



DFKI at CeBIT 2012
New Research Department Cyber-Physical Systems
Software Campus Sponsors Future IT-Leaders

Innovative Factory Systems at the HANNOVER MESSE



The HANNOVER MESSE (April 23-27, 2012) is one of the most important venues for technological developments in the industry, cross-sector exchange of experiences and for the implementation of creative application solutions.



In 2012, DFKI presents the SmartFactory^{KL}, the central exhibit for the field of Industrial Automation as an outlook into the future interaction of the latest technologies in industrial production that has been made come alive. Together with partners from research and industry, innovative applications and concepts from the topic areas resource efficiency, pervasiveness, automation, and mobility are impressively demonstrated.

We are looking forward to your visit to hall 8, stand D06!



Hall 8, Stand D06

Cyber-Physical Systems Present Project IGEL at the HANNOVER MESSE 2012

The goal of the recently completed project IGEL was the development of a secure cone scanner as a security device for autonomously driven industrial vehicles. The focus of the undertaking was on the innovative evaluation of measured data, a security-aimed floor level and obstacle recognition as well as a security certification according to IEC 61508. IGEL is a cooperation of the DFKI research department Cyber-Physical Systems and Götting KG, on whose stand the project will be presented.

We are looking forward to welcoming you in the "Mobile Robots & Autonomous Systems" area!

Hall 17, Stand E56



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DFKI Presents Industry 4.0, the Internet of Services, Software-Cluster and EIT ICT Labs at CeBIT

► DFKI presents itself with keynotes, talks and presentations, on panel discussions and award presentations at CeBIT lab talk, the open conference forum in the innovation hall of CeBIT, at the Webciety Forum, at the Forum AutoID/RFID, in the THESEUS Lounge, at the Robotation Academy and at the CeBIT Global Conferences. ◀

Tuesday, March 6

11:00-11:15 Opening CeBIT lab (lab talk, hall 26 (H9), J50)
Prof. Dr. Annette Schavan,
Federal Minister of Education and Research

11:30-12:00 Open Web Platform and Digital Product Memory

Opening Keynote (lab talk, hall 26 (H9), J50)
Dr. Jeff Jaffe, CEO World Wide Web Consortium, W3C

12:00-12:45 Industry 4.0: Cyber-Physical Systems as a basis for the 4th Industrial Revolution

Opening panel discussion (lab talk, hall 26 (H9), J50)
Participants: Ministerialdirektor Prof. Dr. Wolf-Dieter Lukas, BMBF; Ministerialrat Dr. Andreas Goerdeler, BMWi; Prof. Dr. Lutz Heuser, AGT Group Germany; Prof. Dr. Willem Jonker, EIT ICT Labs; Prof. Dr. Henning Kagermann, acatech; Prof. Dr. Wolfgang Wahlster, DFKI;
Presentation: Reinhard Karger, DFKI

15:00-17:30 Urban Management Summit

AGT International (Convention Center, Saloon 2)
Participants: Ernst Raue, Deutsche Messe AG; Univ.-Prof. Dr.-Ing. Dr.-Ing. E.h. Dieter Spath, Forschungsunion (Smart Cities), Fraunhofer IAO; Prof. Dr. Lutz Heuser, AGT Group Germany; Dr. Harald Olschok, Association of German Private Security Service Industry; Prof. Dr. Wolfgang Wahlster, DFKI.

15:45-16:00 Smart Robotics for High Added Value Footwear Industry

(lab talk, hall 26 (H9), J50)
Dr. Thomas Vögele, DFKI (in the framework of the EU conference ICT & Factories of the Future, lab talk, 13:15-17:30)

Wednesday, March 7

15:20-16:00 Status Quo of the Internet of Things (Webciety Forum, hall 6)
Impulse speech: Reinhard Karger, DFKI

16:00-16:30 New Processes with RFID and NFC in the Supermarket (Forum AutoID/RFID, hall 5, E50)
Speech: Prof. Dr. Antonio Krüger, DFKI/IRL

16:30-17:15 The Complementary Meaning of Barcodes, 2D Codes and RFID for the Automatic Identification (Forum AutoID/RFID, hall 5, E50)
Discussion Forum „Round Table“
Participation: Prof. Dr. Antonio Krüger, DFKI/IRL

Thursday, March 8

11:15-11:45 Seminar Series Networked Robotics (Pavillon 36, Robotation Academy)
Speech: Artificial Intelligence, Dr. Jan Albiez, DFKI

15:00-16:00 EIT ICT Labs Entrepreneurship Session

(lab talk, hall 26 (H9), J50)
15:00-15:05 Opening
15:05-15:15 Innovate with EIT ICT Labs, Klaus Beetz
15:15-15:45 Short presentations of innovators from the different EIT ICT Labs co-locations
15:45-16:00 Panel discussion with the Innovators
Participants: EIT ICT Labs innovators and business developers, Klaus Beetz.

Friday, March 9

12:00-13:00 Software-Cluster – Innovations for the Digital Enterprise: 60 Minutes – 60 Ideas

(lab talk, hall 26 (H9), J50)
Participants: SAP Research, IMC AG, DFKI, Fraunhofer IESE, TU Darmstadt, Software AG, IT FOR WORK, AGT Germany, foodQuest

11:00 Cirius – Multimodal interaction with semantic Web services and knowledge sources

(THESEUS-Lounge, hall 26 (H9), G50)
Speech: Dr. Tilman Becker, DFKI

12:00 Innovation Observation and Idea Management

(THESEUS-Lounge, hall 26 (H9), G50)
Speech: Dr. Günter Neumann, DFKI

14:00 Medical Imaging – Research, Technology and the Usage for Collaborative Diagnoses

(THESEUS-Lounge, hall 26 (H9), G50)
Speech: Dr. Daniel Sonntag, DFKI

16:00-17:00 EIT ICT Labs – Action Lines

(lab talk, hall 26 (H9), J50)
16:00-16:20 Action line - ICT for Quality of Life
Leveraging Information Society Data for Quality of Life
Roberto Saracco, EIT ICT Labs
16:20-16:40 Action line - Smart Energy, Smart Grid
Christian Huder, EIT ICT Labs
16:40-17:00 Action line - Digital Cities, Open Networks
Khaldoun Al Agha, EIT ICT Labs

Saturday, March 10

12:30-13:30 EIT ICT Labs – Action Lines

(lab talk, hall 26 (H9), J50)
12:30-12:50 Action line - Master School
Master & Doctoral Schools
Udo Bub, EIT ICT Labs
12:50-13:10 Action line - Future Internet FITTING
Marco Bicudo, EIT ICT Labs
13:10-13:30 Action line - Health & Well-Being
Stress Management
Jean Gelissen, EIT ICT Labs



The EO smart connecting car is an intelligent e-auto that can change its form to adjust to individual mobility requirements.

Electric Mobility with Brains – Smart E-Car Adjusts Shape to Match Traffic

► A car that is extremely flexible, can change shapes, and adjusts to the current traffic conditions – that is the EO smart connecting car, developed by engineers of the Robotics Innovation Center at DFKI Bremen. It is the car that in the not too distant future will drive itself. This prototype is part of the “New Mobility in Rural Areas” project which is investigating the innovative technologies of electromobility.

Flexible chassis enables connection to “road trains”

A changing morphology is quite unique: The driver's compartment of the EO smart connecting car is raised when the chassis is telescoped. This is also possible while driving. In the process, the car “grows” from approx. 1.6 to 2.1 meters in height and “shrinks” about half a meter to a length of less than two meters. The space savings is designed to facilitate a mechanical connection to other e-cars in a kind of chain, a so called “road train.” The contracted form makes the road trains shorter and easier to maneuver. This means greater economy of scale when transporting objects over the same route. Data and energy are transmitted to the other vehicles and the “train” is uniformly controlled, which saves fuel and improves the range. Optional components such as loading ramps and luggage racks can be attached without any problems.

Wheels that turn 90 degrees

Spatially distributed drives let the EO smart connecting car flexibly navigate narrow spaces such as those encountered in

the inner cities or parking garages. Specially designed axles allow each of the four wheels to turn 90 degrees – great for sideways parking into a tight spot. Obstacles are easy to negotiate with this lightweight (700 kg) vehicle, which can turn on a dime, move diagonally, or raise each wheel separately. The top speed is currently about 55 km/h.

Autonomous parking, docking, and charging

The development aim is to achieve a car that drives autonomously. This includes, for example, automatic parking and docking to the charging stations. Sensors in and on the car can receive traffic information and communicate with other users on the road. The development philosophy is similar to that used for robots: The e-car is equipped with the appropriate sensors and computing capacity needed to gather precise information about its surroundings and to enable it to navigate successfully. In consideration of the current traffic situation, the remaining battery capacity, and an optimized energy consumption, routes are calculated – and traffic jams are avoided.

Background: The “New Mobility in Rural Areas” Project

The project is sponsored by the Federal Ministry of Transport, Building, and Urban Development (BMVBS) and has a schedule that runs until March 2014. The lead manager is Fraunhofer IFAM (Institute for Manufacturing Technology and Advanced Materials). The program coordination is managed by NOW (National organization for hydrogen and hydrogen fuel cell technology). ◀

More information

www.dfki.de/robotics



Contact

Prof. Dr. Frank Kirchner
Head of research department
Robotics Innovation Center
E-mail: Frank.Kirchner@dfki.de
Phone: +49 421 17845 4100

CeBIT Hall 26 (H9), Stand F42



Semantic Knowledge Space for the Virtual Office of the Future

► Knowledge workers face very demanding requirements in the digital workplace. Confronted with various applications, involved in several projects and processes, assigned to changing teams, and on the road with a mobile office, they must filter the relevant information from the ever-increasing flow. The resulting knowledge spaces are complex, dynamic, and may use different terminology distributed over several applications. It is difficult enough to maintain an overview of their own knowledge space, not to mention the need to maintain a shared group view.

The DFKI response to this challenge is the concept of the “Semantic Desktop.” In essence, this is a mental model of the knowledge worker – consisting of concepts (topics, projects, persons, tasks, etc.) and resources (documents, e-mails, web pages, etc.), formally represented as a Personal Information Model (PIMO) and embedded into the routine work flow for use in any application. PIMO is available in office applications such as e-mail, web browsers, task management tools, and Windows explorer. Semantic annotation of resources like files, folders, e-mails, web pages, tasks, or notes is possible.

All are affected in some way – whether a team, a department, or a company – by the views of the individual knowledge workers. The sharing of individual PIMO concepts and resources creates a so-called Group Information Model (GIMO). The GIMO is a dynamic knowledge base derived from the group and, as part of the organizational memory, it is connected by means of the semantic desktop to the applications of the knowledge worker.

In addition to structuring individual and group knowledge, PIMO enables extended semantic services: For example, the semantic desktop supplies a comprehensive tool to show the process know-how gained by the employee during execution and to make this available for future iterations of the process. In effect, this enriches the concepts and makes them easier to understand, i.e., for process tasks, decisions, or exceptions handling.

DFKI’s Competence Center “Virtual Office of the Future” is presenting its results and prototypes from the ADiWa (Alliance Digital Product Flow) and SemoPad projects (semantic mobile access to personal

knowledge spaces via the iPad) at this year’s CeBIT. In SemoPad, the iPad connects with the ADiWa infrastructure to provide user access to personal concepts from PIMO as well as to the shared concepts from a group. This mobile access to the user’s knowledge structure, e.g., some event of interest, allows the user to create new concepts or annotate resources in order to expand the PIMO and share the view with colleagues. ◀

More information
www.dfki.de/vof
www.adiwa.net

CeBIT Hall 26 (H9), Stand F42

Contact

Dr. Heiko Maus
 Head of Competence Center
 Virtual Office of the Future
 E-mail: Heiko.Maus@dfki.de
 Phone: +49 631 20575 1110

ADiWa. | ALLIANCE
 DIGITAL
 PRODUCT FLOW



Semopad

GuardDoc – Monitors Your Incoming Documents

► For several years, the DFKI Competence Center for Multimedia Analysis and Data Mining (MADM) has been investigating something called “intrinsic document features” in an effort to improve security when processing paper-based invoices and receipts. These features, produced during the original document creation process (intrinsic), are analyzed for any atypical deviations. Using these results, manipulated documents are readily identified as such. An important part of this research always focuses on usability under actual conditions, where digitization processes are sometimes subject to limitations.

The widespread use of the centralized digitization of incoming mail carries with it a higher risk for attempted fraud. It is easier to submit copied or manipulated documents, because only the digitized correspondence goes to the case specialist for processing. An invoice that has been scanned, manipulated, printed, and re-scanned is difficult to identify as a forgery with just the naked eye. Such records may be encountered above all, in invoicing scenarios with the criminal intent to gain a financial advantage in the insurance industry.

While it is appropriate for some so-called extrinsic security features to be inserted for security-relevant documents (for example, watermarks or holograms, etc.), this is not always possible for documents used in everyday correspondence. In this case, the production processes in wide use would have to be aligned and coordinated, which is of course associated with enormous costs and huge organizational efforts.

The GuardDoc Technology

The GuardDoc demonstrator is a verification system that checks incoming documents for authenticity. After digitization, an OCR text recognition process first determines the source of the document, for example, the invoicing party. Previously verified documents from the same source are loaded and the new incoming document to be checked is automatically compared to the already existing documents. Such comparisons can facilitate the detection of characteristic differences that distinguish scans of a copy or a ma-

nipulated document from the scans of an original. If a deviation is detected, the document is marked accordingly for a subsequent, special processing step.

Application scenarios

Recognizing a manipulated document

Scanning, manipulating, and reprinting a document is a fairly simple undertaking for anyone with access to today's modern printers and scanners. GuardDoc automatically recognizes deviations that originate during a scan process, which the naked eye cannot observe, and marks the file as a suspected forgery.

