ETFA 2025 Porto Portugal 9-12 September

30th IEEE International Conference on Emerging Technologies and Factory Automation

Call for Papers
SS07 – Evaluation Methods for Autonomous Cyber-Physical Systems' Behavior

Organized and Chaired by

Luis Alberto Cruiz Salazar[1], Felix Gehlhoff[2], Christoph Legat[3], Artan Markaj[2], Mehmet Mercangöz[4], André Scholz[5]

[1]Universidad Antonio Nariño, Cartagena, Colombia, luicruz@uan.edu.co
[2]Helmut Schmidt University Hamburg, Germany, {felix.gehlhoff, artan.markaj}@hsu-hh.de
[3]Technical University of Applied Sciences, Augsburg, Germany, christoph.legat@tha.de
[4]Imperial College London, United Kingdom, m.mercangoz@imperial.ac.uk
[5]Siemens AG, Germany, andrescholz@siemens.com

❖ **FOCUS**. Global competition, shorter product life cycles, and volatile markets are straining manufacturing, logistics, and energy operations. Workforce shortages further threaten the production of essential goods and system operations. To address this, increasing autonomy in cyber-physical systems (CPS) is key. Autonomous CPS make decisions without human intervention, systematically execute processes, adapt to environmental changes, and self-govern resources. However, their behavior is often complex and unpredictable, making evaluation crucial. This includes testing, verification, diagnostics, and performance analysis using data-driven (e.g., Generative AI), knowledge-driven, and simulation-based methods. Potential use cases range from simulation-based goal selection to explaining CPS actions to operators.

❖ **TOPICS**

- Simulation-based evaluation of autonomous CPS' behaviour
- Verification of system goals and requirements
- Testing intelligent control algorithms (MAS, reinforcement learning or model-predictive control) for autonomous CPS
- Data-driven methods for autonomous CPS' identification and adaption
- Real-time diagnosis and decision making in autonomous CPS' operation
- Integration of Explainable AI (XAI) for enhanced autonomous CPS' transparency
- Real-time decision support approaches for autonomous CPS' supervision
- Evaluation methodologies for autonomous CPS leveraging Digital Twins and Asset Ad-ministration Shells (AAS)
- Evaluation of human-autonomy interaction in remote and autonomous operation
- (Real-time) Safety and regulatory compliance evaluation of autonomous CPS
- Performance, metrics and test-beds for the evaluation of autonomous CPS
- Evaluation of degrees of autonomy in autonomous CPS
- Standards for quality and conformity assessment of autonomous CPS' behaviour

❖ **AIM.** This Special Session is designed to unite experts from both the industrial and academic spheres to discuss the latest innovations, developments, research outcomes, and practical successes in assessing the behavior of autonomous CPS. As such, it serves as a venue for presenting recent progress and breakthroughs, sharing novel concepts, and promoting collaborations as well as future research partnerships.
The special session is supported by the GMA-FA VDI/VDE working group 3.35 on Industrial Agents and sponsored by the IEEE Technical Committee on Industrial Agents

❖ **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

IEEE IES U.PORTO FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO CISTER - Research Centre in Real-Time & Embedded Computing Systems

etfa2025.ieee-ies.org
etfa2025@fe.up.pt