

CUI@CHI: Inclusive Design of CUIs Across Modalities and Mobilities

Jaisie Sin
js.sin@mail.utoronto.ca
University of Toronto
Toronto, Canada

Benjamin R Cowan
benjamin.cowan@ucd.ie
University College Dublin
Dublin, Ireland

Martin Porcheron
m.a.w.porcheron@swansea.ac.uk
Swansea University
Swansea, United Kingdom

Robin Brewer
rnbrew@umich.edu
University of Michigan
Ann Arbor, USA

Heloisa Candello
heloisacandello@br.ibm.com
IBM Research
São Paulo, Brazil

Minha Lee
m.lee@tue.nl
Eindhoven University of Technology
Eindhoven, The Netherlands

Sarah Theres Völkel
sarah.voelkel@ifi.lmu.de
LMU Munich
Munich, Germany

Ana Paula Chaves
ana.chaves@nau.edu
Northern Arizona University
Flagstaff, USA

Amanda Lazar
lazar@umd.edu
University of Maryland
College Park, USA

Leigh Clark
leigh@boldinsight.co.uk
Bold Insight
United Kingdom

Cosmin Munteanu
cosmin@taglab.ca
University of Waterloo
Waterloo, Canada

Stacy Branham
sbranham@uci.edu
University of California, Irvine
Irvine, USA

Razan Jaber
razan@dsv.su.se
Stockholm University
Stockholm, Sweden

ABSTRACT

Conversational user interfaces (CUIs) are often advertised to be accessible and easy-to-use, yet it is still not known how to make them fully inclusive and acceptable for all of their potential users, especially for those who may stand to benefit the most from CUIs. This workshop is the latest installment of a workshop series on conversational user interfaces [15, 20] and will bring together scholars, practitioners, and researchers to discuss the state of CUI design for marginalized and vulnerable populations, how inclusive design is considered (or neglected) in current CUI design practice, and how to move forward when it comes to designing CUIs for inclusion and diversity. Our aim is to spark vigorous and interesting discussions from multiple perspectives on issues related to inclusive design, marginalization, and the benefits and harms of CUIs. We aim for this workshop to serve as a platform on which to build a community and determine future directions to tackle important topics of inclusivity and equity in CUI design.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).
CHI '23, April 23–28, 2023, Hamburg, Germany
© 2023 Copyright held by the owner/author(s).
ACM ISBN 978-1-4503-9422-2/23/04.
<https://doi.org/10.1145/3544549.3573820>

CCS CONCEPTS

• **Human-centered computing** → **Natural language interfaces; Human computer interaction (HCI); HCI design and evaluation methods.**

KEYWORDS

inclusive design, digital design marginalization, conversational user interface, CUI, speech interface, voice user interface, intelligent personal assistants

ACM Reference Format:

Jaisie Sin, Heloisa Candello, Leigh Clark, Benjamin R Cowan, Minha Lee, Cosmin Munteanu, Martin Porcheron, Sarah Theres Völkel, Stacy Branham, Robin Brewer, Ana Paula Chaves, Razan Jaber, and Amanda Lazar. 2023. CUI@CHI: Inclusive Design of CUIs Across Modalities and Mobilities. In *CHI '23, April 23–28, 2023, Hamburg, Germany*. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3544549.3573820>

1 BACKGROUND

Conversational User Interfaces (CUIs) allow users to interact with digital devices in manners that have been frequently hailed as more “natural” and “easier-to-use” compared to “traditional” modalities such as GUIs (Graphical User Interfaces). Technologies employing CUIs, such as voice-based Google Assistant and Amazon Alexa, allow users to use speech to manage their lives through digital means (e.g., through calendar and reminder applications) and connect with essential services (e.g., shopping and ridesharing). With

CUIs becoming an increasingly popular and commercially viable way of interacting with digital devices [17], this mode of technology interaction is often seen as having much promise in making technology more accessible for certain user groups such as older adults and people living with disabilities.

