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UNIVERSITY OF DEBRECEN • AIDA

AICET 2026

Book of Abstracts

*AI Cutting-Edge Trends
Summer Symposium and School*

24–28 August 2026
Debrecen, Hungary | Hybrid event



Faculty of Informatics • Kassai Campus



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Welcome to AICET 2026

AIDA AICET 2026 brings together researchers, doctoral candidates, students and industry professionals to explore emerging directions in artificial intelligence and machine learning. Held in Debrecen from 24 to 28 August 2026, the five-day symposium and summer school connects scientific lectures with practical training and international exchange.

This volume introduces the plenary speakers and brings together their lecture abstracts. The contributions span distributed deep learning, computer vision, human–robot interaction, generative modelling, human–AI collaboration, computing infrastructures, autonomous driving, interpretable learning and environmental decision support.

Research and practical learning

The programme combines plenary lectures with NVIDIA workshops, professional skills courses and optional on-site industrial certification examinations. Its practical sessions address agentic AI applications, multimodal agents, diffusion models and accelerated robotics. Professional development activities cover the use of generative AI at work, communication and digital marketing.

The final two days connect AICET with IEEE CITDS 2026 through conference sessions and related activities. Challenge events and social gatherings provide further opportunities for participants to exchange ideas and build research and professional connections.

The AIDA community

The International AI Doctoral Academy (AIDA) connects institutions, researchers, educators and students working in artificial intelligence. Its educational mission supports doctoral training, shared teaching resources and access to advanced AI knowledge across institutional and national boundaries.

AICET gives this mission a practical setting: participants encounter current research, examine the scientific principles behind new methods and gain experience with technologies used in real applications. The event is jointly organised by AIDA and the University of Debrecen.

Scientific scope

The plenary programme links foundational questions with deployment challenges: how learning systems share knowledge, interpret visual information, collaborate with people and operate reliably in complex environments. Across these topics, the lectures place particular emphasis on the relationship between technical capability and practical use.

Debrecen and the host faculty



Faculty of Informatics, University of Debrecen, Kassai Campus.

The Faculty of Informatics at the University of Debrecen provides the academic setting for AICET 2026. The Kassai Campus brings the scientific and educational programme into a university environment in Debrecen, Hungary, with on-site activities complemented by remote participation.

Organising leadership

András Hajdu • General Chair

Dean of the Faculty of Informatics and Professor at the University of Debrecen. His work connects data science, artificial intelligence and medical image analysis with research leadership and professional education.

Balázs Harangi • Technical Program Chair

Associate Professor at the Faculty of Informatics, University of Debrecen. His research and teaching focus on digital and medical image processing, pattern recognition, machine learning and deep learning.

Local organisation

Organising committee: András Hajdu, Balázs Harangi, Gergő Bogacsovics, Tamás Bérczes, Sándor Pecsora, Ákos Szabó and Bence Hegedűs.

Technical coordination: Sándor Pecsora

Event coordination: Bence Hegedűs

Administrative coordination: Arnold Pintér

Contents and lecture schedule

All times are local to Debrecen (CEST).

24 AUG • 09:00–10:00	Ioannis Pitas	
Decentralized DNN Architectures for Visual Data Analysis		5
25 AUG • 09:00–10:00	Marina Ivasic-Kos	
Application of computer vision models in security and surveillance		6
25 AUG • 14:00–15:00	Mohamed Chetouani	
When Robots Get It Wrong: Detecting Ambiguity and Failure Using Vision-Language Models		7
26 AUG • 09:00–10:00	Stefano Berretti	
Animating 3D Human Face and Body		8
26 AUG • 14:00–15:00	Sarit Kraus	
Smarter Together? Teams of AI and Humans		9
27 AUG • 09:00–10:00	Helen Karatza	
Resource Orchestration and Scheduling Across the Mist–Fog–Cloud Continuum: Trends and Future Directions		10
27 AUG • 14:00–15:00	My T. Thai	
The Next Challenge in Autonomous Driving: Rare Failures		11
28 AUG • 09:00–10:00	Péter Baranyi	
Neural Mesh		12
28 AUG • 14:00–15:00	Thanh-Binh Nguyen	
From Data to Decisions: AI, Digital Twins and Integrated Modelling for Climate and Air Quality		13

