

# KCIST NEWSLETTER

## July 2021

### Projects

#### **JuBot - staying young with robots has begun (Carl-Zeiss-Stiftung)**

On April 1st, 2021, the project "JuBot - Staying young with robots - versatile robot assistance for coping with everyday life" officially started. Interdisciplinary research questions are addressed in order to make progress in the field of intelligent assistance robotics and to promote innovations in solving the challenges associated with an aging society. The research project brings together expertise at KIT in artificial intelligence, humanoid robotics, human-machine interfaces, wearable robotics and sensor technology, motion sciences, secure and privacy-preserving distributed systems, psychology and physiology, embedded systems, residential architecture and technology assessment. The 20 PIs come from computer science, sports science, mechanical engineering, electrical engineering, architecture and technology assessment. The project is coordinated by Professor Dr.-Ing. Tamim Asfour.



#### **FLAIROP - exploring distributed AI technologies in industrial use (BMW)**

The German Federal Ministry for Economic Affairs and Energy is funding a new research project on the use of distributed AI technologies in an industrial context. In the German-Canadian cooperation Federated Learning for Robot Picking (FLAIROP), Professor Dr.-Ing. Kai Furmans (IFL) and Professor Dr. Ali Sunyaev (AIFB) with his research group Critical Information Infrastructures will explore over the next two years distributed learning for pick-and-place robots together with the University of Waterloo, as well as the industrial partners Festo SE and Darwin AI.

### **KARL - artificial intelligence for work and learning in the Karlsruhe area (BMBF)**

In the research project Artificial Intelligence for Work and Learning in the Karlsruhe Area (KARL), a regional competence center is being created in an interdisciplinary research network that will make artificial intelligence (AI) tangible and learnable. The focus is on the influence of AI on human work in production, commerce, mobility and education. The AI-supported working and learning systems created in the research project will be designed, tested and then demonstrated together with the practical partners. The learning factory Global Production at the wbk offers, for example, the possibility to conduct behavioral-economic experiments to capture the acceptance-promoting criteria. Until 2026 the wbk will be working on this project together with regional research partners from KIT (ifab and itas), Karlsruhe University of Applied Sciences (ilin and iaf), the Computer Science Research Center and the Fraunhofer Institutes IOSB and ISI.

### **NephroCAGE - exploring decentralized Federated Machine Learning for nephrology (BMWf)**

The German Federal Ministry for Economic Affairs and Energy is funding the Canadian-German joint project "NephroCAGE" to research decentralized Federated Machine Learning for nephrology, which began in February and is being carried out with the participation of the Critical Information Infrastructures research group. Together with Canadian project partners (University of British Columbia, McGill University, Genome Canada, Genome British Columbia, Genome Quebec) and German project partners (Charité - Universitätsmedizin Berlin, Hasso Plattner Institute, PIRCHE AG), Professor Dr. Ali Sunya-ev (AIFB) and his research group will over the next two years explore the design, development and application of a decentralized, block-chain-based Federated Machine Learning system in nephrology.

### **Future Democracies - ExU-Proposal „KIT Centers Competition“, stage 1**

The application "Future Democracies" was approved within the framework of the ExU proposal "KIT Centers Competition", Stage 1. Democracy is a valuable asset. In order to be able to protect it in the future, technical protection measures are necessary. Two important areas are the secure and reliable digitization of election processes, including the secure and usable implementation of new concepts such as the Liquid-Democracy-Concept, and the reduction of the influence of fake news via social media. The aim is - by means of workshops - to bundle the research and interest of researchers in the field of Future Democracies from the center. The project is coordinated by Professor Dr. Melanie Volkamer. Funding is provided for the period from May 2021 to January 2022.

## **OBAS - objective evaluation of user comfort through the design of a vibration filter**

In the "OBAS" project, vibration characteristics of power tools are analyzed in terms of user comfort and transferred to a vibration filter for user-centered product development. This should enable an objective measurement of the subjectively perceived vibration comfort in power tool applications. The project is being carried out at IPEK - Institute for Product Development under the direction of Professor Dr.-Ing. Sven Matthiesen. The German Federation of Industrial Research Associations (AiF) is funding the project over the next two and a half years.

