

NEWSLETTER



GERMAN RESEARCH CENTER FOR ARTIFICIAL INTELLIGENCE

1/2011

RESEARCH LABS

KNOWLEDGE MANAGEMENT

ROBOTICS INNOVATION CENTER

SAFE AND SECURE COGNITIVE SYSTEMS

INNOVATIVE RETAIL LABORATORY

INSTITUTE FOR INFORMATION SYSTEMS

AGENTS AND SIMULATED REALITY

AUGMENTED VISION

LANGUAGE TECHNOLOGY

INTELLIGENT USER INTERFACES

INNOVATIVE FACTORY SYSTEMS



The talking cocktail shaker – Digital refinement of everyday objects in the Internet of Things

DFKI Strengthens Its Presence at CeBIT

CeBIT

DFKI Coordinates W3C in Germany

W3C

DFKI at HANNOVER MESSE 2011

HANNOVER
MESSE
4.-6. APRIL 2011



Innovations with Eyes, Ears, and Reason

DFKI at the CeBIT 2011



DFKI is once again exhibiting current solutions at CeBIT 2011 (**March 1-5, 2011**) in Hannover. CeBIT lab in **Hall 9** (formerly called future parc) is the direct interface between ideas and commercial applications and is the perfect venue for the DFKI exhibits (**Stand A30**). Real systems, prototypes, innovations with eyes, ears, and reason to try out and understand are on display.

DFKI is also represented at the CeBIT lab talk through its involvement in a series of panel discussions and lectures.

One of the key topics of the 25 DFKI exhibits at this year's CeBIT is "Urban Technologies", an area that is dealing with the aspects of urbanization of the world's population as a technological challenge.

Other DFKI exhibits can be visited at the various combined exhibit areas: Federal Ministry of Education and Research **BMBF (Hall 9, B40)**, Federal Ministry of Economics and Technology **BMWi (Hall 9, B47)**, Saarland University (**Hall 9, B43**), Association for Automatic Identification and Mobility (**Hall 7, D12**).

The DFKI stand covers an area of 1600 square feet and is located in close proximity to the BMBF and BMWi stands and adjacent to CeBIT lab talk (**Hall 9, A40**), which is moderated by Reinhard Karger. CeBIT lab, the conference forum at the trade fair, offers more than 100 lectures, conference seminars, live presentations, panel discussions, and project demonstrators to provide excellent insights into the state of research and the technology standards of the future.

We look forward to welcoming you to Hannover!

Service-Oriented Architectures in Production Systems

DFKI at the HANNOVER MESSE 2011

At this year's Hannover Messe from **April 4-8**, DFKI Innovative Factory Systems (IFS), under the supervision of Prof. Dr.-Ing. Detlef Zühlke will present an exhibit that demonstrates the concept of transferring SOA paradigms from ICT platforms to factory automation systems.



The concept employs a modular production unit and can be viewed at the DFKI **stand A16** in **Hall 8**.

Web services can control and monitor the production process, check status and production grade of the work, communicate with sensors, and actively support parameterization and maintenance of field devices.



W3C Opens German-Austrian Office at DFKI



The World Wide Web Consortium (W3C) has established its new office in Berlin at DFKI. The opening event was celebrated on February 10, with speakers from W3C, the Federal Ministry of Economics and Techno-

logy (BMW), DFKI, and industry partners participating at the THESEUS Innovation Center.

"European research and industry have a clear role in shaping the Internet of the Future," explained Dr. Jeffrey Jaffe, CEO of W3C. "The increased participation of key German and Austrian industries will not only impact positively on their business and innovation strategies, but will also influence W3C's international landscape."

W3C, founded by WWW inventor Tim Berners-Lee, is an international consortium of over 300 member organizations working to develop standards and guidelines for the web. The work of W3C is jointly run by MIT (Massachusetts Institute of Technology) in the USA, ERCIM (European Research Consortium for Informatics and Mathematics) in France, and Keio University in Japan. W3C's 14 other regional offices make it a truly international organization.

DFKI, a member of W3C for many years, has made many vital contributions in several areas: technologies of the semantic web, multimedia semantics, and the markup languages EMMA, EmotionML, MathML.

In this venue, Prof. Dr. Wolfgang Wahlster described the central role played by the web in every type of IT-intensive industry. "Today's grand opening of the German-Austrian W3C office at DFKI is an important milestone," said Wahlster. "We look forward to strengthening W3C's position in Europe via our network of national and international research institutes, standardization bodies like DIN and ISO, and the IT-intensive, German speaking industry as a whole."

Standardization is the key to linking innovation, application, and product development. DFKI directors Prof. Dr. Philipp Slusallek and Prof. Dr. Hans Uszkoreit introduced current topics that will benefit from standardization in W3C: Object Memory Modeling (OMM), Unified Service Description Language (USDL), XML3D, and language technologies. Dr. Orestis Terzidis, SAP AG, expressed his positive expectations, specifically, his hope that USDL will soon enter the regular W3C standardization process. Dr. Andreas Goerdeler, BMW, discussed the contributions made among others by the THESEUS research program. He also emphasized the great significance of the cooperation between international and national standardization organizations like ISO and DIN. W3C CEO Dr. Jeffrey Jaffe emphasized the fact that such cooperation is made possible by the fundamental work of W3C. The W3C status as an accredited PAS Submitter (Publicly Available Specification) since the end

of last year, gives it the opportunity to generate ISO standards. Dr. Philipp Hoschka, Head of the "Ubiquitous Web" department at W3C, introduced standardization topics for the mobile web. Dr. Stefan Wess, Managing Director Attensity Europe, illustrated, using the example of Social Media Analysis, the role of standardization of the web for IT-intensive industries. Prof. Michel Cosnard, President of W3C's European host ERCIM and INRIA (Institut National de Recherche en Informatique et en Automatique), described the close relationship between web technology, standardization, IT training, research, and innovation.



l.-r. Prof. Michel Cosnard, ERCIM; Prof. Wolfgang Wahlster, DFKI; Prof. Felix Sasaki, DFKI; Dr. Jeffrey Jaffe, W3C; MinR Dr. Andreas Goerdeler, BMW

The German-Austrian W3C office promotes successful synergies. The W3C standards and the work of W3C on an open web platform will form the basis for the convergence and the transformation ongoing in many important industries, including automotive, broadcasting, chemical, pharmaceutical, and mobile communications.

More information

www.w3.org

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► Useware Engineering – User Focused Development of User Interfaces

The rate of innovation in times of global markets has never been higher. At ever shorter intervals, whether talking about industrial machinery or cellular telephones, the customers are offered technological novelties and advanced development models with a greater range of functionalities. Yet how many customers actually know about and use all the functionalities implemented by the suppliers? The more complex and unintuitive the available products become, the more important it is to insure an optimal design of the user interface. Whenever operating a product becomes too complicated for the user, the overall effectiveness and efficiency of the product suffer. Poor menu prompts often lead to frustration and dissatisfaction among the users and this detracts from the product's desirability. The term used to describe the aspects of effectiveness and efficiency of the interactive controls as well as the overall user friendliness is "usability".

It is extremely important, especially for industrial systems, that the concept of operation be designed with human abilities foremost in mind. Complicated unit controls pose an extra burden for the operator beyond the actual job assignment, which can affect the safety of both people and equipment. Especially in the event of an accident or incident, a high level of system transparency ought to exist to allow an operator to respond quickly and without error. Difficult to understand and inaccessible user interfaces diminish the controllability of complex systems and are a major cause of system failure and safety risk.

So, how do we achieve this usability? We must develop user interfaces that take into account human abilities and needs. This is precisely what the useware engineering process created at the DFKI research department for Innovative Factory Systems (IFS) provides. In order to ensure the optimal approach for the developers, the

process differentiates the various overlapping development phases. The analysis phase is of major importance for the development of useful user interfaces, and, among other things, it defines the context and identifies the specific user groups intended for the product being developed. Using various methods such as surveys and observations, it determines the user's tasks, needs, and desires in the respective contexts. An early determination of user requirements facilitates all subsequent decision making, while in the process helping in the timely identification of programming errors and risks and in avoiding costly reworking.



It is generally acknowledged today that usability represents a comprehensive added value for customers and suppliers. Nevertheless, the expert knowledge and development methodology for user interfaces has not yet been adequately internalized. An optimized user interface improves the efficiency and effectiveness of modern products and provides a positive experience for the users as well as a satisfied customer, and, in the final analysis, benefits the manufacturer. The Useware-Engineering Process of DFKI-IFS is an approach that can significantly reduce development effort and costs.

More information
www.dfki.de/ifs

CeBIT HALL 9, STAND A30

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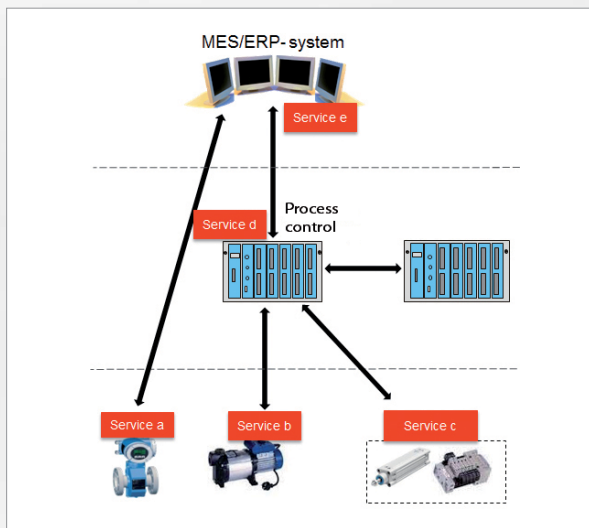


Service-Oriented Architecture in Manufacturing Systems – DFKI at the Hannover Messe 2011

Web services control and monitor the production process, check the status and production grade of the work, communicate with sensors, and actively support the parameterization and update of control terminals.

Service-oriented architecture (SOA) with integrated web services has become the dominant solution for improving the flexibility and reusability of components in traditional IT systems. The transfer of SOA paradigms from ICT platforms to factory systems also gives the process domain an opportunity to meet the coming market challenges. In these times of rapid change in the markets, manufacturing companies face transformed requirements, shorter product life cycles, and a growing preference for customized products. Production plants must become more flexible in the future if they are to respond to these challenges.

