15th IFAC Workshop

Intelligent Manufacturing Systems (IMS 2025)

Koszalin, Poland, 11-12 September 2025

https://ims2025.pl/

This proposal is endorsed by TC 5.1, TC 5.2 and TC 9.2

Invited Session Proposal:

LLM and Generative AI for Intelligent Manufacturing Systems

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Keywords: Intelligent manufacturing; Generative AI, LLM, Digital twin, Agent-based approach

Code: 57t74

ABSTRACT

Industrial automation—particularly in manufacturing systems—opens up vast opportunities for increasing efficiency, enhancing flexibility, and supporting decision-making processes across various levels of operations. While large language models (LLMs) have traditionally found their applications in natural language processing (NLP) and other text-driven tasks, their potential to bring about a paradigm shift in the automation of industrial environments is now increasingly evident. Generative AI (GenAI) models, specifically, provide advanced tools for process optimization, system state forecasting, fault diagnosis, and the predictive maintenance of machines and equipment.

This session aims to explore the most recent developments and innovative use cases for the application of LLMs and GenAI in the field of industrial automation. Topics of interest include the integration of LLMs and GenAI into production planning to streamline workflows, the use of intelligent data analysis techniques for predictive and preventive maintenance, the automation and enhancement of quality control procedures, and the intelligent management of complex, interconnected systems. Additionally,

the session will focus on how AI-driven agents can assist in performing Failure Modes and Effects Analysis (FMEA), offering significant value in assessing and mitigating potential risks within industrial processes. Throughout the session, participants will be exposed to real-world case studies, insights from current research projects, and a discussion of the technical and operational challenges faced when implementing LLM-based technologies in industrial contexts. This session will not only highlight the theoretical possibilities of such technologies but will also address practical applications and the transformative potential of AI-driven solutions in shaping the future of industrial automation.

Covered topics include:

- Applications of LLMs in process optimization, anomaly detection and decision-making.
- The use of GenAI for the intelligent diagnostics and predictive maintenance.
- Case studies on adaptive systems supported by LLMs.
- Development of intelligent assistant systems for manufacturing systems.
- Agent-based approaches for usage of LLM for intelligent manufacturing systems
- Usage of LLM for Failure Mode and Effects Analysis (FMEA)

Timeline:

- **December 16, 2024:** Deadline for paper submission
- **March 03, 2025:** Notification of acceptance/rejection
- **April 07, 2025:** Final paper submission
- **September 11-12, 2025:** 15th IFAC IMS Workshop (IMS 2025), Koszalin, Poland

Manuscript Preparation

For Manuscript Preparation please look at http://www.ifac.papercept.net/conferences/support/support.php
For Manuscript submission please look at https://ifac.papercept.net/conferences/scripts/start.pl
Upon submission, make sure to use the **Invited session identification code: to be announced latter**

For any further information, please contact the Special Session Technical Committee

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