Workshop on the Design of Inclusive and Accessible Future Mobility

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ABSTRACT

Through automation, future mobility has the potential to offer services to a broader range of users than ever before. However, users at the margins are often not represented in the design process or vehicles, and specifically automated vehicles. This can lead to these users being overlooked and ultimately excluded from the use of automated mobility services. Therefore, it is vital to raise awareness for the inclusive design of future mobility services and reflect on how they can become part of automotive design and research practices. In this AutomotiveUI 2021 workshop, we will explore this topic from different angles through expert talks and reflections, followed by discussions. The expected outcome of the workshop is the development of and work on an agenda for accessible and inclusive mobility in the age of automated vehicles.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**; *Mobile computing*; *Ubiquitous computing*.

KEYWORDS

autonomous driving, automated vehicles, connected cars, inclusive design, accessibility, autonomy, fairness

1 INTRODUCTION

Through automation, future mobility has the potential to offer services to a broader range of users than ever before. A potential of automated driving is that people without a driver's license could use the system, such as cognitively or physically impaired [3]: children [8], older adults [4, 8], and people with disabilities [8]. On the one hand, for these vulnerable social groups, automated vehicles could help to overcome mobility access barriers and better participate in social life, work, and education. On the other hand, automated vehicles could even increase access barriers when mobility services are built around pure economic considerations. Yet, on-demand and shared mobility concepts make future automated vehicle services more affordable and accessible. Recent works looked into the design requirements, e.g., automatic doors, of shared rides from an older adults perspective [5] or emphasized the needs of women [10] or vision impaired [1] in such settings. Also, the importance of inclusive communication outside of automated vehicles with other road users that are vision-impaired has been stressed by [2]. However, the accessibility requirements between different groups of impairments might differ, e.g., differ in the way they navigate [6]. Just recently there have been efforts made to push the inclusive and accessible design research, e.g., by workshops of Löcken et al. [7] or Owens et al. [9]. Overall, there is comparably less research on the non-average users of mobility services. Therefore, it is vital to even raise awareness for the inclusive design of future mobility services and reflect on current automotive design and research practices.

1.1 Workshop Goals and Expected Outcomes

With our workshop, we plan to facilitate an exchange on how we can make future mobility design more equitable , i.e., more inclusive and accessible. Therefore, we will bring together researchers and practitioners of the AutoUI community and beyond, with different backgrounds in both the design of in-vehicle interfaces and in supporting people with disabilities. We plan to gather ideas and practices on how to collaboratively design an equitable future for the use of automated vehicles by people with disabilities. Overall, we aim at (1) a reflection and discussion of inclusive mobility, (2)

developing a common research agenda that fosters possible collaborations between participants, and (3) gathering first design solutions in an interactive session.

1.1.1 Workshop Description. The tentative schedule for this workshop is planned as follows. We will have two sessions of 90 minutes, between 12:00UTC and 16:00UTC, so that all organizers from timezones UTC-4 and UTC+2 can participate. The sessions will be held online via Zoom. For the first session, we plan to put a spotlight on the non-average users from assisted living facilities and sheltered workshops through initial talks of the organizers (3x 10min talks + 5min discussion, followed by a short break for 10min). People in assisted living facilities and shelter workshops have a variety of impairments that are a barrier for them to participate in standard transportation designed for the average. We will also solicit contributions of experiences from other contexts - these contributions will also be given room for presentation (max. 6 presentation slots of 5min). Participants are encouraged to submit a position paper beforehand. The rest of the first session will be used for discussions, to develop a research agenda, and organizational purposes.

The second session will be used for group activities in order to work on the research agenda, gathering first design solutions. Therefore, subgroups will be built to analyze the situation from different viewpoints. Some example questions which will be addressed: Who are the relevant stakeholders? What are relevant disabilities (physical and cognitive), and what are their special needs for mobility? Which barriers exist currently and in future (automated) mobility scenarios? What aids and auxiliary devices exist, and where can future research help to improve the situation? Are there potential conflicts between special needs of different disabilities? Are there potential conflicts between special needs and the goals of automated mobility? What are the opportunities of automated mobility for people with disabilities, and what is required to leverage potentials?

The workshop addresses both concrete requirements for user interfaces and demands for the whole customer journey in a mobility scenario. Results will be summarized and published.

1.2 Virtual Engagement

To address the "zoom-fatigue", we will stick to the maximum session length of 90min. There will be a 10min break in the half of each session. Further, we will engage participants in these sessions through smaller or larger interactive parts, such as discussions (session 1) and interactive group work (session 2). We will use the tool Miro as a virtual Whiteboard to protocol important discussion points and gather questions. Further, we will set up a Slack channel to connect participants before/during/after the workshop sessions.

2 BIOGRAPHIES

Henrik Detjen is a Ph.D. student at the University of Duisburg-Essen and works as a researcher/lecturer at the University of Applied Sciences Ruhr West. Currently, he is involved in a competence center for automated mobility. His research interests lay within the fields of mobile human-computer interaction and augmented reality.

Stefan Geisler is a Professor for Applied Computer Science and Human-Machine Interaction at the University of Applied Sciences Ruhr West. There, he is the director of the Positive Computing

Institute and head of the degree program Human-Technology Interaction. Before that, he has worked for several years at Ford in the automotive industry. One of his current research interests is the wellbeing-driven design of future mobility scenarios for a diverse society.

Stefan Schneegass is an Assistant Professor for Computer Science at the University of Duisburg-Essen. He received his Ph.D. from the University of Stuttgart in 2016. Since the beginning of his Ph.D. in 2012, he has worked on various national and international research projects and published in the most important conferences and journals in the field of human-computer interaction. Currently, he is doing research in the field of human-computer interaction, especially in the area of mobile, wearable, and ubiquitous interaction.

Andrew Kun is Professor of Electrical and Computer Engineering at the University of New Hampshire, and director of the UNH Human-Computer Interaction Lab. His research interest is human-computer interaction. In his research he has primarily focused on the design and evaluation of speech interfaces and augmented-reality interfaces in vehicles, on exploring emerging trends in human-computer interaction for automated vehicles, and on the use of visual behavior and pupil diameter changes to model the relationships between user interface characteristics and user performance and satisfaction. He is a Steering Committee member of the ACM AutomotiveUI conference series.

Vidya Sundar is an Associate Professor in the Occupational Therapy department at the University of New Hampshire. She has over 14 years experience in conducting disability related research, specifically on community living and employment of individuals with disabilities. Her current research focuses on intervention programs for career development and sustainability for individuals with disabilities and the intersection of technology, disability, and work.

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