



Designing Conversational User Interfaces for Older Adults

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ABSTRACT

We are concurrently witnessing two significant shifts: voice and chat-based conversational user interfaces (CUIs) are becoming ubiquitous, and older people are becoming a very large demographic group. However, despite the recent increase in research activity within fields such as CUI, older adults continue to be underrepresented as CUI users both in research and in the design of commercial products. Therefore, the overarching aim of this workshop is to increase the momentum for research that centers on older adults as CUI users. For this, we plan to create an interdisciplinary space that brings together researchers, designers, practitioners, and users, to discuss and share challenges, principles, and strategies for designing CUIs for the ageing population. We thus welcome contributions of empirical studies, theories, design, and evaluation of CUIs for older adults. Through this, we aim to grow the community of CUI researchers across disciplinary boundaries (human-computer interaction, voice and language technologies, geronto-technologies, information studies, etc.) that are engaged in the shared goal of ensuring that older adults are not marginalized or excluded from the design of CUIs.

CCS CONCEPTS

• Human-centered computing; • Interaction design; • Interaction design process and methods;

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1 INTRODUCTION

Both developed and developing nations are facing rapid ageing of their populations: people aged over 65 years old are expected to comprise 27% and 17% of these nations' populations, respectively, by 2050 [3, 5]. Although issues related to older adults (OAs) are receiving substantial attention in other areas of research e.g., Gerontology, Accessibility, Cognitive Psychology, OAs are underrepresented as users in the field of human-computer interaction (HCI) in several spaces where new technologies and interactions are emerging, such

as conversational user interfaces [19]). Furthermore, the commercial market space for such new technologies are often growing at a rate faster than the HCI research within those areas. Conversational User Interfaces (CUIs) such as chatbots, voice assistants, etc. are one of the most illustrative examples of this trend, with CUIs often marketed as helpful to underrepresented users such as older adults (OAs). Yet research suggests that not only OAs do not fully benefit from such technologies [23] and that adoption levels are low, but in fact the design of such novel interfaces may effectively lead to OAs becoming “digitally marginalized” when services shift to being primarily offered through such platforms [22].

The commercial success of CUIs prompted the transition of many essential services (e.g., financial, health) or that of several social applications from desktop or mobile to “voice-first” or “chatbot” interfaces. This is facilitated by recent algorithmic advances such as deep learning or generative adversarial networks and their application to voice recognition, language understanding, or language generation. However, this rapid transformation of the commercial space is currently outpacing several threads of research in this space, such as those focused on interface design considerations, leading to significant discrepancies between how such technologies are marketed and how OAs perceive them [24]. Such gaps also exist between our research knowledge about how best to design CUIs for OAs, and how OAs actually perceive and adopt such interfaces [21]]. These gaps encompass several key aspects of designing inclusive interfaces: usability issues, socio-cultural and personal models of interaction (e.g., perception, trust), design principles, or the specific implementation of functional aspects of the underlying technology. Failure to properly consider such factors may result in CUIs further entrenching the algorithmic discrimination that affected other AI applications or simply result in lower adoption of such potentially beneficial technologies by OAs.

This workshop proposal builds on successful prior workshops at CHI by several of the current authors that focused on the general design of inclusive interactive interfaces for older adults. The first author of this proposal was also the principal organizer of a series of CHI workshops on speech interaction that laid the ground for the creation of the CUI conference series, with several of the other authors of this proposal being involved in the organization of these workshops. Given the emerging research evidence that OAs are at risk of being marginalized by the design of CUIs, it is thus timely that these two directions of research come together and focus on understanding the challenges and on proposing solutions to ensure CUIs are designed with diverse users such as older adults in mind.

