NEWS

GERMAN RESEARCH CENTER FOR ARTIFICIAL INTELLIGENCE

Google is a DFKI Shareholder

SmartFactory^{KL} - German Mittelstand 4.0

DFKI and ZeMA Launch Power4Production

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2/2015

Freedom of Movement for Pixels!

DaaS is a Selected Place in the Land of Ideas 2015


Photo: André Mailänder

Germany
Land of Ideas

Selected Landmark 2015

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www.land-der-ideen.de/en

DaaS
Display as a Service

Display as a Service, DaaS, allows individual monitors to be transformed into one gigantic display wall.

Everyday life is full of screens: smart phones, tablets, and monitors are everywhere. However, most of them are firmly connected to an information source. Display as a Service provides an unprecedented level of flexibility: Displays of different sizes and resolution can be linked with DaaS via a standard network and filled from any number of devices.

This represents entirely new forms of design and control, presentation and teamworking – from giant display walls to a combination of several computer screens during a meeting.

The award ceremony is scheduled for

December 10, 2015
10:00 a.m. - 4:00 p.m.

at DFKI Saarbrücken.

Google is DFKI's Newest Shareholder

Google Germany GmbH has acquired a share of DFKI making it the institute's 17th industry partner. DFKI is now the only research facility in Europe in which Google is participating as an industry partner with a capital investment and a seat on the supervisory board. A press conference attended by many representatives of the media and approximately 150 invited guests was held on October 6, 2015 at DFKI Saarbrücken.

Making the joint announcement were Prof. Wahlster along with Dr. Wieland Holfelder, Engineering Director for Google Germany and Minister President of the Saarland Annegret Kramp-Karrenbauer. The Federal Minister of Research and Education, Prof. Dr. Johanna Wanka, was conducting government consultations in India at the time and sent her congratulations to the event via a video statement.

Dr. Holfelder, Prof. Wahlster, Minister President Kramp-Karrenbauer, Federal Minister Wanka (via video feed)

Minister President Annegret Kramp-Karrenbauer explained:
"DFKI's new partnership with Google is further evidence of the excellence of the information technology in the state of Saarland. This commitment by a global corporation like Google underscores the reputation of DFKI and the site location in general. We look forward to the results of this partnership and to the anticipated contributions to the future development of the digital society."

As Federal Education and Research Minister Prof. Dr. Johanna Wanka stated:
"We want to shape the digital era and use the Internet of Things to our advantage. The partnership between DFKI and Google represents a good opportunity to develop this goal. A key challenge is the proper management of a growing volume of data and this issue concerns both the protection and security of the data. The dialog between Google and the top-level German scientists regarding these important matters can speed the development of reliable and practical, as well as understandable and user friendly solutions for the digital society of the future."

System demo of "3Digify – DIY 3D Scanner" for Michel Benard, University Relations Manager at Google

Prof. Dr. Wolfgang Wahlster, CEO DFKI:
"I am certain, that in the coming decade our innovation alliances with Google and the other market leaders in our group of shareholders, we will revolutionize mobility, daily living, and working with a new generation of autonomous assistance systems, if we examine the possible technological breakthroughs for feasibility and gain public acceptance at an early stage."

Dr. Wieland Holfelder, Engineering Director at Google Germany GmbH added:
"Since the opening of our first office in Germany in 2001, we have continuously sought and expanded close relationships with local scientists and technology experts. We have enjoyed a long standing and close partnership with DFKI which is one of the world's most renowned research institutes. We are delighted that we can now intensify this as a shareholder. We see great opportunities in cooperation with other well-known partners to provide even greater support and strengthen the exciting research topics at DFKI. We look forward to the resulting technological developments so that they will find their way into Google services, for the benefit of our users around the world."

The press conference was complemented by a series of DFKI exhibits from all research sites. The subjects included: Big Data text analysis, relation extraction, 3D object scanning, social media monitoring, forensic imaging and video analysis, intelligent semantic TV, 3D Internet, INDUSTRIE 4.0, and Display as a Service (DaaS).

AGRICULTURAL TECHNOLOGY

Power 4 Production

INDUSTRIE 4.0

LANGUAGE TECHNOLOGIES

RETAIL AND LOGISTICS

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SmartFactory^{KL} Demonstrator

SmartFactory^{KL} and DFKI at SPS IPC Drives in Nuremberg

SPS IPC Drives is Europe's leading exhibition for electric automation, systems and components – a sector where INDUSTRIE 4.0 has become a fundamental axiom. This year, DFKI and the *SmartFactory*^{KL} present the world's first vendor-independent INDUSTRIE 4.0 plant, jointly implemented by a major partner consortium. The demonstrator is exhibited from November 24-26, 2015 in Hall 3A, Stand 440.

The project is composed of 16 partners and is now in its third term. After creating quite a sensation at the Hannover Messe in April of this year, the current R&D effort for continuous development is focused on the contextual framework. The themes of visionary applications, infrastructure, digital factory, and automation are to be intensified in the next stage of development.

The demonstrator production plant consists of separate, vendor-specific production modules that can be programmed to function autonomously or jointly. Strung together, they form a complete manufacturing process. An infrastructure system supplies the mobile modules with high voltage power, an industrial Ethernet, compressed-air, and a higher-level emergency stop loop. The infrastructure consists of various boxes, also provided by different manufacturers. Integrated IT systems can access the data and issue commands to the plant components via this “backbone,” which ensures the continuity of the data across the various levels.

A business card case is used as a sample product and it controls its own production processes as it moves through the plant by means of an RFID tag. Customized information about color, inlay, and engraving are selected in advance and stored in the RFID memory, which controls the specific steps performed at each module. This very specific demand on the available services in the system ensures an efficient production down to a batch size of one.

Visitors at the DFKI stand and the *SmartFactory*^{KL} get a look into the future of the human factory worker in the INDUSTRIE 4.0 production environment. By means of smart devices like tablets, SmartGlasses, or SmartWatch, the worker of the future will be supported by innovative technologies like augmented vision or virtual reality as they go about their increasingly complex activities. In this way, proposed actions, information, or training assignments will be transmitted to the employees in a manufacturing environment clearly and reliably in real time.

Experience the future of industrial manufacturing in Hall 3A, Stand 440.

More information
www.smartfactory-kl.de

sps ipc drives

Electric Automation
Systems and Components
International Trade Fair
Nuremberg, 24 - 26. November 2015

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Economics Minister Gabriel and Minister President Dreyer Attend First INDUSTRIE 4.0 Day for the German Mittelstand in Kaiserslautern

The Federal Minister for Economic Affairs and Energy, Sigmar Gabriel, and the Minister President of Rhineland Palatinate, Malu Dreyer, attended the first symposium on INDUSTRIE 4.0 for small and medium-sized enterprises (SME) at DFKI Kaiserslautern on October 22, 2015. An important stop on the agenda included a visit to the *SmartFactory*^{KL} – a system demonstrator and research platform for innovative factory systems that shows how digital production networks can actually be achieved in practice.

Minister Gabriel said: "The digital transformation will only succeed in Germany if we incorporate medium-sized companies, the foundation of the Germany economy, in the INDUSTRIE 4.0 revolution and make the "German Mittelstand" success model fit for the future. It gives me great pleasure today to support the first *Industrie 4.0 Mittelstand Day* and to give small and medium-sized enterprises the opportunity to become better informed about INDUSTRIE 4.0, to create a network within the region, and to address issues and concerns to the politicians."

Minister President of Rhineland-Palatinate, Malu Dreyer remarked: "There is no better place to talk about the production systems of the future and to experience them than at the *SmartFactory*^{KL} here in Kaiserslautern. This is the ideal site to launch the regional conferences for the INDUSTRIE 4.0 platform. I am delighted that the *SmartFactory*^{KL} will be one of the five Mittelstand 4.0 Competence Centers sponsored by the German Ministry of Economics. This promotes further development of your standing and influence as you support our industrial SMEs on the path of implementing Industrie 4.0."

In her welcome remarks, Eveline Lemke, the state economics minister clearly stated her commitment to INDUSTRIE 4.0 as a major priority for the innovation and industrial policies of the state: "The government is eager to see enterprises within the state benefit from the development potential of INDUSTRIE 4.0 at the earliest opportunity."

Prof. Zühlke explains the development potentials of INDUSTRIE 4.0 for the German Mittelstand.

Federal Minister Gabriel and Minister President Dreyer

Prof. Detlef Zühlke, Head of DFKI's Innovative Factory Systems department and chairperson and founder of technology initiative *SmartFactory*^{KL}, added: "The encouragement and support of the *SmartFactory*^{KL} not from industry alone, but also from state and federal administrations, brings us closer to the realization of the INDUSTRIE 4.0 promise. We can use this unique platform together with competence center *Mittelstand 4.0 Rheinland-Pfalz* and the neighboring regions, to promote and advance implementation, especially among the small and medium-sized companies."

The first *Industrie 4.0 Mittelstand Day* in Kaiserslautern was a joint initiative of the German Federal Ministry for Economic Affairs and Energy (BMWi) and the State Chancellery of Rhineland-Palatinate. It marks the launch of a series of events specifically directed at small and medium-sized companies and plans are being made to expand to the other federal states. The aim is to inform the Mittelstand about the digital transformation in Germany and make them aware of the topic and the potential of INDUSTRIE 4.0. About 100 representatives from government, business, and small and medium-sized manufacturing companies in the region attended *Mittelstand Day* and discussed opportunities and strategies for the implementation of INDUSTRIE 4.0.

Project PROWILAN: Fast, Secure, Wireless – WiFi of the Future for Real Time Control in INDUSTRIE 4.0

The increasing demand for flexible and cost-efficient production is driving a growing industry interest in secure and robust wireless solutions. "Professional Wireless Industrial LAN – PROWILAN" is a BMBF project constituted as a consortium of eight German organizations, where manufacturing and research experts are jointly developing the next generation of WiFi radio technology to meet the rapidly increasing requirements of future industrial applications.

The aim of the project is to improve the reliability, bandwidth, and latency of the WiFi solutions and to provide user-friendly and efficient support to the most sophisticated or critical safety applications, for example, augmented reality or radio-based emergency stop circuits. Until now, the commonly used radio technologies have only been able to achieve stable, cooperative Augmented Reality applications to a limited extent. Today's WiFi systems are not even able to meet the growing needs of difficult access environments, where assembly and maintenance services are to be performed.


Photo: Bosch

Emergency WiFi message on tablet: "Recommended action: faulty part handling"


Photo: Bosch

Project coordinator Prof. Dr. Hans Schotten, Head of the Intelligent Networks department at DFKI in Kaiserslautern, explains: "The efficient implementation of the INDUSTRIE 4.0 concept requires a flexible, user-friendly, and secure communication solution. The aim of PROWILAN is to develop the new, high performance industrial WiFi systems to meet these new requirements."

One of the required and planned innovations is a multi-band capable radio interface that will not be sensitive to interference in individual bands and will always provide immediate availability. This will enable very fast response times by the applications. It is important to ensure short system response times, for example, in the event of an emergency stop of the equipment, to achieve the guaranteed shutdown time. Another key innovation from PROWILAN is the integration of a high-performance 60-GHz module, which is intended to significantly increase the data transfer rates. Similarly, an integrated localization process for industrial environments will give mobile units the capability of determining their location and spatial orientation. Also, the new Plug & Trust method developed in PROWILAN to facilitate fast and easy commissioning, retrofits, and safety protection is of central importance in ensuring a high level of customer acceptance.

More information
www.prowilan.de

PROWILAN is sponsored under the IKT 2020 – Research for Innovation program of the Federal Ministry of Education and Research (BMBF) and is funded with a total of 4.6 million euros. The project was launched in February 2015 and runs until early 2018. Other members of the consortium besides DFKI, as the overall coordinator, are: ABB AG, IHP – Leibniz Institute for High Performance Microelectronics, IMST GmbH, NXP Semiconductors Germany GmbH, Bosch Rexroth AG, Robert Bosch GmbH, and Dresden University of Technology.

In addition to Intelligent Networks, DFKI's department of Augmented Vision, headed by Prof. Dr. Didier Stricker, is also contributing to the **PROWILAN** project.

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Minister President Kramp-Karrenbauer, Prof. Wahlster, Prof. Müller, Minister Rehlinger at the opening of Power4Production

Power4 Production

DFKI and ZeMA Launch New Center for INDUSTRIE 4.0 - Production Engineering

On October 5, 2015 the Center for Innovative Production Systems "Power4Production" in Saarbrücken has begun operations as the point of contact for the business community of the Saarland. It is operated by the German Research Center for Artificial Intelligence (DFKI) and the Centre for Mechatronics and Automatisation Systems (ZeMA).

The focus of the center is on an intelligent network of products and production environments to achieve added value in manufacturing. The first efforts are aimed at such topics as direct communication between the work piece and the machine and human-robot interactions (HRI) in the context of so called cyber-physical production systems. This includes the problems and issues encountered in such subjects as robust networks, cloud computing, and energy efficiency in manufacturing. The new "Power4Production" Center is designed to provide assistance to companies and to perform the preparatory work necessary for the Saarland of the future.

"If two highly competent partners like DFKI and ZeMA, which we have followed and actively supported for many years, get together and pool their proven outstanding capabilities, the result of the collaboration will surely be convincing as well," said Annegret Kramp-Karrenbauer, Minister President of Saarland, at the opening ceremony.

The Minister of Economic Affairs of Saarland Anke Rehlinger also sees INDUSTRIE 4.0 as "a real topic for the future of our state." The ever increasing digitization of production also represents new opportunities for small and middle sized enterprises: "That is especially true for the mechanical and plant engineering, for electronics, and for the automobile industry which are strongly represented here in Saarland. INDUSTRIE 4.0 can be the catalyst for real growth in these areas, both through better use of resources as well as through an even stronger customer focus with small batches and customized product designs."

The new technology center will be under the co-management of Professors Müller and Wahlster. The staff of both institutes will work for P4P at the ZeMA facilities in Saarbrücken.