However, preliminary evidence suggests that we do not yet fully know how to design CUIs in a way that is inclusive of marginalized and vulnerable populations [22]. For example, more research is needed on older adults' perceptions of and barriers to using voice assistants, how voice assistants should talk to them, and how anthropomorphism plays into their interactions [22]. Design decisions that overlook user groups (e.g., older people or people with disabilities) in the design of CUIs can foster their social exclusion. When conversational technology is not designed in a manner that is inclusive of marginalized and vulnerable peoples, for example by considering their information and accessibility needs [7], these users face a greater risk of encountering offline social consequences that can push them further towards the margins of society and grow the digital divide [23]. Such was the case with a legal incident involving a pizza ordering website and mobile app that was incompatible with screen readers, and thus excluded blind or low-vision users from using them and denied them a method of engaging with offline society in a manner that was available to everyone else [14, 16].

Attention to the design of conversational and speech systems that support diversity and inclusion has rapidly increased over recent years. For instance, open issues in the design of CUIs for older adults were highlighted at CHI 2022 [25] and CUI 2019 [22]. Moreover, matters of design for inclusion and vulnerability are a primary focus in the upcoming CUI 2023 conference, which has a theme of Designing for Inclusive Conversation [9]. This workshop will build on these community conversations through focused discussions on the design and study of CUIs through the lens of inclusion and diversity.

This workshop aims to foster an interdisciplinary dialogue on the challenges to the inclusive design of CUIs. By engaging the CHI community about inclusive practices for the design of speech-based systems, we aim to encourage interest in and discovery of further research opportunities in the practice and design of more inclusive speech interactions. To do this, in our workshop discussions, we will reflect on the state of the inclusive design of CUIs for marginalized and vulnerable populations, examine the topic of inclusive design of CUIs in design practice, and discuss how the CHI community should move forward on this design issue.

2 ORGANIZERS

Jaisie Sin is a graduate student at the Technologies for Ageing Gracefully Lab and the Faculty of Information at the University of Toronto. Her research focuses on the inclusive design of conversational interfaces for underrepresented users, with a primary focus on ageing. She is a Full Papers Co-Chair at the upcoming CUI 2023 conference. She has also been a co-organizer of the CUI conference series and related workshops at CHI '19–'22, IUI '20–'21, and CSCW '20.

Heloisa Candello is a research scientist in the Responsible and inclusive technologies group of IBM Research laboratory in Brazil. Her work focuses on human and social aspects of Artificial

Intelligence systems, particularly conversational user interfaces. Her work in this area includes the development and application of mixed-methods research in the context of conversational systems. Currently, Heloisa is leading a project that aims to bring “conscious” access to micro-credit by enhancing non-traditional financial practices of low-income small business owners with AI technology in the Global South. Her research resulted in several publications in leading conferences (CHI, CUI, CSCW, DRS) and recognition in the HCI and Design field.

Leigh Clark is a Senior UX Researcher at Bold Insight UK. His research explores how CUIs can be made more inclusive and trustworthy, and how linguistic theory can be implemented and redefined for CUI interactions. He is a co-founder of the ACM SIGCHI Conversational User Interfaces (CUI) conference.

Benjamin R Cowan is an Associate Professor at UCD's School of Information & Communication Studies. His research fuses concepts in psychology, HCI, and communication systems to explore how design impacts aspects of user behaviour in social and collaborative technology interactions. He is a co-founder of the ACM SIGCHI Conversational User Interfaces (CUI) conference, co-director of the HCI@UCD group, and a principal investigator in the Science Foundation Ireland funded ADAPT Centre.

Minha Lee is an Assistant Professor at the Department of Industrial Design at the Eindhoven University of Technology. She focuses on the ethics of developing technologies like CUIs and robots, with a focus on flourishing through moral emotions like compassion or gratitude via our conversations with artificial agents. She has previously organized relevant workshops, e.g., CUI@CHI in 2022 and HRI workshops on robot-identity to address the artificial identity of robots and CUIs in 2021 & 2022.

Cosmin Munteanu is an Associate Professor at the University of Waterloo, and Associate Director of the Technologies for Ageing Gracefully lab. His area of expertise is at the intersection of Human-Computer Interaction, Automatic Speech Recognition, Natural Language Processing, Mobile Computing, and Assistive Technologies. He has extensively studied the human factors of using imperfect speech recognition systems, and has designed and evaluated systems that improve humans' access to and interaction with information-rich media and technologies through natural language. Cosmin has organized speech interaction workshops and panels at SIGCHI conferences such CHI, MobileHCI, and IUI for almost a decade, and has frequently delivered courses on designing voice interactions at these venues.

