Objective

Compare the use of human-like reaching motions and augmented reality for conveying a robot’s intent during robot-human object handover tasks.

Project Details

Object handover - the transfer of an object from a giver to a receiver - is a ubiquitous task in any collaborative or service robot applications (e.g., factory assistant handing over a tool, or homecare robot handing over a glass of water). Object handover requires careful coordination between giver and receiver. In human-to-human handovers, multiple implicit communication modalities, including gaze, posture, and gestures, are utilised to convey the intent of handing over the object, and the specifics of the handover task (e.g., where to handover, when to handover). For service robots to be able to perform handovers with humans effectively, they must also be able to communicate with humans in an intuitive manner.

This project will implement and compare the use of two different methods for robots to convey object handover location to humans. The first method is an implicit method utilising human-like reaching motions. It has been shown that human handover reaching motion consistently follows an elliptical path. Hence, by observing the onset of a human reaching motion, people can anticipate the end point of the reach. By implementing human-like reaching motions onto robots performing handovers, we should be able to allow a human partner to better anticipate the robot’s intended handover location. The second method is an explicit method utilising augmented reality (AR) through a head-mounted AR device (Microsoft Hololens2). Using AR, we can explicitly show the human where the robot intends to handover the object by rendering virtual displays at the intended handover location. This project will investigate and compare the benefits of these two methods.

Prerequisites

Experience with C/C++/C#, ROS, Unity, Visual Studio would be useful.