Prof. Rainer Müller, Scientific Director at ZeMA explained: "Our scientific efforts at the Center will actively contribute to securing the competitiveness of the industries in the Saarland. DFKI and ZeMA complement each other perfectly with their competencies in computer science, artificial intelligence, and the engineering sciences. We already cooperate successfully on a number of projects."

DFKI CEO Prof. Wolfgang Wahlster added: "Since setting the foundation ten years ago with our SmartFactory at DFKI-Kaiserslautern and presenting INDUSTRIE 4.0 as the project of the future for the Federal Government five years ago, we are now working with ZeMA on implementing the next generation of multi-adaptive factories and manufacturing assistance systems."

In addition to focusing on the issues of INDUSTRIE 4.0, another priority is the creation of a network of companies, where the current challenges of operational practices can be addressed. The portfolio of "Power4Production" is to be expanded with continuous and advanced training opportunities for the staff and management of external companies.

More information
www.power4production.de

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Smart Clothing, Tiny Eyes, and a Virtual Twin – Artificial Intelligence at EU ICT 2015 Exhibition

Train in intelligent clothing, look through the smart eyes of the future, and meet your virtual twin - these innovative DFKI technologies were presented at ICT 2015 in Lisbon.

ICT 2015 is the biggest event in the EU calendar for Information and Communication Technologies. The latest strategies and initiatives in European IT research and innovation were presented in Lisbon on October 20-22, 2015, in addition to outstanding project results under this year's motto "Innovate, Connect, Transform." Three projects from the DFKI Augmented Vision research department participated in this exhibit of interactive best practices. One of five concepts exhibited at the popular public discussion forum was the EASY-IMP project that develops intelligent cloud applications for smart clothing.

EASY-IMP – Smart clothing with intelligent applications in the cloud

In the EASY-IMP project, DFKI manages innovative approaches to the development of products and services in the area of intelligent clothing and body-worn sensors.

"Wearables" (products and applications) are jointly developed, feedback is exchanged, and applications can be customized in a special cloud platform. The main focus is on production planning, integrated services, optional designs, installable components, and selectable fabrics and sensors. DFKI's Augmented Vision department is concerned with linking sensors to a mobile device, the evaluation of sensor data, and the design of the user interfaces on the smartphone.

In addition, the scientists and engineers in Kaiserslautern are developing software for the optimization and evaluation of sensor equipped clothing in a virtual environment. Four pilot applications for the areas of Sport, Games, Rehabilitation, and Medicine were presented at the ICT-Pavilion on the Praça do Comércio in Lisbon.

Easy-IMP – Evaluating the sensor data

Eyes of Things - Mini-Eyes for the Internet of Things

The aim of the Eyes of Things project is to develop applications based on miniature cameras so the intelligent systems of the future will be able to perceive their environments in a more comprehensive and more interactive manner for longer periods. Advances in the area of Computer Vision (CV) combined with mobile applications from the areas of Augmented Reality, Wearable Computing, and Ambient Assisted Living are expanding the Internet of Things.

Today's image processing applications may only be used for short periods because of the limited capacity of contemporary batteries, not suitable for something that requires prolonged use. The new applications are expected to enable such cameras to capture and analyze the most extensive range of visual data while consuming the least energy possible. This is what the research team of Professor Stricker hopes to achieve over the next three years as they focus on the integration of the first prototypes and the development of a basic platform for appli-

Photo: AWAIBA

Eyes of Things: miniature camera

cations. Future intelligent interactive systems will be able to perceive their environments more comprehensively and for longer periods. Simple functions will be demonstrated first on a prototype processor.

AlterEgo – The virtual twin for difficult therapies
In the EU's "AlterEgo" project, physicians and computer scientists work on innovative treatments and learning methods to assist people affected by the illnesses associated with social handicaps like autism or schizophrenia.

For these patients, communication is often easier when the counterpart is similar, as similar as possible. The aim is to provide them with a virtual mirror image that acts as an interactive partner and, in this way, facilitate long term improvement in their communication and social skills.

This may achieved by employing a virtual character or even a humanoid robot. It is based on an exact recording and reconstruction of the patient's features in a digital avatar that subsequently adapts to progress in the treatment. The AlterEgo scanning system is being developed at DFKI Kaiserslautern on the basis of 3D body scanners that facilitate the creation of animated models of the individual subject. The virtual twin created in this way is displayed as a mirror image on the monitor as an interactive partner. The patients first get to know themselves by playing with their alter ego, so that later on – after gradually disassociating from their mirror image – they can accept others as interactive partners. The fundamentally new methods of scanning provide great promise in other areas too.

AlterEgo – The virtual twin

The automated creation of a digital, three dimensional and moving avatar is of great interest, for example, in the representation of humans in film productions, or for interactive computer games, or for a virtual dressing room for online clothing shops.

At ICT 2015, the AlterEgo project demonstrated an interactive game using a virtual twin that is currently undergoing therapeutic evaluation.

More information
www.easy-imp.eu
www.eyesofthings.eu
www.euromov.eu/alterego

Günther Oettinger, EU Commissioner for Digital Economy and Society, receives information about EASY-IMP

Project team EASY-IMP

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Augmented Reality System Supports Road Construction

On the streets of Great Britain alone there are over 1.5 million construction sites each year that are excavated for maintenance purposes. Because of inadequate positional information, this results in enormous damage to the property of third parties. The excavation work incurs up to one billion pounds in direct costs and an additional four billion pounds in follow-on costs.

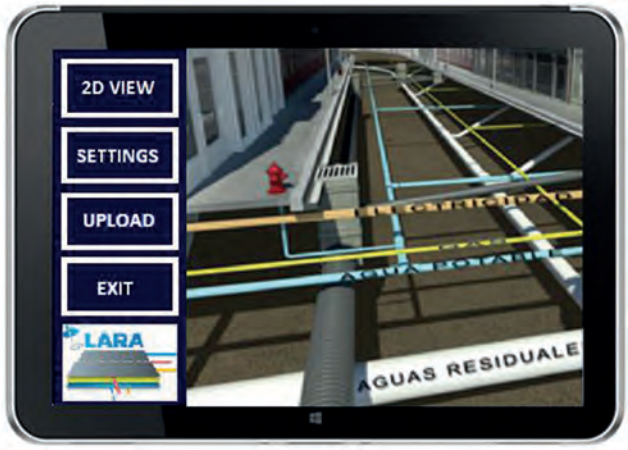
LARA (LBS Augmented Reality Assistive System for Utilities Infrastructure Management through Galileo and EGNOS) is a European research project that is developing a new mobile device for the planning and execution of excavation projects. LARA creates a virtual view of the underground infrastructure, for example, water pipes and power cables. This new device is a kind of touchpad, equipped with a camera and sensors for the geolocation of the Galileo and EGNOS global satellite navigation system (GNSS).

FUNDED BY

DFKI's Augmented Vision department in Kaiserslautern develops augmented reality interfaces to render the complex underground infrastructures as a 3D model, which is then available for further use. The process integrates the positional data and information about underground junction points from public data bases and 3D geoinformation systems. The end users of the system are public agencies and companies in the area of energy supply technologies.

The process starts when a technician prepares a plan for the excavation at his desk. After entering the geo-coordinates of the construction site, a LARA app displays the installed piping as an overlay on a map of the area. On the day of the excavation, the LARA system navigates in 2D mode to the precise location. Upon arrival there, the system is switched to the 3D mode and displays the pipelines under the earth as an augmented reality overlay in the real camera image. In this mode, information about the water lines, electrical power cables, and gas pipelines appears at structured levels so the user can choose between various views.

When the construction crew begins work, the system provides them with exact information about where they must pay particular attention to pipes or cables and what obstacles to expect. If the workers find that the information is incorrect, they can request an exact update and, if necessary, correct the geo-coordinates.



The device and application developed in LARA are transferable to commercial products and services. A marketable and competitive orientation is assured by the pragmatic inclusion of end users in the consortium. An investment in LARA products and associated services may lead to a long term increase in productivity and resource efficiency for the end user and a reduction in the total excavation costs of the construction site.

LARA is funded under the Horizon 2020 EU Framework Program for Research from February 1, 2015 to January 31, 2017.

More information
www.lara-project.eu

Project partners

Aristotle University Thessaloniki, Greece
Birmingham City Council, Great Britain
City of Cozani (DEYAK), Greece
GeoImaging Ltd, Cyprus (Coordination)
German Research Center for Artificial Intelligence (DFKI)
Hewlett Packard Espana S.L., Spain
Ingeniería Y Soluciones Informáticas del Sur S.L., Spain
SignalGenerix Ltd, Cyprus
University of Malaysia Sarawak

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Vitruv21 Platform Connects 3D Models and Planning Information

An interactive, three dimensional model of planned building construction allows architects, site managers, and owners to identify problem areas in the design and execution of building projects earlier and with more reliability. The Vitruv21 research project has developed an interactive visualization method for buildings and their surroundings, individual building stages, and resources. Using the method helps to prevent planning errors, reduce costs, and increase the safety at the construction site because the virtual planning in 3-D makes the construction processes more efficient and transparent.

The German and French partners in the regional construction industry, in cooperation with the University of Applied Sciences (htw saar) and DFKI Saarbrücken, have developed "Compass." Based on web technologies for planning and visualization, it is the most important project result and has already been evaluated on specific construction projects. In terms of the Building Information Modelling (BIM) concept, "Compass" allows for the continuous flow of (3D) data and information. The associated meta information and all of the necessary 3-D models are available in a Web interface. It also supports the standard, decentralized data storage in the Web area. An optional, stereoscopic visualization module allows planners to move interactively through their virtual designs at a scale of 1:1 and the early identification of errors, for example, made by one of their suppliers. Because all required information is centrally available in the user interface, the site manager always has an overview of the current planning status at the construction partner or service provider. Through the use of standard web technologies, the Compass system can be cost effectively extended with modular components. Additionally, as the user interface has purposely been kept simple, "Compass" is also well-suited for use at small and medium sized companies. This model project included building, railroad, and bridge construction projects on both German and French sides. In addition, it facilitated a three dimensional visualization project for redevelopment of the former mining lands in the community of Merlebach in Lorraine on the French side.

Vitruv 21 was funded under the EU INTERREG IV A program for the macro-region of Saarland, Moselle, Lorraine, Westpfalz, and Luxembourg for a term of three years and successfully closed out on June 30, 2015.

Project partners

CdF Ingénierie, Freyming-Merlebach, France
Communauté de Communes de Freyming-Merlebach
DB International GmbH, Regional Office Saarbrücken
Drees & Sommer Luxembourg SARL, Munsbach
Ehrhardt + Hellmann Bauunternehmung GmbH, Homburg/Saar
European Institute for Information Systems and Management (EIISM), Dieulouard, France
German Research Center for Artificial Intelligence (DFKI)
Guelle & Fuchs, Forbach, France
HSB Baumaschinen GmbH, Ensdorf
htw saar, Saarbrücken (Coordination)
OBG Hochbau GmbH & Co. KG, Ottweiler
Peter Gross Hoch- und Tiefbau GmbH & Co. KG, St. Ingbert
Wolff Hoch- und Ingenieurbau GmbH & Co. KG, Saarbrücken

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Ettention – Innovative Software for Electron and Computed Tomography

Three dimensional imaging processes like medical computed tomography (CT) or electron tomography can deliver composite representations from two dimensional projections. Special algorithms for the tomographic reconstruction process now make it possible to generate 3D views that depend entirely on software performance to determine their quality.

A "Computational 3D Imaging" team composed of DFKI researchers Tim Dahmen, Patrick Trampert, Sviatoslav Bogachev and Nico Marniok in cooperation with the start-up Eyen SE has developed Ettention, an innovative software package for the tomographic reconstruction process.

The requirements placed on this kind of software are high: Researchers in the lab demand excellent reconstruction quality and the fastest possible processing of high resolution data. A fundamental condition is the seamless integration with other established tools. A critical milestone is the integration of Ettention in IMOD, the de-facto standard software for electron tomography. The development of new reconstruction algorithms is greatly facilitated by Ettention's use of modular and readily expanded architecture.

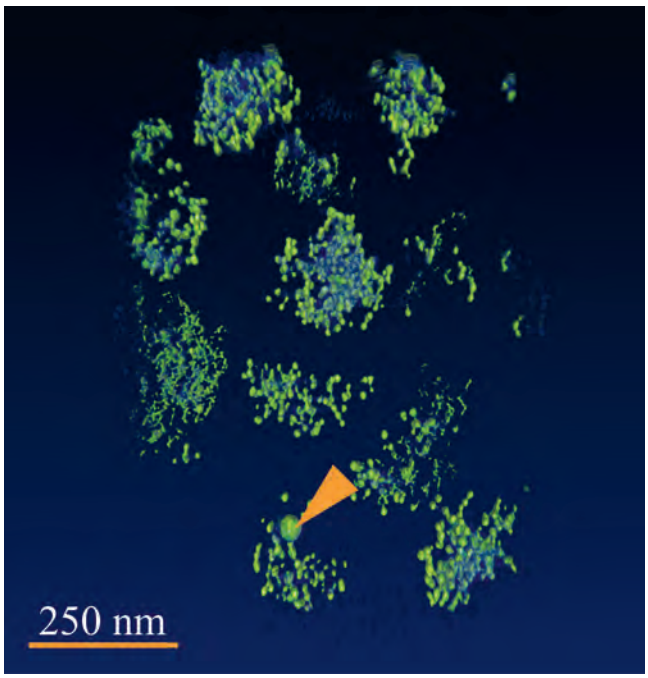
Ettention serves as a common platform for various research projects. The initial version was created under the EU project NOTOX, which studies future methods for the safe testing of cosmetic products for toxicity. The aim of the project is to have computer models that can simulate the effects of cosmetics or even drugs as accurately as possible.

The German Research Funding Organization (Deutsche Forschungsgemeinschaft, DFG) has already included Ettention in the "Iterative Methods for Computed Laminography" (IMCL) project in the field of computed tomography. On the basis of a special X-ray tomography process, the Computed Laminography (CL), IMCL develops solutions for non-destructive testing of industrial equipment and components that are too large for conventional computed tomographic methods.