Recognizing a copy

GuardDoc technology can also be used to differentiate between the original and the copy. Because the copy process is essentially a scan and print process, GuardDoc is once again able to detect any variations and marks the copied document. In business and admin processes that require the submission of original documents only, GuardDoc refuses to accept a copy.

GuardDoc allows the user to visualize the results of the checks and the individual processing steps. ◀

More information
madm.dfki.de

CeBIT Hall 26 (H9), Stand F42

Contact

Dr. Armin Stahl
 Head of Competence Center
 for Multimedia Analysis
 and Data Mining
 E-mail: Armin.Stahl@dfki.de
 Phone: +49 631 20575 4000

RoTa screen shot: GuardDoc scans incoming documents, identifies the sender (e.g., RoTa), and verifies their authenticity. The third document on the list is not authentic and has been automatically identified as such. Further clarification of this event can be called up under “Details.”

The screenshot shows the GuardDoc application interface with a menu bar (File, Edit) and a toolbar (Scan). The main area displays a list of scanned documents with the following details:

Scanned Document:	Originator:	Status:	Details:
RoTa Creation Date: 04.01.2012 Creation Time: 18:40 Size: 2464x3508 Format: PNG	RoTa	Genuine	Forgeries: 0 Number of all documents: 10 Percentage of forgeries: 0.0% More...
RoTa Creation Date: 04.01.2012 Creation Time: 18:40 Size: 2464x3508 Format: PNG	RoTa	Genuine	Forgeries: 0 Number of all documents: 11 Percentage of forgeries: 0.0% More...
LuxaKom Creation Date: 04.01.2012 Creation Time: 18:40 Size: 2464x3508 Format: PNG	LuxaKom	Forgery!	Forgeries: 1 Number of all documents: 8 Percentage of forgeries: 12.5% More...

The first two documents are from 'RoTa' and are marked as 'Genuine'. The third document is from 'LuxaKom' and is marked as 'Forgery!'. A red box highlights the text 'Amtl. Kenn' and 'MS KL 12' on the first document's preview.

Show How It's Done – New Methods for Augmented Reality Manuals



The image on the notebook shows what the AR manual user sees through the head-mounted display

► Digital manuals that are faded in directly into the field of view of the user via a head-mounted display are one of the most often used application examples for Augmented Reality (AR) scenarios. AR manuals can significantly simplify or accelerate maintenance, reparation or installation works on complex systems.

In order to make AR manuals really fit for use, the DFKI research department Augmented Vision works on the simplification of their creation by integrating AI technologies. So far, the so-called authoring process happened mostly manually and therefore involves considerable time and effort. The systems often need manually written, script-like descriptions of the activities; moreover, expert knowledge about the tracking system used and the installation of the tracking aids is necessary.

At CeBIT 2012, the DFKI research department Augmented Vision presents an AR manual that shows the user the necessary steps for the installation of a RAM bar in a notebook via a head-mounted camera. User-friendliness was in the focus of the development, so the authoring process has been significantly simplified. The system learns the necessary steps by singular or recurring demonstration of the respective action. Thereby it doesn't need special markers or other aids and also recognizes free-hand gestures, which distinguishes it from many other methods.

The authoring tool automatically decomposes a one-time viewed plot into single distinguishable sequences and subsequently recombines them by means of a stochastic transition model. An observed action can be precisely mapped to the matching chapters, and notes concerning the following steps can be overlaid at the exact moment. This type of learning ("teach-in") is a cutting-edge research topic in AI and especially in robotics and commonly referred to as "programming by demonstration" in the literature. The method also automatically generates respective overlays that fade in a half-transparent "shadow image" of the action to be carried out. Important details or additional references can be highlighted directly in the recorded sequence by inserting graphical symbols like arrows or lines.

The simplified authoring and teaching method opens up new fields of applications, for example, in quality management, as it can be used by specialist who are actually trained in those fields instead of software specialists. Skilled employees could record "reference work cycles", thus guaranteeing that subsequent repetitions are carried out in the exact same way.

The research department Augmented Vision is already working on an Android-smartphone version that would make the "AR manual" application available for consumers, too. They could thereby be supported, for example, in assembling furniture or when installing and operating household appliances.

The underlying technology has been developed in the framework of the project EMERGENT in the Software-Cluster and supported by the Federal Ministry of Education and Research (BMBF) under the funding label "01C10S01", and has been partially funded by the EU project COGNITO "ICT-248290". ◀

More information
<http://av.dfki.de/gallery>

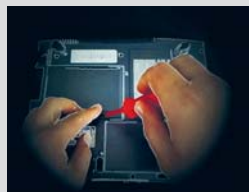
Contact

Nils Petersen
 Research department:
 Augmented Vision
 E-mail: Nils.Petersen@dfki.de
 Phone: +49 631 20575 3540

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Recording of an arbitrary sequence that subsequently is automatically splitted into single, distinguishable actions



Automatic generation of action instructions from the contour image around the focus of the user and manual drawing in into the sequence



The automatically generated as well as the manually added AR overlays are being displayed in the correct position and at the right time

uService – Create Mobile Apps Easily



► Project uService provides visitors to the CeBIT with an opportunity to create their own mobile apps and to offer them to other smart phone users. The technology of uService gives even “technology-challenged” users the ability to configure their own mobile app.

uService provides tools that can be used on a smart phone or a computer to create a unique individual app. These user-generated apps can then be offered and consumed on the uService platform. Users follow a building block approach to combine these individual app-blocks into a new personal app. One block might be a map app or a heart rate monitor app, which, when combined, produce a jogging app for a smart phone that can display the position and the heart rate of the user. In the conceptual social community, other users are also offering various different blocks.

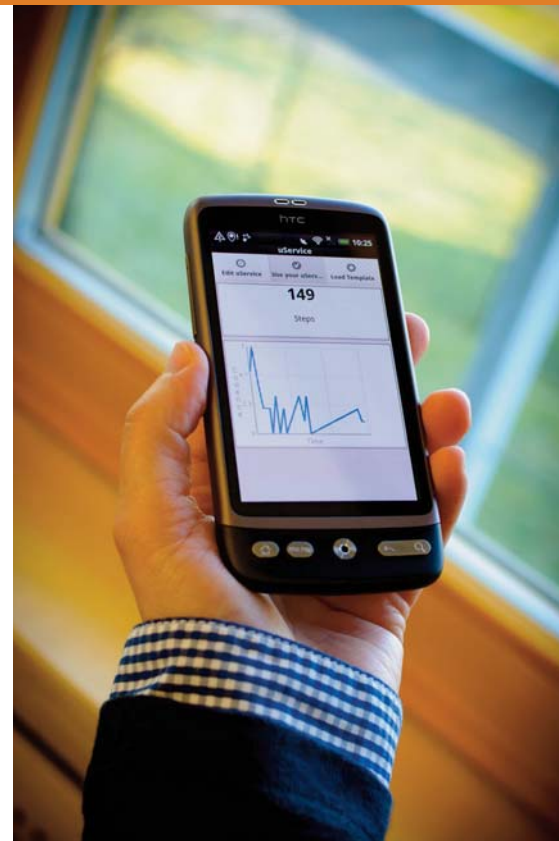
An example explains how this can work: Richard allows the integration of his walking pace counter by giving his friend Peter access to his counter in the context of a block. Peter can now create a jogging app that measures his own and Richard's walking pace. Peter creates a mobile app using the uService platform where he can see only the blocks that he can actually use, like the pace counter Richard released only to his friends.

Users do not necessarily have to search for apps. uService displays prompts for apps that have been created and match the personal preferences and the current situation of the user. Security mechanisms for the exchange of sensitive data offer protection from data theft.

Any parties interested in using a particular app can take advantage of the uService payments infrastructure, where the respective app can be purchased. Correspondingly, any user that has developed an app can offer it in uService to other users to produce sales income – a promising feature for further development in that it allows advertisements to be linked in the app. In this context, uService supplies advertising agencies an appropriate infrastructure to offer ad blocks that can be integrated with customized apps.

All in all, uService enables the effective and cost-efficient development of apps even for the smallest of target groups, for whom commercial development would not be profitable (long tail principle). The user focus of uService allows bundling the innovative power of many individual users so that it can bring the next hit to the app market much faster than the conventional app suppliers.

uService unites partners from business and research communities in an innovative consortium and is funded by the Federal Ministry of Education and Research (BMBF) (FKZ 01IS09020D). DFKI project partners are Communology, Deutsches



Mobile uService editor on an HTC smartphone

Lauftherapiezentrum, Morpho e-Documents, Orga Systems, and Rostock University.

Visit uService in Hall 26 (H9), Stand F34 and create your very own mobile app. ◀

More information
<http://iwi.dfki.de>
www.uservices.de

Extended uService editor on the iPad

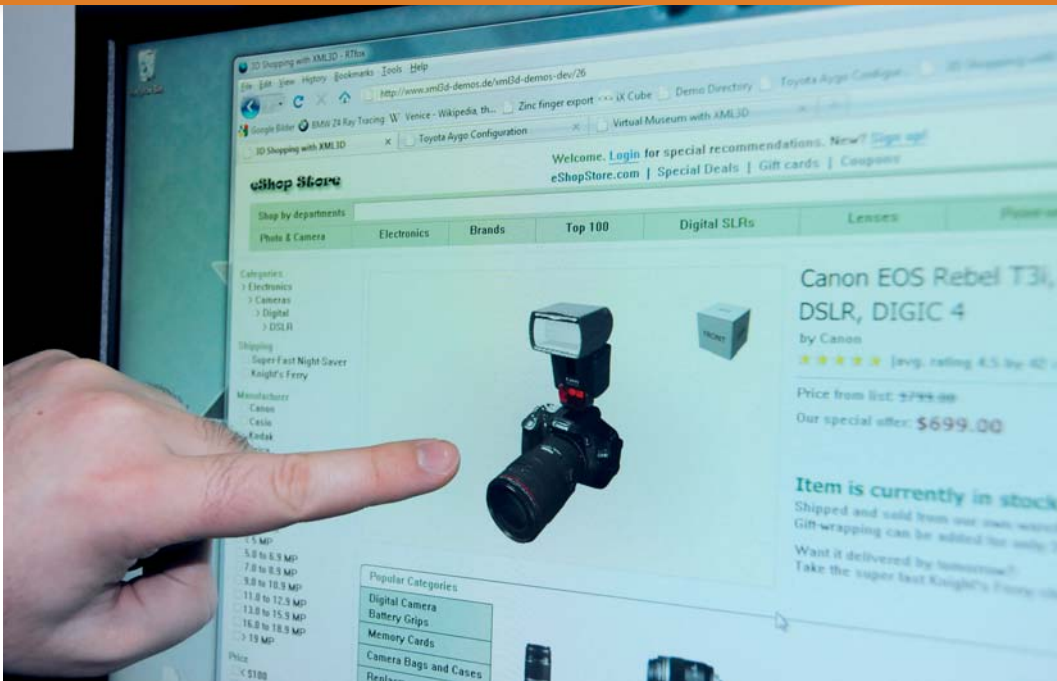


CeBIT Hall 26 (H9), Stand F34

Contact

Dr. Dirk Werth
 Head of Business Integration
 Technologies
 Institute for Information Systems
 (IWi) at DFKI
 E-mail: Dirk.Werth@dfki.de
 Phone: +49 681 85775 5236

Alexandra Chapko
 Institute for Information Systems
 (IWi) at DFKI
 E-mail: Alexandra.Chapko@dfki.de
 Phone: +49 681 85775 4092



Intelligent Applications for the 3D Internet

► Intelligent production facilities complete tasks autonomously while being monitored and serviced, with the help of the Internet, by workers thousands of kilometers away. They can plan modifications on a virtual model of the plant and track the implementation down to the smallest detail via video link on giant monitor walls.

A working group under the direction of Prof. Dr. Philipp Slusallek will present three components of this visionary future at CeBIT 2012: The image data transfer software NetVFB, Dual Reality Manufacturing (p. 30), and XML3D. ◀

Surfing the Third Dimension with XML3D

► The hardware for the interactive presentation of three-dimensional scenes can already be found in every PC, every smart phone, and even in every recently purchased TV set. However, until now the associated content could only be enjoyed by those who play PC games or someone who uses a workstation with CAD software to design buildings or other products.

online browsers is opening new markets with a variety of new applications. This implies a huge fundamental change for the 3D Internet, the “Online Adventure.”

This is all dramatically changed by XML3D. This extension of the HTML web language was developed by DFKI and the Intel Visual Computing Institute at Saarland University and can be used quickly and easily to develop 3D applications for any web browser. XML3D enables web developers to embed and work with 3D content in web pages just as easily as they currently do with YouTube videos.

Not only are these XML3D applications available wherever there is an Internet connection and a browser installed, but also the combination affords even small and medium sized companies the technology to create their own 3D applications. These can then be used on a traditional PC, but also on a mobile end device like a tablet PC. ◀

Typical uses of XML3D, in addition to the familiar 3D configurators for kitchens and automobiles, include interactive infographics, learning applications, and computer games. In the future, before purchasing a theater ticket, the user will be able to “try out” the seats of a certain price class in the virtual theater, including the stage setting. Another example lets a user design a customized cabinet before it is manufactured and delivered. The integration of three-dimensional virtual worlds in standard

More information
www.xml3d.org
www.intel-vci.uni-saarland.de

Contact

Kristian Sons
 Research department: Agents and Simulated Reality
 E-mail: Kristian.Sons@dfki.de
 Phone: +49 681 85775 3833



Internet Service Eliminates Cable Spaghetti at Presentations and Conferences

► Until now, if anyone wanted to connect a laptop to an external monitor, a projector, or even a monitor wall, they needed a special adapter cable to do it.

