

Master thesis topic: Let's help our doctors! Human-Robot Collaboration

Background

There are different industrial and service sectors that require efficient human and robot collaborations. For example, the health-care sector, where humans are still performing physically strenuous and sometimes dangerous work. In this case, robots should also consider the safety of the human while providing assistance, especially in dangerous situations. For example, in a hospital, the robot needs to identify the tasks that can be dangerous to the human and take those roles when splitting the tasks. For instance, in the case of a pandemic emergency, the robot could assist nurses by bringing food or medicine to the patients, thus exposing the health-care personnel to a minimum. This project will be the first step to build strong and long term collaborations with the Sahlgrenska hospital in the healthcare domain.



Problem and goal

In this thesis, the students will design and develop a variety of different methods in the areas of machine learning, reasoning, decision-making, control, and robotics.

- They will develop learning and control methods to allow robots to reason about complex situations in order to ensure high performance and safety for the human co-worker.
- Implementation of learning methods for the automatic generation of grasping parameters such as wrist position and orientation, hand preshape. This can also include information from force control to enhance the grasping and manipulation of objects.
- Then, the learned models will be transferred into a virtual mobile robot (e.g. the TIAGo robot or the Yumi robot) to interact with humans in a virtual scenario.

Prerequisite: Basics of Automatic Control, Learning algorithms, Programming (ROS, Python or C++), Dynamics

Contact persons: Karinne Ramirez-Amaro. E-mail: karinne@chalmers.se
Emmanuel Dean, deane@chalmers.se