

# Getting back to basics: using road accident investigation to identify the desirable functionality of longitudinal control systems

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## **Abstract**

ABS (antilock brake system), EBA (emergency brake assist), ACC (adaptive cruise control) and alternative examples of intelligent vehicle control systems aspire to support the driver in controlling the vehicle and alleviate the incidents that would lead to collisions and injuries. This paper considers some requirements for such systems based on a study of accidents occurring in the real-world. While systems are rationally developed in the engineering laboratory, on the test track and through use of simulations, the need for a thorough understanding of the design needs as observed in the real-world of current day accidents is increasingly recognized. This paper overviews the range of data available on the causes of accidents in the UK. A fresh look is taken at some issues relating to braking by specific reference to data from the On-The-Spot (OTS) accident research study in an attempt to consider the necessary functionality of active safety systems pertinent to longitudinal control failures. The road user interactions file from 3024 road accidents in Thames Valley and South Nottinghamshire regions of the UK, as covered by OTS study, were analysed. Significant contributory factors where “failure to stop the vehicle” was identified as the accident precipitating factor were seen to be “following too close”, “disobeyed automatic traffic signal”, “careless/reckless/in a hurry”, “failure to look” and “failure to judge other person’s path or speed”. On the other hand, where “sudden braking” is identified as the accident precipitating factor, contributory factors included “sudden braking” (as a contributor), distraction, aggressive driving, failure to judge other person’s path, “masked road markings”, “excessive speed”, “following too close”, and “road layout”. Current systems address some of these issues, while possibly overlooking others; recommendations for future safety engineering designs are made accordingly.

## **Introduction**

The driving task has been described from many different perspectives. Early theories suggested a versatile safe field in which the driver aims to navigate the vehicle (Gibson & Crooks, 1938). More recent work considers time related descriptions (Senders, Kristofferson, Levison, Dietrich, & Ward, 1967; Van Winsum & Brouwer, 1997; Van Winsum, 1998), motivation (Fuller, 1984; Naatanen & Summala, 1976;

In D. de Waard, F.O. Flemisch, B. Lorenz, H. Oberheid, and K.A. Brookhuis (Eds.) (2008), *Human Factors for assistance and automation* (pp. 203 - 216). Maastricht, the Netherlands: Shaker Publishing.