CUI@CSCW: Inclusive and Collaborative Child-facing Voice Technologies

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ABSTRACT

Conversational User Interfaces (CUIs), from online chatbots to smart speakers, are increasingly being used to support children and family activities. This virtual workshop seeks to bring together researchers from academia and practitioners from industry who are interested in the design, development, application, and study of CUIs with a focus on children and family based interactions. We aim to examine the challenges involved in designing and developing CUIs that are capable of supporting everyday activities of children and families. Furthermore, we will also discuss the insights CSCW research can provide into understanding how CUIs can participate in collaborative activities of children and families. By bringing together existing researchers and new ideas in this space, we intend to map new areas of work including addressing the technical, social, and ethical challenges that lay ahead. Additionally, this workshop seeks to foster a strong community and enable potential future collaborations on this important topic.

CCS CONCEPTS

• **Human-centered computing → Natural language interfaces**; *Collaborative and social computing systems and tools.*

KEYWORDS

children, family, CUIs; voice interfaces; VUIs; CSCW; speech interfaces; chatbots; collaboration; social interaction; accessibility

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1 BACKGROUND

Conversational User Interfaces (CUIs) are systems that engage in conversations with humans using text or spoken language. CUIs, including voice-based conversational agents such as Amazon Alexa and Google Assistant, continue to grow in popularity and availability [24]. As these systems become pervasive in family environments (e.g., [1, 2, 7, 8, 10, 19, 23]), we turn to question how interactions with these technologies by and around children and the family unfold.

1.1 Child Interaction with CUIs

Research over the past decade has shown that conversational agents are used by children for a range of purposes, including but not limited to, small talk or expressing emotions [10], for learning and reading [9, 26], as well as to foster communication with children and other members of the household [1, 25]. Designing CUIs for children leads to specific challenges. Rather than being static, children's needs and preferences change as they move through the four different stages of mental development [15]. What is more, compared to adults, their interaction with CUIs are often more difficult as they are, in general, less clear in their articulation, less competent in their vocabulary, and less observant of conversational conventions as compared to adults [3, 10].

Although support is essential for mental-well being and health, children and young people are often hesitant to ask for help. Recently scholars have started to explore how CUIs can help children by providing social support [4] or by helping children develop emotional intelligence including the ability to formulate alternate actions to address their own negative behavior [22]. However, there are ongoing challenges including that of safety, privacy, trust, and usability [12] that warrant deeper research into this topic, which are beginning to be discussed in workshops as well [11].

1.2 CUIs and family interaction

A further challenge to child interaction also become stark when considering the fact that CUIs are family devices. Recent work on smart speaker use emphasises the multi-party nature of family interaction with these devices, with the need to consider that such interactions "might play out within locally occurring conversations into which [interaction with smart speaker] become lodged or embedded." [19]. Such devices, when placed in social spaces such as the home are not single user devices [19], with the need to consider the role of family dynamics, roles and social hierarchy of the user(s) when designing CUI experiences. For example, little is known about the role CUIs can play when parents and children play or learn together.

Finally, in many cases, technology is being designed and developed only with samples of children who have access to the Internet and have familiarity with technology. As a consequence, lower-income, and ethnic minorities, who may also experience lower digital literacy, are left out of consideration of newer and more innovative technology such as CUIs. As an example, families and children from low-income household and those classed as ethnic minorities are found to feel less capable of engaging voice-controlled smart devices, often due to their limited literacy in English, higher comfort in speaking in their vernacular language/dialect which are often not supported by such devices, and/or limited exposure to such devices [8, 21]. Therefore, there is a need to understand the challenges in designing inclusive CUIs that accommodate and are sensitive to a wider range of personal, social, and cultural context. Through greater involvement within CSCW, we believe there is research and development of CUIs can further develop in this space, and all the topics highlighted above.