Ioannis Pitas

Aristotle University of Thessaloniki and CERTH, Greece

Speaker biography

Ioannis Pitas is a Principal Researcher at Aristotle University of Thessaloniki and CERTH/ITI, and Chair of the International AI Doctoral Academy. He is an IEEE Fellow, IEEE Distinguished Lecturer and EURASIP Fellow. He was Professor at AUTH from 1994 to 2025 and directed its Artificial Intelligence and Information Analysis laboratory from 1999 to 2025. His research spans computer vision, machine learning, autonomous systems, intelligent digital media and biomedical imaging. He coordinates the Horizon Europe TEMA project and has extensive experience in international research, scientific publishing and doctoral education.



Decentralized DNN Architectures for Visual Data Analysis

Abstract

This lecture overviews decentralized and distributed DNN architectures and their implementation in cloud/edge environments. Big data analysis can be greatly facilitated if decentralized/distributed DNN architectures are employed that interact with each other for DNN training and/or inference using the human Teacher-Student education paradigm. A novel Learning-by-Education Node Community (LENC) framework is presented that facilitates communication and knowledge exchange among diverse Deep Neural Networks (DNN) agents, undertaking the role of a student or teacher DNN by offering or absorbing knowledge respectively. The framework enables efficient and effective knowledge transfer among participating DNN agents while enhancing their learning capabilities and fostering their collaboration among diverse networks. The proposed framework addresses the challenges of handling diverse training data distributions and the limitations of individual DNN agent learning abilities. The LENC framework ensures the exploitation of the best available teacher knowledge upon learning a new task and protects the DNN agents from catastrophic forgetting. The experiments demonstrate the LENC framework functionalities on multiple teacher-student learning techniques and their integration with lifelong learning. Our experiments manifest the LEMA framework's ability to maximize the accuracy of all participating DNN agents in classification tasks by leveraging the collaborative knowledge of the framework. A LENC framework implementation in cloud/edge environments is also overviewed. Applications are presented in big visual data analysis tasks for Natural Disaster Management.

Marina Ivasic-Kos

University of Rijeka, Croatia

Speaker biography

Marina Ivasic-Kos is Professor at the University of Rijeka, where she leads the Laboratory for Pattern Recognition and Soft Computing and the AIRI Centre laboratory for Computer Vision, Virtual and Augmented Reality. She received her PhD in Computer Science in Zagreb. Her research focuses on artificial intelligence and computer vision, with projects in surveillance, autonomous navigation and diagnostic applications. She has coordinated research projects and contributed to Horizon, Digital Europe, COST and Erasmus+ initiatives. She also serves on research evaluation and accreditation panels.



Application of computer vision models in security and surveillance

Abstract

This lecture presents various computer vision tasks and the application of deep learning models in the field of security and surveillance.

Using images captured by drones during search and rescue operations, thermal images of a protected border area, and video surveillance at an airport, models for object detection and tracking, and activity recognition are analyzed. These models are developed based on real-world data to improve the security of protected areas and to assist surveillance officers and human crews in maintaining security.

The lecture will present the results of ongoing research and prototypes of systems developed for land border protection to detect a person moving without authorization in a restricted access area, for the detection of abandoned luggage in public spaces such as airports to prevent incidents that could endanger the safety of a large number of people, and in search and rescue operations to assist human crews during and after search operations to search the area more easily and quickly and find a lost person.

The lecture will also provide basic information about deep convolutional neural networks and VIT and present the design of the experiment from the phase of data collection and preparation along with the basic principles of transfer learning, to the selection of appropriate state-of-the-art models, their further fine-tuning for the task of interest, and up to the evaluation and explanation of the results.

In conclusion, open questions and challenges in the application of deep learning methods in the field of surveillance and security will be discussed, which are of a technical nature, such as the detection of small objects of interest, crowding and large occlusion of objects, difficult object tracking, while at the same time taking care of privacy.

