Faculty of Engineering  
Summer Research Program 2020-2021

Project Title: **Augmented Reality-Boosted Human-Robot Handovers**

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**Objective**

This project is about passing objects between humans and robots. People often pass objects to people, in daily life. This is, however, challenging for robots because it requires detecting people and the object, and executing the motion. Moreover, signaling handover intent with robots is especially challenging because robot arms don’t have a face. What if the person who is interacting with the robot is wearing Augmented Reality (AR) glasses, so the future trajectory of the robot as well as the grasp point is projected onto the glass? This project will develop an AR interface, and evaluate with user studies whether it makes the human-robot interaction more fluent for handover scenarios.

**Project Details**

We already have a working human-robot handover system in our robotics lab (depicted in the picture). We also have a Microsoft Hololens 2 Augmented Reality glasses. This project will consist of 3 parts:

1) Improving the existing code (Python) so that the object grasp point is dynamically updated in real-time (right now it does not change).

2) Developing code on Hololens (Unity) so that the following is visualized: future trajectory of the robot hand, grasp point, text showing the detected object class. We will also develop a way for the human can signal his/her intent to start a handover.

3) Once the interface is developed, recruiting and conducting a user study that evaluates whether AR-boosted handovers is preferable to people compared to not using AR-glasses at all.

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**Prerequisites**

- Strong programming skills in Python or C++.
- Experience with Unity or Robot Operating System (ROS) is a plus.
- Interest/experience in hands