

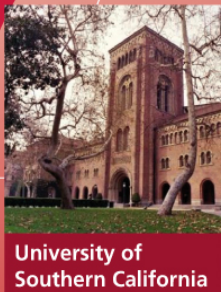
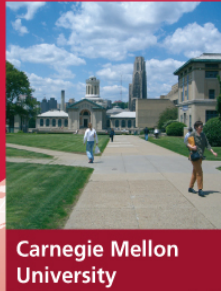
25 Years of interACT: A Success Story for International and Crossdisciplinary Cooperation

Rüdiger Dillmann

KIT-FOCUS ANTHROPOMATICS AND ROBOTICS



interACT: research competence world wide



Center Director: Prof. Alex Waibel, e-mail: alex.waibel@kit.edu

Contact: Karlsruhe Institute of Technology (KIT), interACT, Margit Rödder, e-mail: margit.roedder@kit.edu

interACT – how it all began...

- 1991: Joint lab of Alex Waibel at University of Karlsruhe and Carnegie Mellon University



interACT – how it all began...

- 2004 official foundation of the international center for Advanced Communication Technologies
- 2004 official signing @ CMU by Presidents Horst Hippler (KIT) and Jared Cohon (CMU)



interACT – how it all began...

- 2007 Hong Kong University of Science and Technology
- 2008 Waseda-University, Tokyo, Japan



*Waseda-President Shirai,
Minister Frankenberg,
Alex Waibel*

interACT – how it all began

- 2010 :
 - National Institute of Information and Communications Technology (NICT)
 - University of Southern California
 - Fondazione Istituto Italiano di Tecnologia (IIT)
- 2012 Nara Institute of Science and Technology (NAIST)



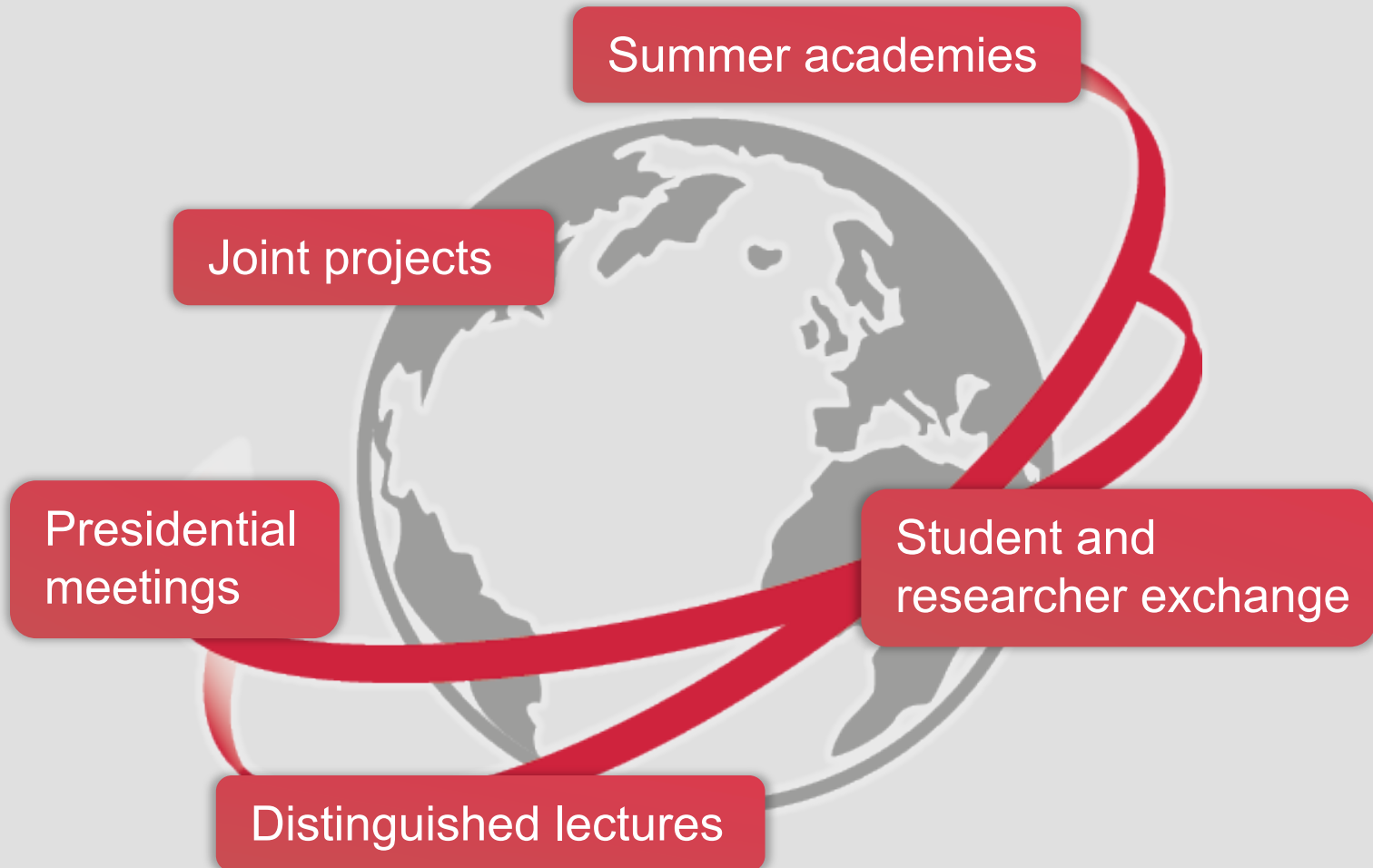
KIT-President Hippler and NAIST-President Isogai, 2012

interACT's Mission

Neither Export nor Import, but Collaboration between the Best:

