Adaptive Human Vehicle Interface: different types of interaction in a virtual environment

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Abstract

The main objective of this study was to assess effects of an Adaptive Human Vehicle interface on performance measurements, such as Driver Reaction Time (DRT) or vehicle parameters values. On the interface warnings of Advanced Driver Assistance Systems (ADAS) were presented in two formats, i.e. visual and visual coupled with haptic feedback. The ADAS systems selected for this study were *Safe Junction Warning*, *Pedestrian Detector Warning*, and *Lane Departure Warning*. Furthermore, in order to reduce CO_2 emissions, multimodal interactions have been analysed, through a *Fuel Consumption Warning* system. All the tests were completed in a virtual environment using a driving simulator with urban and highway scenarios. In addition to the registration of the drivers' reaction time (DRT), acceptance was assessed with the technique developed by Van der Laan, Heino, and De Waard (1996).

Introduction

In Spain, in 2008 2.181 people were killed and several thousands severely injured in traffic accidents last year (DGT, 2008). Traffic accidents are one of the largest health problems for society both in Spain and the rest of the world. Consequently, many activities are ongoing to decrease the accident impact and frequency. Important examples are infrastructural measures, improved driver education, and more intensive enforcement.

In order to decrease the number of accidents while at the same time focussing on sustainability, the MARTA (*Mobility and Automotion trough Advanced Transport Networks*) project started in September 2007. MARTA is an initiative coming from the Spanish automotive industry, leaded by Tier 1 Ficosa International with relevant partners such as car manufacturer SEAT and telecommunications operator Telefónica. MARTA focuses on the study of the scientific bases and technologies of transportation for the 21st century that will lead to an ITS (Intelligent Transportation Systems). In particular, MARTA focuses on vehicle-to-vehicle and vehicle-to-infrastructure communications, to develop new technological services and solutions to improve road mobility. These intelligent systems of the future should contribute to

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