CeBIT: Computer Reads Text Written into the Air

The Lead Theme of Datability and Interaction of Humans and Machines Are in the Focus of the Exhibits Presented at the Joint Stand of KIT and the FZI Research Center for Information Technology

Airwriting: Based on movement signals, the computer recognizes letters written into the air. (Photo: Markus Breig, KIT)

In the future, computers and humans will cooperate more seamlessly. May it be by easier access to data or by the intuitive control of programs and robots. At the CeBIT, latest innovations in this area will be presented by the Karlsruhe Institute of Technology and the FZI Research Center for Information Technology (hall 9, stand D13). The exhibits range from gesture-controlled communication to firewalls to data management to computer-supported surgery.

Writing without Keyboard: Handwriting Recognition Based on the Hand's Movement

Writing into the air instead of typing text messages on the mobile phone via the tiny keyboard? This may be done using a sensor wristband, which records hand movements. A computer system translates them into texts. The novel **airwriting** system of KIT uses gestures as inputs and is suited in particular for mobile communication devices and so-called wearable computing applications.

Monika Landgraf
Chief Press Officer

Kaiserstraße 12
76131 Karlsruhe, Germany
Phone: +49 721 608-47414
Fax: +49 721 608-43658
E-mail: presse@kit.edu

For further information, please contact:

Kosta Schinarakis
PKM – Science Scout
Phone: +49 721 608 41956
Fax: +49 721 608 43658
E-mail: schinarakis@kit.edu

Johanna Häs
FZI Corporate Communications and Media
Phone: +49 721 9654-904
Fax: +49 721 9654-905
E-mail: haes@fzi.de

The airwriting system made in Karlsruhe may be applied in future mixed-reality applications. In combination with smart glasses, i.e. glasses displaying information in the users' field of view, the airwriting wristband can be used to input commands and texts by gestures without holding a mobile device in the hand. The prototype airwriting system is showcased at the CeBIT stand. In the course of the Future Talks lecture series (hall 9, stand F99), the developers Tanja Schultz and Christoph Amma will present the airwriting system on Thursday, March 13, 2014, 13 to 13.30 hrs.

More information: http://csl.anthropomatik.kit.edu/airwriting

Surgeons Feel and See via Operation Robots

Within **OP:Sense**, KIT develops methods for future robot-supported surgery. The system focuses on supporting and relieving the strain of the surgeon. It provides novel options for interactive control and sensor feedback. OP:Sense is a modular platform to study novel methods for the secure and precise execution of robot-supported operations.

OP:Sense consists of two robot arms controlled by the surgeon via haptic input devices and several 3D cameras monitoring the working space around the field of operation. Based on this scene monitoring, new safety concepts are developed for close human-robot cooperation in the operation theater. On this basis, further research is conducted in particular in the area of situation recognition. At the CeBIT, the system will be presented live.

Video demonstration of the OP:Sense system:
http://www.youtube.com/watch?v=g0ZgSaNtTUw

Click here for other projects of KIT's medical engineers:
http://rob.ipr.kit.edu/english/327.php

Enhanced Security by Combination of Several Firewalls

Firewalls provide protection against attacks from the internet. Figuratively speaking, they filter out "harmful" data packages from the incoming data flow and transmit "good-natured" packages only. Security gaps, however, cannot be excluded completely. Sometimes, the firewalls cannot be trusted entirely or built-in loopholes are used by mischievous attackers.

In a collaboration between the Karlsruhe Institute of Technology (KIT) and the FZI Research Center for Information Technology, the Competence Center of Applied Security Technology KASTEL devel-

oped a concept for the secure combination of network firewalls: A specialized hardware module securely implements the combination of several firewalls. The security of this approach has been proven in a formal model. A working prototype as well as an illustrating model are presented at CeBIT.

For information on the Competence Center for Applied IT Security Technology (KASTEL), click: http://www.kastel.kit.edu/index.php

More information on FZI's IT security research: http://www.fzi.de/en/forschung/forschungsfelder/forschungsfelder-en/ffeld/software-sicherheit-und-kryptographie/

Participatory Collection of Data by Smartphone

Modern smartphones and their built-in positioning and activity monitoring sensors can simplify complex data collection processes significantly. This concept is known as **participatory sensing**.

At the CeBIT, FZI scientists will demonstrate the potentials of participatory sensing by three applications: 1) A freely configurable platform allows local governments to record danger spots and damages of the local infrastructure with the help of their citizens. In Karlsruhe, the corresponding application called KA-Feedback is being used already. 2) Another prototype is designed for leisure parks to measure flows of visitors and directly recommend rides that are less frequented at the moment. 3) The third prototype of Disy Informationssysteme GmbH, a spinoff of FZI and KIT, shows how ideas of participatory sensing can be merged with the acquisition of complex geodata on tablets to facilitate field work of public administration.

More information on FZI's real-time data processing research: http://www.fzi.de/en/forschung/forschungsfelder/forschungsfelder-en/ffeld/real-time-data-management

Predictive Data Analytics: Decision Models Based on Large Data Volumes

The volume of business and market data available to companies is increasing steadily. At the CeBIT, scientists of FZI will demonstrate how large data volumes can be evaluated specifically by means of **predictive data analytics**.

With various applications being used as examples, latest analytics solutions for decision-making will be presented. For instance, data analytics can be used to optimize computing centers or to predict

key figures for business management. Data analytics can also be used to carry out targeted marketing campaigns. This idea will be presented at the stand by PriceNow, a spinoff of FZI and KIT.

More information on FZI's research into big data and service science:
http://www.fzi.de/en/forschung/forschungsfelder/forschungsfelder-en/ffeld/data-and-service-science

Stand of the Federal Ministry for Economic Affairs and Energy: Security in the Mobile Cloud (hall 9, stand E24)

Theft-proof processing of company data in a cloud? This is ensured by the IT modules developed by CAS Software AG, KIT, and WIBU-SYSTEMS AG under the "MimoSecco" project: The model is based on a smart separation of the three zones of use, processing, and storage as well as on encrypting and fragmentation of the data inventories. By means of a database adapter, the data are encrypted and stored in the cloud in a distributed manner. The database adapter uses a hardware token as a security module for encrypting and decrypting. Upon the query of an authorized user, only the data needed for processing are available in decrypted form for a short term. Moreover, data accesses can be made dependent on the context of the user (place, time, etc.). The consortium will present the "MimoSecco" results at the stand of the Federal Ministry for Economic Affairs and Energy that funds the project (hall 9, stand E24). Demonstrators will illustrate the process, with the data of a solar farm being used as an example.

More information: www.mimosecco.de

Information on KIT's participation in the CeBIT can also be found at: http://www.pkm.kit.edu/english/cebit2014.php

Information on FZI's participation in the CeBIT can be found at: http://url.fzi.de/cebit

Karlsruhe Institute of Technology (KIT) is a public corporation according to the legislation of the state of Baden-Württemberg. It fulfills the mission of a university and the mission of a national research center of the Helmholtz Association. Research activities focus on energy, the natural and built environment as well as on society and technology and cover the whole range extending from fundamental aspects to application. With about 9000 employees, including nearly 6000 staff members in the science and education sector, and 24000 students, KIT is one of the biggest research and education institutions in Europe. Work of KIT is based on the knowledge triangle of research, teaching, and innovation.

The FZI Research Center for Information Technology at the Karlsruhe Institute of Technology is an independent and non-profit institution for applied research in information technology and technology transfer. Latest scientific findings of information technology are transferred to companies and public institutions. It also qualifies young scientists for their career in academics or business as well as self-employment.

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