The flexibility and adaptability of the digital twin-driven manufacturing system in the mass customization paradigm (Code: x4dj1)

Goal:

Digital twin (DT) has been a prevailing topic in both academics and industry, owing to the rapid development of artificial intelligence, cyber-physical systems, and digital technologies. The core idea of the DT is to develop a virtual replica corresponding to the physical entity. Through the real-time interaction between the virtual and real spaces, the system can display and analyze the state of the physical entity, and make further decisions on it. As an enabling technology of intelligent manufacturing, the DT has been used by many scholars to build the manufacturing system, that is, the DT-driven manufacturing system (DTMS). Previous research has demonstrated that DT has great potential in manufacturing.

Meanwhile, with the help of technological evolution and innovation, the rapid growth and globalization of Internet manufacturing services have created demanding customers who need unique, high-quality, low-cost products that meet their personal needs and preferences. Affected by the above, the mass customization (MC) paradigm has become a research hotspot in the manufacturing industry, and MC workshops are emerging in the manufacturing industry. MC combines the advantages of customized and mass production to meet customers' diversified and personalized needs with low cost and fast delivery. It aims to deliver products and services that meet individual manufacturing needs with near-mass production efficiency. Therefore, it is essential to provide personalized products or services for consumers through the flexibility and adaptability of manufacturing systems in the MC paradigm.
Therefore, due to the production needs of multiple varieties and small batches in the MC paradigm, the DTMS faces challenges on flexibility and adaptability. This special session aims to bring together specialists in the flexibility and adaptability of DTMS to address the large-scale customization paradigm.

Topics:

This special session aims to present the state-of-the-art, theories, informatics-based approaches, tools, and cases to focus on the flexibility and adaptability of digital twin-driven manufacturing system. To contribute to those areas, this special session includes the following topics, but are not limited to:

- Digital twin-driven process planning stage
- Digital twin-driven decision-making in the manufacturing process
- Digital twin-driven self-organization between multiple manufacturing systems
- Digital twin-driven self-adaption for dynamically changing requirements
- Digital twin-driven quality inspection in the manufacturing process
- Digital twin-driven collaboration among multiple manufacturing systems
- Digital twin-driven autonomous decision-making based on multimodal information analysis
- Digital twin-driven autonomous interaction during the manufacturing process

Organizers:

Dr. Shimin Liu

The Hong Kong Polytechnic University

E-mail: shimin.liu@polyu.edu.hk

Phone: +852 – 62043121