2 FOCUS AREAS

This workshop focuses on tackling the current and emerging interconnected (technical, social, ethical) challenges and approaches

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toward the design of CUIs that are inclusive of OAs' needs, wants, and abilities, grounded in an understanding that addressing these require an interdisciplinary approach. As an illustrative example, "mobile device" is one of the prominent forms of computing, including phones, tablets, and wearables. Mobile device ownership rates for older adults are increasing [2], yet there are fewer concrete principles for designing for older adults [1, 4]. Voice assistants (e.g., Alexa) are advertised as helpful for seniors, yet they are not designed for them, especially within the context of mobile interaction. The current UI designs are required to be culturally and personally relevant to specific groups. For example, one of the relevant problems is in the "OOBE" (Out Of Box Experience) – setting up the device in the first place (e.g., for Alexa, which despite being marketed as easy to use, requires a companion mobile phone app for the setup [23]). There are few instructions, and they are generally not step-by-step. They leave out details or refer older adults to a website when they have to coordinate between a computer they use to access the website and the devices they are using for setup: smartphone, smart speaker, etc. OAs need to be adept with a smartphone voice assistant device (download the app, set it up), then link the device to their home network (if they have one). This on its own may present several barriers to adoption and to long-term use. Additional factors such as cultural perceptions, management of cybersecurity and privacy, and software updates that often result in changes in UI (and thus challenges to mental models of use), represent further barriers illustrative of the complex design ecosystem that may marginalize OAs from using not only CUIs but also the services that are often offered primarily through such modalities / interfaces. Another worth mentioning issue is ageism, which can be found in research on CUI (and digital technologies, in general) with older adults [21], and that limit considerably the design of CUI for – and with – older adults.

As such, we are proposing several "seed" themes to anchor the workshop, with further themes emerging from the contributions brought by workshop participants:

- How does the usability of VUIs affect OAs' experience with, perception of, and adoption of CUIs across several types of applications that are important to underrepresented users such as OAs?
- What are the user requirements for CUIs that enable their adoption by OAs across the type of applications that are relevant to this demographic and across the many form factors under which CUIs are embedded?
- What are the sociotechnical and human factors that influence the adoption of emerging interfaces such as CUIs by OAs, and how may such factors lead to designs that are not inclusive of OAs?
- What tools and resources are needed to assist designers in building CUIs that are inclusive of OAs, and how can we develop such resources?
- What are the appropriate technical / engineering considerations that must be implemented to ensure CUIs do not further marginalize OAs?
- What approaches are most suitable to evaluate both the usability and the social and personal benefits of CUIs designed for OAs?
- How can CUIs be designed for and with OAs in order to facilitate and support better access to a diverse range of information, services, and applications?
- What role can CUIs serve in creating opportunities for social connection and providing OAs with an enhanced sense of belonging in the digital society?
- How can ageism be reduced or mitigated in CUI research and design?

3 WORKSHOP GOALS

Building on the research needs highlighted earlier, as well as on the interest in making CUIs more inclusive (as evidenced by the CUI 2022 conference motto), the proposed workshop aims to reach three goals:

Enriching the Research Repository: We invite researchers from various fields to present their work on and collectively engage in synthesizing and collating findings from different disciplines, and to discuss barriers and approaches to designing CUIs that are usable, adoptable, personally, and culturally relevant to OAs.

Continuing Community Building: Designing for OAs continues to be largely a research endeavor, with limited resources available within industry [25]. At the same, the design and development of CUIs are now ubiquitous within industry. As such, a goal of this workshop is to bring together researchers and practitioners across several disciplines and industries who are actively working or having interest toward understanding older adults' use of and need for CUIs. We thus hope that this workshop will help the CUI community grow by attracting the interest of geronto-technology researchers, and help establish a community of practice at the intersection of these disciplines.

Raising Awareness: CUIs are a significant market of interest for industries, expected to grow from US\$ 2 billion to an estimated US\$ 30 billion in the next few years [7]. At the same time, the ageing population is growing rapidly and may soon be the largest demographic of technology users (e.g., 17.5% of the population is of 65+ years of age in Canada [8]). Yet research interest within HCI, CUI, and related fields is still relatively small. This workshop aims to raise awareness of the challenges and research opportunities at the intersection of CUI research and designing for OAs, helping further the interest within the CUI space in designing interfaces and interactions that are truly inclusive.

