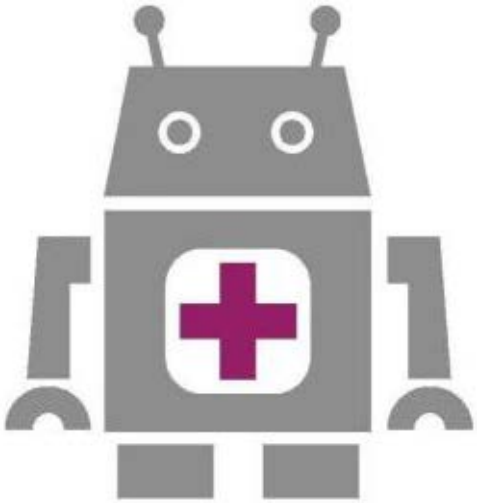
# COST Workshop on Social Robotics

## The future concept and reality of Social Robotics: challenges, perception and applications

## The role of Social Robotics in current and future society



### Perception

### Working Group Booklet

**Tuesday 11 - Thursday 13 June 2013**
**International Press Centre (IPC), Résidence Palace**
**Brussels, Belgium**

http://www.cost.eu/events/socialrobotics
#socialrobots

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# Programme

**Monday 10 June 2013**

**Hotel NH Du Grand Sablon, Rue Bodenbroek 2/4, 1000 Brussels (BE)**

17.30 – 19.00: Workshop Registration

19.00 – 19.30: Welcome words by **COST representatives**

19.30 – 20.00: **Gian Piero Brunetta** (University of Padua, IT) “Robots in the cinema”

20.00 – 22.00: Dinner

**Tuesday 11 June 2013**

**International Press Centre, Rue de la Loi 155, 1000 Brussels (BE)**

8.30 Workshop Registration

**9.00 – 13.00: Plenary Session (Polak Room) - Chair: Leopoldina Fortunati (University of Udine, IT)**

9.00 – 9.15: Official Opening by **Tatiana Kovacikova**, COST Office Head of Science Operations

9.15 – 9.30: Workshop Introduction by **Leopoldina Fortunati**, Head of the Organising Committee

9.30 – 10.00: **Anne Bajart** (EC/DG Connect A2 Robotics) “The EU-funded research programme in robotics: achievements and perspectives”

10.00 – 10.30: **Fabrizio Sestini** (EC/DG Connect) “Collective Intelligence, Internet Ethics and Sustainability: Issues for Social Robots”

10.30 – 11.00: **Sakari Taipale** (University of Jyväskylä, FI) “European perceptions of robots and related implications for the policies of the social”

11.00 – 11.30: Coffee break

11.30 – 12.00: **Atsuo Takanishi** (Waseda University, JP) “Some Aspects of Humanoid Robot Design”

12.00 – 12.30: **Antonio Bicchi** (University of Pisa, IT) “From Social Robots to Societies of Robots”

12.30 – 13.00: **Naomi Baron** (American University Washington D.C., US) “Shall We Talk? Conversing with Humans and Robots”

13.00 – 14.00: Lunch break

**14.00 – 16.00: Working Group Session I**

**Working Group “Challenges” (Maelbeek Room)**

**Chair: James E. Katz** (Boston University, US)

14.00 – 14.20: **James Katz** (Boston University, US) “Attitudes toward robots suitability for various jobs as affected robot appearance”

14.20 – 14.40: **Matthias Rehm** (Aalborg University, DK) “Culture Aware Robotics”

14.40 – 15.00: **Shuzhi Sam Ge** (National University of Singapore, SG) “Era of Social Robots”

15.00 – 15.20: **Christine Linke** (University of Berlin, DE) “Phenomena of Human-Social Robot-Interaction: The Social Construction of Reciprocity, (Inter-)Subjectivity and Relationship”

