

NEWSLETTER



GERMAN RESEARCH CENTER FOR ARTIFICIAL INTELLIGENCE

2/2010

RESEARCH LABS

KNOWLEDGE MANAGEMENT

ROBOTICS INNOVATION CENTER

SAFE AND SECURE COGNITIVE SYSTEMS

INNOVATIVE RETAIL LABORATORY

INSTITUTE FOR INFORMATION SYSTEMS

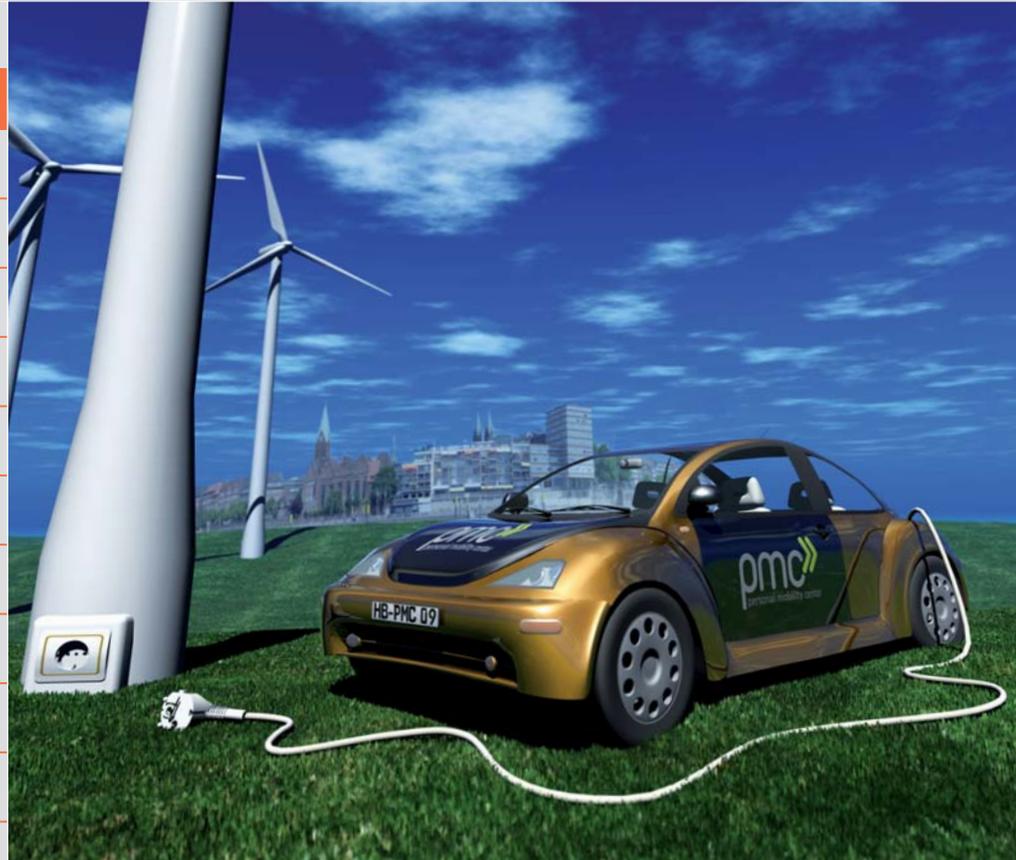
AGENTS AND SIMULATED REALITY

AUGMENTED VISION

LANGUAGE TECHNOLOGY

INTELLIGENT USER INTERFACES

INNOVATIVE FACTORY SYSTEMS



Germany
Land of Ideas
Selected Landmark 2010

Inauguration of the DFKI Visualization Center Selected Landmark in the Land of Ideas 2010

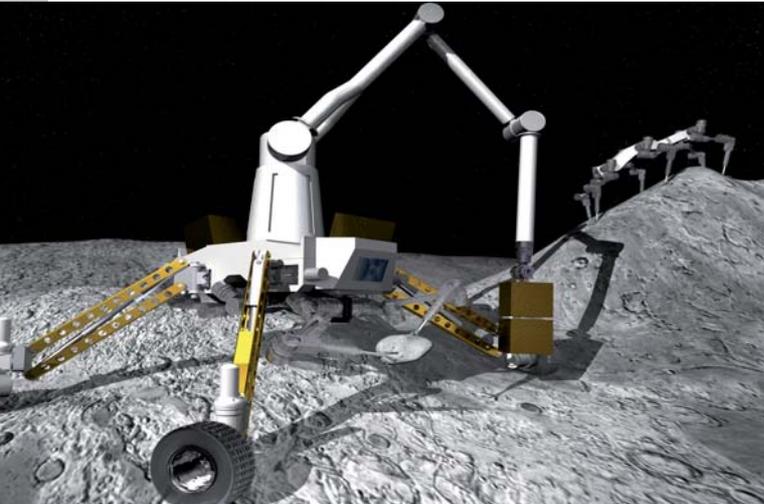
Electric Mobility Research

THESEUS-Innovation Center for the Internet of Services

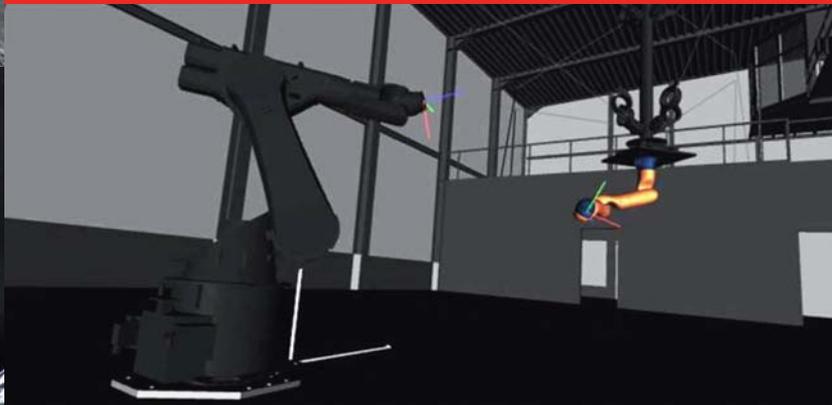


Inauguration of the Space Exploration Hall

DFKI Bremen, Robotics Innovation Center – RIC



The Space Exploration Hall provides the state of Bremen with a unique experimental facility and the opportunity to test individual robotic systems and even teams of robots in application areas such as space travel, disaster area, safety and security management.



