Trinational Round Table: Artificial Intelligence

April 24, 2025, 11 a.m. – 6:00 p.m., ARS Electronica (Linz), Seminarroom

Agenda

11:00 a.m.	**Welcome and Get-Together** (*at the cash desks at the entrance to the museum*)
11:15 a.m.	**Presentation of ARS Electronica on AI with Deep Space 8K Tour**
11:50 a.m.	**Networking-Lunch & Registration** (*at Jenners Restaurant, 3rd floor, ARS Electronica Center*)
1:00 p.m.	**Introduction** Prof. Dr. Tomas Sauer (University of Passau / Network INDIGO) Prof. Dr. Wolfgang Dorner (Deggendorf Institute of Technology)
1:10 p.m.	**Presentation of the Europaregion Donau-Moldau e.V. and KI Campus Ostbayern** Vendula Maihorn and Fabian Hans
1:20 p.m.	**AI in the Arts: Opportunities and Challenges** Prof. Ali Nikrang (University of Music and Theatre Munich)
1:35 p.m.	**Address of Welcome** Christoph Kremer (Managing Director ARS Electronica Center)
1:50 p.m.	**Performance Benchmarking of AI-Algorithms for Time-Series Forecasting** Prof. Dr. Andreas J. Kassler (Deggendorf Institute of Technology)
2:05 p.m.	**Neuromorphic Computing @ JKU-SCCH** PD Dr. Bernhard Moser (Software Competence Center Hagenberg GmbH, Johannes Kepler University Linz)
2:20 p.m.	**Foundation Models for Knowledge Extraction and Image Compression** Prof. Dr. Christian Osendorfer (University of Applied Sciences Landshut)
2:35 p.m.	**Telemedicine Self-Examination of Speech and Memory for Rapid Detection of Cognitive Impairments Using Machine Learning Methods** Dr. Luboš Šmídl, PhD (University of West Bohemia, Pilsen)
2:50 p.m.	**Advancing Motor Imagery and Execution with Artificial Intelligence** Assoc. Prof. Dr. Roman Mouček (University of West Bohemia, Pilsen)
3:05 p.m.	Coffee Break
3:30 p.m.	**AI in Aquaculture, Fishery and Hydrobiology** Assoc. Prof. Dr. Radka Symonová (University of South Bohemia, Budweis)
3:45 p.m.	**Agent-Lab - Advanced Generative Experimentation with Neural Technologies for Laboratories** André Kestler (OTH Amberg-Weiden)
4:00 p.m.	**Bridging AI Research with Industrial Automation** Prof. Dr. Stefan Huber (Salzburg University of Applied Sciences)
4:15 p.m.	**AI Catalyst for Export-Oriented SMEs** Valerija Muravjova and Prof. Dr. Margarethe Ueberwimmer (University of Applied Sciences Upper Austria)
4:30 p.m.	**Discussions in a Barcamp Format** (Focus Group Discussions in the seminar room and room "Citizen Lab")
5:45 p.m.	**Wrap-up and Conclusion**
6:00 p.m.	**End of the Event**
ca. 7:00 p.m.	*Optional joint **networking-dinner** at a restaurant (on self-payment basis) (at Wirtshaus Keintzel, Rathausgasse 6, 4020 Linz, Austria)*

AI in the Arts: Opportunities and Challenges

Prof. Ali Nikrang

University of Music and Theatre Munich

Artificial intelligence is currently changing key structures in the arts and culture sector. It is intervening deeply in existing work processes, shifting the focus of content and increasingly taking on tasks that were previously reserved for artistic, human activity. Despite all its technical capabilities, however, the current state of development of AI raises fundamental questions - especially where individual, subjective artistic work is required. Yet this is precisely the prerequisite for art as a social and socially relevant phenomenon.

The talk explores the question of how artistic practice and technology-centred AI research can be linked in concrete terms. The focus will be on practice-oriented projects in the field of AI and music, which are being implemented for example at the University of Music and Theatre Munich as well as at the ARS Electronica Futurelab and enable an artistic discussion of AI research and development.

