
The Challenges of Working on Social Robots that Collaborate with People

Lynne Baillie

School of Mathematical and
Computer Sciences,
Heriot-Watt University
Edinburgh, UK
l.baillie@hw.ac.uk

Cynthia Breazeal

MIT (USA)
MIT Media Lab
20 Ames St. E15-468
Cambridge, MA 02139
cynthiab@media.mit.edu

Pete Denman

Intel Corp
Portland, USA
pete.a.denman@intel.com

Mary Ellen Foster

University of Glasgow
Glasgow, UK
MaryEllen.Foster@glasgow.ac.uk

Kerstin Fischer

University of South Denmark
Sønderborg, Denmark
kerstin@sdu.dk

Jessica R. Cauchard

Interdisciplinary Center Herzliya
Herzliya, Israel
jcauchard@acm.org

ABSTRACT

The advances in Robotics offer exciting opportunities for robots to become socially collaborative technologies. But are we ready for and are the robots capable of enabling a good level of interaction and user experience? How can the CHI community work with the Human Robot Interaction (HRI) community to share best practices and methods in order to continue to advance research that crosses methodological and cultural boundaries between HRI and HCI?

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'19 Extended Abstracts, May 4–9, 2019, Glasgow, Scotland, UK.

© 2019 Copyright is held by the author/owner(s).

ACM ISBN 978-1-4503-5971-9/19/05.

<https://doi.org/10.1145/3290607.3299022>

This workshop will bring together key researchers working in and across both HCI and HRI to share existing challenges and opportunities to advance the field of Socially Collaborative Robotics. We will look to share our recent research experiences and practices in order to build capacity in the crossings between HCI and HRI.

CCS CONCEPTS

- **Human-centered computing~Human computer interaction (HCI)**

KEYWORDS

Robotics; Social; Health; Assistive; Human Robot Interaction (HRI), HCI.

ACM Reference format:

Lynne Baillie, Mary Ellen Foster, Cynthia Breazeal, Kerstin Fischer, Pete Denman, and Jessica.R.Cauchard. 2019. The Challenges of Working on Social Robots that Collaborate with People. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI'19 Extended Abstracts), May 4–9, 2019, Glasgow, Scotland, UK*. ACM, New York, NY, USA. 4 pages. <https://doi.org/10.1145/3290607.3299022>

1 MOTIVATION

The HRI community and its constituents has been growing exponentially in the last few years [3]. From 2014 to 2017, submissions to the HRI conference have increased by 60%. However, in the last two years, HRI papers at CHI and the cross-fertilisation and co-collaboration between these two communities, has not seen much traction, nor have there been any workshops at CHI in this area. There has been some albeit, low level of interaction, from the CHI community very recently with a workshop at Mobile HCI (MobileHRI: The 4th PubRob Workshop on Human-Robot Interaction in Public Spaces [4]). We wish to build on that small beginning by holding our workshop at CHI. As a result, one of the organisers and three of the attendees that were part of the Mobile HCI conference and workshop are part of this PC for this workshop. By holding this workshop, we aim to raise awareness of the growing area of HRI to the CHI community and in particular the work being done in the area of social robots. The CHI community can bring a wealth of experience in terms of lab and field experiments, longitudinal studies, and user-centred design methods to HRI.

There is a general need to increase the research crossing between HCI and HRI. However, we specifically wish to focus on robots that work in partnership with people. This is a growing area of social robotics and touches on the following: ageing societies, manufacturing, construction, customer service, education, child development and autonomous vehicles. This growth has resulted in many initiatives emanating from industry, government, policy makers and funders to promote and support new research in robotics. One of the reasons for this is, for example, the expectation that socially collaborative robots and other technologies will enable people to remain independent in their own homes and communities for longer. This is both economically driven (current care models which need a high level of human help in most countries cannot be sustained with the

increasing ageing population and people managing long term chronic conditions) and also socially driven (to empower and enable the population to be involved in this social change).

However, the interaction spaces proposed for social robotics are complex: as they are personal (homes), communal (workplaces, schools and retail environments), and sometimes in extreme and dangerous environments (construction). Therefore, an iterative approach is needed for the design and evaluation of such robots moving from the lab, to real world and back again. Increasing the time and embedding such an iterative approach into HRI models (something CHI researchers do often) would enable us to see “true” human behaviour in the real world. So we believe studying and iterating from real world context is crucial. The reason this is so crucial is that it is particularly challenging to make robots a technology that people can socially interact with and use in numerous places and for multiple reasons (see challenges below).

An additional reason why it is so critical the two communities engage more fully is the growing awareness within health, social care and education professions and practices, that people should no longer be seen as passive recipients of learning or care, but as co-decision makers (patient engagement, shared decision making, etc.). Therefore, designing and examining how best to co-create the interactions with these technologies and learning from how people actually interact with these technologies themselves becomes increasingly important.