DFKI Innovative Factory Systems (IFS), under the supervision of Prof. Dr.-Ing. Detlef Zühlke, will have an exhibit at this year's Hannover Messe from April 4-8, which demonstrates the concept of transferring SOA paradigms from ICT platforms to factory automation systems using a modular production unit.



The classic industrial production plant is controlled by so-called programmable logic controllers (SPS) that communicate with control terminals (sensors and actuators) via digital or analog inputs and outputs, or via field bus systems like Profibus. The demonstrator presented at the HMI 2011 Fair has been entirely converted to benefit from service-oriented architecture. The industrial-grade control terminals provide their functionality to the network as abstract web services. A central orchestration unit can meaningfully combine these services to form a process, which enables a service-based control of the manufacturing process.

Semantic technologies for manufacturing have been integrated in the demonstration scenario. The semantic

descriptions make functionalities and interfaces to the web services machine-readable. In this way, visitors can interactively enter the semantic selection criteria over a user interface to browse and find the services available in the demonstrator. The diverse web services provided by the control terminals, the setup and update of parameters as well as the execution and control of the production processes are all activated using standard mobile operating devices.



Service-oriented production plants are chipping away at the prevailing dominance of the automation pyramid model and its rigid levels. Communication across the levels is possible so that, for example, information from a control terminal to the Enterprise Resource Planning (ERP) System need not be compiled from level to level, but rather is available directly as a service. The use of SOA technologies in the production realm allows new devices to be connected to the existing network at no

great expense which means the expansion or modification of plants can be a very flexible undertaking.



More information
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HMI HALL 8, STAND A16

▶ RADAR – Resource Annotation and Delivery for Mobile Augmented Reality Services



"I eat lunch here every day" or "This is my favorite pub in Kaiserslautern" are informative statements that only have meaning in relation to a

location. Location based services connect information with geographic data and supply it not only to a virtual room, but also to real, mobile contexts. In this sense, "Augmented Reality Services" takes on a special role in providing the user with information about objects in the immediate environment and digitally expanding the reality. For the first time now, "Reality Browsers" on mobile devices provide an infrastructure that enables Augmented Reality Services without the need for any additional, costly instrumentation or appropriate interface development.



Stiftung
Rheinland-Pfalz
für Innovation

The central problem for Augmented Reality Services today is to provide data in a way that it can be used in various services, because there are no generally accepted standards.

The services tend to use their own proprietary data format, which requires special data preparation. As a result of this heterogeneous situation, presently, it is nearly impossible to integrate and aggregate data from the diverse use contexts of different services.

To meet these challenges, the RADAR project is developing an open infrastructure for the administration and aggregation of location-based multimedia data from various sources such as the social and semantic web or digital libraries. RADAR not only makes available its own mobile client for supplying customized content, it also provides adapters for existing services like Layar, Wikitude, and ALOQA. The first application case, the "Augmented City Kaiserslautern" is now being realized.



RADAR is funded through the Rhineland-Palatinate State Foundation for Innovation and has its roots in DFKI's social media platform ALOE.

More information
www.dfki.de/radar

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▶ Social Media Miner – Web 2.0 Trend Recognition for Companies

Opinion-forming processes are no longer solely a phenomenon of traditional media like newspapers, radio, and television. Today, the World Wide Web also plays an important role. The advent of Web 2.0 generated even greater numbers of users who contribute online content. They express their opinions in blog articles and write product evaluations in e-commerce platforms and exchange thoughts in discussion boards.

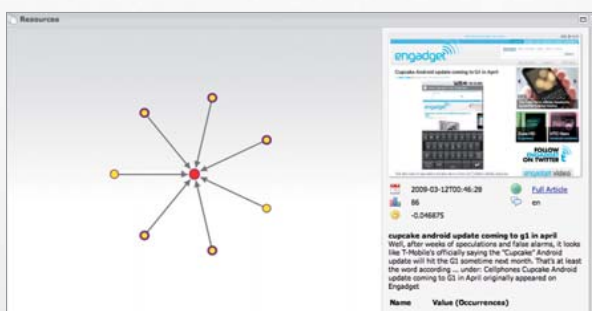
In the context of their innovation processes and customer communications, commercial companies recognize that they need to maintain a constant awareness of what is being said in online domain discussions (e.g., about a product or a person). However, because of the

volume of information available in Web 2.0, it is very time and cost intensive to read all the relevant entries. Social Media Miner (SMM) provides partially automated support for the company's market researchers so they do not lose sight of what is happening in the domain: they can gain an overview of the discussion topics and recognize emerging trends at their earliest stage.

SMM does this by pooling blog articles for specified domains from various search engines. Through a combination of algorithms taken from Social Network Analysis (SNA) and text mining, the categories can be defined within the domain and the most influential blogs per topic are prompted for recommended reading. Social Media Miner is funded by the Investitionsbank Berlin (IBB) within the framework of the EU ProFIT program, and the industry partner is trommsdorff + drüner innovation + marketing consultants GmbH.

More information
<http://socialmediaminer.wordpress.com>

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Public-Private Knowledge Management in Agriculture iGreen Gets to the Heart of Services and Knowledge



Aim

The aim of the iGreen research project is the design and implementation of a network of knowledge

and location-based services which links distributed public and private sources of crop farming information. Mobile decision-making agents with state-of-the-art technologies are being developed. They connect locally to a network in order to support and optimize production processes that are frequently organized in collaboration with many different groups in an energy-efficient, economically and environmentally friendly manner.

Application

To the user, iGreen offers a standardized and branch-spanning access to intelligent technologies, which enable collaboratively organized, data-specific services. Small enterprises in particular will profit from the access to encompassing structures for knowledge exchange and eBusiness, while ensuring local control.

Infrastructure and knowledge gain will result in higher efficiency, reduced resource consumption, and better economics. The competitiveness of enterprises that integrate into the innovative network of services and knowledge will thus be improved.

Crop farming, the main application area of iGreen, is dominated by decision-making that is characterized by spatial and time-dependent information. In order to enable individual, timely, and efficient support for on-



site decision making, iGreen supplies a mobile decision-making agent with local access to diverse sources of information such as geological data. Thus, iGreen makes a major contribution to a results-oriented and resource-efficient form of agricultural production.

Domain specific applications are being implemented and tested in practical field trials in cooperation with end users, i.e., big and medium-sized farm equipment manufacturers. The integration of national industry organizations and representative public institutions, for example, the Chamber of Agriculture, promises a high degree of acceptance and market penetration.

Outcome

The desired outcome includes:

- ▶ An integrated infrastructure for a network of knowledge and services, based on content-supported, service-oriented software architecture (SOA).
- ▶ The availability of open source software permanently supported in its basic components
- ▶ Mobile decision making agents and technology platforms for effective knowledge structure and transfer
- ▶ The practical evaluation in real field studies of the created structures and specific applications including integration of innovative software with modern agricultural technology
- ▶ The establishment of sustainable network structures, especially among innovators, consultants, and end users as well as the technically supported continuing cooperation in public-private-partnerships.

The Innovation Alliance iGreen is an association of 24 players from economy, science and public authorities, funded by the Federal Ministry of Education and Research.

More information

www.igreen-projekt.de

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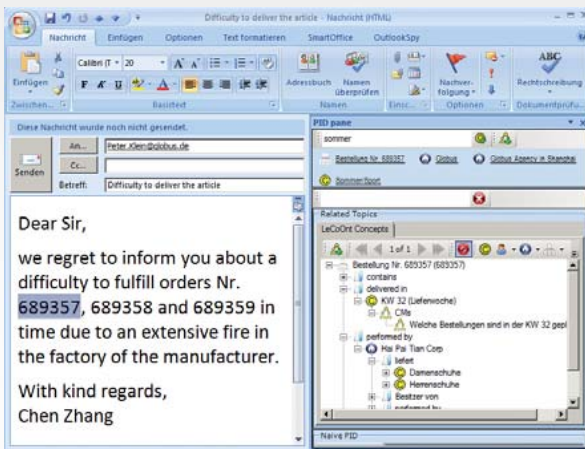
CeBIT HALL 9, STAND A30

SmartOffice – Knowledge Management Plugins for Microsoft Office

The volume of relevant information office workers are facing every day is huge, and it is growing steadily. This is especially challenging for practitioners of the so called knowledge-intensive occupations, who have to deal with fact-filled and knowledge-intensive tasks in their jobs, like scientists, journalists or engineers. Their e-mails and documents serve not only as aids to solving an immediate task, but rather as important sources of knowledge about business processes that can be retrieved for re-use at some future time. This is why documents like e-mails must be organized and archived.

In order to simplify the job of structuring electronic documents, scientists at DFKI have developed enhancements for the Microsoft Office applications Outlook and Word, which provide the Office-package with additional intelligent functions, thus facilitating improved management of e-mails or text documents. The SmartOffice Plugins PID4Look and PID4Word enable the automatic assignment of semantic categories to e-mails or text documents as well as annotating them with information stored in a knowledge database.

PID4Look generates classification recommendations for e-mails in Outlook and provides a simple exploration



option in a knowledge base: A user can view the categories and search through additional related categories or information objects in the knowledge base. Beyond this, PID4Look delivers information objects such as sent or received e-mails, documents, appointments, tasks, or contact data that may be relevant to the current job to the user.

PID4Look is already being applied in the AdiWa research project (Allianz Digitaler Warenfluss). The plugin is used there to manage unstructured tasks in order processing at our project partner, Globus SB-Warenhaus Holding. PID4Look assigns an activity to inbound e-mails and documents. When these are subsequently enriched with semantic information, for example, about the type of

order or the supplier, it is easier to find and retrieve them at some future time. The integration of PID4Look in an existing order processing system enables the construction of highly networked, order-related document archives.

PID4Word integrates functions to identify semantic categories in Word files. Furthermore, the plugin enables passages in a document to be annotated automatically with the help of SmartTags and makes the document interactive: When a category name is identified in a document, SmartTags that provide a link to the knowledge base are set automatically. By clicking such a tag, the user can open the respective categories in the ontology browser.

The near-term planning calls for the further enhancement of SmartOffice with plugins for the other Office applications like Excel or Powerpoint.

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

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META-NET – Network of Excellence to Support the Multilingual Europe Technology Alliance

Speaking your native language – be it Estonian, Hungarian, or Portuguese – must not superimpose any social or economic disadvantages in the networked European information society.

META-NET

Language technology enables communication and cooperation to go beyond language barriers.