4 WORKSHOP FORMAT AND EXPECTED OUTCOMES

Given the context mentioned here, we will welcome position papers, short research papers, and expressions of interest along the focus areas described earlier, as well as open topics suggested by potential attendees (given the nascent phase of this community, and our goal of encouraging a grassroots approach to defining this space).

The workshop is proposed as a half-day in-person workshop. The first half of the workshop will discuss case studies, position papers, short research papers, and provocations presented by researchers and industry practitioners; and the second half will consist of group discussions focused on the high-level workshop themes. The workshop will conclude with a review of the current state of the research within this space, and propose future research steps and areas of

investigation. The key takeaways of this workshop are (1) understanding the current state of this emerging research field and (2) identifying the major issues and future directions. As a practical outcome, we will explore the editorship of a special edition HCI journal.

We want to bring together researchers and experts across the globe from HCI (particularly focused on CUI design), Computer Science (e.g., voice and language processing), Sociology (Gerontology), and Accessibility computing. We will welcome research, practitioners from both industry and academia, as well as representative users, ensuring a diverse attendance.

5 WORK PLAN

Before the Workshop: The co-organizers will commit to publicizing the workshop. The Call for Participation will be distributed to different channels, including mailing lists (e.g., ACM SIGCHI Chapters) and social networking sites (SNS) (e.g. LinkedIn, Facebook, Twitter).

Submissions of 4 pages (CHI Extended Abstract format (link: <https://www.acm.org/publications/proceedings-template>), excluding references) will be solicited, via email to the organizers (a dedicated website and email submission link will be set up). Additionally, expressions of interest, position statements, personal experience stories, and provocations will also be available for submission – particularly aiming to attract interest from outside of academia.

During the Workshop: The half-day workshop will consist of several sessions that are designed to be engaging and interactive. All accepted submissions will be posted to the website before the workshop. The workshop's total time duration will be of 5 hours approximately.

- Session 1 (30 mins) Introduction and agenda: The main goals and workflow of the workshop and the agendas to be briefed.
- Session 2 (60 mins): Lightning talks: All participants (expecting 10 people) will be asked to introduce and give a short overview of their submission (4 mins for each presenter) followed by the Q&A (1 min).
- Coffee break (30 mins)
- Session 3 (50 mins): Birds of a feather discussion, in groups aligned with the workshop themes.
- Session 4 (40 mins): Plenary reporting on the discussion groups' findings, identifying key points.
- Session 5 (30 mins): Wrap up and discussion of follow-up activities to advance this research field.

After the Workshop: Contributors will be given the opportunity to update their submissions based on insights, suggestions, and comments gained through the workshop's activities. The workshop website will remain as a hub to sustain further collaboration among participants. Further, based on the outcomes of the workshop we will form an editorial board to propose and handle calls for a special issue of a prestigious journal on rethinking conversational user interfaces for older adults. We have already built a cross-domain community to develop interactive technology for older adults which were not prioritized in popular applications. This is evidenced by the IxAP conferences organized by a subset of the authors of this workshop proposal (in collaboration with SIGCHI). We plan to leverage the community-building value of a CUI workshop in order

to build on our prior efforts to create a research agenda focused on designing inclusive interaction for OAs.

Call for Participation: This workshop aims to increase the momentum for research that centers on older adults as Conversational User Interface (CUI) users. For this, we plan to create an interdisciplinary space that brings together researchers, designers, practitioners, and users, to discuss and share challenges, principles, and strategies for designing CUIs for the ageing population. We thus welcome contributions of empirical studies, theories, design, and evaluation of CUIs for older adults. Through this, we aim to grow the community of CUI researchers across disciplinary boundaries (human-computer interaction, voice and language technologies, geronto-technologies, information studies, etc.) that are engaged in the shared goal of ensuring that older adults are not marginalized or excluded from the design of CUIs.

