Longitudinal Social Impacts of HRI over Long-Term Deployments

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Abstract—The Longitudinal Social Impacts of HRI over Long-Term Deployments Workshop seeks to bring together researchers working on all aspects of thoroughly understanding such deployments. This includes researchers working in contributing areas, such as longitudinal studies of human-robot interaction, long-term autonomy, and real-world deployments.

This workshop seeks to grow the study of how real-world deployed robot systems impact the people who interact with them and the social structure of the places that they inhabit. Historically, research in this area has been high-impact. As the world sees robots begin to inhabit places designed for people - delivery robots on city streets, and robots with jobs in airports, shopping malls, and in the home - we expect the importance of understanding these impacts to grow.

I. Website

https://sites.google.com/view/lsi-hri/home

II. Introduction

"Longitudinal Social Impacts of HRI for Long-Term Deployments" will be held on March 7, 2022; during the workshop day of the 2022 IEEE/ACM Conference on Human-Robot Interaction. It will bring together researchers interested in understanding how the real-world deployment of robots that work in close proximity with people may impact society. We look to this topic with an eye toward not only maximizing the benefit of robots to society; but to assuring that that benefit is both equitable - in that it is done in a way that avoids or minimizes disparate outcomes across socioeconomic strata, racial, and other social axes; and ethical – in that informed, well-research care is given to the impact that these technologies have on society with intentions to maximize social, societal, and individual good.

Recently, the use of robots has expanded in ways that have brought them into more regular contact with people. Historically, robots have been confined to work cells in factories or automotive plants, performing repetitive tasks away from people. This is beginning to change. The robots in Amazon warehouses[1] are only the most well-known and visible example. Companies like Savioke[2] and Diligent[3] are deploying delivery systems. Other small robot companies such as Fox Robotics[4], Pensa Systems[5], MaidBot[6], and Avidbots[7] are pushing robots into more visible roles where they interact with people. Deploying robots in jobs that people see takes classical, well-understood ethical issues and brings them into the field of robotics in ways that we are beginning to see play out in the real world. The Boston Dynamics Spot[8] has been used both in ways that criticized as a surveillance overreach[9] and in ways that have been praised as making work safer.[10] Sensational reports about first-reactions to robots such as we often see do not paint a full picture of the impact of these systems. As robots become more prevalent in close interaction with people, however, the study of how they impact society will become more crucial. We believe that we cannot arrive at a thorough understanding of these impacts exclusively through laboratory experimentation. This is to say that arriving at an accurate picture of the impact of robotic systems on society will involve studying them in long-term real-world deployments. In such deployments, novelty effects will wear off, preconceived notions will disappear, and their real impact can be seen.

Historically, a variety of projects have studied the longitudinal effects of long-term human-robot interactive systems. A few include Roboceptionist [1] - deployed at the Carnegie Mellon University Robotics Institute, Minerva [4] - deployed at the Smithsonian National Museum of American History, Robovie [2] - in Japanese a shopping mall, and a longitudinal study of robots delivering interventions to children with autism spectrum disorder [3]. Robots are becoming more capable on a

[1] https://www.amazon.jobs/en/teams/amazon-robotics

[2] https://www.savioke.com/

[3] https://www.diligentrobots.com/

[4] https://www.foxrobotics.com/home/

[5] https://www.pensasystems.com/

[6] https://maidbot.com/

[7] https://www.avidbots.com/

[8] https://www.bostondynamics.com/spot

[9] https://www.nytimes.com/2021/04/28/nyregion/nypd-robot-dog-backlash.html

[10] https://www.cnn.com/2020/09/10/perspectives/robots-future-of-work-boston-dynamics/index.html

continual basis, and are entering less structured environments; environments which are designed around people. As progress continues, this will drastically change how people are able to interact, and the impact that the robot is able to have on its environment. Understanding how to best study these interactions and their social impact will require a concerted effort from the community to understand what has made the previous projects successful and where effort must be placed to ensure the success of future projects.

