Information for journalists and media representatives
“Vehicle Interaction Lab, immersive driving simulator”

Automated driving and vehicle assistance systems are taking on an increasing number of driving tasks. To explore how people are coming to terms with these increasing levels of automation, Fraunhofer IAO is conducting tests in its Vehicle Interaction Lab.

An important part of the research is dedicated to driving scenarios while the focus is shifting progressively toward automated driving. After all, the more autonomous the vehicle, the more time its driver has for other things. One of the topics researchers are examining is the extent of distraction and sleepiness for drivers as well as when their involvement is necessary and how to get their attention as quickly as possible. Other important aspects of the research are how the driving experience is changing emotionally, which elements of automation drivers like and feel comfortable with, and how the vehicle interior should be designed to this end. For this research the integration of technical components, such as smartphones and tablets or other hardware is easily done in the driving simulator at Fraunhofer IAO.

Equipment used in the driving simulation lab includes an eye tracking system, multi-camera surveillance as well as devices for measuring physiological data and evaluating driving data. The lab is also equipped with an age simulation suit and a pupillograph that measures driver fatigue.

Depending on the project requirements and focus of the research, different driving simulations and real vehicles are used with virtual prototypes and concepts for human-machine interfaces along with automated driving functions to create true-to-life driving scenarios in all phases of development. Using realistic and functional prototypes from the outset helps the researchers make the right decisions and identify the optimum design options from an early stage.

In the immersive driving simulator, the driver sits behind the wheel in a real vehicle with an angle of vision of 180°. In addition, three front projections simulate the view in the inner and outer rearview mirrors, giving the subject a perceived field of vision close to 360°. To further increase the sense of reality, a sound system spatially reproduces all the acoustic signals from the vehicle and the surrounding environment. The simulator is also equipped with a movement system that generates seat and chassis vibrations and simulates jerking motions caused by breaking.

Facilitating research into the human-machine interface, the simulator is fitted with a modular and expandable dashboard featuring a reconfigurable instrument display and a screen with multi-touch functionality in the central console. For conducting the simulations, SILAB software is used.

Further information:
https://www.es.iao.fraunhofer.de/de/labors/vehicle-interaction-lab.html
https://www.es.iao.fraunhofer.de/de/forschungsfelder/vehicle-interaction.html
Our **contacts** for the Vehicle Interaction Lab, immersive driving simulator:

**Frederik Diederichs**  
Human Factors Engineering  
Fraunhofer IAO  
Nobelstraße 12, 70569 Stuttgart  
Phone +49 711 970-2266  
frederik.diederichs@iao.fraunhofer.de

**Sven Bischoff**  
Human Factors Engineering  
Fraunhofer IAO  
Nobelstraße 12, 70569 Stuttgart  
Phone +49 711 970-5197  
sven.bischoff@iao.fraunhofer.de
**Photo material**

The following pictures may be used free of charge as part of reports on the Vehicle Interaction Lab, immersive driving simulator. Requests for high-resolution images should be sent to presse@iao.fraunhofer.de. All photos used must be accompanied by the appropriate source reference, and we kindly request a copy of the published material. The photos are to be used exclusively for editorial reporting and under no circumstances in advertising or sales materials. Further circulation, copying, editing or use on websites that is not for the purposes of editorial reporting is not permitted.

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**Vehicle Interaction Lab, driving simulator (1): Flexible high-tech equipment facilitates customized settings**

New technologies are considerably changing how we experience motor vehicles. User-friendly driving assistance systems are crucial to automotive manufacturers looking to beat the competition.

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**Vehicle Interaction Lab, driving simulator (2): Assistance systems must interact intuitively with drivers**

Researchers are examining the extent of distraction for drivers as well as when their involvement is necessary and how to get their attention as quickly as possible.

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**Vehicle Interaction Lab, driving simulator (3): Highly automated driving applications make it conceivable for drivers to sleep while the vehicle is driving autonomously. With this in mind, researchers are looking into how sleep affects driving performance and safety in situations where the driver has to retake control of the wheel after waking up.**
Vehicle Interaction Lab, driving simulator (4):
In the driving simulator, new operating and display concepts are evaluated and optimized with regard to their usability, user experience and impact on driving behavior and safety.

Vehicle Interaction Lab, driving simulator (5):
Thanks to specialist evaluators, our biometric sensor platform and data obtained from the immersive driving simulator, we receive real-time insights into the behavior and experiences of our subjects.

Vehicle Interaction Lab, driving simulator (6):
Equipment in the driving simulation laboratory includes one stationary and one mobile eye tracking system, multicamera surveillance and data evaluation devices. The lab is also equipped with an age simulation suit and a pupillograph that measures driver fatigue.