

## Industry Forum

# Bridging the Gap between Academia, Industry, and Government to Benefit End-Users

2012 International Conference on Robotics and Automation (ICRA'12)

May 15, 2012 8:30 AM – 5:30 PM

Saint Paul River Centre

Organizers:

**Raj Madhavan, Ph.D.** (University of Maryland, College Park & National Institute of Standards and Technology, USA) &

**Rainer Bischoff, Ph.D.** (KUKA Laboratories, Germany)

The ICRA'12 industrial forum will focus on bridging the gap between academia, industry and government by bringing together experts, leaders, and practitioners from diverse domains and from across the world to provide a truly global perspective. Similar efforts have been undertaken in the United States, Europe, and Asia with mixed results. You will hear from researchers, vendors, and funding agencies on their experiences and roadblocks they have encountered.

A panel discussion will conclude the forum to foster dialog between participants and speakers. Based on the discussions stemming from the entire day, a white paper will be published with an action plan to go from where we are to where we can. The target audience of the forum is end-users, developers, vendors, and anyone who is interested in robotics and automation technologies.

In addition to the main theme, the following topics will be addressed during the forum:

- How can industry and academia work together by actively collaborating and acknowledging differences in practices, implementations, and mindset?
- What can government agencies do to foster such collaboration and facilitate innovation and technology transfer?
- How can the end-users and the community at-large benefit from the above three groups working as a cohesive whole?
- What are known (and hidden) and not-so-widely discussed barriers and roadblocks?
- What is the role of standardization and ad-hoc standards and best practices?
- Can the support of entrepreneurship address some of the aforementioned problems?
- How can we leverage existing know-how and target the low-hanging fruit as well as long-term issues in a collaborative fashion?

## Agenda

- 0830-0840 Introduction & Welcome: Dr. Raj Madhavan & Dr. Rainer Bischoff
- 0840-0900 Opening Remarks: IEEE-RAS President, Prof. David Orin & IEEE President-Elect, Dr. Peter Staecker
- 0900-1030 Invited Talks
  - ***Delivering Innovation***, Dr. Tom Wagner, Chief Technical Officer, iRobot
  - ***Medical Robotics—New Platforms and Collaborative Development Models***, Dr. Dan Jones. & Dr. Simon DiMaio, Intuitive Surgical
  - ***Technology Transfer for the Benefit of End users: The DLR-KUKA Lightweight Robot Success Story***, Dr. Rainer Bischoff & Dr. Alin Albu-Schaeffer, KUKA Laboratories
- 1030-1045 Coffee Break

- 1045-1145 Invited Talks
  - ***Advancement of Korea Robotics Industry with Collective Effort among Academia, Industry and Government***, Prof. Sukhan Lee, Dean of Graduate School & Director, Intelligent Systems Research Center, Sungkyunkwan University
  - ***Integrating Research from Academia to Industry***, Prof. Henrik Christensen, KUKA Chair of Robotics & Director, Center for Robotics and Intelligent Machines, Georgia Tech.
- 1200-1430 Lunch (provided) & ICRA '12 Plenary
- 1430-1600 Invited Talks
  - ***Building Bridges through Consensus & Standards***, Dr. Jim Wendorf, Director of Industry Connections, IEEE Standards Association
  - ***European Collaborative Research in Robotics - From FP7 toward Horizon 2020***, Mr. Libor Kral, Head, European Commission Unit E5 - Cognitive Systems, Interaction, Robotics
  - ***Gearing up and Accelerating Cross-fertilisation between Academic and Industrial Robotics Research in Europe***, Prof. Bruno Siciliano, University of Naples
- 1600-1615 Coffee Break
- 1615-1715 ***Panel Discussion***
- 1730 Adjourn

## Titles & Abstracts

### **Delivering Innovation**

***Tom Wagner, Ph.D. iRobot***

The theme of the Industrial Forum is “Bridging the Gap between Academia, Industry, and Government to Benefit End-Users.” This theme alone articulates a set of issues ranging from stakeholder alignment to the complexities of getting innovative technology incorporated into a robotic product that others can use. This talk will not provide “the” answer. Instead I hope to share a few thoughts and insights on these topics that might assist those who want greater impact for their technology and have a passion for making things happen.

### **Medical Robotics—New Platforms and Collaborative Development Models**

***Dan Jones, Ph.D. & Simon DiMaio, Ph.D. Intuitive Surgical***

Just in the past few years, medical robotic platforms—such as the Accuray CyberKnife®, the Mako Rio®, the Intuitive Surgical da Vinci®, and others—have started to have significant clinical impact. Next-generation surgical systems are now on the horizon, and the research community is contemplating exciting new technologies that could extend computer-assisted surgery even further. This presentation will examine the origins of the da Vinci tele-robotic system, its present capabilities and limitations, new technologies on the horizon, and how we might see such platforms evolve in the future. Given the theme of this Industrial Forum, this presentation will focus on issues and challenges in bringing new medical robotic platforms from lab to hospital, including: 1) government sponsorship of early platform development; 2) regulatory barriers to commercialization; 3) challenges in clinical adoption; and 4) effective models for industry-academia collaboration.

