Coordinated driving for testing ADAS: a training approach to reduce additional demands while driving

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Abstract

Select Advanced Driver Assistance Systems (ADAS) affect both individual drivers as well as other drivers on the road (e.g. C2X-technologies). In order to test these systems in everyday traffic, it is necessary to drive collectively, i.e. driving without losing sight of other cars or changing the order of cars within a group (so-called "coordinated driving"). Coordinated driving might place additional demands on the driver and, thus, specialized training to help cope with these demands might be advisable. In this study, 18 participants were placed in groups of three and asked to drive around a motorway course four times. Each of the drivers was instructed to collectively drive to a predefined destination without jeopardizing themselves or surrounding traffic. After completing two rounds, the groups received computer-based training. This training focused on the demands that coordinated driving places on the driver and presented strategies how to deal with such challenges. The groups received one of two types of training; the first solely focused on the presentation of select rules ("training with rules-only") and the second focused on the presentation of rules and video-based exercises ("training with rules plus exercises"). In this paper, the essential aspects of these training variations were tested in order to increase the safety of participating vehicles and the realization of test situations as a whole. Overall, essential parts of both trainings are put into practice. Driving safety (i.e. safety-critical time headways and number of driving errors) in coordinated driving is not influenced by these computer-based trainings positively. Additionally, the drivers of the rules-only training underestimate how demanding it is to follow the rules. These results suggest that coordinated driving imposes additional demands on the drivers that can be reduced by an adequate training.

Introduction

Empirical testing of C2X-technologies through "coordinated driving"

Fields of application as well as limits of so-called Car-2-X-(C2X)-Technologies are being discussed more and more in the context of Advanced Driver Assistance Systems (ADAS) and In-Vehicle Information Systems (IVIS; e.g. Schmidt, Leinmüller & Böddeker, 2008). By means of C2X-technologies, information can be transmitted between cars as well as between road users and the traffic infrastructure (e.g. traffic lights, ITS Central Stations). Thus, it is possible, (1) to inform

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