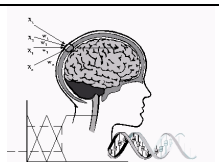
International

Innovation in Knowledge Based and Intelligent Engineering Systems



INVITED SESSION SUMMARY

Title of Session: AI Agents for Advanced Engineering Design

Name of Chair:
Prof. Christian Spreafico, University of Bergamo

Co-chair:
Prof. Davide Russo, University of Bergamo,
Prof. Daniele Landi, University of Bergamo

Details of Session:
This session explores the transformative potential of AI agents in engineering design. Engineering design is a systematic process of conceiving, developing, and optimizing new products, processes or systems, involving various activities and the continuous management of knowledge at different levels and formats. AI agents offer powerful capabilities to enhance these complex process.

The engineering design workflow often encounters limitations regarding information processing, iterative development, and the integration of diverse knowledge domains. The advent of modern AI infrastructures, such as Large Language Models (LLMs) and Retrieval-Augmented Generation (RAG) systems, significantly amplifies the capabilities of AI agents in engineering design. These advanced tools enable AI agents to excel in autonomous learning, sophisticated decision-making, and dynamic interaction. This session will investigate how AI agents, supported by these cutting-edge technologies, can revolutionize design workflows, improve decision quality, stimulate innovation, and effectively manage the increasing complexity of contemporary engineering projects.

The main purpose of this invited session is to gather researchers and practitioners from AI, engineering design, knowledge management, and related fields. We aim to foster a dynamic exchange of the latest advancements, identify shared challenges, and explore synergistic approaches for the effective integration of AI agents into the engineering design ecosystem. This includes discussing how AI agents, utilizing modern AI infrastructures, can interact with various data types (technical documents, images, CAD models), process information, generate creative solutions, and support designers throughout the entire product lifecycle.

The topics of interest include, but are not limited to:

- AI Agents for Technical Knowledge Retrieval
- AI Agents for Patent Analysis
- AI Agents for Conceptual Design (e.g., integration with CAD, image analysis, and concept generation)
- AI Agents for Design for X (Manufacturing, Assembly, Maintenance, Disassembly)
- Integration of AI Agents with Systematic Innovation Theories (e.g., TRIZ method)
- AI Agents for Competitors Intelligence
- AI Agents for Technological Forecasting
- AI Agents for FMEA and Anticipatory Failure Investigation
- AI Agents for Design for Compliant Mechanisms and Additive Manufacturing
- AI Agents for Eco-Design, Life Cycle Assessment (LCA), and Circular Economy
- Knowledge Management in Engineering Design using AI Agents
- Modern AI Infrastructures for Design: Exploring LLMs, RAG, and other foundational models
- Multi-agent Systems in Collaborative Design Environments
- Case Studies and Applications of AI Agents in specific engineering domains

Website URL (if any):

http://chsp.altervista.org/SDF/IS_Spreafico.html

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