Investigating the desired level of automation for a ship hull cleaning robot

Introduction to Fleet Cleaner

Figure 1 Robot cleaning Zr. Ms. Karel Doorman

Fleet Cleaner develops and deploys robots for ship hull cleanings. We are an innovative technical company based in Delft. With our unique robot we offer the most complete solution for ship hull cleanings on the market, available in all Dutch seaports. The Fleet Cleaner robot removes fouling from a ship's hull, thereby increasing fuel efficiency dramatically and reducing fuel costs. The cleaning is performed during loading and unloading in port; resulting in no down-time for the vessel. The fouling that is removed from the vessel is captured and filtered by our state-of-the-art filtering system aboard our support vessel. This is the reason that Fleet Cleaner is one of only a few companies licensed to perform hull cleanings in Dutch ports.

Research objectives

During a hull cleaning the robot is remotely controlled by a human operator. The operator is assisted by a number of software features including an auto pilot that makes the robot semi-autonomous.

However a human supervisor is always needed. The human also has look out for obstacles and turn the robot around at the end of the ship. Fleet Cleaners goal is to make the cleaning operation as efficient as possible and keep the work load for the human operators low. An ideal situation would be where the operator can do other tasks (e.g. maintanaince) during the cleaning operation. To do this the auto pilot could be extended. However the effects of further automation on the performance and workload of the operator are unkown. Therefore we are looking for students who are interested in one or more of the following topics:

Figure 2 The control room

- Investigation into the workload of the human operator with the current setup.
- Investigation into state-of-the-art autopilots and driving assistance for comparable scenarios.
- Investigation into the risks and concequences of human and machine error while cleaning a ship
- Expanding the autopilot functionalities and/or altering the control room setup to increase operator efficiency.

The developed system components will be demonstrated and validated in the actual operational setting and are to be implemented on the actual robot system. We are looking for a talented and enthusiastic MSc student, preferably with a background in systems and control, robotics, or related engineering fields. We offer the following:

- 9-12 months thesis assignment at Fleet Cleaner (at the Delft office)
- Actual implementation and testing of your research in a real-world application
- Working in an innovative company
- Working together in a young, enthusiastic and multidisciplinary team
- An appropriate internship allowance

Fleet Cleaner