This everyday problem was the catalyst for a joint project for the teams of Prof. Dr. Philipp Slusallek, DFKI, and Prof. Dr. Thorsten Herfet, Saarland University, who co-manage the Intel Visual Computing Institute in Saarbrücken. They have developed a kind of "Internet service" that can link the computer with the display device. In this way, screen content can be switched over to the displays of various end devices and even played on large surface monitor walls.

"The approach is a fairly simple one," explained Alexander Löffler, who developed the associated software "NetVFB" together with researchers of the Intel Visual Computing Institute. If it is installed on a computer, every application can pack the monitor image it generates into a virtual frame buffer, so that it will also be visible as a download service in a network. Similarly, the display devices available in a conference room can be represented as networked services. "The presentation can be switched over to a desired display at the push of a button. The transfer is accomplished over the Internet," said Löffler.

The screen content of several participating notebooks can be displayed on a single monitor with this new software. Because the virtual frame buffer can be shown simultaneously on several displays, it is also possible for the presenter to watch and control the presentation from a smart phone. The software is also useful outside of the meeting scenario. Because modern LCD displays can have frames that are only two to three millimeters wide, they can be constructed into giant, high-resolution monitor walls at a reasonable price. Even if these walls consist of more than 20 displays, a laptop is sufficient to play the content onto them via a common WLAN connection.

This was only possible in the past at a substantial cost in hardware. All of this makes the new approach from the Saarbrücken scientists very interesting for the advertising and retailing sectors, for example, on the perimeter billboards in sports stadiums or for interactive retailing displays.

Internally, the software uses optimized video transmission protocols to enable the synchronized transfer of the image data from the virtual frame buffers directly to the displays. In the conventional approach, display content is transmitted uncompressed via cable to the display device 60 times per second for diverse standards like VGA, DVI, or HDMI. A high-resolution display can easily accumulate several gigabytes per second. The Saarbrücken approach, in contrast, sends only the changes in the data and only in compressed form. The cost is reduced to just a fraction. It is also technically possible to integrate the displays from mobile phones. Research with this technology is ongoing to enable the navigation screen of a smart phone to be transferred to the electronic display in the dashboard of a car. If successful, this would facilitate the design of completely new user interfaces not just for use in a car. ◀

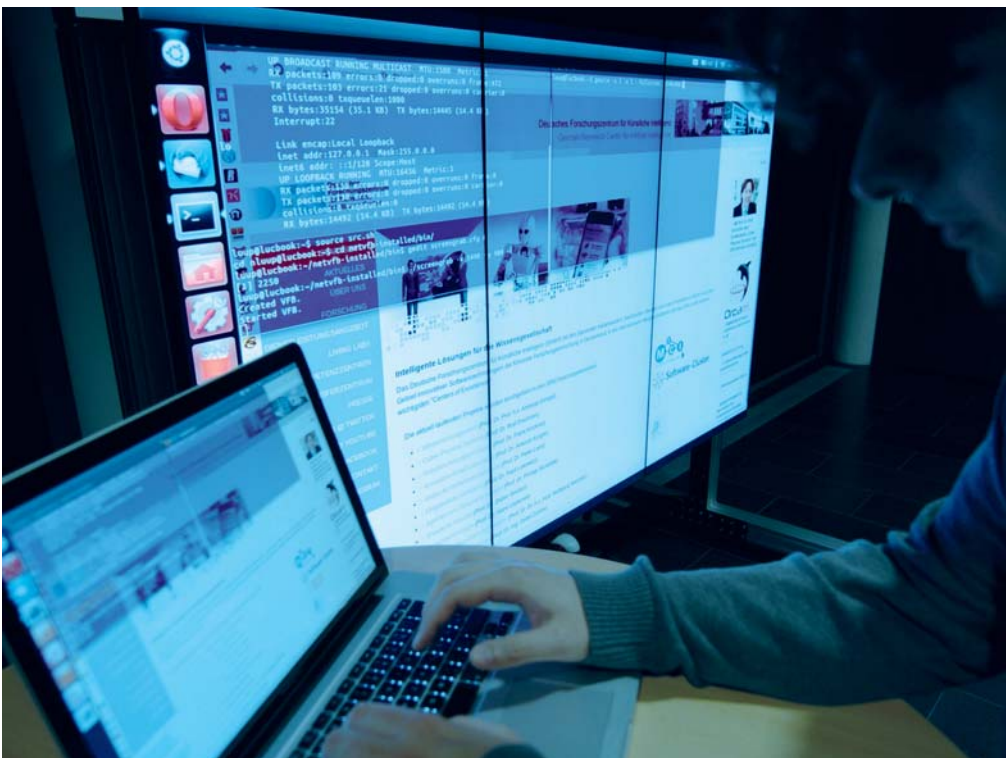
More information

www.intel-vci.uni-saarland.de/en/projects/display-wall.html

CeBIT Hall 26 (H9), Stand F34

Contact

Alexander Löffler
 Research department: Agents and Simulated Reality
 E-mail: Alexander.Loeffler@dfki.de
 Phone: +49 681 85775 7743





Interactive Trainer Supports the Mobility of Seniors

► Interactive Trainer is a technical assistance system that helps seniors to independently perform rehabilitation exercises following a stroke or to prevent falls.

Two virtual characters encourage seniors to rediscover or retain their mobility: A virtual on-screen trainer motivates them to complete a customized training program within their own homes, which can significantly improve their flexibility and mobility. The system includes a telemedical monitoring service that supplies feedback and increases the safety of the individual user. The other virtual figure, an avatar, mimics the movements of the exercising person, which are captured by a Kinect depth-sensing camera and movement sensors fitted close to the body. This sensor data is consolidated in a module that analyzes the movement.

A multimodal dialog system motivates and corrects the users as it guides them through the training units. Possibilities include not just specific therapeutic exercises, but also training games. The virtual trainer gives specific instructions and tips for improvement while the program is running: Errors are pointed out and correct performance is lauded via audio as well as graphically. Each respective exercise is evaluated at completion to determine if the training goals were achieved. All relevant therapy data is securely transmitted for a telemedical visit to the attending therapist.

Interactive Trainer is being jointly developed in the BMBF SmartSenior project with the partners Fraunhofer FIRST, Charité, Nuromedia, Humotion, and Otto Bock Healthcare. A detailed requirements analysis and evaluation of the current therapeutic approaches to mobility training at home has been conducted with therapists and doctors of the Charité Hospital in Berlin.



The multi-modal user interfaces and the interactive control systems for Interactive Trainer were designed and developed at DFKI with the needs of seniors as the primary consideration. Seniors now have the possibility to communicate in natural language and interact with the system via the familiar TV remote control. ◀

More information
www.smart-senior.de

CeBIT Hall 26 (H9), Stand E43

Contact

Ben Hennig
 Dr. Norbert Reithinger
 Research department:
 Intelligent User Interfaces
 E-mail: [Ben.Hennig | Norbert.Reithinger]@dfki.de
 Phone: +49 30 23895 1818 or -1802

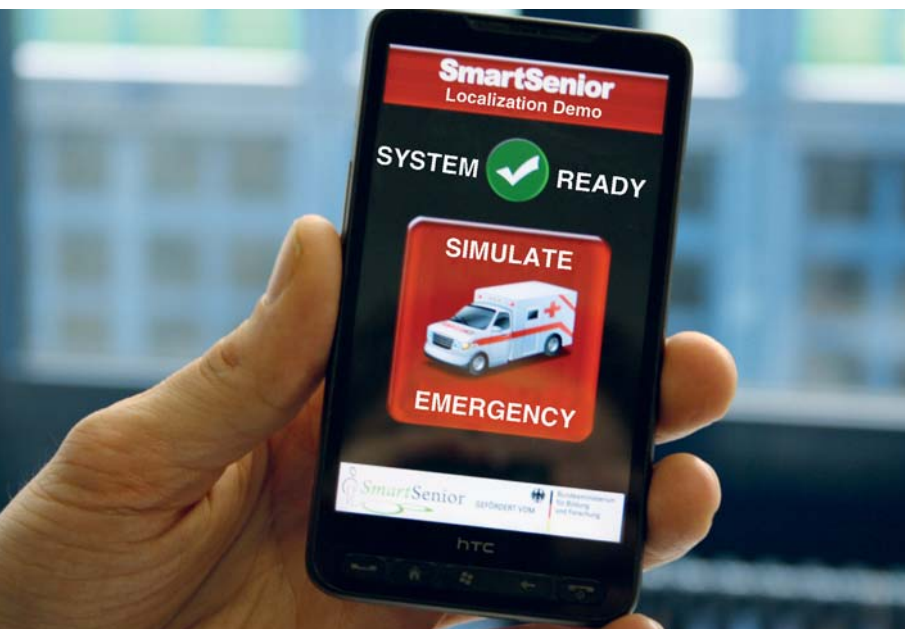
Emergency Localization – Enjoy Safer Travel with Extended Emergency Assistance

► Whether at home, out and about on foot, or in the car or a building – an emergency assistance system identifies a medical emergency using vital sensor measurement data and automatically makes an eCall to inform a central rescue service. The positioning system is capable of finding seniors in need of assistance under any circumstances. The application provides additional safety in everyday mobility situations.

In addition to the patient's personal data and a classification of the emergency, the system transmits a description of the location to facilitate the timely arrival of rescue personnel.

Site information is supplied by a positioning module developed at DFKI that is able to locate the user indoors or outdoors, and even in a mobile situation like when traveling in a car. Several different technologies have been used, e.g., GPS, GSM, WLAN, and Bluetooth Fingerprinting. Highly accurate positioning data is achieved through a positioning algorithm that uses a combination of the most significant sensor data – situation dependent sensor fusion. To evaluate the latest technologies, a supplemental simulation environment was created especially for indoor positioning, which allows for rapid switching between methods and combinations in addition to visualizing the functioning of the positioning technology.

The joint demo scenario at CeBIT 2012 was created by argos information GmbH, Charité FFG, Global Health Care and DFKI and involves a life-size training torso fitted with an ECG device and a phantom (blackbox).



The phantom simulates the vital data of a fictional automobile driver and transmits this data in real time to a smart phone that is equipped with the emergency wizard. The emergency assistance system continuously analyzes live data from the phantom, looking for any change in the heart rhythm (simulated with a push of a button in this demo). When a change is recognized, the system initiates an emergency response. The emergency wizard responds by activating the driver's emergency stop assistant, which navigates the virtual car to a safe stop at the side of the road. In parallel, location data from the positioning module is retrieved and the emergency is reported to the emergency services center, a platform for electronically forwarding emergencies to the responsible rescue management center. For demo purposes, the emergency and the site information is forwarded to the Telemedical Center Charité (TMCC). TMCC alarms the fire department and establishes a voice link to the emergency patient via mobile phone.

The system is developed under the framework of the science alliance initiative "SmartSenior – Intelligent Services for Seniors", sponsored by the Federal Ministry of Education and Research (BMBF). The aim of SmartSenior is to create and maintain the best possible quality of life for senior citizens.

Further results of the SmartSenior program can be seen at three scenario stations at the BMBF stand (Hall 26 (H9), E50): In the Home, Underway, and Business. ◀

More information
www.smart-senior.de

CeBIT Hall 26 (H9), Stand E43

Contact

Kinga Schumacher
 Dr. Norbert Reithinger
 Research department:
 Intelligent User Interfaces
 E-mail: [Kinga.Schumacher |
 Norbert.Reithinger]@dfki.de
 Phone: +49 30 23895 1823 or -1802

PeerEnergyCloud – Cloud-Enabled Smart Energy Grids

Public market place for trading renewable energies

Germany Land of Ideas



Selected Landmark 2012

► The DFKI PeerEnergyCloud project is a joint venture that is developing an innovative energy management system for the intelligent use of renewable energy with its partners, the Karlsruhe Institute of Technology (KIT), AGT Germany, SEEBURGER, and the Stadtwerke (municipal utilities) Saarlouis.

Among the most complex and pressing issues in this field, in particular, is a more efficient and dynamic organization of the German energy market. Achieving a high share of renewable energy in the energy mix requires a so-called "load de-coupling" of the power grid in a modern energy management system. The power supply will no longer be centrally controlled, but rather through new "smart micro grids" that integrate the consumers with the local suppliers. This scenario includes the establishment of a public marketplace for trading local power as well as the conception and development of new monitoring and forecasting methods.

The integration of local sensor and actuator systems into intelligent, digitized households through a protected fiber optic cable enables the real time processing of the usage data. Consequently, a whole range of new possibilities are opened which include: forecast-

ing of power generation and consumption, energy block trading, and energy-related value added services like energy auditing, property protection, or building monitoring.

The marketplace for energy trading is created on a cloud platform, which uses private as well as public resources. Thanks to the dynamic features of the cloud, the service can be offered at a reasonable price and is scalable to the demand.

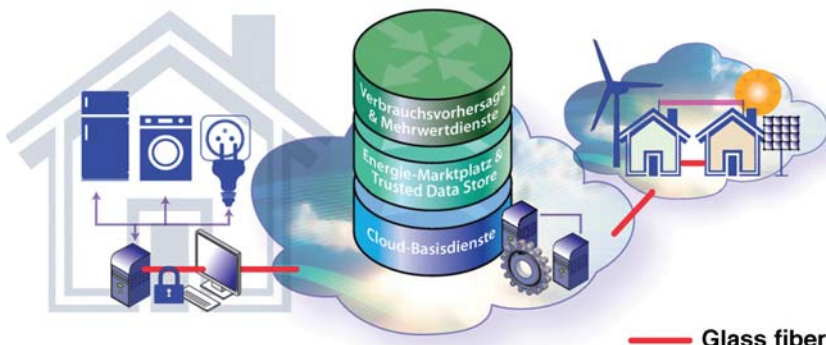
The major innovations of the PeerEnergyCloud are: A public marketplace for agent-based energy trading and value added services, real-time bulk storage with system access controls and usage profiles, plus safe sensor and actuator technology.