Martin Porcheron is a Senior Lecturer in the Computational Foundry at Swansea University. His work examines the use of new technologies such as conversational interfaces in multi-party settings like pubs and the home. He has recently co-organised workshops at CHI '18–'22 and CSCW '16, '17 and '20 on topics including collocated interaction (e.g., [11]) with technologies and conversational user interfaces (e.g., [5, 21]). He is a founding member of the CUI conference steering committee.

Sarah Theres Völkel is a User Experience Researcher at Google in Germany. She received her PhD from LMU Munich and investigated in her research how to imbue conversational agents with personality and users' preferences for different conversational agent personalities. She is one of the Program Chairs for CUI '23 and attended the CUI workshop series at CHI and IUI.

Stacy Branham is an Associate Professor at the University of California, Irvine, USA. She studies how technology can integrate people with disabilities into collaborative contexts. Her recent work has focused on designing voice assistants to better serve people with vision-based disabilities as they navigate large indoor spaces and co-read with their children.

Robin Brewer is an Assistant Professor in the School of Information at the University of Michigan. Her research is at the intersection of HCI, accessibility, and aging where she studies how to best represent disability and older age in systems. Previously, she has designed and developed Interactive Voice Response systems for late-life disability [1, 4], investigated the role of voice assistants to support social well-being and health needs of older adults [2], and offered critical perspectives on voice assistants in long-term care communities [3].

Ana Paula Chaves is an Assistant Teaching Professor at Northern Arizona University, USA. Her research explores chatbot social characteristics, particularly focusing on the impact of language use on user perceptions and social positioning.

Razan Jaber is a final year Ph.D. student at Stockholm University's Department of Computer and Systems Sciences. Her work centers around augmenting speech agents with other modalities of interaction, with a focus on including *gaze*. Her work draws upon human-human interaction and conversation analysis as a resource for CUI development.

Amanda Lazar is an Assistant Professor at University of Maryland in the US. Her research addresses how technologies designed for health and wellbeing position and support individuals as they age. Much of her work examines technology design and use in the context of dementia.

3 POSITION PAPER TOPICS

We will focus on three main areas of discussion: (1) The state of CUIs and their design for marginalized and vulnerable populations; (2) Practicing inclusive design of CUIs; and (3) Moving forward in the inclusive design of CUIs. For each of these topics, we invite participants to share their research on all marginalized or vulnerable populations. We expand on these themes below.

State of CUIs and their design for marginalized and vulnerable populations. Existing research provides preliminary insights into the perceptions and barriers to CUI use for marginalized and vulnerable populations (e.g., [22] on CUIs for older adults). What are the important opportunities, challenges, and open issues when it comes to CUI design for marginalized and vulnerable populations, such as older adults? Are there discrepancies between what was intended by CUI developers and what has been found in research (e.g., as hinted at by [24])? Is there evidence that some CUIs and their design unintentionally exclude different user groups, for example on the basis of age, race, or gender?

Practicing inclusive design of CUIs. The development of digital technologies has historically often overlooked the unique needs of vulnerable or marginalized user groups such as older adults [12, 13, 18], resulting in their exclusion from experiencing the opportunities of the growing digital world and damaging real life consequences [10]. How can CUI designers and developers ensure that these mistakes of the past are avoided in order to develop truly

inclusive CUIs? How should CUIs be designed to be accessible and empowering for all users, including those with special needs? What are best practices from designing CUIs primarily for vulnerable populations (e.g., [6, 19]) and what can we learn from these insights for the design of CUIs that have a broad user base?

Moving forward in the inclusive design of CUIs. It is important for the CHI community to continue exploring open issues and actively tackle issues of inclusion in relation to CUIs, but what direction should be taken to do so? How can we bridge knowledge gaps between speech interaction and design inclusive for older adults? What are the topics that the CHI community should use to help frame their explorations of the inclusive design of CUIs? What can the CHI community learn from inclusive design practices and, in turn, improve the inclusiveness of such technologies?

The proposed topics address CUIs for marginalized and vulnerable populations through the lens of inclusive design, which is receiving growing academic interest in the speech community. For this, we expect a diverse audience with varying interests and points of view. The topics proposed for the workshop do not require close knowledge of the inner workings of speech interaction or inclusive design. We expect that the workshop will encourage contributions and discussions from all participants, regardless of whether or not they consider themselves to be “experts” on these topics or the user populations in question.

