

Proposal for Special Session at IEEE CASE 2022

Goal:

- [With the tremendous advance of society and technology, industrial systems are becoming more and more intelligent and facing a growing complexity. Complex coupling influence exists among the links and components of those intelligent systems, which jointly determine the system's overall performance. For example, in modern manufacturing systems, different workstations, high-dimensional process parameters, and various uncertain factors interact with each other, which ultimately have a complex impact on production efficiency and product quality. In the automated terminal system, the container flows between the equipment and goes through various operation steps such as quayside crane, yard crane, container truck, automated guided vehicle, etc. Each step affects the other and determines the terminal operation efficiency together. Such complexity and coupling influence pose a significant challenge to the optimization and decision of intelligent industrial systems.
- How to measure the complexity of these intelligent industrial systems? How to better describe, analyze and improve complex industrial systems? Does the traditional reductionism-based research idea still adapt? There is no doubt that advanced theories and methods such as big data analytics, complex networks, swarm intelligence, and machine learning have brought down to answer the above questions. This special session focuses on the cutting-edge theories, algorithms, and applications for optimizing and decision-making intelligent industrial systems. The topics include, but will not be limited to the following:
 - Advanced theories, trends, and perspectives for the optimization and decision of intelligent industrial systems
 - Advanced methodologies for measuring the complexity of intelligent industrial systems
 - Advanced techniques for describing, analyzing, and improving complex industrial systems
 - Big data analytics-enabled complex industrial systems
 - Complex network theory for complex industrial systems
 - Operation research about complex industrial systems
 - Causal inference science for complex industrial systems
 - Cutting-edge ideas about the integration of operations research and machine learning
 - Innovative applications of big data analytics, complex networks, and machine intelligence in complex industrial systems
 - Innovative cases in production, logistics, health care, or transportation systems]

Session Title: [Complexity and Data Analytics in Intelligent Industrial Systems]

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Contributions:

1. "Intelligent optimization and decision of complex system: a survey and new perspectives " by Wei Qin
2. "Research on reservation method of non-clear containers based on dynamic programming " by Jiyue Zhu
3. "Causality-based virtual measurement method for intelligent manufacturing workshop" by Jinhua Hu
4. "A data-driven approach for determining the optimal process conditions in a batch production process" by Yan-Ning Sun
5. "Intelligent methods on the scheduling of complex automation systems" by Wuyin Wang
6. "Design heuristic rules for integrated scheduling of automated container terminals" by Zhanluo Zhang

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More contributions are to be added.