- Education
 - Educate Internationally Experienced Scientists
 - Adept to work in International Teams
 - Build Alliances between the Best
- Research
 - Develop Advanced Communication Technologies
 - Build Technology that makes Collaboration and Communication Easier
 - Facilitate Joint Projects and Joint Funding

interACT's tasks



interACT Student Exchange

- 2004 – 2016: 160 students supported
- 41 Studien-, 52 Diplom-, 27 Bachelor-, 28 Master-, and 12 PhD Thesis at the partner universities



CMU-president Cohon with interACT-students at Universität Karlsruhe, June 2006

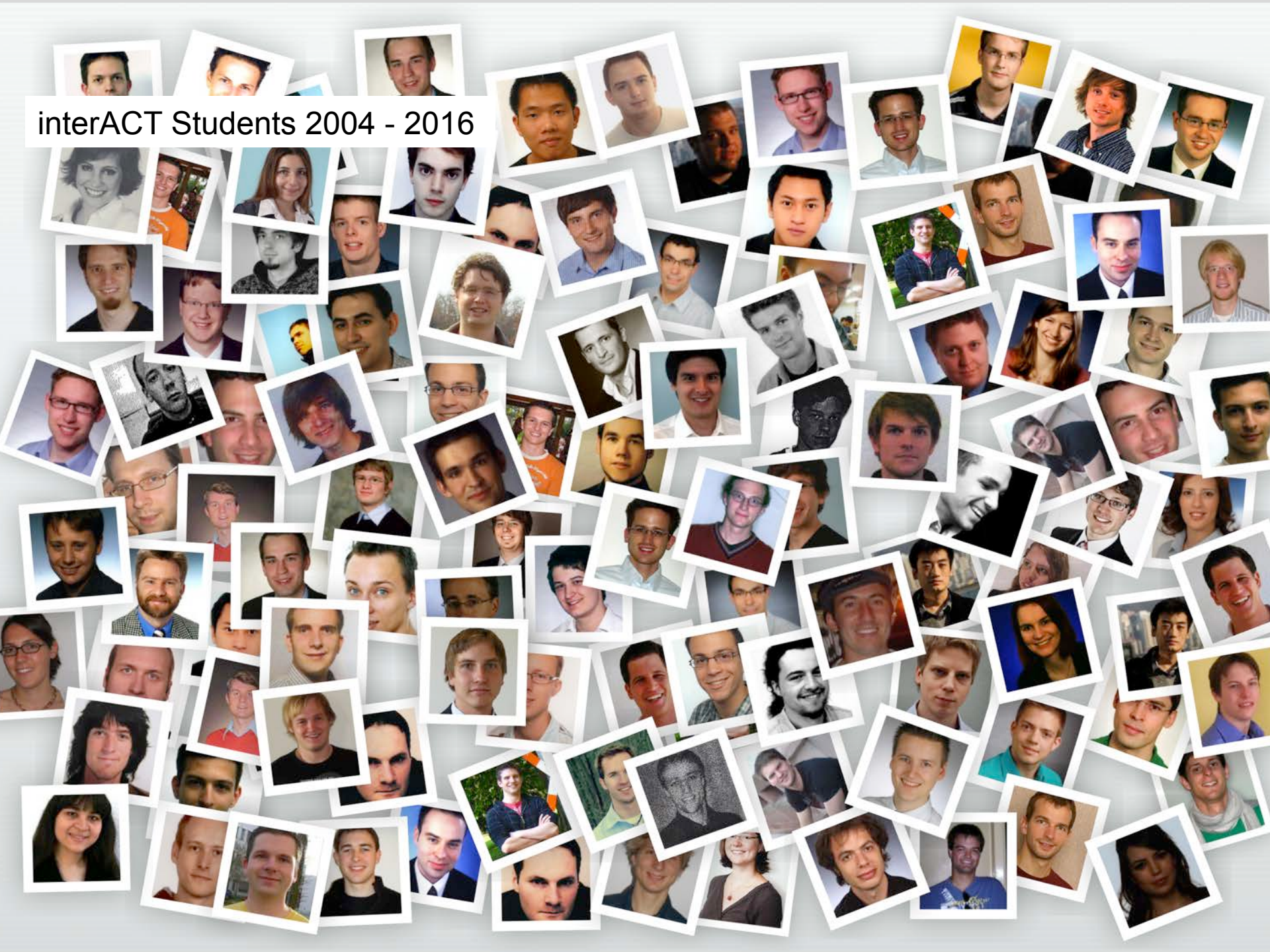


interACT students St. Gärtner, M. Völker, D. Hazer, S. Greiner, Mount Washington, Pittsburgh



