

Human Factors Challenges in Highly Automated Driving

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Abstract

Highly automated driving is promising for improving the safety, efficiency, and convenience of road transportation systems by providing vehicle control during normal driving, or by providing emergency responses in safety-critical situations. Some highly automated cars have already been tested on public roads, and most major car makers announced that their automated driving technology will be available on the market by around 2020.

However, a human driver will still be expected to have control responsibilities for an automated driving car in the case of emergency, particularly under NHTSA Levels 2 and 3 of automated driving. The driver's role in a highly automated driving car will be changed from a vehicle operator to a supervisor or an emergency operator, and the driver's primary task will be to monitor critical factors in the environment or to detect system failures. Thus, human factors challenges in highly automated driving need to be addressed and discussed from the perspective of the driver's changed role.

The challenges include the control authority and transition between a human driver and an automated driving car, drivers' acceptance of automated driving, behavior adaptation and misuse including drivers' willingness to engage in non-driving-related secondary tasks, and human factors research tools. Another concern is to monitor a driver's state including situational awareness in real-time, as the driver's role shifts to supervising an automated vehicle and environment, and path planning down the road.