15.20 – 16.00: Panel Discussion

**Working Group “Perception” (Passage Room)**

**Chair: Ryad Chellali** (Italian Institute of Technology, IT)

14.00 – 14.20: **Maria Bakardjieva** (University of Calgary, CA) “This Bot Hurt my Feelings: Ethics and Politics for Social Bots”
14.20 – 14.40: **Nikhil Bhattacharya** (Institute for Liberal Arts, US) “With Our Technology, In Our Image: A Philosophical Analysis of Social Robots”
14.40 – 15.00: **Charles Ess** (University of Oslo, NO) “Robots and Humans as Virtuous Agents? Core questions and challenges”
15.00 – 15.20: **Michaela Pfadenhauer** (Karlsruhe Institute of Technology, DE) “The Contemporary Appeal of Artificial Companions”
15.20 – 16.00: Panel Discussion

**Working Group “Applications” (Polak Room)**

**Chair: Alessandro Saffiotti** (Orebro University, SE)

14.00 – 14.20: **Rytis Maskeliunas** (Kaunas University of Technology, LT) “Gaze tracking based emotional status determination”
14.20 – 14.40: **Timo Kaerlein** (Universität Paderborn, DE) “The robotic moment in mobile media. An inquiry into new intimacies in human-technology relationships”
14.40 – 15.00: **Pelachaud Catherine** (CNRS, FR) “Socio-emotional humanoid agent”
15.00 – 15.20: **Barbara Lewandowska Tomaszczyk and Paul A. Wilson** (University of Lodz, PL) “Affective robotics - modelling and testing cultural prototypes “
15.20 – 16.00: Panel Discussion

16.00 – 16.30: Coffee break

**16.30 – 18.30: Working Group Session II**

**Working Group “Challenges” (Maelbeek Room)**

**Chair: James E. Katz** (Boston University, US)

16.30 – 16.50: **Amparo Lásen** (University Complutense of Madrid, ES) “The Shared Agency between People and Technologies in the Context of the ‘Affective Paradox’ ”
16.50 – 17.10: **Maria Teresa Riviello** (Second University of Naples and IIASS, IT) “A Cross-Cultural Study on the Effectiveness of Visual and Vocal Channels in Transmitting Dynamic Emotional Information”
17.10 – 17.30: **Juha Röning** (University of Oulu, FI) “Natural Human Robot Interaction”
17.30 – 17.50: **Stefan Benus** (Constantine The Philosopher University, SK ) “Social aspects of entrainment in spoken interactions”
17.50 – 18.30: Panel Discussion

**Working Group “Perception” (Passage Room)**

**Chair: Ryad Chellali** (Italian Institute of Technology, IT)

16.30 – 16.50: **Sara Rosenblum** (University of Haifa, IL) “Brain-hand language secrets as reflected through a computerized system”
16.50 – 17.10: **Kimmo Vanni** (Tampere University of Applied Sciences, FI) “Social robotics as a tool for promoting occupational health”
17.10 – 17.30: **Shirley Elprama and An Jacobs** (Vrije Universiteit Brussel, BE) “Robots in the operating room”
17.30 – 17.50: **Elizabeth Broadbent** (The University of Auckland, NZ) “The social and emotional impact of robots in healthcare”
17.50 – 18.30: Panel Discussion

**Working Group “Applications” (Polak Room)**

**Chair: Alessandro Saffiotti** (Orebro University, SE)

16.30 – 16.50: **Patrick Law** (The Hong Kong Polytechnic University, HK) “Biomedical Engineering: The case of rehabilitation program in Hong Kong”

16.50 – 17.10: **Rui Loureiro** (Middlesex University, UK) “Social robots in the rehabilitation of cognitive and motor function”
17.10 – 17.30: **Anthony Remazeilles** (Tecnalia Research and Innovation, ES) “Development of mobile robots for providing assistance to the elderly population: experience acquired”
17.30 – 17.50: **Filippo Cavallo** (Scuola Superiore Sant'Anna, IT) “Social Robotics for healthcare applications: the Robot-Era experience”
17.50 – 18.10: **Renaud Ronsse** (Université Catholique de Louvain, BE) “Primitive-based entrainment in upper- and lower-limb periodic movement assistance by using adaptive oscillators”
18.10 – 18.30: Panel Discussion

