

# Proposal for Special Session at IEEE CASE 2024

## Title:

Smart and Sustainable Manufacturing

## Synopsis of the Special Session:

Smart manufacturing, in the era of Industry 4.0, leverages advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), data analytics, robotics, and cyber-physical systems. The objective is to create intelligent, interconnected, and automated manufacturing systems, thus leading to enhanced productivity, improved quality control, reduced downtime, and increased flexibility. Simultaneously, sustainable manufacturing has gained considerable attention as a means to address the environmental, social, and economic challenges associated with conventional manufacturing. Sustainable manufacturing focuses on minimizing resource consumption, reducing waste generation, optimizing energy usage, and adopting eco-friendly production processes. There is a growing inclination among customers and markets towards digital, customized, and flexible solutions with a reduced environmental impact. This inclination aligns with the central concept of Industry 5.0, which complements the Industry 4.0 approach by placing research at the forefront of the transition to a sustainable, human-centric, and resilient industry. The integration of smart and sustainable manufacturing is pivotal, holding the potential to revolutionize the environmental and economic impact of the manufacturing industry.

This session will be an excellent opportunity for networking, collaboration, and knowledge exchange among industry experts, academics, and professionals who are passionate about advancing the field of manufacturing towards a more intelligent and sustainable future.

## Sub-topics of the Special Session [provide at least 8 topics]

1. Sustainable and Resilient Manufacturing Systems: Strategies and Technologies
2. Energy-efficient and Eco-Friendly Production Processes
3. Digital Twin Technologies for Smart and Sustainable Production
4. Innovations in Human-Robot Collaboration
5. Circular Economy Practices in Manufacturing
6. Life Cycle assessment in Smart and Sustainable Manufacturing
7. Advancements in Flexible Manufacturing System Modeling and Control
8. Intelligent Decision-Making for Sustainable Production Systems
9. Human-Machine Interfaces and Ergonomics in Sustainable Manufacturing
10. Case Studies on Successful Implementation of Sustainable Manufacturing Practices
11. Innovative Materials for Eco-Friendly Manufacturing Processes
12. Industry 5.0: Bridging the Gap between Technology and Sustainability

## Organizers:

- Qing Chang, Professor, School of Mechanical and Aerospace Engineering, University of Virginia. Email: [qc9nq@virginia.edu](mailto:qc9nq@virginia.edu)
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**Expected Contributions [a minimum of 8 planned contributions is recommended]:**

1. "Cooperation-Based Bi-Level Rescheduling Method Considering Multiple Objectives for Distributed Hybrid Flow Shop With Unrelated Parallel Machines Under Multi-Type Disturbances", hanghao Cui and Xinyu Li\*
2. "Production and Changeover Control of Textile and PET Recycling Systems", Elias El Achkar and Nicla Frigerio\*
3. "Knowledge Graph-Enabled Background Data Recommendation Towards Automated Life Cycle Assessment", Tao Peng\*
4. "A New Approach to Schedule Machines and AGVs Jointly in A Flexible Job Shop", Xiuli Wu\*
5. "Modeling and Analysis for Inherent Energy Efficiency of Two-machine Bernoulli Serial Lines", Longyao Xu, Peiji Liu\*, Xu Wang
6. "Collaborative Scheduling Optimization Method for Multi-stage Automobile Engine Hybrid Flow Shop", Hewang Zhai, Maokun Qiong, Wei Wu, Congbo Li\*
7. "Human-robot collaboration through human in the loop hierarchical reinforcement learning", Tian Yu, Chen Li, Qing Chang\*
8. "A Comprehensive Approach to Energy-efficient and Quality-conscious Control of Conveyor Belt Dryers in Petrochemical Production", Muhammad Waseem, Qing Chang\*