November 22, 2010

DFKI Bremen, Robotics Innovation Center
Robert-Hooke-Straße 5, 28359 Bremen

www.dfki.de/robotics



Agenda

- 2:30 p.m. Welcome remarks – *Renate Jürgens-Pieper*, Senator for Education and Technology, Free Hanseatic City of Bremen
- 2:40 p.m. *Jochen Homann*, State Secretary in the Federal Ministry of Economics and Technology (BMWi)
- 2:50 p.m. *Dr. Michael Menking*, Site Manager, EADS Astrium in Bremen
- 2:55 p.m. *Dr. Fritz Merkle*, Board Member for Business Development, OHB Technology AG in Bremen
- 3:00 p.m. *Prof. Dr. Dr. h.c. mult. Wolfgang Wahlster*, CEO and Scientific Director, DFKI
- 3:05 p.m. *Prof. Dr. Frank Kirchner*, Director, DFKI Robotics Innovation Center
- 3:15 p.m. Tour of the labs
- 4:15 p.m. End of ceremony

New DFKI Visualization Center

Immediately located at the Saarland University's commons forecourt, the new DFKI building completes the architectural ensemble of the first two construction phases of DFKI and Steinbeis Material Engineering Center Saarland (MECS), adding a distinctive corner point to an area traversed by several thousand people every day.



Visualization of the architectural ensemble

Architect Oliver Brünjes from Saarbrücken created a functional building which incorporates both office space and a showroom. The office space assigned to the upper three floors was designed as a large block, which to the south and west presents a classic window facade, while the north and east sides, facing the commons, are completely covered with glass panels. Vertical slats cover the entire length of the three floors and allow for privacy and shade, as they align following the sun's position.

The geometric block of offices sits atop the first level which appears almost completely encased in glass: the showroom area. This area was intentionally designed for the greatest transparency as it will house events, exhibits, presentations, and demonstrations. A covered walkway on the side of the courtyard connects the Visualization Center with the foyer of the main building.

The design of the third building distinguishes itself in several ways from the architecture of traditional office buildings, which meant some real challenges to the persuasive talents of the architects and the imagination of the building contractor. Although the architectural plans were available in digital format, several viewpoints proved difficult to evaluate. The three-dimensional representations made possible by the DFKI visualization tools during the planning phase opened up a whole new range of detail and possibilities, and provided an overall impression of the new building in the vivid language of form and color.



Visualization variants

The use of the latest simulation methods was key in evaluating alternatives and choosing the colors. The use of DFKI-blue, which identifies the main building, is continued as a visual link to the new building structures. Various alternatives could be considered and evaluated quickly and efficiently using a model of the main building, the terrain, and a digital 3D model of the new building.

One of the most conspicuous features of the new building are the large vertical slats, which replace the traditional jalousie windows in protecting the rooms and work areas on the east side from the direct rays of the sun. The lamella slats had to be deep enough to adequately shield against the affects of the sun without overly restricting the view to the outside. In order to determine the optimal depth, the 3D model was transferred into VR (Virtual Reality). The stereoscopic, three-dimensional representation integrated with the possibility to move interactively throughout the building quickly ensured the necessary dimensions for the slats to meet both requirements.



DFKI Visualization Center

The Visualization Center opens to the public as one of the "Selected Landmarks in the Land of Ideas" on November 5, 2010. The DFKI Visualization Center is a place where this know-how and knowledge can be distributed and presented while continuing to develop and expand it. In this way, DFKI will be able to get even more people enthusiastic about its research and innovations.

▶ Introducing the Visualization Center

On November 5, 2010, the DFKI Visualization Center is celebrating its grand opening as one of the "Selected Landmarks in the Land of Ideas 2010" in the new DFKI building in Saarbrücken. As the newest DFKI Lab, the visualization center works closely with industry and others to speed the process of integrating innovations from basic and application oriented research into commercial products and services for the end user.

The new center will focus on visualization services, the transfer and dissemination of research findings, and the establishment of R&D partnerships related to the subject of interactive visualization of complex scenarios and simulations.

In business and research, systems are becoming more complex, less transparent, and more difficult to manage because of the continuous improvement in functional performance and range, the ever greater number of variants, the broader networking of sub-systems, and the steadily growing flood of information and data. Therefore a customized, accurate, and reliable visualization is key to the successful management of these trends and use of this information.

Scientific Director of the Visualization Center is Prof. Dr. Philipp Slusallek, Head of the DFKI research department Agents and Simulated Reality. The realistic visualization of complex models in real time is a core area of his research. Successful cooperation with renowned car manufacturers and the aviation industry demonstrates the practical relevancy of this subject. Several different visualization centers have already been equipped since 2004 with the real-time ray tracing technology developed in Saarbrücken, for example, at Volkswagen and EADS Airbus.



Visualization of light reflexes on a car



Visualization of an aircraft cabin

Now the completion of the third phase of the DFKI Saarbrücken construction project has provided the opportunity to establish such a visualization center in the Saarland and to integrate it in the new DFKI building. The visualization center will provide the interactive resources to answer complex questions using visual tools that previously have been available only in highest-standard industrial centers. In this area, DFKI works in close cooperation with other institutes located on the campus: the Multimodal Computing and Interaction Cluster of Excellence, the two Max-Planck-Institutes for computer sciences in Saarbrücken, and, first and foremost, Intel Corporation which is providing funding for the Intel Visual Computing Institute at the university, occupying an entire floor of the new building and providing a large portion of the computing power.



Visualization of the historic city of Saarlouis

The future work of the visualization center is based on several pillars: The team at the department of Agents and Simulated Reality working with Georg Demme, head of the Visualization Center, provides visualization services of the highest technical and scientific standards within the SaarLorLux region. The target groups include business, academic, and public institutions. Corresponding to the motto: "Lead technolo-

gies from the region for the region," visualizations of the historic fortified city of Saarlouis as well as Saarbrücken's planned "City Riverwalk" are two impressive projects already completed and presented to the public even before the official opening of the center.

With a closely integrated network of research and industry experts, the center is also a central meeting point for the transfer of technology from the research lab to commercial applications. It will host events to introduce the latest technologies and research results, scheduled and organized in cooperation with the Competence Center for Computer Science, the IT-Cluster Saarland, and other partners.

The Visualization Center also serves as a central location for the presentation and demonstration of research achievements of computer science in Saarbrücken for the numerous high ranking government visits to DFKI. The representative rooms of the Visualization Center are also available for presenta-

tions to other partners located on the university campus and beyond.

Last but not least, the Visualization Center will make it possible to develop new approaches that make visualization even faster and more realistic, new interactive technologies will be tested and new display systems can be realized. The new DFKI Visualization Center, with its technological diversity and close ties to both research and industrial sectors, represents another milestone in the rapid growth of computer science in Saarbrücken, on the scientific campus, and in the state of Saarland in general.

Germany Land of Ideas



Selected Landmark 2010



Visualization of the „City Riverwalk“ in Saarbrücken

► **State Secretary Julia Klöckner Visits DFKI Kaiserslautern**

Intelligent data base technologies for the agricultural sector, industrial production scenarios of the future, tools for automatic recognition and analysis of image content and texts, eye-tracking technologies for interactive reading, and sensor-aided monitoring systems for the elderly were just some of the subjects Parliamentary State Secretary Julia Klöckner learned more about during her visit to DFKI Kaiserslautern.