2 WORKSHOP AIM

In the prior CUI workshops we have focused on broader challenges that are relevant to CSCW community [17] and theoretical and methodological challenges of voice-based interactions [13, 20]. In this workshop we aim to particularly focus issues that are particularly relevant for children and families around CUI:

- Explore parameters and issues needing to be considered in designing CUIs for interpersonal spaces, such as people's homes.
- Re-imagine CUIs as *everyday computing interfaces*.
- Examine key ideas around the appropriateness and design of tool-like voice agents and social-actor like voice agents that might also support inter-person collaboration.
- Understand the challenges in designing inclusive CUIs that accommodate and are sensitive to one's developmental stage, intersectional identity, and personal, social, and cultural context, specially in multi-party interactions in homes.

Furthermore, there are specific and timely issues that we wish this workshop to raise, including:

- What impact CUIs have on conversational habits, particularly those of children?
- How (if at all) personalities should be designed for personified CUIs? How should one ensure that such CUIs are not creepy?
- How can CUI (better) incorporate sociolects, i.e., non-standard dialects, such as Hinglish and African American Vernacular English.
- How can CUIs become a way for family members with low literacy or access to technology to interact with digital media and the Internet?
- How do parents and children organise and collaborate with and around these technologies?
- How can interactions with CUIs, as always-on, always-accessible technologies, be regulated by parents?
- How could we design these technologies to support education and e-learning? For example, how can CUIs appropriately support children's in-home learning (e.g., by prompting reflecting instead of providing direct answers) while still keeping them engaged.
- How can parents and CUIs organise and collaborate in child rearing responsibilities? For example, what role can CUIs play to enhance or support children's after-school activities, or the learning of appropriate manners and behaviours?
- How can we address existing CUI usability issues that limit accessibility to both general and underrepresented populations (pre-school children, children with mental or physical impairments, etc.)?
- How can CUIs support children by improving their mood and increasing positive emotions?
- How can CUIs enhance or support individual's personal health and well-being?

3 ORGANISERS

Radhika Garg is an Assistant Professor at Syracuse University's School of Information Studies. In her research she has been involved with multiple projects that investigated how diverse families with children learn about, engage with, and use smart speakers in their homes over time. She has also led participatory design projects with children with the aim of informing the futures of voice agents for various contexts including in-home learning.

Martin Porcheron is a 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–'21 and CSCW '16, '17 and '20 on topics including collocated interaction (e.g., [6]) with technologies and conversational user interfaces (e.g., [5, 18]). He is a founding member of the CUI conference steering committee.

Leigh Clark is a Lecturer in Human-Computer Interaction at the Computational Foundry in Swansea University. His research

examines the effects of voice and language design on speech interface interactions and how linguistic theories can be implemented and redefined in this context. He is co-founder of the international Conversational User Interfaces (CUI) conference series.

Benjamin R. Cowan is an Associate Professor at University College Dublin's School of Information & Communication Studies. His research lies at the juncture between psychology, HCI and computer science in investigating how theoretical perspectives in human communication can be applied to understand phenomena in speech based human-machine communication. He has published widely on user centered issues in conversational and speech interface interaction, is co-founder of the international Conversational User Interfaces (CUI) conference series and has been involved in a number of workshops on this topic at CHI and Mobile HCI.

Bo Zhang is a PhD student at Syracuse University's School of Information Studies. He takes a human-centered approach in his research and is currently interested in designing conversational agents for children's learning in home settings.

Asbjørn Følstad is a senior research scientist at SINTEF, Oslo, Norway. His main research area is human-computer interaction. Recent research topics includes the design and user experience of chatbots with application areas such as youth and health information, education, public sector service provision, and customer service. Asbjørn is also one of the organizers of the CONVERSATIONS annual workshop on chatbot research.

Jeni Paay is Professor of Interaction Design at Swinburne University of Technology, Melbourne, Australia. She is Program Director in the Smart Cities Research Institute, directing the "Future Places for Living" program, and is also Deputy Director of Centre for Design Innovation. She has a transdisciplinary background spanning architecture, computer science, and Human-Computer Interaction publishing in Human Centred Computing and Interaction Design. Her research areas include: Interaction Design for Mobiles, AR and VR; Digital Health; Interaction Design for Smart Spaces and Domestic AI; Design for Digital Workspaces and User Experience Design.

