

## Proposal for Special Session at IEEE CASE 2022

### Goal:

In line with the human-centric concerns of Industry 5.0, modern factories are striving for an ever-higher degree of flexible and resilient production in mass personalization with increasing complicatedness and complexity. To achieve it, human-robot collaboration (HRC) becomes a prevailing strategy, which combines high accuracy, strength, and repeatability of industrial robots with high flexibility and adaptability of human operators to realize optimal overall productivity. Cutting-edge technologies, including robot modelling and control, cognitive computing, mixed reality/metaverse, industrial IoT, and advanced data analytics create the potentials to bridge the gap of knowledge distilling and information sharing between onsite operators, robots and the manufacturing system with mutual cognitions. Therefore, 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 HRC-empowered human-centric smart manufacturing paradigm characterized with high-level teamwork skills.

### Track topics and their description

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 HRC for futuristic human-centric smart manufacturing. To contribute to those areas, this special session includes the following topics, but are not limited to:

- Cognitive human-robot collaboration systems
- MR/Metaverse-assisted human-robot collaboration
- Intuitive safety concerns in human-robot collaboration
- Multi-modal Intelligence for human-robot collaboration
- Adaptive motion planning in human-robot collaboration
- Human intention prediction in human-robot collaboration
- Semantic knowledge representation for human-robot collaboration
- Human-robot collaboration cases, systems, and implementations in manufacturing

**Session Title:** [Human-Robot Collaboration for Futuristic Human-Centric Smart Manufacturing]

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### **Contributions:**

1. “A multi-granularity scene segmentation approach for human-robot collaboration” by Junming/Pai Zheng/Lihui Wang
2. “A deep reinforcement learning-based approach for adaptive robot planning with safe interactions” by Chengxi Li/Pai Zheng/Xi Vincent Wang
3. “Human digital twin for human-centric smart manufacturing” by Li Li/Tao Peng
4. “Understanding multi-fold human needs in human-robot collaboration” by Tao Peng/Haonan Wang
5. “Cognition-driven robot decision making method in human-robot collaboration environment” by Rong Zhang/Xinyu Li/Jinsong Bao
6. “Reinforcement Learning for Human Fatigue Detection in Human Robot Collaboration” by Zhang Chen/Ying Liu
7. “Digital twin-driven smart robotics with human-in-the-loop” by Yongkui Liu
8. “Digital twin-based virtual reconfiguration method for mixed-model assembly line” by Zhihao Liu, Wenjun Xu
9. “Dynamic task re-allocation in human-robot collaborative workshop based on online worker fatigue detection” by Xinyu Li, Wenjun Xu
10. “Early prediction of turn-taking based on spiking neural network to facilitate human-robot collaborative assembly” by Siqi Feng, Wenjun Xu
11. “Consistency analysis of digital twin model used for typical robotic assembly process” by Yinyu Tan, Jiaming Zhang, Wenjun Xu