Development partner Eyen SE now offers studies of the molecular structures of biologic samples as a service – with the aid of Ettention. Ettention has already been effectively employed outside the university and research environment. The company achieves a benefit from the platform that contributes to further development. For example, Eyen has ported the software to Linux and provided the research findings to the community. This scenario shows how an open source concept enables the cooperation between publicly funded research and industry to the benefit of both.

The first release of Ettention occurred on July 1, 2015 and it is now available as an open source platform.

More information
www.ettention.org
www.notox-sb.eu
www.imcl-sb.de



Tomogram of a human cell with gold nano-particles reconstructed with Ettention. The recording was made using a combined tilt and focus series.

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DFKI's Medical All-round Care Service Solutions Score Well at "Smart Service World" Technology Competition

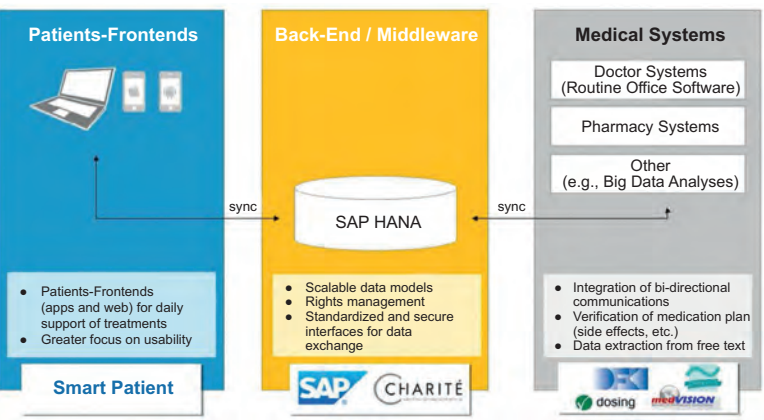
The changing demographics and increasing age of the population is accompanied by an increasing incidence of chronic illnesses. More and more sufferers are dependent on medications and on continuous medical care. The care could be much more individual and effective if all of the people involved in the service and treatment – physicians, hospitals, pharmacies, nursing services – had better access to patient data and it were possible to update this data and easily expand it with new information. Existing data applications lack any systematic involvement in the therapy process because the collected patient data is not made available to all attending physicians.

The aim of Medical All-round Care Service Solutions (MACSS) is to counteract this problem. MACSS is developing a prototype for a new patient centered Smart Health Service Platform in close cooperation with science, business, health insurers, care providers, patient associations, and drug manufacturers. Even the patient will have access to the platform to enter health information there in a kind of patient diary noting their condition or their dietary routines or to retrieve warnings, advice, and explanations.

Successfully competing in the Federal Ministry for Economic Affairs and Energy (BMWi) technology competition "Smart Service World – Internet-based services for the economy," the MACSS consortium's proposed research program and stated aims were the only ones in the health category to be selected to receive federal funding as one of the 16 projects from the total of 130 submitted.

The other participants in this collaborative project managed by Prof. Dr. Klemens Budde, Department of Internal Medicine (Nephrology) at the Charité - Universitätsmedizin Berlin, are DFKI's Language Technology Lab, along with industry partners Dosing, SmartPatient, SAP, and MedVision and the research partner Beuth University of Applied Sciences, Berlin.

MACSS is expected to achieve a long term improvement in doctor-patient as well as doctor-doctor communication. For the first time, patient data from cyber-physical systems can be merged via a mobile, bi-directional application in a single platform and made available for therapy and care decisions. Innovative technologies based on main memory database storage can now aggregate, analyze, and recombine data for various information services.

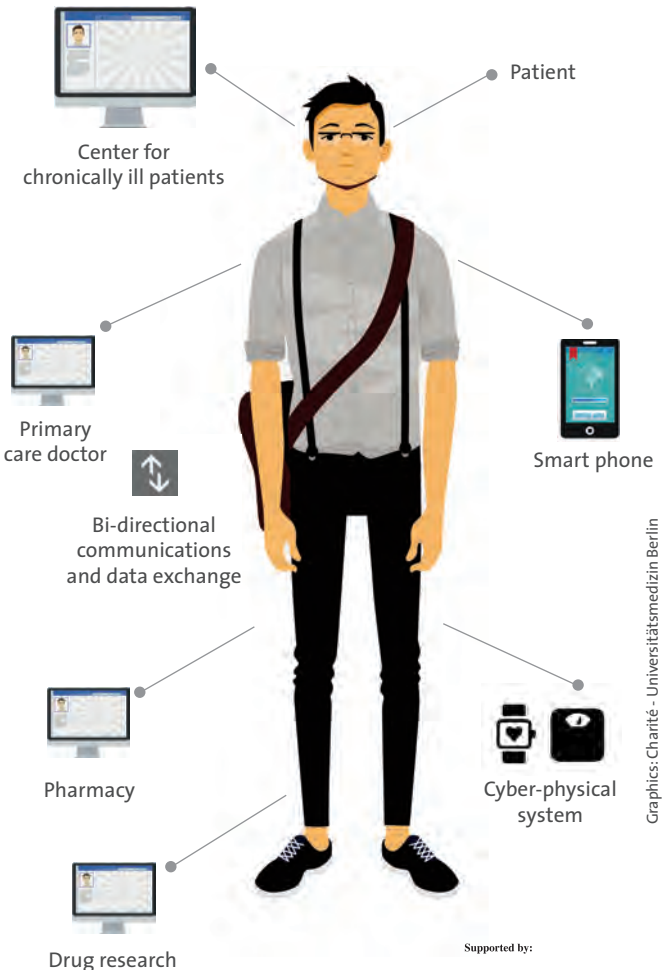


Graphics: Charité - Universitätsmedizin Berlin

The exemplary innovative services of MACCS have the potential to greatly facilitate care and everyday living for the chronically ill and make them safer.

An approved security and authorization concept already exists in prototype to protect sensitive patient data. New business sectors in the healthcare market can be developed through the consortium's cooperation with associated partners Apple, Bosch+Sohn, Pfizer Deutschland, Astellas Pharma, and Chiesi.

More information
www.dfki.de/lt



Graphics: Charité - Universitätsmedizin Berlin

Supported by:
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META-FORUM 2015 and Riga Summit 2015

META-FORUM is the name of an international conference series for a multilingual Europe. Following successful conferences in Brussels, Budapest, and Berlin, this year's META-FORUM was held in the capital of Latvia on April 27, 2015 in the context of the "Riga Summit on the Multilingual Digital Single Market." The event was organized by the DFKI Language Technology Department – with the support of the META-NET initiative and the EU Project CRACKER – and the cooperation of the Tilde company, which operates in the Baltic countries. The main theme this year was "Technologies for the Multilingual Digital Single Market."

The opening remarks were provided by high ranking officials Lolita Čigāne, chairperson of the Committee for European Affairs in the Latvian parliament and the Latvian Foreign Minister Edgars Rinkēvičs. In their remarks, they emphasized the central importance of the digital single market and digital communication technologies for their country. The concluding remarks, given by Dr. Márta Nagy-Rothengass, Head of "Data Value Chain" unit, Directorate General for Communication Networks (DG Connect) of the European Commission, provided a summary of the Commission's activities in the areas of language technologies and Big Data. Dr. Georg Rehm, network manager META-NET and Coordinator for CRACKER, presented the first draft of a new strategy paper for language system solutions designed to make the digital single market multilingual. Prof. Dr. Hans Uszkoreit, Head of DFKI Language Technology Department and the META-NET network gave a review of the last five successful years at META-NET and enunciated the priority areas for future European research in this area.

Edgars Rinkēvičs, Foreign Minister of Latvia

Some of the most respected European research scientists reported the latest findings and success stories from ongoing research and innovation projects in a plenary session and in a poster session. Three additional sessions were devoted to the topics: data text analytics, interactive systems, and machine translation. The presenters included Laure Le Bars (SAP, Vice President of the Big Data Value Association), Rebecca Jonsson (Artificial Solutions), and Matthias Heyn (SDL plc).

Representatives of the major European initiatives such as CLARIN, META-SHARE, and LT Innovate participated in a panel discussion where the focus was on existing technologies and services and their use in future European applications. A second panel brought together representatives of the European language communities as organized in the European Federation of National Institutions for Language (EFNIL) and the Network to Promote Linguistic Diversity (NPLD). The panel presented a joint position paper that demonstrated agreement on the need to develop language technologies for all European languages.

This year's META Prize was awarded to the initiator of the semantic resource BabelNet, Roberto Navigli (Sapienza University of Rome), who was present to accept the award in person. The META Seal of Recognition was awarded to LT Innovate (UK), Translated (Italy), and DBPedia (Germany, Spain, et al.). After the main program, an internal meeting of META-NET was held in which, among other actions, the Executive Board was elected. The new chairperson of the META-NET Executive Board is Prof. Jan Hajic (Charles University, Prague), his deputies are Dr. Andrejs Vasiljevs (Tilde Machine Translations) and Prof. Josef van Genabith, Head of DFKI's department of Multilingual Technologies. Dr. Georg Rehm continues to serve as network manager for the initiative.

META-FORUM 2015 was sponsored by META-NET, a Network of Excellence consisting of 60 research centers in 34 countries. META-NET is forging the Multilingual Europe Technology Alliance (META) – an open alliance of developers and users of language technologies from research, manufacturing, and public administration communities. The common goal is to create a research and technology offensive for the realization of a multilingual European information society. The alliance has existed since November 2010 and already has a membership that includes representatives from approximately 800 companies and institutions from more than 60 countries.

More information
www.meta-forum.eu
www.meta-net.eu
www.rigasummit2015.eu
www.cracker-project.eu
www.cracking-the-language-barrier.eu

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(l. to r.) Georg Rehm, Andrejs Vasiljevs, Lolita Čigāne


Hans Uszkoreit on the future of language technology research

Open Letter to the European Commission:

The digital single market must be multilingual!

In advance of the Riga Summit 2015, DFKI language specialists Prof. Hans Uszkoreit, Prof. Josef van Genabith, and Dr. Georg Rehm together with three other European colleagues prepared an open letter to the European Commission in which they call on the EC to take into account the factors language and multilingualism in the planning for the digital single market.

The open letter is provided in over 20 languages online at: **http://multilingualeurope.eu**

Europe's digital single market must be multilingual!

The European Commission strategy for the digital single market must respond to the challenges of multilingualism to guarantee equal digital opportunities for all official languages of the EU.

Specifically, although it is a fact that the language borders are also market boundaries, these can be overcome through language technologies. We ask that a multilingual digital single market be established, one in which multilingual technologies have a critical role to play.

Just two days after its publication on March 20, 2015, the letter had more than 1000 signatures. Currently, it has over 3600 supporters from all European countries. Among the signatories are:

- 5 Members of the European Parliament
- 150+ High ranking corporate representatives (CxO level)
- 1200+ Professors
- 400+ Project and research managers
- 20+ Entrepreneurs

The initiators welcome additional signatories and the distribution of the above link within your own networks!

3cixty Wins Semantic Web Challenge 2015

The Semantic Web Challenge is a prestigious international competition held each year for practical semantic systems. This year the first prize was awarded to "ExplorMI 360" an app developed by 3cixty, a research consortium coordinated by DFKI.

The consortium is organized under the European research network EIT Digital and the app was developed to assist visitors to the World Expo 2015 in Milan, Italy. ExplorMI 360 stores information from various sources and displays it by country and theme for the pavilions, conferences, and events taking place on the Expo fair grounds, and even about hotels, restaurants, or transportation options in the northern Italian city.

The app can be customized for a better overview or to plan a visit to a specific exhibit or a theme show. For example, you can filter by category, search by key word, or define a maximum distance from your current location to refine the display of major events. Interesting destinations can be stored in a wish list and linked to an individual schedule. The user can specify the display to show only events occurring during the period of the visit, or to select only restaurants that have positive evaluation comments in the Internet.

To deliver optimized results for such multi-criteria settings, ExplorMI 360 relies on a background software platform that draws from various online sources, links the data semantically to an aggregated knowledge base, and then makes it available in the standard RDF format (Resource Description Framework).

More information
www.3cixty.com
http://challenge.semanticweb.org

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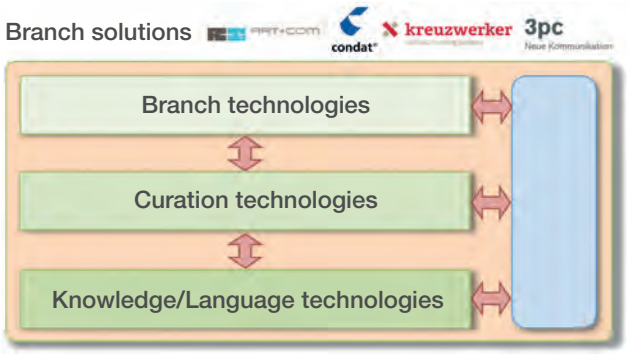

WK · POTENZIAL
UNTERNEHMEN REGION
Die BMBF-Innovationsinitiative Neue Länder

Launch of New Collaborative Project – Digital Curation Technologies

The curation of digital information, data, messages, and media content has become an essential activity with new requirements arising in recent years.

DFKI researchers are working with four Berlin-based companies on language and knowledge technologies for the efficient processing, preparation, and distribution of media content in a collaborative project called "Digital Curation Technologies." A major aim is to provide better support to editors and knowledge workers in a typical curation workflow.

Curation involves complex knowledge and is a time intensive process, in which editors or interdisciplinary teams generate new content directed at a specific purpose from heterogeneous sources. The effort required includes selection, aggregation, temporal classification, internationalization, enrichment, visualization, and specification of the sources. Also to be taken into account is the ever-increasing processing speed, number of information sources, and amount of data.

