Human-Robot Interaction in Handing-Over Tasks

Abstract:
In many future joint-action scenarios, humans and robots will have to interact physically in order to successfully cooperate. Ideally, seamless human-robot interaction should not require training for the human, but should be intuitively simple. Nonetheless, seamless interaction and cooperation involve some degree of learning and adaptation. Here, we report on a simple case of physical human-robot interaction, a hand-over task. Even such a basic task as manually handing over an object from one agent to another requires that both partners agree upon certain basic prerequisites and boundary conditions. While some of them are negotiated explicitly, e.g. by verbal communication, others are determined indirectly and adaptively in the course of the cooperation. In the present study, we compared human-human hand-over interaction with the same task done by a robot and a human. To evaluate the importance of biological motion, the robot human interaction was tested with two different velocity profiles: a conventional trapezoidal velocity profile in joint coordinates and a minimum-jerk profile of the end-effector. Our results show a significantly shorter reaction time for minimum jerk profiles, which decreased over the first three hand-overs. The results of our comparison provide the background for implementing effective joint-action strategies in humanoid robot systems.

Stichworte:
baja, jast, joint-action, robotics, cotesys