

## **Human-AI Interface Design for Remote Assistants Supporting Highly Automated Driving Systems During Minimal Risk Maneuvers**

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Implementing highly automated driving systems (ADS, SAE L4) into intelligent mobility services in Germany depends on the availability of a remote assistant. ADS utilize artificial intelligence (AI) to manage driving related tasks, like object detection, route planning, and collision avoidance. These AI subsystems are sophisticated, yet they sometimes need support due to technical limitations that cause minimal risk maneuvers (MRM) resulting in a standstill of the vehicle in traffic. These limitations can be handled by a remote assistant providing high level support thus expanding the ADS's capabilities. The effectiveness and feasibility of this remote assistance depends on the effective Human-AI interaction between the assistant and the ADS. This requires the assistant to understand the system. A better understanding can be achieved by a transparent system that provides information about its functioning. However, how and what information can be presented in a Human-Machine Interface (HMI) to provide transparency and enable a better understanding is yet to be determined. A possible way to achieve this goal is providing information about the system's visual detection by highlighting detected objects in the vehicle's video stream to the assistant. In an experimental online study, we investigated the influence of HMI transparency on the understanding of remote assistants towards an ADS during an MRM. Participants experienced different MRMs in which they received information about the system's visual detection of objects, e.g., other road users, via an HMI that augmented the vehicle's video streams (boxing vs. saliency mapping vs. combined). The augmentations aimed at providing transparency and enabling a better understanding of remote assistants of the ADS. Results provide insights into design possibilities for transparent HMI, improving the understanding of assistants and enabling adequate trust and complacency towards the ADS. This can support the HMI design solutions for efficient and safe implementations of remote assistance into ADS. [300 words]

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