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A Hybrid Automata Framework for an Adaptive Impedance Control of a Robot-Assisted Training System

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Abstract:
There is an increasing demand for an effective and adaptive robot-assisted training system for traumatic brain injury patients which can considerably promote their sensorimotor control performance, apart from ensuring the safety of the patients. This study focuses on the impedance control framework to simultaneously track the position trajectory while regulating the apparent impedance of the robot. The framework is based on the hybrid automata model that is used to govern the desired trajectory deployed by the robot-assisted training in assisting rehabilitative motion. A designed experimental setup was developed to evaluate the performance of the proposed hybrid automata scheme. Preliminary simulation results demonstrated the excellent response of the proposed framework with its ability to track the desired trajectory as well as the varying patients' arm impedance profile.

Keyword: Hybrid Automata; Hybrid Automata; Robot-Assisted