

Cognitive Systems Monographs

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Human Centered Robot Systems

Cognition, Interaction, Technology

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Preface

Making robots interact with humans in a useful manner can be approached in two complementary directions: taking advantage of the flexibility of human cognition to simplify the interaction for the robot; or conversely, trying to add as much flexibility and “cognition” into the robot system to simplify the interaction for the human.

Limitations of today’s technology and of our understanding of how to achieve highly flexible “cognitive” robot behavior has led to the development and deployment of robot systems almost exclusively in the first direction. However, in recent years we have seen that we are nearing the point where we can build robots that can interact with people in more flexible ways, integrating significant abilities of perception, navigation, communication, situation awareness, decision making and learning.

This development has reshaped the landscape of robotics research in a significant way and has created a new focus with fascinating perspectives from both the perspective of scientific research and the perspective of practical applications: the realization of Human Centered Robot Systems.

These systems must be able to interact with humans in natural ways that shift the burden of adaptation to the machine and not the human. Therefore, their interaction and communication patterns must comply with the level of human abstraction and with the ways of human cognition. As a consequence, their realization cannot be viewed as an engineering task alone, but requires the integration of insights from a considerable spectrum of other disciplines that try to nurture our understanding of the “Gestalt” of cognition and its underlying mechanisms.

The present volume collects a set of prominent papers presented during a two-day conference on *Human Centered Robotic Systems* held in Bielefeld during Nov. 19-20, 2009. The goal of this conference – with predecessors in Karlsruhe 2002 and in Munich 2006 – was to bring together researchers in the area focusing on the shared goal of understanding, modeling and implementing cognitive interaction from the perspective of robotics, computer science, psychology, linguistics, and biology in order to advance

interdisciplinary dialogue and to enhance our knowledge towards the realization of Human Centered Robotic Systems in both the mentioned complementary directions.

The papers in this volume offer a survey of recent approaches, the state-of-the-art, and advances in this interdisciplinary field. They hopefully can provide both practitioners and scientists with an up-to-date introduction into a very dynamic field, which has not yet attained text book status, but which is rich with fascinating scientific challenges. Methods and solutions in this area are very likely to produce a significant impact on our future lives.

As editors, we would like to thank the authors for their work and the members of the program committee for the reviews of the submitted manuscripts. We would also like to thank Dr. Katharina Tluk von Toschanowitz for the coordination of the compilation of this volume.

Bielefeld
September 2009

Helge Ritter
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