

The [Delft Center for Systems and Control](#) (DCSC) of [Delft University of Technology](#), The Netherlands has a vacancy for a 2-year **postdoc position** on

Robust machine-learning-based detection and classification for autonomous underwater robots

Project description

In this project we will develop novel and robust machine-learning-based approaches for detection and classification for underwater robots using multi-sensor data from cameras, sonar, and magnetic sensors. The overall aim is to collectively detect and afterwards remove 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 postdoc 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 postdoc project we will focus on two major topics, where more emphasis can be put on either topic based on the expertise and interests of the selected candidate:

- (1) model-based and learning-based approaches for multi-sensor data fusion and detection and classification of underwater litter, and/or
- (2) robust detection and classification of multi-sensor underwater data in the presence of limited training data.

For topic (1) deep learning, physics-informed 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. In addition, by integrating model-based and learning-based decision making approaches we will be able to use a priori information from dynamical or behavior models of fish, seaweed, plastic, etc. to significantly enhance detection and classification compared to existing approaches.

For topic (2) the aim is to develop efficient methods to detect and classify underwater litter from cameras, sonar, magnetic sensor data that are robust to disturbances, glare effects, different light intensities, shadows, etc. Moreover, in view of the limited availability of labeled underwater images (and even less so for sonar or magnetic data) another important challenge is to do this with a limited amount of training data. In this context, transfer fusion learning where labeled image data are transformed into label data for sonar data of the same scene is another challenging research topic.

The postdoc 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 mission is to conduct foundational research in systems 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 a PhD degree in systems and control, computer science, AI, applied mathematics, or a related field, and with a strong background in machine learning and decision making or control. You are also expected to work on the boundary of several research domains. A good command of the English language is required.

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 2 years. As an employee of the university you will receive a competitive salary starting of EUR 4036 gross per month in the first year and rising to a maximum of EUR 5090 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.

The position can either be a full-time one, or if the successful candidate requests it, a part-time one (80 % or higher). In accordance with the equal opportunity policy of Delft University of Technology female candidates are in particular encouraged to apply.

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=15068>

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, the abstract and/or summary of your PhD thesis, your MSc course program and the corresponding marks, names and addresses of 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.