This workshop focuses on tackling the current and emerging inter-connected (technical, social, ethical) challenges and approaches toward the design of CUIs that are inclusive of OAs' needs, wants, and abilities, grounded in an understanding that addressing these require an interdisciplinary approach. We invite researchers, industry practitioners, designers, and users to submit position papers, provocations, short research studies, position statements, user experience stories, or expressions of interest along the following topics:

- How does the usability of VUIs affect OAs experience with, perception of, and adoption of CUIs across several types of applications that are important to underrepresented users such as OAs?
- What are the user requirements for CUIs that enable their adoption by OAs across the type of applications that are relevant to this demographic and across the many form factors under which CUIs are embedded?
- What are the sociotechnical and human factors that influence the adoption of emerging interfaces such as CUIs by OAs, and how may such factors lead to designs that are not inclusive of OAs?
- What tools and resources are needed to assist designers in building CUIs that are inclusive of OAs, and how can we develop such resources?
- What are the appropriate technical / engineering considerations that must be implemented to ensure CUIs do not further marginalize OAs?
- What approaches are most suitable to evaluate both the usability and the social and personal benefits of CUIs designed for OAs?
- How can CUIs be designed for and with OAs in order to facilitate and support better access to a diverse range of information, services, and applications?
- What role can CUIs serve in creating opportunities for social connection and providing OAs with an enhanced sense of belonging in the digital society?
- How can ageism be reduced or mitigated in CUI research and design?

Additional topics related to the broad space of designing CUIs for OAs are also welcome.

Details are on the workshop website: <http://speech-interaction.org/CUI-OA2023/>. Submissions should be in the CHI Extended Abstracts (EA) Format, sent to , of at most 4 pages long (excluding references). All accepted submissions will be posted on the workshop website (except when explicitly requested otherwise by authors, e.g., for industry-based position statements, which do not need to follow the CHI EA template)

Registration: At least one author of each accepted position paper must attend the workshop and all workshop participants must register for both the workshop and for at least one day of the conference.

Important Dates:

- May 17: Submissions due
- May 24: Notifications to authors [will be adjusted based on early-bird conference registration deadline]
- July 17: Workshop

6 ORGANIZERS

Cosmin Munteanu is an Associate Professor and Schlegel Research Chair in Technology for Healthy Aging at the Department of Systems Design Engineering, University of Waterloo, and Director of the Technologies for Ageing Gracefully lab. They are a transdisciplinary scholar, drawing from a wide range of disciplines such as engineering, computing sciences, critical theory, and technology and society studies. Cosmin takes a primarily ethnomethodological approach to study how to design intelligent applications that improve access to information, support social connections late in life, and reduce digital marginalization for underrepresented groups such as older adults. Their work is situated at the intersection of user experience design, digital inclusion, aging, natural language processing, and ethics, primarily focusing on the sociotechnical design of inclusive interfaces with and for older adults.

Sayan Sarcar is a Lecturer in Human-Computer Interaction at the Birmingham City University, UK. His research area includes Computational UI Design, Ageing & Accessibility, Input and Interaction.

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 CUI 2023 conference. She has also been a co-organizer of the CUI conference series, related workshops at CHI '19–'22, IUI '20–'21, and CSCW '20. She was also the lead organizer of the panel on age-based inclusivity at CHI '22 [20].

Christina Wei is a Ph.D. student at the University of Toronto's Faculty of Information. Her research is at the intersection of conversational user interfaces and financial technology, on using CUIs to improve financial inclusion for marginalized communities such as older adults.

Sergio Sayago is a Lecturer in Interactive Systems and Languages at the University of Lleida (Spain). Since 2009, his research examines the everyday use of digital technologies by older adults from an interdisciplinary, mostly ethnographic—and qualitative—perspective. His long-term research goal is to understand and improve aging (and living) with digital technologies. He is the author

of *Cultures in Human-Computer Interaction* (Synthesis Lectures on Human-Centered Informatics, Springer) and editor of *Perspectives on Human-Computer Interaction Research with Older Adults* (Human-Computer Interaction Series, Springer).

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