One example of the digital curation process is the development of an interactive exhibit for a visitor's center that can visualize the discoveries uncovered at an archaeological site with photos, descriptions, and historical data on a map. The use of language and knowledge technologies can assist the staff with the choice of suitable objects, preparation of appropriate content, layout of the map, and determination of various subject-related points of view.

DFKI has partnered with small and middle size companies ART+COM, Condat, Kreuzwerker, and 3pc Neue Kommunikation to develop the components to create a platform for digital curation systems. These components perform the functions of research, enrichment, analysis, aggregation and combination (e.g., thematically, chronologically, geographically), as well as the summation and internationalization of content. In addition, industry and platform technologies facilitate the implementation of industry-specific workflows and scalable applications. Using such platforms, the partners can more easily exploit and develop innovative solutions for museums and showrooms, TV/Radio and Web-TV channels, publishing and media companies, and libraries and archives.

"Digital Curation Systems" expands on the findings of the Federal Ministry of Education and Research (BMBF) sponsored innovation conference "Semantic Media Web" which has been organized by Xinnovations since 2012. The specific aims, strategies, and application scenarios of the new collaborative project were announced and discussed at an expert symposium for Digital Curation Systems in the context of the Semantic Media Web-Innovation Conference on October 6, 2015.

The project "Digital Curation Systems: Semi-automated Process for the Efficient Processing, Preparation, and Distribution of High Value Media Content" was launched on September 1, 2015 and has a term of two years. It is sponsored by BMBF under the framework program "Enterprise Region: Potential Core Growth."

More information
www.semantic-media-web.de
www.digitale-kuratierung.de

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Federal Ministry of Education and Research

Project-Kick-off „Digital Curation Technologies"

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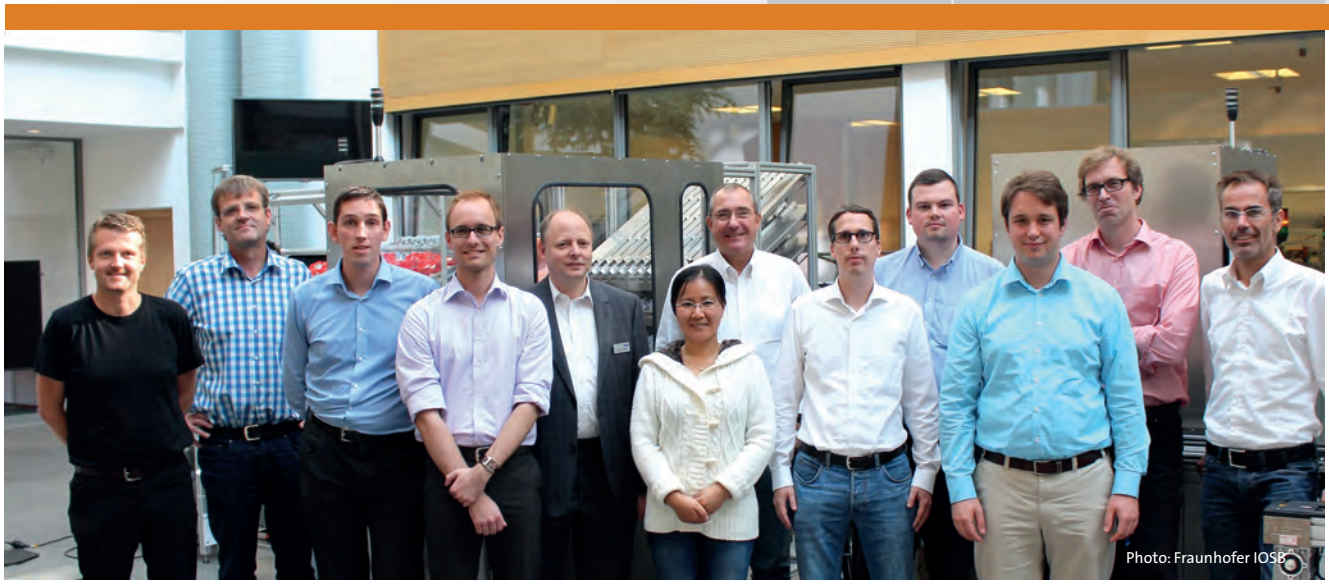

AGATA kick-off in the Fraunhofer Industrial Automation Application Center in Lemgo

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Intelligent Analysis of Complex Manufacturing Processes – DFKI Joins Research Project AGATA

The amount of data and information is increasing faster than ever before in human history. Manufacturing processes are becoming ever more complex through new technologies and the advent of INDUSTRIE 4.0. Both in industrial and agricultural production, more and more information that can be digitally collected, analyzed, and networked to create new commercial applications is available via the Internet, from cloud services, and as sensor data from equipment and even whole factories.

Project AGATA (Big Data Analysis in Manufacturing Processes) develops technologies that enable the more efficient use of the complex flow of data from production processes in industry and agriculture. DFKI is one of seven partners in the project sponsored by the Federal Ministry of Education and Research (BMBF) and funded with 2.2 million euros.

Prof. Andreas Dengel, Site Director at DFKI-Kaiserslautern and Head of the Knowledge Management department explained: "The aim of AGATA is to develop a self-learning assistance system that monitors and analyses the data generated in production, while detecting relationships between the production processes, equipment settings, and limiting conditions. The insight gained about system errors and deviations is useful in optimizing the machine operations and improving production efficiency." In AGATA, DFKI develops procedures and methods to detect anomalies in the raw data. Such obvious patterns provide important information about the sources of error and opportunities for optimization.

The following example illustrates the complexity of the challenge for the algorithms in such a system: A combine harvester has more than 500 sensors and parameters that generate hundreds of measurements. Based on the settings and depending on environmental factors like location and slope of the fields, sunshine, rain, and wind, the yield of the machine harvest can vary, in extreme cases, by tenfold. That is why it is so important to find the optimal settings for each complex scenario. The first step is to analyze the data for errors and irregularities and then select the right setup for the respective limiting conditions. The algorithms developed in the project are made available for process analysis and for practical tests in agricultural applications.

Smart Farming meets Big Data

Integrating the technologies of the "Internet of Things and Services" with the agricultural sector is one of the special subject areas of DFKI's department of Knowledge Management. DFKI was the lead manager of the major research project "iGreen" (www.igreen-projekt.de), which included 23 partners representing the entire agricultural value creation chain and applied IT research community. The aim of the project was to implement a location-based knowledge and services network to link various public and private distributed sources of information.

In the AGATA project, the lead manager Fraunhofer Institute for Optronics, System Technology and Image Exploitation (IOSB-INA) is joined by DFKI as a collaborating partner along with CLAAS, Bayer Technology Services, Hilscher Gesellschaft für Systemautomation, and Tönsmeier Dienstleistung.

More information
www.dfki.de/km

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Prof. Dr. Wolfgang Wahlster Interviews Ammar Alkassar, Founder and CEO of Sirrix, a DFKI Spin-off Company

Ammar Alkassar looks back on his career of nearly 15-years in cryptography and IT-security while at Saarland University and DFKI. He has received many awards for his contributions, in particular, in the area of technology transfer. Ammar Alkassar is on the Board of the German IT security association TeleTrusT, active in the export initiative IT-Security Made in Germany, and is also the director of the European Center for IT Security in Bochum.

Wahlster:
In May this year, Sirrix was acquired by the electronics company Rohde & Schwarz based in Munich. What made you decide to accept this offer?

Alkassar:
We had many discussions with venture capital companies in the USA. However, the participation of American venture capital would have meant a greater infringement of our company philosophy as would the entry of a German firm like Rohde & Schwarz. Additionally, the group has plans to expand into one of the largest IT security providers on the European market. Sirrix operates in business segments where conventional defense suppliers have gaps. Our products are for the Rohde & Schwarz product line a nice addition in the cyber-security segment.

Wahlster:
What Sirrix product is the most successful?

Alkassar:
That is without doubt our secure Browser in the Box, a virtual surfing environment for federal agencies developed while under contract to the Federal Office for Information Security (BSI) and now installed on more than 30,000 computers.

Wahlster:
What role do the technologies from DFKI play in the Sirrix products? How much AI technology is in your products?

Alkassar:
What connects us to DFKI, above all, is the software engineering and processing by automated software verification tools, with which DFKI has opened brand new doors. I am firmly convinced that IT security will benefit greatly from AI technologies to process large amounts of data in the coming years.

Wahlster:
What methods are you using exactly?

Alkassar:
Mainly information extraction and machine evaluation; in other words, an assessment of the things that could lead to security incidents. When it comes to the big issue of detecting anomalies, the conventional tools quickly reach their limits. This is an area where Germany can take the lead as the research is not yet so advanced worldwide.

Prof. Wahlster, Dr. Alkassar

Wahlster:
In your opinion, what are the next big challenges in IT security?

Alkassar:
The megatrends like Big Data, cloud computing, data intelligence, and the Internet of Things all require IT security to achieve wide acceptance and use. Also, the increase in private end devices will create many new branches and fields of application that expect immediate IT security. Currently, the threat situation is dominated by malware. Malware intelligence based on anomaly detection will have a much greater significance in the future. Botnets (web robot networks) are a problem area that has not yet reached its full extent. We face a whole ecosystem of criminal technologies and our defense systems are not at the required levels: We need new smart technologies.

Wahlster:
Security software must be user friendly, to prevent the user from switching it off.

Alkassar:
If you do not win the users over to your side, you will lose them. The IT companies in Germany must do better. Proactive, transparent systems, and "Security by Design" (i.e., software security integrated in the development process), are the performance features of Sirrix.

Wahlster:
For this you need an outstanding, highly motivated staff. How do you deal with the shortage of skilled workers? IT security, in particular, is considered to be a difficult and very theoretical subject area, in which many people do not last.

Alkassar:
The greatest motivation usually comes from a desire to contribute some protection against crime and economic espionage. In terms of recruiting, we select the most promising candidates from Saarland University. After all, we are competing with the major IT suppliers.

Wahlster:
What abilities and skills are needed by IT security experts – besides computer science and mathematics? Do you seek a particular profile?

Alkassar:
The team of founders benefitted greatly from the solid theoretical training of the Saarland University graduates. The practical skills are learned in the company, but the basic theory, the systemic thinking, and the ability to take an integrated perspective – these are the basic tools of the craft that we brought with us and should never set aside following the spirit of the moment.

Wahlster:
Were Business Angels involved in the founding of Sirrix?

Alkassar:
No, but we did succeed in winning the support of successful entrepreneurs on our Board of Supervisors. One of them, for example, is Willi Berchtold, who was the co-founder of the IT industry association BITKOM and its chair for many years.

Wahlster:
How has the growth of Sirrix been financed?

Alkassar:
We have not needed external venture capital. Our growth has been internal and mainly through the reinvestment of profits, something I strongly recommend for young companies in Germany. In our case, the role of business angel was filled by a research grant from the Federal Ministry of Education and Research (BMBF). At this point in time, we have already paid more in taxes than the amount received as a research grant. The downside to growth without venture capital is that the money for marketing is missing.

Wahlster:
Have you kept to the classic entrepreneurial virtues, for example, no distribution of profits to the founding partners?

Alkassar:
That you pay yourself a small salary at the beginning is something that should be a matter of course for entrepreneurs, although it is associated with a high level of personal financial risk.

Wahlster:
You were an early supporter of the enterprise network Software-Cluster. How does the software cluster of excellence benefit Sirrix and you personally?

Alkassar:
This permitted us to establish contact to firms like SAP or Software AG, which opened, and looking at INDUSTRIE 4.0, considerably shortened our channels of cooperation. The software cluster provides young companies in the start-up phase with a tremendous opportunity to capitalize on the wealth of experience from the established software firms.

Wahlster:
What will change after the takeover by Rohde & Schwarz for the company and for you as the CEO?

Alkassar:
Initially, very little. The name Sirrix stays and so do I, as CEO.

Wahlster:
Do you plan on staying in the Saarland?

Alkassar:
The future cyber security activities are distributed across seven sites: Bochum, Saarbrücken, Darmstadt, Hamburg, Berlin, Leipzig, and Munich – it is nice to have a pleasant base in Saarland, from which we can operate successfully.

Wahlster:
Mr. Alkassar, thank you for this interview and best wishes for the future.