## Wednesday 12 June 2013

**International Press Centre, Rue de la Loi 155, 1000 Brussels (BE)**

8.30 – 9.00: Workshop Registration

### 9.00 – 11.00: Plenary Session (Polak Room) - Chair: Anna Esposito (Second University of Naples and IIASS, IT)

9.00 – 9.30: **Satomi Sugiyama** (Franklin College Switzerland, CH) **and Jane Vincent** (University of Surrey, UK) “Consideration of the mobile device as a form of social robot”
9.30 – 10.00: **Kerstin Dautenhahn** (University of Hertfordshire, UK) “Social robotics and real world applications – an interdisciplinary perspective”
10.00 – 10.30: **Anniina Huttunen** (University of Helsinki, FI) “Does Intelligence Matter? - Legal Ramifications of Intelligent Systems”
10.30 – 11.00: **David Cohen and Mohamed Chetouani** (University Pierre and Marie Curie, FR) “Social Signal Processing in Developmental Psycho-Pathology”

11.00 – 11.30: Coffee break

### 11.30 – 13.30: Working Group Session III

### Working Group “Challenges” (Maelbeek Room)

**Chair: Harmeet Sawhney** (Indiana University, US)

11.30 – 11.50: **Carlo Nati** (Education 2.0, IT) “Cad software to introduce robotic design process at school”
11.50 – 12.10: **Chung Tai Cheng** (The Hong Kong Polytechnic University, HK) “The technologicalization of education in China and the case study of Home-School Communication System”
12.10 – 12.30: **Michele Viel and Giovanni Ferrin** (University of Udine, IT) “Taming social robots through playfulness and do it yourself: children in action”
12.30 – 12.50: **Linda Giannini** (MIUR, IT) “Pinocchio 2.0, robot and other stories”
12.50 – 13.30: Panel Discussion

### Working Group “Perception” (Passage Room)

**Chair: Guglielmo Tamburrini** (University of Naples “Federico II”, IT)

11.30 – 11.50: **Nadia Berthouze** (University College London, UK) “Body Movement and touch behaviour as means to recognize and enhance affective experience”
11.50 – 12.10: **Marcin Skowron** (Austrian Research Institute for Artificial Intelligence, AT) “From Virtual to Robot Bartender: insights from the affective dialogue system”
12.10 – 12.30: **Anna Esposito** (Second University of Naples and IIASS, IT) “Emotional expressions: Communicative displays or psychological universals?”

12.30 – 12.50: **Kristrún Gunnarsdóttir** (Lancaster University, UK) “Robot assistance: prominent visions and problem domains”
12.50 – 13.30: Panel Discussion

**Working Group “Applications” (Polak Room)**

**Chair: Sara Rosenblum** (University of Haifa, IL)

11.30 – 11.50: **Hicham Atassi** (Brno University of Technology, CZ) “An Autonomous intelligent system for Call Centres Surveillance and Assessment”
11.50 – 12.10: **Tatsuya Matsui** (Flower Robotics Inc., JP) “A design approach for the robots to be accepted in the society”
12.10 – 12.30: **Claudia Pagliari** (University of Edinburgh, UK) “Roles, relationships and rights in interactions between real and virtual humans: insights and implications from a study on Avatar-supported eHealth”
12.30 – 12.50: **Vanessa Evers** (University of Twente, NL) “Human Robot Co-existence”
12.50 – 13.30: Panel Discussion

13.30 – 14.30: Lunch break

**14.30 – 16.30: Working Group Session IV**

**Working Group “Challenges” (Maelbeek Room)**

**Chair: Harmeet Sawhney** (Indiana University, US)

14.30 – 14.50: **Ryad Chellali** (Italian Institute of Technology, IT) “The Social Robot: myths, reality and perspectives”
14.50 – 15.10: **Raul Pertierra** (Manila University, PH) " The person in the machine: the machine in the person”
15.10 – 15.30: **Joachim Hoeflich and Afifa El Bayed** (University of Erfurt, DE) “The Acceptance of Social Robots in Today’s Germany and its Prospects”
15.30 – 15.50: **Nello Barile** (Iulm, University of Milan, IT) “The automation of taste: anthropological effects of Shazam and another apps used as search engines in the everyday life”
15.50 – 16.30: Panel Discussion