By bringing together researchers interested in longitudinal studies on real-world human-interactive long-term deployments, we hope to arrive at a clearer vision of how best to study these systems. Looking to past successful studies, the number of studies that meet all of these criteria is limited. We invite researchers who have studied all areas touching on this topic - longitudinal studies, real-world deployments, long-term deployments, ethics and social impacts, and general human-robot interaction - for a day of talks and discussions to help arrive at a consensus regarding the best practices, objectives, metrics, and hypotheses in studying this topic.

III. Target Audience and Goal

This workshop targets a combination of researchers and practitioners with experience or interest in human robot interaction issues of large-scale, long-term, and/or real-world deployments. Existing work tends to focus on what is necessary from a technical perspective to make such systems work, or how people interact with them in a laboratory setting, ideas. interactions in a real-world setting. While notable long-term, real-world studies exist, we expect this body of research to grow significantly in the face of the challenges of emerging robotics applications. We are targeting around 50 attendees who seek to grow this area of research.

IV. Content and Structure

The workshop's goal is to include a variety of ongoing work from research laboratories focusing on HRI for long-term and large-scale deployments. The workshop also seeks to increase collaboration among attendees.

A. Contributed papers

Contributions are invited on all topics relevant to longitudinal social impacts of HRI over long-term deployments and topics that can help to inform this core idea, including (but not limited to):

- Longitudinal studies
- HRI over real-world large-scale deployments
- Interdisciplinary approaches and long-term autonomy
- Methodological and Technical challenges
- Social impacts of HRI over long-term deployments
- Social effects such as safety, privacy, and inclusion
- New opportunities for HRI and HR teaming
- Demonstrations of long-term deployments
- Hardware and devices for human-robot interaction
- New sensors, biological signals

Papers include short work-in-progress and position papers (2-4 pages) and long-format integration and experimental papers (4-6 pages). All papers are to be considered for both oral presentations and posters. Posters will be presented during the third session. To encourage participation, 1-2 page extended abstracts describing the research interests of participants (optional) will also be accepted and featured on the workshop's website. The submission site can be found under the Call for Papers (CfP) on the workshop's website.

B. Recruitment

This workshop will recruit participation through an interdisciplinary set of channels, including postings to venues familiar to robotics researchers such as: ai-robotics, robotics-worldwide, robocup-world-wide, and postings to extra-disciplinary lists such as the Society for Social Studies of Science, Association for Information Science and Technology, and newsletters such as Data + Society.

C. Sessions and Schedule

The schedule is broken into three sessions. The first two sessions begin with invited talks, to be followed by oral paper presentations, ending with a discussion of the material presented with the presenters. The third session is reserved for poster presentations and discussion. After the day's presentations, there is breakout discussion intended to aid in the formation of collaborations and the synthesis of ideas. In the evening, there will either be a social hosted in Gather or brief http://gather.town.

D. Breakout Session Structure

The plan for the breakout session is to have pointed discussion topics intended to increase collaboration and support the synthesis of ideas from the workshop. Breakout groups will work in teams of 4-8 people discussing the topic, formulate

TABLE I
Tentative workshop schedule

Time	Activity
9:00-9:15	Opening
9:15-10:00	Invited Talk I
10:00-10:50	Video Presentation 1
	Video Presentation 2
	Video Presentation 3
	Video Presentation 4
10:50-11:00	Discussion
11:00-11:15	Coffee Break
11:15-12:00	Invited Talk 2
12:00-13:00	Lunch
13:00-13:45	Invited Talk II
13:45-14:35	Video Presentation 5
	Video Presentation 6
	Video Presentation 7
	Video Presentation 8
14:35-14:45	Discussion
14:45-15:00	Coffee Break
15:00-15:45	Invited Talk III
15:45-16:45	Breakout Session
16:45-17:00	Concluding remarks
17:00-18:00	Social Hour on http://gather.town

ideas, and will each present for up to 5 minutes at the end of the breakout session, directly before the close of the workshop.

V. Documentation

Contributed papers will be posted on http://arXiv.org. If there is sufficient interest, the workshop will be used to seed a a special issue in a relevant journal.