4 LINK TO WEBSITE

Information about the workshop and the conversational interfaces community will be posted on a website dedicated to the workshop (at www.conversationaluserinterfaces.org/workshops/CHI2023/, which will be accessible when the workshop is accepted). This website will also provide the workshop call for participation, workshop aims, agenda and outcomes, workshop date, organizers' short biographies and contact information, and copies of all accepted papers.

5 PRE-WORKSHOP PLANS

We seek position papers that are 3 to 4 pages long (including references), submitted in the CHI Extended Abstract format (<https://chi2020.acm.org/authors/chi-proceedings-format/#EAF>), and describe work of discussion related to the position paper inclusive design topics outlined above. Admittance to the workshop will be based on the overall quality, novelty, and relevance of the submission, and the CUI community's goals of bringing together a set of participants that can represent the diverse and multidisciplinary facets required for the design of CUIs. We will pay particular attention to under-served regions or universities, for our inclusive community will benefit from this, especially concerning the inclusive design of CUIs. Papers should be submitted to js.sin@mail.utoronto.ca by February 23rd, 2023. At least one author of each accepted paper must attend the workshop. All participants must register for both the workshop and for at least one day of the conference.

Accepted papers will be posted to the workshop website ahead of the workshop date and serve as the basis for presentations and discussion at the workshop. For examples of papers that are acceptable for the workshop, please see the websites for past CHI workshops in

2022 (www.conversationaluserinterfaces.org/workshops/CHI2022/) and 2021 (www.conversationaluserinterfaces.org/workshops/CHI2021/). All accepted workshop papers will also be invited to submit to the CUI '23 conference taking place in Eindhoven, The Netherlands.

6 WORKSHOP STRUCTURE

We plan for a one-day, in-person/hybrid workshop structured in a series of presentations, activities, and structured discussions to exchange insights and lessons learned related to the inclusive design of CUIs. We aim for approximately 20 participants, which has been the norm in the past CUI workshops. Our tentative schedule is below.

- (1) **Introductions.** We start with brief introductions from organizers and participants, goals, and interest in the inclusive design of CUIs. We go over the workshop goals and the plan for the day.
- (2) **Presentations.** 3- to 5-minute presentations from accepted position papers.
- (3) **Breakout Session 1: Identifying CUI Inclusive Design Challenges.** Participants and organizers will be divided into three groups. Each group will map the design challenges, experiences, and possible outcomes related to the inclusivity of CUIs. Groups will address questions such as: Who was involved in the design process, and how? Who was harmed [8] by the process and/or products of non-inclusive design? What were the benefits each population received? The groups then present what they have identified when we return for a sharing moment.
- (4) **Breakout Session 2: Reflections on Potential Marginalization.** The participants and organizers will be divided into three groups again. Each group will choose one challenge from the previous breakout session and reflect on the potential far-reaching considerations to users' well-being. Once again, the groups will present their reflections when everyone reconvenes.
- (5) **Breakout Session 3: Tools & Opportunities.** Participants will be divided into three groups once more. Groups will work together to generate a small "toolbox" of strategies, ideas, and tools from the reflections. This session will also involve identifying key opportunities and possible directions aimed at improving the inclusive design of CUIs. The groups will share their findings when everyone reconvenes.
- (6) **Closing.** The organizers will end the workshop by synthesizing the main points from all previous sessions. The workshop participants and organizers will reflect together to develop tangible research topics and potential outcomes for CUI research. This will help in the development of future directions for the CUI community to consider in relation to inclusive design, including how to plan for upcoming CUI conference series and workshops by taking into account participants' views.

Note, even if we transition to an online workshop, our plan above will remain the same. The organizing committee has prior experience in hosting online, offline, and hybrid workshops.

7 POST-WORKSHOP PLANS

The expected workshop outcomes include:

- Reconnecting, sustaining, and extending the existing CUI community of researchers.
- Invitation of participants to inclusive design-related initiatives within the CUI community.
- Identification of major themes in inclusive design issues relevant to CUI research.
- A proposal for a special issue of the ACM interactions magazine for highlighting inclusive design concerns relevant to CUI research.
- A proposal for a special issue at relevant journals, e.g., International Journal of Human-Computer Interaction.
- Invitation of a selection of papers for a fast-track review process for our upcoming CUI 2023 conference.

