



**AALBORG UNIVERSITY**  
DENMARK

**Aalborg Universitet**

## **Re-Configuring Human-Robot Interaction**

Bischof, Andreas; Hornecker, Eva; Krummheuer, Antonia Lina; Rehm, Matthias

*Published in:*

HRI '22: Proceedings of the 2022 ACM/IEEE International Conference on Human-Robot Interaction

*DOI (link to publication from Publisher):*

[10.1109/HRI53351.2022.9889550](https://doi.org/10.1109/HRI53351.2022.9889550)

*Publication date:*

2022

*Document Version*

Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*

Bischof, A., Hornecker, E., Krummheuer, A. L., & Rehm, M. (2022). Re-Configuring Human-Robot Interaction. In *HRI '22: Proceedings of the 2022 ACM/IEEE International Conference on Human-Robot Interaction* (pp. 1234-1236). IEEE. <https://doi.org/10.1109/HRI53351.2022.9889550>

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

### **Take down policy**

If you believe that this document breaches copyright please contact us at [vbn@aub.aau.dk](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.

# Re-Configuring Human-Robot Interaction

Andreas Bischof  
Media Informatics  
Research Group “miteinander”  
Chemnitz University of Technology  
Chemnitz, Germany  
andreas.bischof@informatik.tu-  
chemnitz.de

Eva Hornecker  
Faculty of Media, Dept. of Informatics  
Bauhaus-Universität Weimar  
Weimar, Germany  
eva.hornecker@uni-weimar.de

Antonia Krummheuer  
Institute for Communication and  
Psychology  
Aalborg University  
Aalborg, Denmark  
antonia@hum.aau.dk

Matthias Rehm  
Department of Architecture, Design  
and Media Technology  
Aalborg University  
Aalborg, Denmark  
matthias@create.aau.dk

**Abstract**—The workshop investigates two major boundaries within HRI design and research: Firstly, we aim to cross the boundaries of engaging in interdisciplinary collaboration of such divergent disciplines as engineering, design, psychology, philosophy and sociology. Secondly, we aim to cross the boundaries of HRI design and social contexts of use – often referred to as ‘real world’ environments. This endeavor is not new, however we aim for approaching these two borders of HRI research and design more systematically, e.g. by providing new methodological impulses. The idea of “configuring” has a long tradition in Science and Technology Studies (STS) to describe how potential users and use cases are shaped and in turn reshaped (configured) throughout technology design – be it explicitly or accidentally. Given HRI is becoming deeper integrated in ‘real world’ contexts, such as public spaces, homes and care facilities, we argue for the need for a re-configuration. This includes a critical reflection of material, procedural and methodological implications that shape future users within HRI design practices – for and together with people.

**Keywords**—participation, paradigms, theory, methods

## I. THE SHIFT FROM TECHNICAL TO SOCIO-TECHNICAL SYSTEMS

Since the inaugural HRI conference in 2006 and the foundation of the Journal for Human-Robot Interaction (now Transactions in HRI) in 2012, the central challenge of human-robot interaction has remained the same. Robots that are leaving factory shop floors and research laboratories do not only imply new “application areas”, but pose a severe problem to HRI as a field of research: When building autonomous machines to interact with humans, the conditions of success lie at least partly outside the technical system – within the human interpretation and use. With this transfer from robots as technical systems to robots as being part of socio-technical systems, interpretative, highly context dependent lifeworlds of humans and their continuous interactive negotiation became relevant challenges to research and development of robots.

The question of how to deal with this challenge was one of the most important reasons for the formation of HRI as a scientific field. In particular, the challenge of understanding, measuring and modelling HRI empirically prompted the founding of the HRI conference and THRI, as Sara Kiesler recalls in an interview with Selma Šabanović on the history of the field: “It was certainly the first time that sort of what I’d call scientific studies were put together with empirical data

[...]. There were other social robotic pieces, but I think that might’ve been the first time that a whole bunch of people did systematic empirical work.” [1]

## II. THE LIMITS OF LABORATORY STUDIES

Under this founding condition, the question of methodological standards, paradigms and quality criteria quickly became one of the most virulent to be discussed and fought out together. Despite – or because – the disciplinary backgrounds of the founding figures were very diverse, quantitative psychological laboratory studies quickly became the standard for comparable and acceptable HRI publications.