On June 26, 2010 at DFKI, Prof. Dr. Prof. h.c. Andreas Dengel welcomed the Parliamentary State Secretary representing the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV). Systems and prototypes from the department of Knowledge Management, Augmented Reality, Image Understanding and Innovative Factory Systems were presented.

„DFKI is a first class center of innovation,“ explained the State Secretary to the press during the discussion that followed the presentations.

One particular subject of interest was the iGreen research project being managed at DFKI Kaiserslautern. Project iGreen is composed of 24 partners representing business, research, and public authorities, all cooperating on the design and realization of a location-based service and knowledge network to connect distributed public and private sources of knowledge dealing with crop science. iGreen is an effort to link public and private sources of information and then, with the aid of mobile decision support tools, provide this data to support agricultural production processes in an



Julia Klöckner, State Secretary at the Federal Ministry of Food, Agriculture and Consumer Protection



Prof. Andreas Dengel and State Secretary Julia Klöckner

energy-efficient, economical, and environmentally sound manner.

"Today, we have large volumes of data from various sources that could be helpful in designing a more balanced and effective exploitation of local and mobile resources for agricultural use. The key thing is that this data be integrated and made available in a manner that allows farmers to use it. This is the overall aim of the project iGreen at DFKI, which is funded by the Federal Ministry of Food, Agriculture and Consumer Protection," according to Julia Klöckner. "What scientific research here in Kaiserslautern is doing for agriculture is very impressive," remarked the State Secretary to the Rheinpfalz reporter. So impressive, in fact, that she would like to organize a meeting of the Committee on Food, Agriculture and Consumer Protection of the German Bundestag in Kaiserslautern.

Prof. Dr. Andreas Dengel, project leader for the development of the iGreen knowledge network, added: "We network distributed data sources in order to develop computer tools for decision support systems needed by the farmers. The respective sources are either available as private knowledge held by the farmers or can be found via various channels in the public domain or as common knowledge within the business sector. Examples of the latter are: availability, product characteristics and dosing recommendations related to seeds or fertilizers as well as distribution opportunities and prices for the harvested crops."

iGreen is funded until the end of 2012 with more than 14 million Euros under the framework of the federal research program "IKT 2020 - Research for Innovation."



Prof. Andreas Dengel

At the invitation of Google, DFKI presented Text 2.0 at "Zeitgeist 2010" in Hertfordshire, England. "Zeitgeist" is a conference by invitation only for around 400 executives and senior managers of Google's strategic partners. The annual conference provides a forum for the introduction and discussion of future trends. Prof. Dr. Andreas Dengel, member of the DFKI management and technical director, accepted the invitation to participate in the panel discussion themed "The World of Tomorrow" where he conveyed the technologies, ideas, and visions of Text 2.0.

The host of speakers and guests at Zeitgeist 2010 included Nobel Prize winner Desmond Tutu, London's mayor Boris Johnson, Tim Berners-Lee, the inventor of the World Wide Web, and Howard Schultz, CEO of Starbucks.

Text 2.0 was the only demo system among the total of 5 presented that was developed in an academic research environment. Google board members Larry Page and Eric Schmidt were among the visitors to the DFKI stand where they learned about and tested Text 2.0.

Text 2.0 is based on the idea that a text "knows" when it is being read: with the aid of an eye-tracker, Text 2.0 determines the position of the reader's eye on the screen. The system introduces context-related multime-

Text 2.0 at Google Zeitgeist 2010

dia effects suitable to the topic and the surroundings of the text passage being read, for example, photos, background noises, or mood music. Text 2.0 can do even more than that: translations of any foreign language text passages are displayed while the passage is being read. "Smart footnotes" explain complex relationships, terms, or events. Furthermore, if a reader loses their thread, a red arrow marks the place where they stopped.



Text 2.0 – system demonstration

More information

<http://text2o.net>

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TU Kaiserslautern and DFKI Sign Cooperation Agreement with University of Malaysia, Sarawak

The University of Kaiserslautern and DFKI Kaiserslautern have expanded their cooperations with Asian universities. Prof. Dr. Andreas Dengel, representing the University of Kaiserslautern, where he is also a professor for computer sciences, traveled to Kuching, Malaysia, for the signing of the agreement. The agreement covers cooperation in the field of Artificial Intelligence and joint research activities.

"I am very pleased that the hard work and personal commitment of many years has paid off and we can now offer students and researchers from the university and DFKI another option to strengthen their resumes with this opportunity in Malaysia. Such international experience is increasingly important in a global world and enriches all concerned – not only from a scientific perspective, but also by increasing human understanding," remarked Prof. Dr. Dengel, representing the President of the University at the official signing ceremony.

The President of the University of Kaiserslautern, Prof. Helmut J. Schmidt, commented on the goal of the cooperation: "Global networks for the exchange of scientists



Prof. Andreas Dengel; Prof. Khairuddin Ab Hamid, President Unimas; Datuk Omar Abang Johari Tun Openg, Housing and Urban Development Minister of Malaysia; Dato' Abdul Wahab Abdullah, Head of the Malaysian Institute of Microelectronic Systems (MIMOS)

and students are an important element for excellence in research and education. This is especially true for us as a technical university."

DFKI Takes Silver at EuroITV 2010 Awards

The DFKI Competence Center for Multimedia Analysis and Data Mining (MADM) won the Silver Award with Smart Video Buddy at the 8th European Conference EuroITV 2010.



The team of the Competence Center Multimedia Analysis and Data Mining

Smart Video Buddy is an intelligent video assistant that recognizes and automatically understands the content of films, analyzes running video programs and identifies the concept behind sport shows like soccer or basketball in real time. The system links the analyzed video to other related content and suggests clips or news that have an association to the subjects. It can open an adaptive news feed or recommend products suitable for the running video. The recommendations are based exclusively on a real time analysis of the visual characteristics in the running video. This enables the system to recognize semantic concepts in the video and offer additional relevant information to the user, e.g., highly up-to-date headlines.

All software components are integrated with the respective graphic user interface so as to permit interaction with the recommended content without interrupting the running program. The system vividly shows how state-of-the-art-research in video analysis can transform the passive consumption of media into an interactive experience.

EuroITV is one of the leading international conferences for interactive media and was held from June 9-11, 2010 in Tampere, Finland. The annual event has been organized each year since 2003. A novelty this year was the EuroITV Grand Challenge, a competition based on the topic "Television of the Future." The aim was to discover innovative ideas, concepts, and systems that enrich the experience of viewing TV and video for the user. There were 14 such entries from international research institutes and companies.

Smart Video Buddy was able to convince the jury composed of 11 international media experts at EuroITV Grand Challenge 2010 and was selected for the Silver Award.