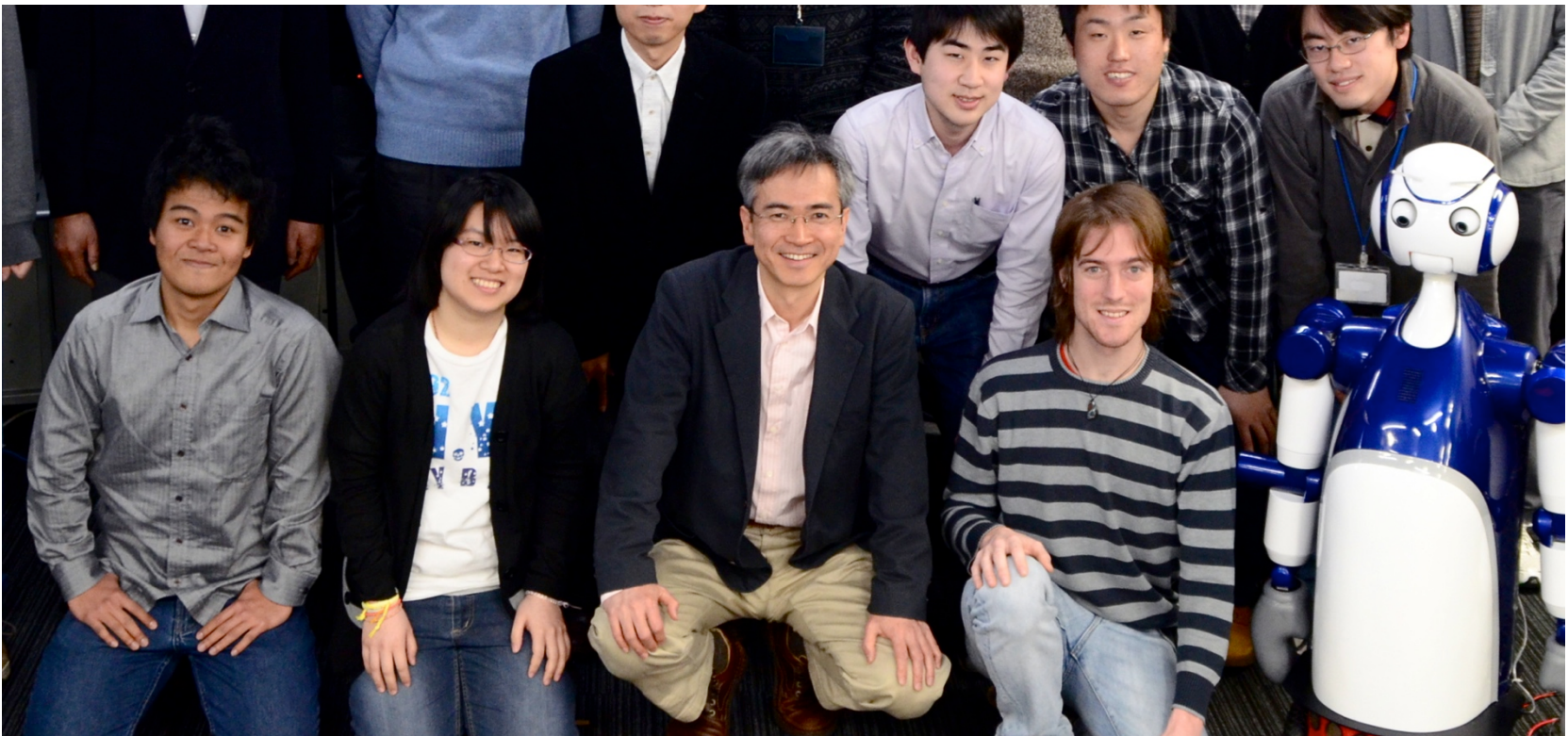
interACT students D. Telaar and A. Fritz @ HKUST

interACT Students 2004 - 2016



interACT Cooperations

- More than 75 permanent cooperations established between professors of the partners



Waseda Associate Director A. Takanishi and interACT student H. Sperr at Waseda-University

interACT Distinguished Lecture Series

- Sharing scientific know-how between partners
- Around 5 distinguished lectures per year



Tom Mitchel, CMU @ KIT, 2005



Randy Bryant, CMU @ KIT, 2013



Dekai Wu, HKUST @ KIT 2007

interACT Summer Academies & Workshops

- Research workshops and academies with cross-institutional and cross-national emphasis
- interACT organised six summer academies in the last 10 years
- Strong support of the international evaluation campaign (IWSLT)



1st summer academy on „Summarization of Spoken Language“, Pittsb. & Tokyo, 2004



IWSLT in Heidelberg, 2013



interACT-partners in the IWSLT-steering committee



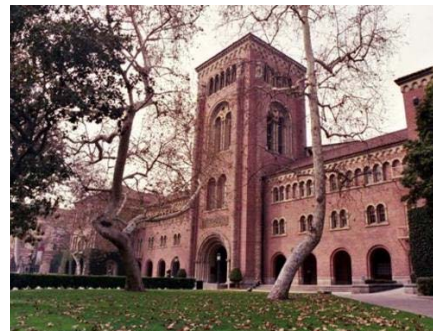
interACT-partners at IWSLT 2012 @ HKUST

interACT joint Projects and Research

- **CLICS**, interACT-Partners KIT & HKUST & Waseda & NAIST & CMU, Funding 1 Mio€ (2015-2018)
- **EU-BRIDGE**, interACT-Partner KIT & HKUST, Funding 8 Mio€, 1,5 Mio€ (nur KIT) 2012–2015
- **Babel**, interACT-Partner KIT & CMU, Budget 328.000€ (nur KIT), 2012–2014
- **Xperience** interACT-Partner KIT & IIT, Budget 1,6 Mio€ (nur KIT), 2011-2015
- **WALK-MAN**, interACT-Partner KIT & IIT, Budget: 960.000€ (nur KIT), 2013-2017
- **KoroiBot**, interACT-Partner KIT & IIT, 560.000€ (nur KIT), 2013-2016
- **Autonomes Lernen**, (Schwerpunktprogramm, DFG, NSF) (interACT-Partner, KIT & USC), 20.000€ (nur Reisekosten, KIT), 2014-2018
- **CHIL**, interACT-partners KIT & CMU, Funding: 15 Mio€, 2,4 Mio€ nur KIT, 2004–2007
- **TC-STAR**, interACT-partners KIT & CMU, Funding 5,9 Mio€, 567.500€ nur KIT, 2004– 2007

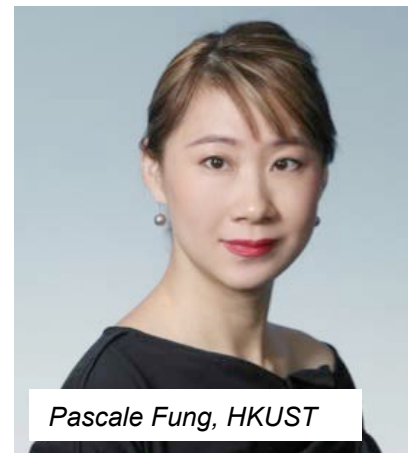
interACT Organisation

- Follows local organizational principles and operates in collaborative manner
- interACT director is Alex Waibel, associate directors at each partner
- interACT offices at all partners

