Assistive Applications, Accessibility, and Disability Ethics in HRI

Katherine H. Allen
Tufts University
Medford, MA, USA
kat.allen@tufts.edu

Reuben M. Aronson
Tufts University
Medford, MA, USA
reuben.aronson@tufts.edu

Tapomayukh Bhattacharjee
Cornell University
Ithaca, NY, USA
tapomayukh@cornell.edu

Frank Broz
Delft University of Technology
Delft, Netherlands
F.Broz@tudelft.nl

Mai Lee Chang
Carnegie Mellon University
Pittsburgh, PA, USA
maileec@andrew.cmu.edu

Maggie Collier
Carnegie Mellon University
Pittsburgh, PA, USA
macollie@andrew.cmu.edu

Taylor Kessler Faulkner
University of Washington
Seattle, WA, USA
taylorkf@cs.washington.edu

Hee Rin Lee
Michigan State University
East Lansing, MI, USA
heerin@msu.edu

Isabel Neto
Universidade de Lisboa
Lisbon, Portugal
isabel.neto@tecnico.ulisboa.pt

Katie Winkle
Uppsala University
Uppsala, Sweden
katie.winkle@it.uu.se

Elaine Schaertl Short
Tufts University
Medford, MA, USA
elane.short@tufts.edu

ABSTRACT

This full-day workshop addresses the problems of accessibility in HRI and the interplay of ethical considerations for disability-centered design and research, accessibility concerns for disabled researchers, and the design of assistive HRI technologies. We invite authors to submit extended abstracts (up to 2 pages, excluding references) and short papers (up to 4 pages, excluding references) on a range of topics relevant to ethics, accessibility, and assistive applications in HRI, including critical reflections on methodologies, design papers on human-centered or anti-ableist assistive technology, and papers from those outside the HRI community who may have insight to share on these concerns. The workshop will use a hybrid format to allow participants who due to disability, geographic, financial, or other constraints, are unable to travel, and will feature keynote speakers, panel discussions, and breakout sessions.

ACM Reference Format:
Katherine H. Allen, Reuben M. Aronson, Tapomayukh Bhattacharjee, Frank Broz, Mai Lee Chang, Maggie Collier, Taylor Kessler Faulkner, Hee Rin Lee, Isabel Neto, Katie Winkle, and Elaine Schaertl Short. 2024. Assistive Applications, Accessibility, and Disability Ethics in HRI. In *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI '24 Companion), March 11–14, 2024, Boulder, CO, USA.* ACM, New York, NY, USA, 3 pages. https://doi.org/10.1145/3610978.3638151

HRI '24 Companion, March 11–14, 2024, Boulder, CO, USA

ACM ISBN 979-8-4007-0323-2/24/03.
https://doi.org/10.1145/3610978.3638151

1 INTRODUCTION

According to the World Health Organization (WHO), an estimated 1.3 billion people experience significant disability. For the Human-Robot Interaction community, this means that any technologies we create must take into account the needs and preferences of disabled people[1] — especially in the context of assistive technologies[8, 17], which are often targeted directly at disabled users and which have a rapidly-growing market[5].

Under the social model of disability[9], 'disability' is the result not of mental or physical impairments *per se*, but of the interaction between people living with those impairments and an environment filled with physical, attitudinal, communication and social barriers which create access gaps between those people and their wants and needs. The social model advocates changing society to allow the full participation of all members. For HRI, this means both developing novel robot-based assistive technologies (e.g. guide robots specifically design for blind users), and ensuring that novel robot designs are accessible to a broad community of users (e.g. providing a general-purpose mall information desk robot a way to communicate with blind shoppers). As the expert in the access needs of any disabled person is the person themselves[13], effective disability-related research should happen in partnership with, rather than on the behalf of, disabled people[6]. However, because disability is a marginalizing condition, researchers also need to take into account the burden on disabled participants in contributing to our research and the inherent power dynamics of collaborations.

[1]There is debate in and between the academic, medical/service, and disability advocacy communities about the language to use when identifying people who are disabled. There is no consensus in academic literature for how to choose between person-first language (i.e. person with mobility impairment, person with autism) and identity-first language (i.e. physically disabled person, autistic person)[3, 15]. Here, we primarily use identity-first language in keeping with the preferences of the disabled members of the research team.