Keywords: Object Detection, Object Tracking, Action Recognition, Deep Neural Networks, Drone images, Thermal images, CCTV images

Mohamed Chetouani

Sorbonne University, France

Speaker biography

Mohamed Chetouani is Deputy Director of the Institute of Intelligent Systems and Robotics at Sorbonne University and Vice-Chair of AIDA. His research covers social signal processing, social robotics and interactive machine and robot learning, with applications in psychiatry, psychology, social neuroscience and education. He coordinated the ANIMATAS European Training Network and served as President of the Sorbonne University Ethics Committee from 2019 to 2023. He is Ethics Manager of the euROBIN network and was General Chair of ACM ICMI 2023.



When Robots Get It Wrong: Detecting Ambiguity and Failure Using Vision-Language Models

Abstract

This talk presents recent advances in Human–Robot Interaction using Vision-Language Models (VLMs). We explore how robots can detect ambiguous instructions, ask for clarification, and recognize when their actions are misaligned with human intent during collaborative tasks. The talk also discusses personalization, interactive robot learning, and open challenges for building robust and trustworthy human–robot collaboration systems.

Stefano Berretti

University of Florence, Italy

Speaker biography

Stefano Berretti is Associate Professor in the Department of Information Engineering at the University of Florence, with habilitation as Full Professor since 2017. His research focuses on 3D computer vision, face and expression recognition, biometrics, human behaviour understanding, and 3D and 4D reconstruction and generation. He has published more than 250 articles and held visiting appointments in France and Canada. He serves in editorial roles for IEEE Transactions on Circuits and Systems for Video Technology, ACM Transactions on Multimedia Computing, Communications, and Applications, and IET Computer Vision. He is an IEEE Senior Member.



Animating 3D Human Face and Body

Abstract

Generating novel sequences of human facial expression, talking heads, or body to form a natural and plausible action with continuous and smooth temporal dynamics is a challenging problem. These motions can either simulate full body movement, like for gait, or part specific movement, like in playing the guitar or phone call, or involve facial expressions, action units or even mouth movement when a person speaks or reads a text. With the advent of powerful generative models such as GANs or Diffusion models, novel data generation paradigms have become possible, and these networks have shown to be powerful in many image generation tasks. However, many issues remain to be solved especially when passing from the static to the dynamic case and new research problems emerge.

We expect generating synthetic and realistic static and dynamic data of humans can have a big impact in several different contexts. A straightforward outcome that developing such techniques could have, is that of generating an abundance and variety of new data that could be otherwise difficult, very expensive and time consuming to obtain from reality. Such data can be essential in simulation, virtual and augmented reality, in training more robust learning tools, to cite a few. For example, we could expect new applications in the game and movie industry, where fully synthetic actors could be used in the near future, without the need of explicit modeling.

In this talk, we will address some recent works in this domain for generating expressive talking heads and body animation of 3D human avatars.

Sarit Kraus

Bar-Ilan University, Israel

Speaker biography

Sarit Kraus is Professor of Computer Science and Artificial Intelligence at Bar-Ilan University. Her research develops intelligent agents and multi-agent systems that integrate machine learning, including large language models, with optimisation and game theory. A central theme is enabling agents to interact effectively with people and robots. Her distinctions include the IJCAI Computers and Thought Award, the IJCAI Research Excellence Award, the ACM SIGART Agents Research Award, the ACM Athena Lecturer recognition and the EMET Prize. She is an ACM, AAAI and EurAI Fellow and a recipient of an ERC Advanced Grant.



Smarter Together? Teams of AI and Humans

Abstract

The rapid advancement of intelligent systems—ranging from large language models (LLMs) to autonomous drones and robots—has unlocked remarkable capabilities while introducing new challenges for human interaction and coordination. As these systems grow in autonomy and complexity, humans may find it increasingly difficult to collaborate effectively or maintain situational awareness.

