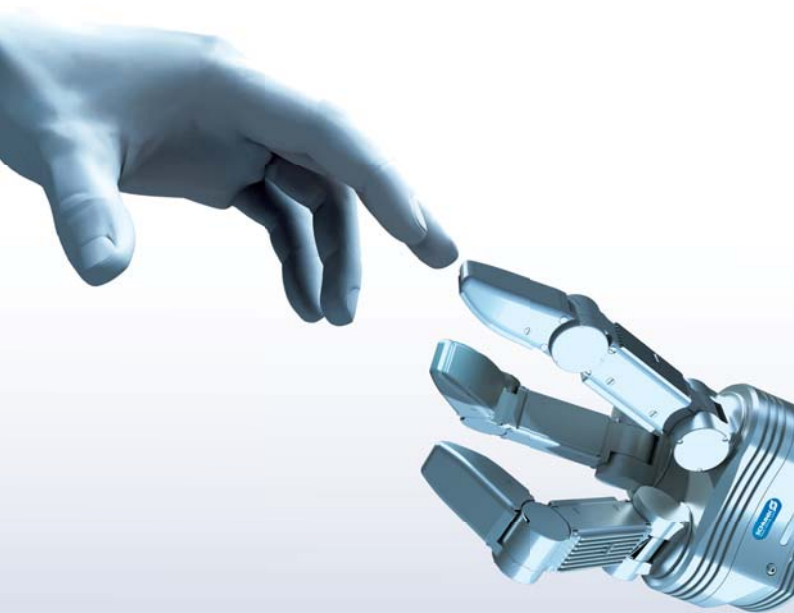


I N T E R N A T I O N A L
EXPERTDAYS
S E R V I C E R O B O T I C S

FEBRUARY 24-25, 2010 · HAUSEN · GERMANY

Tomorrow
starts today.



P R O G R A M

SCHUNK offers for the third year in row a platform for an intensive, worldwide exchange of the service robotics community. The topnotch two-day event on February 24 and 25, 2010 will bring together experts from around the world to present research projects and trends, to intensify networking of the individual experts and institutions and to identify demand-based and marketable service robotics applications.

But where are service robots today? Already, the International Federation of Robotics (IFR) Statistical Department has identified in total, about 200 companies as producers and developers of service robots. Stock and sales of service robots for professional use, domestic applications and entertainment are forecasted to have enormous growth rates.

The SCHUNK Expert Days on service robotics have been established as a platform for international roboticists and market experts. This is a high quality opportunity to share visions and know-how to boost service robotics worldwide. Moreover, the Expert Days enable co-operation and mutual networks.

The special topics in February 2010 will be:

- Advanced Gripping Skills
- Mobile Manipulation
- Modular Robotics

Come and join us for the third Expert Days on February 24th and 25th, 2010 in Brackenheim-Hausen.



Henrik A. Schunk
Managing Partner
SCHUNK GmbH & Co. KG



Chairmen



Prof. Henrik I. Christensen
Georgia Institute of Technology

"Real systems for real applications"



Martin Hägele
Fraunhofer Institute for Manufacturing, Engineering
and Automation (IPA)

*"A unique opportunity to develop and launch new products
for established and especially for new markets"*



Christopher Parlitz
Manager Service Robotics
SCHUNK GmbH & Co. KG

"To develop service robots is a chance to shape our future"



Roko Tschakarow
Business Unit and Sales Manager
Mechatronic Components and System Solutions
SCHUNK GmbH & Co. KG

*"The key factors for service robots are
dependability and modularity"*



Tuesday, February 23, 2010

19:00 Welcome Reception

Wednesday, February 24, 2010

- 08:30 - 09:15 Registration & coffee
- 09:15 - 09:25 Welcome by Henrik Schunk
- 09:25 - 09:45 Introduction by Martin Hägele
- 09:45 - 10:15 **Prof. Henrik I. Christensen**
Reshaping robotics to address new opportunities
- 10:15 - 10:45 Prof. Markus Schwarz / Dr. Robert Boesecke
Industrial robot and custom made solutions for orthopaedic and trauma / Computer aided surgery research projects at the University Hospital Heidelberg
- 10:45 - 11:15 Dr. Marc Ronthaler
Mobile robots are actors in the internet of things
- 11:15 - 11:30 Coffee break
- 11:30 - 12:00 Florian Weißhardt
Care-O-bot-Research: Providing robust robotics hardware to an open source community
- 12:00 - 12:30 Sorin Grigorescu
FRIEND - Robust machine vision in assistive robotics tasks
- 12:30 - 14:00 Lunch & Exhibition
- 14:00 - 14:30 **Prof. Bruno Siciliano**
Fast visual grasp of unknown objects with a multi-finger hand
- 14:30 - 15:00 Thomas Haase
Intelligent control and reactive grasping for multi-finger grippers
- 15:00 - 15:30 Prof. Rezia Molfino
Robotic handling of limp, soft, near 2D material
- 15:30 - 16:00 Coffee break
- 16:00 - 16:30 Prof. Darius Burschka
GRASP - Cognitive grasping through emulation, introspection and surprise
- 16:30 - 17:00 Dr. Stefano Saliceti / Dr. Ryad Chellali
Environment for qualitative and quantitative evaluation of grasping effectiveness using embedded sensory feedback / Mapping human hand motion to 3-finger robotic hand - preliminary results
- 17:00 - 18:30 Discover SCHUNK (optional)
- 18:30 Get-together party

