

Workshop:

Natural Interaction with Social Robots



Part of the Topig Group with the same name.

<http://homepages.stca.herts.ac.uk/~comqkd/TG-NaturalInteractionWithSocialRobots.html>

organized by Kerstin Dautenhahn, Mohamed Chetouani, and Vanessa Evers

14 March 2014, Rovereto, Italy part of the European Robotics Forum (ERF), 8:30-10:30.

A) Summary of presentations

Emilia Barakova, Eindhoven University of Technology, the Netherlands

Long-term relationships with robots

The talk discussed long-term relationships with robots in the framework of experiments in behavioral training of children with autism with a NAO robot. The talk featured the lessons learned from 3 longer-term experiments with robots (long-term from the point of view of robotics research, the experiments were 4-5 months each, but the work with the robot 2-3 months, the rest was pre- and post-intervention). It is based on the Wikitherapist and ZonMW funded projects, Wikitherapist is at: <http://www.idemployee.id.tue.nl/e.i.barakova/>.

The talk summarized the challenges for long-term interactions with robots and the effects of habituation to the robot came as a major issue. The talk concluded that in a 1-1 scenario (robot -child) this habituation did not occur, maybe also because the design of the interaction scenarios was more focused on the engagement of the child with the robot. In using the child as a mediator of a Lego game the designer put more efforts in promoting child-to-child interaction, and also the behaviors of the robot were less autonomous, physical, and surprising; so the children at certain point could very well predict what the robot will do and focused on interacting with each other, taking pieces from the robot when necessary.

Overall conclusion - more natural and highly autonomous interaction is necessary. The social robots should have intelligent/ autonomous behaviors. Speech interaction is crucial in the interaction with a humanoid robot.

Laurence Devillers, Paris-Sorbonne IV/Researcher at LIMSI-CNRS, France

Affective and social dimensions of spoken interactions between human and robot

The talk discussed social robot interactions based on emotion, intention, and social behavior detection.

Two projects were presented:

- 1) French ROMEO 2007-11 and ROMEO2 2012-15 : Social interaction with Robot: application for dependent people and elderly, but also children
- 2) EU CHISTERA JOKER 2014-17 : Explore advanced dialogue involving complex social behaviors such as humor in order to provide a robot with the ability to create and maintain a long-term social relationship through verbal & non verbal language interaction

1) Project ROMEO and ROMEO2 with Aldebaran Robotics:

<http://www.projetromeo.com/> demo: Living with robots (LIMSI – project ROMEO):

<https://www.youtube.com/watch?v=p1ID-gvUnWs>

- Emotion and speaker detection with audio channel only (no ASR)
- User profile modeling (emotional and interactional dimensions) and selection of behavioral strategies of the robot

In Romeo2, induction techniques were used (Wizard of OZ) to explore the interactions between elderly people and robot in order to build perceptive and cognitive models.

Objectives:

- Get a first feedback of elderly people
- Validate and enhance the envisaged scenarios
- Getting a corpus for future research in interaction

2) JOKER: JOKe and Empathy of a Robot -

<http://www.chistera.eu/projects/joker>

The aims of JOKER are to

- create a generic intelligent user interface providing a multimodal dialogue system with social communication skills including humor, empathy, compassion and other informal socially-oriented behavior.
- fuse the verbal and non verbal cues (audio, eye-gaze, gestures) including affect bursts for social and emotional processes both in perception and generation

- build rich user profiles taking into account user's personality, interactional behavior
- explore advanced dialogues involving complex social behaviors in order to create a long-term social relationship
- react in real-time

The main challenges are:

JOKER will investigate humor in human-machine interaction. Humor can trigger surprise, amusement, or irritation if it doesn't match the user's expectations. Social interactions require social intelligence and "understanding" for dealing with news circumstances by anticipating the mental state of another person. JOKER will explore two social behaviors: expressing empathy and exchanging chat with the interlocutor as a way to build a deeper (long-term) relationship.

Anna Esposito, Seconda Università di Napoli, Department of Psychology, Caserta, and IIASS, Italy

Socially Believable Behaving Systems: Needs and challenges in processing social information

The main challenges identified were:

a) The modeling and understanding of:

- context effects
- dynamics of signal exchanges in terms of shared meanings
- emotional states
- cultural differences

b) The integration of cognitive theories, knowledge representation models and algorithms in a computational framework

c) The development of novel machine learning techniques for processing, analyze, recognize and synthesize socially situated multimodal streams of communicative signals

Kerstin Dautenhahn, Adaptive Systems Research Group, University of Hertfordshire, UK,

Natural Interaction with Social Robots?

The talk described some challenges concerning human-robot interaction, arguing that our reference point of what robots are and how they are supposed to behave constantly changes, and people's perceptions and reactions to robots change, too. Robots are not people or other animals, they are artifacts that are programmed – one can look inside the box. The talk also discussed how people's views

of robots are influenced by media, culture, individual likes, dislikes, and expectations of users, prior experience with technology etc. (so there is no such thing as a truly naïve participant in an HRI study). All these issues make the design of 'natural' interaction highly complex, in particular given the huge design space of robots in terms of appearance and behavior. The talk suggested that often too much focus is directed to humanoid robots, while non-humanoid robots can be very efficient for interaction, too. An example of a non-humanoid robot was given that successfully exploited cues studied in ethological research on dogs. The talk concludes with introducing the concept of companion robots, as it has been used over the past 10 years in projects such as Cogniron, LIREC, and Accompany.

Rachid Alami, LAAS, CNRS, Toulouse, France

Summary of presentation:

The talk discussed social abilities of robots based on Human-Aware Planning Abilities

- A shift was pointed out in the perspective in several robotic domains from a single (isolated) robot applications to human-robot teams
- Robots will have to plan (and adapt) their activities with us or simply in our presence
- In order to achieve this, robots will need models and algorithms: models of us, hulas, and algorithms to synthesise or adapt their behaviours to people.
- Future planners will have to produce not only safe and efficient but also acceptable and intentionally legible plans.

B) Summarising notes

by Astrid Weiss (Vienna University of Technology, Austria):

Legibility and predictability might improve natural HRI and make HRI more intuitive and acceptable
Predictability might differ between user groups (older adults vs. adults), adaptation in robot motion based on user behavior

Open issues: Impact of behavior dynamics (robot motion) on sociality? What is more important: motion, affordance, speech? How does it affect and interplay?

Language constructs sociality; emotional speech is universal over cultures.

Open issues: How can we use speech to shape the sociality of the robot? How does the utility (functionality) of a robot interact with its sociality (dialogue type, emotional speech, etc.)? Recovering behavior: How can we support the user that he/she can recover from errors without the help of a

technician? Error messages need to be expressed "naturally" by the robot; it needs to precisely indicate the problem, and constructively suggest solutions --> this would lead to more stable long-term interaction and would be very natural as users want to have the feeling of control over a system. How can we minimize the user's memory load to remember what to do (and how to do it) with the robot by making interaction options "visible". Robot usage options need to be visible or easily retrievable whenever appropriate.

What could be possible breakthroughs, step changes?

- better sense-making for robots; e.g. through semantic segmentation: "Robot knows the household of the user"
- more robust technology with better battery endurance: Let the robot run in a household and really observe over time how people react
- better speech recognition also to distinguish between users and allowing more complex grammar (we need to get rid of commanding robots)
- actually doing household chores (assuming if a service robot provides the expected functionality, such as making the bed, cleaning windows etc. functional acceptance would increase and subsequently social interaction increases)
- smaller and faster robots with lower motor noise are crucial for functional acceptance