



**UNIVERSITY of
DEBRECEN**

PROGRAMME

2nd International Conference on Autonomous Machines and Intelligent Robotics Applications (AMIRA 2026)

October 13–14, 2026, (Debrecen, Hungary)

organized by

Faculty of Engineering, University of Debrecen
and

IEEE Industrial Electronics Society



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MEGVALÓSULÓ
PROJEKT



Welcome Message

It is our great pleasure to welcome all participants of AMIRA 2026 to Debrecen, Hungary, and in particular to the Faculty of Engineering of the University of Debrecen. We are delighted that this international conference brings together researchers, professionals, and experts from different parts of the world to exchange knowledge, share recent results, and discuss new perspectives in the field of AMIRA (Autonomous Machines and Intelligent Robotics Applications).

The University of Debrecen is one of Hungary's traditional and internationally recognized universities, with a long-standing commitment to education, research, and innovation. Within the University, the Faculty of Engineering is a dynamically developing faculty with an increasingly important role in engineering education and research. We are especially pleased that our students will also have the opportunity to gain insight into the topics presented at AMIRA 2026 and to experience an international scientific event in their own academic environment.

It is a particular pleasure to welcome several distinguished keynote speakers to the programme. Their contributions will provide valuable perspectives and stimulate discussions on important current and future challenges in the field.

The technical programme of AMIRA 2026 reflects a rigorous and selective review process. More than 40 papers were submitted to the conference, of which only 20 have been selected for presentation. Each submission was evaluated by at least three independent reviewers, ensuring a thorough and demanding assessment of the scientific contributions. The accepted papers represent the work of authors from countries across America, Europe, Australia, Africa and Asia, highlighting the international character of the conference.

We are proud to host AMIRA 2026 in Debrecen, a city with a strong academic tradition and a rapidly developing industrial environment. The presence of major international companies such as BMW, Schaeffler, Thyssenkrupp, Krones, and EMERSON |NI reflects the city's growing industrial importance and creates new opportunities for cooperation between academia and industry.

We sincerely hope that AMIRA 2026 will provide an inspiring forum for scientific exchange, fruitful discussions, and new professional connections. We wish all participants a successful and enjoyable conference in Debrecen.

Sincerely yours,

Péter KORONDI
General Chair



Committees of AMIRA 2026

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- Prof. Péter KORONDI (University of Debrecen, Hungary)
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Discover Debrecen - A city where tradition meets innovation

Welcome to Debrecen, Hungary's second-largest city and a vibrant centre of education, science, culture and innovation. From its historic city centre to the green landscapes of the Great Forest, Debrecen offers a diverse range of experiences within easy reach of the conference venue.



Great Reformed Church - The symbol of Debrecen

Standing at the heart of the city, the Great Reformed Church is Debrecen's most iconic landmark. Its monumental architecture and historic significance reflect the city's strong Protestant heritage and its role in Hungarian history. Visitors can also enjoy panoramic views of the city from the church towers.



Déri Museum - Art, history and culture

Located in the elegant Déri Square, the Déri Museum is one of Debrecen's most important cultural institutions. Its collections span art, archaeology and local history, while its best-known treasures include Mihály Munkácsy's monumental Christ Trilogies.



Historic City Centre - The heart of Debrecen

Take a walk through Kossuth Square, Piac Street and the surrounding historic streets to discover Debrecen's distinctive urban character. Historic buildings, cafés, restaurants and lively public spaces make the city centre an ideal place to experience the atmosphere of the city.



University of Debrecen - A tradition of knowledge and innovation

The University of Debrecen is one of Hungary's leading research and educational institutions and an important part of the city's identity. Its impressive Main Building, surrounded by the greenery of the Great Forest, represents Debrecen's long-standing academic tradition and its forward-looking spirit.



Great Forest - Nature in the heart of the city

The Great Forest is Debrecen's largest urban green area and a popular place for walking, cycling and relaxation. The park combines peaceful woodland paths with attractions such as Békás Lake, the Nagyerdei Water Tower and the surrounding cultural and recreational venues.



Nagyerdei Stadium - Sport, architecture and community

Located in the Great Forest, the Nagyerdei Stadium is one of Debrecen's most distinctive modern landmarks. Home to Debreceni VSC and a venue for major sporting and cultural events, the stadium combines contemporary architecture with the natural setting of the Great Forest.



