Human Preferences in Industrial Human-Robot Interactions

Abstract:
Joint-action is one of the key research areas in robotics and especially important in physical human-robot interaction. The two main criteria for robots, which should be integrated in everyday life, are safety and efficiency. Therefore, it is of particular interest to understand how humans work together in order to transfer the resulting facts from these studies to direct human-robot interaction. In this work, we investigate a simple case of physical human-robot interaction, i.e. the handing over of small objects from a robot to the human. Experiments, in which six cubes were handed over from the robot to the human, were performed with two different robot systems, a robot arm in a humanoid set-up and a typical industrial set-up. Two different velocity profiles were integrated in the robot systems, a trapezoidal velocity profile in joint coordinates and a human inspired minimum jerk profile in cartesian coordinates. In both set-ups the use of the minimum jerk profile lead to shorter reaction times of the humans for the interaction. The humanoid setup showed with both profiles shorter reaction times than the industrial setup. It was also investigated in the experiments, whether the human body position adopts during the experiments to an optimal position for the hand-over. During the experiments the body spatial position stayed largely invariant, which indicates, that the subjects were not frightened and felt comfortable with the given hand over position. The result of our experiments along with the given comparison to natural human-human behaviour
provides a solid basis for more efficiency of collaboration of humans and assistive robot systems.

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