When available for all European languages and in a position to supply robust as well as precise translations among the languages, this technology can ensure access to the same information and knowledge for all speakers regardless of the language spoken. Multilingual language technology that also relies on the functionalities of internet-based information and communication systems also possesses the potential to develop new markets.



One pressing condition for the realization of this vision is a significant acceleration and intensification of research and development – an acceleration that can be achieved only through a joint effort by all participating interests. This group includes: scientists, customer and supplier branches, technology integrators, language communities,

government agencies, politicians, research sponsors, journalists, and finally, the potential users. This heterogeneous group of actors is pooled together in the umbrella organization META (Multilingual Europe Technology Alliance), with the aim of making the European vision of a common digital market and information community a reality.

META-NET is a Network of Excellence coordinated by DFKI and funded by the European Union. It pursues the aim of strengthening the technological foundation for a multilingual European information society and imple-



Meta-Net symposium, Berlin



Founding members of Meta-Net, kick-off meeting Berlin

menting applications that support, for example, machine translation and multilingual information and knowledge management for all European languages. Through the parallel development of intuitive, language-based and voice-controlled user interfaces, diverse technology sectors will be advanced – from household electronics to machinery and automotive industries to include innovative computers and robots. META-NET consists of three strategic areas:

- ▶ **META-VISION:** Establishment of META, the dynamic and influential interest group with a common technology vision and a strategic research agenda for a multilingual Europe.
- ▶ **META-SHARE:** Development and release of an open and distributed infrastructure for the exchange of resources and language databases.
- ▶ **META-RESEARCH:** Network with related research and technology topics.

META-NET was established in February 2010 by 13 partners from 10 countries. Since that time, the network has expanded to include all of Europe and now consists of 44 members in 31 countries. The network was first introduced to the public in November 2010 at the META-FORUM 2010 conference in Brussels, Belgium.

More information
www.meta-net.eu

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▶ SmartSenior – Innovative Research Serving People

There are 28 well-known companies and research institutes working on innovative technologies in the research alliance SmartSenior, with funding provided by the Federal Ministry of Education and Research (BMBF). The research will benefit seniors as they go about their daily routines and help them to retain their independence.



The aim is to assist senior citizens socially, economically, and with healthcare services in ways that extend the period of time in which they are able to live in familiar surroundings. The project considers the independence of seniors living alone as well as the acute or chronically ill, i.e., elderly persons that require assistance and nursing care.

The world of the senior citizens in our society is the focus of the research initiative SmartSenior. It examines issues within the following three themes:

- ▶ How can seniors move about safely or retain their mobility?
- ▶ How can seniors keep their health or recover quickly from illness?
- ▶ How can seniors maintain their independence and stay in their homes for a longer period?

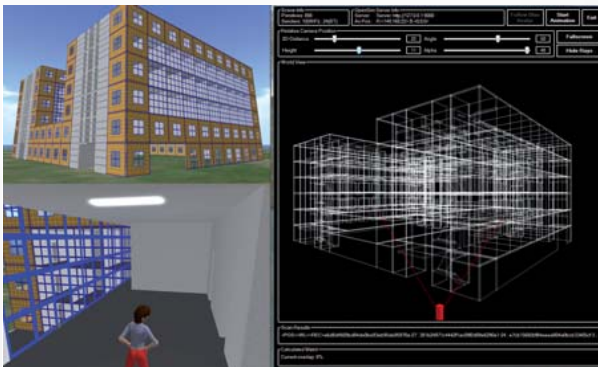
There are diverse quality of life issues in the scenarios "Safe Mobility", "Healthcare Services" and "Extended Independence". At the center of all this is the assurance that in an emergency, life saving medical methods will be employed. Taking the longer view, the goal is to establish an optimally organized prevention and care system.

SmartSenior goes even further by striving to support maximum autonomy for seniors.

The issues are about facilitating their lives in familiar surroundings, both at home within their own four walls as well as with a social network of friends, family, and service providers. Last but not least, new communications media, innovative mobility aids, and assistance systems will greatly improve the comfort and quality of life of seniors.

SMARTSENIOR – MOBILE ASSISTANCE SYSTEM FOR MEDICAL EMERGENCIES

An emergency assistance system, which was developed for SmartSenior, helps to determine medical emergencies using measurement data and vital sensor technology and automatically informs a rescue hotline per eCall. Besides the personal data of the victim and a classification of the emergency, a description of the location is also transmitted, which enables the emergency response staff to quickly reach the scene of the accident.



A positioning component developed at DFKI delivers information about the location. The component is capable of locating the user both indoors and outdoors as well as in mobile environments, for example, while in a

moving car. This involves the use of various technologies, including GPS, GSM, WLAN, and Bluetooth fingerprinting.

A simulation environment had to be constructed for the evaluation of these new technologies especially for the indoor positioning function. This permits rapid switching between methods as well as the combination and visualization of how the positioning technology actually functions. The CeBIT 2011 installation demonstrates the evaluation of positioning data in a simulation environment and the indoor-location finding technologies. The exhibit also shows how the system works in the real environment of the fair grounds – both in the exhibit building as well as in the exterior areas. The medical emergency that initiates the location search is simulated for the demonstrator by pressing a button on a smartphone.

Additional interim findings from SmartSenior are presented at three different stations in the context of CeBIT Labs at the BMBF exhibit (Hall 9, Stand B40). Various applications for the home, en route, and in a telemedical center will be displayed there. Examples of the integrated intuitive operations and assistance-oriented solutions by SmartSenior include: the renter service portal which links service providers for things like repair services, sensor based services to control the status of household devices, the telemedical agent, and the emergency response/emergency shutdown agent.

iHELPYou – OVERCOMING THE LANGUAGE BARRIER WITH MOBILE TRANSLATION AGENTS

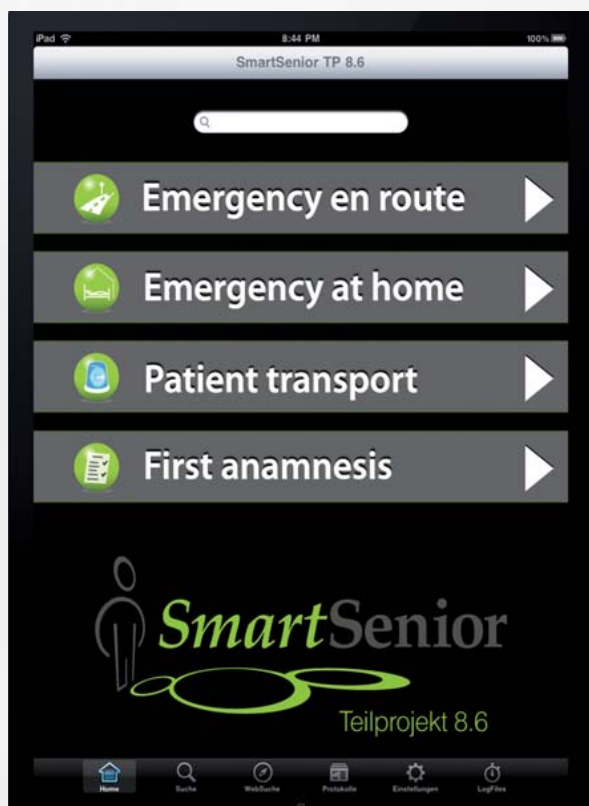
In the iHelpYou project, DFKI extends and customizes SmartSenior technologies. In 2008, more than 12 million people having various ethnic backgrounds were living in Germany – or, approximately 15% of the population. Generally speaking, these residents have learned German as a second language and have no problem mastering everyday situations. However, in medical emergencies things can quickly turn dangerous due to communication problems.

"Hello, my name is Dr. Schmeier. I am a doctor. What happened to you?"

"Kusura bakmayın anlamıyorum. Almanca konuşmuyorum. Düştüm ve başım incindi." "Excuse me, but I do not understand you!"

"Afedersiniz, sizi anlamıyorum."

In the "SmartSenior – Independent, safe, healthy and mobile seniors" project, DFKI is developing iHelpYou, a multi-language interactive dialog system that supports



and, in some cases, is key to make the doctor-patient communication between individuals who do not speak the same language possible.

The system runs on an iPad and supports a great number of typical doctor-patient dialogs that may take place at home or en route after an emergency or accident. Furthermore, there are model conversations of the kind experienced during an ambulance ride and also general questions to determine the initial patient history. Interaction targeted especially at senior citizens is also an integral part of the system.

Besides the complexity of the dialog content, which was documented with the cooperation of the rescue professionals of SMH GmbH in Berlin, the system has other innovative features:

- ▶ Communication requires two directions: Accurate translations of the doctor's questions into the patient's language and reverse translation of the patient's answers.
- ▶ Scalability on mobile phones: Several thousand sentences are possible through the use of "fill-in" texts and links to special lexicons.
- ▶ Understanding through language: Speech synthesis on the end device with low latencies and supporting more than 26 different languages by the company SVOX AG.

More information

www.smart-senior.de

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Imprint

Issue 27, February 2011, ISSN 1615-5769

Published by: German Research Center for Artificial Intelligence GmbH (DFKI)

Editorial staff: Heike Leonhard, Michael Bruss, Christof Burgard, Reinhard Karger, Daniela Menzel, Helga Riedel, Udo Urban

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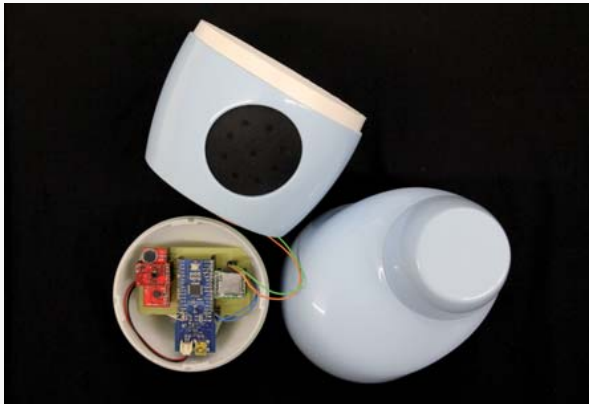
Layout, graphics: Christof Burgard, Production: One Vision Design

Translation team: Glenn Peach, Sylvia Krüger, Michael Bruss

Responsible: Heike Leonhard, Corporate Communications

Frequency of publication: Semi-annual, Newsletter online: www.dfki.de/web/news/dfki-newsletter

▶ The Anthropomorphic Cocktail Shaker as an Emotional Cyber-Physical System



A cocktail shaker that laughs, acts bored or even gets angry encourages the hobby barkeeper to mix cocktails properly. Using so-called "smart objects" this edutainment installation can recognize the actions of the user in the vicinity of the cocktail shaker and respond with explanations and advice.

