ETFA 2025 Porto
Portugal
9-12 September

30th IEEE International Conference on Emerging Technologies and Factory Automation

Call for Papers
SS05 – Capability- and Skill-based Engineering of Manufacturing Systems

Organized and Chaired by
Tobias Kleinert[1], Aljosha Köcher[2], Kristof Meixner[3],
Siwara Schmitt[4], Michael Winter[1], Luis Miguel Vieira da Silva[2]
[1]RWTH Aachen University, {kleinert, m.winter}@iat.rwth-aachen.de
[2]Helmut Schmidt University, {aljosha.koecher, miguel.vieira}@hsu-hh.de
[3]CDL-SQI, TU Wien, kristof.meixner@tuwien.ac.at
[4]Fraunhofer IESE, siwara.schmitt@iese.fraunhofer.de

❖ **FOCUS.** As customer requirements tend to change more and more frequently, it becomes necessary to pursue flexible and adaptive automation approaches. Such approaches demand an explicit description of the functionality that a production system provides and that products to be manufactured require.

Recent research has introduced approaches based on capabilities and skills using holistic data models (i.e., ontologies, DSLs, variability models …). While capabilities are seen as an abstract description of (manufacturing) functions a system is able to perform, skills are often described as their executable counterparts (i.e., implementation with an invocation interface such as OPC UA).

In order to find solutions for a customer requirement automatically, required tasks as well as domain-specific constraints have to be matched with capabilities provided by automation components. This can be achieved by various techniques such as Artificial Intelligence (AI) planning, satisfiability checks or knowledge graph exploration and reasoning. Process plans can then be orchestrated by combining skills, which are related to capabilities found in the previous step. Finally, simulation and optimization of such process plans can be performed before executing them.

❖ **TOPICS**

   ❖ Modeling of capabilities, skills and services: data modeling, modeling languages, knowledge graphs, rule engines, knowledge-based systems, Asset Administration Shell
   ❖ Algorithms to find matching capabilities: planning, AI, capability-task-matching, satisfiability checks, knowledge graph exploration
   ❖ Skill-based production: generation / modeling of process plans, orchestration, execution, optimization
   ❖ Simulation of a proposed plan: optimization, simulation techniques for skills
   ❖ Engineering methods: automated code generation, model-based programming, automated generation of models
   ❖ Organization of marketplaces and e.g. supply chains in data spaces via services

❖ **AIM.** This Special Session aims at bringing together professionals from industry and academia to share cutting-edge concepts, recent developments, research results, and practical achievements in the emerging area of skill-based manufacturing engineering from different angles and present related phenomena in real-world applications and systems. Therefore, the Special Session provides a platform to report on recent advances and developments, exchange new ideas, and foster future research collaborations and synergies.

❖ **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