
Automated Cars as Living Rooms and Offices: Challenges and Opportunities

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Abstract

With increasing automation of the driving task, cars' cockpits are transforming towards living spaces rather than pure modalities of transport. The promise of automated vehicles being individual places for relaxation and productivity while on-the-go, however, requires significant research. Not only safety-critical questions, but also issues related to ergonomic design, human factors for interactive systems, and social aspects have to be investigated. This special interests group presents an opportunity for connecting various CHI communities on these problems, which need to be solved under time-pressure, because automated vehicles are coming – whether or not the HCI-related issues are solved.

Author Keywords

automated driving; work; well-being; special interests group

CCS Concepts

•Human-centered computing → Human computer interaction (HCI); •Applied computing → *Computers in other domains*;

Introduction

After the industrial revolution, society's well-being gained importance. The ever-increasing shift from rural to urban workplaces, however, requires workers to endure time-

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CHI'20 Extended Abstracts, April 25–30, 2020, Honolulu, HI, USA

ACM 978-1-4503-6819-3/20/04.

<https://doi.org/10.1145/3334480.3381054>

SIG Goals

This SIG's goals are to

1. **establish connections** between different research backgrounds in order to identify and solve issues in the broader area of engaging in non-driving activities during automated driving.
2. lead to **holistic discussions** – thereby including societal, individual but also technological point of views, ultimately leading to a research agenda with concrete action points.

During all activities, emphasis will be made to focus on concrete actions (such as collaborative research proposal or experiments) to reinforce research activities on this topic.

consuming and stressful commutes to and from work. In the near future, automated vehicles may present the first opportunity to engage in relaxing activities during one's commute and/or use the time productively to shorten a workday. As Perterer et al [5] and several others [2, 6] show, drivers already do so today and want to increasingly do so with automated vehicles. However, a range of safety (e.g., take-over requests, [13]), human factors and ergonomic [8], and ethical and societal questions (Can my boss force me to use my commutes productively without reducing in-office hours?) have to be answered to realize this opportunity in a way beneficial to society. As recent (fatal) incidents have shown (Uber, Tesla, ...), people will engage in so-called non-driving related tasks (NDRTs) during automated phases, whether the level of automation (cf. SAE J3016, [11]) is high enough to safely do so or not; industry puts these cars on the streets and ultimately on the market, despite mentioned fatal experiences of the past. Hence, it's researchers' responsibility to connect to a joint effort in solving problems of situation awareness, motion sickness but also user experience and ethical / societal issues, amongst many other. While recent workshops and publications at CHI [4, 7], and specialized CHI conferences (e.g., AutomotiveUI [9]), have shown growing interest, we believe that there is still a need to expand research based on this initial work since many issues remain unsolved [12]. This special interest group (SIG)'s mission is, thus, to provide a platform for establishing new and deepening existing collaborations between a broad range of HCI researchers, as well as facilitating the creation of new ideas. The ultimate goal is to jointly define a research agenda as a community.

Discussion Pillars

As in previous related workshops, the following points serve as "pillars of discussion":

Non-driving related tasks: How can we design user interfaces for productivity and well-being in the car, that are safe but also enjoyable? Which tasks are suitable for the restricted environment car?

Technologies: Which technologies can support work and play in vehicles? For example, what is the role of adaptive systems which adjust themselves to the user and context? How can they improve UX and safety?

Ergonomics: What are the requirements of interior and interface design for a mobile office, to ensure comfort and usability while enabling/maintaining usability and safety?

Evaluation methods: Where are qualitative and where are quantitative methods needed/better suitable? How can we generalize lab results/results from other applications to that of a living room and office car?

Research road map: What are the next most important topics, specifically in regards to the different levels of automation and their limitations?

In particular interesting will be how the discussion results differ with the broad HCI/CHI community, in comparison to those at specialized conferences (such as AutomotiveUI). A report on the findings over several years of "Mobile Office/Living room"-related workshops and SIG meetings, in relation to a review of published work in specialized conferences (AutomotiveUI) versus CHI during the same time frame, is planned to be submitted to CHI 2021.

Meeting Schedule*Before the meeting*

The organizers will advertise the SIG on social media (LinkedIn, Twitter, ResearchGate, etc.) as well as via mailing lists (CHI, UBICOMP, Driving Assessment and AutomotiveUI) and personal invitations, utilizing their broad network in the CHI community.

SIG Activities

Pre-Meeting Advertising the SIG meeting on social media and mailing lists (e.g., CHI / UBICOMP / AutoUI / Driving Assessment).

During Meeting Self-pitches with follow-up discussions.

After Meeting Invitation to chat-platform for ongoing discussion.

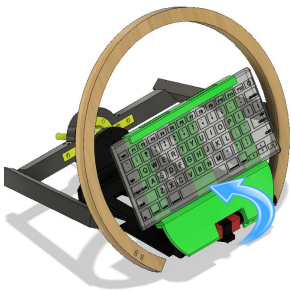


Figure 1: Steering wheel prototype that supports both take-overs and productive typing in highly automated driving [10].

During the meeting

The organizers will start off the meeting with a quick overview of the topic in their point of views (from automotive human factors, to computational HCI and industrial research), with an emphasis of the idea behind the SIG: connecting researchers of various backgrounds to speed up, improve and extend research on “the mobile office” (ca. 15 minutes). Subsequently, participants of the meeting are encouraged to give a self-pitch on their research background, interests, as well as their individual goal behind attending this SIG meeting (strictly time limited to ca. 2 min per person, depending on number of participants). The mentioned points will be gathered live by the organizers and accumulated to ca. 3-4 core topics. These will then be opened for discussion with ca. 10 minutes per topic. In the end of the meeting, the organizers will quickly wrap-up the session and invite participants to join the after-meeting activities.

After the meeting

After the meeting, the organizers will distribute gathered material and a brief summary of results, as well as invitations to a chat-platform like Slack or Microsoft Teams to all participants. Here, we will create digital rooms for each of the stated core topics, that were identified during the SIG meeting, as well as different multi-purpose chat-rooms (e.g., for feedback requests on ongoing work, discussing interesting publications, etc.). These will be moderated by the SIG’s organizers and should serve the purpose of intensifying and establishing contact between researchers in a friendly and informal atmosphere.

Organizers

The organizers consist of diverse backgrounds including academic and industrial researchers, professors, and PhD candidates, from three continents. All of them have a wealth of experience in organizing workshops. They partly have

previously collaborated on “Mobile Office” workshops in the AutomotiveUI conference series [1, 3], as well as various other activities at CHI-related conferences. This constellation represents the idea of the SIG: interconnecting a diverse set of CHI communities with a shared interest.

Acknowledgements

Andrew Kun and Orit Shaer were supported in part by NSF grant CMMI-1840085. Andreas Riener and Clemens Schartmüller were supported by the “Innovative Hochschule” program of the German Federal Ministry of Education and Research (BMBF) under Grant No. 03IHS109A (MenschIN-Bewegung) and its FH-Implus program under Grant No. 13FH71011A (SAFIR).

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