Immersive Inclusivity at CHI: Design and Creation of Inclusive User Interactions Through Immersive Media

Bektur Ryskeldiev
University of Tsukuba, Mercari R4D
Japan
bektour@digitalnature.slis.tsukuba.ac.jp

Yoichi Ochiai
University of Tsukuba
Japan
wizard@slis.tsukuba.ac.jp

Koki Kusano
Merpay, Mercari R4D
Japan
koki.kusano@mercari.com

Jie Li
CWI
Netherlands
jie.li@cwi.nl

Yamen Saraiji
Avatarin Inc
Japan
yamen@avatarin.com

Kai Kunze
Keio University
Japan
kai@kmd.keio.ac.jp

Mark Billinghurst
University of Auckland
New Zealand
mark.billinghurst@auckland.ac.nz

Suranga Nanayakkara
University of Auckland
New Zealand
s.nanayakkara@auckland.ac.nz

Yusuke Sugano
University of Tokyo
Japan
sugano@iis.u-tokyo.ac.jp

Tatsuya Honda
Fujitsu Limited
Japan
honda-tatsuya@ed.tmu.ac.jp

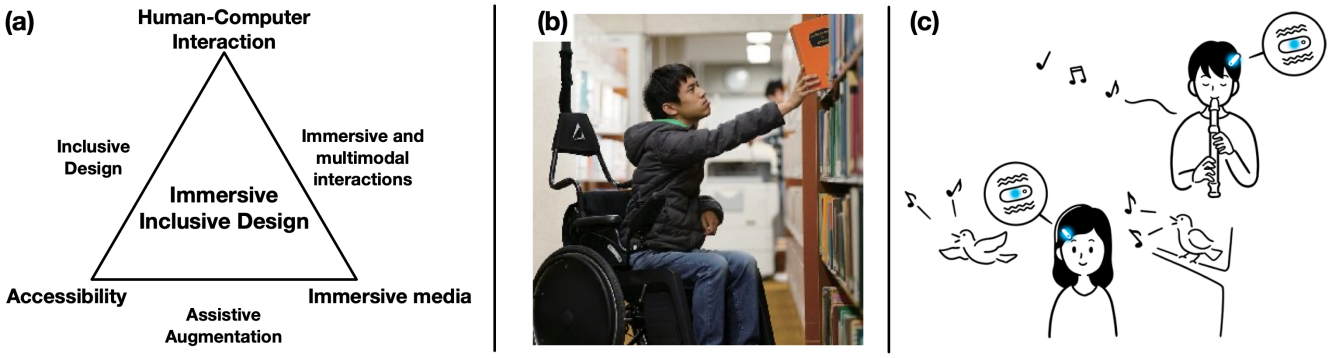

Figure 1: (a) Proposed immersive inclusive design placement in relation the fields of Human-Computer Interaction, immersive media, and accessibility. (b, c) Examples of immersive inclusive design applications: (b) using a wheelchair remotely controlled through Virtual Reality (VR) telepresence interface for assistance [3], (c) applying a headworn hair clip for translation of auditory signals into haptic vibration [4]

ABSTRACT

Immersive media is becoming increasingly common in day-to-day scenarios: from extended reality systems to multimodal interfaces. Such ubiquity opens an opportunity for building more inclusive environments for users with disabilities (permanent, temporary, or situational) by either introducing immersive and multimodal elements into existing applications, or designing and creating immersive applications with inclusivity in mind. Thus the aim of this workshop is to create a discussion platform on intersections between the fields of immersive media, accessibility, and human-computer interaction, outline the key current and future problems of immersive inclusive design, and define a set of methodologies for design and evaluation of immersive systems from inclusivity perspective.

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CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**; **Accessibility technologies**; *Collaborative and social computing*.

