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Call for Papers for the Special Session on

Intelligent Modelling and Fault Diagnosis Techniques for Safety-critical Industrial Systems

Organized and co-chaired by

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Technical Outline of the Session and Topics

Modern industrial systems have grown sophisticated and powerful to meet stringent demands for precision manufacturing. The increasing level of intelligence of industrial systems has raised higher requirements for performance, reliability, and security. This is especially evident in safety-critical applications such as autonomous vehicle systems, smart chemical plant monitoring, intelligent steelmaking, where system failures can lead to catastrophic human, environmental, and economic losses. Consequently, it is essential to develop accurate modelling and fault diagnosis techniques to ensure system safety and reliability.

On the other hand, intelligent technologies like AI and machine learning have rapidly developed and applied in various fields. These cutting-edge technologies offer innovative approaches for the modelling and fault diagnosis of industrial systems. They enable precise prediction and detection of potential faults, thereby significantly enhancing product reliability and safety. By leveraging these intelligent approaches, the industrial system can embrace new opportunities for the revolutionary advancement and next-generation innovation.

Therefore, this special issue seeks pioneering developments in intelligent modelling and fault diagnosis methodologies, establishing rigorous benchmarks and demonstrating real-world applications to enhance the safety and reliability of safety-critical industrial systems.

Topics of the session include, but are not limited to:

- Advanced AI-driven modelling and fault diagnosis techniques for industrial systems
- Edge computing and real-time monitoring for constrained embedded devices
- Explainable AI for transparent fault diagnosis in safety-critical industrial systems
- Adaptive modelling and parameter identification under time-varying operating conditions
- Remaining useful life prediction and state of charge estimation in industrial systems
- Reliable operation and predictive maintenance in industrial systems
- Cybersecurity and privacy-preserving fault diagnosis in industrial systems
- Transfer learning for cross-domain fault diagnosis
- Defect detection and fault diagnosis based on multimodal data, such as images and time-series data
- New opportunities, challenges and applications in safety-critical industrial systems

Timeline for Authors

All the instructions for paper submission are available on the conference website. Please visit www.iecon2026.org or scan the QR code for the timeline.