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## A digital twin-based frame work for task planning and robot programming in HRC

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### Abstract

This paper presents a digital twin-based framework for complex assembly tasks in human-robot collaborative assembly system. In this research, the system is developed to support the planning, decision, and implementation of human-robot collaboration. Virtual simulation is applied from task planning to robot control, including assembly task allocation and scheduling, robot trajectory planning and programming. Online optimization is conducted for real-time control based the status of operators and robots from the real production system. An industrial case is presented to validate the performance of the proposed digital twin framework and collaborative assembly system.

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