PeerEnergyCloud is sponsored by the Federal Ministry of Economics and Technology (BMWi) and was one of the winners of the 2011 Trusted Cloud Competition. The PeerEnergyCloud project will be celebrated as a "Selected Landmark in the Land of Ideas 2012" on October 9, 2012 at the Stadtwerke Saarlouis. ◀

More information
www.peerenergycloud.de

Trusted Cloud

peer energy cloud



— Glass fiber

Contact

Dr. Jörg Baus
 Dr. Boris Brandherm
 Research department:
 Intelligent User Interfaces
 E-mail: [Joerg.Baus | Boris.Brandherm]@dfki.de
 Phone: +49 681 302 64047 or -3496

CeBIT Hall 26 (H9), Stand G50



Prof. Wahlster and Prof. Kagermann present the THESEUS Navigator to Federal Chancellor Dr. Merkel, Federal Economics Minister Dr. Rösler and Ministerialrat Dr. Goerdeler, Federal Ministry of Economics and Technology.



THESEUS research program

The THESEUS research program is an initiative of the Federal Ministry of Economics and Technology (BMWi) with the aim of simplifying access to information, networking data for new knowledge, and establishing a basis for the development of new online services. The research focuses on semantic technologies developed in the Core Technology Cluster (CTC), and attempts to test and employ them in specific application scenarios, for example, in the areas of medicine, business web services, optimization of business processes. THESEUS is an umbrella program where 60 partners from the research and business communities work on the development of new technologies for the Internet of Services.

THESEUS Navigator for the Internet of Services

► At CeBIT 2012, DFKI is presenting specific visionary applications for the technologies that have been developed in the context of the THESEUS research program. The THESEUS Navigator, installed on an iPad, demonstrates how small and middle-sized firms can participate in ongoing mega trends and systematically tap into global markets.

THESEUS Navigator was first introduced in December 2011 at the Sixth National IT Summit in Munich. At that time, using a technology demonstrator, DFKI CEO Prof. Dr. Wolfgang Wahlster and Prof. Dr. Henning Kagermann, President of acatech, explained to Federal Chancellor Dr. Merkel, Federal Economics Minister Dr. Rösler and Dr. Goerdeler, Federal Ministry for Economics and Technology, how SMEs

can participate in the growing trend toward mega cities.

Small and middle-sized enterprises often don't have the possibility to realize a business opportunity on international markets. Thanks to the semantic technologies developed in the THESEUS program, precisely these companies gain the chance to offer their services to the global markets. The rise of mega cities is a sector in which these technologies will gain substantially in importance in the coming years. In the near future, large-volume investment in various infrastructure areas will be necessary in order to master the enormous environmental and social challenges.

A graphic representation of an imaginary

mega city serves as a model to demonstrate how, aided by augmented reality, a Navigator installed on the iPad could identify and exploit all potential services early in the planning phase of a mega project. The Navigator identifies service jobs in various sectors which, as the mega cities are realized, will have to be solicited. These are then automatically analyzed and classified using semantic technologies from the THESEUS program. Other tools are also used, for example, from the THESEUS application scenarios TEXO and USDL (Unified Service Description Language), which enable the use of standardized services across company boundaries. The Navigator balances the service provider's SME profile with the specific solicitations and proposes matching business partners for a collaborative proposal.

In our sample case, an energy-efficient ICT infrastructure will be developed and implemented in the area of green information technologies – and the portfolio of our fictional service company is the perfect match. The solicitation describes the creation and operation of an energy efficient infrastructure for Information and Communication Technologies. The project has a total order volume of 3,5 million Euro. Individual project requirements are the supply, installation, and maintenance of an integrated, energy and cost-optimized ICT system for the tourism industry. Our service company is specialized in the project planning, installation, and operation of energy-efficient

ICT infrastructures. However, for the consulting and development of a customized software package, the service provider will need additional partners. The Service Web developed under the framework of THESEUS determines potential vendors that are able to provide the services to close this gap. Consequently, the IT company can now prepare an offer that completely covers the required degree of value added services. THESEUS technologies move SMEs into a position where they can submit competitive offers at the international level in the future by a bundling of each respective company's core competencies. ◀

More information
www.theseus-programm.de/en
www.it-gipfel.de
www.ekiosk.de/en
www.semvox.de/en.html

CeBIT Hall 26 (H9), Stand G50

Contact

Dr. Tilman Becker
 Research department:
 Intelligent User Interfaces
 E-mail: Tilman.Becker@dfki.de
 Phone: +49 681 85775 5271

Cirius – Multi-Modal Interaction with Semantic Services and Knowledge Sources

Say what you want to know and show what you mean.

► The multi-modal dialog system Cirius provides access to information, multimedia content, and services from a semantic database. Using a PHEX multi-touch console (e-kiosk) or a microphone, semantically marked data about everyday issues can be retrieved per voice command or gesture.

The system interprets the various input modalities, e.g., natural language in spoken form, or pointing gestures, and enables rapid access to semantic services as well as to the ontological representation of the extracted information. These services establish access to any number of different online information sources. Machine dialog lets you search and review knowledge, but you can also control the monitor with voice commands. The system comprehends the current situation and follows the interactions in order to

construct a dialog history: it can then interpret even such remarks as “...and this river?” if the conversation previously dealt with a tributary of the Danube and now switches to the Mosel River with a pointing gesture.

The core of the multi-modal system consists of an ontology-based dialog system platform (ODP), developed at DFKI in the context of the THESEUS program (CTC-WP4). The ODP's open architecture guarantees both a flexible integration and interface to user-specific modalities and system components as well as to application-specific functionalities.

ODP provides high-performance programming interfaces for dialog-specific processing modules, which support efficient data representation of knowledge structures and rule-based processing. The

ODP solution is distributed through the DFKI spin-off “SemVox.”

Cirius was developed under the THESEUS research program. Cirius accesses, among others, the knowledge base constructed for the THESEUS Use Case ALEXANDRIA by research partner “Neofonie.” ◀

More information
www.theseus-programm.de/en
www.it-gipfel.de
www.ekiosk.de/en
www.semvox.de/en.html

CeBIT Hall 26 (H9), Stand G50

Contact

Dr. Tilman Becker
 Research department:
 Intelligent User Interfaces
 E-mail: Tilman.Becker@dfki.de
 Phone: +49 681 85775 5271





RadSpeech – Mobile Speech Interaction for Radiologists

► RadSpeech is a mobile work station for radiologists. Many experts in the field of radiology desire just such a mobile environment with interactive speech capability as a work place.

Via voice command, a radiologist or the attending physician can retrieve and review electronic medical files together with the associated images from an iPad touch screen and then arrange them as required. Using natural language and gestures, images of traditional radiologic and tomographic examinations can be annotated and retrieved at a later time by semantic search. The dialog-based image search and annotation supplies the foundation for future computer-aided clinical diagnosis and decision-making. RadSpeech supports the physician's work routine with intuitive operating controls and can be used in situations when there is no fixed work place available, for example, during visits or in meetings.

RadSpeech represents the next generation of intelligent, scalable, and intuitive user interfaces for semantic search in the area of medical image processing. Ontology-based knowledge representation is not only useful for image content, but also for the complex processes of speech recognition and dialog management. Most importantly, it aims to improve the efficiency of medical diagnosis while achieving better structured examination reports, including semantic image annotations.

At CeBIT 2012, DFKI and its project partners are presenting a “collaborative dia-

log scenario” at the stand of the Federal Ministry of Economics and Technology (BMWi) that demonstrates how patient data can be retrieved from image and text-based clinical findings onto an iPad or iPhone via interactive speech. In this scenario, the dialog system takes up the role of the medical specialist, who proposes a qualified radiologist for a second opinion and facilitates the correspondence.

In addition, the latest version of the RadSpeech diagnostic questionnaire for radiologists in mammography will be presented at the CeBIT stand. This interactive paper is a collaborative development with DFKI's Knowledge Management department. With the aid of a special pen and handwritten notes, it facilitates the generation of a structured diagnosis on the basis of standardized medical terminology. RadSpeech was created within the framework of the MEDICO application scenario of the THESEUS program, sponsored by the Federal Ministry of Economics and Technology. The research in MEDICO focuses on the intelligent structuring of heterogeneous patient data – texts, images, lab data – and making it accessible.

DFKI research scientist Dr. Daniel Sonntag was selected as the winner of the German High Tech Awards 2011 for Medical Technologies for his work on RadSpeech. The award, valued at 10,000 Euro, and the business case were presented at the world's largest convention for medical imaging, the RSNA (Radiological Society of North America) in Chicago in December 2011.

The success of RadSpeech, as explained by the international panel of experts at the German High Tech Awards, is attributed, above all, to the marketability of mobile dialog technology for medically relevant applications and the maturity of DFKI technology in this segment, which has proven itself in the international marketplace. ◀

Project partners
Siemens AG
FAU Clinic, Erlangen

More information
www.dfki.de/RadSpeech

CeBIT Hall 26 (H9), Stand G50

Contact

Dr. Daniel Sonntag
Research department:
Intelligent User Interfaces
E-mail: Daniel.Sonntag@dfki.de
Phone: +49 681 85775 5254



CeLTech – Adaptive Learning Systems and Intelligent Classroom Software

► Intelligent-adaptive learning systems are the focus of software demonstrations developed at the “Intelligent e-Learning Technology” lab at CeLTech Saarbrücken. The advantage of these technologies rests, in particular, on their ability to customize the educational process, something which is experiencing a growing global demand from schools, universities and institutes for continuing education. The wide range in student abilities can be taken into account as well as the various educational scenarios – e.g., exam preparation, learning in-depth content, learning new content, review of known content, exercises, and test problems or assessments. In addition, there is an intelligent adaption of content to personal preferences for display, examples, visualization, or language – even including accessibility preferences. Collaboration and communications in natural groups or peer-to-peer are equally possible as linking to a learning architecture (e.g., Learning Management Systems) or the integration of external content systems. The latest findings from international, national, EU and DFG projects, and the US Department of Education regarding the investigation and development of intelligent-adaptive learning systems will be shown by the CeLTech staff at both the DFKI and the Saarland University CeBIT stands.

Another highlight at CeBIT is a new kind of “Intelligent Classroom” software developed at the CeLTech-“Mencius-Lab” at Jiao Tong University, Shanghai. Teachers can use an app(lication) developed for Android and iOS smart phones as well as for tablet PCs to live-stream their classes to mobile end devices:

In this way, power point or web presentations as well as live video from the lecture hall are available in top quality anywhere in the world and enable the participation in educational instruction independent of location. The Mobile Learning App from CeLTech enables the viewing of several classes on different channels. Application scenarios will also be presented in Hannover by the CeLTech staff, along with the new features introduced in the second release of “Learn & Go,” a mobile learning app specially developed for Saarland's universities and scheduled to become operational in the 2012 summer semester. The latest release supplies a connection to social media services like Facebook and Twitter while other new features such as a voting function for ranking courses or the food at the campus canteen have also been added. ◀

More information
www.celtech.de

CeBIT Hall 26 (H9),
 Stand F42 and F34

Contact

CeLTech – Centre for e-Learning Technology at DFKI
 PD Dr. Christoph Igel
 Managing Director
 E-mail: Christoph.Igel@celtech.de
 Phone: +49 681 85775 1051 oder -1052

Mobile Learning app “Learn & Go”





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Official start of the Software Campus at the 6. IT Summit in the presence of Federal Chancellor Merkel, Federal Minister Rösler and high-ranking representatives from economy, science and politics.

Software Campus Sponsors Future IT-Leaders from DFKI

► The pilot phase of the Software Campus got started in the spotlight of the 6th National IT Summit held on December 6, 2011 in Munich with the selection of three “High Potential” PhD candidates who are academically supervised at DFKI and the Saarland University. Together with eight other master or PhD candidates they will be sponsored for two years by the Software Campus, a public-private-partnership of the Federal Ministry of Education and Research (BMBF) and the IT industry. Prof. Dr. Wahlster is the Chairman of the Selection Committee of the Software Campus.

The pilot phase of the Software Campus kicked off at the IT-Summit 2011 in Munich. Federal German Chancellor Dr. Angela Merkel personally congratulated all of the exceptionally well qualified applicants who participated in the first round and, in her keynote address, wished the students success in the future. The three outstanding candidates chosen for the support are Sandro Castronovo, Sabine Janzen, and Kinga Schumacher. All three doctoral theses are being supervised at DFKI (Kinga Schumacher and Sandro Castronovo) or at Saarland University (Sabine Janzen). In the context of the Software Campus, industry partners will help prepare the winners to meet the challenges of IT management: Sabine Janzen and Sandro Castronovo are supported by the Scheer Group and Kinga Schu-

macher by Software AG. Prof. Wahlster drafted the initial concept paper for the Software Campus and, in June 2010, presented the concept to the government as a member of the Science and Industry Research Union, where it was approved as a component of the federal government's “High Tech Strategy.”

“Recognizing that ICT is the No. 1 innovation engine for all of Germany's pioneering industries, we urgently need more computer scientists on the executive boards of large companies and as entrepreneurs for the next generation of medium-sized companies. The mentoring offered to the students on the Software Campus by leading researchers from the EIT ICT Labs guarantees the highest professional level, research focused on business applications, and European networks,” explained Prof. Dr. Wolfgang Wahlster, CEO of DFKI.

