Proceedings of the 5th International Conference on
Automotive User Interfaces and Interactive Vehicular Applications
Eindhoven, 2013
Innovations in the area of vehicle electronics, sensing technologies and wireless communication (including both vehicle-to-vehicle (V2V) and vehicle-to-roadside (V2X)) are resulting in a rapid change of the driving context. Over the last few years, a rapid increase can be observed in the number of systems aiming to support the driver and increase the safety and comfort. Ultimately, the combination of these support systems may lead to the complete automation of the driving task. In addition, developments in the area of wireless communication have vastly increased the possibilities for drivers and passengers alike to take nomadic appliances within the car for entertainment and communication purposes. These developments create both opportunities and challenges for researchers and developers in the area of automotive user interfaces and interactive vehicular applications.

We proudly present the proceedings of the Fifth International Conference on Automotive User Interfaces and Interactive Vehicular Applications (www.auto-ui.org/13). It builds on the success of the previous conferences, starting in Duisburg-Essen in 2009, with follow-up conferences in Pittsburgh (2010), Salzburg (2011) and Portsmouth, New Hampshire (2012).

This year’s conference is hosted by the User-centred Engineering group of the Department for Industrial Design at Eindhoven University of Technology (TUE). The Department for Industrial Design of TUE focuses on research and design for intelligent systems. The above-mentioned technological innovations demonstrate that the automotive and mobility domain is an ideal application domain for research and development in the area of intelligent systems. In collaboration with the departments of Mechanical Engineering, Computer Science, Electrical Engineering and Industrial Engineering & Innovation Sciences, the department for Industrial Design contributes to the education of automotive engineers and research for and design of intelligent automotive systems, constituting the Strategic Area Smart Mobility of TU Eindhoven.

Conference Goals

The rapid technological innovations create opportunities for new applications for making driving safer, more efficient, more comfortable and more fun. One goal of the conference is therefore to provide a platform for discussing new applications. One of the topical subjects is the trend towards automation of the driving task and the associated human factors issues. The increase of applications and systems aiming to increase safety, efficiency, comfort and fun also has a downside, of increasing the chance of driver distraction. Another goal of the conference is therefore to provide a platform for exchanging insights concerning driver distraction and how to use these insights for the design of vehicular applications reducing distraction. In the third place, innovations in the domain of interaction technologies have found their way into the domain of automotive user interfaces, and the conference serves as a platform for exchanging insights about novel interaction technologies. Fourthly, putting the affective aspect associated with driving on a par with safety, efficiency and comfort brings the driving experience to the fore, confirming a gradual shift in focus that surfaced at AUTO-UI ’12. Finally, the strong applied focus of the Automotive UI conferences makes AUTO-UI an ideal meeting place for people both from academia and industry.
Submissions and Review Process

Authors were invited to submit short (4 page) or long (max 8 page) papers. In total 67 papers were submitted, with authors from Europe, America, Asia and Australia. Each paper was reviewed by at least three independent reviewers. On the basis of the review, the chairs selected 41 pages, 24 for oral presentation and 17 for presentation in the poster session, which are included in the conference proceedings. The conference was organized in cooperation with the Association for Computing Machinery (ACM), so that the proceedings will be available through the ACM portal. In addition, contributions were submitted for the work-in-progress session and the doctoral consortium. These contributions, as well as the demos presented at the conference, appear in the adjunct proceedings. Pursuing on the success of the 2011 and 2012 conference, proposals for workshops and tutorials were invited. From the eight submissions for workshops six workshops resulted, four full-day workshops and two half-day workshops. The workshop descriptions have been included in the adjunct proceedings.

Acknowledgements

We would like to express our warm appreciation to the many people who have contributed to the organization of this conference: the Conference Committee, the Technical Committee and additional expert reviewers. We also thank the management and members of the department for Industrial Design, who supported the organization of the conference in many different ways. Last but not least, we would like to thank the Conference office of TUE and the student volunteers for their contributions.

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Driver distraction and high mental workload are typically among the topics that are mentioned when design, development, introduction and implementation of user interfaces are discussed in the field of traffic and transport. There is more at stake, however, drivers should not only be able to cope with interfaces in a relatively comfortable manner, they should also be accommodated in such a way that they act optimally with respect to the specific system’s purpose.

Driver distraction, or inattention to the road have been reported to be responsible for a considerable number of the accidents on road by the human factors community for quite some time. A review of the literature demonstrates a lot of empirical work that was conducted already in the seventies of the last century, to gain understanding of the role of attention mechanisms in the driving task. Subsequently, the design and development of in-vehicle advisory and control technology has stimulated a host of more empirical studies during the last thirty years. The introduction, implementation and penetration of devices have increased progressively. In particular, the boost of cellular telephones, navigation systems, and now smartphones (combining the latter two) has led to an increase in distraction opportunities within the vehicle.

Closely related to situational distracting in the driving environment is mental workload. The increase in technology in the driving environment imposes cognitive demands to the driver that has to date not yet been completely sorted out. The relationship between mental workload and driving performance has been demonstrated in many studies, however, mainly with rather complex information technologies, at the high end on a continuum of information quantities in the driving environment. It is largely unknown how and where the “redline” of information provision leading to mental overload should be assessed.

Finally, many systems if not most of them are designed for the average human driver, i.e. in the Netherlands a man of about 35 years old, preferably driving on a motorway. The interface is designed accordingly, with some margins (size, speed, letters etc.) of course to accommodate not only this driver but not too much margin, because that would be at the cost of practical usefulness. Tailoring to the individual is in some cases perhaps necessary in this respect to keep certain groups interested, and other groups safe from making errors. Tailoring, to ensure individual acceptance of systems is necessary for optimal functioning and compliance. Suitable user interfaces are vital in that respect.

From driver distraction to driver support, the role of user interfaces
Karel Brookhuis completed his study in Psychology at the University of Groningen, specialising in experimental psychology and psychophysiology, in 1980. He is a full professor at the Faculty of TPM at Delft University of Technology and at the Department of Psychology of the University of Groningen. Research interests are human factors in occupational settings, particularly traffic and transport, for instance, with respect to driving behaviour in specific conditions. Research topics include effects of psycho-active substances and fatigue on driving behaviour, measurement methods, psycho-physiological aspects of task performance, work load in traffic, specifically under and with ICT applications. Much of this work has been through participation in several large European projects focusing on design and evaluation of new telematics applications (ADAS) in traffic. Karel Brookhuis (co-)authored over 300 publications, from Book Chapters to Research Reports and International Scientific Journal Articles, some of which were cited quite a lot (more than 300 times). He also organised and (co-) edited an International Handbook, and a large number of conference proceedings.