

Human-Robot Conversational Interaction (HRCI)

Donald McMillan
donald.mcmillan@dsv.su.se
Stockholm University
Stockholm, Sweden

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

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

Joel E. Fischer
joel.fischer@nottingham.ac.uk
University of Nottingham
Nottingham, United Kingdom

Bahar Irfan
birfan@kth.se
KTH Royal Institute of Technology
Stockholm, Sweden

Ronald Cumbal
ronaldcg@kth.se
KTH Royal Institute of Technology
Stockholm, Sweden

Nima Zargham
zargham@uni-bremen.de
Digital Media Lab, University of
Bremen, Germany

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

ABSTRACT

Conversation is one of the primary methods of interaction between humans and robots. It provides a natural way of communication with the robot, thereby reducing the obstacles that can be faced through other interfaces (e.g., text or touch) that may cause difficulties to certain populations, such as the elderly or those with disabilities, promoting inclusivity in Human-Robot Interaction (HRI). Work in HRI has contributed significantly to the design, understanding and evaluation of human-robot conversational interactions. Concurrently, the Conversational User Interfaces (CUI) community has developed with similar aims, though with a wider focus on conversational interactions across a range of devices and platforms. This workshop aims to bring together the CUI and HRI communities to outline key shared opportunities and challenges in developing conversational interactions with robots, resulting in collaborative publications targeted at the CUI 2023 provocations track.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative interaction**;
Interaction design; **Collaborative and social computing**.

KEYWORDS

Conversational User Interaction, Embodied Interaction, HRI

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1 INTRODUCTION

Conversation is one of the primary methods of Human-Robot Interaction (HRI), with research at HRI covering many aspects of this interaction technique from how it differs or imitates human-human communication [2, 8], through how to leverage everyday communication to improve interactions with a diverse set of users and settings [4, 10, 11], to how people interact with conversational robots in their everyday lives [5, 12].

In parallel, research specifically into Conversational User Interaction (CUI) has been increasing with the 5th annual ACM CUI taking place in 2023. In this venue there are similar examples of exploring the differences and similarities to human-human communication [1, 6], taking advantage of learning from analysing human interaction to improve CUIs [3, 9], and how people interact with conversational user interfaces on a day to day basis [9], as well as those embodied in robots [7]. A shared interest for CUI and HRI researchers is the *embodied* nature of conversations, i.e., gestures, gaze, and other multimodal cues, whether the embodiment is presented as a smart speaker or a humanoid robot.

The proposed workshop thus looks to gather researchers, designers and practitioners from the range of disciplines that intersect on Human-Robot-Conversational Interaction (HRCI) to discuss and coordinate this cutting edge research and develop a truly multi-disciplinary HRCI community. To do this we aim to bring together some of the leading researchers in these fields, with an interest in CUI based HRI questions to map the work needed to develop the thematic grand challenges identified by recent CUI and HRI work.

2 OUTLINE OF THE WORKSHOP

The workshop comes at a critical juncture, whereby research in the fields of HRI and CUIs have intensified, but are in need of unifying challenges to focus the research domain more effectively. This workshop will be critical to the direction of both fields with goals to (a) *Identify key themes and areas of overlap in current literature and practice* (b) *Discuss the strategies, methods and approaches appropriate to address these themes*, and (c) *Explore the potential impact of addressing these challenges for both fields*.

Over the past 5 years, our small – yet growing – CUI community has successfully brought together researchers and industry practitioners from fields including conversation analysis, dialogue systems, computational linguistics, human-machine interaction, speech interface design, and voice UX research. We have tackled topics such as designing speech interactions, analysis of turn-taking with commercial systems, and conversational design. More recently at CHI '19, the community turned its attention to the deficit of theoretical and methodological perspectives. From this solid base, it is thus timely to now move towards a more holistic perspective on this space, by collaborating with the HRI community to situate the future direction of the research and goals in the community in the complex and collaborative interactional contexts which human-robot interaction is directed towards.