Each year, approximately 80 to 100 students will be accepted into the Software Campus and their projects will be funded with up to 100,000 Euro over a maximum of two years. The findings of the research projects undertaken as part of the Software Campus will be made public and presented at the annual summit conference in front of the other participants and the academic and industrial partners. The goals for the DFKI/Saarland University PhD student projects are:

The implementation of a platform for the development, integration, and evaluation of interactive Car-2-X applications, which play a key role in the design of discovery hub for electric mobility on the campus of Saarland University (Sandro Castonovo: "Beyond the 'Push Paradigm': Enhanced Forms of Information Access and Novel Application Areas for Vehicle2X Communication Networks"), The modeling of strategic behavior of conversational agents in processing intentions in dialog (e.g., sales talks) using game theory approaches (Sabine Janzen: "Satisfying Conflicting Intentions in Dialog Systems"), and The development of innovative solutions for the mobile exploration of corporate information networks (Kinga Schumacher: "Exploring Structured, Semi-Structured, and Unstructured Content of Next Generation Information Management Systems").

Long-time BITKOM President and co-initiator of the Software Campus Prof. Dr. August-Wilhelm Scheer has written in his blog: "All industry partners to the project have great ambitions when it comes to coaching and mentoring young talents. Such coaching is definitely an absolute priority. I look forward to working with students to develop innovative concepts which, in all probability, can only be generated by a combination of the unbiased questioning of youth and a wide range of experience."

Software Campus is an elite development program for master and doctoral students in the final phase of their master's program (before the master's thesis) or at the beginning of the doctoral program in computer science who have excellent qualifications and a creative entrepreneurial spirit. The training content includes topics from the IT world, but mainly focuses on management methods and strategies for corporate management, market positioning, and innovation management. All is organized within a powerful network of universities and companies; so learning takes place in a practical environment. The goal of the Software Campus is to promote top managerial talent in the ICT sector. This goal is achieved by implementing publicly funded (by BMBF) small research projects, proposed by the students themselves with application support from the respective research and industry partners. The students are mentored by their academic and business partners during the course of the project. It is this support that forms the innovative core of the future IT executive training program of the Software Campus.

Software Campus is developing its international reputation as well with the long term goal of having up to 50 percent of the participants be highly talented young researchers from foreign countries. Gender equality is also being addressed as a mid-term goal with the aim of doubling the percentage of women from the current level. Financing is divided evenly among the Federal Ministry of Education and Research (BMBF) and the participating companies. The industry partners include Robert Bosch, DATEV, Deutsche Post, Deutsche Telekom, SAP, Scheer Group, Siemens, and Software AG. In addition to DFKI, research partners and members of the EIT ICT Labs include Fraunhofer ICT Group, Max Planck Institute for Computer Science, and at the university level the partners are TU Berlin, TU Darmstadt, Karlsruhe Institute of Technology (KIT), TU Munich, and Saarland University. Management partner is the EIT ICT Labs GmbH with headquarters in Berlin. ◀

More information
www.softwarecampus.de/en




The Goal:
 To educate the leaders of tomorrow's IT and strengthen Germany as a location for leading edge technology innovation.





Shopping Becomes Smart and Intelligent – Innovative Retail Laboratory at CeBIT 2012



► Intelligent refrigerators – refrigerate, schedule, eat consciously

A well-stocked refrigerator is the centerpiece of many kitchens and serves as the cornerstone of healthy nutrition. Sensible eating habits are supported by a refrigerator that has been provided with product and nutrition data. The intelligent refrigerator at the Innovative Retail Laboratory enables access to a variety of data about the foods contained inside. This information goes far beyond the standard packaging labels and enables practical applications designed for the consumer.

Early in the manufacturing process, the product packaging is equipped with a radio frequency tag. This tag stores information about the product, its manufacture and storage, and it can be comprehensively expanded. Besides standard data like the nutritional information, individual data is continuously recorded such as the transportation route or the unbroken temperature data from the product's life cycle all the way to the end customer.

This data is received and distributed through integrated antennae. A touch screen that is mounted on the refrigerator facilitates the simple retrieval of the information. In addition to the information above, the refrigerator supplies information about the shelf life of the products and warns of the approaching expiration of the "best before date."

The intelligent refrigerator saves favorites and food allergies in individual user profiles and automatically issues a warning when a potentially incompatible product is selected. Suggested recipes can be generated subject to various criteria using the foods currently stocked in the intelligent refrigerator. If planning a shopping trip soon, have the refrigerator prepare a shopping list on the display screen. In the process, connect to the Internet to obtain external information such as the weekly promos at the various markets. The shopping list is then coded with a QR code and displayed on the refrigerator. Using a smart phone, make a photo and store the list on your mobile.



I see something you don't see

Food price comparisons using supermarket flyers in advance of your shopping require significant time and effort. This is precisely where the Guerilla-Marketing-App "GuerillAR" can help. "GuerillAR" is an augmented reality app for smart phones. The smart phone camera scans a supermarket flyer and overlays it in real time with information from another chain of supermarkets. Furthermore, product allergy notices can be displayed or you can get an explanation of regional slang like "brats" or "broilers."

The smart phone display highlights changes and remarks from the overlay related to the flyers. In this way, items from the home brand of one chain are substituted with the home brand item and logo of the other chain. It is a quick and uncomplicated way to compare prices, even if the items are not identical, but are equivalent items from another retailer. In a practical sense, the app links the familiar paper flyers with the conveniences of innovative technologies.

The fastest payment ever

Pay by phone - anywhere, anytime! The latest mobile phones, equipped with NFC (Near Field Communication) technology enable a safer, faster, and more convenient way for users to pay.

The data from products equipped with NFC tags can be easily captured by scanning the item with an NFC-capable smart phone. It is then possible to display the information about the respective product on the display of the mobile phone, or the product can be stored directly in the virtual shopping cart in the phone. A simple payment is made at one of the "cash-tags," which are to be found all over the store, e.g., on wall posters. Scanning a "cash tag" by NFC will perform the respective financial transaction directly on the mobile phone, eliminating the need for personal data to be entered at the register. Visitors to the CeBIT can test NFC-based mobile payments.



The age of digital cookies

We are proud to present another CeBIT first: QKies – cookies with QR codes and an individual message. QR codes printed with food coloring on edible paper encode, in a most delicious way, any message the sender could possibly want to convey: e.g., an invitation to a company event or product information. Distributing these homemade QKies to customers is a very personal and most original way to invite and inform people. The two-dimensional bar codes can be read by nearly every smart phone with a free standard app.

In addition to the homemade cookie mix, finished QKies can also be purchased in quantities starting at 500 each. The QR codes then refer everyone to the same URL. In this way, the cookies are perfect as giveaways.

Now you can approach your customers and stay in their good graces, because QKies are not only the food snack of the future, they also taste great. As the winner of one of the 365 “Selected Places” in the Land of Ideas 2012, the “age of digital cookies” project exemplifies the incredible variety of ideas and innovative power of Germany. The celebration party is scheduled for September 10, 2012 in Eppelborn, Germany.

CeBIT Hall 5, Stand E50/58

The intelligent cheese counter – “I’d like a piece of that one!”

Golden yellow hard cheeses, delicious kinds of soft cheese, or superb creamy fresh cheese lure the customers to the cheese counter – unfortunately, no one knows the names, let alone the proper way to pronounce them. In the final analysis, the cheese counter is not really a place for tasty delicacies, but rather one of misunderstandings between customer and vendor. “Do you mean this one?” “No, the one next to it.”

The intelligent cheese counter knows what item or promotion sign the customer is pointing at. The two-way scale displays the selected sort to both customer and vendor. Also shown is additional information about the cheese – e.g., its origins or what wine goes well with it. Products are more transparent for the customer and the advice from the vendor is of higher quality.

The system employs a depths camera mounted above the fresh product counter that can recognize gestures to an accuracy of two centimeters. By subtracting the depth of background data - i.e., the structure of the counter - it is relatively quick and easy to recognize and interpret the pointing gestures of a customer. The data is interpreted and information about the selected product can be displayed on any standard commercial scale with two displays. The customer is provided with product information and the vendor obtains background knowledge as the basis for better service to the customer. This eliminates misunderstandings and improves the presentation of the delicacies. ◀

More information
www.innovative-retail.de
www.qkies.de

CeBIT Hall 26 (H9), Stand F42

Germany Land of Ideas



Selected Landmark 2012



Contact

Prof. Dr. Antonio Krüger
 Head of research department
 Innovative Retail Laboratory
 E-mail: Antonio.Krueger@dfki.de
 Phone: +49 681 85775 5075

Dr. Ralf Jung
 Head of Living Lab
 Innovative Retail Laboratory
 E-mail: Ralf.Jung@dfki.de
 Phone: +49 681 85775 2016

► DFKI Interview: Dr. Ralf Jung

Dr. Ralf Jung is the Head of the Innovative Retail Laboratory (IRL)



Dr. Ralf Jung,
Head of Living Lab
Innovative Retail Laboratory (IRL)

What do you see as the application potential of your research?

The close cooperation with our partner GLOBUS SB-Warenhaus Holding results in focusing our research on the development of practical and innovative assistance systems for the retailing sector of the future. This partnership provides us with the opportunity to test and evaluate our findings with the specialists from GLOBUS in a practical environment.

When did your interest in Artificial Intelligence begin and how have AI processes changed since that time?

My first exposure to Artificial Intelligence was in 2004, first at the junior research group FLUIDUM while preparing my thesis paper and later on, as a staff researcher for the collaborative research project (SFB) 378 "Resource-adaptive cognitive processes." I can especially see a great potential for success in the merging of traditional AI methods with the vision of ubiquitous computing in user-oriented assistance systems.

What are the greatest challenges and opportunities for AI systems?

That has to be in the area of tailoring the individ-

ual knowledge transfer to the needs of the individual user, which requires a high level of contextual knowledge. At the same time it involves increasing the awareness of the responsibility to handle individual privacy data with respect.

What do you enjoy doing when you are not working as a research scientist?

Besides enjoying various kinds of sports, my real passion is music.

Are there parallels with your professional life?

Yes, I pursue my goals with passion and enthusiasm. It is the same whether on a project team or among the band members: the seed of a good idea only grows into something really great through the combined interactions of all participants.

What are your current projects?

We are designing several mobile applications at the IRL. In addition, we are busy with current retailer topics, for example, to study payment methods based on near-field-communication (NFC), digital signage, and smart indoor-navigation. All research projects have a primary interest in applying the value added from target user group studies.

B-Catch – Visual Flight Path Calculation with Entertainment Character



"Piggy" playing ball games

► The B-Catch project is investigating methods to acquire thrown balls – even when the observer is in motion – and to predict their future path based on the observed trajectories. The project methodology is to solve algorithmic questions concerning real-time image processing, for example, probabilities modeling of knowledge about the characteristics of ball trajectories.

Building on the earlier B-Catch work on image processors and object tracking, researchers have now developed the first model of a new kind of entertainment systems known as "Piggy." Piggy is being developed to play independently in an interactive ball game with a group of people at a public event. Similar to the RoboCup, a sports scenario allows the system to demonstrate its skills, further develop its capabilities, and to identify detailed requirements. The deliberately minimalist design consists of a racket with a spherical head and permits – as in billiards – the return of the ball by choosing the point of interception. This design reduces the

system to two driven degrees of freedom, which allows cost efficient production and economical operation.

Piggy invites visitors to join a game of catch at the DFKI stand at CeBIT.

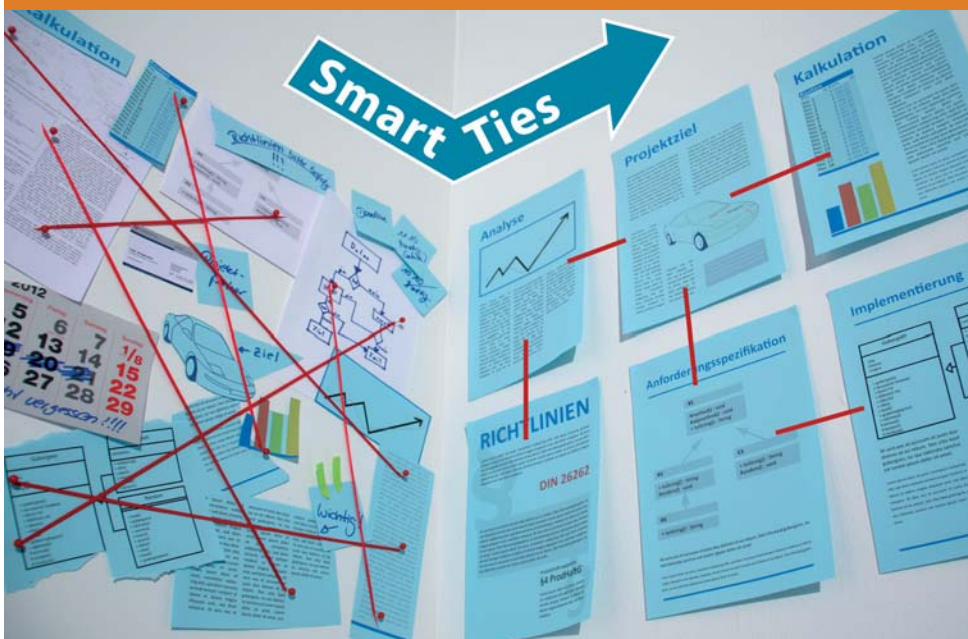
The B-Catch project is sponsored by the German Research Foundation (DFG). ◀

More information
www.dfki.de/cps

Contact

Dr. Tim Laue
Research department: Cyber-Physical Systems
E-mail: Tim.Laue@dfki.de
Phone: +49 421 218 64209

CeBIT Hall 26 (H9), Stand F42



SmartTies – Document Management in the Software Development Process

► In this time of global competition, innovation cycles have become significantly shorter. In order to remain competitive, new products must be brought to market ever more quickly. This is increasingly true for safety-critical systems like airplanes, railroad cars, or automobiles, but also for many so-called embedded systems such as those found in smart phones or other everyday products. The quality and safety of these systems must be guaranteed by certification in accordance with valid guidelines or standards like CC (Common Criteria for Information Technology Security Technology), ISO 26262, or IEC 61508. These standards require the preparation of concept papers, specification requirements, risk analyses, and test plans during the development phase, which later must be viewed in a related context during implementation. These documents are all closely interconnected. A concept paper, for example, may describe a use scenario that highlights several risks, which then serve as the basis for the risk analysis. This in turn produces safety requirements that must be adhered to in the implementation. Finally, this is verified by specific tests in accordance with a test plan.

