

# **How Automated Driving Systems can show their behavior: System Transparency for In-vehicle HMI of Highly Automated Vehicles to Improve User Experience**

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In coming years, individual transportation will increasingly traverse towards automated driving systems (ADS) that will execute the driving task and provide an envisioned safe and inclusive way of transportation. In some cases, even advanced ADS will require support in situations that exceed their capabilities and cause minimal risk maneuvers (MRMs). This support can be provided by a remote assistant, who supports the vehicle during these MRMs. This collaboration between ADS and remote assistant results in a new driving experience for passengers. They will experience situations with uncertainty, as the system inherently gives no information about the MRM resolution process. To meet the passengers' possible uncertainties, new approaches for in-vehicle HMI (iHMI) design are needed to make the ADS' behavior transparent. Providing system transparency by giving information about the resolution process is one step towards a user-friendly experience. In the current study we investigate an approach based on ecological interface design to provide information efficiently and user-friendly in case of MRMs. It aims at improving understanding, predictability, and user experience for passengers. In a simulator, study participants experienced an automated shuttle ride in virtual reality. During their ride, they experienced varying designs of an iHMI, using abstractions, textual information or a combination. We assumed that the abstractions will provide easier access to the underlying information resulting in improvements of understanding, predictability and user experience. The results aim at providing insights into design solutions to improve passengers' understanding and experience using an iHMI for advanced ADSs that are supported by remote assistants.

*250 words*

## References

- Brandt, T., Wilbrink, M., & Oehl, M. (2024). Transparent internal human-machine interfaces in highly automated shuttles to support the communication of minimal risk maneuvers to the passengers. *Transportation Research Part F: Traffic Psychology and Behaviour*, 107, 275–287.  
<https://doi.org/10.1016/j.trf.2024.09.006>