Ewa Luger is Chancellor's Fellow at the University of Edinburgh, Fellow of the Alan Turing Institute (London) and Deputy Director of Research at Edinburgh Futures Institute. Her academic research investigates the sociotechnical and moral issues arising from machine intelligence and data-driven systems, with a focus on Human-Computer Interaction, Public Policy and inclusion. Ewa is currently a member of the Leadership Circle responsible for the delivery of Scotland's AI strategy, the EPSRC Digital Economy programme advisory board, Facebook's 'Algorithms & the Public Interest' expert advisory group, ORBIT's (RRI) steering group, REPHRAIN's ethics advisory panel, and the World Economic Forum Trusted Data Intermediaries task force.

4 PRE-WORKSHOP PLANS

We will host our call for papers and other workshop related material on the CUI workshop website and promote the workshop to networks within the CUI community (workshop organisers are members of the the ACM In-Cooperation CUI conference series steering committee) through the CUI mailing list. We will include our aims, agenda, outcomes, dates and biographies on our website. We will also post accepted position papers after authors' consent.

The call for positional papers will ask for 3–6 page papers in the ACM SIGCHI Extended Abstract template, including references. Papers should describe how their work relates to the workshop topic or respond to one of the challenges highlighted above, or any other key topic that authors feel should be addressed by the community. We are ambitious for papers to be diverse in terms of topic, discipline, and approach, and workshop participation to be open and accessible to all people. We will accept up to 20 position papers for the workshop.

In addition to papers, we will invite the submission of one-page position statements for participants who wish to join the workshop without submitting a paper. In our past experiences we have found that this option is particularly attractive to industry-based researchers.

5 PARTICIPANTS

Our workshop aims to bring together 30–50 world-leading researchers and industry representatives from a range of communities related to speech, dialogue, human-machine interaction, speech interface design, and voice UX to bring a multidisciplinary approach in solving these issues. Through engaging across these communities, we aim to highlight the relevance and broaden the reach of speech interface work at CSCW and within HCI in general to other research communities (e.g. speech technology, linguistics, dialogue research, cognitive sciences), whilst also building a collaborative, diverse and cross-disciplinary conversational interaction community that is strongly connected to CSCW. We had over 100 participants at the virtual CUI 2020 conference, more than 40 participants at our CSCW 2020 workshop [16] and 50 participants our recent CHI 2021 workshop [14]. We are thus confident that we will be able to attract similar levels of interest at CSCW this year.

6 WORKSHOP STRUCTURE

Based on our experience of previously organising a virtual workshop, we propose the following structure. The maximum length of the workshop will be four hours to avoid fatigue and the likely impact home-working and time-zones will have on people's availability to attend a longer workshop. The workshop will be conducted via Zoom, but will use additional tools like Jamboard for note-keeping and brainstorming with participants. We would be also open to using the virtualization platform that CSCW might prefer for ask us to use instead.

(1) **Introductions**: Brief introductions from organisers and participants on workshop structure, goals, and interest in CUI research.
(2) A number of sessions in which there will be:
    - **Presentations**: *Very* short presentations from accepted submissions.
    - **Breakout discussion**: A discussion in one or more groups based on numbers of participants and topics. While the final topics will be based on the issues raised by the participants and the presentations, we envision the list of topics to include themes such as: "designing CUI for family space", or "CUIs for play and education", "CUIs for family

collaboration." The aim will be to discuss key challenges and future research and design opportunities.
- **A short break**: Lengthy online workshops become tiring for everyone very quickly.

(3) **Group discussion**: There will be a regrouping towards the end of the workshop where subgroups will feedback and debrief. We will allow time for a short discussion.
(4) **Next steps**: The chairs will briefly lead a discussion on the next steps for the CUI and CSCW communities.

Each of the organizer will work to facilitate discussions and events throughout, by chairing breakout discussions, timekeeping and keeping notes during the workshop.

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