

Assessing driver abilities for driving safety and driver assistance

*Stanley Oliver, Guangyan Li, and Diane Westwood
Institute for Automotive and Manufacturing Advanced Practice
University of Sunderland
UK*

Abstract

The aim of this paper is to review existing knowledge regarding human capabilities and driving performance so as to establish which physical and cognitive parameters are closely related to vehicle driving thus constituting the factors for driver assessment. Based on this study, a list of human abilities can be identified for assessment in order to identify potential weaknesses or impairments in a driver and to suggest the type of assistance the driver may need for safe driving. The study suggests that, with a comprehensive assessment programme and the various technologies for driver assistance, it is possible to build a vehicle which can fit the needs of a particular driver.

Introduction

Previous research in the area of driver assistance has focused mainly on the needs of disabled or elderly drivers for the conversion or adaptation of vehicle controls. Accordingly, most physical assistance systems currently available in the automotive industry are designed for this purpose, however, most drivers display below standard ability on some parameter relevant to driving, for example, some people have more problems than others seeing at night or turning the head to check for traffic behind. Driving performance may be impaired in unfamiliar territory or when driving under stress, fatigue, or under time pressure; it is estimated that at least 34% of all serious accidents are attributed to transient conditions concerning driver state such as loss of alertness rather than more permanent physical disability (Vallet, 1991). Therefore, it seems reasonable to suggest that almost every driver needs assistance of some form: physical or cognitive, on a permanent or transient basis.

In recent years, there have been increased demands for comprehensive methodologies to identify 'unsafe' drivers (Keltner and Johnson, 1992; Martinez, 1995). The 'Tele-Assess Project' was set up at the University of Sunderland in collaboration with several other academic and industrial partners with the aim of understanding a driver's ability or suitability for driving a vehicle and to identify the various types of assistance he/she may need in order to drive safely. This requires assessing drivers' physical and cognitive abilities and to provide the driver with assistive systems that match his/her physical or cognitive needs. This research