More information and system demos
<http://madm.dfki.de/smartvideobuddy>
www.youtube.com/watch?v=qu4qc0SEvjs

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DFKI Research in Concept Recognition Wins Google Award

The intelligent analysis of video content opens a myriad of service opportunities for advertisers and consumers alike, but also for the major search engine providers. Several other big names in research join DFKI among the winners of this year's Google Research Award, for example, Oxford University and Massachusetts Institute of Technology (MIT). Google has supported outstanding research achievements worldwide for several years through its awards program.

This award is tied to funding support for the TAViAn Project, which uses a technology developed at DFKI that facilitates the automatic suggestion of ads suitable for online video content.

The Google support is predicated on research performed at the DFKI Competence Center Multimedia Analysis and Data Mining. The team around group leader Dr. Armin Stahl and Dr. Adrian Ulges has developed visual systems that automatically learn from online portals like Flickr and YouTube. A statistical analysis of image and video

content permits automatic detection of diverse semantic concepts, for example, an object, location, or activity ("Eiffel Tower", "Beach" or "Soccer").

Prof. Dr. Andreas Dengel, Scientific Director at DFKI Kaiserslautern, explains the functionality of TAViAn: "The core of this system application is the integration of automatic video search functions with links to advertisements. The automatic understanding of concepts in the scenes of a running video facilitates the determina-



tion of the users' interests. Thanks to the smart technologies being developed in Kaiserslautern, the system can already be recommending other related videos, web content, or ad spots during the time the user is watching the video. The analysis of video content permits pinpoint placement of specific ads for a particular target group."

More information and system demos
<http://madm.dfki.de>
<http://madm.dfki.de/smartvideobuddy>

www.dfki.de/moonvid
http://research.google.com/university/relations/research_awards.html

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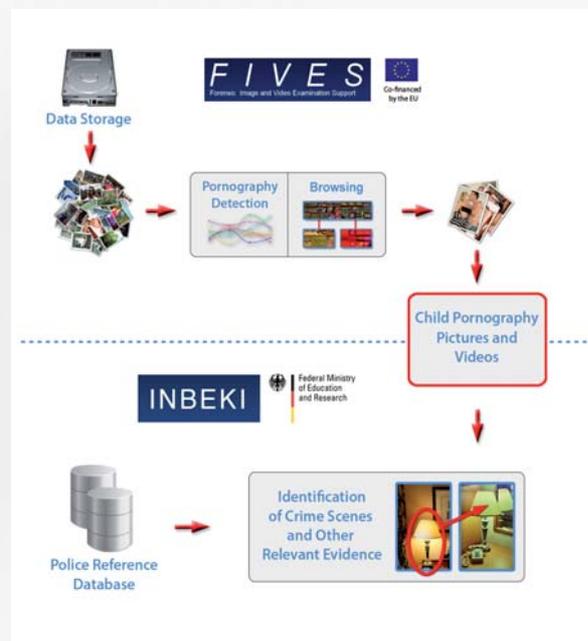
DFKI Develops Image and Video Analysis Tool to Fight Child Pornography

Two of the projects underway at DFKI Competence Center for Multimedia Analysis and Data Mining (MADM) seek to develop, together with other research partners and police authorities, more efficient technologies for the detection and assessment of pornographic photographic and video materials.

FIVES (Forensic Image and Video Examination Support) is funded under the European Union's Safer Internet Program and focuses on forensic analysis of confiscated data. A major goal is the automatic detection of illegal materials stored in large data bases. Most traditional approaches are based on hash values (checksums) and can only detect exact copies of known photos. The DFKI technology, in contrast, uses statistical analysis of content to enable fully automated identification of suspected images or video searches for pornographic scenes. Furthermore, investigators can search large data volumes on the basis of visual similarities more efficiently.

INBEKI (Interaktionsgesteuerte Bilddatenanalyse zur Bekämpfung von Kinderpornographie) focuses on the detailed analysis of previously detected relevant materials. Investigators are interested in spotting cross-references between different cases, something that normally requires several days or weeks using modern manual analysis. The technologies developed by DFKI in the INBEKI project permit the automatic or semi-automatic comparison of crime scenes and individual indicators contained in the data with other police records. INBEKI is funded under the framework of the "Hightech Strategy" of the Federal Ministry of Education and Research (BMBF).

These DFKI technologies described above provide a major contribution to the fight against child abuse – investigative authorities now have a swifter and much more efficient capability to assess materials, criminal activities can be processed faster and cases of abuse may be prevented.



More information
<http://madm.dfki.de>
<http://fives.kau.se>
<http://madm.dfki.de/demo/fives>

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▶ DFKI Competence Center for Case-Based Reasoning



Prof. Klaus-Dieter Althoff

The DFKI Competence Center for Case-Based Reasoning (CC CBR) under the guidance of Prof. Dr. Klaus-Dieter Althoff focuses on R&D in the area of technologies and problem solving methods based on experience management. Prof. Althoff is the head of the Intelligent Information Systems department of the Institute of Computer Science at the University of Hildesheim. He has many years of experience with the innovative integration

of software engineering methods in the processes of Artificial Intelligence (AI).

The main idea behind case-based reasoning (CBR) is the search for similarities, which always produces a list of available data sorted by relevance. An important part of this process is domain knowledge, in the form of ontologies and application-specific measures of similarity, to permit inferences to be drawn from past experience and previously described results.

The vision of the CBR competence center is the integration of pragmatic basic research with application-

oriented research and technology transfer and, in cooperation with partners in the international CBR community, to further the advancement of ongoing research and practice. The realization of this vision requires the continuous development of existing methods, tools, and platforms. Specifically, CC CBR is working on the advanced development of DFKI's open source tool myCBR, which provides simplified ways to develop similarities-based search for use in a variety of application scenarios.

CC CBR already has an ongoing industrial project in the area of technical diagnostics with the newest DFKI shareholder, John Deere, and future project activities in the areas of energy efficiency, financial services, and nutrition are currently being planned.

More information

www.dfki.de/web/competence/cccbr
www.mycbr-project.net

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▶ Forrester Analyst Labels New DFKI Technology "The Next Big Thing"



A „new milestone in process management“ is how Forrester's senior IT analyst Clay Richardson described the technology developed at DFKI for

flexible real-time support of work processes and active recommendations for business process steps. In his keynote address at the Business Process Management Conference (BPM 2010) in New Jersey, USA, Richardson singled out DFKI and its futuristic work concerning recommendations for work processes. He was impressed by the concept and the demonstrator presented at the event by DFKI in cooperation with the Vienna University of Technology.

In a blog entry on the Forrester Research homepage on the topic "The Next Big Thing in BPM: Real-Time Process Guidance", Richardson outlines a new "killer app" that supports the user in the execution of his work processes and draws the relevant knowledge from his social networks. In his blog, he makes explicit reference to the "highly innovative" technology developed at DFKI that "hits the nail on the head". According to Richards, the DFKI software is the "first tangible – and well thought out – application of internal crowdsourcing" in the world.