A complementary approach may be to promote and encourage the participation of disabled roboticists, who can bridge between the disability and HRI communities and have lived expertise that can inform research agendas. However, inequities within society and particularly within academia[10] restrict the access of disabled people to higher education, and the current state of inaccessible technology often limits the participation of disabled academics. While advocating for structural change at the societal level is a long-term project requiring collaborations beyond just the HRI community, recent work in in HCI suggests that there are steps that academic communities can take to reduce the burdens on disabled academics and encourage their participation[2, 11–14]. A key goal of our workshop is to engage with the tensions and complexity of these problems in order to begin to develop community standards, research methods, and design guidelines that enable disabled people to access both the HRI community itself and the robots that we co-create.

We identify Feminist HRI [16] and critical disability studies [4, 7] as pertinent frameworks for discussions in this space. In particular, we recognise the need for intersectional considerations of participants' identities in the design process. This includes developing methods and standards that better engage with co-designers' multiple identities and with power dynamics, as disabled people may often be "low power" users within a particular application context (compared to clinicians or caregivers).

This workshop will bring together people interested in the accessibility of the HRI community, assistive technology researchers, and people interested in research ethics from all areas of HRI (technical, social, psychological, design, etc.) to explore guidelines around research ethics in this area of HRI, as well as new directions for this area of research. We will engage with others from the assistive technology research community to inform our approach, for example, the organizers of a similar workshop at ASSETS focused on the HCI community[1].

2 ORGANIZING COMMITTEE

The organizing committee includes eleven members of the HRI community whose research engages with assistive robotics, socially assistive robotics, social robots, accessibility, trust, and/or inclusion:

Katherine "Kat" Allen is a PhD student in Mechanical Engineering and Human-Robot Interaction at Tufts University. Her work focuses on accessible makerspaces and human-robot physical collaboration.

Reuben Aronson is a Postdoctoral Scholar in the Department of Computer Science at Tufts University. His current research is focused on shared control for assistive robotics.

Tapomayukh "Tapo" Bhattacharjee is an Assistant Professor in the Department of Computer Science at Cornell University. He works on assistive robotics. He is the recipient of NSF CAREER Award'23 and his work has won Best RoboCup Paper Award at IROS'22, Best Paper Award Finalist and Best Student Paper Award Finalist at IROS'22, Best Technical Advances Paper Award at HRI'19, and Best Demonstration Award at NeurIPS'18.

Frank Broz is an Assistant Professor at TU Delft. His current research focuses on multimodal interaction for socially assistive robotics. He served as accessibility co-chair for HRI 2022 and 2023.

Mai Lee Chang is a Postdoctoral Researcher in the Department of Computer Science at Carnegie Mellon University. Her current research is part of the NSF AI-CARING Institute that focuses on designing AI/robots to support older peoples as they age in place. She has co-organized a workshop on fairness and transparency at HRI.

Maggie Collier is a PhD student in Robotics at Carnegie Mellon University studying assistive robotics in the Human and Robot Partners Lab. She is currently interested in the sense of agency that users experience in assistive robotics.

Taylor Kessler Faulkner is a Postdoctoral Scholar at the University of Washington in the Personal Robotics Lab. Her current research is on assistive feeding for people with upper-extremity mobility impairments with ADA (the Assistive Dexterous Arm).

Hee Rin Lee is an Assistant Professor at Michigan State University. Her research adopts critical approaches to design and evaluate robots for social good. Lee aims to empower underserved groups, such as people with disabilities by strengthening their autonomy and effecting positive change.

Isabel Neto is a 5th year PhD student at Lisbon University. Her work focuses on social robotics and how robots can be used to foster inclusion among children with and without visual impairment.

Katie Winkle is an Assistant Professor in Social Robotics at Uppsala University. Her research tries to put (relatively abstract) concepts of trustworthy AI into practice for human-robot interaction design and development.

Elaine Short is an Assistant Professor in the Department of Computer Science at Tufts University. Her research develops new AI methods and learning techniques to enable robots to more effectively provide assistance while centering the needs and perspectives of disabled people. She also works to increase the representation of people with disabilities in computing as the co-Chair of Access-SIGCHI and a co-PI of AccessComputing.