The continuing trend in information technology to develop ever smaller, more powerful, and less expensive processors, communication units, sensors, and actuators

is resulting in the computer having a much more intensive role to play in our everyday lives. Everyday objects can be digitally upgraded with miniaturized electronics and outfitted with additional capabilities which go far beyond the original application. In this interactive installation, various types of wireless signal sensors integrated into the cocktail shaker and bottles cooperate to extract the user interaction from the sensor data.

Dealing effectively with these smart objects requires a new type of user interface. This system combines the "tangible interaction" design concept with the approach of anthropomorphic interfaces using the human abilities for physical interaction with the objects as well as for the intuitive interpretation of affective feedback.

More information
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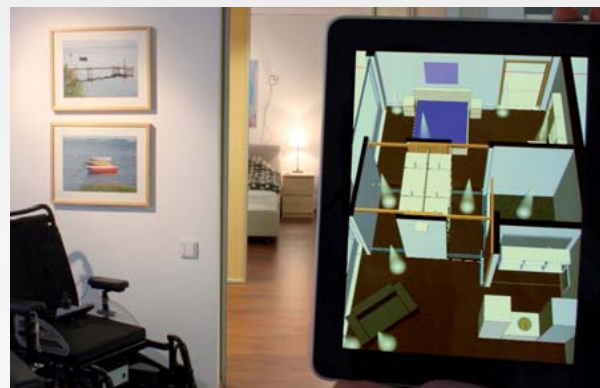
▶ Dual Reality in the Bremen Ambient Assisted Living Lab

Dual reality models are virtual representations of the real world, which are at the same time networked to that world. They not only mirror the appearance of the actual environment but also its functionalities and they are able to interact with it. With the aid of 3D models, the dual reality user has the ability to remotely view the current condition of the office or the apartment. Simultaneously, devices connected to the model may be controlled via a simple click.

DFKI presents a dual reality concept at CeBIT 2011 using the Bremen Ambient Assisted Living Lab (BAALL), a 60m² model living area for seniors with a focus on mobility assistance. Rolland, an autonomous wheelchair, uses a laser sensor system to bring its occupant precisely to the desired destination, for example, the kitchen table. Command input is achieved via an interactive voice response system, which also enables the user to control lighting, sliding doors, and the adjustable height kitchen. All devices are also viewable and controllable in the 3D dual reality model.

All this is made possible by the Universal Remote Console (URC) platform and the Yamamoto modeling tool. URC is an open standards-based platform that facilitates personal interaction with an arbitrary number of devices and services over a central operating interface. Using Yamamoto, it is possible to represent building interiors in 3D and to model the installed sensor and actuator systems there. The combination of these two

approaches supports the continuous development process of intelligent environments from concept to realization.



Dual Reality controls at the BAALL

More information
www.baall.net
<http://ccaal.dfki.de>

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CAPTURE – Fast 3D Scene Reconstruction for Urban Planning and Emergency Management

All over the world, urban environments are facing radical changes. While in some regions the number of inhabitants diminishes, cities in other regions experience a significant increase in the number of residents. In this context, a major challenge for modern urban planning is to preserve high-quality living space while increasing attractiveness and security of urban environments. A primary goal here is to balance the demands of private and commercial use, efficient infrastructures, open access to public spaces, and security. Urban planning addresses these challenges through the shaping of urban environments, of transportation and communication networks, and the protection and upgrading of the natural environment. In most cities, urban planning also involves emergency managing concepts, which consider measures for dealing with emergency situations and loss limitation. For efficient urban planning, and even more for the management of emergency situations, a holistic view on all aspects of an urban environment is required. This in particular involves 3-dimensional models of streets and buildings, which today in most cases have to be manually captured. This process is cumbersome and very error-prone.



Panoramic picture made with a high-resolution camera (St.-Martins-Square, Kaiserslautern)

Goal of the CAPTURE project is to develop a software system that automatically reconstructs 3-dimensional scenes from 2-dimensional images. CAPTURE is funded by the German Federal Ministry of Education and Research (BMBF). The fundamental principle of CAPTURE is to apply triangulation techniques to sets of images which show a single scene from different perspectives. This allows for the construction of high-resolution 3-dimensional scenes within a comparatively short time frame.

CAPTURE applies a novel approach to the problem of 3-dimensional scene reconstruction: Instead of analyzing large quantities of low resolution images, CAPTURE uses a small number of very-high-resolution and high-dynamic-range images (HDRI). In addition, CAPTURE applies a unique image geometry and uses full-spherical images instead of usual panorama shots. Such images contain by far more information than ordinary images and provide a holistic representation of the scene within a single image. The use of HDRI preserves finest optical structures, which are exploited by CAPTURE to support a precise 3-dimensional reconstruction process.

First commercial products on the foundation of CAPTURE are currently developed in cooperation with AGT Group (Germany) GmbH, part of the network of AGT International, one of the fastest growing providers of public safety and security solutions including innovation in the management of urban environments. The reconstructed 3-dimensional scenes are for instance used for urban information systems or the planning and implementation of emergency operations.



3D reconstruction composed of several panoramic pictures

At CeBIT 2011, AGT and the Augmented Vision department of DFKI present results of the CAPTURE project. Different urban scenes, streets, and places as well as interiors of large buildings are shown together with their 3-dimensional reconstructions.

Also visit AGT at the CeBIT joint stand of Hessen, Hall 9, Stand D22.

More information
www.dfki.de/av

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CeBIT HALL 9, STAND A30

► **DFKI at CeBIT lab talk 2011**



CeBIT lab talk, the conference forum at the trade fair, offers more than 100 lectures, conference seminars, live presentations, panel discussions, and project demonstrations to provide excellent insights into the state of current research and the technology standards of the future.

- ▶ 3D technologies
- ▶ Open cloud computing
- ▶ Private cloud
- ▶ Web 3.0
- ▶ Semantic Web
- ▶ Urban Management

TUESDAY, MARCH 1, 2011

12:00–12:45 p.m.

Keynote panel discussion: "Digital value added – Innovated in Germany" – Machine engineering for the 21st century originates in software cluster.

Prof. Dr. Lutz Heuser, CEO, AGT Group (Germany) GmbH

Dr. Wolfram Jost, CTO, Software AG

Ministerialdirektor Prof. Dr. Wolf-Dieter Lukas,

Director of Key Technologies, Federal Ministry of Education and Research (BMBF)

Prof. Dr. Dieter Rombach, Fraunhofer Gesellschaft

Prof. Dr. Wolfgang Wahlster, DFKI

Presentation: *Reinhard Karger, DFKI*

WEDNESDAY, MARCH 2, 2011

2:10–3:00 p.m.

Panel discussion: "From Software to Service – The Internet of Services: Benefits and Outlook"

Prof. Dr. Wolfgang Wahlster, DFKI

Prof. Dr. Herbert Weber, Fraunhofer ISST

Prof. Dr. Lutz Heuser, CEO, AGT Group (Germany) GmbH

Dr. Orestis Terzidis, SAP AG

Dr. Stefan Wess, Attensity Europe GmbH

Hermann Friedrich, Siemens AG

THURSDAY, MARCH 3, 2011

"SME meets Research"

10:30–10:50 a.m.

IT as an engine for innovation for SMEs – New markets through the Internet of Things and Services

Prof. Dr. Wolfgang Wahlster, DFKI

12:00–12:20 p.m.

COMMIUS – E-mail-based process support for small and medium-sized enterprises

Dr. Dirk Werth, DFKI

12:40–13:00 p.m.

SpeechEval – Semi-automatic usability testing of interactive voice response systems

Dr. Norbert Reithinger, DFKI

17:10–17:30 p.m.

Standardization is Key: German-Austrian W3C Office at DFKI, Berlin

Prof. Dr. Felix Sasaki, DFKI

FRIDAY, MARCH 4, 2011

10:00–11:30 a.m.

Standardizing the cloud: "No standards – no success"

Research focus of DIN – *Deutsches Institut für Normung e.V.*

DFKI involvement: "Cloud in the open web platform", *Prof. Dr. Felix Sasaki, DFKI*

SATURDAY, MARCH 5, 2011

11:00 a.m.–12:30 p.m.

A key topic of the CeLTech – Centre for

e-Learning Technology of Saarland University and DFKI

11:00–11:20 a.m.

Pant pocket learning: Mobile Learning Environment

Dr. Roberta Sturm (CeLTech, Principal Researcher, Head of Lab „Applied e-Learning Technology“, Saarbrücken)

11:20–11:40 a.m.

Experiencing the human Body: Learning Technologies in Medicine

Prof. Dr. Martin Haag (CeLTech, Principal Researcher, Head of Lab „e-Learning in Medicine“, Heilbronn/Heidelberg)

11:40–12:00 a.m.

Finding the Best Brains:

Talent recruitment and e-Learning

Adjunct Professor Dr. Christoph Igel

(CeLTech, Managing Director, Saarbrücken)

12:00–12:30 p.m.

Panel discussion with the speakers

Program coordination and presentation

Reinhard Karger, DFKI

CeBIT HALL 9, STAND A40

Lady Robot AILA: Human-Like Motion and Awareness

Robots have been employed in industrial production for nearly 50 years. However, one rarely sees a robot used for inspection and maintenance, for assembly and dis-assembly of large-scale plants, or for dangerous rescue operations. The major reason for this is the highly demanding design requirements: The systems must be able to independently perform tasks in complex environments. The lady robot named AILA, developed at DFKI Robotics Innovation Center, is one step ahead of her colleagues. She can perceive her environment in three dimensions, recognize objects and their features, and deal with them in a direct manner.

Situational Awareness in 3D

AILA's perception skills are mainly achieved with stereo camera images and laser range finders that produce an image of the environment, using so called point clusters or point clouds. Humans orient themselves by using their knowledge of space, structure, and the position of objects. AILA functions in a similar way: She is able to interpret space semantically, identifying tables and shelves through her spatial-semantic descriptions. AILA can follow complex instructions, for example, "Take the red can from the shelf" or "Place the object on the table."

