Delft Center for Systems and Control

TU Delft
Delft University of Technology

PhD Position Data-driven and modular control for energy and agricultural systems

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Job description

Over the last century automation has produced unprecedented improvements in productivity, profitability, and safety for a variety of industrial processes. Theses gains, however, are largely concentrated in centralized applications (e.g., chemical plants) or in mass-produced products (e.g., automobiles), in which economies of scale afford for a team of specialists to develop and implement these model-based automation strategies. In many energy and agricultural applications, such as heating ventilation and air-conditioning (HVAC), micro-grids, and controlled environment agriculture (CEA), the cost of deploying these advanced controller design strategies for a single facility often exceeds their potential economic benefit. For these applications, we instead require control algorithms that are **data-driven and modular** in that we can apply the same low-cost approach to deploy controllers for multiple systems with similar physics, but different parameters.

In this PhD project, you will design data-driven and modular controller algorithms to address these limitations in energy and agricultural systems. The goal is to leverage first-principles knowledge as well as advances in **machine learning, optimization, and data-driven control** to design a streamlined controller synthesis procedure. In particular, we will focus on modular approaches that allow us to apply the same low-cost controller synthesis procedure to deploy controllers for a variety of systems with similar physics, but different parameters. By reducing the cost to deploy these advanced automation and control algorithms, we can expand the scope of these advanced automation strategies and thereby bring significant improvements to the resilience, economics, and sustainability of modern energy and agricultural systems.

Requirements

Applications should have:

- Completed a relevant MSc degree in systems and control, engineering, applied mathematics, or a related field.
- A strong background in systems and control, optimization, and/or machine learning
- A desire to work in a multidisciplinary project.

Nice to have:

- Knowledge of energy and agriculture systems is a plus, but not required

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 € 2770 per month in the first year to € 3539 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, TU Delft has the Coming to Delft Service. This service provides information for new international employees to help you prepare the relocation and to settle in the Netherlands. The Coming to Delft Service offers a Dual Career Programme for partners and they organise events to expand your (social) network.

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 Dr. Koty McAllister, r.d.mcallister@tudelft.nl.

Application procedure

Are you interested in this vacancy? Please apply by 20 October 2023 via the application button and upload:

- Motivation letter stating why the proposed research interests you
- Curriculum vitae (CV)
- Contact details of two professional referees
- A research document written by the applicant (e.g., MSc Thesis)
- Transcript from your MSc program.

For information about the application procedure, please contact Irina Bruckner, HR Advisor, 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.
- Please do not contact us for unsolicited services.

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