

EU project HADRIAN: Designing Automated Driving for Human Mobility Needs



How can automated vehicles optimally support our mobility needs without annoying or even endangering us? How can rapid market penetration be achieved through increased trust in these systems? Answers to these questions are provided by the EU research project HADRIAN, coordinated by VIRTUAL VEHICLE.

Fluid interaction between drivers, automated vehicles and infrastructure using a holistic, user-centric approach provides the solution to driver support instead of driver guardianship. The HADRIAN research results demonstrate that extending the driving automation systems to include road infrastructure elements as well as the human driver increases the reliability and usefulness of automated driving. The knowledge and innovations gained from the project also forms the basis for the first annual Fluid Human-Systems Interaction symposium in Graz on May 9-10, 2023.

Graz (A), May 09, 2023 - Highly automated driving promises more safety and a variety of novel mobility options for otherwise excluded mobility participants, less stress and the opportunity for more meaningful activities while driving. Many expect that autonomous vehicles will have a significantly market share by 2050 - in addition, the share of automated functions on the road is steadily increasing and even becoming regulated by law. Thereby user acceptance of automated driving vehicles has been developing much more slowly than expected and is crucial to be addressed.

People and technology: A complex equation with many unknowns

Powerful smart technology accompanies and assists us in many areas of life - but it is also becoming increasingly complex: sensors, algorithms, enormous amounts of data and their handling, and also the

safety and reliability of systems need to be carefully aligned to meet our needs. Thereby, the "human factor" is a critical part of this equation: in its diverse manifestations of intuition and experience, individuality and trust, acceptance and excessive demands, it forms the measure of all things in the development of new technologies. Although these characteristics differ significantly from person to person, they can be measured and modeled to be included in the technology development process.

Dr. Jost Bernasch, Managing Director of VIRTUAL VEHICLE: "Understanding human behavior and adapting technology to humans in the best possible way - this is the basic prerequisite for creating acceptance for new technological solutions. The VIRTUAL VEHICLE knows the two worlds 'Technology' and 'Human Factors' very well and has a unique expertise in the interconnection of these two research areas. This long-standing expertise of VIRTUAL VEHICLE was the solid basis for the EU project HADRIAN. Key pillars are the close integration of vehicle and road infrastructure and 'Fluid Interactions' between driver and vehicle."

What exactly do we mean by "fluid interactions"? In these fluid interactions, not only is there an ongoing comparison of essential information between the vehicle, the driver and the environment, but the vehicle also adapts to the driver individually and offers information and assistance precisely when this improves the driving situation and driving condition and makes it safer. The driver is therefore not permanently confronted and inundated with all possible information, but only with the decisive information.

The HADRIAN innovation: Fluent interaction between people, vehicles and infrastructure.

How can automated vehicles be holistically designed to optimally support our mobility needs? The EU research project HADRIAN, coordinated by VIRTUAL VEHICLE, is investigating how predictability and plannability of automated driving can help drivers better harness these benefits of an autonomous vehicle for themselves. How can I plan my trip and relax or work on the side on my route, for example? To this end, the HADRIAN project displays relevant information from the road infrastructure in the vehicle and supports it with fluid interactions.

Dr. Peter Mörtl, Key Researcher for Human Systems Integration at VIRTUAL VEHICLE: "Over the past three and a half years, the sixteen partners of the EU project HADRIAN have investigated solutions for expanding the application range of automated vehicles, conducted research with more than 800 participants, and demonstrated the developed solutions on test tracks and open roads. The research results show how a joint consideration of people, vehicles, and infrastructure can achieve more usable and safer automated driving."

Further information: www.hadrianproject.eu

Premiere for the fluid HSI symposium: "Fluid Human-Systems Interaction"

The final event of the EU project HADRIAN, which takes place on May 9 and 10 also serves as the premiere of the new symposium "Fluid Human-Systems Interaction (fluid HSI)". At the fluid HSI

symposium, the innovations of the HADRIAN project are presented and practical demonstrators are shown. Information booths and two workshops provide direct interaction with researchers and engineers to discuss their innovations, initiate collaboration and create future scenarios. Leading partners from academia and industry discuss ways to realize fluid interaction between people, vehicles and infrastructure for European mobility.

Univ.-Prof. Dr. Horst Bischof, Vice Rector for Research at Graz University of Technology: "VIRTUAL VEHICLE brings international experts from science and industry to Graz with the research project HADRIAN and its first symposium on 'Fluid Human Systems Interaction'. The VIRTUAL VEHICLE is part of a network and regional ecosystem of science and industry that has formed in the Graz area. The internationally recognized expertise at TU Graz in Data Science and AI and the competence of the University of Graz in cognitive sciences are an essential part.

