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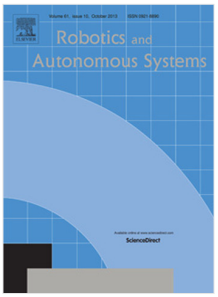

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Multimodal Sensor-Based Whole-Body Control for Human-Robot Collaboration in Industrial Settings

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Abstract

This paper describes the development of a dual-arm robotic system for industrial human-robot collaboration. The robot demonstrator described here possesses multiple sensor modalities for the monitoring of the shared human-robot workspace and is equipped with the ability for real-time collision-free dual-arm manipulation. A whole-body control framework is used as a key control element which generates a coherent output signal for the robot's joints given the multiple controller inputs, tasks' priorities, physical constraints, and current situation. Furthermore, sets of controller-constraints combinations of the whole-body controller constitute the basic building blocks that describe actions of a high-level action plan to be sequentially executed. In addition, the robotic system can be controlled in an intuitive manner via human gestures. These individual robotic capabilities are combined into an industrial demonstrator which is validated in a gearbox assembly station of a Volkswagen factory.

Keywords: