

---

# Child-Robot Interaction: Social Bonding, Learning and Ethics

**Wolmet Barendregt, Sofia Serholt**

University of Gothenburg,  
Sweden  
Wolmet.barendregt@ait.gu.se  
Sofia.serholt@ait.gu.se

**Ana Paiva, Patrícia Alves Oliveira**

INESC-ID, Instituto Superior  
Técnico, Portugal  
ana.paiva@inesc-id.pt@gmail.com  
patricialvesoliveira@gmail.com

**Arvid Kappas, Christina Basedow**

Jacobs University Bremen,  
Germany  
a.kappas@jacobs-university.de  
c.basedow@jacobs-university.de

**Asimina Vasalou**

University of London,  
United Kingdom  
a.vasalou@ioe.ac.uk

**Carl Heath**

Interactive Institute Swedish ICT  
AB, Sweden  
ch@tii.se

Copyright © 2014 by the Association for Computing Machinery, Inc. (ACM). Permission to make digital or hard copies of portions of this work for personal or classroom use is granted without fee provided that the 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 in print or the first screen in digital media. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted.

To copy otherwise, to republish, to post on servers, or to redistribute to lists, requires prior specific permission and/or a fee. Send written requests for republication to ACM Publications, Copyright & Permissions at the address above or fax +1 (212) 869-0481 or email [permissions@acm.org](mailto:permissions@acm.org).

## Abstract

This workshop aims to exchange experiences with issues surrounding Child-Robot Interaction. More specifically, the main aims are to discuss how social bonding between children and robots can be evaluated, how robots can be used to aid children in their learning process, but also what ethical issues arise when children learn from and bond with a robot. Another aim is to discuss how teachers' and caretakers' perspectives on children's use of robots should be taken into account when designing and evaluating robots for children.

## Author Keywords

Children, Robots, Social Bonding, Learning, Ethics

## ACM Classification Keywords

I.2.11 Intelligent agents, K.3.1 Computer-assisted instruction, K.4.1 Ethics

## General Terms

Design

## Workshop topic

Scientific research investigating the use of (social) robots with children has steadily increased in recent years. The robots used in this research range from robotic pets and educational aids [1-3] to therapeutic and assistive tools for children.

Children are an especially interesting target group for Human-Robot Interaction since they are often more willing than adults to interact and engage with robots [4], although factors such as gender and age of the children influence the interaction. In this workshop we would like to focus on three main topics: Bonding, Learning, and Parents' and Teachers' perspectives on children's interactions with robots.

Children are more likely to easily form a bond with a robot. Fior et al. [5] investigated for example if children could form relationships with robots and view them as friends. Their results showed that most children thought the robot could be their friend, more than half of the children would talk to the robot, and almost half of the children would even share a secret with the robot.

Similarly, Bethel et al. [6] investigated if preschool children were as likely to share a secret with a robot as with an adult. In this study the children played the game "follow-the-leader" with an adult and a humanoid robot. The lead investigator shared a unique secret with each child. During a break in the game with both the adult and the robot, the children were prompted with five questions to determine if they would share this secret. The results indicated that the children were as likely to share the secret with the robot as the adult with a similar amount of prompting effort and that the children interacted with the robot in a similar way as with the adult.

Shahid et al. [7] investigated if children compared playing with a robot with playing alone or with a friend. The results suggested that children enjoyed playing with the robot more than playing alone, but not as much as when playing with a friend.

Since research has suggested that when empathy or support is provided (from a human or artificial source) learning is improved, it is a logical step to use robots as teaching aids or companions. Kanda et al. [1] for example conducted an 18-day field trial at a Japanese elementary school using two "Robovie" robots with first-grade and sixth-grade children to investigate the possibility of using robots as social partners to teach the children English. Although the majority of the children did not improve their English skills, the children were very interested in the robot.

In an experiment with an expressive robot used with 10-11 year-old children Saerbeck and Bartneck [8] found that a robot engaging in social interaction seemed to be more effective than one focusing on a mere knowledge transfer. They therefore argued that robotic user interfaces could be meaningfully integrated in the educational process.

However, as Pearson and Borenstein [9] point out, robots that children bond with and/or learn from are intended to affect individual well-being, and several ethical issues should thus be considered, such as whether robots ought to be made to appear or act humanlike, and whether they should be gendered. Furthermore, parents and teachers are also important stakeholders when it comes to children's use of robots, either as social or learning companions. Other important topics for the workshop are thus how we can make sure that these robots really increase children's well-being and how we can take parents' and teachers' opinions and attitudes into account when designing and evaluating robots for children.