Performance Benchmarking of AI-Algorithms for Time-Series Forecasting

Prof. Dr. Andreas J. Kassler

Deggendorf Institute of Technology

Forecasting time-series data has many diverse and important use-cases in areas such as finance, transport, networking or marketing. Recently, several AI-based forecasting methods have been successfully designed and implemented such as regression trees, support vector machines, transformers, or CNNs. However, when designing new methods or evaluating the performance of existing methods on your data sets, researchers need to follow and re-implement the same basic steps in terms of data preparation, cleaning, model selection, hyperparameter tuning, etc. In this talk, we present a novel framework, that automates all these steps. Experimenter just need to provide simple configuration files while our framework generates code for data preparation, hyper parameter tuning, model selection, model benchmarking for both training and inference. By integrating the framework with Kubernetes, we automate the model benchmarking at cloud scale, also supporting different hardware platforms (e.g. AI accelerators) for both training and inference. Also, the framework collects telemetry data during the training and inference runs effectively enabling model scoring/benchmarking on a diverse range of parameters.

Neuromorphic Computing @ JKU-SCCH

PD Dr. Bernhard A. Moser

Software Competence Center Hagenberg GmbH and Johannes Kepler University Linz

Neuromorphic computing is an emerging field of AI that aims to synthesize bio-inspired spike-based information encoding with HW-SW design for novel more efficient AI systems. This keynote gives an overview of the latest research results in this field from our research group in Linz-Hagenberg, both on the mathematical foundations and on its applications.

Foundation Models for Knowledge Extraction and Image Compression

Prof. Dr. Christian Osendorfer

University of Applied Sciences Landshut

One of the pressing challenges in today's AI and machine learning landscape is the significant computational cost often associated with building competitive systems on top of foundation models. In this talk, I will present two recent projects that show how even with a modest compute budget, it's possible to create impactful machine learning applications.

The first system is a knowledge extraction engine that integrates audio and text foundation models to automatically build an interactive knowledge base from related YouTube videos. The second system leverages a diffusion-based foundation model for ultra-low bit-rate image compression. Our approach outperforms the current closed-source state-of-the-art in image fidelity at lower bit-rates while remaining fully open-source. A preliminary version of this system was accepted as a workshop paper at NeurIPS 2024.

Telemedicine Self-Examination of Speech and Memory for Rapid Detection of Cognitive Impairments Using Machine Learning Methods

Dr. Luboš Šmídl, PhD

University of West Bohemia, Pilsen

Early cognitive disorders diagnosis is becoming increasingly important due to population aging. The most common causes include Alzheimer's disease and frontotemporal dementia. These diseases are also manifested by changes in speech. NLP allows us to identify and classify these changes. The project aims to develop a web application for self-assessment and automated detection of cognitive disorders from speech. The application will be a voice dialogue system using machine learning methods. The novelty of this approach is the possibility of an efficient self-assessment of a wide spectrum of the Czech population from their homes and an automated evaluation of test results. Early detection can be followed by a more detailed diagnosis and adequate treatment.

We are now halfway through the project. Partial tasks of the web application and preliminary results for Czech will be shown during the presentation. The goal for the future is to get an international project and implement voice dialogue with automatic evaluation of cognitive disorders for other European languages.

Advancing Motor Imagery and Execution with Artificial Intelligence

Assoc. Prof. Dr. Roman Mouček

University of West Bohemia, Pilsen

Artificial intelligence (AI) is increasingly used to decode mental representations of movement from the brain's electrical activity, opening new possibilities in neuroscience, rehabilitation, sports training, and brain-computer interface (BCI) applications. We will explore the identification of brain patterns associated with motor imagery and execution, the role of machine learning and deep learning algorithms in this process, and the potential of these innovations to enhance motor rehabilitation strategies.