2 CHALLENGES TO BE ADDRESSED

Despite advances in robotics, there are still currently many barriers and challenges to adoption, not least the somewhat flaky hardware. There have been some advances recently in developing robots which can be used by non-roboticists, such as Anki and Jibo [2], which is why we believe this workshop is so timely.

It is important that as robotics evolves and becomes more a part of our everyday lives, that we make sure that robots, especially social robots, integrate well into people’s routine practices, homes, workplaces and communities.

Researchers working between HCI and HRI are, for example, already struggling with issues including (but not limited to):

- Choosing the right methods for studies relating to socially collaborative robotics in home, public and community settings. Specifically, we need to consider a wide array of methods from efficacy and effectiveness studies, to realistic evaluation, to lab testing, to design and evaluation at scale and in the wild.
- Selecting and integrating methods from HCI and HRI that allow for future repeatability of studies; an issue highlighted in [1].
- Communication related issues e.g. supporting effective social interactions through cognitive and emotive computing, and through natural interactions.
- Managing the balance between appearance and capability, this includes providing safe physical contact or moving within very close proximity. This also includes the novelty effect e.g., that people overestimate a robot’s capabilities.

- Addressing the level of user engagement and co-working/problem solving with a socially collaborative robot and when it is appropriate or necessary for a handover to other technologies or people to occur.
- Looking for what are the most appropriate ways for a social robot to collect and manage data about the humans it interacts with. This needs to be done in terms of explainability, trust, privacy, security, ethics, and information governance issues.
- Managing differences across regions, organisations, cultures, practices and expectations between the many stakeholder groups (e.g. commercial companies, users, charities, funders, policy makers).
- Ensuring that our interaction methods and designs meet the challenge of enabling socially collaborative robots without removing the need for appropriate human social contact; especially to guarantee shared decision making.

3 ORGANISERS

Lynne Baillie, Heriot-Watt University (UK)

Prof. Lynne Baillie has been involved in advancing the field of user centred design of home, mobile and rehabilitation technologies for over fifteen years. Recently she has started working in the HRI area with a focus on health and healthy ageing. She has had several full papers published at the SIGCHI conference and has also previously run a workshop at CHI. She is currently the Director of the Interactive and Trustworthy Technologies Research Group at Heriot-Watt University.

Cynthia Breazeal, MIT (USA)

Prof. Cynthia Breazeal is recognized as a founder and pioneer of the field of social robots and human-robot interaction. She is also founder of Jibo, the first social robot and extensible platform for the home. Her work bridges user-centred design with advancing the AI of social and emotional intelligence of robots. Her recent focus is on designing, deploying, evaluating social robots in real world contexts over long periods of time with application to education, wellness, ageing, and paediatrics. She is bringing these insights to institutions and corporations such as Samsung, Huawei, NTT Data, Boston Children's Hospital, Boston Public Schools, and more.

Pete Denman, Intel (USA)

Senior Designer developing prototypes in “Labs” at Intel Corp, where he guides ideas through the design process, working with developers, engineers, and ethnographic researchers to create future technologies. Known best for being the lead designer for famed physicist Stephen Hawking's speech software, Denman could relate to Hawking's circumstances more than most due to his disability. Pete's current work focuses on emotional understanding and its many intersections into technology.

Kerstin Fischer, SDU (Denmark)

Kerstin Fischer is a Professor for Language and Technology Interaction at the University of Southern Denmark and leads the Human-Robot Interaction Lab in Sonderborg. She has published 9 books, 24 journal articles and more than 50 conference and book contributions and currently leads two national projects. She furthermore acts as senior associate editor of the journal Transactions in Human-Robot Interaction, she is part of the steering committee of the Human-Robot Interaction conference. Her research focuses on the development of smooth, seamless interaction between humans and technologies, on usability and on participatory design techniques.

Jessica Cauchard, IDC Herzliya (Israel)

Dr Jessica Cauchard has been focusing her research at the intersection between human-computer and human-robot interaction for the past 4 years. She has developed novel research methodologies for flying robots based on traditional HCI methods. She is interested in how people will interact with autonomous robots in the future. Prior to her faculty position at IDC Herzliya in Israel, she worked as a postdoctoral Research Fellow at Stanford University.

Mary Ellen Foster, University of Glasgow (UK)

Dr Mary Ellen Foster is a Senior Lecturer in the School of Computing Science at the University of Glasgow. Her primary research interests are human-robot interaction, social robotics, and embodied conversational agents. She is the coordinator of the MuMMER project, a European Horizon 2020 project in the area of socially aware human-robot interaction. She obtained her PhD from the University of Edinburgh in 2007 and has previously worked at the Technical University of Munich and Heriot-Watt University.