MODEM - Contemporary art in the city

MODEM Modern and Contemporary Arts Centre brings contemporary visual culture to the heart of Debrecen. Its exhibitions and events offer an interesting contrast to the city's historic architecture and provide a glimpse into its contemporary cultural scene.



Aquaticum - Relax and recharge

Situated in the Great Forest, the Aquaticum complex offers thermal baths, pools and wellness facilities. It is an ideal place to unwind after a busy conference day and experience one of the region's long-standing traditions of thermal bathing.

Attractions, events, food and travel tips: <https://visitdebrecen.com/>



Venue



Faculty of Engineering, University of Debrecen

Faculty of Engineering at the University of Debrecen is an inspiring, modern and student-centred institution shaping the future of engineering and technology. With roots reaching back to the 1960s, the Faculty combines strong traditions with continuous innovation and international ambitions. Its strategy focuses on Industry 4.0 and the human-centred Industry 5.0 transition, embracing digitalisation, sustainability and artificial intelligence. Through close industry partnerships and dual education, students gain practical experience in key sectors including e-mobility, automation, robotics, aerospace, smart technologies and green engineering. Research in autonomous machines, cyber-physical systems, V2X communication, Digital Twins and intelligent robotics connects education with cutting-edge technological development.

Venue Information

All conference sessions and lunch are held in the Faculty of Engineering building.

PRESENTATIONS A.3.22 Conference room	LUNCH A.3.05 Lunch room
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Please follow the conference signage on site.



Social Events

Welcome Dinner



Address:
4032 Debrecen Medgyessy sétány 4.

Located in the heart of Debrecen's Great Forest, Krúdy Restaurant combines the charm of a historic atmosphere with contemporary gastronomy. Named after the renowned Hungarian writer Gyula Krúdy, the restaurant evokes the flavors and culinary traditions of his era while incorporating modern and innovative elements. Surrounded by the greenery of Nagyerdő, it offers an elegant and relaxed setting for an enjoyable evening of Hungarian and international cuisine.

The Conference Dinner will take place at Krúdy Restaurant in Debrecen on Tuesday, October 13, starting at 19:00. Guests are warmly invited to enjoy an evening of fine dining, conversation and networking in the elegant atmosphere of Debrecen's Great Forest.

Technical Tour to Vehicle Laboratory



Address:
4032 Debrecen, Kazay Sámuel utca 1.

The Vehicle Laboratory is a modern, nearly 2,700 m² facility supporting practical education and research in automotive engineering, mechatronics, robotics and Industry 5.0 technologies. It features specialised laboratories, workshops, classrooms and an outdoor 1,340 m² asphalt test track. The facility provides students with hands-on experience in vehicle technology, robotics, EMC testing and advanced engineering systems, closely connecting university education with industrial innovation.

Laboratory Visit: Wednesday, October 14, 14:00–16:00

Gala Bonquet



Address:
4032 Debrecen, Nagyerdei park 1, 4032

Located in the heart of Debrecen's Great Forest, the Régi Vigadó is one of the city's iconic and oldest restaurants, with traditions dating back to 1826. Surrounded by the peaceful greenery of Nagyerdő, it combines historic atmosphere with modern gastronomy. Its elegant interiors and spacious terrace make it an ideal venue for dining, celebrations, weddings and special events. The restaurant is known for its meat dishes, extensive wine selection and welcoming, nature-inspired atmosphere.

The Gala Dinner will take place at Régi Vigadó in Debrecen on Wednesday, October 14, starting at 19:00. Guests are warmly invited to enjoy an evening of dinner, conversation and networking in the historic and charming atmosphere of Debrecen's Great Forest.