Thursday, February 25, 2010

- 09:00 - 09:15 Recap Day 1 by Martin Hägele
- 09:15 - 9:45 **Prof. Antonio Bicchi**
Variable impedance actuators for adaptive robotics
- 09:45 - 10:15 Sami Haddadin
Next Generation Robots: From robotic co-workers to intrinsic compliance
- 10:15 - 10:45 Eric Berger
ROS and PR2 - Platforms for personal robotics
- 10:45 - 11:00 Coffee break
- 11:00 - 11:30 Dr. Danijela Ristic
RoboWalker – A mobile robot-assisted gait rehabilitation system
- 11:30 - 12:00 Prof. Mike Stilmann
Robotics and intelligent machines
- 12:00 - 13:15 Lunch & Exhibition
- 13:15 - 13:45 **Rainer Bischoff**
Towards closer academia-industry cooperation and faster technology transfers in robotics
- 13:45 - 14:15 Thomas Bömer
Safety of collaborative robots in industry
- 14:15 - 14:45 Diego Compagna
The insertion of service robots in environments of high social complexity
- 14:45 - 15:00 Coffee break
- 15:00 - 15:30 Dr. Reinhard Lafrenz
ECHORD – European clearing house for open robotics development
- 15:30 - 16:00 Prof. Michael Hofbauer
Modular Machines – reconfigurable mobile robots for research and education
- 16:00 Close-up & conclusion

Lectures and discussions will be given in English.
Preliminary program. Changes may occur.

Location:
SCHUNK GmbH & Co. KG,
Wilhelm-Maybach-Str. 3,
D-74336 Brackenheim-Hausen



Eric Berger
Willow Garage**ROS and PR2 - Platforms for personal robotics**

Personal robotics and mobile manipulation have the potential to improve the quality of life for people across a variety of specific applications. To develop those applications, open platforms which support development of robotics applications and promote sharing code and results for both companies and academic researchers are essential.

The combination of ROS software and the PR2 robot provides a platform which supports a wide variety of applications and integrates many key pieces of functionality into an open and extensible system that is designed to support development. ROS software has also been ported to and interfaced with many other hardware and software systems to provide reusable capabilities and a framework for sharing code between robots effectively to enable successful research and application development.

Prof. Antonio Bicchi
University of Pisa**Variable impedance actuators for adaptive robotics**

To address the problem of harnessing the increased complexity of Variable Impedance Actuators (VSA) design, we consider the enumeration of all possible arrangements of two prime movers (elementary motors), two harmonic-drive gears, the output shaft, and the interconnections (either rigid or elastic). We discuss an automated algorithm to search and present a reduced number of feasible basic designs and propose a quasi-static model of VS actuators used for performance analysis. One of the designs obtained is prototypically implemented.

Rainer Bischoff
Kuka Roboter GmbH / EUROP**Towards closer academia-industry cooperation and faster technology transfers in robotics**

European robotics stakeholders are currently engaging in a number of activities which are geared towards a closer academia-industry cooperation and faster technology transfers. In this talk these activities are introduced as first steps towards the implementation of the recently elaborated Strategic Research Agenda of European Robotics.

Prof. Markus Schwarz / Dr. Robert Boesecke

University of Heidelberg / PRECISIS AG

Industrial robot and custom made solutions for orthopaedic and trauma surgery / Computer aided surgery research projects at the University Hospital Heidelberg

Orthopaedic and trauma surgery was identified as application area of industrial robot technology early. Approx. 70 systems can be identified in this medical field with several applications worldwide. Most of them are in the state of development. Application-specific developments may induce more acceptance of robotic devices in the operating theater.

Four research projects for surgical applications in the patient's head are summarized, with robotical and optical technologies applied. The pre-clinical research program COMPUSURGE aims to evaluate technologies for more precise and less invasive surgery technologies. The program is funded by the FP6 research activities of the European Commission.