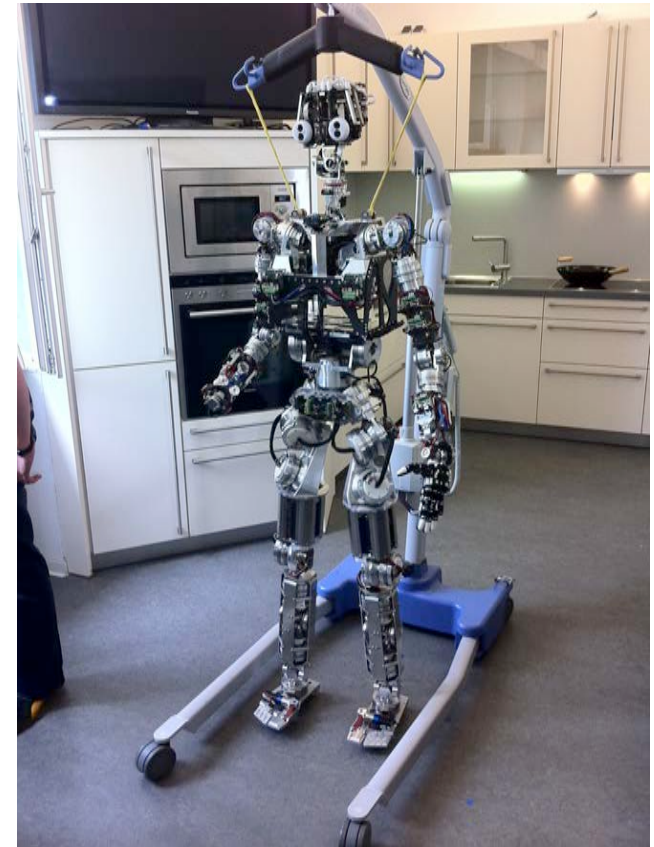
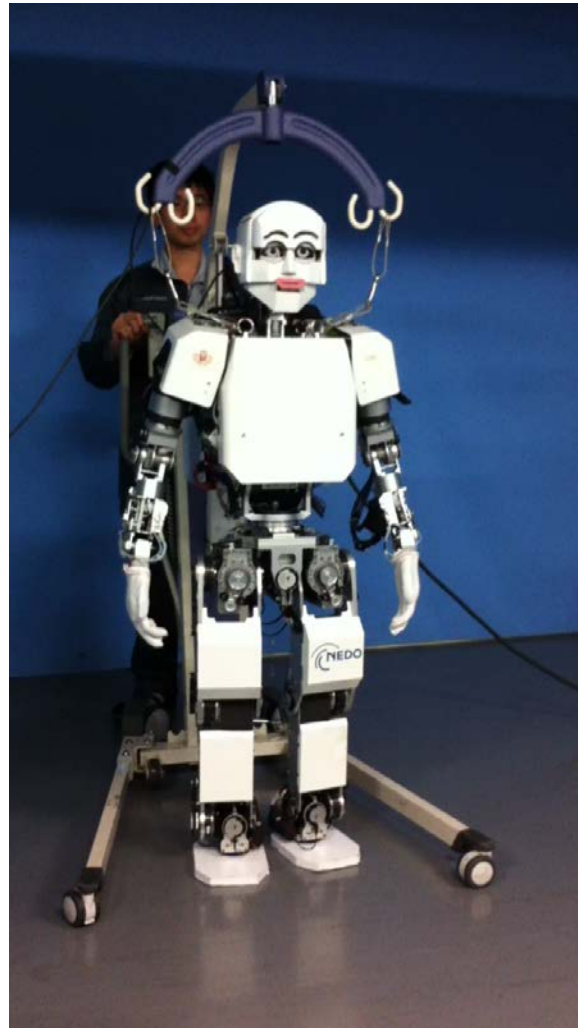
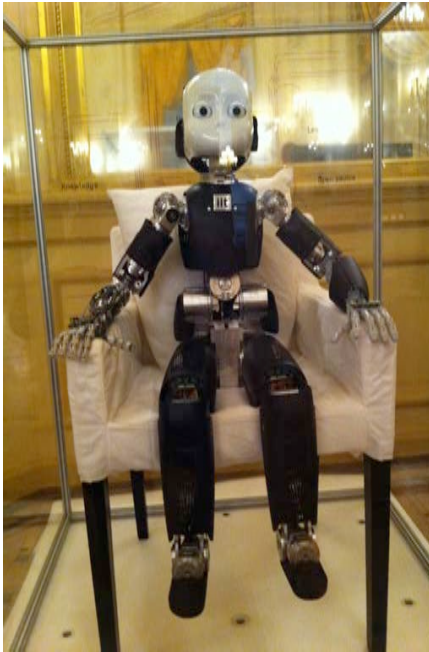


interACT Associate Directors

- Each partner appointed an associate director:



....and some of the robots within InterACT



Institute for Anthropomatics and Robotics (IAR) one of the Core Members of InterACT

KIT-FOCUS ANTHROPOMATICS AND ROBOTICS



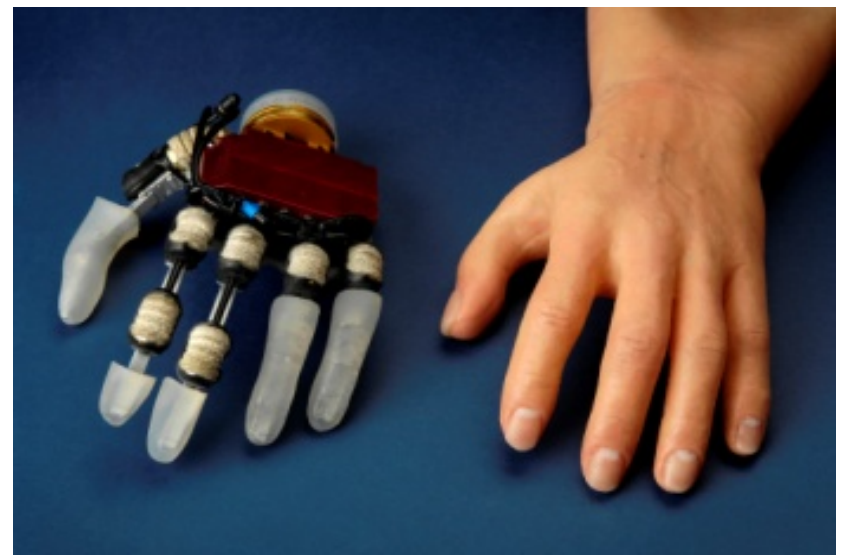
Robotics is ...