Sirrix AG
security technologies

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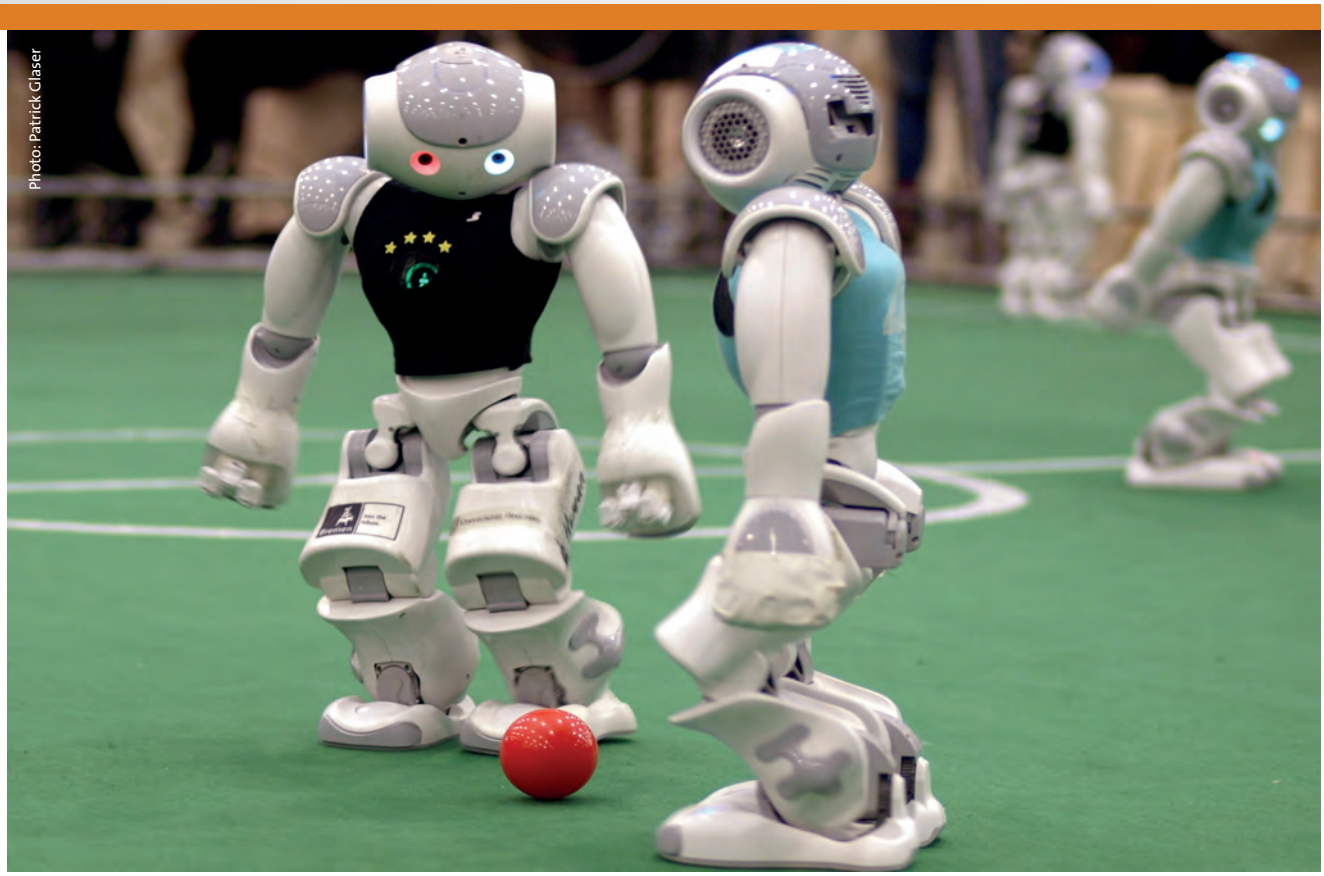

One of the Bremen robots (black shirt) goes one on one during RoboCup in Hefei, China.

B-Human Success – More than a Collection of Titles and Trophies

Andreas Stolpmann and Jesse Richter-Klug are no fans of the game of soccer, that is, if the players are real people. On the other hand, they can't get enough of the game when it is played by robots, especially, if they are watching robots they themselves have programmed. The two University of Bremen students are members of Team B-Human, one of the most successful teams in the RoboCup Standard Platform League with a record winning four world championships and two world vice champion titles. In this year's German national competition, the team and its humanoid NAO robots captured the German Open title for the seventh consecutive time. At the world championships in Hefei, China, they finished just behind Team UNSW Australia to win the runner-up title.

B-Human is a collaborative project under the leadership of Prof. Dr. Rolf Drechsler, Head of DFKI's Cyber-Physical Systems (CPS) department and the Department of Mathematics and Computer Science at the University of Bremen. Under the guidance of DFKI and the university research staff, the students perform application oriented software development and have the chance to work over several semesters independently on problems of their own initiative concerning all aspects of robot soccer. The participation in the RoboCup German Open and the RoboCup World Championships is an integral part of the project. That is when they find out if the many hours in front of the computer have actually paid off. "The competition is the climax that we prepare for so very intensively right from the start. That is why it is so disappointing when we finish a close second, as we did in the final round in China," said computer science student Jesse Richter-Klug. It was the second semester of participation for the 21-year-old student and this was his first time on tour with the robots.

Success is sweet, but B-Human is about so much more than collecting titles and trophies. As project leader and CPS researcher Thomas Röfer explained: "Of course, we want to develop good software and be successful in the competitions, but we also want to interest the students in an academic career and make them enthusiastic about research. Our success in doing so is proven by the fact that the project is also successful off the playing field." Many of the former team members are working as researchers today at the university or at DFKI.

Andreas Stolpmann can easily imagine staying in the field of research after his studies and would like to continue working on projects like B-Human, in particular as his master's thesis is about "Robotic Detection Systems Using Artificial Intelligence (AI) Methods." Although this 28-year old has completed the required number of semesters to graduate, he is still passionately committed to the project. "In particular, I like the idea of competition and the team collaboration. It is great to compete against other teams and it motivates me to go on and continuously improve my work," said the computer scientist. Thanks to B-Human, Andreas has not just improved and expanded his programming skills, he has also learned to independently solve complex problems.

There are many more problems that need solving, along with a host of other challenges. The changing rules at RoboCup add to that by continuously increasing the requirements placed on the robots – after all, they will eventually compete against real people and win. Bachelor degree student Jesse Richter-Klug is currently working on the arm controls of the robot to enable it in the future to lift the ball and throw it back onto the playing field. Again this year, the team from Bremen had to respond to

several changes, for example, the goal posts are now painted white instead of yellow. This change makes it more difficult for the robots to recognize the goals, since white is much more common than yellow in the environment of the playing field and also, the NAOs themselves are white.

Customarily, besides the "normal" soccer tournament, the RoboCup includes a technical competition as well. This involves solving individual tasks and serves to test possible future rule changes, such as the use of different pitch surfaces or soccer balls. In China, the Bremen Team was able to win a victory with the best overall performance and, at least in this category, climb to the top of the winner stand. For the past two years, there has also been a competition among selected teams to examine the interactive capabilities of the robots, by making them play with the NAOs from another team. In this category, the NAO team from Leipzig HTWK narrowly won the contest, but only because it played more often on the side of the winning team. In the overall tally, B-Human demonstrated the best performance and received the highest point total from the judges.

The Bremen students and researchers have participated since 2008 with their NAOs in the Standard Platform League of the RoboCup – and have been among the top finalists from the start. After every World Cup, the B-Human team releases its latest software as open source, which is now used by half the teams in the league. But what is the secret to the project's success? "Mainly our success is because of the great support we are provided here. No one is ever left alone if there is a problem and the students help each other and share their know-how," said Andreas Stolpmann. And, Jesse Richter-Klug summed it up with these words: "B-Human is simply a lot of fun!"

More information
www.dfki.de/cps/research/b-human
www.b-human.de

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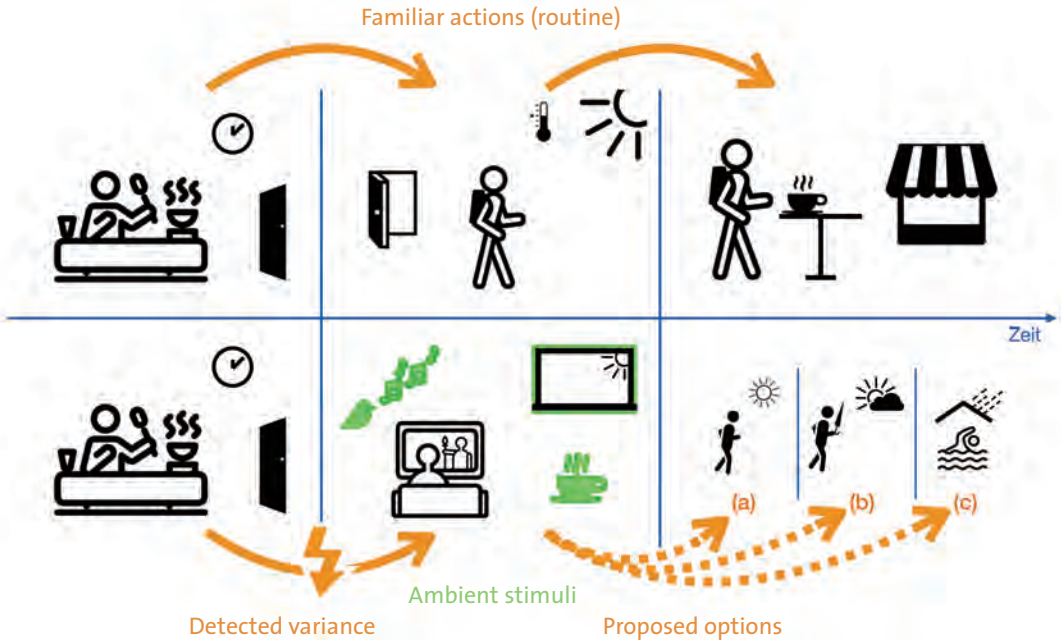
Bremen University students Andreas Stolpmann and Jesse Richter-Klug are pleased with the success of their NAOs and Team B-Human.



Manage Everyday Life with Help from Interactive Ambient Systems

Age related cognitive impairment, dementia, and the loss of vision or hearing often cause the sufferers to reduce their range of activities or no longer perform the usual daily tasks.

A research project called "Design Ambient Adaptive Notification, DAAN" develops systems that enable the elderly and people with handicaps to remain self-reliant and able to cope with the challenges of daily life for a longer time. Scientists at DFKI's department of Intelligent User Interfaces manage the project, which is sponsored by the Federal Ministry of Education and Research (BMBF) for a term of three years.

The project aim is to implement a technical platform of systematic support for the needy. This involves the development and testing of ambient stimuli that indirectly provide discrete proposals for action to the user without insisting on anything. Subliminal messages or environmental stimuli motivate people to keep up or resume their usual activities. People with dementia, for example, can be assisted in the maintenance of their daily routine.

The system first identifies what typical chain of actions a person performs over an extended period. Typical routines like a daily walk or a coffee break can be recorded by means of an appropriate user interface, or sensor systems integrated in the clothing, or some relevant object like a coffee cup or walking cane. After establishing such routines, if an expected activity is missing, an audio signal such as a bird's song or something to catch the eye near a window will be initiated. Similarly, the cup or the cane could draw attention to themselves via sound and light signals. Such forms of low-threshold ambient notification remind the users of their usual routines. Using an existing device, for example, a tablet computer or a PC, the system simultaneously provides orientation for the daily routine, by showing the expected options. In addition, the DAAN system can also provide new incentives by suggesting alternative activities.

"The system can focus on the cognitive needs of the user and draws on individual experience, for example, the familiar ways and places. The user should feel as if the directions are being given by a person and not coming from some machine," said Frederik Wiehr, Ph. D. candidate at DFKI.

The project partners are DFKI, Deutsche Telekom, IXDS, University of Stuttgart, Intuity Media Lab, and Berlin University of Arts (UdK). Each contributes a different focus to the joint development and implementation of DAAN. The research focus at DFKI is on the recognition of places, people, and activities in the learning phase of the system, which reaches decisions through the interaction among the various subsystems and sensors and offers proposals to the user.

More information
www.dfki.de/iui

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Job Interview with an Avatar – Empathetic Training Support for the Job Application Process

The job interview is often perceived as the greatest challenge in the quest for a new job. Empathetic virtual training systems can create additional opportunities to practice for the interview situation and to learn how to better evaluate your performance.

The aim of EmpaT (Empathetic training for the application process) is to develop a simulated environment that enables users to evaluate and improve their social and emotional skills in an interactive exchange with a virtual avatar. The research is targeted at young people entering the labor force for the first time and experienced professionals who are redirecting their careers.

EmpaT first performs a real-time analysis of the social signals and links this to an emotional real-time model in order to adjust the responses of the interactive avatar to the socio-emotional situation of the users. This interpretation of social and emotional signals is studied and realized by a project consortium composed of computer scientists, psychologists, and 3D graphics specialists as required to understand each individual user and adapt the system to their social situation. Sophisticated hardware sensors are used to accomplish this analysis. The sensors record social communication signals such as eye and hand movements and body language. The real-time processing of the data collected in this way is used for adaptive-reactive control of the EmpaT training avatar.

An advisory board supervises the design and execution of the project and advises the researchers on ethical, social, and legal issues. The ethics committee is composed of experts from the specialty fields of coaching, youth work, law, and education. The effects of individual interactions with a virtual being, an avatar, are examined in a realistic simulation environment in a continuous series of acceptance and evaluation studies. The committee is also dedicated to identifying the potential long term social implications of virtual, empathic training systems.

In an initial scientific study with 52 participants, the EmpaT approach proved to be a promising alternative to conventional preparation methods for the job interview. Subjects who completed the training with the virtual EmpaT interviewer showed less fear of the interview, improved non-verbal skills, and a stronger overall interview performance.

EmpaT is sponsored for a term of three years by the Federal Ministry of Education and Research (BMBF) under the framework of the major research priority “Socially and emotionally sensitive systems for optimized Human Computer Interaction – From technical tool to interactive assistant (InterEmotio).” The company VDIVDE-IT is the project manager. Besides DFKI, the other project partners are Saarland University, University of Augsburg, and the Charamel and TriCAT companies.

More information
www.empat-projekt.de

Simulated job interview with interactive Avatar

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Smart Factory Networks – Practical Examples of INDUSTRIE 4.0 Implementation

Thinking manufacturing plants of the future or, in the vernacular, the "Internet of Things," is a very exciting vision: production processes will change in previously unheard of ways as the virtual and the real worlds start to communicate with each other. At the forefront of this future merger of manufacturing technologies and Internet technologies is the question of how this radical upheaval in global industrial production will be organized and achieved.

A book has been written that comprehensively presents the results of the INDUSTRIE 4.0 research project CyProS (cyber-physical production systems). CyProS is an important first step towards the industrial application of cyber-physical production systems (CPS). The major consortium includes project partners from a variety of sectors and represents the different priorities of potential CPS users, CPS suppliers, and the relevant research institutes.

The project focus is on the insights and practical experience gained from the implementation, integration, and operation of cyber-physical system components. The higher-level structure of the new book follows the different stages of integration and application of CPS.

The long term perspective is focused on ensuring INDUSTRIE 4.0 develops in a direction that secures Germany's future as an industrial power.