SmartTies is an administrative system that assists in the management of development document collections. It supports the development and change processes by pointing out the consequences of an action to the software developer or, in obvious cases, performs the required modification automatically. For example, if an external review determines that a certain risk is not fully included in the risk analysis, a change must be undertaken. This implies follow-on changes to the requirements document, the test plan, and the implementation, which the user can then execute in SmartTies while ensuring consistency.

In the entire process, the developers continue to work in their familiar environments. Modifications are implemented in the document collection at specified times with additional adaptation requirements being determined and stored in the system for later processing. SmartTies recognizes the current development status and is able to generate the appropriate documentation or answer inquiries concerning the current status.

In contrast to traditional document management systems, SmartTies does not rely on just one predefined document pattern but can be adjusted and expanded to any number of document types using the respective ontologies. The documents and the relationships that exist among them are structurally analyzed using the ontologies and then represented in a standard meta language, where tools are available for semantic differential analyses and for integrating document versions. The core of the system consists of a control system where documents and their interrelated content are represented in a comprehensive graph. Consistency conditions are established using ontology-based replacement rules that enable the graph – and thus, the document collection – to be modified to maintain a consistent status.

SmartTies was created at DFKI's Cyber-Physical Systems research department within the framework of the FormalSafe projects, sponsored by the Federal Ministry of Education and Research (BMBF), and OMOC, sponsored by the German Research Council (DFG). ◀

More information
www.dfki.de/cps

Contact

Prof. Dr. Dieter Hutter
 Research department:
 Cyber-Physical Systems
 E-mail: Dieter.Hutter@dfki.de
 Phone: +49 421 218 64277

Prof. Dr. Christoph Lüth
 Research department:
 Cyber-Physical Systems
 E-mail: Christoph.Lueth@dfki.de
 Phone: +49 421 218 64223

CeBIT Hall 26 (H9), Stand F42



Cyber-Physical Systems

Professor Rolf Drechsler to head new research department at DFKI

► Computers are becoming smaller and smaller while at the same time performance is increasing. Today, we can build systems that can be embedded to interact with their physical environments, and are at the same time linked to one another via the Internet. This combination of extensive networking and embedded systems in the physical world is what characterizes the research subject known as Cyber-Physical Systems (CPS). CPS are found in aircraft, automobiles or smartphones. We are currently standing on the threshold of a new era with visionary developments such as fully autonomous automobiles, networked transportation systems, or those ambient systems used in assisted living environments (Ambient Assisted Living).

CPS imply new requirements for hardware and software development. The combination of embedding and networking increases the potential for error. Many of the cyber-physical systems are configurable or even self-modifiable, which scales up their vulnerability. The clear boundary between hardware and software begins to fade, which requires a rethinking of the traditional development models. At the same time, CPS are increasingly taking over safety-critical tasks, where an error may have catastrophic consequences. This is an area where it is necessary – and legally required – for these systems to be verified as being free from error and in compliance with specified safety requirements.

The Cyber-Physical Systems research department at DFKI is one of the few places that can claim expertise in the areas of hardware and software development as well as the functional safety and IT security areas. Verification of the correctness and safety of these systems primarily relies on the use of formal methods, which promise high quality by testing the systems with mathematical techniques. Our projects are application-oriented and our research is performed in close cooperation with our partners in the industry.

Our areas of research include:

- System and circuit design: Proven correctness in the design process is essential for error-free circuits and systems. The correctness is tested in the early design stages of the system by means of formal proof methodologies to save costs. The RESCAR project, for example, conducts accurate time analyses to ensure robust systems in the area of electromobility.
- Software development methods: This area includes the software verification and certification methods required for the efficient management of the huge variety of documents that are subject to a certification or verification process. This involves taking into account the relevant norms and standards like CC, ISO 26262, and IEC 61508 (for example, as in the recently completed IGEL project) as well as developing the enabling technologies, as was done in the FormalSafe and OMoC projects. These are also being demonstrated at the DFKI stand (Hall 26 (H9), Stand F42).
- Ambient Assisted Living: Integrated everyday technologies in the home and living environment are conceived, developed, and tested at the Bremen Ambient Assisted Living Lab (BAALL). BAALL is a 60 sqm, fully equipped research apartment, where technical solutions and concepts for assisted living are investigated to support the “seniors to be,” for example, as part of the EU ASSAM project.

With all of the developments in this pioneering field, we are well-positioned to provide valuable services to DFKI's partners and customers in the future with cyber-physical systems. ◀

More information
www.dfki.de/cps

Contact

Prof. Dr. Rolf Drechsler
Head of research department
Cyber-Physical Systems
E-mail: Rolf.Drechsler@dfki.de
Phone: +49 421 218 63932

TAKE Searchbench – Semantic Search in Documents and Digital Libraries

► Within the context of the TAKE (Technologies for Advanced Knowledge Extraction) project, DFKI is developing the computer-linguistic methods used in semantic phrase analysis that go well beyond the familiar possibilities of full text retrieval in text documents. The TAKE Searchbench project involves a search engine controlled via a browser that allows the user to ask structured queries in the form “subject-verb-object” for example, “method improves precision” or, in the shorter version, as “improve precision”. Propositions formulated in the passive voice are also automatically considered in the active form, so the construction “precision is improved by... method” will also be found. You can even search for similar propositions on the basis of synonyms.

The big advantage of semantic phrase retrieval is found in the accuracy of the returns: The search engine looks for the complete proposition: text fragments in which the words in the search query appear without any semantic relationship (i.e., appearing together only by chance) will not be displayed.

On request, the search engine will ignore negated propositions in the text (even when the negation happens at the single word level) and it can even find verb antonyms (opposite in meaning). Text passages can also be found when the subject or object has been replaced by pronouns like “it” or “their” – i.e., TAKE

Searchbench performs a so-called anaphora or coreference resolution.

Results are always presented in a phrased context and may also be highlighted in a PDF-document with the Acrobat Reader plugin. Search queries can be stored in the web browser as bookmarks, or e-mailed.

This technology can be applied to technical or scientific documents, patents, business document repositories, digital libraries, news archives, and many more. TAKE combines semantic phrase search with metadata filters, which support the automatic completion of search terms and multi-faceted navigation. The system can be employed as a high-performance, accuracy-oriented search engine for large volumes of text. Expert terminology found in a data domain may be automatically extracted on the basis of statistical properties without any explicit knowledge of the field. These terms can then serve as supplemental search criteria.

Text indexing, achieved on the basis of Apache “Solr”, creates a highly scalable, efficient application even for huge numbers of documents, when even scanned documents are subject to analysis and search. The text retrieval is complemented by a graphic browser, which helps to display links among various documents and to more easily navigate through the so-called dependency

graphs that often occur, for example, in the case of citations.

The TAKE methods do not only serve semantic retrieval, rather they can also function as the basis for other innovative, semantic-oriented applications in terms of collaborative research and development projects. It is also conceivable, for example, that automated responses to inquiries, and automated text summaries, controlled language or style checks, as well as an automatic taxonomy and glossary extraction are possible from such text collections.

The project is funded by the German Federal Ministry of Education and Research (BMBF). ◀

More information
<http://take.dfki.de>

CeBIT Hall 26 (H9), Stand F42

Contact

Dr. Ulrich Schäfer
 Research department:
 Language Technologies
 E-mail: Ulrich.Schaefer@dfki.de
 Phone: +49 681 85775 5154



Add and remove filters for the papers you are interested in (or remove all currently set filters).

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• A Relational Model of Semantic Similarity between Words using Automatically Extracted Lexical Pattern Clusters from the Web (2009)

Bollegala, Danushka, Matsuo, Yutaka, Ishizuka, Mitsuru

Next, the semantic similarity between the two words is computed using a Mahalanobis distance measure. ... We propose a relational model to compute the semantic similarity between two words. ... Finally, the semantic similarity is computed as the Mahalanobis distance between points corresponding to the feature vectors. ... of sim Show this sentence in the context of its document

• A Data Driven Approach to Relevancy Recognition for Contextual Question Answering (2006)

Yang, Fan, Feng, Junlan, Di Fabrizio, Giuseppe

De Boni and Manandhar (2005) proposed an algorithm of calculating the semantic similarity between the current question Q and a previous question Q'. ... To compute the semantic similarity between two questions, we modified De Boni and Manandhar's formula with a further normalization by the length of the questions; see formula (2). ... Researchers have proposed a variety of ways in measuring the semantic similarity or relatedness between two words (to be exact, word senses) based on WordNet. ... Notice that the WordNet: 'Similarity implementation' Another idea is to feed the decision tree training both the normalized and non-normalized semantic similarity information and see what would come out.

A Relational Model of Semantic Similarity between Words using Automatically Extracted Lexical Pattern Clusters from the Web

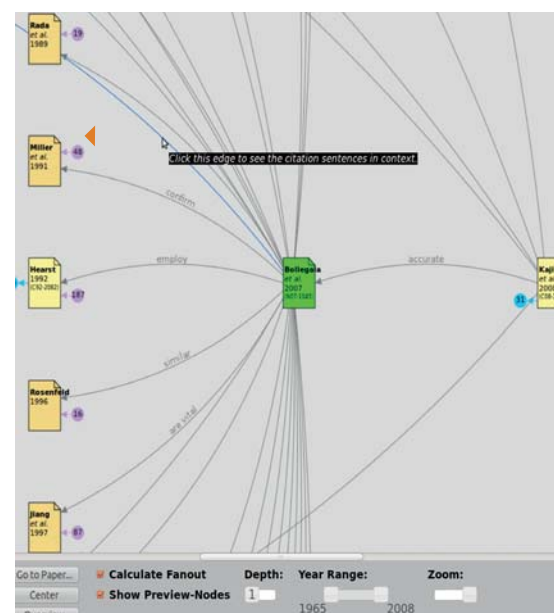
Bollegala, Danushka (University of Tokyo, Tokyo Japan)
 Matsuo, Yutaka (University of Tokyo, Tokyo Japan)
 Ishizuka, Mitsuru (University of Tokyo, Tokyo Japan)

content
 natural language processing
 training data
 shortest path
 previous work

Content PDF Citations

words by a feature vector defined over the clusters of patterns. Finally, the semantic similarity is computed as the Mahalanobis distance between

of similarity. A edit distance matches in a di





Monnet Links Business Reporting Across Languages

► The monnet project (www.monnet-project.eu/) aims at setting up easy Internet tools using XBRL (eXtended Business Reporting Language, www.xbrl.org) for the extraction and automatic translation of structured information, like financial statements and business reports, in various European languages.

At DFKI, in close collaboration with the partners DERI (Digital Enterprise Research Institute Galway), XBRL-Europe and SAP, we have specified and implemented a use case concerning business intelligence on European companies, involving a semantic-level analysis of business reporting in several languages. This use case is building on national and international accounting regulations that are encoded in XBRL taxonomies. XBRL is an XML-based open standard for identifying and communicating complex financial information in corporate business reports.

The biggest challenge the project is facing is the delivery of accurate semantic approaches for translation and information extraction, without having the need to modify the habits of current users of XBRL-encoded information. This allows the smooth integration of new technologies and resources in a well-established work-flow.

In monnet, we have implemented an “upgraded” XBRL in form of localized ontologies. With ontology localisation, we mean mainly the translation of the lexico-terminological level of ontologies (often referred to as the ‘ontology labels’). This approach supports not only the translation of the central elements of business reports (in the languages covered by the project: Dutch, English, German and Spanish), but also the extraction, integration and presentation of financial data in various types of documents and languages. In doing so, Monnet is contributing to the effective sharing of financial and business

knowledge across Europe. The project outcome is a set of software components, all of which can be used in combination as well as stand-alone:

- ▷ Ontology Lexicalization
- ▷ Ontology Localization
- ▷ Cross-lingual Ontology-based Information Extraction
- ▷ Cross-lingual Knowledge Access & Presentation

The demonstrator we present at CeBIT is processing XBRL instance documents from the Belgian National Bank, mapping the information into a semantic representation, supporting then the generation of a report of the main information in another language, and also linking to the taxonomies used in other European countries, especially Germany and Spain. ◀

More information
www.monnet-project.eu

CeBIT Hall 26 (H9), Stand F42

Contact

Thierry Declerck
Research department Language Technology
E-mail: Thierry.Declerck@dfki.de
Phone: +49 681 85775 5358



The New Generation of Voice Control for Cars

► Voice Control for Cars (VCC) is a multi-modal in-car demonstrator for an advanced in-vehicle information system (IVIS). Aided by natural language, touch screen interaction, or turn-and-push dialing, drivers can focus attention on road conditions and traffic rather than on operating the controls of the vehicle's entertainment electronics, and they can select the input mode best suited for the current context.

Traditionally, in-vehicle information system developments have shown little interest in integrating any other input mode than voice control – speech was considered the least distracting input mode for the driver. By adding additional input modes, VCC takes into account the various cognitive or psycho-motoric demands experienced while driving.

