Envisioning the Future of Accessible Immersive Technology: Creating a Roadmap and Building Community

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Immersive technology - for example, Augmented and Virtual Reality - is relevant to many areas of our lives, including work, education, and leisure. However, accessibility of such systems for disabled people remains problematic on the physical, digital, and experiential level. In this workshop, we want to bring together the accessibility community to envision the future of accessible immersive technology, identifying key research challenges, particularly with respect to the design and evaluation of immersive experiences. Together, we want to converge toward a shared roadmap for future research that is constructive, and prioritizes the preferences and needs of disabled people so that we can all benefit from immersive technology.

1 MOTIVATION

Immersive technology - Augmented Reality (AR), Virtual Reality (VR), games, and other multimedia systems that facilitate immersive experiences [Geerts et al. 2022] - is relevant to many areas of our lives, including work, education, and leisure. For example, VR systems are increasingly used in professional training [Belani 2020], serious games are extensively leveraged in education [Zhonggen 2019], and people around the world use immersive technology in the context of leisure, e.g., to access culture (e.g., through AR museum apps [Miyashita et al. 2008]), or when engaging with digital games and obtaining one of the many benefits [Jones et al. 2014]. Likewise, immersive technology has potential beyond the virtual, supporting accessibility of the built environment, e.g., in planning and architecture [Götzelmann et al. 2021], or as a societal intervention that shares lived experience and prompts reflection on the (in)accessibility of daily life [Pei et al. 2023]. However, the accessibility of such systems for disabled people remains problematic. On the physical level, input hardware is commonly designed for non-disabled users, creating access barriers for disabled persons particularly because of the complexity of immersive technology [Dudley et al. 2023; Mott et al. 2020]. On

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the digital level, dedicated efforts to make interaction paradigms accessible are required (e.g., see [Dudley et al. 2023; Franz et al. 2021; Hoppe et al. 2020; Yamagami et al. 2022]), but these often remain at the level of case studies, and a number of other aspects of system design are not yet fully understood (e.g., regarding the representation of disability in immersive systems [Gerling et al. 2020]). Finally, because of the multilayered access challenges that immersive technology introduces, the experience that systems provide for disabled persons is only partially explored (e.g., see [Franz et al. 2023; Gerling et al. 2020]), and developing a detailed understanding of the impact of immersive technology remains a privilege of non-disabled persons.

In this workshop, we want to bring together members of our community who work in the area of immersive technology and accessibility to envision the future of accessible immersive technology, identifying key research challenges in designing, experiencing, and evaluating immersive technology in the context of disability. Jointly, we want to converge toward a shared roadmap for future research that prioritizes the preferences and needs of disabled communities [McDonnell et al. 2023]. Thereby, we hope to open up new perspectives on immersive technology that move beyond normative views of the technology, and that appreciate human plurality, allowing broader groups of people to benefit from such systems in the future.

2 WORKSHOP MODE

We propose a **hybrid half-day workshop**, scheduled for the afternoon starting at 1 pm and concluding at 5 pm. It aims to foster collaboration and community building within the field of accessible immersive technology, expanding to European research networks and beyond. Our focus is on connecting participants by emphasizing break-out activities. Committed to inclusivity, we are prepared to offer a seamless hybrid experience for workshop participants wishing to join the event remotely. We are ready for providing the infrastructure for a hybrid workshop (separate meeting rooms for breakout sessions, Meeting Owl cameras/microphones in combination with Teams calls for a good remote participant experience).

3 WORKSHOP ACTIVITIES

Workshop activities will rely on participant input on their biggest challenges and lessons learned when working on the accessibility of immersive technology.

Pre-Workshop Activities: We will solicit participant input in the two weeks leading up to the workshops through a lightweight approach using email and shared documents, which is the most accessible option. Focus will be on participants' expectations of the workshop, their current research challenges, and lessons learned. The organizing team will also provide a slide template for introductory talks of the participants and offer the option to share one's presentation before the event to facilitate community building. We will aggregate all input, and produce a curated list of questions to guide the workshop on the day.

Workshop Activities on the day: The workshop will be held at InformatiKOM II at KIT Campus South, a fully accessible building that provides the required infrastructure. At 1 pm, the workshop will start with an introduction to the workshop topic, followed by a short acquaintance session through two-minute introductory talks held by the participants. These talks should include a brief bio and aim to share awareness of the ongoing research projects in our area. The main session, starting at 2 pm, will include group work in the style of a World Café to address the main questions raised by the participants. These discussions will be held in multiple 20-minute rounds and moderated by the workshop organizers, who will manage remote participation through breakout rooms and shared documents. A 10-minute coffee break will follow each round, although additional pauses will be available at any time if requested. At

4 pm, workshop organizers will present the results of each discussion together with workshop participants, and will summarize implications for the future. Results will be documented within a shared digital space, with the workshop ending latest 5 pm. Participants are welcome to bring demos of their own accessible systems to the event for shared exploration with other workshop attendees at the end of the workshop.

