



**First International Workshop**  
on  
**Cognitive Robotics in Surgery**  
**Heidelberg & Karlsruhe, Germany**  
**26th – 28th January 2012**



**Final Program**

# The International Advanced Robotics Programme

## Background

The general objective of the International Advanced Robotics Programme (IARP) is to encourage development of advanced robotic systems that can dispense with human work for difficult activities in demanding or dangerous environments, and to contribute to the revitalization and growth of the world economy. IARP is interested in promoting initiatives that can trigger the development of novel robotic systems and of new areas of application for robotic technologies.

## Executive Committee

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Brazil	<i>L. Hsu</i>
Canada	<i>E. Dupuis</i>
China	<i>Q. Huang</i>
European Commission (Observer)	<i>W. Boch, P. Karp</i>
France	<i>P. Bidaud, E. Dombre</i>
Germany	<i>R. Dillmann</i>
Hungary	<i>L. Vajta</i>
Italy	<i>C. Moriconi</i>
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Korea	<i>M.-S. Kim</i>
Poland	<i>Maslowski</i>
Russia	<i>V. Gradetsky</i>
Spain	<i>M. Armada</i>
United Kingdom	<i>G. Pegman</i>
USA	<i>M. Reischman</i>

# Cognitive Robotics in Surgery

## Scope and Topics

The purpose of this workshop is to review and discuss research challenges and critical issues in cognitive robotics for surgery that remain challenging, unsolved or unaddressed.

Specific topics include but are not limited to:

- Knowledge- and Model-Based Surgery
- Perception – Interpretation - Action
- Telerobotics for MIS
- Endorobotics
- Multimodal Tumor Therapy with robots
- Navigation and Registration for MIS
- Semantics for robotic surgery
- Context-aware surgical assistance
- Surgical skill assessment

## Organization Committee

Heinz Wörn, Karlsruhe Institute of Technology

Rüdiger Dillmann, Karlsruhe Institute of Technology

Hans-Peter Meinzer, Germany Cancer Research Center, Heidelberg

Markus Büchler, University Hospital of Heidelberg

Roland Unterhinninghofen, Karlsruhe Institute of Technology


Stefanie Speidel, Karlsruhe Institute of Technology

Oliver Weede, Karlsruhe Institute of Technology





## International Program Committee

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E. Coste-Manière	G. Hirzinger	B. Müller
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E. Dombre	R. Kikinis	J. Troccaz
G. Ferrigno	A. Knoll	R. Unterhinninghofen
H. Feußner	T. Lüth	

# Thursday, 26<sup>th</sup> January




<b>9:00</b>	<b>Registration</b>	
<b>9:30</b>	<b>Introduction and Addresses</b> Heinz Wörn, Karlsruhe Institute of Technology Markus Büchler, University Hospital of Heidelberg	
<b>9:45</b>	<b>The International Advanced Robotics Programme</b> Rüdiger Dillmann, Karlsruhe Institute of Technology	

## Session I – Chair: Rüdiger Dillmann

<b>10:00</b>	<b>Robotic Surgery in Europe: Projects and Research Issues</b> Paolo Fiorini, University of Verona	
<b>10:30</b>	<b>Trends in surgical robotics in the CURAC Society in Germany</b> Jörg Schipper, University Hospital of Düsseldorf	
<b>11:00</b>	<b>Medical robotics research in the Heidelberg-Karlsruhe region</b> Heinz Wörn, Karlsruhe Institute of Technology	
<b>11:30</b>	<b>Medical robotics research of KIST, Korea</b> Sung-Chul Kang, Korea Institute of Science and Technology	


**12:00 Lunch**

## Session II – Chair: Paolo Fiorini

<b>13:30</b>	<b>An Overview of Medical Robotics in Great Britain</b> Ferdinando Rodriguez, Imperial College London	
<b>14:00</b>	<b>Recent Advances in Surgical Robotics in Japan</b> Kanako Harada, University of Tokyo	
<b>14:30</b>	<b>Medical robotic research activities in France</b> Phillippe Poignet, University of Montpellier	




**15:00 Coffee Break**

## Session III – Chair: Heinz Wörn




<b>15:30</b>	<b>Cognitive Aspects of the DLR MiroSurge Scenario</b> Florian Fröhlich, German Aerospace Center	
<b>16:00</b>	<b>Surgical Process Modeling: Methods and Applications</b> Pierre Jannin, University of Rennes	
<b>16:30</b>	<b>Haptics for minimally invasive surgery</b> Patrick Helmer, Force Dimension	
<b>17:00</b>	<b>Medical Robotics at KUKA</b> Cyrill von Tiesenhausen, Thomas Neff, KUKA Laboratories	

# Friday, 27th January

## Session IV – Chair: Hans-Peter Meinzer

<b>9:00</b>	<b>Medical Robots Research in the United States</b> Ron Kikinis, Harvard Medical School	
<b>9:30</b>	<b>Medical Robotics Research in Spain</b> Alicia Casals, Universitat Politècnica de Catalunya	
<b>10:00</b>	<b>Surgical robot's workspace design and operating room setup using semantic simulation engine</b> Janusz Bedkowski, Institute of Mathematical Machines	
<b>10:30</b>	<b>Coffee Break</b>	

