Call for Papers
Special Issue on Artificial Intelligence Generated Content (AIGC) for Industrial Manufacturing
IEEE Transactions on Automation Science and Engineering

Information technologies are permeating all aspects of manufacturing systems as well as other fields, expediting the generation and availability of industrial big data, fundamental models, and so on. Traditionally, industrial automation devices would collect sensor data from various sources and simple inference is performed that usually does not add to the existing practitioners' knowledge. On the other hand, applying more sophisticated AI approaches require sensor data to be annotated, which is impractical when high volume high frequency data are considered. This seriously prevents AI-enabled technology from being effectively deployed in industrial manufacturing scenarios. Artificial Intelligence Generated Content (AIGC) is a production method based on AI technology that can generate synthetic content based on rules learned from data. In principle, AICG enables devices to seamlessly integrate knowledge, perception, learning and action to reach more advanced automation-to-intelligence goals. However, several open challenges arise with the coupling between AIGC and the automation application. In addition, the performance evaluation of AIGC is not settled since benchmark datasets are far from being well established.

The central theme of this special issue will be the AIGC technology for industrial manufacturing, where the focus areas are: (1) how to solve the data and label scarcity problem in industrial automation applications such as anomaly detection, process monitoring, additive manufacturing, human-machine collaboration; (2) how to effectively connect the virtual and real industrial environment, with examples being cross-modal fusion, early-warning, industrial omniverse. We are soliciting original contributions, from leading researchers and practitioners from academia as well as industry, which address a wide range of theoretical and application issues in AIGC for industry manufacturing. Specifically, we encourage submissions which can generate realistic-like image, video, sound for tasks of model training and simulation. Topics for this special issue include, but are not limited to:

- AIGC architectures for industrial automation applications including semiconductor, automotive, manufacturing and robotics.
- Efficient and improved solution for industrial AIGC including the industrial applications of NeRF, Gaussian Splatting and Diffusion.
- Multi-modal perception and cross-modal generation (text2image, text-2-3D, text2video) for industrial applications for anomaly detection, fault analysis.
- Embodied fundamental models for industrial applications.
- AIGC for digital twins and intelligence editing
- Copilot-based Human-AI collaboration for manufacturing
- Typical industrial application for AIGC
- Benchmark for industrial AIGC
- Safety and ethics of AIGC in industrial applications

Please note that submission without clear industrial application will not be considered.

Deadlines:

- April 1, 2024: announcement of special issue.
- October 1, 2024: paper submission deadline.
- January 1, 2025: completion of the first-round review.
- May 1, 2025: completion of the second-round review.
- August 1, 2025: final manuscripts due.
- November 2025: tentative publication date.

Guest Editors:

- Huaping Liu, Tsinghua University, China, hpliu@tsinghua.edu.cn
- Weiwei Wan, Osaka University, Japan, wan@sys.es.osaka-u.ac.jp
- Jason Gu, Dalhousie University, Canada, jason.gu@dal.ca
- Valeria Villani, University of Modena and Reggio Emilia, Italy, valeria.villani@unimore.it
- Giulia Pedrielli, Arizona State University, U.S.A., giulia.pedrielli@asu.edu
- Yiannis Aloimonos, University of Maryland, U.S.A., jyaloimo@umd.edu