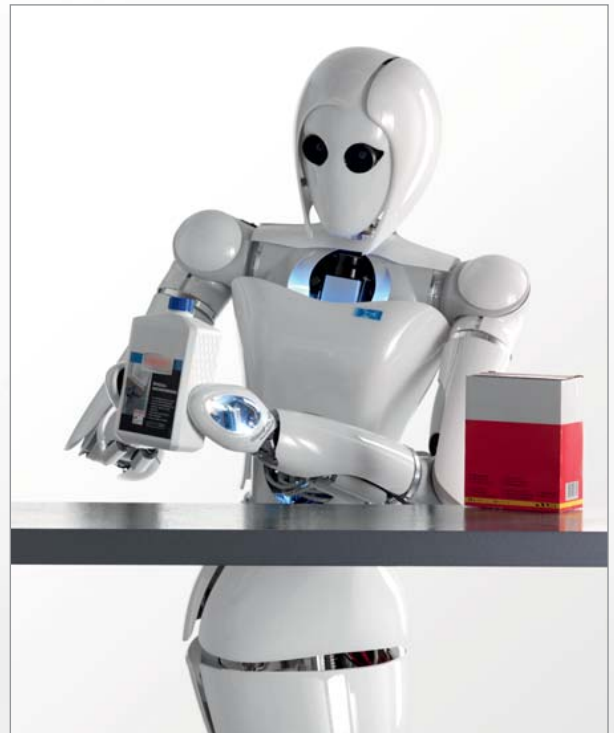
Motion Planning with 18 Joints

When AILA moves, 18 joints built into the arms and body must function in unison. Coordinated, intentional movements are necessary for the lady robot to hold and transport objects with both arms. During this activity neither the environment nor the robot's own body should become an obstacle. The distance between both hands must be the same in order for her to hold the object securely and with the proper positioning, e.g., a box with the opening at the top.

Her motion should resemble that of a human being. This is one of the higher-level objectives in AILA's continuing development. The day when AILA is oriented on human motion models, she will be able to choose among various ways to perform a task. In addition, the evaluation of system behavior is simple, in view of the fact that human movements are well known to us and therefore, easier to judge. AILA is designed to be employed in environments that are appropriate for humans in terms of size, accessibility, and positioning of objects.

Semantic Product Memory Helps the Robot

AILA can visually identify many of the object's characteristics, for example, the size. Nevertheless, this often requires an intensive effort – and there are features such as weight which cannot be determined visually. This effort can be avoided when the object itself supplies the robot with the relevant data via a semantic product memory. An antenna in her left hand allows AILA to read the data stored in the object's semantic product memory.



Background: SemProM Project

AILA originates from the SemProM (Semantic Product Memory) project funded by the Federal Ministry of Education and Research (BMBF). Within the IKT-2020 research program of the BMBF, the Innovation Alliance "Digital Product Memory" is developing key technologies for the Internet of Things. A core theme is the use of robots and wireless interaction with a semantic product memory that can present relevant object characteristics in a machine readable form.



More information
www.semпром.org

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CeBIT HALL 9, STAND A30

▶ Artificial Intelligence in Retail Trade – Innovative Retail Laboratory at CeBIT 2011

DFKI's Innovative Retail Laboratory (IRL) is presenting future scenarios and addressing the topic of AI in retail at CeBit 2011. There are currently more than 20 live demonstrators housed at the headquarters of GLOBUS SB Warenhaus Holding in St. Wendel, where they are part of a 450 m² laboratory that forms a unique infrastructure set up to demonstrate an intelligent shopping environment. Three of these will be transported and put on display in Hannover.



Easy Checkout

Instrumented Cereal Display Shelf

Products in the supermarket of the future know where they belong, what they are made of, and who can safely benefit from them. Goods equipped with RFID labels (Radio Frequency Identification) can communicate their location to the nearby environment. An instrumented shelf can recognize when such a product is removed and can provide information about the product on its display. If a customer chooses several products, the respective content can be easily listed in table form for comparison.

Instrumented Fruit Stand

Just as they do today, shop employees in the supermarket of the future will have a big role to play as the service partner for the customer. The difference is that they will have the support of an assistance system like, for example, an instrumented fruit stand that knows what fruit or vegetable is presently stocked there. Type, origin, class, price, tips, and handling instructions are automatically shown on displays built into the stand. Icons in the display unit permit the customers to clearly see what display belongs to each bin. In case the products are rearranged, the labels adjust automatically.

Easy Checkout

When the customers finish shopping, they proceed with ease through an RFID gate where the goods in the shopping cart or basket are automatically read by the check-

out system. After confirmation by the cashier, customers pay by credit or debit with their customer card or a mobile device equipped with NFC (Near Field Communication) technology. Optionally, bills can be settled by applying a fingerprint. The printed receipt contains, in addition to the usual entries, a 2D barcode (QR Code) with a link to a digital version of the sales receipt that allows it to be displayed for example, on a mobile phone. Consequently, the shopper also has a digital copy of the sales receipt in paperless form. This innovation is a real time saving idea because it is no longer necessary to unload and reload the items. Furthermore, it offers new, convenient, and fast payment options. Come visit the IRL exhibit at CeBIT 2011 in the Auto ID/RFID Solutions Park (Hall 7, D12).

CeBIT-Forum AutoID/RFID

Supermarket of the Future

Friday, March 4, at 2:00 - 5:00 p.m. (Hall 7, D03).

2:00 - 2:30 p.m.

Innovation in Retail Trade – How New Technologies Will Change Supermarket Shopping in the Future
(Prof. Dr. Antonio Krüger, Innovative Retail Lab)

2:30 - 3:30 p.m. Intra-Logistics

The long way of the chocolate bar from the producer to the supermarket – How intelligent carriers serve the customers and help to improve logistics
(Björn Anderseck, Fraunhofer IML; Katrin Weiß, Mars Services GmbH; Jörg Sandlöhken, REWE-Informationssysteme GmbH)

3:30 - 4:00 p.m. Payment

Payment of the Future: Innovative payment processes with contactless Smart Cards (Matthias Kaufmann, B+S Card Service GmbH)

4:00 - 4:30 p.m. Real-time location tracking

Passive location tracking technologies for storage logistics (Roelof Koopmans, Mojix Europe)

4:30 - 5:00 p.m. Round Table

How the new technologies will change the shopping experience in the supermarket of the future

Presentation: Gesche Roy, DFKI

More information

www.innovative-retail.de

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CeBIT HALL 7, STAND D12

3D Internet – Virtual Cities

Modern planning and design tools for architects and urban/regional planners rely more and more on the three dimensional representation of objects. When such designs are expanded through modeling of the surrounding areas, the ideas, concepts, structures, and alterations can be more vividly displayed. Nevertheless, such visualizations today still need expert support and are only possible using special systems. The XML3D technology developed at DFKI's Agents and Simulated Reality lab in collaboration with Saarland University, the Leading Edge Cluster Multimodal Computing and Interaction, and the Intel Visual Computing Institute, makes it possible for anyone to view such models online and to benefit from the advantages of three-dimensional presentation.



Computing Institute, makes it possible for anyone to view such models online and to benefit from the advantages of three-dimensional presentation.

There is a strict separation in the traditional internet between two and three dimensional content. The XML3D technology developed in Saarbrücken makes it possible to embed 3D objects as fully developed HTML elements

into a webpage. This greatly simplifies the development of new 3D web applications, for example, a 3D Wikipedia page for Venice or for the historic fortifications of Saarlouis. Beyond this at the DFKI stand at CeBIT 2011, there are demonstrations of a car configurator, a physics simulation, an agent-based problem solving simulation, or a retail product tracking.



More information
www.dfki.de/asr
www.viscenter.de
www.xml3d.org

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CeBIT HALL 9, STAND A30

The Whole World in a Picture – Interactive Gigapixel Visualization

Experts of the Interactive Visualization and Data Analysis (IVDA) group at the DFKI Agents and Simulated Reality Lab demonstrate how visualization at home – in super-computer style – is possible on common computers, tablet PCs, and smartphones or even on high resolution video walls. They give information about the latest research and developments in the field of large-scale data visualization.

Interested parties can experience the visualization of a gigabyte data set on a high resolution 80 megapixel powerwall. The video wall consists of a five by four bank of 31" LCD monitors powered by a network of PCs. The visualization itself is controlled via mobile devices like iPhones or iPads. Following the installation of the control software on a smartphone, multiple users can login to the wall via Internet and collaborate in the exploration of the data. Using an extremely detailed satellite photo of the entire world as an example, visitors can turn, reposition, zoom, or even change the seasons on the corresponding map sections.

The aim of the Gigapixel Visualization project is to quickly and easily explore – on a wide range of devices – enormous amounts of image data from diverse areas of scientific application using a software called ZAPP (Zero Administration Powerwall Package), which was developed at DFKI. Based on the distributed architecture



of ZAPP, it is not necessary for all the users of the visualization to actually be present – all that is required is an Internet connection to access the system.

More information
www.ivda.uni-saarland.de

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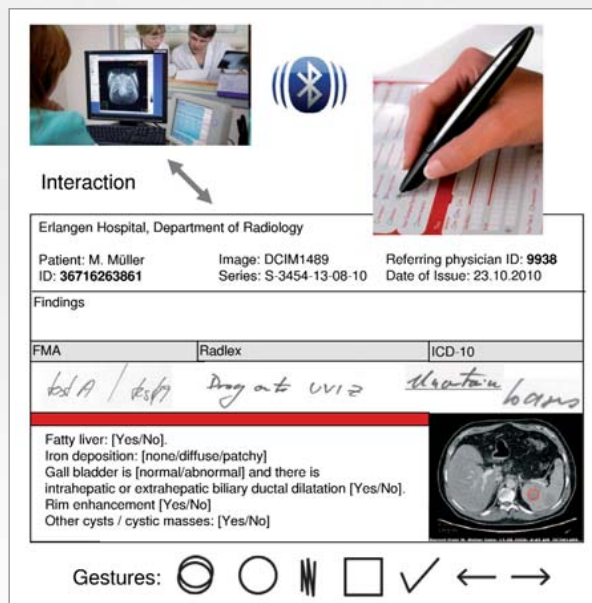
CeBIT HALL 9, STAND B43

▶ RadSpeech – A Semantic Speech Dialogue System for Radiologists



With traditional user interfaces, users may browse or explore visualized patient data, but little to no

help is given when it comes to the interpretation of what is being displayed. Semantic annotations should provide the necessary image information, and a semantic dialog system should be used to ask questions about the image annotations while engaging the clinician in a natural speech dialog. Our motivation in developing RadSpeech is the design and implementation of a multimodal dialog system for the radiologist. Dialog-based semantic image retrieval and annotation form the basis for help in clinical decision support and computer aided diagnosis.



