Designing with the Body AI Assistive Technology with Sighted Guiding Companions

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Prior work on AI Assistive Technology (AI-AT) for People with Visual Impairments (PVI) has treated navigation largely as an independent activity. Consequently, much effort has been focused on providing individual users with wayfinding details about the environment, proximity, obstacles, and landmarks. However, independence is also achieved by PVI through interacting with others, such as in sighted guiding. Drawing on the interdependence concept, our interest is to explore how AI can be reoriented for supporting collaborations between PVI and sighted companions. We present our current research project aiming to adopt a soma design approach to design AI-AT for interdependence in participatory workshops with sighted guiding companions. We believe results will have important implications for both design methods and AI interventions. These implications will offer points of reflections on access as collective achievement, and promoting diversity, inclusion, and social justice for people with disabilities more broadly.

CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI)**; *HCI design and evaluation methods*; **Accessibility**; *Accessibility design and evaluation methods*; *Accessibility technologies*;

Additional Key Words and Phrases: soma design, accessibility, AI, assistive technology, people with visual impairments

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1 INTRODUCTION

Assistive Technology (AT) for people living with varying forms of visual impairment (VI) has become a common part of their daily lives, supporting them in activities and routine tasks, such as reading text, navigating the web, using smartphones, and so on [6, 7, 11, 19, 20, 24, 25, 32]. More recently, artificial intelligence (AI) has been promoted as a means for extending these ATs. For example, increased attention has been given to designing and developing AI-AT to aid independent navigation for people with visual impairments. In this research, much effort has been dedicated to providing the individual with wayfinding guidance and complementary information about the physical features in an environment, such as one's proximity to obstacles, curbs, hazards and landmarks [1, 9, 14, 16, 17, 21]. However, technologies and applications that go beyond supporting individual tasks to instead attend to the relational, social, and collaborative aspects of navigation remain under-explored in the design of AI assistive technology.

In this workshop paper, we present a current research project and the undertaken approach, which builds on the inspirational research from Cynthia L. Bennett et al. [3]. In ASSETS, Bennett et al. developed an argument around

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interdependence that sees AT as a way to extend the relations among one another, focusing on how actors are made more or less able, relationally, through other actors and with/through AT. Consequently, this frame stresses the work done by people with disabilities in collaboration with others and how access and independence are achieved through this interdependence. Here, access is seen as not a binary concept (either achieved or not) but in continuous production. The interdependence perspective thus opens up opportunities to think differently about the design of AT and, consequently, about the use of AI in this context.

Our research aims to take up the call from Bennett et al. [3] and, therefore, situates at the intersections of AI and its applications in assistive guidance technologies for people with visual impairments. Specifically, our work is focused on alternative ways of approaching AI assistive technology design to enhance social interactions during navigation. Rather than presuming an instrumental view of independent navigation, our interest is to consider what role AI might play in augmenting and extending the interdependencies between PVI and others. We seek not to "solve" the "problem" of navigation but to explore how and where people's collective capacities might be enhanced through AI assistive technology [5], promoting access as a collective achievement. As a case study, we decided to focus on the case of sighted guiding in blind navigation. Because of the physical connection between a person with visual impairment and a sighted companion, sighted guiding serves as an emblematic example of collaborative achievement and interdependent work [30]. Furthermore, social dynamics can change suddenly moment-to-moment as companions move together in the environment, demonstrating that access is in continuous production and negotiation.

We investigate how we can design AI assistive technology that fosters cooperation and extends the capabilities of people with visual impairments and their guides. To address our research question, we take inspiration from soma design [12] as a design approach to conduct a series of participatory workshops with pairs of participants composed of a person with visual impairments and a sighted guide. We believe that soma design presents a promising design approach for engaging with the body and facilitating interpersonal communication, which can serve to inspire novel design ideas around AI-AT for interdependence. Moreover, this approach prioritises the diversity of bodily experiences, promoting inclusion and accessibility as a collective achievement and a social justice issue.