More information
www.projekt-cypros.de

Smart Factory Networks
(Available in German only)

Practical Examples of
INDUSTRIE 4.0 Implementation

Publishers: Gunther Reinhart,
Bernd Scholz-Reiter, Wolfgang Wahlster,
Manfred Wittenstein, Detlef Zühlke

Fraunhofer Verlag 2015
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Price: 30 €

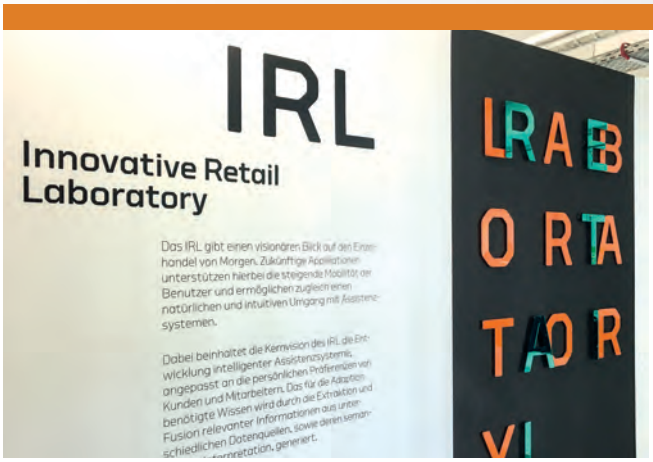
Prof. Alan Bundy Honored as DFKI Fellow

After serving on the Scientific Advisory Board (SAB) for 12 years, Prof. Alan Bundy stepped down as scheduled at the 47th SAB meeting in Bremen on September 28-29, 2015. Prof. Bundy succeeded the former chairperson of the SAB, Prof. Peter Deussen from Karlsruhe in 2004.

As a member of the Scientific Advisory Board, Prof. Bundy advised DFKI on matters of scientific focus and evaluated research activities. He also mentored the research department of Prof. Siekmann for many years. As part of his farewell ceremony, in recognition of his service on behalf of DFKI, Alan Bundy was honored by Prof. Wahlster and appointed as a DFKI Fellow.

Alan Bundy is a professor for "Automated Reasoning" in the department of Computer Science at the University of Edinburgh and an active member of numerous academies, including, the Royal Society, the Royal Society of Edinburgh, and the Royal Academy of Engineers. He is a founding member of the Association for the Advancement of Artificial Intelligence (AAAI), the Society for the Study of Artificial Intelligence and Simulation of Behavior (AISB), and the European Coordinating Committee for Artificial Intelligence (ECCAI). His major awards include the IJCAI Research Excellence Award (2007), the CADE Herbrand Award (2007) and the IJCAI Donald E. Walker Distinguished Award (2003).

His successor at the Scientific Advisory Board is Prof. Werner Damm, chairperson of the non-profit OFFIS Institute for Information Technology in Oldenburg.



Thomas Bruch and Antonio Krüger

The Future of Retail – Relaunch of the Innovative Retail Lab in St. Wendel

The research lab for innovative technologies for the retail sector has been reopened with a new design. After several months of reconstruction, the Innovative Retail Laboratory (IRL) is once again available to research, innovation, and industry partners and the interested public at the Globus SB-Warenhaus Holding Company in St. Wendel, Germany.

Divided into various product environments, the lab's approach closely portrays a real-world shopping environment. The lab conveys an impression of future retailing and the shopping of tomorrow through new exhibits and demonstrators in a realistic supermarket layout and an interactive home environment with numerous assistance functions. "Multi-channel strategies, digital customer worlds, and intelligent assistance systems are the topics we seek to develop even more for our customers. We are pleased to have DFKI and Saarland University, two strong partners, involved with us in this effort," said Thomas Bruch, CEO of Globus Holding, at the reopening ceremony in October 2015.

The home environment is a simulated private residence and creatively shows how the shopping experience can be complemented and expanded from home. The potentials of online and offline shopping are combined in the form of a merger of shopping channels, and even taking into account the aspect of sustainability. For example, one of the new system demonstrators is an instrumented waste container that supports waste separation and, in this way, contributes to a better recycling rate.

"The honeycomb layout of the shopping environment and the shop-in-shop concept supports the presentation of different product lines. These clear divisions in the context of interactive application scenarios place the focus of development on prototype assistance functionalities and the creation of a realistic testing and research platform for present day and pioneering technology trends," explained Dr. Gerrit Kahl, Head of the Innovative Retail Lab.

In addition to this redesign, the IRL also focuses on innovative retail concepts and a personalized approach to the customer. Realistic application scenarios enable testing of new interactive possibilities for customers and further development in close cooperation with the experts from Globus.

A new concept of the innovation partner program makes it possible for other partners in the retail sector to participate in the research efforts of the IRL. The aim of the innovation partnership is to promote the knowledge transfer between research and practice, for example, by implementing joint R&D projects or through internal innovation workshops. The first partner in innovation is Bizerba, a weighing scales manufacturer who has been collaborating with IRL for several years, for example, as part of the annual IRL "Innovative Technologies for the Retail Trade" conference.

The latest example of this successful cooperation is a jointly implemented project for the automatic user identification on food scales.

More information
www.innovative-retail.de

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The upper body exoskeleton developed in the previous project Capio for remote control of robotic systems was further developed in RECUPERA-Reha for use in rehabilitation.

From the Earth into Space and Back – Ongoing Projects at the Robotics Innovation Center

They are to explore the universe, to enable reliable cooperation with humans, and to support patients in stroke rehabilitation. At DFKI's Robotics Innovation Center (RIC), research scientists are currently developing intelligent robots for both terrestrial and extraterrestrial applications as well as a software framework to enable the construction and operation of powerful and reliable robotic systems. The scientists rely on the efficient use of reusable components and their transferability to various application areas.

Model-Based Software Development for Robots

As early as in 2009, the Bremen researchers had developed the Robotics Construction Kit (Rock), a software framework that provides modular components as tools for use in programming robots. Project D-Rock is the most recent extension of the "Rock" framework. In addition to the modular design, what makes this project so special is the comprehensive model-based approach, which makes the complexity of the software more manageable for the programmer. It is part of the German Aerospace Center's (DLR) Project Management Agency "Software Systems and Knowledge Technologies" program and funded by the Federal Ministry of Education and Research (BMBF) with 2.5 million euros. In addition to the software, the modeling kit also includes the hardware and the system performance.

Comparing the separate models with the status of the systems enables a dynamic reconfiguration, which makes the robot much more flexible in response to unforeseen situations. Project D-Rock has resulted in a set of effective software tools, which will be demonstrated using the Mantis robot developed in Project LIMES.

A Mantis for Space

Mantis is a six-legged mobile robot that can use its front limbs for manipulation by lifting its upper body. The scientists at the RIC and the University of Bremen began the development of the multi-limbed robot, similar to a praying mantis in appearance, as part of Project LIMES back in 2012. The completion of the system this year represents an important milestone for the DLR Space Agency project funded by the Federal Ministry for Economic Affairs and Energy (BMWi). Mantis is designed for future missions in space, especially, on rough, difficult access terrain, to take soil samples or to facilitate the construction of infrastructure. The system is equipped with a wide array of sensors that provide not only a visual awareness of its environment, but also a tactile one, which means it is able to independently analyze the immediate ground conditions. In addition to developing the mechatronics, scientists in the LIMES project optimize various movement patterns using machine learning methods that allow the robot to navigate across the most varied formations and surfaces.

Robotic Assistants for Astronauts

Robots like the Mantis are expected to help astronauts perform their work in space. Since September 2013, RIC scientists have been collaborating with international partners in project Moonwalk to study the ways robots can cooperate with astronauts under the conditions existing in space. As part of the 7th

EU framework program for space research, the RIC project has been funded for a three year period to develop a robotic platform for use in space as well as the interface to enable the astronaut to communicate with the robot.

The control is to be achieved by the gestures of the astronaut, which generate specific commands that can then be sent via radio signal to the robot in space. To simulate the harsh conditions on foreign planets as closely as possible, the operability of the technologies developed in Moonwalk are being tested in the Spanish desert (comparable to the Martian surface) and under the Mediterranean Sea (comparable to the moonscape). The robot is conceived as an underwater micro-rover that can be deployed in difficult terrain both on land and under water. Equipped with a 360-degree camera, the robot can explore and map its surroundings in detail.

Robots for Rehabilitation Therapies

Scientists at RIC, besides gesture controls, are also studying other innovative approaches to control the robots, for example, by means of an exoskeleton. In addition to applications in space, portable robotic systems are also well-suited for use in medical rehabilitation. Scientists have been working on a research project called RECUPERA-Reha since September 2014 in collaboration with the Rehaworks Company. Together they are developing a mobile, full body exoskeleton that can implement rehabilitative concepts and support the movements and intentions of people with neuro-motoric disabilities (for example as a result of stroke).

The project is sponsored by the Federal Ministry of Education and Research (BMBF) under the DLR Program Manager for Software Systems and Knowledge Technologies with funding of nearly three million euros. The aims of the project are to design a self-sufficient, energy efficient Human-Machine-Interface that can record and respond to nearly the entire musculoskeletal system and, also to develop an embedded processing system for EEG and EMG signals. Using these signals, the patient's intended movements and, to a certain extent, their strength and direction can be measured. In addition to the full body exoskeleton, RECUPERA-Reha produced a robotic subsystem, which can be used in the near and medium term rehabilitation of people with upper body movement limitations.

More information
www.dfki.de/robotics

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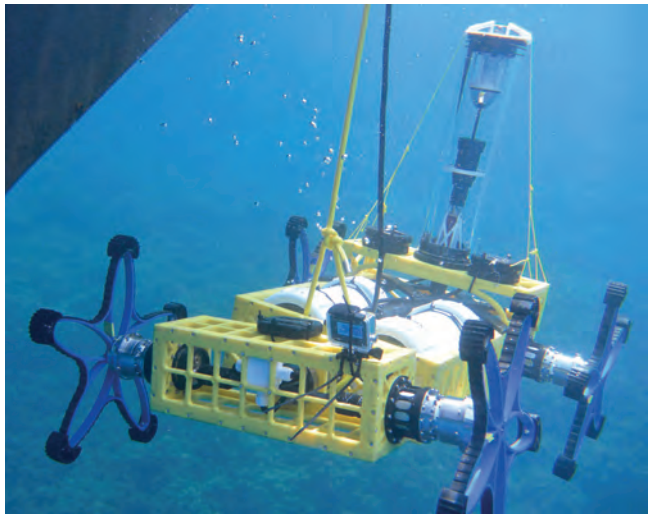


First underwater test of the multi-limbed robot developed in Moonwalk.

The D-Rock approach demonstrates the effectiveness of using the 6-legged Mantis walking robot developed in project LIMES.

Crowd Sensing – Real Time Analysis of Visitor Movements at Automobile Shows

The automated collection of information about visitor behavior at major international automobile shows promises valuable advantages in the area of customer analytics. The analysis of anonymized data helps in the implementation of stand design and future marketing plans. Real-time monitoring and management reporting enable rapid responses to patterns during operations.

For example, the less frequented areas of a stand can be further promoted or the overfilled zones can be expanded. Furthermore, the data can be used to identify so called points of interest and in the analysis of visitor flows. Local and aggregated visitor density and the exposure time in the entrance and exit areas are valuable indicators, which can be subsequently used for the performance analysis of marketing campaigns.

The expertise at DFKI in the area of large scale, collaborative data acquisition is in great demand, in particular, at the international auto shows. DFKI's Embedded Intelligence department has developed a method to anonymize smart phone signatures and track hundreds of thousands of visitors at trade fairs like the International Motor Show in Geneva, Auto Shanghai, or the International Motor Show Germany in Frankfurt (IAA).

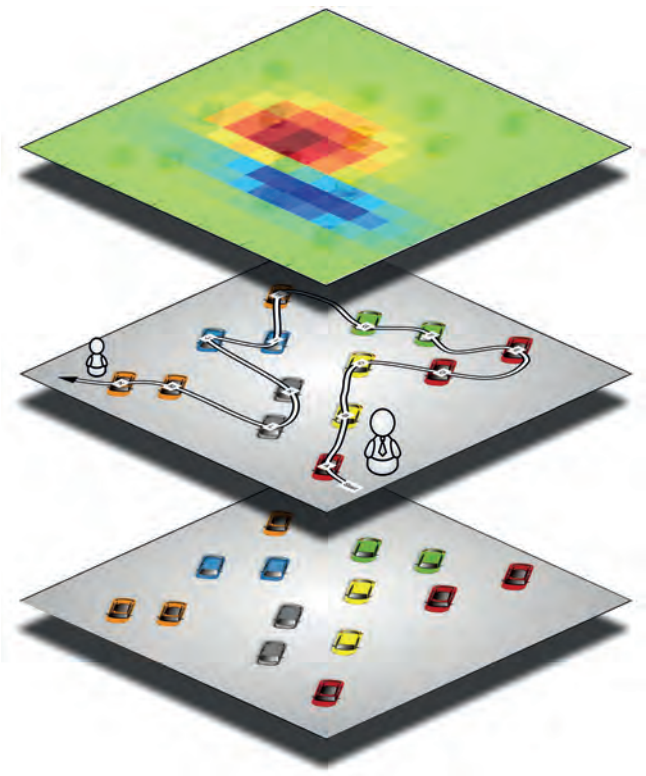
Sensor technology, sensor-setup and real time data processing

The moment the visitors pass through the sensor equipped area, their mobile phones are detected without any need for a connection to an access point. The system also does not require the installation of any specific app. The WiFi or Bluetooth interfaces usually integrated with every smart phone send out periodic signals with information about their presence, the interface-ID, signal strength, and manufacturer of the smartphone; essentially, without doing anything, the iPhones and Android smart phones can be reliably detected by the system.

The interface-ID need not be associated with a user account or a phone number and, of course, it is anonymized prior to the analysis in compliance with data protection regulations. The system consists of several distributed sensors with continuous recording of the detected mobile phones. Each sensor contains two signal interfaces – WiFi and Bluetooth, which record WiFi Probe Requests and Bluetooth Discovery Requests with separate directional antennas. The sensors are linked via a network to a server that provides a consolidated database and the analysis software for the sensor data.

The primary application areas are trade shows with visitors numbering in the tens of thousands and up to hundreds of thousands. In addition, the system can be installed indoors and outdoors, for example, at major open air events, in “Smart Cities” for urban planning, in large office buildings, shopping malls, airports, university campuses, or even at heavy congestion areas along transportation routes.