**Thomas Bömer**

Institute for Occupational Safety and Health (IFA)

Safety of collaborative robots in industry

The new standard EN ISO 13849-1 serves as a basis for evaluation of the functional safety of complex machine controls such as robots controls and their protective devices. The IFA has provided a report explaining the application and a supporting software tool named SISTEMA. When the industrial robot standards ISO 10218 was revised the new application field of collaborative robots was added. Acting on an initiative of a German expert committee for machine safety the IFA, formerly BGIA established within a project limit values for injury criteria for all regions of a simple body model.

**Prof. Darius Burschka**

TU München

GRASP – Cognitive grasping through emulation, introspection and surprise

Our cognitive system uses the surprise event to trigger the learning about the scene and to trigger its own actions as responses to the external stimuli in the environment. We consider the visual and haptic perception as the stimuli generating the input for our cognitive processing. This multi-modal sensor input will allow to extract the initial information about foreground objects in the scene, to classify them, and to match them to already known representations in the Atlas (long-term memory). We present our way of data processing in an off-line (long-term memory) and online (working memory) representation.



Dr. Stefano Saliceti / Dr. Ryad Chellali

Italian Institute of Technology (IIT)

Environment for qualitative and quantitative evaluation of grasping effectiveness using embedded sensory feedback / Mapping human hand motion to 3-finger robotic hand – preliminary results

Dexterous manipulation allows complex and high added value performances in industry. Programming robot's effectors is a challenging task even with anthropomorphic structures. Redundancies and sensing capabilities of human hands are far beyond existing robotic hands. The work undertaken presented aims at the development of an open platform providing full control and sensing of a manipulator equipped with SCHUNK SDH.

This research is splitted in two main topics, the first is focused on the application and the software development needed to use with proficiency the pressure sensors embedded in the SDH while the second is dealing more with fundamental research and the transforms needed to map the human space into the robot space.

**Prof. Henrik I. Christensen**

Georgia Institute of Technology

Reshaping robotics to address new opportunities

Traditionally robots have been designed for repeatability and engineered environments. The new industrial applications are for service tasks where dexterity, robustness and interactivity are much more important. This poses new challenges in the design of robot system. The new applications impacts all aspects of the robot system from mechanical design over software architectures and perception to human robot interaction. The key drivers for design of successful systems for the real-world will be reviewed and a number examples will be presented.

**Diego Compagna**

University of Duisburg-Essen

The insertion of service robots in environments of high social complexity

The successful development of autonomous mobile-robot-assistants depends significantly on the well-balanced reconcilements of the technically possible and the socially desirable. Based on empirical research substantiated conclusions can be established for the suitability of a user-centered approach for the insertion of robot assistants and automated guided vehicle systems in an environment of stationary maintenance care facilities for seniors.



Sorin Grigorescu

University of Bremen

FRIEND – Robust machine vision in assistive robotics tasks

In this talk the semi-autonomous robotic system FRIEND (Functional Robot arm with friENdly interface for Disabled People), designed to assist patients with impairments of their upper limbs in their daily life activities and professional life, will be presented together with the novel machine vision system ROVIS (RObust machine Vision for Service robotics). ROVIS is based on the concept of inclusion of feedback control at image processing level for improving the precision of object detection with respect to external and provide reliable information for object grasping by a robotic manipulator.

**Thomas Haase**

Karlsruhe Institute of Technology (KIT)

Intelligent control and reactive grasping for multi-finger grippers

The integration of multi-finger grippers in most modern industrial arrangements decisively depends on their abilities. New intelligent control systems as well as integrated reactive grasping skills are necessary to simplify the handling and the user interaction with robot hands. The talk indicates current research results and presents a view of upcoming main focuses and development targets at the example of the SCHUNK SDH.

**Sami Haddadin**

German Aerospace Center (DLR)

**Next Generation Robots:
From robotic co-workers to intrinsic compliance**

The first part of the talk deals with the realization of a sensor based robotic co-worker that brings robots closer to humans in industrial settings and achieves close cooperation. I will describe our design methodologies, exteroceptive sensing methods, control and motion algorithms and HRI schemes. The second part covers variable compliance actuation that implements soft-robotic features mainly in hardware.

**Prof. Michael Hofbauer**

University for health sciences, medical informatics and technology

Modular Machines – reconfigurable mobile robots for research and education

The diverse applications of mobile robots lead to a wide variety of drive-geometries and drive-functionalities. To support this we propose a modular platform to quickly (re-)configure various robot drives and build configurable multi-robot systems. We developed a novel model-programmed procedure for on-line kinematics reasoning, which also captures the mobility-implications of operational modes and faults in the drive.



Dr. Reinhard Lafrenz

TU München

ECHORD – European clearing house for open robotics development

ECHORD is an EU-funded project aiming to strengthen the cooperation between scientific research and industry in robotics. There has been a long history of outstanding research and development in both robot manufacturers and research institutes. However, finding common ground between manufacturers and the research community, especially concerning the future direction of robotics research, has proven difficult in the past. Thus, ECHORD will act as a “clearing house” to streamline successful know-how transfers.

