

Fluid Human-System Interaction Symposium

June 4-5, 2024
Graz, Austria

Consensual Statements

This document summarizes the main outcome of the discussions that took place during the Fluid Human-System Interaction Symposium, organized by Virtual Vehicle Research GmbH, and held on June 4-5, 2024, in Graz. Participants from industry, research organizations as well as academic institutions, addressed provocative questions about the roles and challenges of human-system interactions in modern transport. The following general statements represent the results of two intensive days of brainstorming and fruitful creation sessions:

Driver assistance systems and automation: standardization and technological considerations

Warning systems that assist and alert the driver are beneficial for safety and comfort during the journey. However, standardization and technological improvements are still needed, as, for example, the timing and frequency of current warning systems are still often inappropriate (too many false alarms, too many misses). A more fluid interaction process, which would consider driver, vehicle, environment states and their interplay, could elicit more effective warning and appropriate reactions. In this context, the term "fluid" is used to describe a smooth, seamless and natural interaction process. This process should be easy and intuitive, without abrupt interruptions or difficulties, allowing for continuous and harmonious communication between the driver, vehicle and environment.

The current lack of objective and standardized procedures to assess fitness to drive in Europe, especially for an aging population, presents a new challenge, which is exacerbated by the growing complexity of driving automation and related functions. This challenge is compounded by differing national regulations concerning vehicle automation (related to the EU) as well as the potential for new advancements in artificial intelligence.

Gaze-tracking technology, which is entering human-machine interface and driver assistance systems of modern vehicles, seems to be not sufficiently reliable for estimating driver's psychophysical states. As there is more to the driver's state than meets the eyes, a sensor fusion approach, including other physiological signals like heartbeat and breathing frequency, would possibly be recommendable.



Dangers of Human-Machine Interfaces

Interfaces that provide advanced and extended functionality seem to create at least two kinds of danger: on the one hand, they facilitate driver distraction and disengagement; on the other hand, they create an environmental threat due to high data/energy demand and related CO₂ production. This emphasizes an emerging relationship between the increasingly advanced capabilities of modern user interfaces and the proportional environmental effects posed by their energy demands, both locally and remotely. Therefore, the development of augmented services and assistance systems must consider energy efficiency and sustainability within a regulatory framework that ensures that environmental responsibility and technological innovation as well as the integration with infrastructure go hand in hand.

Cooperative safety

There is a consensus towards the interpretation of safety as a cooperative effort, not limited to drivers and their vehicles, but rather involving all road users engaged in interactive situations. Three emerging topics support this consensus:

- (i) The adoption of powerful AI techniques seems promising towards the ability to predict driver's and other (vulnerable) road users' intentions, complementing and amplifying safety systems like, e.g., automated emergency braking.
- (ii) Communication strategies addressing vulnerable road users outside the vehicle should be considered and designed to share information about both the vehicle and the driver's state, compatibly with privacy protection.
- (iii) A fluid, multi-modal mobility system seems to best suit moder transportation needs, while ensuring safe cross-modality transitions and energy efficiency.

It is of the utmost importance that the implementation of these points ensures that AI technologies adhere to both existing and forthcoming regulations (such as the AI Act) that safeguard user privacy, safety, and security, while simultaneously promoting ease of use and social inclusivity across all potential users.



Outlook

Many participants have expressed the intention to work towards the development of common best practice definitions for Human-System Interactions within the IEEE ITS Standards activities.

In a cooperative effort to shape safer and more sustainable Human-System Interactions, several participants are joining the working group “Cockpit of the Future”, where ideas for common projects will be further discussed and developed, along with the organization of workshops at upcoming international events in Europe.

In conclusion, as we advance towards safer and more sustainable human-system interactions, it is paramount to ensure that AI technologies comply with regulatory standards, ensuring the protection of user privacy, safety and security. This commitment is crucial for the effective integration of advanced technologies into modern transportation systems. By promoting user-centric human-system interaction services that prioritize diversity and inclusion, we cultivate welcoming, accessible and sustainable transportation environments for ALL users, emphasizing fluidity and seamless interaction.