

Implementation of a Unified Model of Driver into numerical algorithms for a predictive simulation of behaviour in different transportation contexts

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Abstract

The research presented in this paper stems from the hypothesis that “driver” behaviour is based on certain fundamental characteristics that can be shared amongst different working contexts. Consequently, it is possible to define a “Unified Model of Driver” (UMD) that captures the basic aspects of behaviour of a human being in control of a vehicle. The variation associated to diverse contexts is obtained simply by modifying the parameters that affect the fundamental modelling correlations. Following this hypothesis, a research initiative has been performed within an EU funded Project that has studied automotive, rail and ship domains through a theoretical development, associated to substantial experimental activity in the three domains. The experiments leading to the implementation of the computerised simulation approach consisted of close to 300 subjects from five different countries, probably making it the largest controlled experiment in the transport domain. In this paper, the simulation tool resulting from the research work and experimental activity is presented. A number of simulation runs are presented demonstrating the feasibility of the approach.

Introduction

Modelling human behaviour has become a necessary endeavour since the eighties when the consideration of human-machine interaction became integral part of the design process of “modern” technologies and their control processes.

Following the initial models based on the representation uniquely of human performances, due to the reason that machines were governed essentially through manual control, the cognitive aspects and the functions of perception, interpretation, planning decision making etc. have become much more important as automation has gradually replaced manual control to become the predominant actor in plant and system management.

Modelling implies a theoretical representation of the phenomena under consideration. In the case of human behaviour, modelling this means considering the mechanism that govern the above mentioned cognitive and behavioural functions as well as the associated mental processes and knowledge base, typical of a human