Delft Center for Systems and Control

Delft University of Technology

The Delft Center for Systems and Control (DCSC) of Delft University of Technology, The Netherlands has a vacancy for a 4-year **PhD position** on

Machine learning for multi-sensor detection and classification for autonomous underwater robots

Project description

In this PhD project we will develop novel machine-learning-based approaches for detection and classification for underwater robots using video, sonar images, and magnetic sensor data. The overall aim is to locate, detect, and collect unwanted objects from coastal waters and seabeds. In this way the project contributes to keeping coastal waters clean, to protecting the environment, and to realizing global sustainability objectives.

This PhD project is part of the Horizon Europe project SeaClear2.0 (Scalable full-cycle marine litter remediation in the Mediterranean: Robotic and participatory solutions, see also https://www.seaclear2.eu).

The goal of SeaClear2.0 is to develop a collaborative multi-robot solution engaged in collecting marine waste using autonomous underwater robots. The aim is to realize efficacious marine litter detection and collection, while at the same time minimizing impact on underwater flora and fauna like seaweed and fish. This goal will be reached by bringing together state-of-the-art technologies from the fields of machine learning, control. optimization, and marine technologies and by building a stable and trustworthy system that is able of tackling sea and ocean pollution.

In this PhD project we will focus on two main topics:

(1) the development of novel multi-sensor detection, identification, and classification methods for underwater litter using the different sensors on-board of the underwater robots, and

(2) integration of model-based and data-driven approaches for multi-sensor data fusion and detection classification of underwater litter.

For topic (1) deep learning and multi-sensor fusion will be the principal solution directions where the aim is to combine and merge information from cameras, sonar, magnetic sensors to detect and classify litter, fish, seaweed, etc. At a next stage this can be extended with extra data from surface vessel or aerial drones.

For topic (2) we will extend the methods developed in (1) into an integrated model-based decision making approach that is able to use a priori information from dynamical or behavior models of fish, seaweed, plastic, etc. to further enhance detection and classification.

The PhD student will join our machine learning and optimization team at the Delft Center for Systems and Control (DCSC) of Delft University of Technology. At the DCSC, our overall mission is to conduct foundational research in systems dynamics and control, involving dynamic modeling, advanced control theory, and optimization with societally important application fields including energy, transportation, and sustainability.

What do we ask?

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.

A good command of the English language is required and has to be demonstrated, by being a native speaker, having obtained an English-taught MSc degree, a TOEFL overall band score of 100 (with scores of at least 21 for all sections), or an IELTS overall band score of 7.0 (with scores of at least 6.5 for all sections).

What do we offer?

We offer the opportunity to do scientifically challenging research in a multi-disciplinary research group. The appointment will be for up to 4 years. The PhD student will also be able to participate in the research school DISC (https://disc.tudelft.nl). As an employee of the university you will receive a competitive salary starting of EUR 2770 gross per month in the first year and rising to a maximum of EUR 3539 gross per month based on a full-time appointment, as well as excellent secondary benefits in accordance with the Collective Agreement (CAO) of the Association of Universities in the Netherlands (VSNU). Assistance with accommodation can be arranged.

How to apply?

Are you interested in this vacancy? Please apply by January 8, 2024 via the "Apply now" button on the application webpage
https://www.tudelft.nl/over-tu-delft/werken-bij-tu-delft/vacatures/details?jobId=15051
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.
More information on this position can be obtained from Bart De Schutter (email: b.deschutter _at_ tudelft.nl).

The application deadline for the position is January 8, 2024. However, the position will stay open until a suitable candidate has been found.