... the science of automatic handling for manufacturing, services, interaction with humans



Anthropomatics is ...

... the science of the symbiosis between human
and machine



Institute for Anthropomatics and Robotics

9 Labs, approx. 150 members

• High Performance Humanoid Technologies

Asfour



• Vision and Fusion

Beyerer



• Humanoids and Intelligence Systems

Dillmann



• Intelligent-Sensor-Actuator System

Hanebeck



• Intelligent Industrial Robotics

Hein



• Computer Vision for Human Computer Interaction

Stiefelhagen



• Interactive Systems

Waibel



• Process Control, Automation and Robotics

Wörn

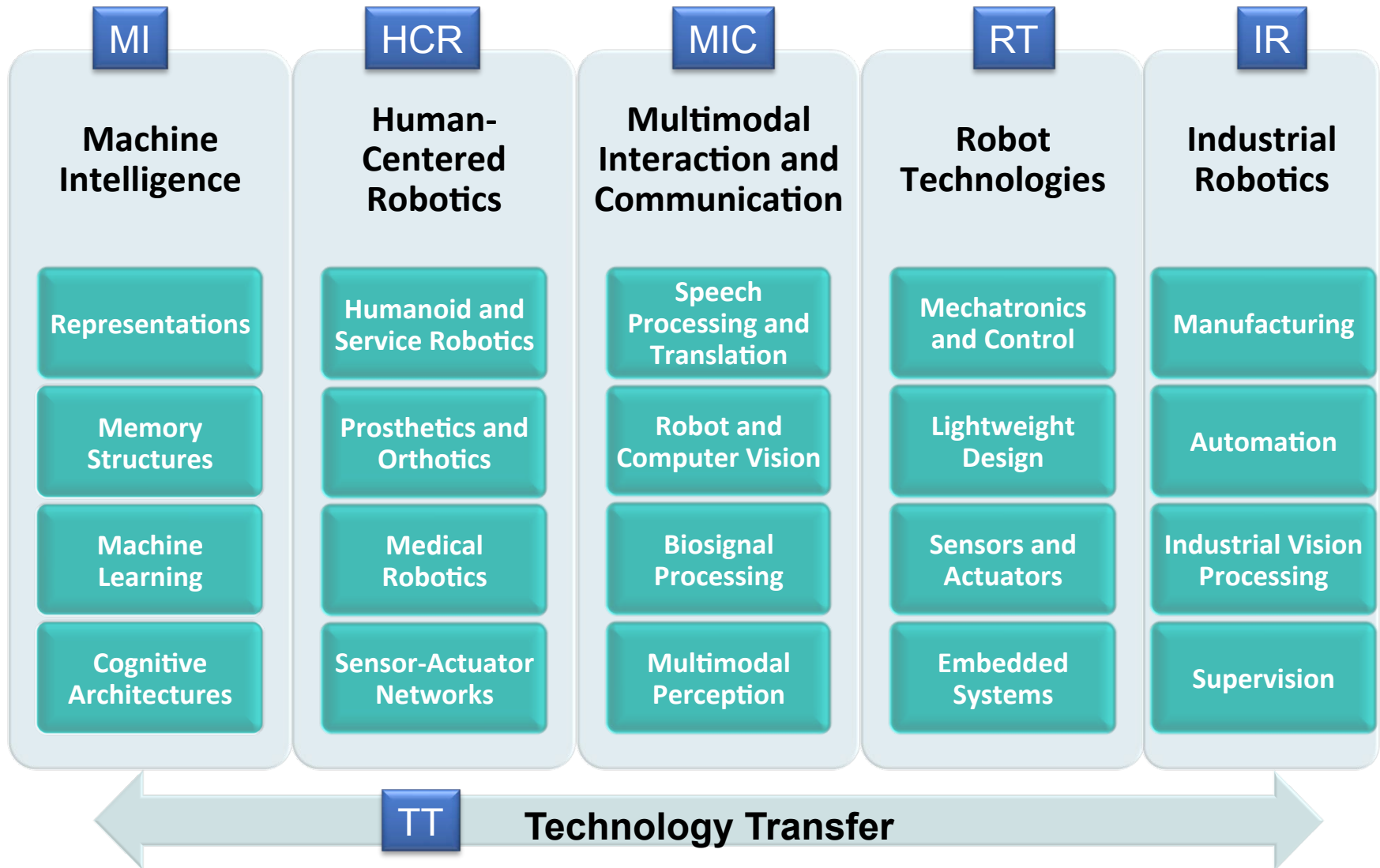


• Applied Technical Cognitive Systems

Zöllner