Tuesday, 13th October 2026 (2-4 Ótemető, Debrecen)

08:00-12:00 AMIRA 2026 REGISTRATION — Aula of the Faculty of Engineering

9:30 – 10:00 Opening Ceremony

Keynote Session

10:00 – 10:30 IN-PERSON
Prof. László Palkovics (*University of Debrecen, Hungary*)
 On-board and Cloud Based Hybrid Control of Level 4 Autonomous Vehicles

10:30 – 11:00 IN-PERSON
Prof. Radu-Emil Precup (*Politehnica University of Timisoara, Romania*)
 Reinforcement Learning-Based Control Structures with Transportation Applications

11:00 – 11:30 IN-PERSON
Prof. Pavol Bauer (*Delft University of Technology, Netherlands*)
 Energy Hubs as the Basic Building Blocks of the Future Energy System

11:30 – 13:00 LUNCH

Presentations

Session 13:00 – 14:40 Dr. József Menyhárt, Róbert Mikuska
Chairs: 15:10 – 16:50 Dr. Sándor Piros, Kis Károly Árpád

13:00 – 13:20 IN-PERSON - AMIRA26-000027
Elena-Lorena Hedrea, Radu-Emil Precup, Claudia-Adina Bojan-Dragos, Anh-Tu Nguyen
 Virtual Reference Feedback Tuning for Liquid Level Control of a Vertical Three Tank System
Section: Education and Other Related Topics

13:20 – 13:40 IN-PERSON - AMIRA26-000025
Yasir Ijaz, Sonya Coleman, Dermot Kerr, Nazmul Siddique, Cormac McAteer, Bryan Baker, Khoi Nguyen
 BoxMix-UDA: Bridging the Cross-Domain Gap in Semiconductor Load Station Inspection
Section: Data-driven Modelling of Engineering Systems



13:40 – 14:00	IN-PERSON - AMIRA26-000048 Peter Korondi, <u>Szilveszter Kovács</u>, Balázs Őrsi Modeling Human Robot Related Attitude with Interpolative Fuzzy State Machines <i>Section: Data-driven Modelling of Engineering Systems</i>
14:00 – 14:20	IN-PERSON - AMIRA26-000042 <u>Sandor Piros</u>, Ravichandran Danthakani, Rajesh Divakaran, Said Kafumbe, Emad Abd-Elrady, Mahesh Nair An Edge-AI and LF-RFID Guided Intelligent Station for Urban Animal Care and Tracking <i>Section: Human Robot Interaction</i>
14:20 – 14:40	IN-PERSON - AMIRA26-000015 <u>Anisom Chakraborty</u>, Enzo Indino, Sandra Victor, Robin Passama, Gowrishankar Ganes Digital Eyes for Communication Between Automated Vehicle and Multiple Vulnerable Road Users: an Exploratory First Study <i>Section: Autonomous Mobility and Transportation Systems</i>
14:40 – 15:10	COFFEE BREAK
15:10 – 15:30	IN-PERSON - AMIRA26-000012 <u>Bennet Greve</u>, Chathura Wanigasekara, Matthias Knauer Sensitivity Analysis of Bi-Level Optimization for Resource Utilization in Maritime Container Terminals Under Disruptions <i>Section: Autonomous Mobility and Transportation Systems</i>
15:30 – 15:50	IN-PERSON - AMIRA26-000012 Ghofrane Gmar, <u>Mayar Taleb</u>, Géza Husi Mobile Robot Navigation Algorithm with an Enhanced Reinforcement Learning Method <i>Section: Navigation and Localization Systems</i>
15:50 – 16:10	ONLINE - AMIRA26-000017 <u>Viktor Sári-Barnácz</u>, Bálint Fazekas, Tibor Goda, Tamas Antal Varga Data-Driven Evaluation of Hyperelastic Models for Tribology Applications Calibrated on Multiaxial Loads <i>Section: Data-driven Modelling of Engineering Systems</i>



16: 10 – 16:30	ONLINE - AMIRA26-000043 Ravichandran Danthakani, Said Kafumbe, Ravi Suppiah, Sandor Piros, Emad Abd-Elrady, <u>Salama Saif Salem Abdulla Alhosani</u> Design, Sensor Fusion Architecture, and Experimental Validation of an Embedded Mechatronic System for Multi-Stream Urban Waste Classification <i>Section: Social and Service Robots</i>
16:30 – 16:50	ONLINE - AMIRA26-000046 <u>Ravichandran Danthakani, Said Kafumbe, Nagayya Hiremath, Sandor Piros, Sasi Kumar, Emad Abd-Elrady</u> Design and Experimental Validation of an Off-Grid Smart Solar-Powered Food Composter Bin (SoliBin) <i>Section: Social and Service Robots</i>
19:00	AMIRA 2026 dinner - Krúdy Restaurant (Nagyerdő, Debrecen)