Interaction

Erlangen Hospital, Department of Radiology

Patient: M. Müller Image: DCIM1489 Referring physician ID: 9938
 ID: 36716263861 Series: S-3454-13-08-10 Date of Issue: 23.10.2010

Findings

FMA	Radlex	ICD-10
<i>bd A / dist. Drog auf UVI 2 Metastasen 60mm</i>		

Fatty liver: [Yes/No]
 Iron deposition: [none/diffuse/patchy]
 Gall bladder is [normal/abnormal] and there is intrahepatic or extrahepatic biliary ductal dilatation [Yes/No].
 Rim enhancement [Yes/No]
 Other cysts / cystic masses: [Yes/No]

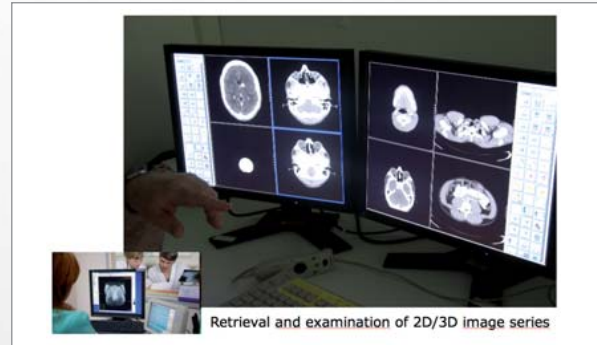
Gestures: ○ ○ || □ ✓ ← →

Functional principle of the interactive diagnosis form

With RadSpeech, we aim to build the next generation of intelligent, scalable, and user-friendly semantic search interfaces for the medical imaging domain, based on semantic technologies. Ontology-based knowledge representation is used not only for the image contents, but also for the complex natural language understanding and dialog management process. With the incorporation of higher-level knowledge represented in ontologies, different semantic views of the same medical images (such as structural, functional, and disease aspects) can be explicitly stated and integrated.

A radiologist's daily task in the SIEMENS patient image finding stations as installed at the University Hospital Erlangen defines the application scenario. Before everything else, we strive for more efficiency during the medical finding process and for more structured finding reports including semantic image annotations.

The CeBIT Demo „Interactive Paper“, presented as part of Theseus MEDICO at the booth of the Federal Ministry of Economics and Technology (BMW, Hall 9, Stand B47), shows new multimodal interaction possibilities of the



dialog system. In cooperation with Markus Weber and Dr. Marcus Liwicki from the Knowledge Management department at DFKI, the interactive paper for radiology findings has been developed. With the help of a special pen and handwritten annotations, structured radiology findings can be produced according to a medical ontology.

Project partners

Siemens AG
 FAU Klinikum Erlangen

More information

www.dfki.de/RadSpeech

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CeBIT HALL 9, STAND B47

Cirius Demonstrator – Multimodal interaction with Semantic Services and Knowledge Sources



Cirius is a multimodal interactive system that enables access to information, multimedia content, and services from a semantic database by means of spoken language and gesture. The demonstrator uses semantically annotated content about Konrad Zuse's computer and related events, organizations, people and shows how it can be called up from a PHEX multitouch console or a smartphone.

Cirius was developed under the terms of the THESEUS research program. The Cirius knowledge base is a database created by research partner neofonie in the THESEUS use case ALEXANDRIA. In addition to details about the inventor of the computer, Konrad Zuse, Cirius provides information about the exhibits at the THESEUS Information Center in Berlin.

The system interprets various input modes like natural language in the spoken form and pointing gestures and in addition enables a rapid access to semantic services as well as the ontological representation of the extracted information. These services create access to an unre-



CTC work package interacting with the THESEUS Use-Case applications

stricted number of heterogeneous online information sources. The gesture control feature, in particular, allows for new forms of interaction: e.g., a photograph of the historic Z3 computer can be "darted" onto the console with a "frisbee gesture" from a smartphone to be used there as the starting point for a search. Cirius uses web services to find additional photos, texts, and videos. Documents in the results that have been provided with location data can immediately be displayed on a map.

The core of this multimodal system consists of an ontology-based interactive voice system platform (Ontology-based Dialog Platform - ODP), which was developed at DFKI under the terms of the THESEUS program (CTC-WP4).

The open ODP architecture insures flexible integration and an interface to modality-specific and user side system components in addition to application-specific implementation functionalities.



Cirius user interface

ODP provides especially powerful programming interfaces for dialog-specific processing components, which support an efficient data representation of knowledge structures and their rule-driven processing. The ODP solution is marketed by DFKI spin-off SemVox GmbH.

THESEUS is a research program initiated and funded by the Federal Ministry of Economics and Technology (BMWi) with the aim of developing a new Internet-based knowledge infrastructure, in order to better utilize and exploit the knowledge in the Internet. Its focus is the semantic technologies being developed in the Core Technology Cluster (CTC) in order to apply and test them in specific application scenarios in areas such as medicine, business web services, business process optimization.

More information

www.theseus-programm.de
www.ekiosk.de
www.semvox.de

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CeBIT HALL 9, STAND B47

▶ Software Cluster Steps into the Spotlight



The Software Cluster is celebrating its first anniversary – one year ago, in January 2010, the Software Cluster was chosen by the federal government as a Leading Edge Cluster.

Only ten clusters in Germany have been awarded with this title, which is linked to federal funds of up to 40 million euros. The Software Cluster is the only one among them dedicated to the software industry. In this joint effort by business enterprises, research institutes, and government, the cluster is working to establish the foundations for the business software of tomorrow by the year 2015.

The official designation represents what businesses and researchers in the field of software development in the region have known all along: radiating outward from the cities of Saarbrücken, Kaiserslautern, Darmstadt, and Karlsruhe are the roots of the German software industry. This is where enterprise software was invented and it is still where large corporations like SAP AG and Software AG, numerous highly innovative SMEs, and especially, where Germany's leading universities and research institutes for education and research in the area of information systems are located.

DFKI occupies a key position in this association of 37 partners, all of whom bring their competencies and resources into the cluster. Furthermore, it hosts two "Living Labs:" the Innovative Retail Lab for the retail trade in St. Wendel and the SmartFactory for production in Kaiserslautern where innovative products and solutions for diverse industries are tested under application-like conditions.

The fact that Germany is a global leader in the field of enterprise software is due in no small part to the Software Cluster. It follows that the Software Cluster is not just a regional phenomenon, rather the enterprises and institutions in the cluster region figure substantially in shaping the "Software made in Germany" image internationally and represent a major component of the German software industry. The region's reputation as the European "Silicon Valley" is steadily growing even abroad. In a European-wide study performed last fall by



the Parisian private equity firm Truffle Capital, the Software Cluster was named once again as the leading software center in Europe – far ahead of the

Paris metropolitan region or the cluster around the English cities of Oxford and Cambridge. Nowhere else in Europe, as much software revenue is being generated as here!

More good news for the Software Cluster arrived appropriately on its first birthday: The federal initiative "Germany – Land of Ideas" managed by the Office of the Federal German President awarded the title "Selected Landmark in the Land of Ideas 2011" to the Software Cluster for its efforts to achieve a digital upgrading of the business processes in many different industries with a new form of enterprise software. As a "Selected Landmark", the Software Cluster represents Germany's innovation potential while serving as an ambassador for the Land of Ideas in the year 2011.

"Actually, it should be called the 'Selected Region 2011' because the Software Cluster links so many of the individual locations selected as Selected Landmarks in the Land of Ideas in previous years," according to Prof. Wolfgang Wahlster, Chair of the Executive Board of DFKI. "The regional cooperation and, correspondingly, the fact that large and small enterprises are working hand in hand with scientists, enables the Software Cluster to operate on a higher plane, which is respected across Europe – and beyond. In the Software Cluster, through a combination of the Internet of Things and Services, we are working to create the next generation of enterprise software for the Business Web."

Germany Land of Ideas



More information
www.software-cluster.org

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CeLTech Presents – Innovative Technologies for Mobile Learning, 3D Medicine, Content Sharing, and Talent Recruitment

CeLTech

Centre for e-Learning Technology

The Centre for e-Learning Technology (CeLTech) of Saarland University and DFKI will present at CeBit 2011 for the first time the functionalities of the mobile "Learn & Go" application titled "Innovation in mobile learning on campus". "Learn & Go" was designed for all everyday smart phone operating systems and offers all the essential functions of a learning management system for use with Apple iPhone, Windows Mobile, Google Android, Blackberry OS, and Nokia Symbian. In addition to providing for the display and use of virtual classrooms, a course catalog, insight into current classes and downloads of learning materials, other available functions include: export of individual semester schedules to a smart phone calendar, a navigation function to find the classroom and, at the moment only as a showcase at CeBit, also

the use of Web 2.0 services and shared services. The app was developed under contract and in cooperation with IMC, one of the leading European suppliers of e-Learning.



CeLTech also focuses on 3D educational and learning content for the medical sector and will present its virtual models of the human anatomy, which can be employed via browser technology, in a so-called CAVE (a three dimensional projection room). In light of the human's specific needs for depth perception, such models are especially well suited for the multi-dimensional representation in an educational context. The exhibit also features "eCampus Saar" the joint learning platform of the Saarland University and the University of Applied Sciences. With approximately 1000 online courses, each month more than 10,000 students and instructors use the digital assessments, eTests, web-based trainings and Web 2.0 services as well as the eLearning services of the Microsoft IT-Academy.

Another presentation introduces intelligent assessment technologies for the field of "Talent Recruitment" intended for use in higher education as well as for corporations. In addition to selecting the most appropriate individual courses of study for students, the online demonstrations use IT and HR consulting examples to highlight the potential of assessment tech-



l.-r. Prof. Volker Linneweber, Saarland University; Prof. Wolfgang Wahlster, DFKI; Prof. Enrico Lieblang, HTW; Prof. Wolfgang Cornetz, HTW; Dr. Christoph Igel, CeLTech

nology developed at CeLTech in terms of lifelong learning.

