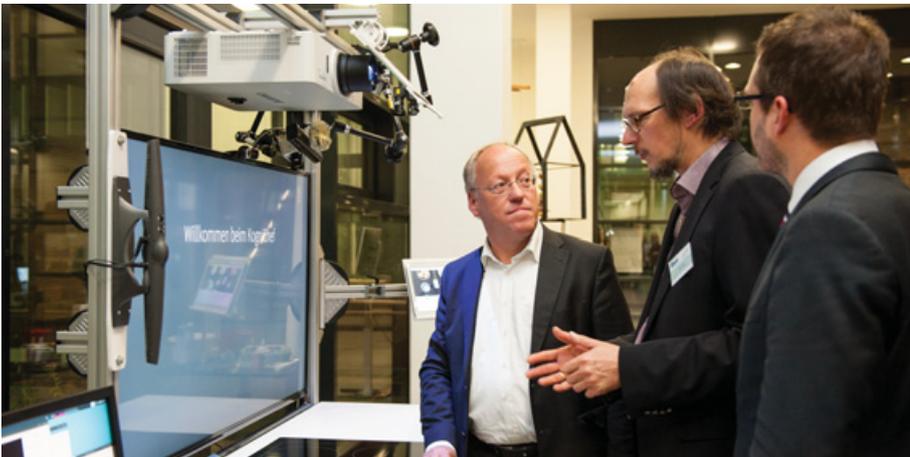


# CITEC Newsletter 1/2016



CITEC is designing a kitchen that can assist elderly and young users alike. CITEC researchers Dr. Thorsten Jungeblut (right) and Prof. Dr. Helge Ritter (middle) show the research demonstrator KogniChef to Bielefeld's mayor Pit Clausen.  
Photo: Germany – Land der Ideen/A. Demandt

## Mastering Old Age with Technology

CITEC is researching technical systems that assist seniors

We can only guess today what old age has in store for us.

But one thing we do know is that we will want to maintain the independence we are accustomed to for as long as possible. Conducting research on cognitive interaction technologies that will make an effective contribution towards achieving this is one of CITEC's goals. We develop intelligent technical systems that recognize the needs of users—whether it is senior citizens or people with disabilities.

In order to test our inventions in daily life, we work with external partners, including the v. Bodelschwingh Foundation Bethel, a diaconal institution headquartered in Bielefeld with a tradition of over 140 years. Both the individuals supported by Bethel, as well as the institution's staff, try out our new systems and tell us how we can better design systems that are helpful.

And the demand for assistance among the elderly is only growing. Studies indicate that by 2030, the number of people in Germany over the age of 80 will increase by nearly 50 percent. This is further exacerbated by the fact that fewer babies are being born, which in turn will decrease the number of future specialists, including professionals in healthcare

and social services providers. Technical solutions could help to relieve workers in these fields from routine tasks so that they can devote themselves to providing a higher degree of care and support. Furthermore, many future senior citizens are already using smart phones and tablets: Tomorrow's seniors will expect technical assistants suited to their age. Since 2011, CITEC and the v. Bodelschwingh Foundation Bethel have been strategic partners. This newsletter demonstrates how we are cooperating and working together in our home region of Ostwestfalen-Lippe. In addition to this, we introduce a CITEC research group that is participating in many of the joint projects of this partnership.

Kind regards,  
Helge Ritter, CITEC Coordinator



## CITEC founds Working Group on Ethics of Technology

A new working group at CITEC engages with the conditions and consequences of the technologies being developed at the Cluster of Excellence. The group comes together to discuss the ethical issues raised by cognitive interaction technology and to develop ethical guidelines for CITEC researchers. In addition, the working group organizes public talks and panel discussions on ethical questions that arise from using these technologies. Group members include professors, postdocs, and doctoral researchers.

## Smart Apartment Project Receives Award

In October 2015, the nation-wide initiative "Germany – Land of Ideas" honored the Cluster of Innovation KogniHome as a selected "Landmark in the Land of Ideas 2015." CITEC is working with 13 partners from the region of Ostwestfalen-Lippe on the smart apartment. This project, which is coordinated by CITEC, was selected from more than 1,000 applicants and placed among the Top 5 favorites in a vote by the public.

## KogniHome Introduced at Congress on Demographics

Which technologies will a user accept—and which ones will he or she reject? Determining the answers to these questions early on in the research on the smart apartment was the topic of a presentation given on the KogniHome project at the Congress on the Demographics of the Future („Zukunftskongress Demografie“), hosted by the German Federal Ministry of Education and Research (BMBF) in Berlin in July 2015. A representative from the CITEC-coordinated project gave a presentation on the concept of the KogniHome 'research workshop' entitled "User acceptance through participation: Universal design in KogniHome."

