Cognitive Mobility

3rd International Conference on Cognitive Mobility

CogMob 2024

CONFERENCE PROGRAM

October 7-8, 2024
Budapest, Hungary

Welcome

We are pleased to welcome you at the Bosch Innovation Campus on behalf of the organizers of the 3rd International Conference on Cognitive Mobility – CogMob 2024.

Cognitive Mobility (CogMob) investigates the entangled combination of the research areas such as mobility, transportation, vehicle engineering, social sciences, artificial intelligence, and cognitive infocommunications. The key aim of CogMob is to provide a holistic view of how mobility, in a broader aspect, can be understood, described (modeled), and optimized as the blended combination of artificial and natural/human cognitive systems. It considers the whole combination as one inseparable CogMob system and investigates what kind of new cognitive capabilities of this CogMob system are emerging. Based on its nature, one of the CogMob focus areas is engineering applications in the mobility domain.

This conference aims to help achieve these goals by bringing together researchers and practitioners from relevant domains of science and industry. We thank the session organizers and the many contributors for making the conference lively with their work. We would like to thank Robert Bosch Ltd for their co-organisation, hosting, and support. We would especially like to acknowledge the devoted support of the CogMob Technical Program Committee members and the work and effort of all members of the organization team, without whom this conference would not have been possible. We hope that all participants of CogMob 2024 will find the conference to be an intellectually stimulating and enjoyable event.

Prof. Dr. Máté Zöldy

General Chair of CogMob2024 Conference

Host and Industrial Platina Partner

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Életre tervezve

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Infocommunications Journal

A PUBLICATION OF THE SCIENTIFIC ASSOCIATION FOR INFOCOMMUNICATIONS (HTE)

HTE 75 1949-2024

Infocommunications Journal

CogSust

Cognitive Sustainability

Cognitive Sustainability

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Promoting excellence in mobility engineering

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General Information

Date and Place

CogMob 2024 will take place between **7-8 October, 2024** at the **Bosch Budapest, Innovation Campus in Budapest, Hungary** (H-1103 Budapest, Vaspálya str. 57/a).

Official Language

The official language of the conference is English. All presentations, including theoretical talks and demos, will be held in the official language.

Proceedings

All accepted theoretical contributions will be available on the pendrive distributed to conference participants.

General regulations

We kindly ask all participants to observe the regulations of the host institution. All participants are kindly asked to refrain from smoking outside of the designated smoking areas.

Social events

Opening speech Oct 7	Innovation Campus, Auditorium
Banquet Oct 7	Vakvarjú Pest Restaurant, Budapest *(H-1061 Budapest, Paulay Ede str. 7)*
Closing speech Oct 8	Innovation Campus, Auditorium

Website: https://cogmob.hu

Tracks & Sessions

Pedestrian Mobility
Organizer: Prof. Melih Yildiz (Erciyes Üniversitesi, Turkey)

Intelligent logistics
Organizer: Prof. Dr. Szabolcs Fischer (Szechenyi Istvan University, Győr, Hungary)

Cognitive networks and their intelligent capabilities
Organizer: Prof. Dr. Ádám Török (Budapest University of Technology and Economics, Hungary)

Advanced drives
Organizer: Dr. Peter Harth (Budapest University of Technology and Economics, Hungary)

Smart vehicles
Organizer: Dr. Laszlo Lovas (Budapest University of Technology and Economics, Hungary)

Enchanted safety
Organizer: Dr. Árpád Török (Budapest University of Technology and Economics, Hungary)

Environmental perception 1
Organizer: Prof. Dr. Tamás Bécsi (Budapest University of Technology and Economics, Hungary)

Learning techniques in cognitive mobility
Organizer: Dr. Kale Utku (Budapest University of Technology and Economics, Hungary)

Environmental perception 2
Organizer: Dr. Szilárd Aradi (Budapest University of Technology and Economics, Hungary)

7th October

Monday

08:30-09:00 **REGISTRATION**

09:00-09:10 **OPENING: Prof. Máté Zöldy, András Kemler, Tamás Zentai**

09:10-09:40 **PLENARY LECTURE: Dr. Marko Babic**
Digital Fuel Twin in Practice

09:40-10:10 **PLENARY LECTURE: Prof. Dr. Barna Hanula**
The Potential of Intelligent Vehicle Control and Traffic Management for Energy Consumption

10:10-10:35 **PLENARY LECTURE: Prof. Dr. Dhinesh Balasubramanian**
Enhancing Safety in Hydrogen Mobility: Data Driven Prediction of Leaks

10:35-11:00 **PLENARY LECTURE: Csongor Horváth**
Analysis of Development Trends in the Electric Powertrain Sector