More information
www.dfki.de/ei



Crowd Sensing symbol graphics – bottom: set-up of exhibits at the stand; middle: a possible visitor path; top: a heatmap of the visitor density

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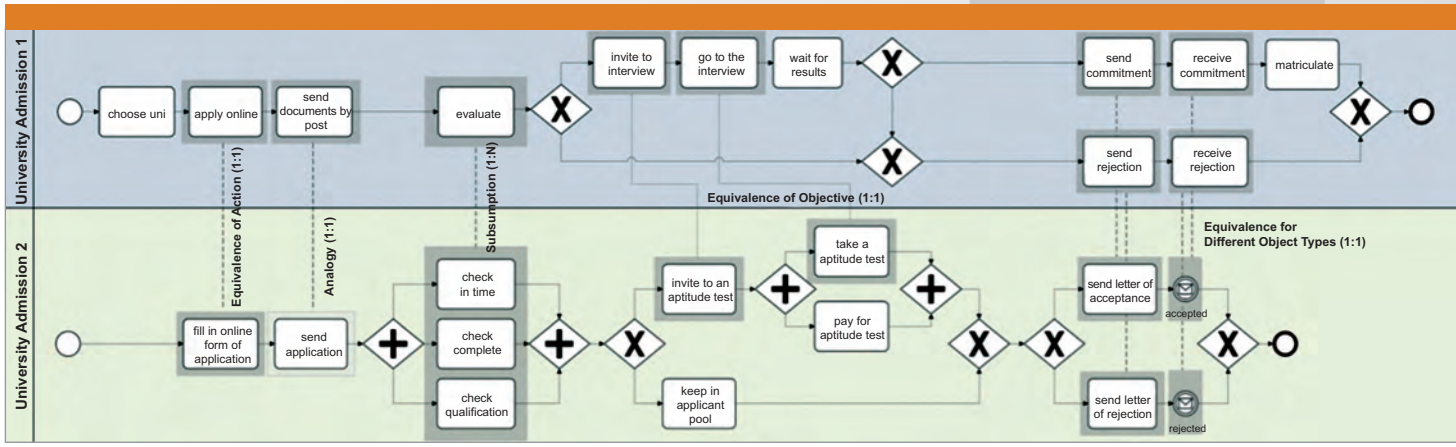

Developing an automated process to identify correspondence between individual process models

IWi Defends International Title at Process Model Matching Contest 2015

At this year's BPM 2015 Conference, the Institute for Information Systems (IWi) at DFKI once again defended its reputation as a leader in Business Process Management. The Process Model Matching Contest is an initiative to evaluate existing methods for the automatic identification of correspondence between individual process models and, in particular, a performance evaluation in a practical application. After the success at the first BPM Contest in 2013 in Peking, where DFKI won the Outstanding Matcher Award for its development of the RefMod-Mine/NSCM algorithm, IWi also entered the second contest under the framework of the 13th International Conference on Business Process Management (BPM 2015) from August 31 to September 3, 2015 in Innsbruck. The major innovations were the qualitative review of the previous evaluation data sets and the introduction of new data sets from the SAP environment. The advanced development of the RefMod-Mine/NHCM algorithm by the Institute for Information Systems achieved the best results across all domains and was able to excel over all competitors to win again.

The modeling of operational workflows is critical for the documentation, communication, improvement and management of business processes for all kinds of enterprises. Because of the new and increasingly automated collection methods, for example, process mining, the number of documented processes is quickly growing. A company's process collections can easily reach a scope of anywhere from thousands to tens of thousands of separate models, which makes their management cost and resource intensive as well as highly problematic - even using established modeling and business process management tools. It has become increasingly difficult for companies to react flexibly to process changes and to adequately plan for all potential side effects.

To meet this challenge, a major starting point is to develop automated processes that identify correspondence between separate process models (see graphic). This demands a focus on the types of equivalent relationships such as action or target equivalence, analogies, or content matches. The cardinality of node correspondence is taken into account as are type conflicts in the correspondence relationships caused by the degree of freedom in modeling.

The knowledge of the correspondence permits a variety of new scenarios for analysis and the continuous improvement of business processes. Some examples are the inductive development of reference processes, support in implementing legal provisions, or the standardization of internal company workflows. At the same time, this knowledge is essential for a flexible response to external or internal influences, as the importance of these influences can then be reliably assessed.

More information
Contest Homepage
https://ai.wu.ac.at/emisa2015/contest.php

RefMod-Miner as a Service
http://rmm.dfki.de

RefMod-Miner Homepage
http://refmod-miner.dfki.de

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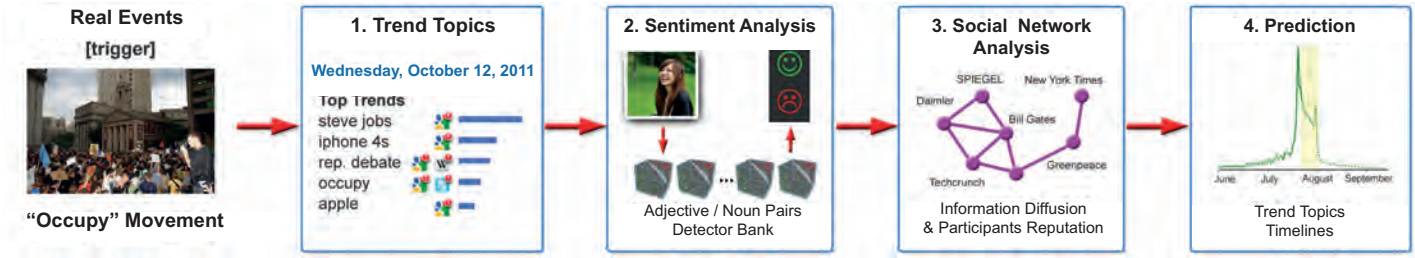

Multimedia Opinion Mining – A Virtual Trend Scout in the Web

In the Internet, hidden among the millions of irrelevant and unstructured data, there are many opinions being exchanged. Users of multimedia are expressing their views about companies and institutions, products, brands, as well as about actual events. Social networks such as the micro-blogging platform Twitter or video platforms like Youtube permit users to enter data, for example, as a text, image, graphic, or video file.

The rapid increase of opinions being expressed online in recent years has led to a growing interest by companies and media organizations in the analysis of this content. Companies are especially interested in extracting a collective sentiment about their products and services from such data.

Unfortunately, most of the existing methods for opinion mining – the filtering or analyzing of opinions – are text based. The content of other linked sources and modalities like images and videos has remained unexploited.

The Multimedia Opinion Mining (MOM) project was launched in March 2015 by the department of Knowledge Management in response to the challenge of extracting opinions from multimedia content in the Internet. Among the various online formats, the social media networks are the most direct sources for identifying what people are saying at any given time and what they are thinking about a certain topic.

The methods applied in MOM make it possible, in an initial step, to identify trend topics as such, and then to monitor their development by watching the opinions expressed as text, image, and video data in the various multimedia data channels. In a second step, a text and image sentiment analysis is performed for the purpose of classifying these opinions. Additionally, a social media analysis identifies the various stakeholders who make up the major sources spreading the opinion. In a final step, the results are analyzed and linked to a life cycle analysis to allow a prediction about the expected course the trend topic will take in the future.

Multimodal Opinion Mining follows a holistic approach that goes beyond pure text analysis and includes the pixel information in images and videos. In summary, the project aims at achieving the next stage in the evolution of the web – the so called "Social Multimedia." In other words, to enable the fusion of social media and multi-media content through the large scale, multi-modal analysis of the social media flows.

More information
http://madm.dfki.de

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Multimedia Opinion Mining

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100 Million Images to Research

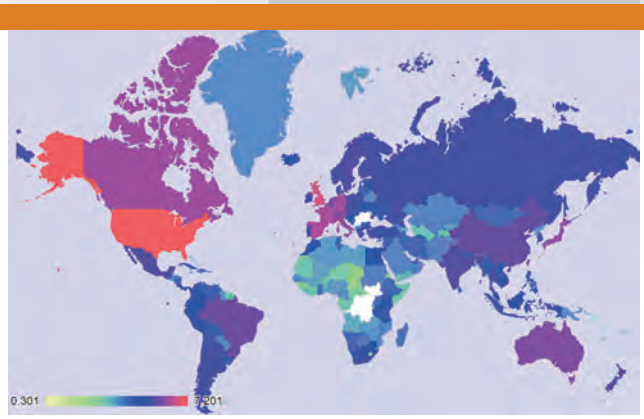
Yahoo Flickr Creative Commons 100 Million (YFCC100M) represents one of the richest data sets available to research scientists in the computer science disciplines of Computer Vision and Multimedia. A number of visual recognition tasks have a similar need for annotated data sets as a basis for training. The recently released data set provides precisely this basis and consists of 99.2 million photos and 0.8 million video sequences. The data is made available through the cooperation of Yahoo, International Computer Science Institute (ICSI) in Berkeley, Lawrence Livermore National Laboratory, and the DFKI Knowledge Management Department.

Researchers at the Competence Center for Multimedia Analysis and Data Mining (MADM) at DFKI Kaiserslautern have developed a special YFCC100M browser to improve the usability of this enormous potential, which enables comprehensive analysis of the entire data set as well as searches and visualization of subsets in real time.

Statistics on these images and videos enable users to continuously refine their search terms and quickly define desired subsets of the data set. The selection of image and video data can be downloaded as a URL list. The YFCC100M browser enables access to this huge data set via real time patterns, iterative refinement of search terms, and the adaption of subsets without having to download it completely.

The system is implemented using Google's Compute Engine to ensure easy accessibility to the YFCC100M data set by multiple users simultaneously from online browsers.

The Google App Engine environment, a framework that permits scalable web applications to be built onto the Google infrastructure, is used to build the front-end. This includes an application that is distributed to multiple servers after installation. If required, new instances are started automatically to provide the application with the necessary resources. The application's back-end, which manages the query and search mechanism of the browser is based on Google's BigQuery.



Geographic distribution of images and videos in YFCC100M

More information
www.yfcc100m.org
http://madm.dfki.de

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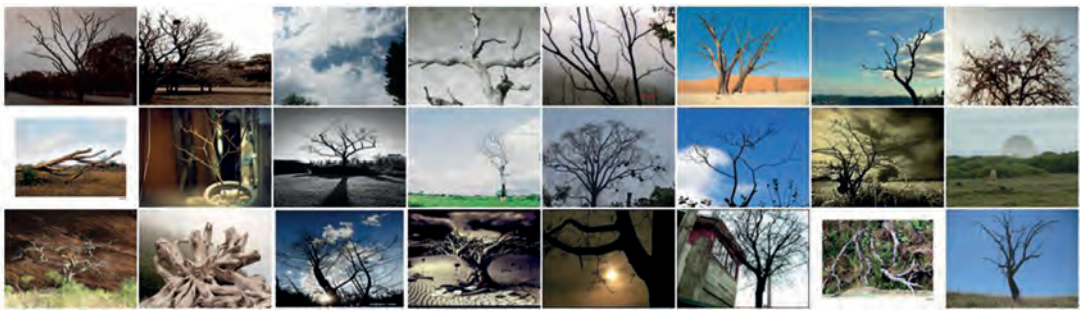
Annotated data sets from YFCC100: Trees in different contexts (dry or frozen)

DFKI Interview – Dr. Damian Borth

Dr. Damian Borth is the Head of the Competence Center for Multimedia Analysis and Data Mining (MADM), a section of the knowledge management department in Kaiserslautern and is also the founding director of the DFKI spin-off company Sociovestix Labs.

What do you see as the application potential of your research?
I can imagine using it to answer the challenge of extracting opinions from the multimedia content of the web. The web is largely dominated by visual media; people express their opinions on certain subjects with a photo or a short video to take advantage of a more emotional and concise level of communication. The analysis of visual and textual content in the social media reveals opinions and trends, which subsequently, can be condensed into timely insights and used in the decision-making process.

When did your interest in Artificial Intelligence begin and how have AI processes changed since that time?
I started working on the analysis of images and video material at DFKI in 2007. I had heard about the issue of Trending Topics from a McKinsey Business Technology Award. So I decided to focus my efforts on the automatic recognition and subjective perception of sentiment and emotion in visual content. The subject of machine learning was always present in my field of interest during those years and while pursuing my post-doc at the International Computer Science Institute (ICSI) and UC Berkeley, I researched the concept of "Deep Learning." The detection rates using such methods are very promising and raise hopes that we will soon see a solution to some problems in the area of computer vision.

What are the greatest challenges and opportunities for AI systems?
Elon Musk and Stephen Hawking have recently pointed out the dangers of AI and, as members of the scientific community, we must respond and demonstrate how our work can provide solutions that benefit society overall. Organizations like the AI4Good Foundation in the USA are setting a good example.

What do you enjoy doing when you are not working as research scientist?
That is an easy one! Clearly, the answer is growing Sociovestix Labs Ltd. We work closely with shareholders in the financial market and the UN Principles for Responsible Investment (PRI) Initiative and this demands some adjustments not only in the terminology, but also the various cultures.

Do you see any parallels to your professional work?
There is a lot of tense interplay between computer science and the world of finance. Precisely for that reason, there is also a great research and development potential. In the area of Financial Data Science, for example, we use AI methods to give more weight in financial circles to current social issues such as climate change.

What are your current projects?
One of the many projects ongoing at the competence center for Multimedia Analysis and Data Mining that I am working on is "Multimedia Opinion Mining." The project is sponsored by the Federal Ministry of Education and Research (BMBF) and deals with the detection of trending topics and visual recognition of emotion. In collaboration with Yahoo and Lawrence Livermore National Laboratories, for example, we published the largest ever data set in computer vision with 100 million images, which can be used to train researchers in the computer science disciplines about computer vision and multimedia machine recognition. In sum, we are answering the questions the world is asking and we report on how people feel about them.

