

Digital twin-enabled human-centric assembly assistance (Code: w783n)

Goal:

In the small batch and highly customized product assembly scenarios, manual assembly still plays one of the vital roles, owing to its ultra-flexibility. To ensure efficiency and to eliminate uncertainties of human operations, advanced assistive technologies (e.g., augmented reality) have been widely adopted. However, the additional equipment and interactions may impede the original manual work habits and bring a vast cognitive burden to the manual assembly process, thus hindering workers from genuinely integration into the intelligent assembly scene. Therefore, a more natural way for human-centric assembly assistance is essential to reach the balance of high-tech and low-burden for humans where operation certainty is guaranteed. To achieve it, digital twin is one promising candidate, which can not only visualize the real-time and multi-dimension information of the assembly scene, but also provide useful task guide and even prediction to the human operators. Align with digital twin, technologies such as computer vision, industrial big data, behavior perception, and human-robot collaboration can bridge the gap between cyber and physical spaces. Much inspired by the human-centric smart manufacturing trend, this special session aims to bring together specialists in different fields of manufacturing systems, robotics, artificial intelligence, and other engineering domains to address the foreseeable digital twin-enabled human-centric assembly assistance paradigm, with an international academic horizon.

Topics:

This special session aims to present the state-of-the-art, informatics-based approaches, tools, systems, and cases to enable the readiness and realization of digital twin-enabled human-centric assembly assistance. To contribute to those areas, this special session includes the following topics, but are not limited to:

- Digital twin model for assembly process
- Digital twin-enabled scene perception
- Digital twin-enabled object recognition
- Digital twin-enabled operation guidance
- Digital twin-enabled process monitoring
- Digital twin-enabled AR/MR assistance system
- Digital twin-enabled human intention prediction
- Cognitive load concerns for digital twin-enabled assembly assistance
- Digital twin-enabled framework for natural human-computer interaction
- Digital twin-enabled assembly assistance cases, systems, and implementations in assembly

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