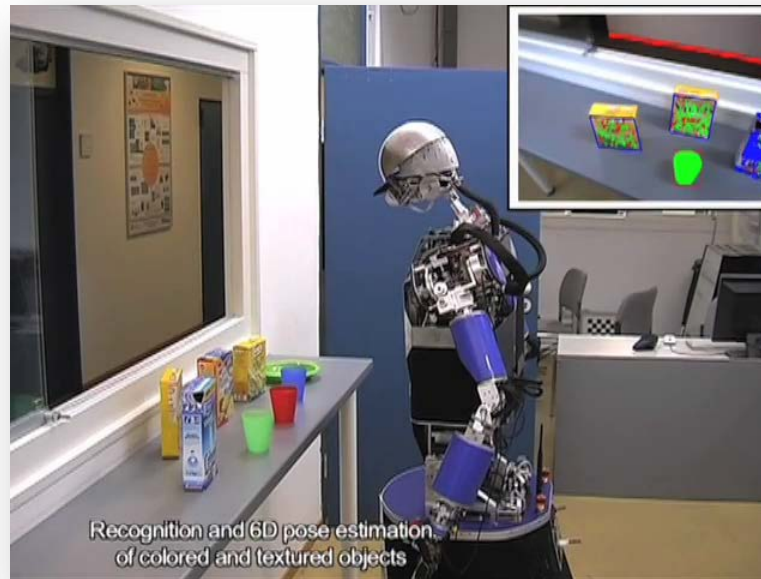


Research Topics



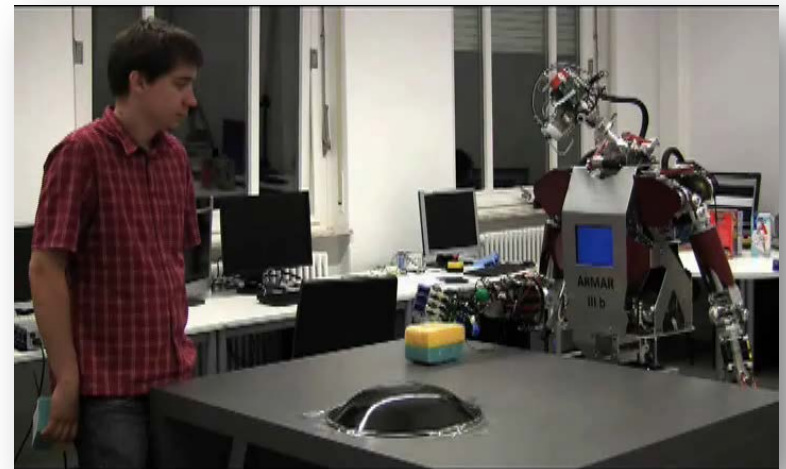
High Performance Humanoid Technologies (Asfour)

- Mechatronics and Mechano-Informatics
- Grasping and dexterous manipulation
- Learning from human observation
- Wearable robotics



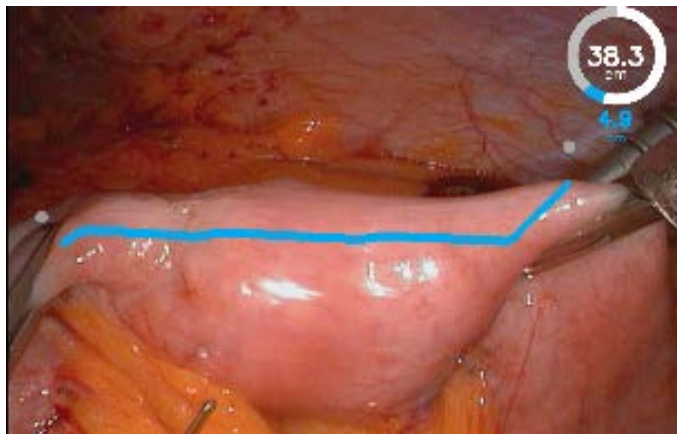
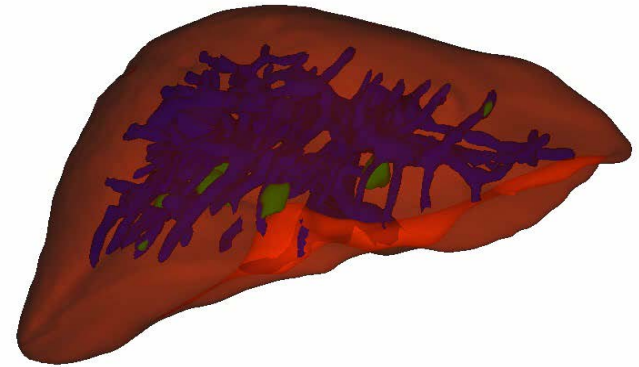
Humanoids and Intelligence Systems (Dillmann/Asfour)

- Programming by Demonstration
- Learning from human observation
- Application in humanoid and service robotics



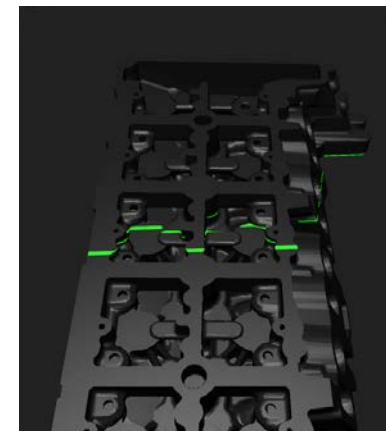
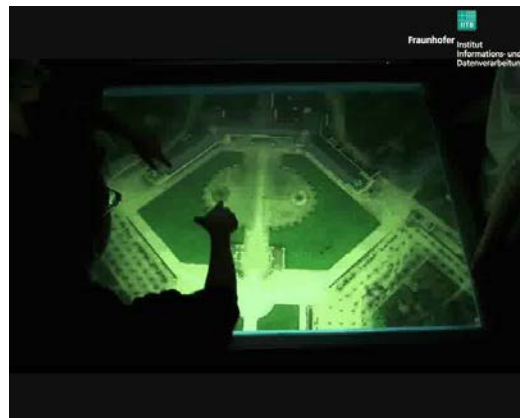
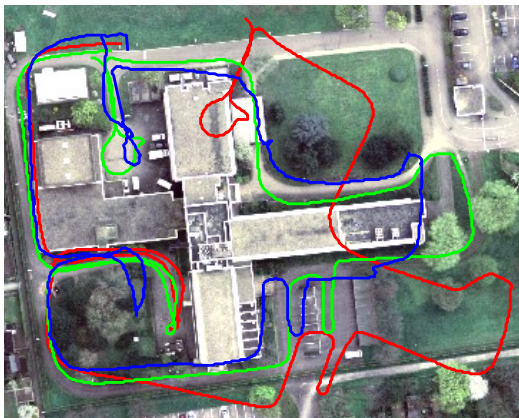
Junior Research Group Computer-assisted Surgery (Speidel)

