# KCIST NEWSLETTER
November 2021

Projects and Research Activities

Open6G-Hub (BMBF)

For the increasingly digital economy and society, reliable and powerful communication networks are of great importance. In the *Open6GHub* project, 17 partners, including KIT, are working on the development and implementation of intelligent communication networks and the next mobile communications generation 6G. At *Open6GHub*, the project partners are initially looking at application scenarios in the networked factory, in rural areas and in agriculture. This is because 6G is intended to serve as the infrastructure for future mobile and highly secure applications based on AI and machine learning. Among other things, mobile access

Image: Jörg Eisen-

points in the terahertz range with direct fiber-optic connection, for example for applications in modern manufacturing environments, are being researched at KIT. In addition, the connection of radio communication and sensor technology will be investigated in a dedicated testbed at 26 gigahertz.
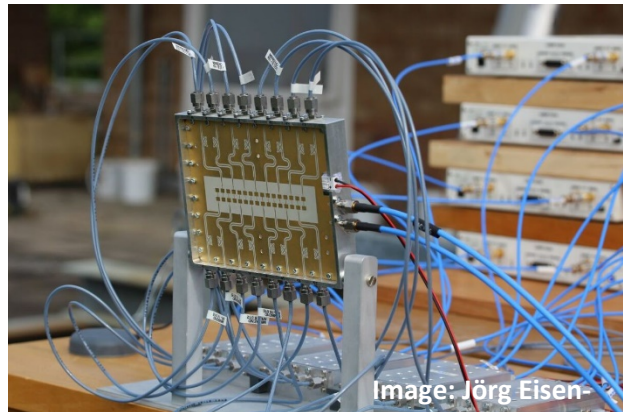
The project also considers terahertz systems, new software and programming concepts for 6G mobile networks and the reliability, security, and exposure of future radio systems. KIT is participating in the *Open6GHub* with a total of ten research groups and is funded with 12 million euros. KIT coordinator is Professor Thomas Zwick from the Institute of High Frequency Technology and Electronics (IHE).

SDM4FZI - Software-Defined Manufacturing für die vehicle and supplier industry (BMWi)

In the research project *Software-Defined Manufacturing for the automotive and supplier industry* (SDM4FZI), the fundamentals for the implementation of software-based production are being researched in an interdisciplinary research network together with the University of Stuttgart. In order to realize production adaptation by means of software in the concept of Software-Defined Manufacturing, physical means of production are integrated together and without complex interfaces in information networks. This creates a virtual image at the information technology level, whereby the functions of the real, physical means of production are mapped by software. Thus, the software for production control can be automatically generated based on the requirements of the product to be produced and dynamically loaded onto the means of production as a container for execution. The PIs come from the fields of computer science, economics, and mechanical engineering. On the KIT side, the project is coordinated by Professor Gisela Lanza.

Foto: Anastasiya Sultanova

DFG proposal SiSmaK - Sensor-integrating screws for multi-axial force measurement and derivation of a design methodology for sensor integration in closed cylindrical machine elements approved (DFG)

Professor Sven Matthiesen from IPEK - Institute of Product Engineering is conducting research together with Professor Klaus Hofmann (IES, TU Darmstadt) and Professor Mario Kupnik (MUST, TU Darmstadt) in the project approved by the DFG as part of the DFG priority program Sensor-Integrating Machine Elements to enable widespread Digitization. The goal of the approved project is to design and solve the interdisciplinary research questions of a sensor-integrating screw in which the forces transmitted via the screw can be measured multi-axially. The primary function, load-bearing capacity, is to be influenced as little as possible and the requirements of installation space neutrality and a self-sufficient energy supply are to be fulfilled. A further objective is to expand existing design methodologies for mechatronic systems especially for the development of sensor-integrated machine elements. The project thus makes a social contribution to comprehensive digitization through sensor-integrating screws. The DFG project will run for three years.

Outstanding Publications

- **Scientific contributions of the department High Performance Humanoid Technologies (H2T) nominated for all four awards of the 2020/2021 IEEE-RAS International Conference on Humanoid Robots.**
  Best Interactive Paper Award: Barmann, L., Peller-Konrad, F., Constantin, S., Asfour, T. and Waibel, A. „Deep Episodic Memory for Verbalization of Robot Experience"
  Most Influential Paper Award: Asfour, T., Regenstein, K., Azad, P., Schroder, J., Bierbaum, A., Vahrenkamp, N. and Dillmann, R. "ARMAR-III: An Integrated Humanoid Platform for Sensory-Motor Control".

- Warsinsky, S., Schmidt-Kraepelin, M., Rank, S., Thiebes, S. and Sunyaev, A. (2021) " Conceptual Ambiguity Surrounding Gamification and Serious Games in Health Care: Literature Review and Development of Game-Based Intervention Reporting Guidelines (GAMING)", in: *Journal of Medical Internet Research*. (Link to the publication).

- Steck, M., Gwosch, T., Matthiesen, S. (2021) "Compensation of mass-based effects in component scaling on a hardware-in-the-loop test bench by virtual inertia" in: *Mechatronics*, 78, Art.-No.: 102622. (Link to the publication).

- Lindenmann, A.; Uhl, M.; Gwosch, T.; Matthiesen, S. (2021) "The influence of human interaction on the vibration of hand-held human-machine systems – The effect of body posture, feed force, and gripping forces on the vibration of hammer drills" in: *Applied Ergonomics*, 95. (Link to the publication)

Awards and Prizes

Faculty Partner Award for the team project of the Critical Information Infrastructures research group in SoSe 2021

This semester, the team project group of Professor Ali Sunyaev's Critical Information Infrastructures research group won 1st place, in the Faculty Partner Award of the "Team Project Business and Technology" event, on the topic of "Innovative Designs for mHealth Privacy Assistants". The award was given to team projects that stood out for their methodology and solution to current societal or business challenges, and were able to clearly convey this in a short presentation of the results.

Association for Information Systems nominates Professor Ali Sunyaev for AIS Distinguished Member - Cum Laude

Professor Dr. Ali Sunyaev has been named an AIS Distinguished Member - Cum Laude of the Association for Information Systems (AIS). A list of all AIS Distinguished Members can be found under the following link: https://aisnet.org/page/DistinguishedMemberList

Public Relations and Events

KIT Science Week – Scientific conference on the topic „The Human in the Center of Learning Systems"

As part of the first KIT Science Week, which took place October 5-8, 2021, KCIST organized a scientific conference on topics related to artificial intelligence and robotics in cooperation with the department of High Performance Humanoid Technologies (H2T). The program included 12 keynotes from top international scientists as well as 5 sessions with a total of 35 presentations by young scientists. The conference took place online via zoom from October 6 - 8, 2021.

Miscellaneous

interACT again sends scholarship students abroad

After a personal student exchange to the interACT partners was not possible due to the pandemic, the interACT Advisory Board again selected scholarship holders in September who will write their theses at Carnegie Mellon University (USA) and Waseda University (Japan). The first student has already started his stay at Carnegie Mellon, the others will follow at the end of this year/beginning of next year. The next selection of fellows will take place in early summer of 2022.

KI@KIT mailing-list (ki@listst.kit.edu)

The purpose of this list is to exchange information on topics related to artificial intelligence at KIT. All interested KIT employees and students can subscribe to the list (further information can be found on the website https://www.kcist.kit.edu/775.php).

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