## **Outstanding Publications**

- **Eye-tracking study with focus on the development of attention-sensitive user interfaces**

Toreini, P., Langner, M, Maedche, A, Morana, S., and Vogel, T. (2021) "Designing Attentive Information Dashboards", to appear in: *Journal of the Association for Information Systems (JAIS)*. ([Pre-Print of Paper](#)).



- **How detection ranges and usage stops impact digital contact tracing effectiveness for COVID-19**

In order to combat the COVID-19 pandemic, many countries have relied on digital contact tracking apps. However, these are vulnerable to tracking errors. In their article, the authors conclude that the widely used Bluetooth Low-Energy protocol may not be the most effective contact-tracking technology and suggest that politicians adapt apps based on society's behavioral characteristics.

Pandl, K.D., Thiebes, S., Schmidt-Kraepelin, M. and Sunyaev, A. „How detection ranges and usage stops impact digital contact tracing effectiveness for COVID-19” in: *Scientific Reports* 11, 9414. [Link to the publikation](#).

- **Machine Learning speeds up simulations in material science**

Research, development, and production of novel materials depend heavily on the availability of fast and at the same time accurate simulation methods. Machine learning, in which artificial intelligence (AI) autonomously acquires and applies new knowledge, will soon enable researchers to develop complex material systems in a purely virtual environment. A wide variety of applications benefit from this technology - from efficient energy storage systems, which are indispensable for the use of renewable energies, to

new medicines, the development of which requires an understanding of complex biological processes. Methods of AI and machine learning can decisively advance material simulations.

In an article published in the journal *Nature Materials*, physicist and AI expert Dr. Pascal Friederich, head of the AiMat - Artificial Intelligence for Materials Sciences research group at the KIT Institute for Theoretical Informatics (ITI) and member of the KIT Materials and KCIST Centers, explains how this works and which applications benefit from it. [https://www.kit.edu/kit/pi\\_2021\\_049\\_maschinelles-lernen-beschleunigt-materialsim-ulationen.php](https://www.kit.edu/kit/pi_2021_049_maschinelles-lernen-beschleunigt-materialsim-ulationen.php)

Original publication:

Friederich, P., Häse, F., Proppe, J. and Aspuru-Guzik, A.: Machine-learned potentials for next-generation matter simulations. In: *Nature Materials*, 2021. DOI: 10.1038/s41563-020-0777-6

Abstract: <https://www.nature.com/articles/s41563-020-0777-6>

## Public Relations and Events

### Online seminar on data-driven product development of human-machine-systems

During the online seminar of the KIT Business Club, participants from different industrial sectors offered exciting insights into the research and innovation activities at IPEK - Institute for Product Development by Dr.-Ing. René Germann and Dr.-Ing. Thomas Gwosch. In the topic of data-driven product development of human-machine systems, the two department heads presented current and innovative data-driven approaches to user-centered product development and system validation. Topics such as the automated evaluation of field data, smart systems that adapt to the user, and the challenges of developing test benches that take the influence of humans into account were discussed, as well as their significance for tomorrow's product development.

### Science Camp Robotic Online

The fourth Science Camp Robotic Online took place from May 26th to June 1st, 2021. The camp, a cooperation of KCIST with the research group High Performance Humanoid Technologies (H<sup>2</sup>T), the Center for Medial Learning (ZML) and the Schülerakademie Karlsruhe, is directed at students in grades 8 to 10 and aims to bring robotics and computer science closer to young people.

Further information can be found at <https://www.kcist.kit.edu/896.php>

## Miscellaneous

### Zoom takes over spin-off company kites from KIT

The U.S. company Zoom Video Communications acquires kites GmbH, a KIT spin-off that has been in existence since 2015 and specializes in the development of real-time solutions for machine translation. The two kites shareholders Professor Dr. Alexander Waibel and Dr.



Sebastian Stüker are internationally renowned experts in speech recognition and translation. The kites team consists of twelve researchers and will support Zoom's engineering team in the future. The work of Professor Waibel and Dr. Stüker is based in part on the Lecture Translator developed by them, which has been bridging language barriers for international students with simultaneous lecture translations at KIT since 2012.

### KI@KIT mailing-list ([ki@listst.kit.edu](mailto: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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