Delft University of Technology

Modeling Human Behavior in Human-Robot Interactions

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Abstract—This interdisciplinary workshop aims to break boundaries between the researchers who develop human models (e.g., from the fields of human factors, cognitive psychology, and computational neuroscience) and roboticists who use human models in different human-robot interaction (HRI) contexts. The keynote talks, contributed submissions, and interactive discussions will focus on the questions such as: How can modeling humans help us understand and design human-robot interactions? What kinds of models are useful for which HRI contexts (physical/cognitive interactions) and purposes (behavior prediction/personalization/theory-of-mind/etc.)? What common lessons can be learned from human behavior modeling in HRI across different application domains? How can modeling humans in HRI tasks help us to better understand human cognition/behavior? By stimulating an interdisciplinary conversation around these questions, we aim to raise awareness of the benefits of modeling and expose the wider HRI community to a variety of different modeling approaches, and facilitate the HRI researchers who already engage in modeling to exchange views on methodology of modeling and best practices from diverse fields.

Index Terms—Human-robot interaction, human behavior, modeling

I. WORKSHOP OVERVIEW

Many of the challenges faced by research in the field of human-robot interaction (HRI) require understanding of human behaviour. At a minimum, researchers need to possess this understanding to design suitable robots and/or interactions but it may also be that the robot itself needs to possess something approximating such understanding; for example, to understand intentions behind human actions or decide what robot action is most suitable in a context.

Behavioral models, i.e., formalized descriptions of behavior, are a powerful tool to develop understanding of humans and predict their behavior. We therefore believe there is a need in HRI to model human behaviour, yet this is not always made explicit and the full implications of having to understand and model human behaviour still need to be comprehensively explored.

The main goals of the workshop are

- To raise awareness of the benefits of modeling and expose the wider HRI community to a variety of different modeling approaches
- To facilitate the HRI researchers who already engage in modeling to exchange views on methodology of modeling and best practices from diverse fields

These goals will be achieved through keynote talks, contributed talks, and interactive discussions, which will all center around the following themes

1) Why model? How can modeling humans help us understand and create better human-robot interactions?
2) How to model? What kinds of models are useful for which HRI contexts (physical/cognitive interactions) and purposes (behavior prediction/personalization/theory-of-mind/etc.)? How to determine the right level of modeling (behavioral/cognitive/neural)? How do we validate our human models?
3) Finding common ground in diverse research fields: Applications of human modeling to HRI in traffic, retail, healthcare, social robots, etc.
4) HRI as a window on human behavior: How can modeling humans in HRI tasks help us to better understand human cognition/behavior?

II. ORGANIZERS

- Arkady Zgonnikov, Assistant Professor in Human-Robot Interaction, Delft University of Technology, Netherlands
- Serge Thill, Associate Professor in Artificial Intelligence, Donders Institute for Brain, Cognition, and Behaviour, Radboud University, Netherlands
- Philipp Beckerle, Professor and Chair of Autonomous Systems, University of Erlangen-Nuremberg, Germany
- Catholijn Jonker, Professor of Interactive Intelligence, Delft University of Technology, Netherlands

III. INVITED SPEAKERS

- Olivia Guest, Assistant Professor, Radboud University, Netherlands. Theme: the role of computational models in theory building from a psychological sciences perspective.
- Dorsa Sadigh, Assistant Professor, Stanford University, USA. Theme: integrating human behavior models in robot motion planning and decision making.
- Tamara Lorenz, Assistant Professor, University of Cincinnati, USA. Theme: dynamics of human interaction and their relevance and usability for HRI.
- Randy Gomez, Principal Scientist, Honda Research, Japan. Theme: the role of cognitively inspired behavioural models in the design of social robot platforms.

IV. TARGET AUDIENCE

The workshop aims to attract a diverse audience interested in the human side of HRI. This includes (but not limited to)

- HRI and robotics researchers who are using (or would like to start using) human models to address design and engineering challenges
- Cognitive science, neuroscience, and human factors researchers who develop models of human behavior and are interested in applications of these models in the HRI context
- Researchers who study human behavior in different HRI contexts and would like to get acquainted with computational modeling and/or contribute to human model development with empirical insights from their work

We welcome all attendees interested in human behavior modeling, regardless whether their current work already involves modeling or not.

V. FORMAT AND SCHEDULE

The workshop will take place on March 10 (CET, PST)/March 11 (JST), and will be fully online.

TABLE I
TENTATIVE SCHEDULE OF THE WORKSHOP

Time (CET)	Activity
21:00 to 21:05	Introduction by the organizers
21:05 to 21:25	Keynote 1 (Olivia Guest)
21:25 to 21:50	Contributed talks 1 and 2
21:50 to 22:05	Coffee break 1
22:05 to 22:25	Keynote 2 (Dorsa Sadigh)
22:25 to 22:50	Contributed talks 3 and 4
22:50 to 23:50	Interactive discussion 1
23:50 to 00:05	Coffee break 2
00:05 to 00:25	Keynote 3 (Tamara Lorenz)
00:25 to 00:50	Contributed talks 5 and 6
00:50 to 01:10	Keynote 4 (Randy Gomez)

VI. NUMBER OF EXPECTED PARTICIPANTS

In addition to 4 organizers, 4 confirmed invited speakers, and authors of 6 oral contributions, the workshop will be open to the participants of the main conference, who will be able to attend the talks, join the interactive discussion, and (optionally) to present a virtual poster. We will limit the number of participants to 50 in order to keep discussions in breakout rooms engaging and productive.

VII. PLAN FOR DOCUMENTING THE WORKSHOP

We will select the accepted contributions based on two-page extended abstracts or four-page position papers which will be published in non-peer-reviewed workshop proceedings on Open Science Framework Meetings. In addition, we will invite selected participants to contribute to a review/position paper summarizing the main findings of the workshop. All the talks of the workshop will be recorded and shared publicly on youtube (provided the speakers' consent).