3 FORMAT

This full-day workshop will use a hybrid format to more readily include participants who due to disability, geographic, financial, or other constraints, are unable to travel. We will have two keynote speakers: Laurel Riek and Charles Kemp. Dr. Riek, a professor of Computer Science at UC San Diego, is an expert in inclusive robotics in healthcare contexts and a leader in applying the social model of disability to HRI research. Dr. Kemp, CTO of Hello Robot, Inc., is a pioneer of co-design methods for assistive HRI and a leader in real-world deployment of in-home assistive robots. The remainder of the workshop will focus on panel discussions grouped from submitted papers, and small breakout groups. We expect 20-30 participants, although if there is more than expected interest in participation, we will substitute a poster session for the panel discussions and increase the size of the workshop. We will organize themed discussion sessions around the key topics raised by accepted paper submissions, which we expect to fall into one (or more) of three categories:

- Ethics of HRI in the context research for or about disabled people, including critical self-reflections on studies
- Accessibility of the HRI community
- Assistive Technologies

9:00-9:15	Welcome
9:15-10:00	Keynote Speaker #1
10:00-10:15	Break
10:15-12:00	Hands-on Activity
12-13:00	Lunch
13:00-13:45	Keynote Speaker #2
13:45-14:00	Break
14:00-14:30	Panel Discussion
14:30-15:45	Breakout Groups with each panelist
15:45-16:30	Poster Session
16:30-17:00	Closing & Call to Action

Table 1: Proposed Workshop Schedule

Panel discussions and groups will be composed of representatives from different backgrounds. We will ask the authors of the accepted papers and the HRI community to provide questions or raise pressing issues that provide starting points to boost discussion. To do so, we will create a dedicated Q & A page on our website.

4 AUDIENCE AND DISSEMINATION

In this workshop, our goal is to bring together researchers and practitioners from a wide range of backgrounds, including computer science, engineering, ethics, law, disability studies, and HCI, interested in making HRI more inclusive and accessible. We encourage researchers to attend the workshop even without a paper submission. Our goal is to maximize community engagement to further increase awareness of accessibility issues. The call for papers and later also a call for participation will be distributed to the HRI, disability, and accessible technology communities via mailing lists, social media, and the organizers' personal networks. An accessible workshop website will be created to provide information about the workshop, disseminate the accepted papers, and promote community building. People wanting to be part of the Accessible HRI community will be invited to join a mailing list to facilitate discussion both leading up to the workshop and to continue discussions after its conclusion.

5 SUBMISSIONS AND EXPECTED OUTCOMES

We invite authors to submit extended abstracts (up to 2 pages, excluding references) and short papers (up to 4 pages, excluding references) on a range of topics relevant to ethics, accessibility, and assistive applications in HRI. Since we hope to learn from other fields of knowledge and form new connections with related research communities, we also welcome submissions from researchers outside of the HRI community.

We particularly welcome contributions from researchers who are interested in "disability-centered HRI", such as co-design or assistive robotics, and those interested in accessibility for robotics careers. We welcome position papers on research ethics, projects using these techniques, and case reports or reflections on methodologies from previous studies, as well as human-centered assistive technology/anti-ableist assistive technology.

All papers should be submitted in PDF format using the ACM standard conference template, remediated for accessibility, and will be peer-reviewed based on their originality, relevance, technical soundness, and clarity. Paper acceptance requires that at least one author registers for and (virtually or in-person) attends the workshop. After the conference, we will provide online access to the workshop proceedings on the workshop website with the authors' permission. In addition, the organizers will coordinate a White Paper with guidelines for starting the conversation about research ethics, linguistics, and the accessibility of robotics careers, and where we envision new directions for this type of research, thereby further disseminating ideas and discussions developed during the workshop.

REFERENCES

[1] [n. d.]. https://assets2023guide.mere.st/organisers/ Accessed 29 September 2023.