On the industry side, MAGNA, INFINEON and AVL should be mentioned, which are also shareholders of VIRTUAL VEHICLE. ASFINAG is an indispensable part of this ecosystem, as otherwise no knowledge can be gained in a real environment. This concentration of competence, vision and real test environment at the location, make the need-oriented future-oriented mobility possible."

Preview "fluid HSI Symposium 2024": Extending research to all road users.

In most current vehicles, human-machine interfaces (HMI / Human-Machine Interface) are limited in their ability to detect the intentions of pedestrians and vehicles in the environment. This can result in pedestrians being endangered or drivers being presented with distracting warnings. The EU project HEIDI (Holistic and adaptivE Interface Design for human-technology Interactions) aims to develop a fluid, cooperative HMI that integrates internal and external sensors holistically to create adaptive HMI solutions for drivers and other road users.

This cooperative human-machine interface effectively collects and synchronizes data from the driver and other road users to properly analyze the situation and recommend safe joint actions to all parties. The coordination logic is in line with the principle of Foresight Safety® developed at VIRTUAL VEHICLE, i.e. the human-like ability to anticipate hazards and proactively avoid dangerous situations. HEIDI's HMI solutions ensure that all road users have the same situational understanding and provide safe interaction between vehicles and vulnerable road users. Fluent internal and external interfaces coordinate information and common recommended actions for all categories of users, adapting to their respective states and conditions, such as distracted drivers and elderly pedestrians.

The EU project HEIDI, coordinated by VIRTUAL VEHICLE, sets up the content framework for the 2nd symposium on the topic on June 4-6, 2024 and will again gather international experts in Graz.

Further information: www.heidi-project.eu

HADRIAN Project Partner

- VIRTUAL VEHICLE Research GmbH (Coordinator)
- UNIVERSITY OF GRANADA
- NATIONAL TECHNICAL UNIVERSITY OF ATHENS
- VDI/VDE INNOVATION + TECHNIK GMBH
- TEC - FUNDACION TECNALIA RESEARCH & INNOVATION
- IKA - RHEINISCH-WESTFÄLISCHE TECHNICAL UNIVERSITY OF AACHEN
- BASt - FEDERAL INSTITUTION FOR ROAD MANAGEMENT
- CEA - COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES (COMMISSARIAT FOR NUCLEAR ENERGY AND ALTERNATIVE ENERGIES)
- IESTA - INSTITUTE FOR INNOVATIVE ENERGY & MATERIAL EXCHANGE SYSTEMS
- UNIVERZA V LJUBLJANI
- TUD - TECHNICAL UNIVERSITY OF DELFT
- ASFINAG - FREEWAY AND EXPRESSWAY FINANCING JOINT STOCK COMPANY
- AVL LIST GMBH
- FORD OTOMOTIV SANAYI ANONIM SIRKETI
- UNIVERSITY OF SURREY
- PARIS-LODRON-UNIVERSITY OF SALZBURG

VIRTUAL VEHICLE Research GmbH

Virtual Vehicle Research GmbH, headquartered in Graz, Austria, is Europe's largest research center for virtual vehicle development in the railroad and automotive sectors with more than 320 employees. The scientific focus is on interdisciplinary cutting-edge research for climate-neutral mobility. The goal is to develop reliable, software-defined systems that will secure sustainable competitive advantages and future jobs.

VIRTUAL VEHICLE cooperates with about 100 national and international industry partners (OEMs, Tier-1 and Tier-2 suppliers as well as software providers). Partnerships with around 50 scientific institutions underpin its reputation as an innovation catalyst for vehicle technologies of the future.

For more information: www.v2c2.at

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Pictures:



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VIRTUAL VEHICLE's Human Factors research area focuses on applying user-centered psychological principles to the development and design of products, processes and systems to reduce human error and increase productivity, safety and comfort.

Source: VIRTUAL VEHICLE

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The "human factor" is at the center of attention: In its manifold manifestations of intuition and experience, individuality and trust, acceptance and excessive demands, it is the measure of all things in the development of new technologies.

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Fluent interaction between drivers, automated vehicles and infrastructure using a holistic, user-centric approach provides the solution for driver support instead of driver paternalism.

Source: VIRTUAL VEHICLE

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