Additional Program Committee Members

In addition we have a PC which contains people who have worked in multiple interdisciplinary teams in CHI and HRI projects funded by the EU, UK, USA: Prof Manfred Tscheligi (University of Salzburg & AIT, Austria); Gnanathusharan Rajendran (HWU, UK), Katrin Lohan (HWU,UK), Frank Broz (USA/UK), Cosmin Munteanu (University Toronto,Canada), Kaska Porayska-Pomsta (UCL, UK), Dr Michael Gienger (Honda, Germany), Ingo Keller (Germany), Theodoros Georgiou (Cyprus).

4 WEBSITE

<http://www.ittgroup.org/chi2019-workshop>

5 PRE-WORKSHOP PLANS

Participants will be invited to submit a position paper which engages with the overarching aim of aiding HCI and HRI to start building a community. In order to stimulate early discussions, we will enable and urge people to post comments on our website before, during and after the workshop about our key challenges.

The participants will also be asked (via the website) to rank each of the challenges as regards the possibility of there being most helped by the CHI community.

This ranking will help us in structuring the discussions at the workshop. The participants will also be encouraged to share links to demos, videos, and project websites in order to maximize identification of lessons learned at the workshop.

6 OVERVIEW OF THE WORKSHOP

This workshop will bring together HRI and HCI experts to share best practices and existing methods and approaches and to share their experiences (good and bad) in crossing the boundaries between the CHI and HRI disciplines. The outcome of the workshop will be a position paper confirming the current challenges outlining how the communities can learn from each other. It will also outline what key next steps in HRI and HCI related research need to be taken to move the research forward on social robots.

This will be a one-day workshop with between 15 and 25 participants (maximum allowed according to CHI website). We will accept up to 15-20 short (4 pages) position papers for presentation on the day but will vary the presentation format (short talks, posters and demos/videos) to maximize interaction between participants and opportunity to share lessons learned and interesting results and findings on the day. The presentations and discussions will focus on the challenges of conducting research in the novel cross discipline area between HRI and HCI. The breakout sessions will involve identifying solutions and ways forward in this new and exciting area of research.

7 POST-WORKSHOP PLANS

The workshop organisers and extended program committee have discussed with editors of the ACM Transactions of Human-Robot Interaction a special issue on The Challenges of Working on Social Robots that Collaborate with People (one of the workshop's organisers is a Senior-Associate Editor of the journal, Kerstin Fischer).

This will include an editorial from the organisers on the outcome of the CHI workshop discussions regarding the grand challenges and opportunities for advancing the HRI and HCI research. We will also offer a short article version of our vision of how HCI and HRI researchers could work together more to advance robotic interaction for publication in the ACM Interactions magazine.

8 CALL FOR PARTICIPATION

Despite advances in robotics, there are still currently many barriers and challenges to adoption, not least the somewhat flaky hardware. However, it is important that as robotics evolves and becomes more a part of our everyday lives that we make sure that robots, especially socially collaborative robots, integrate well into people's routine practices, homes, and communities. We welcome position papers from researchers who are working in between or in the areas of HCI and HRI and who would like to work together to find the right methods for studies relating to socially collaborative robots in home, school, public, work and community settings. Specifically, we need to consider a wide array of methods from efficacy and effectiveness studies, to realistic evaluation, to lab testing, to design and evaluation at scale and in the wild.

We would welcome papers (4-6 pages) on the topic of the workshop, but we are especially interested in position papers outlining research work carried out in one of our challenge areas, we would also welcome anyone from either community who would like to suggest some new challenges.

- Submission Deadline: (on or before) 12 February 2019
- Notification of acceptance: (on or before) 1 March 2019
- Workshop day: Saturday, 4th May 2019
- Submission format: CHI Extended Abstracts Please use the appropriate template, available for both LaTeX and Word (Windows and Mac).
- Attendance requirements: It is a requirement that at least one author of each accepted position paper must attend the workshop and that all participants must register for both the workshop and for at least one day of the conference.

REFERENCES

- [1] Monya Baker. 2015. Over half of psychology studies fail reproducibility test. *Nature*. <https://doi.org/10.1038/nature.2015.18248>
- [2] Mariya Yao. 2017. Why Building Social Robots Is Much Harder Than You Think. Retrieved December 11, 2018 from <https://www.topbots.com/building-social-robots-jibo-anki-cozmo-much-harder-think/>
- [3] HRI | ACM SIGCHI. Retrieved December 11, 2018 from <https://sigchi.org/conferences/conference-history/hri/>
- [4] Accepted Workshops / Call for Workshop Participation – MobileHCI 2018. Retrieved December 11, 2018 from <https://mobilehci.acm.org/2018/2018/04/04/accepted-workshops/>