SDU Robotics

PhD project

Agile Interaction with Industrial Robots

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Abstract

Human-Robot Interaction (HRI) has the potential to enhance productivity, efficiency, safety, and quality in the manufacturing industry. This project aims to address challenges to implementing safe HRI of the manual mold assembly process, including both conventional industrial and collaborative robots. Firstly, a workspace monitoring system is established by combining safety-rated sensors to guarantee the operators' safety. Digital Twins (DTs) technology allows the visualizing and data processing of sensor data in the simulation environment to calculate the distance between operators and hazardous areas defined by industry standards. Additionally, the speed of the robots can be controlled depending on the position and pose of the operator in the shared workcell through the interface provided by the DT platform. Furthermore, the project explores the transition from manual processes to HRI settings by leveraging Product Lifecycle Management (PLM) software. All product-related information, including the expertise and knowledge associated with mold assembly processes, is digitized, stored, and managed within the PLM software through components such as a Bill of Process, a Bill of Materials, an equipment list, and other relevant information. This digitized information is transferred to the DT platform, which has an independent database and enables enhancing the capabilities of the HRI system. By combining these methodologies, the project proposes a comprehensive framework that ensures operator safety, optimizes HRI, and improves the productivity of mold assembly processes.

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