**Working Group “Perception” (Passage Room)**

**Chair: Guglielmo Tamburrini** (University of Naples “Federico II”, IT)

14.30 – 14.50: **Davide Fornari** (Supsi University of Applied Sciences and Arts of Southern Switzerland, CH) “Face as interface: anthropomorphic and zoomorphic artefacts”
14.50 – 15.10: **Takaaki Kuratate** (Technical University of Munich, DE) “Mask-bot: a retro-projected talking head for social interaction media applications”
15.10 – 15.30: **Carl Vogel** (Trinity College Dublin, IE) “Intending no offence”
15.30 – 15.50: **Etienne Burdet** (Imperial College London, UK) “Adaptive nature of human-human interaction”
15.50 – 16.10: **Peter Sinčák** (Technical University of Kosice, SK)
16.10 – 16.30: Panel Discussion

**Working Group “Applications” (Polak Room)**

**Chair: Sara Rosenblum** (Haifa University, IL)

14.30 – 14.50: **Milan Gnjatović** (University of Novi Sad, SR) “The Child, the Therapist, and the Robot: Adaptive Dialogue Management in Three-Party Interaction”
14.50 – 15.10: **Sonya Meyer** (Haifa University, IL) “Social Robots as possible Celiac Disease management mediators for supporting adherence to a healthy lifestyle”
15.10 – 15.30: **Hideki Kozima** (Miyagi University, JP) “Social robot for autism therapy”

15.30 – 15.50: **Frano Petric** (University of Zagreb, HR) “Application of Humanoid Robots in Diagnostics of Autism”

15.50 – 16.30: Panel Discussion

**16.30 – 18.00: Social Robots Exhibition** (opened by private reception)

**Thursday 13 June 2013**

**International Press Centre, Rue de la Loi 155, 1000 Brussels (BE)**

8.30 – 9.00: Workshop Registration

**9.00 – 10.30: Plenary Session (Polak Room) - Chair: Thierry Keller (Tecnalia Research & Innovation, ES)**

9.00 – 9.30: **Paolo Dario** (Scuola Superiore Sant’Anna, IT) “Robot Companions for Citizens: a Vision to Address Societal Challenges and to Improve Quality of Life”

9.30 – 10.00: **Aude Billard** (École Polytechnique Fédérale de Lausanne, CH) “Issues when transferring knowledge from humans to robots”

10.00 – 10.30: **Alessandro Vinciarelli** (University of Glasgow, UK) “Social Signal Processing”

10.30 – 11.00: Coffee break

**11.00 – 13.00: Working Group Session V**

**Working Group “Challenges” (Maelbeek Room)**

**Chair: Maria Bakardjieva** (University of Calgary, CA)

11.00 – 11.20: **Alessandro Saffiotti** (Orebro University , SE) “Towards a human robots-environment ecosystem: opportunities and challenges”

11.20 – 11.40: **António Brandão Moniz** (Karlsruhe Institute of Technology, DE) “Intuitive interaction between humans and robots in industrial environments: the social robotics role”

11.40 – 12.00: **Maria Koutsombogera** (Institute for Language And Speech Processing, EL) “Developing resources of social interactions”

12.00 – 12.20: **Costanza Navarretta** (University of Copenhagen, DK) “The annotation and use of multimodal corpora for modelling believable social robots”

12.20 – 13.00: Panel Discussion

**Working Group “Perception” (Passage Room)**

**Chair: Valèria Csèpe** (Hungarian Academy of Sciences, HU)

11.00 – 11.20 **Valéria Csépe** (Hungarian Academy of Sciences) “Augmented reality and assisted perception”

11.20 – 11.40 **Angelo Cangelosi** (Plymouth University, UK) “Embodied Language Learning in Human-Robot Interaction”

11.40 – 12.00 **Agnieszka Wykowska** (Ludwig Maximilians Universität, DE) "Cognitive- and social neuroscience for social robotics - how the present challenges can tell us where to go in the future”

12.00 – 12.20 **Karola Pitsch** (Bielefeld University, DE) “Social Learning from an Interactional Perspective. The role of a robot's feedback in tutoring situations in human-robot-interaction”