KEYWORDS

assistive technology, collaborative technology, accessibility, artificial intelligence, augmented reality, virtual reality, mixed reality, extended reality, human-computer interaction, inclusive design, internet of things, augmented human

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1 BACKGROUND

Immersive media (e.g., extended reality (XR) and multimodal) interfaces are becoming increasingly common in day-to-day scenarios: from facial tracking and location-based entertainment to voice- and gesture-controlled smart assistants and home systems. As such interactions are becoming more seamless and natural, recent studies are suggesting that in the upcoming years we will see even closer integration between human and technology [8], and artificial intelligence (AI) [9].

Thus, by applying immersive and multimodal forms of interactions to existing interfaces, we also open new opportunities for designing and establishing inclusive environments and applications for users with disabilities (either permanent, temporary, or situational). This approach has been particularly explored in works by "Augmented Human" and "Assistive Augmentation" communities. Where, for instance, in [5] Huber et al. discuss that by combining immersive, wearable, and multimodal interfaces with user's mind, body, and behavior, it is possible to enhance user's perception as well as have an effect on their abilities or disabilities.

Recent examples of such enhancements in academic research include using mobile Augmented Reality (AR) interface for assistance in understanding dynamic menus in vending machines and kiosks [6], combining spatial audio and AR for real time recognition of sounds and speech [1], and making VR experiences accessible for users with vision disabilities through haptic and auditory feedback [10]. Similarly, due to increasing availability of personal mobile and internet of things (IoT) devices, recent commercial applications had also featured immersive inclusive design solutions on navigation through spatialized auditory feedback [7], personal wearables for sound recognition with haptic feedback [4], and using multimodal handheld devices to make live musical performances accessible to users with hearing disabilities [2].

As intersections between immersive media and inclusive design are becoming more commonplace, we outline two main questions: *"How can immersive media make existing environments, systems, and interfaces more inclusive?"* and *"How can immersive systems be built with inclusivity in mind?"*

2 WORKSHOP PLAN

2.1 Workshop Goals

The aim of this workshop is to address these questions by creating a discussion platform among researchers working in the fields of immersive and interactive media, accessibility, and human-computer interaction. The main goals of this discussion are:

- Identify the current and future key problems in inclusive design from the perspective of immersive media; define when making a system more immersive leads to a more inclusive user experience, and how immersive systems can be designed and built with inclusivity in mind,
- Outline the immersive inclusive design taxonomy, in particular how immersive inclusive design principles combine with the concepts of assistive augmentation and accessibility,
- Collect and describe a set of use-cases on immersive inclusive design where this approach was or could have been applied on existing problems and applications,
- Propose and outline potential evaluation methodologies for immersive inclusive design research, create an understanding on how existing evaluation methodologies for accessibility and immersive systems could be applied in immersive inclusivity context
- Outline and expand community of immersive inclusive design researchers and practitioners, encourage a dialogue between academic researchers and industry practitioners, leading to continuous bilateral value and experience exchange.

2.2 Pre-Workshop Plans

2.2.1 Website and Social Media. Workshop overview, call for papers, deadlines, submission form, organizer, and contact information will be displayed on the website **https://iiworkshop2021.github.io**. Given the current pandemic situation and online-only format of the conference, we are aiming for fully remote participation, with video calls for talks and workshop activities, and a separate message group. Further details on remote participation will be posted on the website upon the workshop proposal acceptance and discussion with CHI organization committee.

Prior to the workshop all selected attendees will be requested to fill out the online form regarding their timezone preferences, platform restrictions and accessibility requirements, professional background, and interest in topics connected to immersive inclusive design. This information will be used for scheduling the workshop, arranging the online communication format, and creation of discussion groups on several chosen topics (e.g., immersive inclusive design taxonomy, applications, evaluation methods, and ethical issues) on which the attendees should create a short presentation to be shown during the workshop. All attendees will also be added to a private Slack group for discussion, note sharing, and further planning of the workshop.

