Abstract: Direct physical human-robot interaction has become a central part in the research field of robotics today. To use the advantages of the potential for humans and robots to work together as a team in industrial settings, the most important issues are safety for the human and an easy way to describe tasks for the robot. In this work, we present an approach of a hierarchical structured control of industrial robots for joint-action scenarios. Multiple atomic tasks including dynamic collision avoidance, operational position, and posture can be combined in an arbitrary order respecting constraints of higher priority tasks. The controller flow is based on the theory of orthogonal projection using nullspaces and constraint least-square optimization. To prove the approach, we present three collaboration scenarios between a human and an industrial robot.

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