Wednesday, 14th October 2026 (2-4 Ótemető, Debrecen)

08:00 – 12:00 AMIRA 2026 REGISTRATION — Aula of the Faculty of Engineering

09:30 – 10:00 Opening

Keynote Session

10:00 – 10:30 IN-PERSON

Hans-Peter Kemser (*BMW Group Plant Debrecen*)
Production of the Future - BMW iFACTORY

10:30 – 11:00 IN-PERSON

Assoc. Prof. Marek Pástor (*Technical University of Košice, Slovakia*)
Advanced Phase-Shifted DC/DC Converters as Core Enablers of Power Conversion and Management in Autonomous Systems

11:00 – 11:30 IN-PERSON

Prof. Yasuharu Kunii (*Chuo University, Japan*)
Intelligent Multi Agents for Exploration and Settlement in Unknown and Unexplored Areas

11:30 – 13:30 LUNCH

Presentations

Session 13:30 – 15:10 Dr. Sándor Piros, Emese Sarvajcz-Bánóczy
Chairs: 15:30 – 17:10 Dr. József Menyhárt, Róbert Mikuska

13:30 – 13:50 ONLINE - AMIRA26-000034

Ram Chandra Palsaniya

AI Driven Smart Semiconductor Manufacturing Fab Automation Using Digital Twins, Predictive Maintenance, and Collaborative Robotics
Section: Data-driven Modelling of Engineering Systems

13:50 – 14:10 ONLINE - AMIRA26-000020

Aron Feher, Zoltán Szántó, Mátyás-Levente Borbáth

Real-Time 3D Printing Process Monitoring and Fault Detection on Cloud-based Deep Learning
Section: Drone Technologies and Industrial Applications



14:10 – 14:30	ONLINE - AMIRA26-000035 <u>Mohammad Fiuzy</u>, Stefan Rass Game-Theoretic Resilient Control of Nonlinear Multi-Agent Systems Under Stochastic Adversarial Attacks <i>Section: Drone Technologies and Industrial Applications</i>
14:30 – 14:50	ONLINE - AMIRA26-000021 Aron Feher, <u>Zoltán Szántó</u>, Vajk-István Balázs Cloud-Native Digital Twin Architecture for Soft Real-Time Supervisory UR3 Robot Telemetry and Control <i>Section: Drone Technologies and Industrial Applications</i>
14:50 - 15:10	ONLINE - AMIRA26-000036 Phuoc Nguyen Khoi Tran, <u>Phuoc Vinh Huynh</u>, Hung Nguyễn, Phuc Truong Loc Nguyen Edge-Based 3D Reconstruction and Remote Monitoring Using a Stepper-Actuated 2D LiDAR over MQTT <i>Section: Navigation and Localization Systems</i>
15:10 – 15:30	COFFEE BREAK
15:30 – 15:50	ONLINE - AMIRA26-000038 <u>Bekir Taha Alver</u>, İlhan Kocaarslan A Comparative Evaluation of Local Planners for Differential-Drive Mobile Robots <i>Section: Navigation and Localization Systems</i>
15:50 – 16:10	ONLINE - AMIRA26-000019 Hunor Simon, Aron Feher, <u>Lorinc Marton</u> Graph Signal Processing for Range-Based Mobile Robot Localization <i>Section: Navigation and Localization Systems</i>
16:10 – 16:30	ONLINE - AMIRA26-000022 <u>Yeeshtdevisingh Hosanee</u>, Laya Jose, Madhuka Jayawardhana Junior Programmers AI-Emergence: Teaching Computer Network (CN) OSI Layers with Pluralism Epistemology (Electronics Intra- and Audio Inter-Disciplinary) <i>Section: Education and Other Related Topics</i>
16:30 – 16:50	ONLINE - AMIRA26-000030 <u>Oladapo Ibitoye</u>, Oludayo Olugbara, Ughesni Moodley Contexts and Prospects of Humanoid Robots Deployment in Academic



