# Developing Strategies for Co-designing Assistive Augmentation Technologies


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## ABSTRACT

Assistive augmentation promotes the independence of individuals with impairments by enhancing human capabilities that help overcome specific barriers or challenges. To understand these challenges and other requirements of the user, co-design – a method often used in the design of assistive technologies – could be adopted. Through engaging end-users in the design and development process, augmentation technologies could be designed to cater to the changing needs of users, including requirements for the modality of enhancement and technology integration. However, considerations specific to the co-design of assistive augmentations, such as the involvement of stakeholders beyond individuals with impairments, have yet to be explored. This workshop aims to gather insights from designers and researchers to synthesise new strategies for co-designing assistive augmentation technologies.



## CCS CONCEPTS

• **Human-centered computing** → **Accessibility**.

## KEYWORDS

Assistive augmentation, augmented humans, assistive technologies, co-design

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## 1 INTRODUCTION

Assistive augmentation is an emerging field that intersects assistive technology and human augmentation and provides the opportunity to improve the quality of life of individuals with impairments through extending their physical, sensorial and cognitive capabilities [4]. Assistive augmentation requires a deep understanding of the intention, emotions and physiological capabilities of users, in order to enhance their capabilities adaptively using unobtrusive approaches.

Co-design, or participatory design, is a method commonly used to incorporate the end user's perspective into the development of assistive technology, allowing customised solutions to cater to the specific needs of individuals with disabilities. An extensive body of literature presents approaches aimed at improving the efficiency of co-design activities for assistive technologies, for example, by helping end users communicate their experiences and expectations with designers and researchers during the co-design process [1], and through empowering end users with disabilities through improved accessibility of activities [5]. However, rather than focusing solely on individual requirements, a more holistic view is required in the design of assistive augmentations [3]. In particular, the impacts of enhanced capabilities on different aspects of an individual's life need to be examined, e.g., whether these enhancements reduce or deepen the stigma already experienced by individuals. Furthermore, beyond individuals with impairments, there is also a need to consider the perspectives of other stakeholders, including their social circles, different communities they interact with, and the general public: What do the enhanced capabilities mean for people without impairments? How would people without impairments interact with these technologies? As such, co-designing assistive

augmentation technologies presents different challenges from traditional approaches, which have yet to be explored in existing literature. This workshop aims to bridge this knowledge gap by gathering insights from professionals with technical backgrounds and synthesising strategies for co-designing assistive augmentation technologies.

## 2 CONTENT OF WORKSHOP

The workshop will start with an introduction to the context, aims and agenda. We will conduct three activities for the main body of the workshop, facilitated by organisers attending the in-person workshop. The first activity is a 'lightning' presentation session, where participants will be invited to talk about their work relevant to topics listed in section 5. Depending on the number of participants, each talk should last approximately 3-5 minutes. The second activity is a focus group discussion, where participants will be divided into groups of 3-4 to reflect on the presentations and share their experiences with co-creating assistive augmentation technologies. The goals of this activity are to help deepen understanding of the current challenges, as well as to cultivate empathy between participants. In the third activity, we will ask participants to brainstorm new strategies for co-designing assistive augmentation to explore different possibilities and generate creative ideas to address challenges identified earlier. Participants will then evaluate these ideas and prioritise ideas with the most potential. This activity aims to help concretise and consolidate the ideas and identify directions for future efforts. To conduct these activities, we will require a room with tables and chairs, a projector for the presentations, and pens, coloured markers and paper for the brainstorming activity. There will be breaks between each activity to avoid exhaustion. The breaks will also provide further opportunities for participants to network and hold informal discussions with each other. To close the workshop, we will summarise key insights from the workshop and identify the next steps for the research. We will also collect participant feedback and encourage further discussions and collaborations between participants.

## 3 GOALS AND OUTCOMES

Our goals for the workshop are to allow insights from researchers in the field to be exchanged and new ideas to be sparked through encouraging reflection on these insights. After the workshop, we will share the collected ideas and strategies for co-designing assistive augmentation online. We also intend to present the summarised results and key findings in a journal paper, which will be done in collaboration with interested participants.

## 4 SCHEDULE

This will be a full-day in-person workshop with approximately 10-15 participants. The schedule for the workshop is detailed below:

- **09:00 - 09:15** Introduction
- **09:15 - 10:30** Activity 1: Lightning presentations
- **10:30 - 11:00** Coffee break
- **11:00 - 12:30** Activity 2: Focus group discussion
- **12:30 - 14:00** Lunch
- **14:00 - 15:30** Activity 3: Brainstorming ideas
- **15:30 - 16:00** Coffee break
- **16:00 - 17:00** Activity 3: Discussion of brainstormed ideas
- **17:00 - 17:15** Closing

## 5 RECRUITMENT & REVIEWING

We will be sharing a call for participation for the workshop through the Augmented Humans community, as well as other research communities, e.g., CHI, ASSETS, TEI, etc. We will also advertise the workshop through social media, personal communication channels and mailing lists. We intend to recruit 10-15 participants who are researchers or designers and are interested in assistive augmentation, health technologies or HCI. Submissions will be reviewed by the organisers and selected based on the relevance to the topics of interest listed below:

- Assistive augmentation or human augmentation with health-related applications
- Assistive or adaptive technologies
- Universal or accessibility design
- Co-designing with multiple stakeholders

## 6 ORGANIZER BIOGRAPHIES

**Adele Tong** is a PhD student at the School of Computer Science at the University of Sydney. She is interested in exploring the application and adaptation of ubiquitous technologies for people with different needs, especially in the health domain.

**Zhanna Sarsenbayeva** is a Lecturer in the School of Computer Science at the University of Sydney. Her research interests include Accessibility, Ubiquitous Computing, Affective Computing, and Human-Computer Interaction. She has co-organised several workshops at leading HCI venues including CHI and Ubicomp.

**Jorge Goncalves** is an Associate Professor in the School of Computing and Information Systems at the University of Melbourne. He has conducted extensive research on Human Computation, Ubiquitous Computing and Assistive Technologies. He has also served as Workshops Co-Chair for CHI'19 and CHI'20, and co-organised many successful workshops at leading HCI venues such as CHI, CSCW and Ubicomp (e.g., [2, 6, 7]).

**Hideki Koike** is a professor in the School of Computing at the Tokyo Institute of Technology. He has been working on vision-based Human-Computer Interaction. Recently he is interested in VR/AR systems for skill acquisitions.

**Masahiko Inami** is a professor at the Research Center for Advanced Science and Technology, University of Tokyo. His research interest is in human augmentation technologies, Entertainment Computing, HCI and robotics.

**Alistair McEwan** is the Ainsworth Chair of Technology and Innovation at Cerebral Palsy Alliance and University of Sydney, Faculty of Engineering and Information Technologies. He is the Theme Leader for Biomedical Devices and Instrumentation and helps lead the Australian Research Council Training Centre for Innovative Bioengineering. He was appointed as CPA's first Chair of Technology and Innovation in 2017 to harness advancing technology and innovation to accelerate the search for new and improved treatments and interventions for childhood disabilities.

**Anusha Withana** is an ARD DECRA fellow and a senior lecturer (Asst. Prof.) at the School of Computer Science, the University of

Sydney. He works in the research field of human-computer interaction (HCI), mainly focusing on creating personalized enabling technologies. He is experienced in hosting workshops relating to the fabrication of new technologies.

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