The CeLTech - Center for e-Learning Technology consolidates the research of the Saarland University and DFKI. The institute was established at the start of 2010 and is co-sponsored by the University and DFKI. Prof. Dr. Jörg Siekmann and adjunct professor Dr. Christoph Igel are the two founding co-directors. Current plans call for the University competence center "Virtual Saar University" (CC VISU) and the DFKI Competence Center e-Learning (CCeL) to be merged by the end of 2012 under the CeLTech umbrella. CeLTech will then represent more than 20 years of competence in internationally, nationally, and regionally acclaimed R&D, application, consulting, and services in the fields of educational technologies and information and knowledge management, while at the same time continuing its role as a learning services provider to institutes of higher education in the State of Saarland.



More information
www.celtech.de

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MIRROR – Reflective Learning at Work



In July 2010, the European MIRROR research project in Saarbrücken was started, funded under the 7th EU Framework Program in the area of "Technology-Enhanced Learning." 15 project partners from scientific and business communities have set the goal to develop the first technology-aided approach to learning for use in highly dynamic work environments in which traditional educational programs and formal learning content are inadequate or are altogether unavailable.

Business enterprises today must react quickly and flexibly to changes in environmental conditions in order to remain competitive in the long run. This also means that employees are expected to be highly flexible concerning their job profiles and work content. The traditional teacher-supported educational opportunities and professional training plans are nevertheless designed for the long-term time horizon and are not appropriate for preparing employees for new short-term job content and inadequate to support them in terms of "on-the-job-learning".

The overall aim of the MIRROR research project is to provide a means to enable and motivate employees to reflect on working functions and outcomes in order to

learn from this experience and develop creative approaches to solving current problems in their day-to-day work. The employees will not only benefit from their own experiences, but also



will be empowered to learn from other employees who may have already successfully mastered similar situations. A comprehensive model of continuous learning by means of reflection is being developed to this end within the context of this research along with a so called "AppSphere", which will provide employees with integrated access from their respective working environment to a series of real-time learning applications.

More information
www.mirror-project.eu

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DFKI Develops a Running Coach for Mobile Phones



The Institute for Information Systems (IWi) at DFKI developed uRun, a mobile assistance system designed especially for runners. The system makes it possible to organize, for example, a group run with other interested athletes via a smartphone. Beyond that, the mobile assistant continuously collects and evaluates data about the runner via a link to various sensors, which indicate, for example, the frequency of the heart beat or the runner's speed. Furthermore, the device determines the geographic location of the athlete and proposes an appropriate running course. The virtual trainer can also recognize when runners are overexerting themselves and will advise them to continue on a less strenuous route or reduce the running speed. The acceptance and

usability of uRun is being tested together with active athletes.

uRun is a sample application of the uService (Ubiquitous Service Infrastructure for the Mobile Super Prosumer) project funded by the Federal Ministry of Education and Research (BMBF). The innovative service infrastructure developed for uService allows a mobile user – at any time, from any location – to construct individual electronic services according to their own need and fancy. DFKI has developed a customizable, context-aware search and recommendation engine for mobile phones enabling the user to find just the right service from the huge volume of user-generated, mobile services available, which has now found a specific application in the uRun scenario.

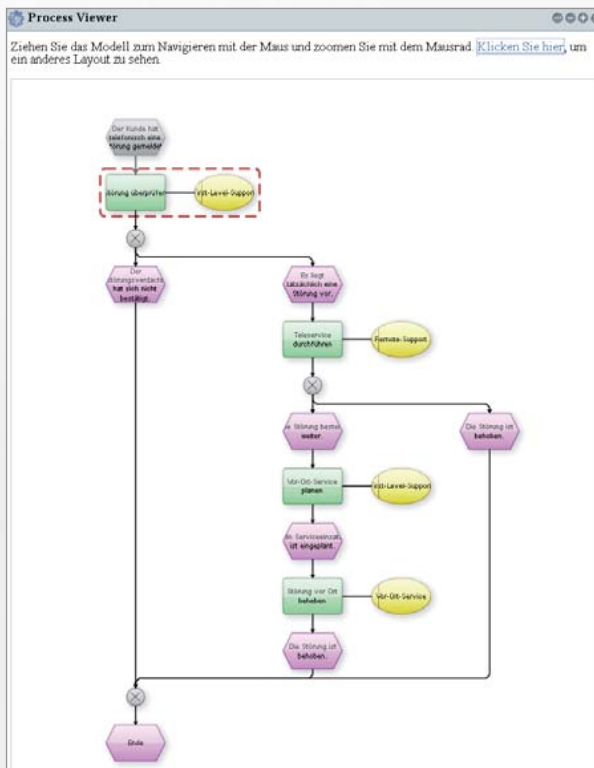
More information
www.userservices.de

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CeBIT HALL 9, STAND B43

PROWIT – Networking Business Processes and Communication

In addition to the exchange of goods and payments, one of the key forms of interaction in business is communication. The need for communication is closely tied to the execution of business processes. For example, taking and processing a purchase order requires communication between the sales agent and the customer; a successful claim against an invoice presupposes an information exchange between the sales representative, customer, and bookkeeping. The if, how and with whom to communicate is decided and performed solely by the responsible employee. A judgment is made within the current situation regarding the necessity to communicate, the proper counterpart is identified, and the appropriate means of communication is then selected.



The aim of the PROWIT (Process-oriented Web 2.0 based Integrated Telecommunication service) project is to provide context-aware communications automatically and based on the current business process being executed. To this end, a Process Collaboration Platform (PCP) is being developed which captures an employee's current situation and opens an integrated telecommunication system. The PCP generates a so-called autonomous process environment which limits communication exchanges to only those users who are working on a common problem. Users currently dedicated to an important task may have their availability restricted through a context-aware platform that automatically reroutes inbound phone calls to another employee. In contrast, priority can be given to some callers, for example, when an urgent problem demands contact with an expert. The PCP identifies the respective roles involved

Benutzer	Verfügbarkeit	Anruf	Chat	Kollaboration	E-Mail
Falko Lameter hat diese Aufgabe schon 14 mal ausgeführt.	Falls wichtig	n/a	n/a	n/a	
Pascal Wasem hat diese Aufgabe schon 12 mal ausgeführt.	Beschäftigt	n/a	n/a	n/a	
Markus Reiter hat diese Aufgabe schon 15 mal ausgeführt.	Verfügbar	n/a	n/a	n/a	
Jens Schimmelpfennig hat diese Aufgabe schon 16 mal ausgeführt.	Verfügbar		n/a	n/a	
Andreas Reinhardt hat diese Aufgabe schon 12 mal ausgeführt.	Falls wichtig		n/a	n/a	
Constantin Houy hat diese Aufgabe schon 13 mal ausgeführt.	Verfügbar	n/a	n/a	n/a	
Simon Schwantzer hat diese Aufgabe schon 14 mal ausgeführt.	Falls wichtig		n/a	n/a	

in the immediate situation and integrates them into the autonomous process environment. The prototype solution also supports exceptional cases by identifying the contacts required automatically based on the situation. It then integrates them all in a timely manner while taking into account the most appropriate means of communication (cellular phones, e-mails, fixed networks).

The basic functionalities of the Process Collaboration Platform are being expanded by the integration of Web 2.0 technologies such as Wikis, which are able to provide context-aware information. A sample scenario demonstrates the repair process of a machine manufacturer. The PCP supplies information as needed about the non-operational machine, for example, in the form of the unit's history. During the time of repair, the autonomous process environment ensures the technician is only available to certain persons, while at the same time giving the technician a priority to contact colleagues or supervisors who may assist in the repair. In the event of an unusual situation, the problem-solving process can be significantly shortened by the timely and context-aware communication with the appropriate partners.

The PROWIT project started in January 2009 and is planned to run for three years. The Federal Ministry of Education and Research (BMBF) provides the funding under the number FKZ 01BS0833.

More information
<http://iwi.dfki.de>
<http://prowit-projekt.de>

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▶ Electro Mobility – DFKI Robotics Innovation Center Develops New Concepts

They are on a roll, and it's a really quiet one: A large number of electric cars is already being tested by regional companies and private users in the Model Region Electro Mobility Bremen/Oldenburg, a program sponsored by the Federal Ministry of Transport, Building, and Urban Development (BMVBS). The DFKI Robotics Innovation Center and the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM) coordinate the regional project management.

Two-seaters, four-seaters, vans, and two-wheelers built by various manufacturers are being evaluated for their suitability for everyday use. DFKI scientists receive feedback from vehicle drivers, operators, and service providers participating in the fleet trials. Researchers are evaluating survey data and documenting user experience concerning the question how best to integrate electro mobility into daily use. The assessment takes regional socio-economic factors into consideration. An equally important part of the government-funded project is the public relations work. To generate broad acceptance of electric cars in the region (potential) users are provided with detailed information during public events.



Scientists are building a comprehensive database during the fleet trials. Vehicle runtime data such as battery charge, voltage, and current flows are recorded, as well as statistical vehicle parameters and other information like current weather conditions. A digital driver's log-book is also connected to the data logger to capture the mobility profile of each driver. This component was developed at the DFKI Robotics Innovation Center.

Model Region Expansion

A long-term goal is the expansion of the Model Region Bremen/Oldenburg in northwestern Germany. This implies a focus on the use of electro mobility in rural environments. The density of R&D players as well as the number of strategic joint ventures outside the region contribute to the regional development – and strengthen its position as one of the most important electro mobility locations.



DFKI Develops the Intelligent Electric Car

Furthermore, these project activities are helping the Robotics Innovation Center as a basis for the development and implementation of technological innovations. DFKI researchers are currently developing an efficient and intelligent electric car. The "RoboCar" is designed explicitly with user requirements in mind: e.g., it will have the capability to undergo morphological form changes and can be equipped with modular components that adjust to individual mobility requirements. Similarly it will be able to communicate with the driver, other vehicles, and an integrated transportation system.

More information

www.personal-mobility-center.de

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Another Google Award for DFKI

DFKI-Kaiserslautern's research department "Augmented Vision" has received 100,000 US dollars for a project about object tracking in digital videos. Google awards this prize for the development of new software solutions for simple production and administration of interactive digital videos, based on new methods of image processing for object recognition and tracking over long sequences of a video.

For some time now, the advertising industry has given increased attention to "product placement", the placing of products within a film scene, so as to present consumers with a form of product advertising without a pause. The next stage of development is called "embedded advertising": An object appearing in a scene becomes a host for additional product information, which the viewer can call up by mouse-click.