[2] Cynthia L. Bennett, Erin Brady, and Stacy M. Branham. 2018. Interdependence as a Frame for Assistive Technology Research and Design. In *Proceedings of the 20th International ACM SIGACCESS Conference on Computers and Accessibility* (Galway, Ireland) *(ASSETS '18)*. Association for Computing Machinery, New York, NY, USA, 161–173. https://doi.org/10.1145/3234695.3236348

[3] Morton Ann Gernsbacher. 2017. Editorial Perspective: The use of person-first language in scholarly writing may accentuate stigma. *Journal of Child Psychology and Psychiatry* 58, 7 (2017), 859–861. https://doi.org/10.1111/jcpp.12706

[4] D. Goodley. 2013. Dis/entangling critical disability studies. Disability & Society. *28(5), 631-644* (2013).

[5] J Kavita and S Onkar. 2019. Elderly Elderly and disabled assistive devices market: Global opportunity analysis and industry forecast. https://www.alliedmarketresearch.com/elderly-and-disabled-assistive-devices-market

[6] Richard E. Ladner. 2015. Design for User Empowerment. *Interactions* 22, 2 (feb 2015), 24–29. https://doi.org/10.1145/2723869

[7] H. Meekosha and R. Shuttleworth. 2009. "What's so 'critical'about critical disability studies?". *Australian Journal of Human Rights* (2009).

[8] World Health Organization(WHO) and United Nations Children's Fund (UNICEF). 2022. *Global report on assistive technology.* Technical Report. https://www.unicef.org/media/120836/file/%20Global%20Report%20on%20Assistive%20Technology%20.pdf

[9] Tom Shakespeare. 2017. *The Social Model of Disability* (fifth ed.). Routledge, New York, NY, Chapter 13, 197–204. https://www.google.com/books/edition/The_Disability_Studies_Reader/aiQlDwAAQBAJ?hl=en&gbpv=1&dq=The+individual+and+social+models+of+disability&pg=PA195&printsec=frontcover [Online; accessed 4. Sep. 2023].

[10] Kristen Shinohara. 2012. A new approach for the design of assistive technologies: design for social acceptance. *ACM SIGACCESS Accessibility and Computing* 102 (Jan. 2012), 45–48. https://doi.org/10.1145/2140446.2140456

[11] Katta Spiel, Christopher Frauenberger, Eva Hornecker, and Geraldine Fitzpatrick. 2017. When Empathy Is Not Enough: Assessing the Experiences of Autistic Children with Technologies. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (Denver, Colorado, USA) *(CHI '17)*. Association for Computing Machinery, New York, NY, USA, 2853–2864. https://doi.org/10.1145/3025453.3025785

[12] Katta Spiel, Christopher Frauenberger, Os Keyes, and Geraldine Fitzpatrick. 2019. Agency of Autistic Children in Technology Research—A Critical Literature Review. *ACM Trans. Comput.-Hum. Interact.* 26, 6, Article 38 (nov 2019), 40 pages. https://doi.org/10.1145/3344919

[13] Katta Spiel, Kathrin Gerling, Cynthia L. Bennett, Emeline Brulé, Rua M. Williams, Jennifer Rode, and Jennifer Mankoff. 2020. Nothing About Us Without Us: Investigating the Role of Critical Disability Studies in HCI. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI EA '20)*. Association for Computing Machinery, New York, NY, USA, 1–8. https://doi.org/10.1145/3334480.3375150

[14] Katta Spiel, Eva Hornecker, Rua Mae Williams, and Judith Good. 2022. ADHD and Technology Research – Investigated by Neurodivergent Readers. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) *(CHI '22)*. Association for Computing Machinery, New York, NY, USA, Article 547, 21 pages. https://doi.org/10.1145/3491102.3517592

[15] Amanda Taboas, Karla Doepke, and Corinne Zimmerman. 2023. Preferences for identity-first versus person-first language in a US sample of autism stakeholders. *Autism* 27, 2 (2023), 565–570. https://doi.org/10.1177/13623613221130845 PMID: 36237135.

[16] Katie Winkle, Donald McMillan, Maria Arnelid, Katherine Harrison, Madeline Balaam, Ericka Johnson, and Iolanda Leite. 2023. Feminist human-robot interaction: Disentangling power, principles and practice for better, more ethical HRI. In *Proceedings of the 2023 ACM/IEEE International Conference on Human-Robot Interaction*. 72–82.

[17] World Intellectual Property Organization (WIPO). 2021. *Assistive Technology.* https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055_2021.pdf