## Session V – Chair: Ron Kikinis

<b>11:00</b>	<b>Robot assisted single access surgery</b> Hubertus Feußner, University Hospital of Munich	
<b>11:30</b>	<b>Medical robots for neurosurgery</b> Giancarlo Ferrigno, Politecnico di Milano	
<b>12:00</b>	<b>Medical robotics for minimally invasive surgery</b> Tim Lüth, Technical University of Munich	
<b>12:30</b>	<b>Lunch</b>	

## Session VI on Research Initiative "Cognition-Guided Surgery" – Chair: Markus Büchler

<b>14:00</b>	<b>Expectations and Needs regarding Cognition-Guided Surgery</b> Markus Büchler, University Hospital of Heidelberg	
<b>14:30</b>	<b>Perception and Visualization</b> Hans-Peter Meinzer, German Cancer Research Center	
<b>15:00</b>	<b>Learning and Knowledge Acquisition in Surgery</b> Rüdiger Dillmann, Karlsruhe Institute of Technology	
<b>15:30</b>	<b>Panel Discussion: Future Trends in Medical Robotics</b> Rüdiger Dillmann Hubertus Feußner, Ron Kikinis, Tim Lüth, Heinz Wörn	
<b>17:00</b>	<b>Conclusion</b>	

## Saturday, 28th January

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**9:00 Meeting at Hotel Bayerischer Hof for bus transfer to Karlsruhe**

**10:00 Lab Tour**  
Rüdiger Dillmann, Karlsruhe Institute of Technology  
Heinz Wörn, Karlsruhe Institute of Technology

**12:00 End**

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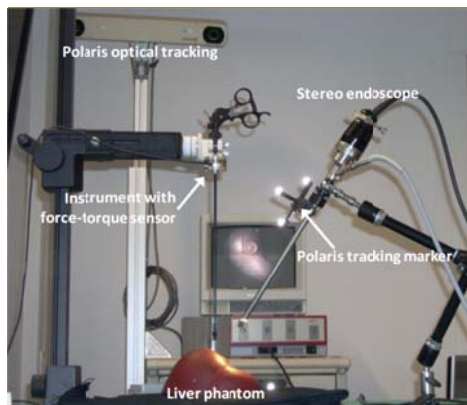
The Institute for Anthropomatics (Rüdiger Dillmann) and the Institute for Process Control and Robotics (Heinz Wörn) established a research lab in a former clinical operation room on the premises of the Karlsruhe Institute of Technology.

A number of demos related to medical robotics surgery will be shown. Among others an assistant system for stereo endoscopic minimally-invasive surgery will be demonstrated. Also, a robot for high-precision laser-based bone cutting will be presented.

Please indicate whether you intend to take part in the lab tour when registering.

### Lab tour location

Institute for Anthropomatics  
Karlsruhe Institute of Technology  
Bldg. 50.20  
Adenauerring 2  
76131 Karlsruhe



## Registration

Registration fee is 200 Euros. Please register at the workshop secretary by email. Indicate if you want to participate in the workshop dinner on Thursday evening and in the lab tour on Saturday.

### Secretary Contact

Mr. Oliver Weede  
Email [oliver.weede@kit.edu](mailto:oliver.weede@kit.edu)  
Phone +49 721 608-47122  
Fax +49 721 608-47141

## Venue

Sessions on Thursday and Friday will be held at the Communication Center of the German Cancer Research Center on the university campus of Heidelberg.

### Venue address

Communication Center  
German Cancer Research Center  
Im Neuenheimer Feld 280  
69120 Heidelberg  
Germany



## Accommodation

A number of rooms have been reserved at Leonardo Hotel Heidelberg. As there is keen demand for hotel rooms in Heidelberg, early booking is recommended. Please refer to "IARP Workshop" when booking.

Leonardo Hotel Heidelberg  
Bergheimer Straße 63  
69115 Heidelberg  
[www.leonardo-hotels.com](http://www.leonardo-hotels.com)  
[reservations.heidelberg@leonardo-hotels.com](mailto:reservations.heidelberg@leonardo-hotels.com)  
Phone +49 6221 – 508-659  
Fax +49 6221 – 508-680



## Workshop Dinner

The workshop dinner will take place at the “Brauhaus zum Ritter”, a traditional brewhouse-style restaurant near the castle of Schwetzingen. The dinner starts at 19:00 on Thursday 26<sup>th</sup>. Bus transfer will be provided. Please indicate whether you want to attend the dinner when registering.

Schwetzingen Brauhaus zum Ritter  
Schlossplatz 1  
68723 Schwetzingen  
[www.brauhaus-zum-ritter.de](http://www.brauhaus-zum-ritter.de)  
Phone +49 6202 - 924950



## Travel Information

### Travelling by train

Heidelberg is connected directly (or via Mannheim, 10 minutes) to the ICE- and IC/EC-Network of German Railways (DB). Arrival is at Heidelberg Hauptbahnhof (Central Station).

### Travelling by plane

Frankfurt Rhein-Main International Airport is located about 80 km from Heidelberg. On arrival at Frankfurt Airport, take the train to Heidelberg Central Station (with or without change in Mannheim). You may also take the Lufthansa Bus.

German Railway information and booking: [www.bahn.de](http://www.bahn.de)