This focus has been criticised within HRI in recent years and is perceived as too narrow. On the one hand, not every engineering achievement or design idea for robotic systems can be translated into a good psychological experiment. Much more central, however, is on the other hand the epistemic critique of laboratory studies: They refer first and foremost to laboratories, leaving proof in ‘unstructured settings’ unclear. As Kerstin Dautenhahn has pointed out, laboratory studies “cannot address [...] how real people, in real-world environments, would interact face to face with a real robot” [2].

## III. THE NEED FOR NEW PARADIGMS

What has been neglected in the numerous and stimulating discussions on empirical methods and standards for HRI in recent years is the recognition that methods are always based on theory – and thus on models of the world, people and interaction. In Science and Technology Studies, those are referred to as (epistemological) paradigms. Paradigms go beyond the question of basic concepts and experimental practices. They include researchers’ self-images, concepts of people (mostly referred to as ‘users’) and also implicitly normative ideas of what constitutes ‘good’ HRI and desirable robots – for a desirable society [3].

So, when Dautenhahn promotes to “adopt methodologies not only from experimental psychology but also from many fields, such as anthropology, ethology, and others” [2], one has to add that those methodologies are coming with concrete theoretical backgrounds and fundamental assumptions about the nature of the world, social reality and interaction. Experimental psychology e.g. enforces a dyadic paradigm of human-robot interaction, as something that is happening between a conscious human and a robotic system – to the detriment of social roles, the interactive production of

Authors’ Bischof & Hornecker work for this publication was enabled by VolkswagenStiftung, FKZ 97 741, “ReThiCare”

© 2022 IEEE. Personal use of this material is permitted. Permission from IEEE must be obtained for all other uses, in any current or future media, including reprinting/republishing this material for advertising or promotional purposes, creating new collective works, for resale or redistribution to servers or lists, or reuse of any copyrighted component of this work in other works.

Please quote as: Andreas Bischof, Eva Hornecker, Antonia Lina Krummheuer, and Matthias Rehm. 2022. Re-Configuring Human-Robot Interaction. In Proceedings of the 2022 ACM/IEEE International Conference on Human-Robot Interaction (HRI '22). IEEE Press, 1234–1236. <https://dl.acm.org/doi/10.5555/3523760.3523990>

meaning and further factors that e.g. Alač and others [4] have proven to be influential.

Inspired by paradigm shifts that have been discussed for the field of human-computer interaction (HCI) [5], Serholt, Ljungblad & Bhroin answered the need for new paradigms in HRI with a proposal for Critical Robotics [6]. They argue that in parallel to HCI paradigms, HRI should move “away from the optimization of man-machine interaction, towards theories about the computer and the human mind, to finally focus on interaction as phenomenologically situated”. Such a shift would also involve a careful analysis of the values realized in human-robot interactions using mixed-method approaches that include from philosophy and social cognition research, as Seibt and colleagues argue [7]. And finally, new, more participatory ways to integrate people in researching and designing have been brought forward as a shift in the ways HRI is done, too [8].

#### IV. WORKSHOP GOALS

The workshop calls for positions and discussions of such new paradigms for HRI. In doing so, we want to irritate two major, limiting boundaries within HRI: (1) Firstly, we aim to cross the boundaries of engaging in interdisciplinary work on such new paradigms between divergent disciplines as engineering, design, psychology, philosophy and sociology. (2) Secondly, we aim to cross the boundaries of HRI and the social contexts of robot use – often referred to as ‘real world’ environments.

These endeavors are not new, as we have discussed above. However we aim for approaching new theoretical and empirical paradigms for HRI more systematically. This workshop on Re-configuring HRI will critically reflect on those boundaries and provide new methodological impulses to overcome them.

For the title, we turned to the famous STS concept of “configuring” which discusses how potential users and use cases are shaped and in turn reshaped (configured) throughout technology design – be it explicitly or accidentally. Suchman’s understanding of the concept as socio-material configuration in specific [9], helps us to think about the particular modes of ordering that produce particular configurations of heterogeneous associations of humans, machines, ideas, infrastructures, plans, discourses, and practices, that HRI and robot development produce. Given robotic technologies are becoming deeper integrated in ‘real world’ contexts, such as public spaces, homes and care facilities, we argue for the need for a re-configuration of Human-Robot Interaction (HRI).

We invite contributions of 2-4 pages length on:

- the exploration of real world practices before, during and after the implementation of the robots.
- a critical reflection of material, procedural and methodological implications that shape future users within HRI design practices.
- interdisciplinary and reflective discussions on new concepts and theories of building robots to interact with people.
- positions on how to re-configure HRI epistemically and methodologically.