11:00-11:20 **COFFEE BREAK**

11:20-12:50 **PARALLEL SESSIONS**

Auditorium	Session Chair: Prof. Melih Yildiz
Pedestrian mobility	
Emese Mako and Zhiger Kurmangaliyev	Evaluating stakeholder opinion on traffic engineering devices to improve pedestrian crossing safety around small village schools
Ziyad N. Aldoski and Csaba Koren	Standardized Assessment, LiDARBased Measurements and Human Perception of Traffic Signs
Nóra Krizsik and Tibor Sipos	The Role of Cognitive Skills in Human-Vehicle Interactions at Designated Pedestrian Crossings
Gabriella Kosztolányi-Iván, Csaba Koren and Bayasgalan Nemekh	Where do pedestrians look, when crossing suburban railway lines with right- and left-hand traffic?
Souvanthone Phetoudom and Emese Mako	Effect of legal and illegal pedestrian crossing manoeuvres on road capacity
Laura Dietl and Christian Facchi	Is Maximum Entropy Deep Inverse Reinforcement Learning suitable for Pedestrian Path Prediction?

VIP 1 Room	Session Chair: Prof. Dr. Szabolcs Fischer
Intelligent logistics	
Zsolt Berki and Áron Bede	Rail freight route choice and costing model for transport modelling
Andrej Dávid, Andrei-Angelo Midan, Maciej Klosak and Yasser Douimia	Sustainability of inland water transport on the Rhine-Main-Danube Waterway
Petra Molnár Major and Máté Zöldy	Investigation of path planning algorithms using artificial intelligence in intralogistics
Abdulhamit Sevgi, Alpaslan Durmuş and Ahmet Murat Kadioğlu	Using of Robotic Systems in Transportation
Aybuke Nacak and Melih Yıldız	Digital Twin in Aircraft Design
Marko Perić, Aleksandar Miltenović, Milan Banić and Szabolcs Fischer	Visual Inspection in Transport Using Autonomous Robots

VIP 2 Room	Session Chair: Prof. Ádám Török
Cognitive networks and their intelligent capabilities	
Furkan Kaya, Şevket Aslan, Mohammad Fahad, Klaudia Madarász	The Usability of Polymethyl Methacrylate in Marshall Samples for Asphalt Pavements Using in Railway Supplementary Layers
András Brautigam, Dóra Harangozó, Mykola Sysyn, Dmytro Kurhan and Szabolcs Fischer	Field Application of Austenitic Filler Metals for Repairing Rail Surface Defects in Paved Tracks
Olga Nabochenko, Mykola Sysyn and Szabolcs Fischer	Void geometry identification with trackside rail deflection measurements
Farkhad Gafiatullin and Gulmira Mukhanova	Integration of Machine Learning and Cognitive Technologies in Logistics: A Comprehensive Analysis
Zhazira Tymbaeva and Daulet Bakytzhan	Assessment of the quality of transport services using the example of the Almaty metro
Gulmira Mukhanova and Nazerke Tolkynbek	Quantitative and qualitative indicators of a reverse supply chain strategy
Saule Bekzhanova and Kuralay Yussupova	Cognitive technologies of transporting waste from mining industry

12:50-13:30 **LUNCH BREAK**

13:30-14:15 **ROUNDTABLE DISCUSSION AT AUDITORIUM**

Student competitions as the witch's kitchen of future mobility
Hosted by HUMDA-Lab, Nonprofit Research Lab
Moderator: Dr. Márk Csörnyei, Robert Bosch Kft.
Gábor Sipos, HUMDA-Lab; **Zalán Demeter**, HUMDA-Lab; **Péter Balog,** Robert Bosch Kft.; **Alex Dudás,** FS East; **Péter Pácsonyi**, BME Formula Racing Team

14:15-14:35 **K8 Logistics small container - Cognitive sustainability in logistics (Energotest Ltd)**

14:35-14:55 **Bosch technology presentation - Wiper systems (Robert Bosch Ltd)**

14:55-15:15 **Mobility as an experience: transport and design (MOME Mobility lab)**

15:15-15:30 **COFFEE BREAK**

15:30-17:00 PARALLEL SESSIONS

Auditorium	Session Chair: Dr. Peter Harth
Advanced drives	
Mihály Katona and Tamás Orosz	Parameter Sensitivity Analysis and Rotor Topology Optimisation of a Synchronous Reluctance Machine
Emil Nagy, Árpád Török and József Pázmány	Design factors for the electric power distribution system of EVs
Aleksandr Šabanovič, Jonas Matijosius, Arturas Kilikevicius and Aleksandras Chlebnikovas	Assessment of Particle Dynamics in Electric Air Filters: The Role of Ionic Wind in Air Quality Improvement
Ádám Nyerges and Dávid Tollner	Battery Electric Vehicle Powertrain Behavior on a High-Speed Handling Course
István Szászi, Vilmos Paiss, Richárd Csaba Kovács, Csongor Horváthand Tibor Vajsz	A New Type of Motor Topology for Reducing the Torque Ripples in Synchronous Reluctance Motor Drives of Electric Vehicles
Kristof Bukovacz, Gábor Sipos, László Sebestyén and Gergely Bári	Comparative Analysis of Hydrogen Storage Methods for Racecars
Mahmoud Said Jneid, Péter Harth and Árpád Török	Vector Control of Special 24-Phase Protean In-Wheel-Motor Used In EV Applications