8 REMOTE/ON-SITE PLANS

Given the ongoing situation regarding the pandemic that is progressing differently around the world, we currently plan for an in-person/hybrid workshop. However, the organizing committee will convene to decide on the best course of action, i.e., online workshop, in due time. In the case of a hybrid workshop, the workshop will be simulcast on Zoom (or a similar platform) to enable remote participation. Online collaboration tools (e.g., Miro) will be used to facilitate discussions.

9 CALL FOR PARTICIPATION

In what ways can we advance our research on conversational user interfaces (CUIs) by including considerations on inclusivity and equity? As CUIs, like Google Home or chatbots, become an increasingly popular and commercially viable way of interacting with digital devices, investigation into the practice and design of more inclusive speech interactions are all the more essential. Authors across all disciplines are invited to submit position papers to the CHI 2023 workshop on the Inclusive Design of CUIs Across Modalities and Mobilities. We expect that the workshop will encourage contributions and discussions from participants, regardless of whether or not they consider themselves to be "experts" on these topics or the user populations in question. Papers can address the state of CUIs and their design for marginalized and vulnerable populations, ways to practice inclusive design of CUIs, and how we can move forward in the inclusive design of CUIs. Potential submissions can look at other areas that are related, such as how to address diverse groups of users that are potentially vulnerable or under-served, e.g., due to socio-economic status or disability. Submissions are expected to be between 3 to 6 pages including references, authors' work thus far, disciplinary background(s), as well as how they relate to the topics and goals of the workshop. We will select submissions based on quality; if accepted, papers will be featured on our website and at least one author must attend the workshop. Papers can be submitted to js.sin@mail.utoronto.ca.

ACKNOWLEDGMENTS

This work is in part funded by Science Foundation Ireland ADAPT Research Centre under Grant 13/RC/2106 P2.

