Post-doc: Shaping collective dynamics in multi-robot systems

Faculty/department Mechanical, Maritime and Materials Engineering
Level PhD degree
Maximum employment Maximum of 38 hours per week (1 FTE)
Duration of contract 1 year
Salary scale €2588 to €4084 per month gross

Mechanical, Maritime and Materials Engineering

The 3mE Faculty 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 Delft Center for Systems and Control (DCSC) coordinates the education and research activities in systems and control at Delft University of Technology. The Center's 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, robotics and transportation systems.

Job description

The departments Delft Center for Systems and Control (DCSC), Cognitive Robotics (CoR) and Process and Energy (P&E) of the faculty of Mechanical, Maritime and Materials Engineering (3mE) are cooperating on the topic of self-organizing multi-robot systems. The number of potential applications of such systems is vast: swarms of nano-robots can perform distributed sensing tasks and drug delivery in the human body; groups of robots can form self-deploying sensor networks that operate in inaccessible or dangerous environments, and teams of robots can guide pedestrian flows in panic escape situations.

Our aim is to produce versatile and reconfigurable robotic systems that can perform complex tasks fully autonomously by using only simple, reliable and low-cost building blocks. The challenge is to steer robust organisation of collective dynamics by controlling only local dynamics. In this project we will develop analysis and synthesis methods that link collective dynamics to the local (constrained and nonlinear) robot dynamics and their interactions.

Our proposed methodology will build upon several interdisciplinary components:
- Recent advantages in modelling and analysis of interacting nonlinear systems, including identification and stability assessment of the global, large-scale patterns;
- State-of-the-art methods for collision avoidance, local motion planning and consensus, which achieve good performance with low computational and communication footprints;
- Efficient simulation methods to realistically capture physical forces in real-life systems, such as inertial forces.

Requirements

Applicants should have the following qualifications:
• A PhD degree in systems and control, applied mathematics, mathematical physics, or computer science
• A strong interest in mathematical modeling and the ability to do interdisciplinary research.
• Basic programming skills in Matlab are expected.
• Good command of the English language and communication skills.

Conditions of employment

The 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.

Information and application

For more information about this position, please contact dr.ir. Erik Steur, e.steur@tudelft.nl. To apply, please submit the following:
1) a detailed CV, including contact information of three references,
2) a brief motivation letter (1-2 pages) stating research interests and vision
Please e-mail your application by …, 2018, to Irina Bruckner, application-3mE@tudelft.nl.
When applying for this position, please refer to vacancy number …

Enquiries from agencies are not appreciated.