## **Workshop**

### *Workshop goals*

This workshop aims to 1) bring together people who are interested in children's social bonding and/or learning with robots; and 2) identify how robots interacting with children in a social or educational manner should be evaluated, taking into account ethical considerations and the role of the context, such as caretakers' and teachers' views.

### *Issues to be addressed*

The focus of the workshop is on the design and evaluation of robots for children. The main issues are how and when children bond to a robot, whether children can learn from or with a robot, and any ethical issues related to the design of the robots or the context in which they are used. More specifically, the workshop participants' experiences with designing and evaluating robots for such purposes are discussed.

### *Workshop format*

#### TARGET PARTICIPANTS

Researchers and designers working on robots to be used by children, such as assistants, toys, and tutors are invited to participate. Especially designers that are interested in the effects of such robots on children and any ethical issues and not so much the technical implementation of these robots are encouraged to apply. A maximum of 20 people can participate.

#### WORKSHOP PREPARATION

Applicants are required to write a paper (maximum 3 pages) about their expectations of the workshop and the specific topics they would like to discuss. The paper should also include the following information:

1. The type of robot they are working with (off-the-shelf, custom-made etc.)
2. The target group they are working with
3. The aim of the robot
4. Any evaluation methods they have used or are planning to use to assess the robot's effect on children and their context

#### SETUP OF THE WORKSHOP

This half-day workshop has a creative character. It refrains from using a standard workshop setup of presentations and discussions. Instead, the participants share best practices and methods, discuss common concerns and have brainstorming. The workshop consists of four parts:

#### Introduction – 60 minutes

Participants introduce themselves by presenting the four points mentioned above. The goal of this part is mainly to get to know each other and to create an informal atmosphere to share best practices and common problems.

#### Discussion in groups – 90 minutes

In small groups, participants discuss three main themes: Role of the robot, Evaluation of the robot's effects on children and their context, Ethical issues.

Each group extracts three conclusions from their discussion which are placed on a poster for each theme.

#### Presenting conclusions – 30 minutes

The participants present the conclusions from their discussions to each other.

#### Creating poster – 60 minutes

In a final session, the participants work on the creation of a poster to be presented in the poster session of the main conference.

#### *Post-workshop follow-up*

During the workshop a poster for presentation at the main conference poster session is created. We will also aim for publishing a workshop report in the SIGCHI Bulletin or a similar publication. Both the report and the poster will be published on the workshop website as well. Depending on the interest from the participants, we will try to arrange a special issue in a journal suitable for the workshop topic, such as for instance the International Journal of Child-Computer Interaction or a joint article based on the discussions during the workshop and on the different position papers. It is our intention to use the workshop website for continued work and events.

#### **References**

- [1] Kanda, T., Hirano, T., Eaton, D., and Ishiguro, H. Interactive robots as social partners and peer tutors for children: A field trial. *Human-Computer Interaction*. 19: (2004). 61-84.
- [2] Kerepesi, A., Kubinyi, E., Jonsson, G.K., Magnusson, M.S., and Miklosi, A. Behavioral comparison of human-animal (dog) and human-robot (AIBO) interactions. *Behavioural Processes*. 73: (2006). 92-99.
- [3] Tanaka, F. and Ghosh, M. The implementation of care-receiving robot at an English learning school for children, in *HRI2011: Lausanne, Switzerland*.
- [4] Scheeff, M., Pinto, J., Rahardja, K., Snibbe, S., and Tow, R. Experiences with Sparky, a social robot. *Socially Intelligent Agents, Multiagent Systems, Artificial Societies, And Simulated Organizations*. 3: (2002). 173-180.
- [5] Fior, M., Nugent, S., Beran, T., Ramirez-Serrano, A., and Kuzyk, R. Children's Relationships with Robots: Robot is Child's New Friend. *Journal of physical agents*. 4, 3: (2010). 9-17.
- [6] Bethel, C.L., Stevenson, M.R., and Scassellati, B. Secret-sharing: Interactions between a child, robot, and adult. In *Proc. IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, (2011), 2489-2494.
- [7] Shahid, S., Krahmer, E., and Swerts, M. Child-robot Interaction: Playing Alone or Together. In *Proc. CHI 2011*, (2011), 1399-1404.
- [8] Saerbeck, M., Schut, T., Bartneck, C., and Janse, M. Expressive robots in education - Varying the degree of social supportive behavior of a robotic tutor. In *Proc. 28th ACM Conference on Human Factors in Computing Systems (CHI2010)*, ACM (2010), 1613-1622.
- [9] Pearson, Y. and Borenstein, J. Creating "companions" for children: the ethics of designing esthetic features for robots. *AI & Society*: (2012).