VCC is designed to react to different, dynamic music databases and to handle the growing number of users who want to use their mobile devices in the car. At startup, the system searches for and analyzes devices and music files and builds up a relational database of genres, artists, albums, and songs. The data can be accessed in two different ways: hierarchical browsing is practical if you are not exactly sure what you want to hear, or whether a certain song was copied to the device. A typical voice command sequence might be: “Music”, followed by “Genre,” “Jazz,” and “John Coltrane.” The alternative way to access the data is called “One-Shot” searching – for keywords stored in the metadata files. VCC even enables playback of remotely stored

music titles, independent of their storage location. If the user requests a song not found in the local database, a search is automatically initiated via a web service and, if successful, VCC launches the title through an integrated streaming player. Similar to music titles, multi-modal searches in a points-of-interest (POI) database are also possible.

VCC is a European collaboration in the EIT ICT Labs TIMS Carrier-GetHomeSafe project between partners Nuance and DFKI. Also involved are other EIT ICT Lab partners Daimler and the Swedish KTH Royal Institute of Technology. ◀

More information
www.eit.ictlabs.eu
www.gethomesafe-fp7.eu



CeBIT Hall 26 (H9), Stand F50

Contact

Dr. Christian Müller
 Research department: Intelligent User Interfaces
 E-mail: Christian.Mueller@dfki.de
 Phone: +49 681 85775 5269



Innorange Team (l.-r.):
Mario Llorente, David Munoz,
Samuli Silanto and Jukka Honkola

EIT ICT Labs – Innovation Comes to Life at CeBIT 2012



► Innovations in ICT (Information and Communications Technologies) are enhancing the quality of life – that’s the vision of EIT ICT Labs. Intelligent traffic management, sustainable power generation, and an aging population are just some of the challenges our society will face in the future.

Innovations in the ICT field are also a focus of CeBIT 2012. At our CeBIT stand, you will experience some of the latest innovations developed to address the challenges of our time.

“We promote innovation, train talented ICT entrepreneurs, and generate world-class business through the comprehensive and rapid implementation of the latest research findings.”

Europe as a global leader in ICT

EIT ICT Labs is one of the three Knowledge and Innovation Communities (KICs) selected by the European Institute of Innovation & Technology (EIT) to accelerate innovation in Europe. The goal of EIT ICT Labs is to make Europe a global leader in ICT innovation. The novel and unique philosophy of EIT ICT Labs is the result of approaching all three corners of the “knowledge triangle” – education, research, and business – equally and in parallel. EIT ICT Labs create a novel “innovation ecosystem” by transforming and integrating education, research, and business aspects into a system capable of responding rapidly and effectively to social challenges and profiting from market opportunities.

New business development and growth

EIT ICT Labs aims to increase the number of successful start-ups, to reduce the time-to-market for their business ideas, and to stimulate international growth. Our business development experts currently support over 20 start-ups with hands-on

coaching on business model development, marketing, and finance. We introduce investors to inventors who have a promising business concept. We also promote the development of existing companies by providing them with access to new technologies and contact to investors and partners across Europe.



innorange Ltd. is a Finnish enterprise being promoted by EIT ICT Labs, which assists the young start-up company in the preparation of business plans and in the areas of marketing and patent rights.

innorange Ltd. are specialists in customer flow management. By observing and analysing the radio signals of mobile devices, innorange Ltd. provides its clients with recommendations on how to improve customer service.

“Our connection to EIT ICT Labs provides us with clear advantages and lends support to the international development of our company. This is especially applicable when considering expansion into EU markets and contact to new business partners.”

Samuli Silanto, CEO, innorange Ltd.

Research areas and special focus projects (“action lines”)

EIT ICT Labs consists of three collaborative research areas – Cloud Computing, Internet Technologies & Architectures, and ICT-aided Human Activity – where the knowledge gained is implemented in new and innovative products, services, and patents. There are currently *six action lines* in which EIT ICT Labs is addressing major societal challenges. These action lines involve a high potential for innovation and new business development.

▷ **Digital Cities** focuses on contemporary information systems for citizens. This will solve many everyday problems such as coordinated scheduling of public transportation, finding available parking spaces, and reducing waste or misuse of resources.

▷ **Future Media** is developing and testing a high-performance and open ICT infrastructure capable of delivering high-quality, data-intensive storage services at a competitive cost being at the same time user friendly, universally accessible, and customizable.

▷ **Health and Well-Being** produces innovative products and services for managing stress, and providing for healthy nutrition, physical activity, sleeping well, and for social interaction.

▷ **Intelligent Mobility and Transportation Systems** produce safer, sustainable traffic and transportation systems. The aim is to integrate ICT-based technologies, concepts and deployment alternatives for future mobility designs at the European and global levels.

▷ **Smart Energy Systems** comprises the development of a joint European approach by research and business which connects ICT resources in an intelligent and green energy management.

▷ **Smart Spaces** focus on the development of intelligent environments for the office, home and public spaces that can make daily life easier, plus being more resource and cost efficient.

▷ **The ICT for Quality of Life CeBIT demo** shows the amount of data being generated in certain areas, like telecommunications or mailing systems, and how these data can be correlated and visualized on maps, thus providing an easier understanding of several phenomena. Furthermore, it shows how the correlated data can be used by third parties, to create new services contributing to enhance citizen awareness and to increase the quality of life, once issues like privacy, security and ownership are addressed.

Training future entrepreneurs

“EIT ICT Labs Master and Doctoral Program”, inaugurated in 2012, offers students, researchers, and teachers an opportunity to develop their creativity and capacity to take risks. “ICT Innovation” is a two-year master degree program in which students study at two universities in two different European countries. In addition to an excellent theoretical foundation, students have the opportunity to work with top European research facilities and leading business partners.

Strong partnerships introduce innovation to daily life

The partner network of EIT ICT Labs represents sixty of the world’s leading universities, research institutes, and companies in the field of ICT. The EIT ICT Labs are organized in hubs or Nodes in six European countries: Germany, Finland, France, Italy, The Netherlands, and Sweden.

Each node is based on a “Co-Location Center,” where the best academic and industry researchers, students, and SMEs transform excellent regional clusters into world-class innovation hotspots. ◀

More information

<http://eit.ictlabs.eu>

<http://eitictlabs.masterschool.eu>



CeBIT Hall 26 (H9), Stand F50



Agile, Alert, Adaptive – The Software-Cluster Innovations

The Software-Cluster contributes to Southwest Germany's reputation as Europe's "Silicon Valley." Universities, companies, and research institutes are working in close cooperation throughout the software development centers of Darmstadt, Karlsruhe, Kaiserslautern, Saarbrücken, and Walldorf. In this relatively small region, the business software of the future is being developed. The Software-Cluster, winner of the German government's leading edge cluster competition, makes its debut at CeBIT 2012 with presentations of the latest innovations, projects and emergent software solutions for the digital enterprise.

Emergent software transcends corporate boundaries and crosses value chains, in a way that makes entirely new business models and business offers possible.

Emergent software enables a lively, cross supplier information flow between business software platforms and ensures the protection of confidential data.

Emergent software adaptively adjusts in real-time to business changes and ensures optimal ease of use for the respective user, regardless of task or location.

More information www.software-cluster.org

Dual Reality in Manufacturing – Remote Control of Production Plants

► Modern production facilities are highly complex systems, with processes and components that can only be understood by specialists. "The capability to perform remote maintenance at a manufacturing plant per computer reduces costs and down time," says Prof. Dr. Philipp Slusallek, head of the DFKI research department Agents and Simulated Reality. At CeBIT 2012, a working group is demonstrating how virtual models can be cou-

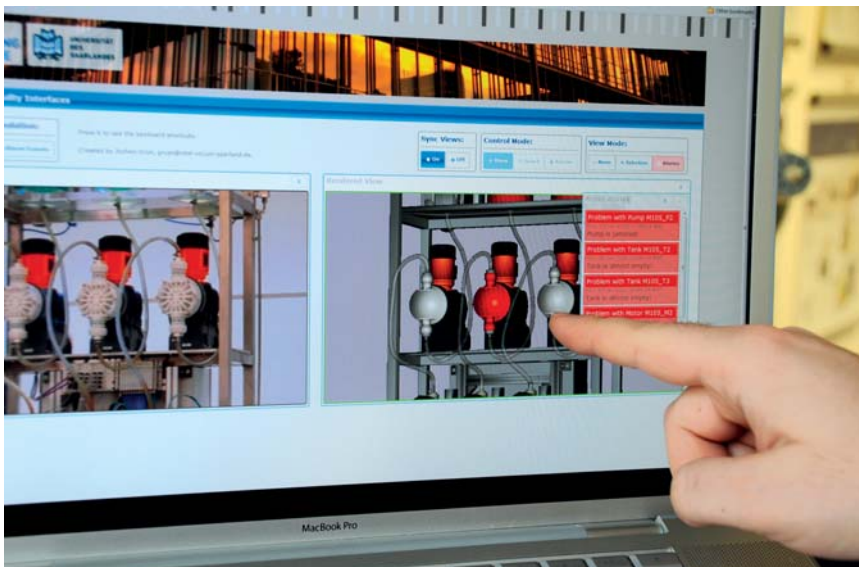
pled with video images in order to remotely control the facility.

An application developed in the Software-Cluster "EMERGENT" project uses a collaborative dual-reality scenario to demonstrate the possibilities of the new declarative languages for 3D content in the Internet, XML3D, and X3DOM. In this remote maintenance scenario, an operator simultaneously views a real time

video transmission from the SmartFactory^{KL} (optional in stereo 3D) as well as a virtual, interactive 3D model in a standard web browser.

The camera positions in SmartFactory^{KL} (www.smartfactory-kl.de) and those in the 3D model are completely synchronous, so that a visible and meaningful correlation between the real and virtual world is possible. Interventions in the virtual world of computer simulation affect the real world of a production facility and vice versa. In the event of a production error, for example, in a component, an alarm will be initiated over the 3D simulation and supplemental information about the respective component will be displayed. The desktop application is complemented by a second, mobile device that conceptually represents the "on-site service" in the plant and works within the same 3D scene. ◀

Dual Reality remote maintenance



CeBIT Hall 26 (H9), Stand F30

Contact

Alexander Löffler
Research department:
Agents and Simulated Reality
E-mail: Alexander.Loeffler@dfki.de
Phone: +49 681 85775 7743

Business Model Wizard – Find and Optimize the Substance of Your Business

► In a highly innovative industry like the software sector, choosing the correct business model is increasingly viewed as a critical success factor and a guarantee for sustainable business success. The Software-Cluster SWINNG research project studies the business models in the software industry and the mechanisms on which they are based. *Business Model Wizard* is a computer-aided construction kit to facilitate comprehensive and uniform descriptions of business models for the software industry and to support established companies and start-ups in the design, analysis, and optimization of their business processes. The kit addresses the strategic focus, the revenue model, the product engineering and product distribution as well as the production operation itself.

The Business Model Wizard accounts for current business model contextual information by linking various information sources. For example, similar business models that are already on the market may provide reference values by which to measure the quality of your own business model. Furthermore, the presentation of market data such as industry sales, growth forecasts, or competitor analyses may highlight new market trends and initiate dynamic modifications in the business model. All this is enabled by the use of semantic knowledge networks, which can be searched interactively at any time with the aid of the user-friendly visual analytics component. An ARIS interface supports the user in transitioning strategic modifications to operational business processes. ◀



CeBIT Hall 26 (H9), Stand F30

Contact

Thomas Burkhart
Institute for Information
Systems (IWi) at DFKI
E-mail: Thomas.Burkhart@dfki.de
Phone: +49 681 85775 5082

Dr. Dirk Werth
Head of Business Integration
Technologies Institute for
Information Systems (IWi) at DFKI
E-mail: Dirk.Werth@dfki.de
Phone: +49 681 85775 5236

Context-Sensitive User Support – An Emergent Knowledge Service at the Workplace

► An emergent knowledge service is being developed that offers a cross-application, context-sensitive and user-adapted support functionality.

In the prototype introduced at CeBIT, the manager of a supermarket can look up product and process information and register instructions and comments for user support via a “Dual-Reality-Dashboard” in the 3D model of the market. The dashboard autonomously adapts to the actual state of the market. When the user changes to another application, for example, in order to register an order or to audit the inventory, the emergent knowledge service represents the same information in connection to Word for the order registration or in connection to Excel for the inventory audit in real-time,

context-sensitively and user-adaptively. This is enabled by the storage of product and process knowledge in an emergent knowledge database, from which user- and context-specific support information about the business processes are provided via the emergent knowledge service.

Classical help functions for standard applications like Office, SAP or Internet applications are extended context-sensitively and role-specifically with the presented concept of a cross-application knowledge service. Static or dynamic information about business processes and business objects in standard business software but also in individually designed solutions are made available via a central knowledge and information serv-

ice or linked service calls. Applications don't have to be adjusted, or only using standardized interfaces. That's how users are given the opportunity to receive the context-relevant information in a business process according to their own role or insert them in a standardized way. This service can support also the most complex, highly individual applications besides the standard applications like Office and SAP. ◀

More information
www.software-cluster.org

CeBIT Hall 26 (H9), Stand F30

Contact

Gerrit Kahl
and Dr. Dietmar Dengler
Research department:
Intelligent User Interfaces
E-mail: Gerrit.Kahl@dfki.de
Dietmar.Dengler@dfki.de
Phone: +49 681 85775 2866 or -5259

IMC Contact:

Dr. Bogdan Sacaleanu
and Dr. Nils Faltin
E-mail: Bogdan.Sacaleanu@im-c.de
Nils.Faltin@im-c.de
Phone: +49 681 9476 108

3D model of a supermarket in the Dual Reality dashboard



► 3rd Innovation Day at *SmartFactory*^{KL}

The 3rd Innovation Day at *SmartFactory*^{KL} again proves to be an important platform for representatives of research, business, government, and the press.