2.1 Main Topics of Interest

Topics of interest include, but are not limited to the following: (a) best practices and overlapping lessons learned from *deploying* conversational agents and robots; (b) *design* of conversational agents and robots; (c) *methodology* and *integration* of conversational systems within robots; (d) *evaluation* studies and practices (whether “in the wild” or in the lab); (e) *adaptive* or *personalised* conversational robots; (f) ethical and legal challenges of conversational robots.

2.2 Format and Activities

This half-day, in person workshop will be organised around a keynote speaker and the identification of challenges that bridge both communities. The proposed schedule is tentative and will be re-arranged according to the schedule and format of the conference and the number of submissions.

The invited speaker will give their insights into the topics of conversational agents for 30 minutes, followed by 10 minutes of Q&A with the audience, thereby, instantiating discussions to follow within the workshop. The author presentations will be based on accepted papers, with ideally 7 minutes for presentation, followed by 3 minutes Q&A with the audience. The discussion sessions will be a core part of the workshop. We will prepare an online interactivity board where attendees will be able to add questions and thoughts they would like to be discussed in groups, available before the workshop, throughout the workshop, and later curated to be shared to attendees after the event. The discussion sessions will start with breakout sessions where attendees will be divided in smaller groups and asked to brainstorm questions and challenges for connecting HRI & CUI from the submitted pools and prepared by the organisers. Then, the group will be gathered to present their main points. The goal of reporting back the points made is to collate them into a selection of topics which can form the core of future collaborative publications by the attendees at the workshop. Each resultant topic will be added to a separate Overleaf document by the organisers and shared with those attendees who show interest in the topic. Each one will be assigned at least one organiser to guide the writing of a paper to be submitted to the provocations track at CUI 2023 to jump-start a number concrete collaborations directly within the workshop, in which each group will design prototypes or experiments around their concepts. In these sessions, we will also encourage attendees to reflect on the ethical impact

of developing and deploying robots that interject themselves into the conversational worlds of the users and the potential societal impact of such an approach towards inclusive solutions.

2.3 Keynote Speaker

Dr. ir. Cristina Zaga is Assistant Professor at Human-Centred Design Group (Design and Production Management department) and a researcher at the DesignLab at the University of Twente. Her contribution is in design methods for embodied AI and interactive agency. Her interests lay in the interaction design and related methodologies for technological products and systems that aim at social good, especially physically embodied AI-driven systems.

3 TARGET AUDIENCE & RECRUITMENT

The primary audience of the workshop includes researchers in the fields of Human-Robot Interaction and Conversational User Interfaces, industry experts, social scientists, developers, and end users. The workshop will be open and inclusive to all participants from varying fields. Based on similar previously-organised workshops, we expect attendance of twenty to thirty participants, with 3 to 4 accepted papers. Effort will be made to stimulate active interaction by leveraging the online tools that have been used in virtual workshops to increase awareness across groups and ease feedback and reporting. As such, online tools will be used to record both questions for the symposium and results from the discussions. We will also leverage slack channels that currently exist and are widely used by the communities in order to foster discussion in the run up to the workshop, to give participants a channel to grow deeper social connections with the participants and organisers over the course of the HRI conference, and maintain communication with attendees after the conclusion of the workshop.

The call for participation for this workshop will be distributed via a dedicated website, mailing lists covering multiple disciplines and social media (e.g., LinkedIn, Twitter). Additionally, relevant principal investigators within HRI, CUI, CHI to social sciences will be individually contacted and encouraged to submit a paper and/or participate in the workshop. The website will provide information about the details of the workshop, and contain proceedings after.

Prospective participants are invited to submit 2 to 4 (maximum of 6 including references) page extended abstracts on research related to the topics described above. We explicitly encourage the submission of papers describing works in progress, preliminary results to discuss with the community, methodology proposals, and lessons learned when designing CUIs or deploying robots to converse with end users. Submissions that address inclusivity through conversational interfaces in HRI will be encouraged. All manuscripts must be submitted in English, in the format provided by HRI2023, and will be peer-reviewed by 2 external reviewers, based on their relevance to the workshop 3 to 4 will be invited to present.