REFERENCES

- [1] Robin Brewer, Raymundo Cornejo Garcia, Tedmond Schwaba, Darren Gergle, and Anne Marie Piper. 2016. Exploring traditional phones as an e-mail interface for older adults. *ACM Transactions on Accessible Computing (TACCESS)* 8, 2 (2016), 1–20.
- [2] Robin Brewer, Casey Pierce, Pooja Upadhyay, and Leeseul Park. 2022. An empirical study of older adult's voice assistant use for health information seeking. *ACM Transactions on Interactive Intelligent Systems (TiiS)* 12, 2 (2022), 1–32.
- [3] Robin N Brewer. 2022. "If Alexa knew the state I was in, it would cry": Older Adults' Perspectives of Voice Assistants for Health. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts*. 1–8.
- [4] Robin N Brewer and Anne Marie Piper. 2017. xPress: Rethinking design for aging and accessibility through an IVR blogging system. *Proceedings of the ACM on Human-Computer Interaction* 1, CSCW (2017), 1–17.
- [5] Heloisa Candello, Cosmin Munteanu, Leigh Clark, Jaisie Sin, Maria Inés Torres, Martin Porcheron, Chelsea M. Myers, Benjamin Cowan, Joel Fischer, Stephan Schlögl, Christine Murad, and Stuart Reeves. 2020. CUI@CHI: Mapping Grand Challenges for the Conversational User Interface Community. 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/10.1145/3334480.3375152>
- [6] Inha Cha, Sung-In Kim, Hwajung Hong, Heejeong Yoo, and Youn-kyung Lim. 2021. Exploring the Use of a Voice-Based Conversational Agent to Empower Adolescents with Autism Spectrum Disorder. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 42, 15 pages. <https://doi.org/10.1145/3411764.3445116>
- [7] Simon Coghlan, Jenny Waycott, Lei Nui, Kelly Caine, and Brodrick Stigall. 2021. Swipe a Screen or Say the Word: Older Adults' Preferences for Information-seeking with Touchscreen and Voice-User Interfaces. In *33rd Australian Conference on Human-Computer Interaction*. 130–143.
- [8] Sasha Costanza-Chock. 2020. *Design justice: Community-led practices to build the worlds we need*. The MIT Press.
- [9] CUI. 2022. About - CUI 2023. (2022). <https://www.conversationuserinterfaces.org/2023/>
- [10] Sara J Czaja, Walter R Boot, Neil Charness, and Wendy A Rogers. 2019. *Designing for Older Adults: Principles and Creative Human Factors Approaches*. CRC press, Boca Raton.
- [11] Joel E Fischer, Martin Porcheron, Andrés Lucero, Aaron Quigley, Stacey Scott, Luigina Cioffi, John Rooksby, and Nemanja Memarovic. 2016. Collocated Interaction: New Challenges in 'Same Time, Same Place' Research. In *Proceedings of the 19th ACM Conference on Computer Supported Cooperative Work and Social Computing Companion (CSCW '16 Companion)*. ACM, New York, NY, USA, 465–472. <https://doi.org/10.1145/2818052.2855522>
- [12] Peter Gregor, Alan F Newell, and Mary Zajicek. 2002. Designing for dynamic diversity: interfaces for older people. In *Proceedings of the fifth international ACM conference on Assistive technologies*. 151–156.
- [13] Vicki L Hanson. 2010. Influencing technology adoption by older adults. *Interacting with Computers* 22, 6 (2010), 502–509.
- [14] Lawrence Hurley. 2019. U.S. Supreme Court rejects Domino's bid to avoid disabilities suit. (2019). <https://www.reuters.com/article/us-usa-court-dominos-pizza-idUSKBN1WM1P1>
- [15] Minha Lee, Jaisie Sin, Guy Laban, Matthias Kraus, Leigh Clark, Martin Porcheron, Benjamin R Cowan, Asbjørn Følstad, Cosmin Munteanu, and Heloisa Candello. 2022. Ethics of Conversational User Interfaces. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts*. 1–7.
- [16] Jason McKee. 2019. Domino's and the Web are Failing the Disabled. (2019). <https://www.wired.com/story/dominos-and-the-web-are-failing-the-disabled/>
- [17] M McTear, Z Callejas, and D Griol. 2016. *The Conversational Interface: Talking to Smart Devices*: Springer International Publishing. Doi: <https://doi.org/10.1007/978-3-319-32967-3> (2016).
- [18] Alan F Newell. 2011. Design and the digital divide: insights from 40 years in computer support for older and disabled people. *Synthesis lectures on assistive, rehabilitative, and health-preserving technologies* 1, 1 (2011), 1–195.
- [19] Hyanghee Park and Joonhwan Lee. 2021. Designing a Conversational Agent for Sexual Assault Survivors: Defining Burden of Self-Disclosure and Envisioning Survivor-Centered Solutions. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 634, 17 pages. <https://doi.org/10.1145/3411764.3445133>
- [20] Martin Porcheron, Leigh Clark, Matt Jones, Heloisa Candello, Benjamin R Cowan, Christine Murad, Jaisie Sin, Matthew P Aylett, Minha Lee, Cosmin Munteanu, et al. 2020. CUI@ CSCW: Collaborating through Conversational User Interfaces. In *Conference Companion Publication of the 2020 on Computer Supported Cooperative Work and Social Computing*. 483–492.
- [21] Martin Porcheron, Joel E Fischer, Moira McGregor, Barry Brown, Ewa Luger, Heloisa Candello, and Kenton O'Hara. 2017. Talking with Conversational Agents in Collaborative Action. In *Companion of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW '17 Companion)*. ACM, New York, NY, USA, 431–436. <https://doi.org/10.1145/3022198.3022666>
- [22] Sergio Sayago, Barbara Barbosa Neves, and Benjamin R Cowan. 2019. Voice assistants and older people: some open issues. In *Proceedings of the 1st International Conference on Conversational User Interfaces*. 1–3.
- [23] Jaisie Sin, Rachel L. Franz, Cosmin Munteanu, and Barbara Barbosa Neves. 2021. Digital Design Marginalization: New Perspectives on Designing Inclusive Interfaces. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–11.
- [24] Jaisie Sin, Cosmin Munteanu, Numrita Ramanand, and Yi Rong Tan. 2021. VUI Influencers: How the Media Portrays Voice User Interfaces for Older Adults. In *CUI 2021-3rd Conference on Conversational User Interfaces*. 1–13.
- [25] Jaisie Sin, Cosmin Munteanu, Jenny Waycott, Robin N. Brewer, Sergio Sayago, Amanda Lazar, and Astrid Weber. 2022. Alexa, Tell Me a Joke!:" Voice Interfaces are Truly Inclusive". In *CHI Conference on Human Factors in Computing Systems Extended Abstracts*. 1–3.