12.20 – 13.00: Panel Discussion

**Working Group “Applications” (Polak Room)**

**Chair: Alicia Casals** (Universitat Politècnica de Catalunya, ES)

11.00 – 11.20: **Thierry Keller** (Tecnalia Research & Innovation, ES) “Robotics for Neurorehabilitation: Current challenges and approaches”

11.20 – 11.40: **Alicia Casals** (Universitat Politècnica de Catalunya, ES) “Social Acceptance in robotics for health”

11.40 – 12.00: **Peter Friedland** (Peter Friedland Consulting, US) “Developing Trust in Human-Machine Interaction”

12.00 – 12.20: **Marcos Faundez Zanuy** (Escola Universitaria Politecnica de Mataro, ES) “Xnergic: a Tecnocampus initiative to promote engineering vocations”

12.20 – 13.00: Panel Discussion

13.00 – 14.00: Lunch break

**14.00 – 15.30: Summaries by Working Groups’ Chairs - Chair: James Katz (Boston University, US)**

**15.30 – 16.00: Conclusions and Follow-Up - Chair: Leopoldina Fortunati (University of Udine, IT)**


## Takaaki Kuratate

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Biography Takaaki Kuratate received a Ph.D. in Information Science from the Nara Institute of Science and Technology, Japan in 2004. He worked at the TOSHIBA R&D Center, Japan (‘91-‘00), and the Advanced Telecommunication Research Institute (ATR), Japan (‘97-‘06) as a researcher working on topics in computer graphics, speech & image processing, and computer vision, with his primary emphasis on auditory-visual speech processing, and 3D face analysis and synthesis. He was a postdoctoral research fellow at MARCS Auditory Laboratories, Univ. of Western Sydney, Australia (‘06-‘09) where he developed a text-to-auditory visual speech system based on extended face database research from ATR. Since 2010, he is working as a senior researcher at the Institute for Cognitive Systems, Technical University Munich, where he heads development of the Mask-bot platform. His research explores topics in building machines able to communicate naturally with people, and includes both graphical and robotic solutions.

Abstract **Mask-bot: a retro-projected talking head for social interaction media applications**


At the Institute for Cognitive Systems, Technical University Munich (www.ics.ei.tum.de), various research themes are being actively studied to provide robots with the capacity to understand human behaviors and to communicate and interact with people via multiple cognitive channels. We explore face-to-face communication, artificial skins, biologically-inspired systems (vision, biped walking), autonomous manipulations of robot bodies, semantic reasoning of human motions, skill acquisition, affective brain-computer interfaces and brain-compatible robotics. Some of this research requires unique devices and equipment, inspiring us to develop our own hardware and software solutions such as multi-modal tactile sensors and high-performance electro-hydraulic actuator. Mask-bot [1], a retro-projected talking head animation system, is one of the systems developed to study communication possibilities between people and robots. It’s hardware consists of a small LED projector equipped with a fisheye lens and a macro adapter, and a 3D face screen. Carefully calibrated facial animation is projected onto the 3D face screen, resulting in realistic 3D heads (web.ics.ei.tum.de/~kura/maskbot.html). An additional pan-tilt unit improves the positive impression even using only an approximation of actual human head motion. Mask-bot was inspired by "Singing Busts", one of the classic attractions displayed at the Haunted Mansion in Disneyland, which used a statue as a screen and projected an actor’s singing face image from the front to make the statue look ghostly and alive. Following these singing busts, various engineering solutions were proposed [2,3,4], beginning with MIT’s Talking Head Projection in 1980. Most of these attempts project non-