Post-Workshop Activities: Community building will be further facilitated through an optional mailing list that will persist beyond the workshop. This will enable shared follow-up activities, e.g., lecture series in the area of accessibility and immersive technology. Additionally, the outcome of the workshop will be summarized and shared as a blog post, and together with workshop participants we will decide whether to submit it to a broader venue (e.g., SIGACCESS Newsletter, ACM Interactions).

4   CALL FOR PARTICIPATION

We invite submissions to participate in the 2024 Mensch & Computer Workshop on *Envisioning the Future of Accessible Immersive Technology* (https://www.accessibility.kit.edu/english/muc2024.php) in Karlsruhe and online on Sunday, September 1st, 2024.

Possible workshop topics include, but are not limited to:

- AR and VR applications for people with visual impairments or limited mobility,
- barriers of XR technology for people with disabilities,
- the intersection of immersive systems and neurodivergence,
- immersive media experiences across different age groups (e.g. younger or older users),
- and other immersive systems, e.g., games and their accessibility.

In particular, we look forward to discussing issues related to the design, experience, and evaluation of immersive technology.

We accept submissions in the following formats:

- Position papers (1-2 page, references excluded) that outline views on accessible immersive technology and on main challenges.
- Short experience reports of (in)accessible immersive technology, both from the perspective of users and from the perspective of technology developers or researchers (1-2 pages paper, or an alternative format e.g., an audio or video recording in coordination with the workshop organizers).
- Pictorials visually exploring issues related to the accessibility of immersive technology. We encourage authors to reflect upon how to make such submissions accessible for others.

Submissions are due on June 30th 2024 AoE via ConfTool or email. They will be reviewed by the organizing committee with focus on author ability to contribute to the discussion, and anticipated benefits at their career stage. Submissions can be included in the GI Digital Library at the request of authors. At least one author must register for and attend the workshop.

5   ORGANIZERS

The workshop will be organized by the following team:

Marvin Wolf is a PhD researcher at the Institute for Anthropomatics and Robotics at the Karlsruhe Institute of Technology (KIT). He is part of the research group Human-Computer Interaction and Accessibility and holds a Master's

degree in Biomedical Engineering from Heidelberg University. His research aims to address physical and digital barriers of VR technology for people with physical disabilities. (https://hci.iar.kit.edu/21_241.php)

Julia Anken works as a Research Associate at the Center for Digital Accessibility and Assistive Technology (ACCESS@KIT), which is part of the Karlsruhe Institute of Technology (KIT). She holds a Master's degree in Computer Science from KIT and her research primarily focuses on creating inclusive working environments in VR for people with visual impairments. (https://www.access.kit.edu/english/287_1447.php)

Katrin Angerbauer is a Ph.D. student at the University of Stuttgart, in the research group of Visualization and Virtual/Augmented Reality. She obtained her Bachelor's and Master's degrees in Software Engineering at the same university. She, personally experiencing life with a disability, draws personal motivation for her research. Her research focuses on human-computer interaction, virtual and augmented reality, and accessibility. It aims to amplify and visualize the lived experiences of people with disabilities and create more accessible and inclusive technology solutions. (https://www.visus.uni-stuttgart.de/en/institute/team/Angerbauer/)

Markus Wieland is a PhD researcher at the Visualization Research Center (VISUS) at the University of Stuttgart and holds a Master's degree in Cognitive Science from the University of Tuebingen. His current research focuses on making non-verbal communication, especially eye contact, perceivable through XR technologies for people with visual impairments. (https://www.visus.uni-stuttgart.de/en/institute/team/Wieland-00007/)

Matthias Wölfel is head of the Institute for Intuitive Interfaces and Immersive Experience, Professor for "Intuitive and Perceptive User Interfaces" at the Faculty of Computer Science and Business Information Systems of the University of Applied Sciences Karlsruhe since 2018, and associated with the Faculty of Business, Economics and Social Sciences at University of Hohenheim. He is also the author of the book "Immersive Virtuelle Realität", published by Springer [Wölfel 2023].

Karin Müller is Deputy Director of the Center for Digital Accessibility and Assistive Technology (ACCESS@KIT) at Karlsruhe Institute of Technology (KIT). In 2002, she received her PhD in Computational Linguistics from the University of Stuttgart. Her research focuses on the question how to improve the access to graphical information for people with visual impairments. She currently leads the InclusiveVR@Work project at KIT. (https://www.access.kit.edu/english/287_888.php)

Kathrin Gerling is Professor of Human-Computer Interaction and Accessibility at Karlsruhe Institute of Technology (KIT). In 2014, she received a PhD in Computer Science from the University of Saskatchewan, Canada. Central to the research of her group is the question of how interactive technology can be designed in a way that supports self-determination, and how we can achieve experiential accessibility that strives for equitable and engaging experiences for all of us. (https://hci.iar.kit.edu/21_59.php)

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