The COPA system (Collaborative Process Assistant) is an advanced DFKI development from the European research and development project COMMIUS (COMMunity-based



Thomas Burkhart demonstrates Commius at CeBIT 2010

Interoperability Utility for SMEs). It actively supports the user at the workplace with flexible business processes.

The words of Clay Richardson emphasize the importance of DFKI as one of the leading application-oriented research institutes for innovative software systems.

More information

www.commius.eu

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New Department: Innovation and Research Consulting



Dr. Dirk Werth

As a Center of Excellence, DFKI is continuously setting new standards in research and technology development. DFKI's effort to generate long-lasting effects with its research findings and facilitate their application in the business world resulted in the Foundation of the new department for Innovation & Research Consulting, IRC.

The expansion of its service portfolio further strengthens the reputation of DFKI as a driving force of innovation in Germany. The IRC aims to make the diverse scope of know-how at DFKI available to businesses and, in this way, promote knowledge transfer from research into business practice. DFKI now provides for corporate customers a direct point of contact for all information, project, and consulting queries, regardless of location. It offers its wide-ranging concentration of competencies from one source. On the basis of its expertise in application-oriented research and practice-relevant industrial projects, DFKI is able to effectively support corporations in integrating technological innovations more easily into their operational processes. Deeply rooted in the landscape of international cutting edge research, DFKI identifies new technological trends and makes them accessible to the business economy.

The IRC is structured as a central functional area immediately ancillary to the company management and is headed by the information systems expert Dr. Dirk Werth (MBA), who also teaches Business Software at Saarland University and Clausthal University of Technology. He is a long-standing member of DFKI where he coordinated national and European research projects and headed numerous corporate consulting projects. Dr. Werth earned his doctorate degree under Prof. Dr. Dr. h.c. mult. August-Wilhelm Scheer with the award winning thesis on collaborative business processes.

The service portfolio of IRC includes business consulting in technology and organizational issues as well as the preparation of studies for the operational use of existing and future technologies:

Workshops are organized with the customer where, in parallel with problem definition, concepts are developed for technology-aided solutions. The technology assessment determines the suitability of a technology for a particular sector or domain. Medium term consulting projects serve in the design and implementation of customer-specific solutions. Feasibility studies evaluate appropriate technologies regarding the sensible and economically sound options for their implementation in a specific company context. Long-term operational coaching enables companies to self-administer a new technology and use it for their additional innovation projects. Long-term technological trends are being studied and evaluated. IRC adds an economic perspective to the comprehensive expert know-how and experience resident in the DFKI research departments.

In this way, DFKI combines its technological and economic know-how in one entity, the IRC, in order to offer its customers an operational approach to innovative technologies. This is how, for the first time, DFKI has united scientific and economic expertise as a new counseling service.

More information
www.dfki.de/irc

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▶ THESEUS Innovation Center for the Internet of Services Opens in Berlin

On June 14, 2010, Parliamentary State Secretary Ernst Burgbacher inaugurated the new 500 square meters THESEUS Innovation Center for the Internet of Services in Berlin.

The Federal Ministry of Economics and Technology (BMWi) initiated the THESEUS research program with the aim of finding ways to simplify access to information, to integrate data for new knowledge, and to create the foundation for the development of new online services. The THESEUS Innovation Center is a technology forum for the Internet of Services. In addition to the exhibit area, the new facility offers space for lectures, conferences, and discussions concerning innovative applications and services for the internet of the future.

As a THESEUS research partner, DFKI is represented by three exhibits at the Innovation Center: Calisto, TechWatch, and Text 2.0. They serve as examples of multimodal user interaction, semantic search technologies, and smart access to knowledge databases.

Calisto is a multimodal, semantics-based interactive system. Natural language and gesture in combination with a touch terminal and a smartphone offer exciting and unexpected possibilities. Comprehensive information linked to a specific shared knowledge domain can be accessed, saved, and exchanged via smartphone. Konrad Zuse, the inventor of the computer, serves as an example of the Calisto exhibit that demonstrates available services: users can access multimedia content like photos, videos, and audio files about Konrad Zuse, while performing a semantic search to find other locations that have a connection to Zuse. The Calisto system understands the commands spoken into the smartphone such as "Display photos of Konrad Zuse." Photos stored in the mobile device can literally be tossed onto the viewing table using gesture commands. The graphic interface is intuitive to use and invites interaction by the user.

TechWatch is a semantic monitoring system which assembles patented and published information about a certain field of technology and graphically illustrates the relationships between the major players: TechWatch finds the relevant persons, organizations, companies, patents, and publications based on the keywords entered by the user and interactively displays the interrelationships between the search results. The system aids companies in identifying new technological trends, monitoring their competitors, and understanding networks. TechWatch can be employed in the areas of trend spotting, market research, and market analysis.

Text 2.0 recognizes the user's reading style. An integrated eye-tracker built into the computer monitor tracks the reader's eye movements and, relative to the portion of the text currently being read, overlays suitable multimedia effects like music, ambient noises, or supplemental information (Augmented Reading).



*Ceremonial cutting of the red ribbon
l.-r. Prof. Hans-Joachim Grallert, Fraunhofer Heinrich-Hertz-Institute; Prof. Wolfgang Wahlster, DFKI; Ernst Burgbacher, BMWi; Dr. Orestis Terzidis, SAP AG; Heinz Paul Bonn, BITKOM; Dr. Andreas Goerdeler, BMWi; Dr. Volker Zimmermann, IMC AG*

The system can access online knowledge bases like DBPedia or Wikipedia or take advantage of networked services, for example, machine translations. Depending on the reading speed, text passages can be masked and only the respective keywords highlighted. This is one way in which the text interactively adapts to the individual user.

The THESEUS Innovation Center invites all interested members of government, business and research representatives including the younger talents from schools and apprenticeships to arrange a convenient visit.

More information

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DFKI and Day of German Unity 2010 in Bremen

On the 20th anniversary of the German unification in Bremen, DFKI was profiled as an important institution for the research community in the areas of aerospace, renewable energies, and electric mobility technologies. In addition to two exhibit tents, on October 2-3, visitors were also able to tour the Robotics Innovation Center.

Aerospace: Lunares Project

DFKI was one of several exhibitors invited by the state of Bremen to present the region as an aerospace technology location. The exhibit explained the usage of innovative robotic systems on the moon as implemented in the Lunares project, a successful cooperation with partners EADS Astrium and OHB Systems. The project, sponsored by DLR and BIG Bremen, includes the SCORPION system developed at DFKI. SCORPION is an eight-legged walking robot, designed for employment on rough terrain like moon craters. The walking pattern and morphology mimic that of actual scorpions. The robot has 24 flexible joints that allow movement over difficult terrain.



Eight-legged walking robot SCORPION

Research at the DFKI Robotics Innovation Center

Split up into 14 groups, 123 guests were able to gain insight into the future of underwater and space exploration, the latest technologies in digital product memory, and the employment of robots in critical safety scenarios. The CUSLAM, CSurvey and CManipulator projects were demonstrated in the underwater lab and test tank.