4 DOCUMENTATION AND DISSEMINATION

All participant contributions will be collected and the proceedings of the workshop will be published on the workshop website. We will additionally offer participants the option to submit their article to arXiv. We will follow up with an journal special issue (e.g., within ACM Transactions on Human-Robot Interaction or a similar

journal) for extended versions of selected workshop papers and new contributions, record the main innovative ideas and talking points on an open online platform during and after the symposium, and during the workshop interested participants will be invited to collaborate on a number of articles for the CUI 2023 provocations track.

5 ORGANISERS

The workshop is organised by leading researchers and practitioners from the CUI and HRI communities with the expertise and diversity necessary to bridge the two communities, making them stronger.

Donald McMillan, Stockholm University, Sweden, donald.mcmillan@dsv.su.se. Donald McMillan is an Assistant Professor at Stockholm University's Department of Computer and Systems Sciences. His research lies at the juncture between HRI, HCI and computer science in investigating how observational methods that provide detailed perspectives on human communication can be applied to improve sensing and interaction with novel devices.

Benjamin R Cowan, University College Dublin, Ireland, benjamin.cowan@ucd.ie. 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-founders of the ACM SIGCHI Conversational User Interfaces (CUI) conference, co-director of the HCI@UCD group, and is a principal investigator in the Science Foundation Ireland funded ADAPT Centre.

Joel Fischer, University of Nottingham, UK, joel.fischer@nottingham.ac.uk. Joel Fischer is a Professor of Human-Computer Interaction at the School of Computer Science, University of Nottingham, UK and Research Director on the UKRI Trustworthy Autonomous Systems (TAS) Hub. His research takes a human-centred view on AI-infused technologies to understand and support human activities and reasoning. He has co-organised international workshops and published widely on related topics spanning robotics and conversational systems, frequently drawing on perspectives from Ethnomethodology and Conversation Analysis.

Razan Jaber, Stockholm University, Sweden, razan@dsv.su.se. Razan is a final year Ph.D. student at Stockholm University's Department of Computer and Systems Sciences. Her work centers around the combination of conversational user interfaces 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.

Bahar Irfan, KTH Royal Institute of Technology, Sweden, birfan@kth.se. Bahar Irfan is a Postdoctoral Researcher and Digital Futures fellow at KTH Royal Institute of Technology. Her research focuses on creating personal robots that continually learn and adapt to assist in everyday life. She has a diverse background in robotics, from personalization in long-term human-robot interaction during her PhD at the University of Plymouth and SoftBank Robotics Europe as a Marie Skłodowska-Curie Actions fellow to user-centred task planning for household robotics at Boğaziçi University.

Ronald Cumbal, KTH Royal Institute of Technology, Sweden, ronaldcg@kth.se. Ronald Cumbal is a PhD student at the division of Speech, Music and Hearing (TMH) at KTH Royal Institute of

Technology. His work focuses on adaptive conversational robots that support learning processes while building rapport in long-term (multi-party) interactions with multicultural users.

Nima Zargham University of Bremen, Germany. zargham@uni-bremen.de. Nima Zargham is a Ph.D. student in the digital media lab at the University of Bremen. His research focuses on enhancing the user experience of speech-based systems for personal use. He concentrates on human-centred approaches for designing voice-based systems in domestic settings, as well as for entertainment.

Minha Lee, Eindhoven University of Technology, Netherlands, m.lee@tue.nl. Minha Lee is an Assistant Professor at the Department of Industrial Design at the Eindhoven University of Technology. She focuses on ethics of developing technologies like CUIs and robots, with a focus on moral emotions like compassion or gratitude via our conversations with artificial agents. She has twice organised the HRI workshop on robo-identity looking at how to address the artificial identity of robots and CUIs in 2021 & 2022.

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