

SEMINAR

Thursday, 10.9.2026, 13:00 , Kolar's Lecture Hall

From Immersive Learning to Autonomous Research: Building AI-Enabled Infrastructure for the Next Generation of Experimental Laboratories

Edin Škaljić,
Association FabLab, Sarajevo

Artificial intelligence is rapidly transforming scientific research from isolated digital tools into integrated, intelligent research ecosystems. This lecture presents a technological roadmap towards next-generation experimental laboratories, demonstrating how digital twins, multimodal sensing, large language models (LLMs), computer vision, and intelligent robotics can be combined into a unified AI-enabled infrastructure supporting scientific discovery.

The presentation begins with the development of real-time digital twins for immersive learning and training environments of collaborative robots and follows their evolution toward advanced Virtual Worlds XR that integrate physiological sensing, behavioral analytics, and adaptive AI. Lecture further explores how domain-specific knowledge systems based on Retrieval-Augmented Generation (RAG), together with collaborative robotics, autonomous mobile robots, and additive manufacturing technologies, create closed-loop research environments capable of supporting experiment planning, data interpretation, rapid prototyping, and iterative optimization.

Rather than viewing these technologies as independent innovations, the lecture proposes an integrated architecture where AI assists researchers throughout the complete scientific workflow from knowledge acquisition and experimental design to autonomous execution, physical validation, analysis, and technology transfer. The presentation concludes by discussing future directions for AI-enabled research infrastructures and the role of interdisciplinary collaboration in accelerating scientific discovery through increasingly autonomous laboratories.

Kindly invited.