VIP 1 Room	Session Chair: Dr. Laszlo Lovas
Smart vehicles	
Áron Fésüs, Bálint Kővári, Tamás Bécsi and László Leginusz	Dynamic Prompt-Based Approach for Open Vocabulary Multi-Object Tracking
Vivien Jóvér, Szabolcs Kocsis Szürke, Bence Hermán, Péter Böröcz, Miklós Kuczmann and Szabolcs Fischer	Vehicle Dynamics Measurements with a Unique Measuring System for Trams
Symbat Zhanguzhinova and Emese Mako	Assessment of pedestrian confidence in LED interface communication tools in VR and real traffic situations
István Lerchner	Application of Cognitive Mobility approach in highlighted areas
Ebru Bahcecioglu and Melih Yıldız	Wing-in-Ground (WIG) Aircraft for European Airspace
Alpaslan Durmuş, Ahmet Murat Kadioğlu, Abdulhamit Sevgi and Erol Duymaz	Using of Novel Ground Effect UAV Systems in Defence

19:00 BANQUET

Vakvarjú Restaurant (H-1061 Budapest, Paulay Ede str. 7)

8th October

Tuesday

8:00-09:30 PARALLEL SESSIONS

Auditorium	Session Chair: Prof. Dr. Tamás Bécsi
Environmental perception 1	
György Csippán, Bálint Kővári, Tamás Bécsi and László Leginusz	Real-Time Media Synthesis from Speech: A New Era in Passenger Entertainment
Áron Dávid Agg, Bence Gábor Péter and András Horváth	Adaptive vehicle trajectory clustering based on Computer Vision
Ayşe Nur Dişlitaş, Melih Yıldız and Gyorgyi Kale Halasz	Digital Twin Applications in Aircraft Design Process
Alpaslan Durmus, Ahmet Murat Kadioglu and Abdulhamit Sevgi	Precission Agriculture and Using of UAV Systems
Balázs Benedek and Adrian Coleșa	CANComa: Shutdown Attack on Automotive Control Units over Controller Area Network

VIP 1 Room	Session Chair: Dr. Árpád Török
Enchanted safety	
Szabolcs Fischer, Mykola Kurhan and Dmytro Kurhan	Innovative Technologies and Cognitive Factors for Enhancing Safety of Train and Car Movement at Level Crossings
Noura Hamdan and Tibor Sipos	Traffic Accidents Severity Prediction using Support Vector Machine Models
Viktoria Otvos and Gábor Pauer	Road safety education in public education - What support do teachers need?
József Répás	The main steps of the digital forensics examination methodology of modern transport vehicles
Csaba Tóth and Szabolcs Fischer	The road pavement structure as a forgotten element of the transport infrastructure system

09:30-09:50 COFFEE BREAK & POSTER SECTION

Poster Section	Session Chair: Prof. Dr. Szabolcs Fischer
Eszter Tóth, András Pollák and Szabolcs Fischer	Exploring the Impact of Fiber Content on the Mechanical Performance of Steel Fiber Reinforced Concrete: Consistency and Compaction Time Analysis
Hanna Csótár, Brigitta Fruzsina Szívós, Szabolcs Szalai and Szabolcs Fischer	Production and Testing of 3D Printed PLA Structures with DIC Technology for the Reinforcement of Concrete Elements
Zoltán Major, Vivien Jóvér, Attila Németh and Szabolcs Fischer	Quantifying the effect of frame stiffness – the substitution inertia of Meier's calculation

09:50-10:50 **BOSCH INNOVATION CAMPUS SITE VISIT**
(Starts from the Aula)
Chair: Mátyás Henger

10:50-11:10 **Vehicles and their environment in interaction - Interaction Design MA projects at MOME (MOME)**

11:10-11:30 **Micromobility - the driving force comes from Bosch (Robert Bosch Ltd)**

11:30-11:50 **Sensing and communication under attack (BME)**

11:50-13:00 **TECHNICAL SESSION**

Auditorium	Session Chair: Dr. Szilárd Aradi
Learning techniques in cognitive mobility	
Cihan Gökçe, Melih Yıldız and Györgyi Kale Halasz	VTOL Craft Controller Design and Simulation Using Digital Twin
Mehran Amini, Ahmet Mehmet Karadeniz and László T. Kóczy	Evaluating Deep Learning Algorithms for Freeway Mainstream Traffic Control
Roland Nagy, Zsombor Pethő and Árpád Török	Effective anomaly intrusion detection system based on ML methods in vehicular networks
Farzad Zolfaghari, Györgyi Kale Halasz, Omar Alharasees and Arturas Kilikevicius	Application of Deep Learning Models for Predicting Health Alerts in Pilots

13:00-13:05 **CLOSING: Prof. Máté Zöldy**

13:05-13:45 **LUNCH**