To address these challenges, intelligent advising agents can support decision-making and reduce cognitive load by providing guidance and explanations that help users assess when and how to act on AI-generated advice. Our overarching goal is to ensure that $AI + Human > \max(AI, Human)$ —that is, the combined intelligence of humans and machines should surpass the performance of either working alone.

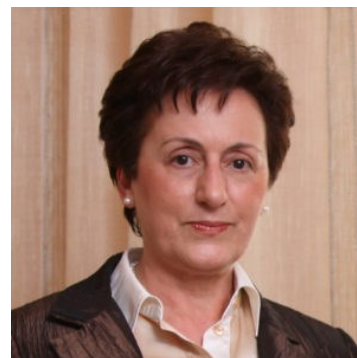
This presentation explores the key challenges of human collaboration with intelligent systems and introduces methods that enable LLM-based agents to coordinate more effectively with people. These approaches aim to establish shared reference points for understanding, foster goal alignment, and promote adaptive interaction. Ultimately, we outline strategies for developing assisting agents that enhance human performance, trust, and satisfaction within human–AI–robot teams.

Helen Karatza

Aristotle University of Thessaloniki, Greece

Speaker biography

Helen Karatza is Professor Emeritus in the Department of Informatics at Aristotle University of Thessaloniki. Her research addresses cloud, fog and mist computing, energy efficiency, fault tolerance, resource allocation, scheduling algorithms and real-time distributed systems. She has authored or co-authored more than 270 technical papers and book chapters and received the ACM SIGSIM Distinguished Contributions Award in 2025. Her editorial roles include Simulation Modelling Practice and Theory, Future Generation Computer Systems and IEEE Transactions on Services Computing. She is a senior member of IEEE, ACM and SCS.



Resource Orchestration and Scheduling Across the Mist–Fog–Cloud Continuum: Trends and Future Directions

Abstract

The explosive expansion of Internet of Things (IoT) applications is increasingly exposing the inherent limitations of centralized cloud infrastructures in coping with the scale, velocity, and distribution of data generated by pervasive sensing devices. In response, Fog and Mist computing paradigms have emerged as pivotal enablers, pushing computation closer to the data sources to alleviate latency, bandwidth, and scalability constraints. While Fog computing facilitates near-edge processing with reduced latency, Mist computing extends this paradigm further by enabling ultra-low-latency execution directly at or near the device layer.

As many IoT applications are inherently time-critical and governed by strict deadline requirements, the efficient orchestration of resources and task scheduling across the mist–fog–cloud continuum becomes essential for ensuring deterministic performance and reliable execution. This keynote explores cutting-edge advances in scheduling strategies and resource management frameworks tailored for real-time IoT environments. It further highlights emerging research directions and open challenges that will define the evolution of distributed computing in future IoT systems.

My T. Thai

University of Florida, USA

Speaker biography

My T. Thai is Nelms Endowed Chair Professor and Associate Director of the Nelms Institute for the Connected World at the University of Florida. An IEEE Fellow, she works on trustworthy AI and optimisation for complex systems, including autonomous systems, healthcare, cybersecurity and network infrastructure. She has authored seven books and more than 350 publications. Her honours include the 2023 AAAI Distinguished Paper Award, the Web Science Trust Test-of-Time Award, the NSF CAREER Award and the DTRA Young Investigator Award. She serves as Editor-in-Chief of ACM Computing Surveys and the Journal of Combinatorial Optimization.



The Next Challenge in Autonomous Driving: Rare Failures

Abstract

Autonomous vehicle (AV) policies excel in everyday driving, yet they routinely collapse in rare, safety-critical edge cases. The culprit isn't just a lack of data, but it is a critical vulnerability to minor distribution shifts. While current world models attempt to simulate these scenarios, they optimize for visual realism over physical validity and temporal consistency. The result? Generated videos that look plausible to humans but provide little value for rigorously testing or repairing the underlying AV policy.