Prof. Dr. Didier Stricker, scientific director at DFKI and Head of the research department "Augmented Vision", explained how a demonstrator functions to illustrate the applicability of this technology: "Objects or persons in films can be marked and linked to relevant supplementary information, for example, the computer of the star in a music video. As the viewer watches the clip, they can click on the product and get further informa-

tion such as manufacturer, model, price, or technical data." The first system prototype is expected to be introduced at the end of 2011 and promises new fields of application for the suppliers of digital video content, advertisers, and even for the developers of computer games.

At the Augmented Vision lab, innovative solutions in the areas of computer vision, sensor interpretation and fusion, human-centered visualization, virtual and extended reality are being studied and implemented. The topics range from basic research to the development of specific industrial prototypes and even include software consulting services.

More information

www.dfki.de/av

http://research.google.com/university/research/research_awards.html

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DFKI Interview: Dr. Armin Stahl



Dr. Armin Stahl is the Head of the DFKI Competence Center - Multimedia Analysis and Data Mining (CC MADM).

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

The theme of my research career has always been the development of intelligent assistance systems. In the

field of Case-Based Reasoning (CBR), this involves technical diagnostic systems and product recommendation engines. One of our current projects focuses on the analysis of multimedia content, for example, to support police detectives in their evaluation of such data.

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

My first experience with AI was during my CBR internship in 1997. The topic was so fascinating to me that, in the end, I chose CBR for my doctoral work. Since then, AI has benefitted tremendously from the huge increase in computing performance. Many of the algorithms that we employ today were unthinkable on the hardware we had back then.

What are the greatest challenges and opportunities for AI systems today?

In my view, what poses the biggest challenge for us today is the possibility to combine and integrate diverse AI methods as they are sometimes based on very different paradigms, assumptions, and points of view. There are many AI research communities today that still operate in relative isolation from one another and they could certainly learn a lot from each other.

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

Sports have always been an important balance to my daily office routine and I really prefer outdoor sports where I can get out and enjoy nature. Therefore biking and kayaking are my favorite leisure activities.

What are your current projects?

In addition to coordinating our CC MADM activities, I am currently heading two projects with industry partners on the subject of anomaly and fraud detection and the BMBF INBEKI project, which combats Internet child pornography.

News in Brief

Asguard Robot as Guest at the "International Green Week" in Berlin



Mobile field robots are gaining in importance in the agricultural sector. This is the trend the Association for Technology and Structures in Agriculture (KTBL) showed from January 21-31 at the

International Green Week Berlin, the world's largest trade fair for food, agriculture, and horticulture. The KTBL stand is where the DFKI Robotics Innovation Center exhibited its cross-country terrain robot ASGUARD. Being just one meter long, the water and dust proof robot moves flexibly along on four star-shaped wheels over uneven terrain, swims, and overcomes obstacles. In the future, equipped with additional sensors, ASGUARD can be deployed to perform diverse agricultural jobs – e.g., to take soil samples or to perform selective weed control.

DFKI Robotics Innovation Center Presents Intelligent Systems at Bremen's House of Science (Haus der Wissenschaft)

Robots are designed for employment in areas that are dangerous and hard to access for humans. The "Intelligent Systems" exhibit by the DFKI Robotics Innovation Center shows how they can be used in space, emergency rescue operations, and to solve complex production tasks. This event initiated by Renate Jürgens-Pieper, Senator for Education and Science, opened on January 20 in the House of Science, Bremen. Among the exhibitors are renowned research institutes of the state of Bremen that, together with their industry partners, find practical uses for science.

CeLTech's New "Digital Music in Education" Lab

Information technology in the music world is a means to an end. So it was only natural for the University of Music, Saarbrücken, to cooperate with the nearby CeLTech Centre for e-Learning Technology, a renowned competence center for educational technologies and information and knowledge management sponsored by DFKI and Saarland University. On January 14, 2011, Prof. Dr. Wolfgang Wahlster (DFKI), Prof. Dr. Volker Linneweber (Saarland University) and Prof. Thomas Duis (University of Music, Saarbrücken) signed a cooperation agreement for the establishment of the "Digital Music in Education" Lab, with the focus on "technology in education, learning, teaching, and the evaluation of music and music studies." More information at: www.celtech.de.

Innovative Retail Lab (IRL) at the EuroShop 2011

Another first for IRL: the "LyDeCa" system is being presented at EuroShop (2/26 - 3/02/2011), in Düsseldorf. The system uses a low-mounted camera on the fresh food counter and recognizes when the customer points to a displayed item or to the special offer board. It then determines which offer has attracted the customer's

interest and displays the respective product information on a scale – as a service for the customers and assistance for the sales clerks. Come visit us at the stand of our partner Bizerba (Hall 06, Stand E56).

DFKI - Founding Member of the Software Campus for the IT-Managers of Tomorrow

The Software Campus, presented to the public during the IT-summit in Dresden as a joint PPP-initiative of leading companies, five universities and three research institutes from the national network of the European elite institution EIT ICT labs, will train the future leaders of the IT industry. Every year, there will be 100 selected Masters- or PhD-students that have the opportunity to become an IT-manager, performing their own projects with the support of mentors from the industry. For more than a year, Prof. Wahlster has helped to conceive this project and to win broad support for the concept.



Photo: BMI/Hans-Joachim M. Rickel

5th IT-Summit, Dresden, December 7, 2010.

l.-r. K.-H. Streibig, Software AG; Dr. R. Achatz, Siemens; R. Obermann, Deutsche Telekom; Chancellor Dr. A. Merkel; J. H. Snabe, SAP; Prof. W. Wahlster, DFKI; MinDir Prof. W.-D. Lukas, BMBF

The Feldafing Circle for Research in the Internet Society and the Science-Industry Cooperation of the German Federal Government explicitly backed the project, before the Work Group 6 of the IT-summit, led by Federal Minister Dr. Annette Schavan and the co-CEO of SAP, Jim Hagemann Snabe, officially introduced the initiative to the IT-summit and the Dresden Agreements. The Software Campus shall offer a substantiated elite training for the ICT management talents and future company founders in the Masters and PhD sectors on a scientific top level. The total budget of the Software Campus will be 10 million Euros per year, half of the amount being funded by the Federal Ministry of Education and Research (BMBF).



DFKI – Simply Innovation



Kaiserslautern Site

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.



DFKI project office Berlin

Because of the increasingly short cycles of innovation in the field of information technology, the lines between research, application related development, and conversion to products are becoming blurred. This is why DFKI projects typically include the entire spectrum from basic application-based research to market and customer oriented development of product functions. DFKI GmbH is managed by Professor Wolfgang Wahlster (CEO and Scientific Director) and Dr. Walter G. Olthoff (CFO).

Projects at DFKI are organized under one of the following areas of research:

- ▶ Knowledge Management (Prof. Dr. Prof. h.c. Andreas Dengel)
- ▶ Robotics Innovation Center (Prof. Dr. Frank Kirchner)
- ▶ Safe and Secure Cognitive Systems (Prof. Dr. Bernd Krieg-Brückner)
- ▶ Innovative Retail Laboratory (Prof. Dr. Antonio Krüger)
- ▶ Institute for Information Systems at DFKI (Prof. Dr. Peter Loos)
- ▶ Agents and Simulated Reality (Prof. Dr. Philipp Slusallek)
- ▶ Augmented Vision (Prof. Dr. Didier Stricker)
- ▶ Language Technology (Prof. Dr. Hans Uszkoreit)
- ▶ Intelligent User Interfaces (Prof. Dr. Dr. h.c. mult. Wolfgang Wahlster)
- ▶ Innovative Factory Systems (Prof. Dr.-Ing. Detlef Zühlke).

The official opening of the DFKI project office Berlin in 2007 signals the further expansion of existing partnerships within Berlin's research community and the implementation of innovative solutions with new industry partners.

At the DFKI competence centers, where the focus is on technological and expert know-how, the aim is the

management of research problems that transcend the individual labs.

Innovations you can touch: the latest innovative technologies are tested, evaluated, and demonstrated in the "Living Labs":

- ▶ Virtual Office Laboratory
- ▶ Robotics Exploration Laboratory
- ▶ Bremen Ambient Assisted Living Laboratory – BAALL
- ▶ Innovative Retail Laboratory
- ▶ SmartFactory Laboratory

The purpose of the DFKI Transfer Center is to make the scientific findings of DFKI available to commercial applications.

DFKI is the only German research institute for Computer Science being a member in the three leading research clusters and the co-founder of Software Campus. With a projected overall annual budget in 2010 of approx. EUR 36 million, the previous year's record result will be surpassed.

Currently, DFKI has 423 employees and 396 student assistants. The circle of DFKI industrial partners comprises among others (partially through associated companies) Attensity Europe GmbH, BMW Group, Daimler AG, Deere & Company European Office, Deutsche Messe AG, Deutsche Post AG, Deutsche Telekom AG, EADS Astrium GmbH, Fraunhofer Gesellschaft e.V., Harting KGaA, Intel Corporation, KIBG GmbH, Microsoft Deutschland GmbH, Ricoh Ltd., SAP AG, Software AG, University of Kaiserslautern, Bremen University and Saarland University.

All work is organized in projects that have a clear objective, are scheduled to last for a specific period of time, and that lead, among other things, to patented solutions, prototypes, or new or improved product functions. At the present time, there are about 139 ongoing projects. Project progress is checked once a year by an independent, international group of respected experts. In addition to federal funds and EU grants for large, joint research projects, substantial contracts from business enterprises could also be acquired in 2010. The successful transfer of DFKI research results to functional products is continuing. The DFKI model of a non-profit Public-Private-Partnership (PPP) was positively received at numerous presentations and is often recommended as a role model structure. January 2010 marked the most recent review of DFKI in the 5-year evaluation circle by the Federal Ministry of Education and Research (BMBF). Also, in May 2010, the Federal Government has evaluated the DFKI-model very positively in a report to the budget committee of the German Bundestag. There is even an effort to incorporate the PPP organizational structure into the Federal Grant Handbook and the text of relevant laws. DFKI has membership rights in the Center for the Evaluation of Languages and Technologies (CELCT), based in Trento, in Yocoy Technologies GmbH (Berlin), in SemVox GmbH (Saarbrücken) and in GraphicsMedia.net GmbH (Kaiserslautern).



Saarbrücken Site



Bremen Site

Intelligent Solutions

for the

Knowledge Society

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- 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



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