Small, lightweight and extremely agile, the MINOAS Magnet Crawler is designed to inspect ship keels and was operated for seven hours in an impressive demonstration as it maneuvered its way up and down the exhibit wall. The ASGUARD system also received enthusiastic greetings at the robot test course where it scampered over rocks and other debris, stairs, railway tracks, and moved through concrete culverts. ASGUARD V2 was designed to support rescue teams operating in disaster zones.

Visitors were also shown the world of robotic space exploration by the semi-autonomous, free climbing robot SpaceClimber and a virtual presentation of the collaborative project INVERITAS. The technologies being developed at DFKI are necessary to construct a satellite that is able to dock with other orbiting satellites.



ASGUARD at the robot test course

The visitors were especially fascinated by the work of the programmers in the SemProM project and its dual-arm robot AILA compared to the movement and recognition capabilities of humans: AILA is able to grasp and individually transport objects like bottles, cartons, and bags, which are strongly differentiated in form from one another, by virtue of the fact that it is equipped with mechanisms that adapt to the specific characteristics of the objects. Object information such as size and weight are stored in digital product memories.

Mobility of the Future – "Model Region Electric Mobility, Bremen/Oldenburg"

At the Weser Tower, visitors had the opportunity to test drive the latest electric vehicles of various sorts, built by several manufacturers. These innovative cars were provided by the model region Electric Mobility Bremen/Oldenburg, a pilot project under the lead management of Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM) and DFKI. Electric Mobility Bremen/Oldenburg is one of eight model regions in Germany selected to share a budget of 130 million Euros. The funding is part of the Second Economic Stimulus Package of the Federal Ministry for Transport, Building, and Urban Development (p. 14).

More information

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► DFKI Studying Electric Cars for Suitability in Daily Use

Climate change, air pollution, and scarcity of resources require us to rethink our mobility concepts. Electric mobility is expected to play a key role in this respect. The Federal Government has placed this subject at the top of its agenda: By 2020, Germany is to become the leading market for electric mobility with one million vehicles on the German road network.



The team of the "Model Region Electric Mobility Bremen/Oldenburg" at the DFKI Robotics Innovation Center Bremen

In coordination with Fraunhofer Institute for Manufacturing Technology and Advanced Materials in Bremen (IFAM), DFKI is the managing agency for the Model Region Electric Mobility Bremen/Oldenburg. The area is considered particularly attractive for this type of research: It typifies special mobility requirements such as the commuter traffic between the cities and the outlying communities. The strong expansion of the wind energy sector with its guaranteed energy production from renewable sources is an additional advantage, just as is the existing close R&D cooperation and strong interdisciplinary nature of the relationships among the relevant actors from government, research, and development.

A major component of the activities in the Model Region Electric Mobility Bremen/Oldenburg is the scientific evaluation of the crossover potential of electric cars. Altogether 100 e-Mobiles will be provided to representative users. Daily usage both in city and rural traffic environments will be automatically documented. These measurements will form the basis of a comprehensive e-Mobility database, which through the use of simulations and service tools will then identify applications for electric mobility in the form of an online virtual model region and aid in advancing a sustainable and intelligent integration of electric mobility.

The public awareness events planned and implemented by DFKI are effectively advancing the topic in the region. Another important activity is the Germany-wide networking with other model regions through exchanges

and reporting to the NOW GmbH (National Organisation Hydrogen and Fuel Cell Technology), which is charged with the overall project management at the national level. Suitable current application areas for electric mobility must be determined and electric cars must be integrated in existing business models. Under the framework of this business model and taking account of traffic concepts and infrastructure planning, DFKI is also studying the long term economic and social uses of electric mobility. Another important part of the project is the continuity of the model region Electromobility Bremen/Oldenburg as a permanent fixture in the region (Personal Mobility Center). The research findings from the model region are integrated into the development of innovative vehicle concepts as well (p. 15).



Photo: DATCOM Telematik GmbH

The data logger that captures the information in the vehicles



A part of the electric vehicle fleet of the DFKI Robotics Innovation Center, tested in the Model Region Electric Mobility Bremen/Oldenburg: Dolphin, Vectrix, Think City, Eco Carrier

The vehicle fleet of DFKI Robotics Innovation Center currently comprises 8 electric cars. The first contractual partner, bremenports, is currently testing two small cars produced by the Norwegian car maker Think City, with the research backing of DFKI.

More information
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Bremen RIC Initiates Workshop Series "The Future of Automotive Technology and Mobility"

The Robotics Innovation Center (RIC) in Bremen is a cooperation partner for the central information depository on the subject of electric mobility in the Model Region Electric Mobility Bremen/Oldenburg (page 14). The center, together with the Fraunhofer Institute for Manufacturing Technology and Advanced Materials Bremen (IFAM) is a coordinator of their regional activities. DFKI has acquired key competences in the emerging market for electric mobility and is actively designing the future of electric mobility with its research and development experience and appropriate problem solving approaches. The workshop series "The Future of Automotive Technology and Mobility" is intended to generate and develop innovative concepts and concentrate existing capabilities and know-how for integration into future research project grants in the area of automotive technology and mobility.

At DFKI, the oMoMo Project (Modular Morphologic Mobility) is working on a concept for a semi-autonomous electric vehicle, which represents an innovative mobility design and employs a morphologic structure that adapts to the individual needs of the operator. Based on the technical possibilities already available in the field of electric mobility, the future

oMoMo model dispenses with the traditional power train by employing distributed drives.



Modularity in this case not only means the intelligent alteration of vehicle

designs for different modes of driving, for example, different modules for a shopping trip or a holiday vacation, but also the possibility to connect separate vehicles to one another and to the environment (e.g., with the infrastructure). This networking enables the efficient sharing and use of energy and information (e-sharing).

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Dr. Thomas Röfer is a Senior Researcher in the department of Safe and Secure Cognitive Systems at DFKI.

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

My area of research is the control of mobile robots. I conduct application-oriented research in the area of Ambient Assisted Living –

the technologies that assist the elderly to retain their independence and live in their own homes for a longer time. My real passion lies in basic research in the area of controlling autonomous, cooperative robots. We study this in our work on the example of robot soccer and we participate in the World RoboCup games every year.

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

During my university studies, I developed a robot that could self-learn what "red" is using an artificial neural network. At that time, artificial neural networks were a trendy topic. Today, they are one of many software tools for resolving problems available in the field of Artificial Intelligence.

DFKI Interview: Dr. Thomas Röfer

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

AI is more present in our daily lives than ever before, for example, in online search engines or car navigation systems. We are experiencing the appearance of the first service robots on the consumer market, for example autonomous vacuum cleaners and lawn mowers. The greatest challenge in the future will be to build robot systems so robust that they find their way into our normal surroundings and, in the process, take over useful functions that improve our quality of life.