In this keynote, I dissect why this gap persists, exposing the limitations of recent world models and LLM-driven scenario generation. I will then introduce our simulation-first framework designed to systematically discover and refine AV policy failures. By anchoring our approach in simulators to enforce strict physical constraints, we deploy critics and planners to pinpoint exactly why a policy fails and how to modify a scenario to expose and repair it. Finally, I will present our sim-to-real pipeline, which transports these simulated failures into the real domain while preserving vital physical, temporal, and policy-relevant failure semantics. Ultimately, this approach delivers real-world models capable of genuinely stress-testing and hardening the next generation of autonomous driving policies.

Péter Baranyi

Corvinus University of Budapest, Hungary

Speaker biography

Peter Baranyi has made significant contributions to the fields of non-linear control theory and modeling. Among his key inventions is the TP model transformation, a sophisticated form of higher-order singular value decomposition for continuous functions. This transformation is crucial in the development of nonlinear control design theories and facilitates new optimisation theory. Baranyi's scientific achievements have been recognised with several prestigious awards, including the Investigator Award from Sigma Xi, the Kimura Award, and the International Design Gabor Award. He has published over 100 journal papers and authored four books, resulting in an h-index of 54.



Neural Mesh

Abstract

The presentation introduces the concept and architecture of the Neural Mesh. The Neural Mesh is an alternative to conventional neural networks. Its primary motivation is that, in many contemporary AI developments, merely achieving highly accurate learning of information is no longer sufficient. Instead, increasing emphasis is placed on learning architectures that yield interpretable and transparent representations, enabling meaningful evaluation, facilitating subsequent design, and allowing the quality of the solution to be formally verified.

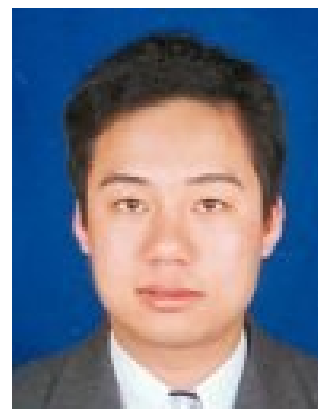
The Neural Mesh architecture presented in this talk represents the learned information in a manner that inherently supports these capabilities.

Thanh-Binh Nguyen

IIASA, Austria • University of Debrecen, Hungary

Speaker biography

Thanh-Binh Nguyen is a Research Scholar and Software Engineer in the Pollution Management Research Group of the Energy, Climate, and Environment Program at the International Institute for Applied Systems Analysis (IIASA), Austria. He is also affiliated with the Faculty of Informatics at the University of Debrecen, Hungary, where he received his habilitation in semantic linked multi-models. He holds a doctorate in data warehousing from TU Wien. His research combines software technology, data integration, artificial intelligence and environmental modelling, with particular emphasis on the GAINS integrated assessment framework and data-driven decision support for air-quality and climate policy.



From Data to Decisions: AI, Digital Twins and Integrated Modelling for Climate and Air Quality

Effective climate and air-quality policies depend on the ability to transform large, heterogeneous datasets into reliable and actionable knowledge. This talk explores how artificial intelligence, environmental Digital Twins and integrated assessment models can support this transformation, with particular emphasis on the GAINS framework.

The presentation introduces computational approaches for connecting environmental, socioeconomic, emissions and scenario data with models used to analyse air pollution, greenhouse-gas emissions and mitigation strategies. It also discusses GAINS-City, an emerging framework that bridges regional integrated assessment and urban-scale analysis through data integration, spatial and temporal downscaling, high-resolution atmospheric modelling, monitoring observations and AI-based data-model fusion.

By combining these methods, environmental Digital Twins can provide more transparent and detailed assessments of urban air quality and population exposure. The talk highlights how integrated modelling and artificial intelligence can strengthen evidence-based decision-making and support the development of effective climate and air-pollution policies.

PUBLICATION INFORMATION

Sources and acknowledgements

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Scientific contributions

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Event and institutional information

AICET 2026 official website

<https://aicet.inf.unideb.hu/en.php>

AIDA AICET 2026 Call for Participation; AICET 2026 Program at a Glance; and the University of Debrecen Press Centre article “Szakmai tapasztalatcsere a mesterséges intelligenciáról”.

Photography and visual identity

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