Minister President of Rhineland-Palatinate Includes the *SmartFactory*^{KL} on Press Tour

As part of her traditional summer press tour, Malu Dreyer led a delegation of journalists from all over Germany to DFKI-Kaiserslautern on September 10, 2015.

On the tour, the head of the state government invited members of the press to accompany her for one day to report on newsworthy topics in the state. After a brief introduction by Prof. Detlef Zühlke, the Minister President proudly cited the pioneering role of the *SmartFactory*^{KL} in the research and implementation of INDUSTRIE 4.0.

Dr. Walter Olthoff, DFKI CFO, Minister President Malu Dreyer, Prof. Zühlke, Head of DFKI's Department Innovative Factory Systems and the *SmartFactory*^{KL}

Prof. Zühlke Joins Steering Committee of Manufacturing Leadership Council

Prof. Dr. Detlef Zühlke is the newest (and only German) member of the Board of Governors at the Manufacturing Leadership Council (MLC). The pioneer of INDUSTRIE 4.0 was officially elected to the office in June 2015. The board members at this global network of business leaders are chosen from 19 research institutes and companies, including Ford Motor Company, Lockheed Martin, Lexmark International, Tata Motors India, Dell Computers, Cisco Systems, University of California (UCLA), Massachusetts Institute of Technology (MIT), and the University of Cambridge Institute for Manufacturing in Great Britain. The aim of MLC is to bring researchers and scientists together with manufacturers and to provide an interface for innovative production technologies and entrepreneurial know-how.

DFKI Employees Win Best Paper Award at INCOM 2015

Mathias Schmitt, Dr. Marius Orfgen, and Prof. Detlef Zühlke received the Best Paper Award in the category "Applications" for their work on the "Dynamic Reconfiguration of Intelligent Field Devices by Using Modular Software Devices." At this year's Conference of the International Federation of Automatic Control held in Ottawa, the keynote theme was the sustainability of the manufacturing economy. The award is an acknowledgement of the practice-relevant research at DFKI's Research Department Innovative Factory Systems and, in particular, for the "Apps in Production" project sponsored by the Rhineland-Palatinate Foundation.

DFKI Embedded Intelligence Takes Best Paper Award at ISWC 2015

In collaboration with scientists of the University of Southampton in Great Britain, DFKI researchers Agnes Grünerbl, Gerald Pirkl, and Prof. Dr. Paul Lukowicz took top honors against a field of 121 submissions at the "19th International Symposium on Wearable Computers" (ISWC 2015). This excellent paper deals with a Smart-Watch app that helps laymen to properly administer emergency CPR and overcome their fear of making a mistake when attempting life saving measures. The research is part of the Smart Society project of the European Union and is seen as the first step towards realizing the "Smart Semantic Nurse."

Stardust Presented With the Sir Arthur Clarke Award 2015

Photo: Peter McGinty, Stardust Network Manager

Stardust is an international training network that has received the Sir Arthur Clarke Award at the UK Space Conference 2015. DFKI is a partner in the research and education network that aims at developing innovative and effective solutions that solve the dangerous problem of space debris and asteroids. This European Union project is blazing new trails in international aerospace research with a network that promotes the training of young scientists who, it is hoped, will someday develop the technologies for monitoring, manipulating, and disposing of space debris and dangerous asteroids.

Presentation of the Sir Arthur Clarke Award to Stardust during the UK Space Conference 2015

More information
www.stardust2013.eu

IROS Visits DFKI Robotics Innovation Center (RIC)

Approximately 150 people visited the robotic research facilities as participants in the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) on September 28, 2015. Scientists introduced current projects like EurEx and HySociaTea and demonstrated various robot systems. Specifically, visitors showed great interest in the autonomous submersible robot "Dagon" at the Maritime Exploration Hall, the "female" robot AILA in the HySociaTea Lab, and the six legged, walking robot "SpaceClimber" in the Space Exploration Hall.The IROS Conference is among the major conferences on this subject worldwide and has been hosted since 1988 at different locations in Europe, North America, and Asia.

More information
www.iros2015.org

SyDe Summer School 2015 Welcomes International Students

In its third year of operation, the "summer school" of the Graduate College for System Design (SyDe) was held from September 9-11, 2015. More than 40 guests from 13 different countries attended the sessions in the House of Science in Bremen. The topics of discussion at Summer School 2015 focused on the correctness of cyber-physical systems. Subjects include, for example, formal modeling and correctness controls in addition to applications in the area of robotics and aerospace.

More information
www.syde.uni-bremen.de

Prof. Dr. Rolf Drechsler delivering the opening remarks

Successful 4th International Conference on Pervasive Displays at DFKI

This year's Pervasive Displays Symposium (PerDis) from June 10-12, 2015, at DFKI Saarbrücken was the largest event ever, with a 50% increase in the number of visitors and a 15% rise in the number of submissions. Researchers in the disciplines of computer science, media design, and fine arts attended PerDis to jointly discuss the opportunities and challenges of digital information and communication in the public and semi-public media environments.

Geometrically correct 3D modeling of physical objects

DFKI Supports 17th Open House at the German Federal Government

As part of the Open House activities at the Federal Government on August 29-30, 2015 – with the anniversary motto "25 Years of German Unity" – DFKI presented at the Federal Press Office on the banks of the Spree River in Berlin: Smart-Mat, an intelligent exercise mat as a personal fitness trainer, an electronic cereal advisor with allergy checker, and a new concept for convenient and secure mobile payments with NFC. The DFKI participation addressed the priority topics of the government's "Digital Agenda" and "New High-Tech Strategy".

DFKI Service Offering

As an internationally renowned Center of Excellence for innovative software systems based on Artificial Intelligence (AI) methods, DFKI is offering the following services with more than 25 years of experience in basic and applied R&D:

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


Kaiserslautern Site


Saarbrücken Site


Bremen Site


Project Office Berlin

German Research Center for Artificial Intelligence

Company Profile

Established
1988

Legal Form
Non-profit organization
(public-private partnership)

Executive Board
- Prof. Dr. Dr. h.c. mult. Wolfgang Wahlster, CEO
- Dr. Walter Olthoff, CFO

Supervisory Board
- Prof. Dr. h.c. Hans-Albert Aukes, Chairman
- Dr. Susanne Reichrath, Representative of Saarland's Minister President for Higher Education, Science and Technology, Vice Chairwoman

Locations
Kaiserslautern (registered office), Saarbrücken, Bremen, Berlin (project office). Further operating sites in Osnabrück and St. Wendel

Shareholders
Airbus Group, BMW Group Forschung und Technik GmbH, CLAAS KGaA mbH, Deutsche Messe AG, Deutsche Post AG, Deutsche Telekom AG, Empolis Information Management GmbH, Fraunhofer Gesellschaft e.V., Google Inc., Harting KGaA, Intel Corporation, John Deere GmbH & Co. KG, KIBG GmbH, Microsoft Deutschland GmbH, Nuance Communications Deutschland GmbH, RICOH Company, Ltd., SAP SE, Software AG, University of Kaiserslautern, Bremen University, Saarland University, VSE AG

Equity Holding
GraphicsMedia.net GmbH, Kaiserslautern
Ground Truth Robotics GmbH, Bremen
SemVox GmbH, Saarbrücken
Yocoy Technologies GmbH, Berlin

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Intelligent Solutions for the Knowledge Society

The German Research Center for Artificial Intelligence (DFKI) was founded in 1988 as a non-profit public-private partnership. It has research facilities in Kaiserslautern, Saarbrücken and Bremen, a project office in Berlin, and branch offices in Osnabrück and St. Wendel. In the field of innovative commercial software technology using Artificial Intelligence, DFKI is the leading research center in Germany.

Based on application oriented basic research, DFKI develops product functions, prototypes and patentable solutions in the field of information and communication technology. Research and development projects are conducted in fifteen research departments and research groups, eight competence centers and six living labs. Funding is received from government agencies like the European Union, the Federal Ministry of Education and Research (BMBF), the Federal Ministry for Economic Affairs and Energy (BMWi), the German Federal States and the German Research Foundation (DFG), as well as from cooperation with industrial partners. Twice a year, a committee of internationally renowned experts (Scientific Advisory Board) audits the progress and results of state-funded projects. In addition, BMBF evaluates DFKI every five years. The most recent assessment was again very successfully concluded in 2010.

Apart from the state governments of Rhineland-Palatinate, Saarland and Bremen, numerous renowned German and international high-tech companies from a wide range of industrial sectors are represented on the DFKI supervisory board. The DFKI model of a non-profit public-private partnership (ppp) is nationally and internationally considered a blueprint for corporate structure in the field of top-level research.

DFKI is actively involved in numerous organizations representing and continuously advancing Germany as an excellent location for cutting-edge research and technology. Far beyond the country's borders DFKI enjoys an excellent reputation for its academic training of young scientists. At present, 470 highly qualified researchers, administrators and 360 graduate students from more than 60 countries are contributing to more than 180 DFKI research projects. DFKI serves as a stepping stone to leading positions in industry and successful careers as founders of spin-off companies. Over the years, more than 60 staff members have been appointed professors at universities in Germany and abroad.

Research & Development

Scientific Directors and Research Departments

Kaiserslautern Site

- Prof. Dr. Prof. h.c. Andreas Dengel: Knowledge Management
- Prof. Dr. Paul Lukowicz: Embedded Intelligence
- Prof. Dr.-Ing. Hans Schotten: Intelligent Networks
- Prof. Dr. Didier Stricker: Augmented Vision
- Prof. Dr.-Ing. Dr. h.c. Detlef Zühlke: Innovative Factory Systems

Saarbrücken Site

- Prof. Dr. Josef van Genabith: Multilingual Technologies
- Prof. Dr. Antonio Krüger: Innovative Retail Laboratory, St. Wendel
- Prof. Dr. Peter Loos: Institute for Information Systems
- Prof. Dr. Philipp Slusallek: Agents and Simulated Reality
- Prof. Dr. Dr. h.c. mult. Wolfgang Wahlster: Intelligent User Interfaces

Bremen Site

- Prof. Dr. Rolf Drechsler: Cyber-Physical Systems
- Prof. Dr. Frank Kirchner: Robotics Innovation Center
- Prof. Dr. Joachim Hertzberg: Robotics Innovation Center, Branch Office Osnabrück

Project Office Berlin:

- Prof. Dr. Volker Markl: Intelligent Analytics for Massive Data
- Prof. Dr. Hans Uszkoreit: Language Technology
- Projects and cooperation in the German capital region

Living Labs

Testing, evaluation, and demonstration of innovative technologies in comprehensive application scenarios:
Advanced Driver Assistance Systems Living Lab, Bremen Ambient Assisted Living Lab, Innovative Retail Lab, Robotics Exploration Lab, Smart City Living Lab, Smart Factory

Competence Centers

Coordination of research activities in particular areas:
Ambient Assisted Living, Case-Based Reasoning, Computational Culture, Language Technology, Multimedia Analysis & Data Mining, Semantic Web, Safe and Secure Systems, Virtual Office of the Future

Key Figures

Annual Budget 2014

€ 38.4 million

Total Assets 2014

€ 108 million

Employees

470 professional staff, 360 graduate student staff

Scientific Excellence and Transfer

International Scientific Advisory Board

Bi-annual evaluation of publically funded projects:

- Prof. Dr. Markus Gross, Eidgenössische Technische Hochschule Zürich (ETH), Switzerland, Chairman

Leading-Edge Research

DFKI is the only German institute for computer science to participate in each of the three leading-edge research clusters:

- Cluster of Excellence "Multimodal Computing and Interaction" funded by the German Research Foundation (DFG)
- Leading-Edge Cluster "Software Innovations for the Digital Enterprise" funded by BMBF
- European Institute of Innovation and Technology (EIT Digital)

Networks of Excellence

At present, DFKI is a coordinator or core partner in four European Networks of Excellence

Promoting Young Talent

DFKI is a founding member and core partner of the Academy Cube and the Software Campus to promote managerial talent in the IT industry

Academic Chairs

More than 60 former staff members have been appointed professors at universities in Germany and abroad

Spin-offs

Over 60 spin-off companies have created approximately 1,700 highly skilled jobs

Committees and Academies

DFKI is represented by its scientific directors on numerous committees and academies:

Scientific and Government Committees

Advisory Board of the Future Internet Public-Private Partnership Programme of the European Union (FI-PPP), Big Data Value Association, Brazilian Institute of Robotics (BIR), Center of Innovation Program of the Japanese Ministry of Education (COI), Feldafinger Kreis, Management Board of the International Computer Science Institute in Berkeley, Münchner Kreis, National Institute of Informatics (NII, Tokio), Program Committee of the National Aeronautics and Space Research Centre DLR, Research Alliance of the German Federal Government, Steering Committee of the German Informatics Society (GI), and others

Business Committees

Deep Sea Mining Alliance (DSMA), Governance Board of the Intel Visual Computing Institute, and others

Scientific Academies

Academy of Sciences and Literature, Berlin-Brandenburg Academy of Sciences, European Academy of Sciences, German National Academy of Sciences Leopoldina, National Academy of Science and Engineering, Royal Swedish Academy of Sciences, and others

As of October 10, 2015

Intelligent Solutions for the Knowledge Society

- INDUSTRIE 4.0 and Innovative Factory Systems
- Smart Data – Intelligent Analytics for Massive Data
- Wearable Computing
- Knowledge Management and Document Analysis
- Virtual Worlds and 3D Internet
- E-Learning and e-Government
- Development of Provably Correct Software
- Smart City Technologies and Intelligent Networks
- Information Extraction from Text Documents
- Intelligent Web Retrieval and Web Services
- Multiagent Systems and Agent Technology
- Multimodal User Interfaces and Language Understanding
- Visual Computing and Augmented Vision
- Mobile Robotic Systems
- Shopping Assistance and Intelligent Logistics
- Semantic Product Memories
- Safe and Secure Cognitive Systems and Intelligent Security Solutions
- Ambient Intelligence und Assisted Living
- Driver Assistance Systems and Car2X Communications
- Cyber-physical Systems
- Multilingual Technologies

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