2 WORKING WITH INTERDEPENDENCE AND AI

The HCI community increasingly recognises the importance of involving people with visual impairments in AI assistive technology design [10, 15, 18, 26, 29]. While research has highlighted this need, there is limited exploration of effective design methods for fostering creative and diverse discussions on AI assistive technology, especially regarding interdependence. Morrison et al. [22] show the limitations of design methods and the challenges with engaging people in ideation methods for future and alternative AI systems. Others reflect on the difficulties of employing traditional methods (i.e., Wizard of Oz) when designing AI technology for supporting an autistic population [2]. Much like our case study, challenges emerge in more complex scenarios where the primary use of AI technology is not to solve isolated tasks but rather to facilitate social interactions. An example of complex scenario is the design of an open-ended intelligent system for supporting a blind child in social activities (i.e., a family meal) [23]. This highlights a need to explore further design methods to better engage with people with disabilities when designing AI-AT that pay special attention to people's collaborative achievement and interdependencies.

We believe that soma design [12] could be a promising approach to advancing HCI and accessibility research related to AI-AT for interdependence with people with disabilities. Soma design integrates the body and movement into the design process. It draws its foundation from somaesthetics theory, which was crafted by philosopher Richard Shusterman. [27]. Somaesthetics theory encourages us to use all our senses in order to enhance our understanding of

how to improve our existence in the world. It is peculiar because aesthetic movement encounters require us to disrupt our usual behaviours in order to develop new, more reflective, thoughtful movements. Rooted in sensory and aesthetic experiences, soma design encourages designers to connect with their own lived experiences to nurture their "soma" and generate novel design concepts. Recent work in HCI has adopted soma design approaches to explore experiences that go beyond merely instrumental use of technology (e.g., menopause and menstrual experience [8, 28]). Through this research we want to centre the diversity of bodies (i.e., people with visual impairments and sighted companions) and experiences [13] with the hope to (i) foster participants' engagement and inclusion as active designers and (ii) offer a preliminary example of AI-AT intervention for interdependence.

3 STUDY METHOD

We are planning to conduct a series of participatory workshops with sighted guiding companions to explore ideas and designs for a wearable prototype to enhance sighted guiding. This research has already been approved by the Swedish National Ethics Committee. We are looking for adult (over 18) pairs composed of a person with visual impairments and a sighted guide who are family members, friends or colleagues. We are about to conduct the first workshop with 2 pairs of participants with the aim of exploring people's relationships as well as tangible design materials for future prototyping. Our workshops will be focused on:

Cultivating Partnership. We are particularly inspired by soma design in its encouragement of design processes that are slow, thoughtful, and aligned with human needs. Drawing also from Bennett and Rosner's work [4], we will start cultivating partnerships with sighted guiding companions to build a trustworthy relationship with the aim to involve sighted guiding companions as active designers in a long-term design exploration. We will share experiences in sighted guiding as well as the use of assistive technology in everyday life.

Contact Improvisation. With inspiration from first-person experiences and Feldenkrais lessons often adopted in soma design [12], we will guide a contact improvisation session. The aim is to help participants to turn their attention to their bodies first and then their connections. Specifically, we will focus on body parts which play a relevant role in sighted guiding (i.e., shoulder, arm, elbow, hand), but also synchronisation and rhythm in body movements. We will facilitate a discussion to help participants articulate how they felt in their bodies and their connection with their companions.

Designing Technology. In this phase, we will invite participants to explore design ideas for a future assistive technology aiming to support their sighted guiding partnership. In this phase, participants could use some soma bits [31] to explore a series of actuators on different parts of the body. Further, we will make available fabric and design materials to extend soma bits, sketch and build their designs.

4 CONCLUSION

The proposed research is a tentative of thinking through a soma design approach about the role played by an AI-AT and how such a system can be designed for and with people living with different abilities. It also aims to support the ongoing and emerging relations between people with vision impairments and their guides, and present a perspective that makes for richer interdependencies and an expansion of collective capacities.

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