



Thinking Technology

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GEFÖRDERT VOM



Bundesministerium
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The Cluster of Excellence

Technology is everywhere in our daily lives, but for many people, it is hard to get a handle on it. This is where the research by the Cluster of Excellence Cognitive Interaction Technology (CITEC) comes in: robots and other technical systems are designed to be operated intuitively and adjust to the needs of their human users. This means that the systems have to be “smart” and communicate in a natural way with their users.

CITEC also works on technology that helps to lead a self-determined life – especially for the elderly or those with chronic illnesses or disabilities.

The Cluster of Excellence brings together some 30 research groups from five faculties at Bielefeld University, including Biology, Linguistics and Literary Studies, Mathematics, Psychology and Sports Science, and the Faculty of Technology.

CITEC is one of 43 Clusters of Excellence in Germany, and is the only cluster with a strong focus on robotics. Its interdisciplinary approach combines cognitive research and engineering. Since 2007, CITEC has been funded by the federal and state governments of Germany as part of the Excellence Initiative.

The Projects

CITEC's interdisciplinary research is grouped into strategic project lines. Researchers draw upon the know-how and expertise from a wide range of scientific fields, and work together, for instance, on large-scale projects with teams of up to 20 people, to develop the technology of tomorrow.

In the Intelligent Coaching Space ICSPACE project, a virtual training room is being developed where athletes and physical therapy patients can practice and improve their sensorimotor skills. In the future, a virtual coach is planned to instruct users in performing tai chi, yoga, and aerobics exercises.



For the FAMULA project, CITEC teams are working to develop a self-learning robot that is designed to autonomously investigate and familiarize itself with objects in order to understand their purpose. In addition to this, the robot will be able to express emotions on its face, which helps it to be perceived as a counterpart in social interactions. The robots' hands were made to resemble human hands in terms of size, shape, and the way they move.

What does a robot need in order to find its way through difficult terrain – without having resort to navigational data? Researchers are investigating this question with HECTOR, the walking robot, who learns to precisely “perceive” its environment and its own body. The stick insect serves as the model for the design of Hector’s body and movement skills.



The fourth large-scale project is the COGNITIVE SERVICE ROBOTICS APARTMENT – a residence with social competence. Accompanied by the humanoid robot Floka, the apartment is designed to provide support to people in their everyday activities, helping to make their lives easier. The special feature of this apartment is that it is not made to perform individual services. Instead, the apartment is designed to learn to react flexibly to users' needs.

In addition to the large-scale projects, CITEC researchers are working on more than 100 different projects of varying sizes.

The Network

While CITEC's network extends around the world, it is also firmly rooted in the region of Ostwestfalen-Lippe. CITEC's Virtual Faculty includes top international researchers in the field of cognitive interaction technology. CITEC also leads the Thematic Network Interactive Intelligent Systems, whose members hail from universities and institutions located on four continents. CITEC works together on joint projects with strategic partners Miele, the v. Bodelschwingh Foundation Bethel, Bertelsmann, and the Honda Research Institute Europe.

Since 2012, CITEC has taken part in the Leading-Edge Cluster Intelligent Technical Systems Ostwestfalen-Lippe (it's OWL). Regional companies, research institutions, and organizations are participating in this initiative.

Its large networks bring new viewpoints to CITEC and expose the scientists to a wide range of perspectives. They exchange ideas with experts from industry and business to develop innovative approaches for their research.

By participating in research studies, future users provide feedback on the usability of the new technologies.

The Graduate School

With around 100 members, the Graduate School is a significant component of the research being conducted at CITEC. A third of all doctoral researchers come from abroad. The Graduate School provides a structured, three-year program of doctoral study. During that time, early-career researchers benefit from the central laboratory infrastructure, as well as the opportunities for further academic and professional qualification in addition to that offered by their doctoral research project. The Graduate School provides members with their own resource budget while conducting their doctoral research.

The CITEC Building

CITEC's concept for its own research building was selected in the competition for research facilities sponsored by the federal and state governments. In 2013, a building tailored specifically to the needs of the researchers was constructed. It is bringing together 250 researchers under one roof.

At the heart of the CITEC Building is the Central Lab Facilities, surrounded by seven additional laboratories. This spatial proximity fosters close cooperation and intensive exchange among different research groups.



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