## **Technology Transfer for the Benefit of End users: The DLR-KUKA Lightweight Robot Success Story**

*Rainer Bischoff, Ph.D. & Alin Albu-Schaeffer, Ph.D. KUKA Laboratories*

Innovation at KUKA Roboter is seen as a core component of the company's business strategy. Innovation becomes a reality when research results are transformed into products, so that these products can be bought and people gain employment. KUKA has a track record of successful collaboration with academia and has managed very often to turn the outcome of collaborative research projects into successful products. The latest innovation in this sense is the KUKA-DLR Lightweight Robot (LWR). After many innovative steps, first at DLR, later at DLR and KUKA, both partners managed to successfully go the strenuous road from the original invention, an idea made manifest in 1991 with the first mechanical structure and 1995 with the first working demonstrator, to prototypes produced in a small series in 2006 and zero series products starting in December 2008. The main motivating force behind the lightweight robot development is to revolutionize the applicability of robotics in our society. Robots should become available not only on the shop floor, but also at our homes, offices, in the public and in space. Looking at the future of automation, robots will not only be stupid machines carrying out dull and dangerous work and being caged behind fences, but work as robot assistants in close proximity of, and in cooperation with, humans. In this shared industry-academia presentation, we will shed light on both sides of the technology transfer and how government funding, entrepreneurship and perseverance of key developers helped to overcome major hurdles.

## **Advancement of Korea Robotics Industry with Collective Effort among Academia, Industry and Government**

*Sukhan Lee, Ph.D. Sungkwan University*

Robotics has been chosen by the Korean government as one of the technical fields strategically important for the future economic growth. The government investment in robotics R&D for a window of future horizon has also been ensured by the, so called, robot law. Under the above framework, a significant amount of effort is underway by academia and industries altogether to advance not only R&D but also industrialization and commercialization in robotics, in particular, of service robots of domestic/personal and professional uses as well as of industrial robots for smart automation. This talk addresses a recent progress of Korea robotics industry by introducing several significant R&D and commercialization drives, including the service robots for home cleaning, education, elderly/disabled care, surgery/medicine, rescue/firefighting as well as the next generation of robotic automation for automobile, ship building and electronics manufacturing, that exemplify a collective effort among academia, industry and government.

## **Integrating Research from Academia to Industry**

*Henrik Christensen, Ph.D. Georgia Institute of Technology*

The US National Robotics Roadmap outlines a number of key challenges for growing the robotics sector across manufacturing, healthcare and services. In order to do this there is not only a need do transformative research, but also a need to consider how this research can be transitioned to companies such component technologies and end-user solutions. In this presentation we will discuss models for setup of successful academia-industry collaborations and give examples of how research has been transitioned into real applications.

## **Building Bridges through Consensus & Standards**

*Jim Wendorf, Ph.D. IEEE Standards Association*

One of the challenges in bridging the gap between academia, industry, and government is finding a neutral, supportive environment in which all of the players feel encouraged to participate, work through their differences, and reach consensus to produce a variety of shared results. The IEEE Standards Association (IEEE-SA) provides a globally recognized framework for developing consensus standards through an open process that engages industry

and brings together a broad stakeholder community. An overview will be given of the options available through IEEE-SA for building consensus across diverse communities, whether to produce formal standards documents or other forms of shared output. Some examples and experiences will be shared, that may suggest similar possible approaches for helping bridge the gap in the robotics and automation domain.

## **European Collaborative Research in Robotics - From FP7 toward Horizon 2020**

*Libor Kral* European Commission Unit E5 - Cognitive Systems, Interaction, Robotics

In the 7th Framework Programme, more than 100 projects in the area of robotics and cognitive systems have been funded with the overall amount approaching €500 million in the period from 2007 until 2011, ranging from blue-sky to more applied research. The focus has been on robotics as an enabling technology for diverse applications in real-life. 2013 will be the last year of FP7 and the relevant work programme will present a balance between continuity and transition towards the next Framework Programme (Horizon 2020). The ingredients include more emphasis on industry-led RTD topics, substantially increased effort to attract new levels of industry participation and focus on use-cases in service robotics.

## **Gearing up and Accelerating Cross-fertilisation between Academic and Industrial Robotics Research in Europe**

*Bruno Siciliano, Ph.D.* University of Naples

This talk will discuss a number of current and future initiatives aimed at gearing up and accelerating cross-fertilisation between academic and industrial robotics research in Europe. Results from the ECHORD integrating project will be presented, where jointly developed experiments are carried out enabling knowledge advancement and technology transfer from research groups to manufacturers. The improvement of cooperation between industry and academia and the enhancement of public perception of European robotics will be enlightened as the main goals of the euRobotics coordination action which has risen at the confluence of the academic network EURON and the industrial network EUROP. The undergoing efforts toward a public-private partnership (PPP) in European robotics will be introduced as a strategic means to boost current European robotics research and innovation to assure competitiveness and industrial leadership of manufacturers, providers and users of robotic technology based systems and services.