VI. Co-Organizers

This interdisciplinary group of co-organizers comes from the Living and Working with Robots project at The University of Texas at Austin, which aims to perform longitudinal studies of long-term real-world deployments of service robots performing jobs on the UT Campus.

Justin Hart, UT Austin, (hart@cs.utexas.edu)
Justin Hart's research focuses on artificial intelligence and human-robot interaction, particularly in the areas of developing naturalistic autonomous interactions with service robots and the development of flexible robot architectures for general autonomy. He is a member of the Learning Agents Research Group at UT Austin, is currently serving as assistant director of Texas Robotics (a research consortium encompassing robotics research and education at UT Austin), was a founding faculty member of the UT Austin Villa @ Home RoboCup@Home Team, and currently serves on the league's executive committee. http://justinhart.net

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Elliott Hauser is an Assistant Professor at the University of Texas at Austin School of Information. He is interested in the ways information systems condition social reality. His work focuses on sites and situations where actions are taken because of information and information systems. Elliott holds a PhD in Information Science from the University of North Carolina at Chapel Hill, where he was a member of the Royster Society of Fellows.

Samuel Baker, UT Austin, (sebaker@austin.utexas.edu)
Samuel Baker teaches English at UT Austin, where he chairs the Executive Team of Good Systems, a Texas Grand Challenge initiative. His research concerns the history and theory of literature, culture, and technology, and currently focuses on the concept of "stewardship," as deployed in contemporary technology culture and as formulated in the historical novels of Walter Scott. He has published a book, Written on the Water: British Romanticism and the Maritime Empire of Culture, and held an NEH Digital Humanities grant to develop the annotation tool eComma. At Good Systems, he co-led the Bad AI and Beyond project, which surveyed attitudes toward AI and has been generating creative and scholarly writing about AI and society, and he helps lead the core research project Living and Working with Robots.

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Joydeep Biswas is an assistant professor in the Computer Science Department at The University of Texas at Austin, where he leads the Autonomous Mobile Robotics Laboratory. His research spans perception and planning for long-term autonomy, with the ultimate goal of having service mobile robots deployed in human environments for years at a time, without the need for expert corrections or supervision. Prof. Biswas' research is supported by funding from NSF (including an NSF CAREER award), DARPA, Army Futures Command Robotics Center of Excellence, Army Research Laboratory, an Amazon Research Award, a JP Morgan Faculty Research Award, and by Northrop Grumman Mission Systems. https://www.joydeepb.com

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Junfeng Jiao's research focuses on smart city, urban informatics, and ethical AI. He is particularly interested in the application of service robots in urban transportation such as first and last mile delivery, and shared mobility. He is the PI of a three-million dollars new NSF NRT project, Convergent, Responsible, and Ethical AI Training Experience for Roboticists, which aims to design the next generation ethical service robot. He is the director of Urban Information Lab, Texas Smart City Bridge Disciplinary Program, a founding member and past chair of Texas Good System Grand Challenge. He has published over 80 peer reviewed articles and two books in Shared Mobility and Smart City, respectively. His research has been reported by media outlets ABC, Associated Press, CNN, Fox, NBC, NPR, New York Times, and Wired. https://www.joydeepb.com

Luis Sentis, UT Austin, (lsentis@utexas.edu)
Luis Sentis teaches human-centered robotics at UT Austin and leads the Human-Centered Robotics Laboratory, an experimental facility that focuses on realtime control frameworks, safe and compliant robot behaviors, whole-body trajectory optimization, and human-in-the-loop amplification. His research has been funded by the Navy, NASA, NSF, Army and the industrial sector to build advanced actuators, humanoid robots and strength amplification lower-body exoskeletons. More recently his research is focused on human autonomy teaming pertaining the measurement of biological states such as trust and mental workload to perform team oriented search and rescue missions using quadrupedal robots. He is one of the recipients of an NSF NRT grant focusing on Convergent, Responsible, and Ethical AI Training Experience for Roboti-

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