



14TH INTERNATIONAL CONFERENCE ON ADVANCED ROBOTICS

Munich, Germany
June 22nd to 26th, 2009

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Sponsored by the German Robotics Society (DGR)
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ICAR 2009 Workshop June 23, 2009 – Munich, Germany

Title

Robust and Legible Manipulation in Human Environments

Description

Although robots are currently faster, stronger, and more accurate than humans, they are still far from achieving human-like performance when manipulating objects. The main reason is that the brain as a motion controller is far superior over robotic controllers in terms of flexibility, autonomous learning abilities, and reliability. In the long run, such characteristics are necessary requirements for robots too; as, for instance, needed in elderly care. With a steadily increasing percentage of elderly people, and therefore the increased prevalence of chronic diseases and disabilities, there is great potential for such robots to help where human resources are insufficient.

In order to achieve robots that have human-like manipulation performance, the computational aspects of everyday manipulation tasks need to be well-understood, and requires the thorough study of the interaction of perceptual, learning, reasoning, planning, and control mechanisms. The challenges to be met include cooperation with humans, uncertainty in both task and environments, real-time action requirements, and the use of tools. The challenges cannot be met by merely improving the software engineering and programming techniques. Rather the systems need built-in capabilities to deal with these challenges. Looking at natural intelligent systems, the most promising approach for handling them is to equip the systems with more powerful cognitive mechanisms. Interesting topics for discussion might be: Which aspects of human environments should robots know before being deployed, and which aspects should it acquire during operation through modeling and learning? Which role should imitation play?

Another aspect of robots in human environments we want to address is legibility of robot behavior, i.e. how well humans can interpret a robot's intentions. For humans to interact naturally with robot, it is not an absolute necessity to have robots with the exact same morphology as humans. This might even have the contrary effect, known as the 'uncanny valley'. Rather, natural interaction depends on a robot's -behavior-, which should be predictable, consistent, efficient and goal-directed. In this context, we will address questions such as: How much should/must robot behavior mimic that of humans? Should robots mimic all idiosyncrasies of humans? Which rules of politeness should robots respect, and how can

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such rules be represented? Does (near) optimal behavior facilitate the interpretation of intentions by others?

Objectives

The goal of the proposed workshop is to make progress towards closing the gap between human and robot manipulation in uncertain environments inhabited by humans. We will do this by considering application domains that are too complex for current robotic system, such as a kitchen robot that can set the table, an office robot assisting a handicapped person on his/her professional environment, or a robot that assists caretakers in elderly homes.

Expected number of participants: >20

Workshop Organizers

Freek Stulp, Technische Universität München, Garching, Germany

Michael Beetz, Technische Universität München, Garching, Germany

Jan Paulus, Bonn-Rhein-Sieg University of Applied Science

Program

09:15 -- 09:45 Introduction

09:45 -- 10:30 Gordon Cheng - Technische Universität München

10:30 -- 11:00 Coffee Break

11:00 -- 11:45 Tim Guhl - KUKA Roboter GmbH

11:45 -- 12:30 Andreas Pott - Fraunhofer Institut für Produktionstechnik und Automatisierung IPA

12:30 -- 14:00 Lunch Break

14:00 -- 14:45 Radu Rusu - Willow Garage / Technische Universität München

14:45 -- 15:30 Michael Beetz - Technische Universität München

15:30 -- 16:00 Coffee Break

16:00 -- 16:45 Alexandre Bernardino - Instituto Superior Técnico, Lisbon, Portugal

16:45 -- 18:00 Panel Discussion