rooted desire to understand our environment and discover its underlying mechanisms, research and education at the 3mE faculty focusses on fundamental understanding, design, production including application and product improvement, materials, processes and (mechanical) systems.

3mE is a dynamic and innovative faculty with high-tech lab facilities and international reach. It's a large faculty but also versatile, so we can often make unique connections by combining different disciplines. This is reflected in 3mE's outstanding, state-of-the-art education, which trains students to become responsible and socially engaged engineers and scientists. We translate our knowledge and insights into solutions to societal issues, contributing to a sustainable society and to the development of prosperity and well-being. That is what unites us in pioneering research, inspiring education and (inter)national cooperation.

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? These videos will introduce you to some of our researchers and their work.

Additional information

For more information about this vacancy, please contact prof. Bart De Schutter, b.deschutter@tudelft.nl.

Application procedure

Are you interested in this vacancy? Please apply by 15 June 2023 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 (if applicable), the abstract and/or summary of your MSc thesis, your BSc and MSc course program and the corresponding marks, names and addresses of two to three reference persons, and all other information that might be relevant to your application.

For information about the application procedure, please contact our HR advisor at recruitment-3mE@tudelft.nl.

Please note:
- 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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