Libraries

Section: Social and Service Robots

16:50 – 17:10

ONLINE - AMIRA26-000037

Furong He, Baizhan Li

Social Service Robots for the Chinese Aging Population: Key Technologies,
Application Scenarios and Localized Implementation

Section: Social and Service Robots

19:00

AMIRA 2026 banquet - Restaurant Régi Vigadó (Nagyerdő, Debrecen)



Keynotes



Prof. Pavol Bauer | Delft University of Technology, the Netherlands

Pavol Bauer is currently a full Professor with the Department of Electrical Sustainable Energy of Delft University of Technology and head of DC Systems, Energy Conversion and Storage group. He received Masters in Electrical Engineering at the Technical University of Kosice ('85), Ph.D. from Delft University of Technology ('95) and title prof. from the president of Czech Republic at the Brno University of Technology (2008) and Delft University of Technology (2016). He is also honorary professor at Politehnica University Timisioara in Romania where he got also a honorary doctorate (Dr.h.c).

From 2002 to 2003 he was working partially at KEMA (DNV GL, Arnhem) on different projects related to power electronics applications in power systems. He published over 200 journal and over 500 conference papers in his field (with H factor Google scholar 71, Web of Science 50), he is an author or co-author of 8 books, holds 16 international patents and organized several tutorials at the international conferences.

He has worked on many projects for industry concerning wind and wave energy, power electronic applications for power systems such as Smarttrafo; HVDC systems, projects for smart cities such as PV charging of electric vehicles, PV and storage integration, contactless charging; and he participated in several Leonardo da Vinci, H2020 and Electric Mobility Europe EU projects as project partner (ELINA, INETELE, E-Pragmatic, Micact, Trolly 2.0, OSCD, P2P, Progressus, Tulip, Flow) and coordinator (PEMCWebLab.com-Edipe, SustEner, Eranet DCMICRO).

His main research interest is power electronics for charging of electric vehicles and DC grids. He is a Senior Member of the IEEE ('97), former chairman of Benelux IEEE Joint Industry Applications Society, Power Electronics and Power Engineering Society chapter, chairman of the Power Electronics and Motion Control (PEMC) council, chairman of Benelux IEEE Industrial Electronics chapter, member of the Executive Committee of European Power Electronics Association (EPE) and also member of international steering committee at numerous conferences.



Hans-Peter Kemser | BMW Group Plant Debrecen

President & CEO BMW Manufacturing Hungary Kft.

Studies:

1995 - 1997 Master of Science, University of Virginia (USA)

Professional Career:

Since 01/2022 President & CEO BMW Manufacturing Hungary Kft.

12/2015 – 12/2021 Managing Director BMW Group Plant Leipzig

01/2014 - 11/2015 Head of Assembly BMW Group Plant Oxford

05/1997 - 12/2013 Various Leading Positions in BMW Group Plants Dingolfing, Regensburg und Berlin



Prof. Yasuharu KUNII | Chuo University, Japan

Yasuharu Kunii received B.S., and M.S. degrees in electrical engineering from Chuo University, Tokyo, Japan, in 1992, 1994, and Dr.Eng. degrees in electrical engineering from the University of Tokyo, Japan, in 1997, respectively. He was a research fellow DC1 of JSPS from 1994 to 1997 at the Institute of Industrial Science, University of Tokyo, joined science and engineering department, Chuo University as a Lecturer from 1997, and was an Associate Professor from 1999 to 2014, and a Processor in 2014. From 2010 to 2011, he was a Visiting Professor at the Technical University of Munich, Bayern, Germany. His research interests are in the area of field and space robotics, especially in Swarm Exploration Robot and Tele-intelligence. He is a Member of the IEEE Industrial Electronics Society, the IEEE Robotics and Automation Society, the Society of Instrument and Control Engineers of Japan, and the Robotics Society of Japan.



Prof. László Palkovics | University of Debrecen, Hungary

Prof. Dr. László Palkovics serves as the Hungarian Government Commissioner for Artificial Intelligence. Previously, he held the positions of Minister of Innovation and Technology (2018–2022) and Minister of Technology and Industry (2022). With a background in mechanical engineering, he has held prominent roles in both academia and industry, including at the Budapest University of Technology and Economics, MTA SZTAKI, and Knorr-Bremse. His expertise encompasses innovation policy, higher education, and industrial R&D. He has played a pivotal role in shaping Hungary's AI strategy and advancing technological modernization. In recognition of his contributions to engineering and innovation, he has been honored with several prestigious awards, including the Széchenyi Prize and the Gábor Dénes Prize.