#### V. ORGANIZERS

##### A. *Andreas Bischof*

Andreas Bischof leads an interdisciplinary research group at Chemnitz University of Technology and collaborates with researchers and practitioners from Media and Communication, Human-Machine Interaction, Sociology, Media Informatics, Design, Science and Technology Studies and Socio-Gerontology. After a Sociology PhD on the epistemology of Human-Robot Interaction, he received grants for robotic projects. As an advocate for transdisciplinary and interdisciplinary research, he tries to sensitize research policy and public funders for the chances and challenges of integrating people in technology development.

##### B. *Eva Hornecker*

Eva Hornecker is a Professor of Human-Computer Interaction at Bauhaus-Universität Weimar. Before Weimar, she spent several years in the UK as researcher and lecturer. Her work lies at the intersection between technology, design, and the social sciences, with a particular interest in anything that is not traditional screen-based computing, is embedded in the physical world, and/or relates to the notion of embodied interaction. She currently leads a project exploring alternative visions for care robotics following an open-ended, design-driven approach.

##### C. *Antonia Krummheuer*

Antonia Krummheuer is associate professor at the Faculty of Social Science and Humanities at Aalborg University. She is a sociologist with a deep interest in understanding the construction of meaning in socio-material practices with and without technologies and how this knowledge can inform the development of HRI and social robotics. Therefore she combines co-creational processes with video-ethnographic research and interaction analysis. She is working at Aalborg University since 2013, before she was assistant professor at Klagenfurt University (Austria), where she received her Doctoral degree (with honours) in 2008.

##### D. *Matthias Rehm*

Matthias Rehm is a professor at the Technical Faculty of IT and Design at AAU. He is the head of the Human Machine Interaction group and the coordinator of the interdisciplinary HRI lab at AAU. Before, he was assistant professor at Augsburg University where he finished his habilitation in 2008. He received his doctoral degree with honors from Bielefeld University in 2001. His research focuses on the fundamental question of how our socio-cultural practices become manifest – and can be exploited – in interactions with technology.

#### REFERENCES

- [1] Ethw.org. 2020. Oral History: Sara Kiesler Retrieved from [https://ethw.org/Oral-History:Sara\\_Kiesler](https://ethw.org/Oral-History:Sara_Kiesler).
- [2] Kerstin Dautenhahn. 2018. Some Brief Thoughts on the Past and Future of Human-Robot Interaction. *ACMTrans. Hum.-Robot Interact.* 7, 1, Article 4 (May 2018), 3 pages. DOI: <https://doi.org/10.1145/3209769>
- [3] Harvard.edu. 2021. FAQ. Retrieved from <https://sts.hks.harvard.edu/research/platforms/imaginaries/imaginaries-faqs/>.
- [4] Morana Alač, Javier Movellan and Fumihide Tanaka. 2011. When a robot is social: Spatial arrangements and multimodal semiotic engagement in the practice of social robotics. *Social Studies* 41, 6 (December 2011): 893–926. DOI: <https://doi.org/10.1177/0306312711420565>.

- [5] Steve Harrison, Deborah Tatar and Phoebe Sengers. 2007. The three paradigms of HCI. In: Alt. Chi. Session at the SIGCHI Conference on human factors in computing systems San Jose, California, USA. 1-18.
- [6] Sofia Serholt, Sara Ljungblad, and Niamh Ní Bhroin. "Introduction: special issue—critical robotics research," AI & Society Special Issue "Critical Robotics", online first <https://doi.org/10.1007/s00146-021-01224-x>, June 2021.
- [7] Johanna Seibt, Marlene Flensburg Damholt and Christina Vestergaard. 2020. Integrative social robotics, value-driven design, and transdisciplinarity. *Interaction Studies*, 21(1): 111–144. DOI: <https://doi.org/10.1075/is.18061.sei>
- [8] Astrid Weiss and Katta Spiel. 2021. Robots beyond Science Fiction: mutual learning in human–robot interaction on the way to participatory approaches. *AI & SOCIETY*, (April 2021) 1-15. DOI: <https://doi.org/10.1007/s00146-021-01209-w>
- [9] Andreas Bischof and Juliane Jarke. 2021. Configuring the older adult: How age and ageing are re-configured in gerontechnology design. In *Socio-gerontechnology*. Taylor & Francis: 197-212. DOI: 10.4324/9780429278266-15.