Towards Human-Robot object exchange, lessons learned

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Abstract

This article gives an overview of the work conducted in the European project CogLaboration for improving human robot interaction through object exchange that has been iteratively used for around a thousand of interactions. A perception layer using Kinect cameras tracks the object and the human partner's hand and triggers the main robot motion phases. A dedicated object exchange database contains not only the object grasping poses, but also expected hand postures and object orientations to adjust respectively the delivery and grasping strategies. The control of the 7-DoFs LWR arm is designed using the DMP framework. It allows the handling of transport constraints, the online detection of any potential arm kinematics violation and the run-time requesting of a new motion pattern to alleviate this risk. The robot anthropomorphic hand has been equipped with an exteroceptive sensory system (tactile and force) for triggering the handover phases. Comparison of Human-Robot exchange and benchmarking data obtained from Human-Human object transfer points to areas for potential improvement.

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