

Proposal for Special Session at IEEE CASE 2022

Goal:

- The goal of the session is to explore innovative applications of the recently emergent disruptive technologies such as Industrial Internet of Things (IIOT), five-generation wireless communication, artificial intelligence and digital twins in the production systems, which demonstrate potential contributions of the technology on the performance measures such as quality, cost, efficiency, and dioxide carbon emission. The proposal is related to the following topics of CASE 2022: Cyber physical production systems and industry 4.0; Data science and data-driven automation; Machine learning and artificial intelligence; Modeling, simulation, and optimization of automation systems; Smart factories, smart logistics and supply chain; and Sustainability and green automation.
- The emergent disruptive technologies present lots of opportunistic and challenges in the field of operations and maintenance management. Some of them have been extensively applied in certain production systems. For example, artificial intelligence has been extensively employed in equipment maintenance and forecasting of performance measures, image identification is a well-known alternative technology when detecting the surface quality of parts. They contribute to reductions in human costs and improvements in productivity. Moreover, with the implementation of new-generation smart manufacturing and digital twin technologies, it arises the problem of co-design among control, communication and computation (Co4), to guarantee the reliability and quality of service (QoS) of the future IIOT and 5G+ telecommunication network-based manufacturing systems. In addition, new production performance indicators such as carbon neutrality and zero-carbon policy have been attracted increasing attention recently. All the mentioned above motivate us to further explore applications of disruptive technologies in intelligent production systems.

Session Title: [Innovative Applications of Disruptive Technologies in Intelligent Production Systems]

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Contributions:

1. “Joint simulation modeling of production system and communication system in a discrete workshop covered by a 5G network” by Zhi-Hai/Mu-Xia
2. “Production line layout design in a workshop under 5G wireless communication environments based on a simulation-based optimization method” by Zhi-Hai/Mu-Xia

3. “Reliability optimization for the communication-computation-control co-design of IIOT based manufacturing systems” by Bin
4. “End-to-End 5G network reliability design for industrial wireless control systems: a data-driven approach” by Mu-Xia/Zhi-Hai
5. “Optimal control-based reliability enhancement for manufacturing systems under 5G wireless communication environments” by Lu-Yao/Mu-Xia