

Human Factors Research for Shared-Control Paradigms in Autonomous Vehicles

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Abstract

Autonomous vehicles are promising for improving the safety and efficiency of transportation and mobility systems by providing vehicle control during normal driving, or by providing emergency responses in safety-critical situations. Most major car makers announced that their autonomous vehicles 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 an autonomous vehicle 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, shared-control paradigms in autonomous vehicles 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 autonomous vehicle, 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 autonomous vehicle and environment, and path planning down the road.

Keywords: Autonomous Vehicle, Self-Driving Car, Shared-Control, Highly Automated Driving.

References

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