**Prof. Rezia Molfino**

Univeristy of Genova

Robotic handling of limp, soft, near 2D material

The lack in available technology and systems for robust handling of limp, synthetic and natural materials is one of the major hindrances to the extended robotization of the high human-labor intensive sectors like these of textile, leather, plastics and garment manufacturing. Several handling operations occur along the manufacturing process of any such goods.

The talk presents modular mechanism architectures set-up for limp material handling combining purposely developed picking modules that enable firm, robust, reliable hold and a gentle handling of limp items.

**Dr. Danijela Ristic**

University of Bremen

RoboWalker – A mobile robot-assisted gait rehabilitation system

Gait rehabilitation after neurological injury is a long and exhausting process that demands a high physical and psychological effort from the patient and the therapist. To provide an effective gait rehabilitation a mobile robot-assisted system is proposed, which provides users with functionalities such as adequate body weight support, an electro-mechanical system for helping patient to complete movements, and an “assistance-as-needed” and markerless vision based measurement system for gait analysis and evaluation of rehabilitation progress.

**Dr. Marc Ronthaler**

German Research Center for Artificial Intelligence (DFKI)

Mobile robots are actors in the internet of things

In future smart labels will give products a memory and support intelligent logistics. By the use of integrated sensors, relations in the production process become transparent and supply chains as well as environmental influences retraceable. Object information stored on the product can support robots in processes like loading and unloading of non-uniform packaged goods. Based on this information, a manipulator can automatically adapt to an object with regard to e.g. size, weight, and handling information.



Prof. Bruno Siciliano

University of Naples

Fast visual grasp of unknown objects with a multi-fingered hand

The presented method is composed of an object surface reconstruction algorithm and a local grasp planner. The reconstruction algorithm makes use of images taken by a camera mounted in an eye-in-hand configuration. Running in parallel to the reconstruction algorithm, the grasp planner moves the fingertips, floating on the current available reconstruction surface, achieving a planar equilateral grasp according to suitable hand kinematic indices. Experiments are presented, showing the effectiveness of the proposed algorithm.

**Prof. Mike Stilmann**

Georgia Institute of Technology

Robotics and Intelligent Machines

The Humanoid Robotics Lab at Georgia Tech is developing robots that that look, think and act in a way that we perceive as human or intelligent. Dexterous, mobile robots that resemble human beings are a reality. We design algorithms for planning, learning and control that enable these robots to autonomously perform human tasks. We believe that reasoning about body posture, choosing meaningful contacts and performing useful manipulation that is unspecified in a robot's task expands the skillset of current robots. Furthermore, it demonstrates progress towards artificial intelligence in the physical world.

**Florian Weißhardt**

Fraunhofer Institute for Manufacturing, Engineering and Automation (IPA)

Care-O-bot-Research: Providing robust robotics hardware to an open source community

The development of complex service robot calls for new, powerful platforms that make the required sensors and actuators available in a compact form. To be able to focus the necessary development work on the actual key areas of research, there is a need for high reliability of the robot hardware, open hardware drivers, suitable visualizations and simulations of the robot and a large possible number of freely accessible software components for robot control. Care-O-bot[®] 3 Fraunhofer IPA offers such a hardware platform, in combination with an open-source driver stack for different frameworks.



Your initiator of the Expert Days

SCHUNK is both a family-owned business and a global player. The company was founded in 1945 and today has more than 1,700 employees worldwide. With leading technology, SCHUNK offers solutions for current and future customer requirements in tooling/workholding and automation.

In the field of automation, SCHUNK has developed and manufactured state-of-the-art grippers, rotary actuators, linear modules, and customer specific special solutions for more than 20 years.

In the area of modular robotics, the company is one of the most innovative players in the market. The philosophy "from a single component to a complex robotic structure" forms the basis for impressive yet economic solutions in industrial and service robotics.

In constant cooperation with research authorities and partners, SCHUNK faces the challenge of intelligently shaping needed future technologies.

REGISTRATION & ACCOMMODATION

For registration to the Expert Days, please complete the form online under www.expertdays.schunk.com

You will receive a confirmation for your registration by return.

Registration fee for companies: € 450,-

Registration fee for universities: € 290,-

We have booked rooms in various hotels in Lauffen and the neighbourhood. You can make your online reservation via the Expert Days registration form.

EXHIBITION

SCHUNK offers you the possibility to present your products in a show room during the conference free of charge.

Moreover, you may introduce your product(s)/company/institute on a poster, sized 70 x 100 cm at a small charge.

For further information, please visit: www.expertdays.schunk.com

If you have any questions please don't hesitate to contact us – our details are:



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