Faculty of Engineering
Summer Research Program 2022-2023

Project Title: Exchanging objects between robots and people

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Objective

The ability to give and take objects from people is an important task for robots. This project's objective is to enable natural handovers between humans and robots. State-of-the-art in human-robot handovers considers a 1-on-1 scenario where the human knows that the robot would offer the object once the robot starts moving. For more realistic scenarios, however, there likely would be multiple people in the robot's vicinity, hence the robot's predictability and reading the human intent becomes more important. For robot-to-human handovers, consider a scenario where the robot occasionally gives an object to the people in its vicinity. This project will study the best ways to convey the intent of the robot, either implicitly with the motion of its arm or head, or explicitly such as with speech.

Project Details

The focus of this project is human-robot handovers with multiple people. We will first look into human-human handovers and what kind of social signals people use when they want to convey that they want to hand over an object. We implement some of these social cues on a robot that has a robotic arm (either a static robot arm or a mobile robot with a robotic arm). A good human-robot interaction design should result in a smooth interaction, where humans correctly predict that the robot is intending to give an object to them. Other people in the vicinity, should also correctly predict that the robot's handover target is someone else, not them. We will design a user study that aims to measure the subjective experience of the participants and conduct a statistical analysis of the survey results. The findings will be summarised in a report, ideally as part of a publication.

Prerequisites
- Strong programming skills in Python or C++
- Willingness to conduct usability experiments with participants
- Interest in publishing the results of research in a scientific journal
- Experience with Linux and Robot Operating System (ROS) is a plus
- Hands-on experience with robots is a plus