AI in Aquaculture, Fishery and Hydrobiology

Assoc. Prof. Dr. Radka Symonová

University of South Bohemia, České Budějovice/Budweis

We are introducing convolutional neural networks to detect and classify objects of freshwater zooplankton. Using a novel devise PlanktoScope and AI, we aim to automate classification, quantification and measuring of zooplankton. This kind of analysis is highly desirable for production aquaculture, fishery, drinking water production, and for hydrobiology. Currently, we are processing image data below 200 microns produced by PlanktoScope in its default setting using a YOLO model; however, we need to move forward to be able to cover the entire size spectrum of our zooplankton groups. To do so, we aim to employ an AI-camera already during data acquisition. We are looking for academic partners to be able to apply for a project and/or to establish a consortium focused on application of AI in aquaculture, fishery, and hydrobiology. We have private companies from the production aquaculture sector interested in piloting our workflow.

Agent-Lab - Advanced Generative Experimentation with Neural Technologies for Laboratories

André Kestler

Ostbayerische Technische Hochschule Amberg-Weiden

The increasing complexity of experimental and analytical processes in the fields of biology and chemistry requires innovative digital support systems. This project aims to develop a multi-agent system (MAS) that supports researchers through intelligent task sharing, data-driven analyses and knowledge retrieval.

At the centre of the system is a coordinator agent that analyses incoming requests, breaks them into subtasks and assigns them to specialised agents. Each agent is optimised for a specific function, such as data analysis, simulation or knowledge extraction. Each agent is registered with the coordinator agent with its expertise. This allows the coordinator to assign the subtasks. The results are iteratively fed back to the coordinator agent, which further manages the results. If necessary, the coordinator agent initiates further steps and delivers the result to the user.

Agents utilize a Large Language Model (LLM) as a central unit, has tool calling ability, and can access a memory of past interactions and knowledge. Examples of tools are database queries, calculator, web queries or API access. Other neural networks can also act as tools, sending results back to the LLMs. Human feedback is used to continually refine the system, allowing it to learn and adapt to new challenges.

The project represents a new type of adaptive and collaborative architecture for use in scientific laboratories. Potential use cases include TLC (thin-film chromotography), tumour research and battery production. This approach is intended to increase the efficiency and precision of scientific processes and create an interactive research assistant.

Bridging AI research with Industrial Automation

Prof. Dr. Stefan Huber

Salzburg University of Applied Sciences

The JR Center for Intelligent and Secure Industrial Automation is a research cooperation with three global Austrian players of the automation industry. In this talk, we will explain how we put a bridge between fundamentals-oriented applied research on artificial intelligence with cooperate R&D. This bridge enabled us to conduct substantial AI research focused on time series, dynamical systems, topological data analysis and reinforcement learning, which is partly erected on a novel testbed packed with cooperate technology.

AI Catalyst for Export-Oriented SMEs

Valerija Muravjova and Prof. Dr. Margarethe Ueberwimmer

University of Applied Sciences Upper Austria

Artificial Intelligence presents significant opportunities for small and medium-sized enterprises, particularly in International Business, Marketing, Sales, and Export. However, successful implementation requires strategic preparation and structured change management. This presentation introduces the AI Catalyst for SMEs Interreg ATCZ project, focusing on two key areas: AI Readiness Radar and Change Process Management for AI Implementation. The AI Readiness Radar serves as a self-assessment tool, enabling SMEs to evaluate their AI preparedness from a triangle perspective: ethical and legal considerations, potential business benefits, and technological capabilities. This structured approach helps companies identify gaps and opportunities before making strategic AI investment decisions in global markets. Beyond assessing readiness, effective change management is crucial for seamless AI integration in international sales and marketing strategies. This session will explore the key factors SMEs must consider to ensure a smooth transition, minimize resistance, and foster an AI-driven corporate culture. By combining strategic self-assessment with organizational transformation, this presentation provides practical insights and tools to help SMEs successfully implement AI and strengthen their competitiveness in international markets.