ETFA 2025 Porto Portugal 9-12 September

30th IEEE International Conference on Emerging Technologies and Factory Automation

Call for Papers
SS01 – Robustness and Uncertainty Quantification in Industrial AI

Organized and Chaired by

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- **FOCUS**. The deployment of Industrial AI systems in manufacturing and process industries demands robust solutions capable of maintaining consistent performance despite variability and disturbances. Robustness ensures reliable operation under diverse conditions, minimizing risks. However, uncertainties from incomplete data, model limitations, or unexpected scenarios must also be quantified and communicated effectively. This session addresses strategies to enhance AI robustness, integrate uncertainty quantification, and convey insights through human-machine interfaces. It targets not only operators but also engineers and professionals relying on AI for planning, optimization, and decision-making, supporting trust and informed use of AI in industrial contexts.

- **TOPICS**
  - Robust machine learning methods for industrial applications
  - Robustness and uncertainty quantification in cyber-physical systems
  - Statistical process monitoring and anomaly detection under uncertainty
  - Out-of-distribution detection in industrial settings
  - Explainable AI (XAI) techniques for industrial applications
  - Uncertainty visualization and risk communication in human-machine interfaces (HMIs)
  - AI-driven decision support systems for operators and engineers
  - Addressing hallucinations and increasing robustness of LLMs in industrial AI
  - Data quality analysis and monitoring for training and inference in AI models
  - Data augmentation and synthetic data strategies for industrial AI
  - MLOps practices for maintaining robust and reliable AI system
  - Hybrid AI approaches combining data-driven and physics-based models
  - Incorporating domain knowledge into AI systems for enhanced reliability
  - Benchmarking and evaluation of uncertainty estimation methods in industrial contexts
  - Case studies demonstrating robustness and uncertainty management in industrial AI

- **AIM.** This Special Session brings together industrial practitioners and AI researchers to discuss the latest innovations and challenges in developing robust AI systems and methods for uncertainty quantification in industrial applications. By providing a platform for sharing advancements, novel methodologies, as well as practical implementations and success stories, the session fosters collaboration between academia and industry.

- **CONFERENCE FORMAT**. The conference will comprise multi-track sessions for regular papers, to present significant and novel research results with a prospect for a tangible impact on the research area and potential implementations, as well as work-in-progress (WiP) and industry practice sessions.

- **AUTHOR'S SCHEDULE (2025)**

❖Regular and special sessions papers
Submission deadline ..... **April 18**
Acceptance notification ..... May 23
Deadline for final manuscripts ..... July 4

❖Work-in-progress/Industry practice papers
Submission deadline ..... **May 30**
Acceptance notification ..... June 20
Deadline for final manuscripts ..... July 4

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