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Giulio Jacucci · Luciano Gamberini Jonathan Freeman · Anna Spagnolli (Eds.)

# Symbiotic Interaction

Third International Workshop, Symbiotic 2014 Helsinki, Finland, October 30–31, 2014 Proceedings





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## Preface

Symbiotic 2014 is the third international workshop on symbiotic interaction. The first workshop was held in Padua during December 3–4, 2012. It was chaired by Prof. Luciano Gamberini of the University of Padua. The workshop provided interesting dialog with industry members, including, start-ups, small, and large companies. The second workshop was held on December 12, 2013 and brought together academics working on ubiquitous computing and brain computer interfaces. The workshop was chaired by Prof. Jonathan Freeman of Goldsmiths, University of London.

This third edition of Symbiotic 2014 marks a change in the series, as the first-time proceedings of the workshop are published. We solicited 16 high-quality submissions in three categories: papers, posters, and demos. The workshop gathered a long list of important scholars in many disciplines (see Program Committee), and each anonymous paper was reviewed by three members. We accepted eight full papers, three posters, and two demos.

The first paper in the proceedings is an introduction by the Chairs and Program Chairs of the concept of Symbiotic Interaction including an overview of submissions.

We believe that Symbiotic will continue to grow and attract more interest from disparate fields with the aim of investigating future relationships between computers and humans. Symbiotic 2014 is partly funded by the MindSee Project and is partially funded by the European Community (FP7 – ICT; Grant Agreement # 611570) and by TEKES, the Finnish Funding Agency for Innovation through the Re:Know Project.

October 2014

Giulio Jacucci Luciano Gamberini Jonathan Freeman Anna Spagnolli

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## Keynotes

## **Contextual Robotics**

### David Kirsh

### University of California, San Diego

**Abstract.** Robots will soon be among us in diverse forms. They will be expected to blend in. Humans take for granted our remarkable sensitivity to situational factors. Robots will have to learn these. When we act together we respond to social cues that are both explicit – speech, gesture, nodding, pointing – and implicit – eye movement, gaze, where, when and how someone stands, oves, makes eye contact. When we cooperate on a task we need to be aware of each other's goals and objectives. We need to coordinate activity. In this talk I will look at some of the diverse ways people coordinate activity when they act jointly and talk about how detection and response to these cues represents another hurdle for new age robots.

David Kirsh is Professor and past chair of the Department of Cognitive Science at UCSD. He was educated at Oxford University (D.Phil), did post doctoral research at MIT in the Artificial Intelligence Lab, and has held research or visiting professor positions at MIT and Stanford University. He has written extensively on situated cognition and especially on how the environment can be shaped to simplify and extend cognition, including how we intelligently use space, and how we use external representations as an interactive tool for thought. He runs the Interactive Cognition Lab at UCSD where the focus is on the way humans are closely coupled to the outside world, and how human environments have been adapted to enable us to cope with the complexity of everyday life. Some recent projects focus on ways humans use their bodies as things to think with, specifically in dance making and choreographic cognition. He is co-Director of the Arthur C. Clarke Center for Human Imagination, and he is on the board of directors for the Academy of Neuroscience for Architecture.

## Models and Measures of Human–Computer Symbiosis

Roderick Murray-Smith

University of Glasgow

**Abstract.** This talk will be a response to the review paper of Jacucci et al.. I will try to frame Human-Computer Symbiosis in an abstract model, and then examine the role of control theory and information theory in measuring the level of symbiosis in any given human-computer dyad. I will also explore the importance of the symbiotic stance to understanding contextual niches and ecosystems of services involving multiple users and multiple services.

Roderick Murray-Smith is a Professor of Computing Science at Glasgow University, in the "Inference, Dynamics and Interaction" research group, and is the Director of SICSA, the Scottish Informatics and Computing Science Alliance. He works in the overlap between machine learning, interaction design and control theory. In recent years his research has included multimodal sensorbased interaction with mobile devices, mobile spatial interaction, Brain-Computer interaction and nonparametric machine learning. Prior to this he held positions at the Hamilton Institute, NUIM, Technical University of Denmark, M.I.T., and Daimler-Benz Research, Berlin. He works closely with the mobile phone industry, having worked together with Nokia, Samsung, FT/Orange, Bang & Olufsen and Microsoft. He is a member of Nokia's Scientific Advisory Board. He has co-authored three edited volumes, 19 journal papers, 16 book chapters, and 76 conference papers.

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