Developing a unified model of driving behaviour for cars and trains

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Abstract

A unified model of driver behaviour and driver interaction with innovative technologies was developed in the European project ITERATE. The model aims to be applicable for all surface transport modes. As a basis of the model development it was assumed that underlying factors influencing human behaviour such as age, gender, culture etc. are constant between transport modes. The model can be of great use when designing innovative technologies since it will allow for assessment and tuning of the systems in a safe and controllable environment without use in real traffic. This paper presents the results of a set of driving simulator experiments carried out to support the model development process. The experiments are unique in the sense that common scenarios were run on two identical portable driving simulator platforms circulated among project partners across five countries as well as full scale train and car driving simulators. This allowed a large number of subjects to take part in the experiment. An important finding from the experiments was that country/culture was found to be a significant factor for almost all performance indicators in both car and train experiments. Furthermore, it seems like small scale simulators provide comparable results as more advanced simulators.

Introduction

A unified model of driver behaviour (UMD) was developed within the ITERATE project based on a literature review of driver behaviour models (Oppenheim, et al., 2010a, Oppenheim, et al., 2010b), see Figure 1. The UMD basically shows that there are a number of factors (*culture, personality, state, experience, and workload*) that have an impact on driver behaviour and interaction with support systems. A review of innovative technologies, i.e. driver assistance systems such as Intelligent Speed Adaptation (ISA) for the road traffic domain, the European Rail Traffic Management System (ERTMS) for the rail domain, and also for the maritime domain was also conducted in the project (Lai, et al., 2010, Barnard, et al., 2010a). Based on these reviews and considering the UMD, a large set of hypotheses were formulated on how car drivers and train operators will behave and interact with support systems depending on the underlying factors influencing human behaviour (Barnard, et al., 2010b). To test these hypotheses and thereby aiming to verify the theoretically developed UMD, a set of road and rail driving simulator experiments were conducted. Results of the driving simulator experiments were also used to

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