realistic computer graphics characters or very simple cartoonish faces. In contrast, our Mask-bot can present both abstract or realistic faces grounded in 3D facial animation and 3D face analysis and synthesis research. We use large 3D face databases to select individual faces, or to create a new 3D model starting from photographs, or from a single image captured from a web cam [5]. The current Mask-bot system is connected to an OpenHRI-based speech communication interface [6], so we can incorporate simple conversation tasks based on keywords recognition in English, Japanese and German. The newer Mask-bot version 2i can replace its mask screen easily, and can interact with users using built-in microphones and a USB camera [7]. Furthermore, our own 3 degree-of-freedom (DOF) head platform will yield more expressive head motion compared to the original off-the-shelf 2DOF pan-tilt unit. We are also developing a desktop version (life size and half size: which can be easily mountable on smaller humanoids), and various 3D mask screens for personalized and averaged faces using the 3D face database. Of course, mechanical robotic faces covered with skin-like material can present the most realistic appearance to users. However, because their appearance is fixed, re-design based on new information is costly. Developers must rebuild not only the mechanically sophisticated structures, but also replace the flexible skin, which requires extra care around lip and eye corners. In contrast, retro-projected systems like Mask-bot stand out for their flexibility: they are able to present a variety of faces varying in both realism and individual appearance, which means the face can easily change to fit the application or the user preference. Additionally, their communication abilities have the capacity to express nuanced, subtle gestures often missing from many of today's mechanical robot faces, and they can easily and iteratively improve the underlying software display algorithms as better methods are uncovered. Lastly, the systems are generally lighter and less complicated than their mechanical counterparts, being comprised of just a small projector, optics and a face screen, with the face screen yielding a better 3D presence than flat screens. Along with these advantages come the same disadvantages of standard data projectors: they are difficult to see in strong illumination conditions, including daylight. There is the possibility of perceptual mismatch caused when the face is animated, but the mask is stationary. Because of these aspects, retro-projected heads need to be evaluated for general aspects such as likability to gain a better understanding of how they are perceived by people during interactions. Despite these limitations, retro-projected systems provide flexible platforms for a myriad of applications involving face-to-face encounters, including communication studies, video conference interfaces, and various human-robot applications. Thus far we emphasize the study of Mask-bot’s face-to-face applications. With it, we can provide various controlled behaviour studies. Furthermore, if we can adapt a promising dialogue management system, a robust speech recognition system and an expressive text-to-speech system (for expressing emotional speech, non-verbal speech cues, realistic breathing pauses and noise), Mask-bot can be used for realistic interactive communication studies and applications, in part to ascertain if the system is robust enough to become a talking companions for elders, or a teaching assistant for children, for example. We believe that Mask-bot and similar retro-projected face technologies can be one of the important, effective solutions for human-robot and human-computer interfaces: low cost, low maintenance, changeable face animation, and

replaceable 3D mask screens can be used for personalized face output. Their appearance in physical space is more compelling than face animation on a flat screen, or on a 3D TV requiring special glasses.

References [1] T. Kuratate, Y. Matsusaka, B. Pierce, and G. Cheng. “Mask-bot” : a life-size robot head using talking head animation for human-robot communication. Proceedings of the 11th IEEE-RAS International Conference on Humanoid Robots (Humanoids 2011), pp.99–14, 2011. [2] S. A. Moubayed, S. Alexandersson, J. Beskow, and B. Granström. A robotic head using projected animated faces. Proceedings of the International Conference on Auditory-Visual Speech Processing (AVSP 2011), p.69, 2011. [3] F. Delaunay, J. de Greeff, and T. Belpaeme. A study of a retro-projected robotic face and its effectiveness for gaze reading by humans. Proceedings of the 5th ACMIEEE International Conference on Human-Robot Interaction (HRI’10), pp. 39–44, 2010. [4] M. Hashimoto, H. Kond, and Y. Tamatsu. Effect of emotional expression to gaze guidance using a face robot. The 17th IEEE International Symposium on Robot and Human Interactive Communication (RO- MAN 2008), pp.95–100, 2008. [5] A. Maejima, T. Kuratate, B. Pierce, S. Morishima, and G. Cheng. Automatic face replacement for a humanoid robot with 3d face shape display. Proceedings of the 12th IEEE-RAS International Conference on Humanoid Robots (Humanoids 2012), pp.469-474, 2012. [6] OpenHRI: opensource software components for Human Robot Interaction, http://openhri.net [7] B. Pierce, T. Kuratate, C. Vogl, and G. Cheng. ”mask-bot 2i”: An active customisable robotic head with inter-changeable face. Proceedings of the 12th IEEE-RAS International Conference on Humanoid Robots (Humanoids 2012), pp.520-525, 2012.