- Surgical Vision
- Intraoperative Sensor/Workflow Analysis
- Context-aware visualization
- Biomechanical Simulation



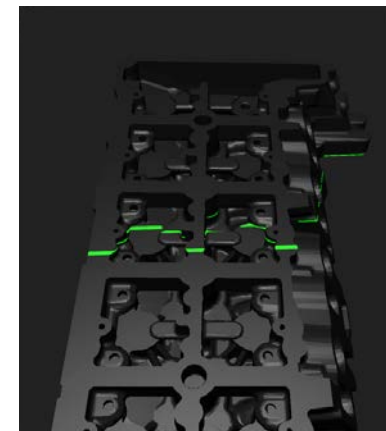
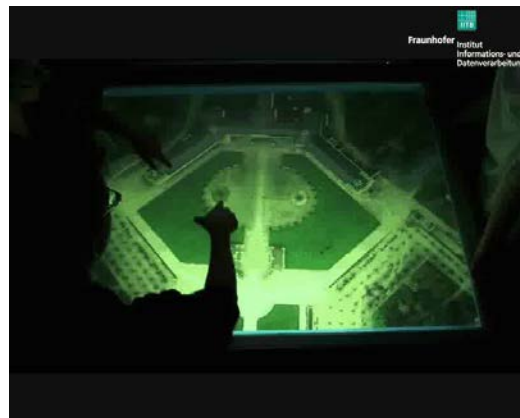
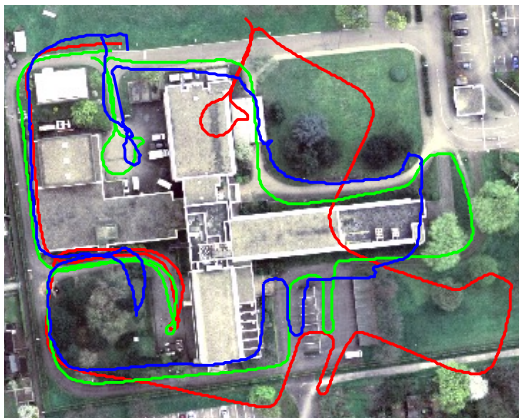
Vision and Fusion (Beyerer)

- Automated Visual Inspection
 - Deflectometry in Infrared and Visual Spectrum, Ellipsometry
 - Detection and Identification of Surface Defects
 - Underwater Vision
- Human-Machine Interaction
 - Multi-Modal Interaction Methods
 - Interaction Techniques for Augmented Reality
- Semantic World Modeling
 - Open World Modeling for Cognitive Systems
 - Smart Surveillance Systems
 - Semantic Interoperability for Manufacturing Execution Systems



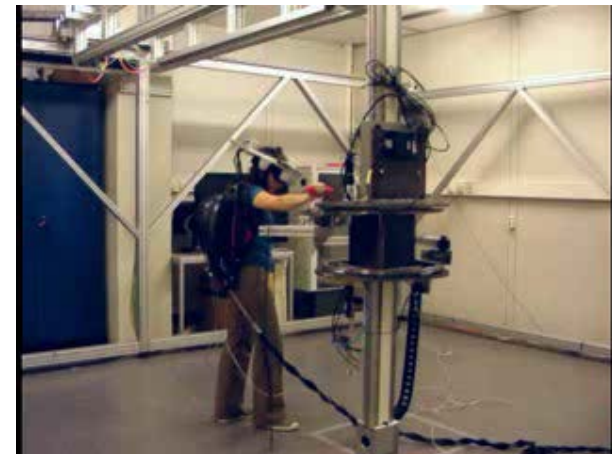
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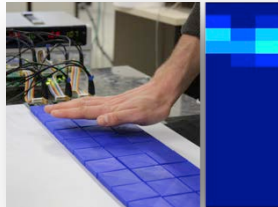
Intelligent-Sensor-Actuator System (Hanebeck)

- Extended-Range Telepresence
 - Multi-modal interface
 - Navigation by walking in arbitrary-sized environments
 - Increased degree of immersion
- Self-organizing Sensor-Actuator-Networks
- Stochastic Model-Predictive Control



Intelligent Industrial Robotics (Hein)

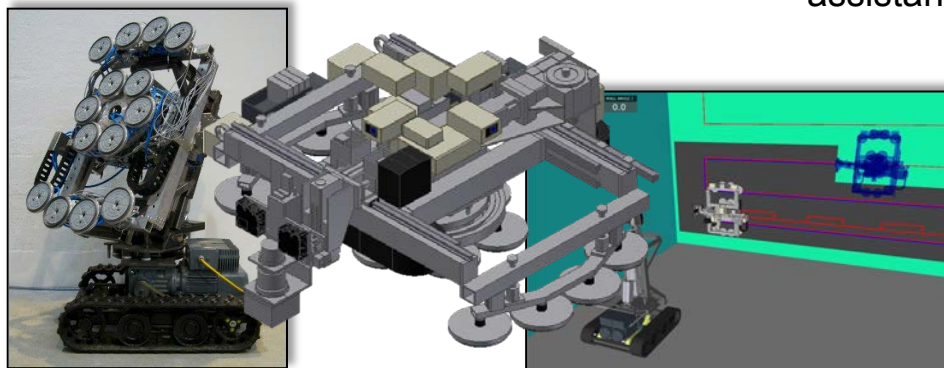
■ Interaction technologies Industrial and Service Robots



Sensors
(Proximity sensors)



Aktors
(Hard- and Software)



Interfaces
(Integrated multimodal
Sensors/Aktors)