2.2.2 Recruitment. We plan to recruit a diverse set of scholars and practitioners primarily from the following communities: HCI (ACM SIGCHI), Computer Graphics (ACM SIGGRAPH), Accessibility (ASSETS, IPSJ SIG AAC), and Augmented Human. Furthermore, we hope that this workshop would also attract researchers, developers,

and UI/UX designers who have experience or are currently working in the industry.

The call for papers (CFP) will be mainly disseminated through said communities' mailing lists and social media, and posted on **http://www.wikicfp.com/cfp/**. We intend to select *up to 30 participants* who will be asked to submit a 2-4 page position paper on one or several topics listed in the CFP. The selection and reviews will be carried out by organizers and invited reviewers.

2.3 Workshop Structure

This workshop is based on a one-day four-hour program. Tentative schedule as follows:

- **9:00-9:15 Welcome and introduction**: Workshop opening, introduction of the topics, program, organizers and participants
- **9:15-09:45 Opening keynote talk** by one of the workshop organizers on inclusive design and immersive media
- **09:45-10:00 Short break**
- **10:00-11:00 Lightning talks**: Series of short position paper talks, 2-3 minutes each
- **11:00-11:15 Short break**
- **11:15-11:45 Group ideation**: Participants work in (preformed) groups on topics introduced prior to the workshop. Each group prepares a short (2-3 slides) presentation on the topic. The groups will be done via Zoom breakout rooms and Discord channels.
- **11:45-12:00 Short break**
- **12:00-12:45 Group presentations**: Each group presents a short 2-3 minute talk on their chosen topic with about 3-5 minutes on discussion
- **12:45-13:00 Workshop discussion and closing**: Organizers summarize the conducted workshop and present potential plans for future collaborations.

3 POST-WORKSHOP PLANS

Outputs such as position papers and discussion contents (presentations and notes) will be published on the workshop website. The workshop process, discussions, and outcomes will be also collected, summarized and published as a blog post on the workshop's website, as well as submitted for publication to ACM Interactions magazine. As we intend to support the created immersive inclusive design community, we plan to also create a mailing list to coordinate further workshops or SIG meetings at ACM CHI or SIGGRAPH sponsored conferences.

Finally, we expect this workshop to outline and broaden the immersive inclusive design research community, as well as create a bilateral experience exchange between academic research and industry which will lead to potential future collaborations.

4 ORGANIZERS

- **Bektur Ryskeldiev** is a Postdoctoral Researcher at Research and Development Center for Digital Nature, University of Tsukuba, and a Research Fellow at HCI group, Mercari R4D. His work is primarily focused on the problems of telepresence, remote collaboration, XR interactions, and inclusive design. He is also a member of ACM SIGGRAPH Immersive and Interactive Media Committee, and ACM SIGGRAPH International Resources Committee (IRC).
- **Yoichi Ochiai** is an Associate Professor at the University of Tsukuba and CEO at Pixie Dust Technologies Inc. He is one of the principle investigators at JST CREST xDiversity grant which is focused on applications of computer graphics, AI, and multimodal interactions for inclusive design.
- **Koki Kusano** is a UX Researcher in Merpay, Inc. He studies tools and methods for supporting Human-Centered Design and applies them in practice as a UX researcher. He has various work experiences related to research and development of design methods, UX and qualitative UX research, as well as lecturing on Human-Centered Design for the master program at Keio University.
- **Jie Li** is a postdoctoral researcher at Distributed Interactive Systems group of The Dutch National Research Institute for Mathematics and Computer Science (CWI). She holds a PhD degree in Human Information communication Design from Delft University of Technology, and is specialised in UX and HCI research. She is currently working on develop subjective metrics for assessing experience in social VR, building and evaluating new social VR experiences in diverse domains (e.g., medical consultation, co-design, museum).
- **Yamen Saraiji** is an Avatar Core Director at Avatarin Inc. He has previously taught as a Project Senior Assistant Professor at Keio University Graduate School of Media Design. His research experience includes working in the fields of telepresence, robotics, artificial intelligence, augmented human, and human-computer interaction.
- **Kai Kunze** works as a Professor at the Graduate School of Media Design, Keio University, Yokohama, Japan. He is a pioneer researcher in the emerging Eyewear Computing field. His current research includes augmenting humans, quantifying cognitive states and amplifying human senses. He is a founding member of the Superhuman Sports Academy Society, Japan.
- **Mark Billinghurst** is Professor at the University of South Australia in Adelaide, Australia, and also at the University of Auckland in New Zealand, directing the Empathic Computing Laboratory. He earned a PhD in 2002 from the University of Washington and researches how virtual and real worlds can be merged, publishing over 550 papers on Augmented Reality, remote collaboration, Empathic Computing, and related topics. In 2013 he was elected as a Fellow of the Royal Society of New Zealand, and in 2019 was given the ISMAR Career Impact Award in recognition for lifetime contribution to AR research and commercialization
- **Suranga Nanayakkara** is an Associate Professor at the Auckland Bioengineering Institute, the University of Auckland (UoA). Suranga founded and directs the "Augmented Human Lab" to explore ways of creating 'enabling' human-computer interfaces as natural extensions of our body, mind and behaviour
- **Yusuke Sugano** is an associate professor at Institute of Industrial Science, The University of Tokyo. His research interests focus on computer vision and human-computer interaction. He received his Ph.D. in information science