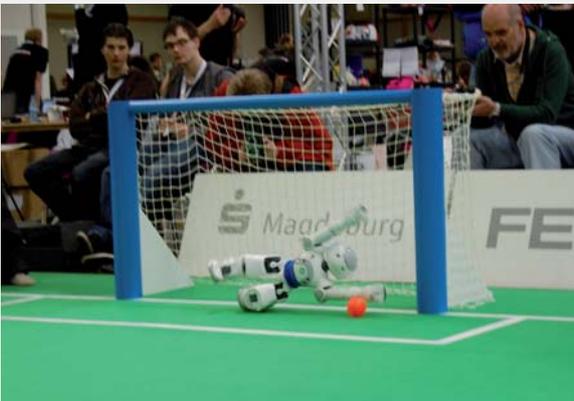
What are your current projects?

We are now evaluating two so-called mobility assistants that enable a larger group of users than previously possible to independently operate an electric wheelchair. We are also developing methods by which the humanoid robots that are also being used in robot soccer can interact with humans. Both of these activities take place in joint ventures with the respective equipment manufacturers.

DFKI and University of Bremen Defend Robot Soccer World Championship Title

For the second consecutive year, Team B-Human remained undefeated as they defended their title in the Standard Platform League in RoboCup 2010 held in Singapore. The competition included 23 teams from 17 countries.

In the final match, the joint team developed by DFKI and the University of Bremen defeated "rUNSWift", the team from the University of New South Wales, Australia by a score of 6:1. The German team demonstrated its technical superiority as it scored an impressive 65 goals with only 3 counter goals. The defensively strong team made it through the second qualifying round with a clean sheet. These stats are even more remarkable as Team B-Human has published last year's winning championship code, essentially giving other teams access to the Bremen know-how.



"The technical game of Team B-Human is characterized by its quick pace, precise shots on the goal, a good team coordination, and a strong one-on-one game. One reason for our dominant victory is that with a five goal lead, we played even more offensively with the goalkeeper moving forward and also scoring several goals", said B-Human team coach Dr. Thomas Röfer.

B-Human effectively doubled the running speed of its robots over the prior year. The robots can now actively keep their balance when taking a shot and adjust the movement of the foot to make contact with the ball at just the right spot. The goalkeeper can stop the ball by a lunging dive, although, thanks to the good forward defense, this was not necessary very often. Additionally, a new shot was integrated during the competition that enabled the robots to play the ball backwards by using the soles of their feet. This trick allowed them to clear some difficult situations.

The B-Human team is composed of students in the computer science program at the University of Bremen and is advised by members of the DFKI staff from the Department of Safe and Secure Cognitive Systems. The team independently developed the entire set of controls

for the soccer robots – including cognition, environmental modeling, behavioral control, team communication, and locomotion.



Team B-Human

RoboCup is an international initiative to promote research in the fields of Artificial Intelligence and robotics. The goal of RoboCup is to build, before the year 2050, a team of autonomous humanoid robots that is capable of defeating the reigning human world champions.

In order to achieve this ambitious goal, each league has been assigned a different focus of research. The Standard Platform League requires standard hardware to be used, i.e., all robots are of identical construction. The challenge for the competing teams is then to be found in the software programming. Up until the year 2008, the standard platform was the four-legged Sony AIBO, but since 2009, the humanoid robot "Nao" manufactured by the French company Aldebaran Robotics is being used. The robot is equipped with 21 flexible joints, two cameras, numerous sensors, and an onboard computer. In this sense, independent action is altogether possible.

More information

www.robocup2010.org
www.b-human.de

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CeLTech And HTW Cooperate for Better e-Learning in Mathematics



**Centre for e-Learning
Technology**

The CeLTech – Centre for e-Learning Technology at DFKI and Saarland University is cooperating with the University of Applied Sciences, Saarbrücken (Hochschule für Technik und Wirtschaft, HTW) in the area of e-

Learning. The aim is to integrate applied basic research and application development activities as well as services in the area of education technologies and software for teaching, learning, and examining.

CeLTech, DFKI, and HTW signed a joint venture agreement on August 5, 2010. The cooperation will focus on the advanced development and extended use of e-Learning systems in mathematics. The two existing products, ActiveMath and MathCoach (the latter developed at HTW), will be more closely integrated and made available to students and faculty members over the online learning management software CLIX Campus.

The ActiveMath-team at DFKI and the MathCoach-team at HTW have a long history of successful cooperation in

the area of e-Learning. The past cooperation has focused on the use of e-Learning systems in the bridge courses for Saarland's Universities. Bridge courses help to prepare first year students by filling in gaps in their math skills prior to the start of classes, easing the transition from secondary school to university. Encouraged by the positive student feedback, the successful cooperation is continuing and will be offered in the standard programs at the universities.

More information

www.celtech.de

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Online Math Courses Facilitate the Start of Studies Throughout Europe



language bridge courses that have their origins in different countries.

Math-Bridge is adaptable to the needs of the students, communicates in the desired language, and even suggests the appropriate subject matter. This is why the contents of the mathematics bridge courses from various nations are not only coordinated in terms of content and language, but also in terms of ontologies. Students can consult a broad range of mathematical definitions and explanations as well as a large number of practical exercises.

Under the umbrella of CeLTech, the teams at DFKI and Saarland University have developed tools for Math-Bridge which permit teachers and tutors all across Europe to jointly prepare new subject matter for the platform and link it to existing content. The system automatically identifies translation gaps or contradictions in the links, for example, the mathematical definitions. Also, the authors are notified if a specific task is missing that the user needs to solve a problem. AI contributes to some of the most unique characteristics of this platform, such as the user model, the content ontology, and the adaptive features.

The use of e-Learning systems in mathematics bridge courses is also the subject of the European project Math-Bridge. Math-Bridge creates an Internet platform that integrates multi-



The Math-Bridge-project was initiated in May 2009 and is funded by a 1.8 million Euro grant from the European Union. Currently, individual courses are offered in Spanish, German, English, Finnish, French, Dutch, and Hungarian.

More information

www.math-bridge.org

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▶ LMU and DFKI Scientists Bring Life to the Ars Electronica Facade



Computer scientists from Ludwig-Maximilians University (LMU) in Munich and DFKI Saarbrücken have transformed the multimedia facade of the Ars Electronica Center into a colorful playing field at the "Ars Electronica 2010" festival of art and technology in Linz, Austria.

The "Touch Projector" technology for interaction with public displays is the creation of a team of scientists around Prof. Dr. Andreas Butz, chair of the Department of Human Machine Interaction at LMU. A working group led by Prof. Dr. Antonio Krüger of DFKI Saarbrücken, in cooperation with LMU expanded the application to allow visitors to the Ars Electronica event to interact remotely with the multimedia facade of the festival building using an iPhone.

The iPhone is used as the input device for the entire facade: The user only needs to point the view finder of the iPhone camera at the building facade. Whatever they "finger paint" on the screen of the mobile device is directly transferred in real time onto the surface of the building. In addition to painting, users can solve puzzles on the building facade.

