

Exploratory design of a highly automated system for entering the expressway

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Abstract

This paper describes how the process of exploratory design is applied for designing a highly automated vehicle system for entering an expressway. The exploratory design process covers the specification of the design within the design team, the assessment of user expectations and the testing of prototypes in a usability assessment. The prototype described in this paper had two levels of support, a lower level of assisted driving and a higher level of highly automated driving. In the usability study the prototype was extensively tested by 6 participants. After testing the prototype the participants rated both levels of support as good and easy to learn and gave valuable hints for improvements. The automation system was designed in the context of the German project IMoST (*Integrated Modelling for Safe Transportation*).

Introduction

Technological progress enables more automation in vehicles, enabling a shifting of control of such vehicles to the machine side of the assistance and automation spectrum (Flemisch et al. 2008, figure 1). In the sky, highly automated planes have flown for decades with a relatively high safety record. On the ground, assistance systems like Adaptive Cruise Control (ACC) or Lane Keeping Systems (LKS), which enable partially automated driving, can be bought for many cars.

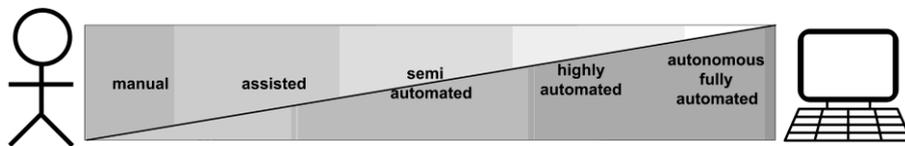


Figure 1. Automation spectrum and automation regions

Fully automated vehicles have already been demonstrated on separated lanes (NAHSC, 1998), in public traffic (Dickmanns, 2002), in desert and urban challenges (e.g. Thrun, 2006) and as demonstrator vehicles “cybercars” in city environment (e.g. Parent, 2007). While such fully automated systems are technically feasible in the long term future, due to acceptance and liability problems (e.g. De Waard et al.

In D. de Waard, A. Axelsson, M. Berglund, B. Peters, and C. Weikert (Eds.) (2010). *Human Factors: A system view of human, technology and organisation* (pp. 201 - 216). Maastricht, the Netherlands: Shaker Publishing.