ETFA 2026 Västerås Sweden 8-11 September

31st IEEE International Conference on Emerging Technologies and Factory Automation

Call for Papers - SS 04
Hybrid AI for Industrial Automation: Integrating Semantic Models and Generative AI

Organized and Chaired by

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FOCUS. Industrial automation must adapt quickly and reliably while leveraging heterogeneous data across systems. Semantic models provide structured representations and reasoning but are costly to engineer. Generative AI, particularly Foundation Models (FMs), unlocks unstructured information and natural interaction but raises concerns regarding formal guarantees. This Special Session targets Hybrid AI that combines both towards flexible, reliable, trustworthy industrial systems: Using semantic models to ground and verify generative AI behavior, and generative AI to automatically create and evolve semantic artifacts.

TOPICS

- **FMs for Semantic Model Engineering:** Automated generation of models (e.g., ontologies, AAS, PDDL), natural language interfaces for querying, automated mapping between different representations (OWL, OPC UA, AutomationML, etc.)
- **Semantic Models for FM Grounding and Control:** Validation and constraint checking of outputs, Verification of generated control logic or process plans, knowledge graph-enhanced retrieval (graphRAG) for planning and maintenance
- **Hybrid Reasoning and Planning:** Integrating symbolic reasoning and planning (e.g., PDDL, SMT) with FM-based approaches, semantically-guided decision-making, FM-assisted task decomposition with model-based capability matching
- **Trustworthy AI through Formal Grounding:** Explainable AI (XAI) using formal models, Traceability and provenance tracking for AI decisions, Validation ensuring consistency between FM outputs and domain models
- **Industrial Applications and Integration**: FM-based control, multi-modal integration, natural-language interfaces for HMI, Integration of FMs and emerging conventions (e.g., MCP, A2A), digital twins enhanced with generative AI capabilities
- **Engineering Methods and Tools:** Model-driven development, benchmarks and evaluation frameworks, domain-specific fine-tuning of FMs on industrial knowledge bases, automated code generation, formalization of engineering artifacts

AIM. This Special Session brings together researchers and practitioners from academia and industry to discuss recent advances, open challenges, and best practices around Hybrid AI for industrial automation, combining semantic models (e.g., ontologies, knowledge graphs, AAS) with Generative AI (e.g., LLMs and multimodal models).

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.

AUTHOR'S SCHEDULE (2026)

Regular and special sessions papers
- Submission deadline ..... April 19
- Acceptance notification ..... May 25
- Deadline for final manuscripts ..... July 4

Work-in-progress/Industry practice papers
- Submission deadline ..... May 31
- Acceptance notification ..... June 19
- Deadline for final manuscripts ..... July 4