The technological implementation of the application is based on a white frame that is displayed on the building. The touch-position on the iPhone display is mapped relative to the white frame on the facade, communication between the wireless device and the multimedia facade is accomplished via a server that sends the respective commands.

During the festival, visitors were able to personally test the application using borrowed devices that interacted directly with the facade of the Ars Electronica Center.

More information and system video

www.project-iris.org
www.innovative-retail.de
www.mmi.ifl.lmu.de

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▶ Gnowsis Hits the Ground Running with Cluug



Gnowsis, the promising DFKI Spin-off in the area of personal information management, is entering the market in autumn 2010 by launching the product Cluug. Cluug is a personal assistant that, building on a semantic search mechanism, shows users the way to their information. Not searching – it's finding that makes the difference.

The system automatically generates recommendations to a selected topic and creates links between related and relevant data. The Alpha version of Cluug has been successfully introduced at the CeBIT 2010 exhibition at the DFKI booth. First pilot projects could be initiated directly on location by taking advantage of synergies between Gnowsis and DFKI. After reaching more than 170 users in the Alpha User Program, the Beta version was introduced in October 2010. As a part of the Beta User Program, first desktop connectors into Microsoft Outlook, Firefox Internet Browser and Windows File Browser are part of the product. This improves the usability of the system and opens new features – users can use Cluug directly from their current applications and discover a completely new way of handling and managing information.

Cluug is a Software-as-a-Service product, purchasing will start right after the Beta phase including all 3 plug-ins. The system and the business model have been awarded with the Austrian MINGO Award 2010 and convinced international juries when winning 3rd place at the Innovation Seed Camp at the ESTC 2009 as well as 3rd place at the Innovate!2010 Pitch Slam at the SemTech2010 in San Francisco.

More information

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News in Brief

Lifetime Achievement Award for Prof. Scheer

Prof. Dr. Dr. h.c. mult. August-Wilhelm Scheer received the prestigious "Design Science Lifetime Achievement Award" presented by the University of St. Gallen, Switzerland. The honor is in recognition of his service to Design Sciences as well as his life's work. Prof. Scheer taught at Saarland University from 1975 to 2006 and founded the Institute for Information Systems, which was integrated into DFKI in 2002. In 1984, he founded the international software and consulting company IDS Scheer AG. Prof. Scheer has served as president of the high-tech industry association "BITKOM" since 2007.



International Association for Pattern Recognition Awards King-Sun Fu Prize 2010 to Prof. Bunke



The International Association for Pattern Recognition (IAPR) is the largest scientific association in the pattern recognition field, representing more than 40 countries and 7000 individual members. It awards several prizes, the highest among them being the widely respected King-Sun Fu Prize in recognition of excellence in the field of scientific achievement.

Prof. Dr. h.c. Horst Bunke, University of Bern, Switzerland was honored in 2010 for his pioneering work in the area of structural pattern recognition. Prof. Dr. Horst Bunke is a long time member and current speaker of the scientific advisory board of DFKI.

Best Paper Award for contribution in the field of medical image processing

The Best Paper Award at the Malaysian Joint Conference on AI (MJCAI 2010) was awarded to Manuel Möller, Patrick Ernst, and Prof. Dr. Prof. h.c. Andreas Dengel from the Department of Knowledge Management for their work on the subject of linking image processing algorithms with anatomical knowledge from medical ontologies.

Best Journal Paper Award for Article on Electronic Pen Input Devices

In March 2010, Dr. Marcus Liwicki together with his Japanese colleagues, Prof. Dr. Seiichi Uchida, Prof. Dr. Koichi Kise, Prof. Dr. Shinichiro Omachi, and Dr. Masakazu Iwamura won the Best Journal Paper Award from the Institute of Image Information and Television Engineers (ITE). Published in the ITE Journal, the paper titled "Digital Pen" discussed the latest technologies for digital pens and future employment scenarios. DFKI is actively conducting research into new pen technologies and applications.

Best Paper Award for Blog-Researchers of the Knowledge Management Department

At the International Conference on Advances in Social Network Analysis and Mining (ASONAM 2010), the work of Darko Obradovic, Dr. Stephan Baumann, and Prof. Dr. Andreas Dengel was chosen as the best of the 62 papers



submitted and received the Best Paper Award. In their paper entitled "A Social Network Analysis and Mining Methodology for the Monitoring of Specific Domains in the Blogosphere," the researchers introduce their work on Social Media Miner, a project which analyzes topics and trends in the blogosphere.

Dr. Andreas Eisele Accepts Position in the European Directorate-General for Translation

Dr. Andreas Eisele, a senior researcher in the Language Technology Lab, has left DFKI on October 15, 2010, to work as project manager for machine translation in the Directorate General for Translation (DGT) of the European Commission. In his new position, he will focus on the introduction of translation approaches originating from projects like EuroMatrix and EuroMatrix Plus (coordinated by DFKI) into the workflow of DGT's more than 1700 translators. Dr. Eisele had been working for DFKI LT Lab since September 2000.

Geoinformatics for Talented Students

In a joint effort, Dr. Johannes Schöning from the Intelligent User Interfaces department and Volker von Nathusius, University of Münster, developed a 2-week summer course in Geoinformatics for the Deutsche Schüler Akademie (DSA). The 16 top students who were selected to participate worked on the compilation, storage, processing, analysis, and visualization of geo-data. Specific projects included development of a solar potential map for the city of Waren an der Müritz and a multi-touch input device for the control of map services using an intelligent user interface.

Publications

WE ARE PLEASED TO PRESENT THE FOLLOWING PARTIAL LISTING OF OUR STAFF'S RECENT SCIENTIFIC PUBLICATIONS

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Kaiserslautern Site

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- ▶ Bremen Ambient Assisted Living Laboratory

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

With a projected overall annual budget in 2010 of EUR 35 million, the previous year's record result will be surpassed.

Currently, DFKI has 409 employees and 358 student assistants. The circle of DFKI industrial partners comprises among others



Saarbrücken Site

Attensity Europe GmbH, BMW Group, Daimler AG, Deutsche Messe AG, Deutsche Post AG, Deutsche Telekom AG, EADS Astrium GmbH, Fraunhofer Gesellschaft e.V., Harting KGaA, IDS Scheer AG, Intel Corporation, KIBG GmbH, Microsoft Deutschland GmbH, Ricoh Ltd., SAP AG, University of Kaiserslautern, Bremen University and Saarland University (partially through associated companies). By acquisition of a company stake, the agricultural and construction equipment manufacturer John Deere and Company joined the circle in 2010.

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 135 ongoing projects. Project progress is checked once a year by an independent, international group of respected experts. In addition to the BMBF 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) and in SemVox GmbH (Saarbrücken).



Bremen Site

Intelligent Solutions

for the

Knowledge Society

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



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