and technology from the University of Tokyo in 2010. He was previously an associate professor at Graduate School of Information Science and Technology, Osaka University, a postdoctoral researcher at Max Planck Institute for Informatics, and a project research associate at Institute of Industrial Science, the University of Tokyo.

- **Tatsuya Honda** is a user interface designer at Fujitsu Limited. Honda began working with deaf people in college as a sign language interpreter and volunteer. Looking to help the deaf, he started work in college on what would become a product called Ontenna (a play on the Japanese words for sound and antenna), a device that translates sound, like music, into vibrations and light.

5 CALL FOR PARTICIPATION

Immersive media is becoming increasingly common in day-to-day scenarios: from extended reality systems to multimodal interfaces. Such ubiquity opens an opportunity for building more inclusive environments for users with disabilities (either permanent, temporary, or situational) by introducing immersive and multimodal elements into existing applications, or designing and creating immersive applications with inclusivity in mind.

This **ACM CHI 2021 Online Workshop on Design and Creation of Inclusive User Interactions Through Immersive Media** invites its participants to open a discussion on intersections between the fields of immersive media, accessibility, and human-computer interaction, outline the key current and future problems of immersive inclusive design, define a set of methodologies for design and evaluation of immersive systems from inclusivity, and create a bilateral value exchange dialogue between researchers and practitioners in academia and industry.

We welcome all interested applicants, including students and professionals with experiences in such fields as Human-Computer Interaction (HCI), social computing, UI/UX design and research, accessibility, immersive media, Augmented, Virtual, and Extended Reality (AR / VR / XR), Artificial Intelligence, and Augmented Human. We intend this workshop to be engaging and informative to all participants regardless of level of familiarity with the workshop topic.

Please note that due to ACM CHI 2021 virtual format, this workshop will be also conducted online. To participate in the workshop, we ask applicants to submit 2-4 page position papers in ACM Master Article (single column) format, on the topics that include, but are not limited to:

- Immersive media and inclusive design
- Accessibility
- Assistive augmentation
- Augmented, Virtual, Mixed, and Extended Reality (AR / VR / MR / XR)
- Human-Computer Interaction
- Human-Computer Integration (HInt)
- Augmented Human
- HCI and Artificial Intelligence

Submissions deadline is February 21st 2021 Anywhere On Earth (AoE), acceptance notifications will be sent out on March 5th 2021. Workshop will happen on May 8th 2021. At least one of the accepted authors is expected to attend both workshop and the conference.

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