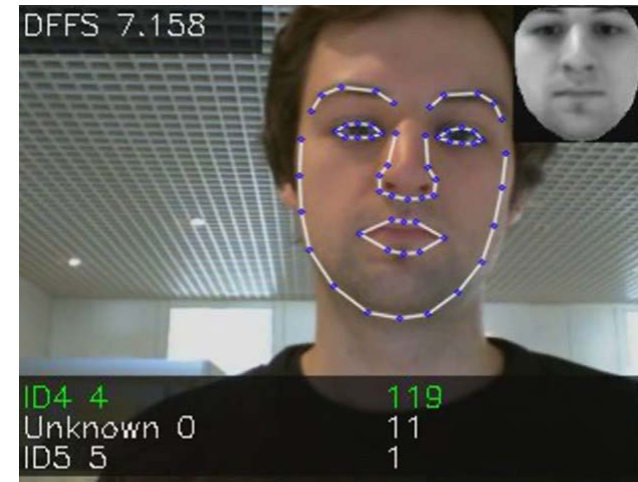
Telemanipulation
(AR-based operator
assistance)



Applications
(Dismantling of nuclear power
plants, release measurement,
Control und Programming)

Computer Vision for Human Computer Interaction (Stiefelhagen)

- Human-Robot Interaction
 - Person tracking, head and hand tracking, pointing gestures (3D), face recognition
- Smart environments
 - Smart crisis control room (work with Fraunhofer IOSB)
- Videoanalysis & Retrieval, Security, Surveillance
 - Interactive search in video
 - Recognition of politicians and VIPs
 - Gender, age, head orientation, interest, ...
- Assistance systems for visually-impaired people



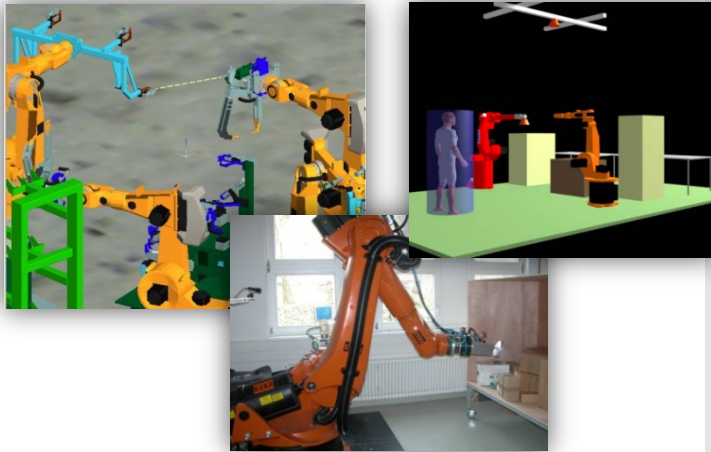
Interactive Systems (Waibel)

- Automatic Speech Recognition
- Simultaneous Machine Translation
- Translation of Lectures and Speeches
- Multimodal Dialog Systems
- Partner Laboratory at
Carnegie Mellon University,
Pittsburgh, USA

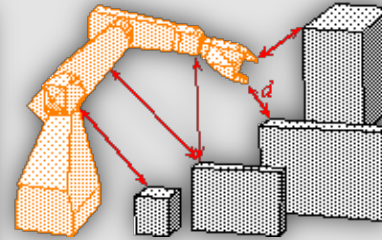


Process Control, Automation and Robotics (Wörn)

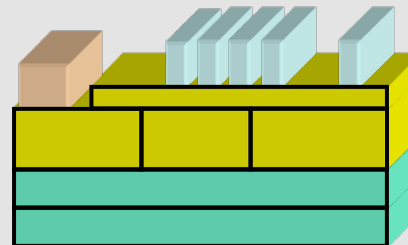
Industrial Robotics



Algorithms for Robotics



Programming,
Interaction,
Path planning,
Calibration

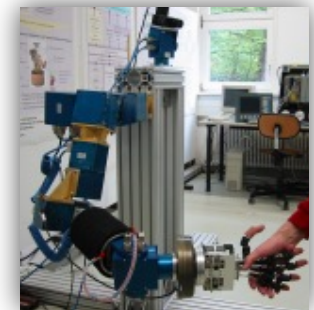


Modular control
architecture for multi-
agent systems

Humanoids and Service Robotics

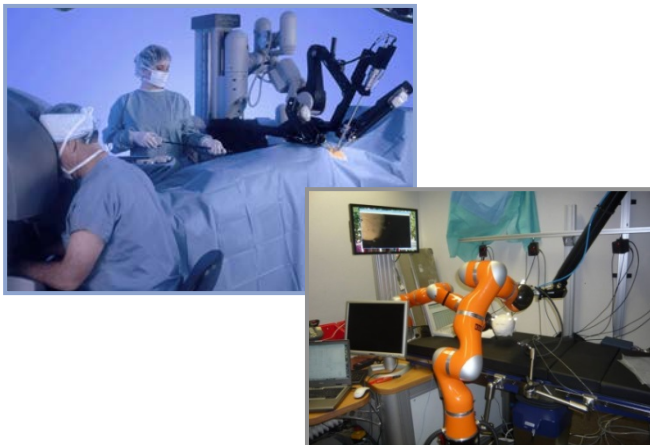


Hands

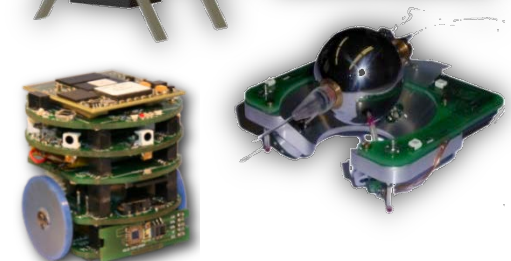
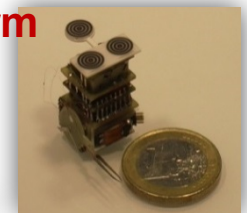


Tactile Sensors

Medical Robotics



Micro and Swarm Robotics



Success of InterACT: Bringing the People together...



Thanks for Your Attention

KIT-FOCUS ANTHROPOMATICS AND ROBOTICS