Assoc. Prof. Marek Pástor | Technical University of Košice, Slovakia

Dr. Marek Pástor is currently an Associate Professor with the Department of Electrical Engineering and Mechatronics at the Technical University of Košice (TUKE), Slovakia. He received his Master's degree (Ing.) in Electrical Systems ('10) and his Ph.D. ('14) from the Technical University of Košice, where he also completed his Habilitation in Power Electronics in 2021. During his doctoral studies, he spent a research period at the Delft University of Technology (TU Delft), Netherlands.

Assoc. Prof. Pástor has authored and co-authored over 100 scientific publications, including more than 40 indexed in the Web of Science and Scopus. He serves as the Principal Investigator for major national research grants funded by the Slovak Research and Development Agency (APVV) and the Scientific Grant Agency (VEGA), and actively participates in EU NextGenerationEU and Horizon Europe research frameworks.



He was involved in the organization of international engineering conferences, including EDPE 2019 and EDPE 2023.

His primary research interests center on high-frequency power electronics, specifically isolated phase-shifted DC/DC converters (PSFB), bidirectional Dual Active Bridge (DAB) and Modular Multi-Active Bridge (MMAB) converters, wide-bandgap (GaN/SiC) semiconductor integration, zero-voltage/zero-current soft-switching (ZVZCS) topologies, and advanced digital decoupling algorithms for multi-port DC microgrids and autonomous platforms.



Prof. Radu-Emil Precup | Politehnica University of Timisoara, Romania

Radu-Emil Precup is currently with the Politehnica University of Timisoara (UPT), Romania, where he became a Professor in the Department of Automation and Applied Informatics, in 2000, and he is currently a Ph.D. supervisor in automation and systems engineering. Since 2022 he is also a senior researcher (CS I) and the head of the Data Science and Engineering Laboratory of the Center for Fundamental and Advanced Technical Research, Romanian Academy – Timisoara Branch, Romania. From 2016 to 2022, he was an Adjunct Professor within the School of Engineering, Edith Cowan University, Joondalup, WA, Australia. He is currently the director of the Automatic Systems Engineering Research Centre of the UPT. From 1999 to 2009, he held research and teaching positions with the Université de Savoie, Chambéry and Annecy, France, Budapest Tech Polytechnical Institution, Budapest, Hungary, Vienna University of Technology, Vienna, Austria, and Budapest University of Technology and Economics, Budapest, Hungary.

He has been an Associate Editor of IEEE Transactions on Fuzzy Systems (2018-2022, Certificate of Commendation in 2022), Information Sciences (Elsevier, 2021-2024), Engineering Applications of Artificial Intelligence (Elsevier, 2021-2024), Applied Soft Computing (Elsevier, 2014-2024), Expert Systems with Applications (Elsevier, 2021-2024), Communications in Transportation Research (Elsevier, 2021-2024), Applied Artificial Intelligence (Taylor & Francis, 2022-2024), and Healthcare Analytics (Elsevier, 2021-2024), is the Editor-in-Chief of Romanian Journal of Information Science and Technology, and is an editorial board member of several prestigious journals including IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Cybernetics (IEEE SMC Best Associate Editor Award in 2025), IEEE Open Journal of the Computer Society, Evolving Systems (Springer Nature Editorial Contribution Award in 2025), Journal of Engineering-JOE



(IET and Wiley), and Journal of Intelligent and Connected Vehicles (Tsinghua University Press, China, and IEEE).

Prof. Precup is a Fellow of IEEE, a corresponding member of the Romanian Academy, a Doctor Honoris Causa of the Óbuda University, Budapest, Hungary, and a Doctor Honoris Causa of the Széchenyi István University, Győr, Hungary. He received the Elsevier Scopus Award for Excellence in Global Contribution (2017), was named a 2022 academic data leader by Chief Data Officer (CDO) Magazine, and was listed as one of the top 10 researchers in artificial intelligence and automation (according to IIoT World as of July 2017).