BOOK OF ABSTRACTS

Plenary session I

Wednesday, 18th of June 2025 Central Hall 09:00-10:00

Chair: **Mirko Raković**

The AI continuum: From Human Monitoring to Autonomous Robots in Contact-Rich Applications

Arash Ajoudani

This talk explores the evolving landscape of applied machine learning across the continuum of human-robot interaction, with a focus on contact-rich environments. Starting from human monitoring for cognitive and physical states, the presentation will highlight how adaptive AI systems can personalize robot behavior to individual needs, enhance safety, and improve collaboration. It will then transition to fully autonomous robotic systems capable of handling complex manipulation tasks in unstructured settings. Through insights from recent research in human-in-the-loop learning, adaptive control, and foundational models, the talk will outline the path toward resilient, intelligent, and context-aware robots that can seamlessly integrate into both industrial and assistive scenarios.

Cognitive Intelligence in Industrial Robots and Manufacturing I

Wednesday, 18th of June 2025 Room REČ 10:30-12:00

Chair: **Zoran Miljković**; Co-chair: **Bojan Nemec**

Towards Using Natural Language to Perform Robotic Tasks

Bojan Nemec, Mihael Simonič, Boris Kuster, Leon Žlajpah, and Aleš Ude

This study explores automating robot programming using human-readable instructions, integrating textual and visual inputs. We present a framework combining a Visual Language Model (VLM), a vision processing model, and an adaptive skill library based on compliant control. The VLM converts textual instructions into executable commands linked to the skill library, while the vision model identifies and localizes referenced objects. This approach removes the need for additional training, enabling robots to execute tasks directly from natural language directives. Our method was evaluated using an internet-connected benchmarking device. It aims to streamline robot programming and enhance natural language communication in industrial and everyday settings.

Implementing IoT Technology on Mobile Platform: Edge-Cloud Integration and Data Handling

Jakub Krejčí, Marek Babiuch, Rostislav Wierbica, and Vaclav Krys

This paper examines the integration of IoT technology on mobile platforms, emphasizing edge-cloud collaboration and data management. Modern robots rely on advanced sensors and cameras to generate critical data for operation in dynamic environments. Efficient data collection, processing, and transmission