On November 10, 2011, DFKI Kaiserslautern hosted numerous invited guests under the motto "ICT in the Factory of the Future," at the new *SmartFactory*^{KL} lab to discuss the implementation of innovative technologies in the field of manufacturing. The *SmartFactory*^{KL} team lead by Prof. Zühlke is investigating the use of modern technologies in industrial production. This annual event provides an interesting venue to present the most recent research results.

Huge advances in micro electronics, communications, and sensor technology have already made the integration and use of intelligent IT systems a reality in every facet of life and work. New components with integrated functions give humans a smart assist as they perform their tasks.

DFKI staff and representatives from the industry presented informative lectures and system demonstrations about cyber-physical production systems, SmartPower networks, RFID technology and virtual reality. In addition to the future factory, Innovation Day featured eleven demonstrators that came into being primarily through a partnership with the *Smart Factory*^{KL}. The expert discussion panels focused on the "4th Industrial Revolution," the bridge between the virtual and material worlds being created from digital value added in manufacturing plants and industrial products.

We are already looking forward to the next successful Innovation Day in October 2012.

More information
www.smartfactory.de

► Electric Mobility: Cooperative Established

DFKI Bremen and the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM), together with Ecotec have established the cooperative PMC Personal Mobility Center Northwest eG. This cooperative research organization is an outgrowth of the activities of the Bremen/Oldenburg electric mobility pilot region. The aim is to establish electric mobility permanently in the region. The PMC advises its members, initiates joint projects, and continuously expands the network.

More information
www.pmc-nordwest.de

► Bremen/Oldenburg Electric Mobility Model Region Extended

The Bremen/Oldenburg model region for electric mobility has been extended to the year 2014. The Federal Ministry for Transport, Building, and Urban Development (BMVBS) decided to continue the model region and has approved new projects. DFKI and Fraunhofer IFAM (Institute for Manufacturing Technology and Advanced Materials) co-manage the regional pilot project. Development has been ongoing since October 2009 on traffic concepts, business models, vehicle design concepts, infrastructure projects, and demonstrators for the broad topic of electric mobility in the Bremen/Oldenburg model region. The first projects were concluded successfully at the end of 2011.

More information
www.modellregion-bremen-oldenburg.de

► Selected CeLTech events 2012

The Centre for e-Learning Technology (CeLTech) is conducting a workshop on "Future e-Learning Technologies in Medicine and Healthcare" on April 23-24, 2012 at DFKI Saarbrücken. The conference is also the venue for the 16th Workshop of the Working Group "Medical teaching and learning systems" of the German Foundation for Medical Informatics, Biometry, and Epidemiology (GMDS). The topic focus is on innovative learning technologies, teaching and learning technologies in the medical & healthcare sectors as well as on IT-induced change management. Scheduled keynote speakers represent the Leibniz Knowledge Media Research Center, Fraunhofer IAO, Springer Medical Publishing, and DFKI.

More information
www.cbt-ag.de

The 7th "European Conference on Technology Enhanced Learning" (EC-TEL) will be convened under the motto "21st Century Learning for 21st Century Skills" on September 18-21, 2012 in Saarbrücken. In prior years, the EC-TEL has been held in Crete, Maastricht, Nice, Barcelona, and Palermo. This year the Centre for e-Learning Technology (CeLTech) has been designated to host the event. The submission deadline for papers, posters and demonstrators (Call for Papers) is April 2, 2012. For questions contact Dr. Sergey Sosnovsky (sergey.sosnovsky@dfki.de).

More information
www.ec-tel.eu



DFKI Service Offering

As an internationally renowned Center of Excellence for innovative software systems based on Artificial Intelligence (AI) methods, DFKI is offering the following services with more than 20 years of experience in basic and applied R&D:

- ▶ Technology transfer of the award-winning research results of DFKI
- ▶ Innovation coaching and start-up consulting in the Public-Private-Partnership sector
- ▶ Individual design, development and implementation of innovative application solutions
- ▶ Market studies, expert surveys, feasibility analysis and empirical user studies
- ▶ Component development with AI-functionality, enhancing the performance of complex software systems
- ▶ Scientific advice on the selection and implementation of complex software solutions
- ▶ Customization, implementation, deployment and maintenance of our AI-solutions
- ▶ Scientific evaluation and benchmarking of software solutions
- ▶ Application-oriented basic research
- ▶ Independent assessment of IT-security and privacy
- ▶ Technology workshops, training and practice
- ▶ Scientific monitoring of data collections and their evaluation
- ▶ Business engineering: Process analysis and development
- ▶ Innovation coaching and turnaround management
- ▶ Strategic and technical Due Diligence consulting for companies in the ICT sector
- ▶ Technical and organizational support for the standardization in the IT sector (including W3C, ISO)
- ▶ Design, construction and operation of Living Labs



Kaiserslautern Site



Saarbrücken Site

The German Research Center for Artificial Intelligence, DFKI GmbH

Intelligent Solutions for the Knowledge Society

Key Figures 2011

- ▶ **Annual Budget**
ca. 39 million Euro
- ▶ **Employees**
ca. 430 (main job)
ca. 320 (secondary job)

Scientific Excellence

- ▶ **Leading Edge Research**
DFKI is the only German research center for Computer Science that is a member in all three leading research clusters
 - ▶ DFG-Cluster of Excellence „Multimodal Computing and Interaction“
 - ▶ BMBF-Cluster of Excellence „Software Innovations for the Digital Enterprise“
 - ▶ EU elite institute EIT ICT Labs
- ▶ **Elite sponsorship program**
Software Campus
- ▶ **Networks of Excellence**
DFKI is vitally involved in eight European Networks of Excellence
- ▶ **Calls to chairs**
More than 60 DFKI members of staff have been appointed to the chair at universities at home and abroad
- ▶ **Spin-offs**
More than 60. Through spin-offs, approximately 1,500 highly skilled jobs have been created

▶ The German Research Center for Artificial Intelligence GmbH (DFKI), with facilities in Kaiserslautern, Saarbrücken, Bremen and a project office in Berlin, is the country's leading business-prone research center in the area of innovative software technology. In the international scientific community, DFKI is recognized as one of the most important “Centers of Excellence” in the world for its proven ability to rapidly bring leading edge research to commercially relevant application solutions.

DFKI was founded in 1988 as a non-profit organization by several renowned German IT companies and two research facilities. Since then, DFKI GmbH has established a reputation for proactive and customer oriented work and is known both nationally and internationally as a competent and reliable partner for commercial innovation. Besides the DFKI states of residence, Rhineland-Palatinate, Saarland and Bremen, numerous renowned German and foreign high-tech companies are represented. The successful DFKI Public-Private-Partnership (PPP) model is nationally and internationally recognized as a forward-looking business structure in the field of cutting-edge research.

With eleven research departments, ten competence centers and five Living Labs, the whole spectrum from application-oriented basic research to market- and customer-oriented development of product functions is being addressed in DFKI projects. Funding is provided from public funding agency tenders like the European Union, the Federal Ministry of Education and Research (BMBF), the Federal Ministry of Economics and Technology (BMWi) and the Federal States as well as by research and development contracts from the industry. A committee of international experts annually audits the progress of publicly funded projects (Scientific Advisory Board). Every five years, the BMBF evaluates the DFKI projects, the latest evaluation in 2010 led once again to a positive result.

DFKI is committed to numerous panels to the science and technology location Germany and enjoys a high reputation far beyond Germany's borders in the training of young scientists. At the moment, about 760 employees (325 of them part-time) from more than 60 countries are working at more than 163 DFKI research projects. More than 60 members of staff have been appointed to the chair at universities at home and abroad.

With an overall annual budget in 2011 of approx. 39 million Euro, the previous year's record result has been surpassed once again. ◀



Bremen Site



DFKI project office in the Focus Teleport Berlin

Corporate Data

- ▶ **Foundation**
1988
- ▶ **Executive Board**
Prof. Dr. Dr. h.c. mult. Wolfgang Wahlster
(CEO and Scientific Director)
Dr. Walter G. Olthoff (CFO)
- ▶ **Legal Form**
Non-profit organization (Public-Private-Partnership)
- ▶ **Industrial Partners**
Astrium GmbH - Attensity Europe GmbH - BMW Group -
Research and Technology - Daimler AG - Deutsche Messe AG -
Deutsche Post AG - Deutsche Telekom AG - Fraunhofer
Gesellschaft e.V. - Harting KGaA - Intel Corporation - John
Deere European Office - KIBG GmbH - Microsoft Deutschland
GmbH - RICOH Company Ltd. - SAP AG - Software AG - Techni-
cal University Kaiserslautern - Bremen University - Saarland
University
- ▶ **Membership Rights**
Center for the Evaluation of Languages and Technologies
(CELCT), Trento - Yocoy Technologies GmbH, Berlin - SemVox
GmbH, Saarbrücken - GraphicsMedia.net GmbH, Kaiser-
lautern - PMC e.G., Bremen
- ▶ **Sites**
Kaiserslautern (registered office), Saarbrücken und Bremen.
Project office Berlin. Further operating sites in Osnabrück und
St. Wendel
- ▶ **Research departments and Scientific Directors**
Kaiserslautern Site
 - ▶ Knowledge Management (Prof. Dr. Prof. h.c. Andreas Dengel)
 - ▶ Embedded Intelligence (Prof. Dr. Paul Lukowicz)
 - ▶ Augmented Vision (Prof. Dr. Didier Stricker)
 - ▶ Innovative Factory Systems (Prof. Dr.-Ing. Detlef Zühlke)
 Saarbrücken Site
 - ▶ Innovative Retail Laboratory, St. Wendel
(Prof. Dr. Antonio Krüger)
 - ▶ Institute for Information Systems (Prof. Dr. Peter Loos)
 - ▶ Agents and Simulated Reality
(Prof. Dr. Philipp Slusallek)
 - ▶ Language Technology (Prof. Dr. Hans Uszkoreit)
 - ▶ Intelligent User Interfaces
(Prof. Dr. Dr. h.c. mult. Wolfgang Wahlster)
 Bremen Site
 - ▶ Cyber-Physical Systems (Prof. Dr. Rolf Drechsler)
 - ▶ Robotics Innovation Center (Prof. Dr. Frank Kirchner)
with a branch in Osnabrück (Prof. Dr. Joachim Hertzberg)
- ▶ **Project office Berlin**
▶ Support of projects in the capital region

- ▶ **Living Labs**
Testing, evaluating and demonstrating innovative
technologies
Bremen Ambient Assisted Living Lab (BAALL)
Innovative Retail Laboratory (IRL)
Robotics Exploration Laboratory
SmartFactory Laboratory
Virtual Office Laboratory
- ▶ **Competence Centers**
Coordinating and focusing research activities
Ambient Assisted Living - Case-Based Reasoning -
Computational Culture - e-Learning - Human-
Centered Visualization - Multimedia Analysis &
Data Mining - Semantic Web - Safe and Secure Systems -
Language Technology - Virtual Office of the Future
- ▶ **Advisory Board**
Chairman: Prof. Dr. h.c. Hans-Albert Aukes
Deutsche Telekom AG
Vice Chairman: Ministerialdirigent Heinz-Josef Mentges,
Ministry for Education, Science, Further Education and
Culture of the State Rhineland-Palatinate
- ▶ **Scientific Advisory Board**
Annual evaluation of publicly funded projects
Chairman: Prof. Dr. Horst Bunke, University of Bern, Switzerland
- ▶ **Committees**
Through its heads of research, DFKI is represented in
numerous committees
Scientific and political leadership committees
Research Alliance of the Federal Government - German
Council of Science and Humanities of the Federal Govern-
ment - BMBF strategy board "Future Internet" - Feldafinger
Circle - IST Advisory Group (ISTAG) - Technology and Innova-
tion Council Berlin - European Network of Excellence "Mul-
tilingual Europe Technology Alliance (META-NET)" - EU
Future Internet High-Level Expert Panel - and others
Economy committees
International SAP Research Advisory Board – Partnership for
Innovation Ambient Assisted Living between BMBF und VDE -
Scientific Advisory Board of Deutsche Telekom Laboratories -
Nvidia - Hitachi - and others
Scientific Academies
Royal Swedish Academy of Sciences - German National
Academy of Sciences Leopoldina - Berlin-Brandenburg Acad-
emy of Sciences - Academy of Sciences and Literature, Mainz -
National Academy of Science and Engineering - European
Academy of Sciences - and others

Intelligent Solutions for the Knowledge Society

- ▶ Knowledge management and document analysis
- ▶ Virtual worlds and 3D internet
- ▶ E-Learning and e-Government
- ▶ Development of provably correct software
- ▶ Innovative factory systems
- ▶ Information extraction from text documents
- ▶ Intelligent web retrieval and web services
- ▶ Multi-agent systems and agent technology
- ▶ Multimodal user interfaces and language understanding
- ▶ Visual computing
- ▶ Multimedia analysis and data mining
- ▶ Augmented vision
- ▶ Mobile robotic systems
- ▶ Shopping assistance and intelligent logistics
- ▶ Semantic product memories
- ▶ Safe and secure cognitive systems
- ▶ Semantic web and Web 3.0
- ▶ Ambient intelligence and assisted living
- ▶ Intelligent solutions for safety and security
- ▶ Driver assistance systems and Car2X communications
- ▶ Cyber-physical systems



German
Research Center
for Artificial
Intelligence



Kaiserslautern Site

Trippstadter Straße 122

D-67663 Kaiserslautern

Phone: +49 631 20575 0

Fax: +49 631 20575 5030

Saarbrücken Site

Campus D 3 2

D-66123 Saarbrücken

Phone: +49 681 85775 0

Fax: +49 681 85775 5341

Bremen Site

Robert-Hooke-Straße 5

D-28359 Bremen

Phone: +49 421 17845 4100

Fax: +49 421 17845 4150

www.dfki.de | info@dfki.de

