

The potential of tactile information for efficient and safe driving

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Abstract

A global trend in the automotive industry is to provide drivers with extensive support and an abundance of information with the explicit ambition to increase traffic safety. Traditionally, information and feedback on driving behaviour has been conveyed via the visual modality and to some extent via the auditory modality. Few advanced driving assistant systems have so far utilized the tactile modality, although it's well known that drivers' often use haptic information when capturing crucial dynamic information from the car, the road surface and alignment, as well as static information from pedals, buttons, steering wheel etc. These conditions are all reflected in comparable investments in research, where haptic information has been grossly neglected. Considering all equipment and support systems that emerge around the corner, and given a limited space and limited driver capability, the great potential of tactile information is explored in the current paper.

Introduction

In critical traffic situations, when a specific driver action is needed, it is important to provide redundant information in different modalities. Usually the visual modality is considered to be the prime target for the presentation envelope, irrespective there are no guarantees for drivers' reception of the critical information. The driver may miss the visual information due to inappropriate eye-point-of-gaze behaviour, blinking, mental drifting, or other physically pregnant distraction. Concerning auditory displays, the information content must be immediately captured. Otherwise, it is a high risk of masking the message or a rapid decay of memory. The auditory channel is also much more vulnerable to distraction compared to the visual and tactile modalities. Preliminary tests in a driving simulator at Linköping University demonstrate that it is hardly impossible to escape information presented in the tactile modality via the driving seat.

Haptic information

Haptic information is an umbrella term for information received through receptors in different systems of our body, such as mechanoreceptors in several layers in the skin picking up tactile information, and receptors located in muscles, tendons and joints

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