## An All-Purpose Avatar

A publication demonstrates how Billie the virtual assistant can help organize one's daily life

A digital assistant for every household: this is the driving concept behind the avatar Billie. CITEC researchers have developed this virtual character, who offers assistance from a TV or computer screen. What activities can avatars like Billie offer practical assistance to users? An article presented at the 7th German Ambient Assisted Living Conference (AAL) addresses this question. The authors of the article include CITEC researcher Professor Dr. Stefan Kopp, gerontologist Melissa Henne from the v. Bodelschwingh Foundation Bethel and Professor Dr. Karola Pitsch from the University of Duisburg-Essen, who led a CITEC research group



Prof. Dr. Stefan Kopp

Photo: CITEC

from 2012 until 2014. Since 2011, CITEC and the v. Bodelschwingh Foundation Bethel have been working on Billie, testing the avatar in everyday situations and equipping it with new functionality.

Billie can help, for instance, when it comes to scheduling doctor's visits and personal ap-

pointments, but the avatar also reminds the user of tasks that need to be done, such as washing up regularly or working out. "This kind of assistance is particularly helpful for the elderly or mentally handicapped people. With assistance, in many cases these people can live independently in their own homes for as long as possible," explains Stefan Kopp, who heads the research group Social Cognitive Systems at CITEC, which developed the virtual avatar Billie.

"A virtual assistant for these target groups has to be safe, robust, and must function autonomously within prescribed limits," says Kopp. "If users don't speak clearly, or use long or disjointed sentences, it is usually hard for a system like this to recognize what the person wants."

Previously, Billie was mostly used to help keep track of appointments and structure one's day. In addition to this, Billie can also assist in making video calls. But the researchers have even more in mind: in the future, Billie could accompany the user when accessing the Internet, and be used to dictate and read aloud emails and other texts. Billie could also be equipped with an emergency responder system, which would call a contact person depending on the situation, e.g. contacting a caretaker or alerting an emergency medicine doctor.

"From the very beginning, we have involved future users in Billie's development," says Melissa Henne, head of the Office of Corporate Development at the v. Bodelschwingh Foundation Bethel. "The test subjects try out the system and contribute their wants and needs to it. In this way, Billie is prepared for everyday use as early as possible. And so what is actually needed in daily



Billie helps cognitively impaired people plan their daily activities. Photo: CITEC

life is what is developed," explains Henne. "The result is human-centered technology." Research began on Billie in 2011 with the CITEC-financed project "Vasa" (Virtual Assistants and their Social Acceptance), in which researchers investigated which manners, facial expressions, and gestures the avatar would have to master in order to be understood by seniors and individuals with cognitive impairments. Launched in 2013, the project "Verstanden" [Understand] was dedicated to ensuring comprehension in virtual assistants: how do these helpers make sure that they correctly understand their users' questions and instructions? The German Federal Ministry of Education and Research (BMBF) financed this project.

The research project Kompass has been running since 2015, and is financed by the BMBF for three years. As part of this project, researchers will examine the impact of interacting with Billie on the social skills of its users, as well as to what degree users develop an emotional attachment to the system, among other topics. Another part of this project includes the voluntary participation of test subjects from target groups on the continuing development of the virtual assistant. In addition to researching the social impact, researchers will also look at which legal and ethical issues play a role when using the avatar. The institutional affiliations of the members of this interdisciplinary team include CITEC and the v. Bodelschwingh Foundation Bethel, as well as the University of Duisburg-Essen and the University of Applied Sciences Bielefeld.

More Information: <https://scs.techfak.uni-bielefeld.de/kompass>



### Publication

Melissa Henne, Stefan Kopp, and Karola Pitsch: "Virtuelle Assistenten als verbindende Schnittstelle zu verschiedenen Unterstützungssystemen" [Virtual Assistants as Interfaces to Different Assistive Systems]. Proceedings 7. Deutscher AAL-Kongress 2014. VDE Verlag. Published as part of the 2014 AAL Conference "Wohnen - Pflege - Teilhabe - 'Besser leben durch Technik'".

<https://www.vde-verlag.de/proceedings-del/453574019.html>

## PEOPLE

### What Makes Robots Human

#### A profile of the research group Applied Social Psychology and Gender Research

Social psychology deals with how people's experiences and behavior are influenced by the presence of others. But how does the presence of robots and other technical systems influence human's thoughts, feelings, and actions? And at what point do human attributes get ascribed to machines? Since 2010, the research group Applied Social Psychology and Gender Research (former name: Gender and Emotion in Cognitive Interaction) has been investigating these questions at the CITEC Cluster of Excellence. "In experiments, among other forms of research, we analyze which factors have an influence on human's anthropomorphism of robots," says Professor Dr. Friederike Eyssel, who heads the research group.

12 members are currently working in Eyssel's team and are researching how a technical system must look, sound, and act, in order to make it as widely accepted by human users as possible. On the one hand, a robot should not be perceived solely as a machine, but on the other hand, a robot shouldn't be so human-like that people fear it. This is particularly relevant for education robots that facilitate language learning.

In the future, the researchers would like to shed light on the role familiarity plays when interacting with robots. Would an unfamiliar robot be anthropomorphized in the same way as a robot that users have known for an extended amount of time? To conduct their research under the most real-life conditions possible, the researchers are part of CITEC's Large Scale Project "The Cognitive Service Robotics Apartment as Ambient Host". They use the smart apartment in the CITEC Building to test the expectations as well as the modes



Since 2010, Prof. Dr. Friederike Eyssel (fourth from left) has led the research group Applied Social Psychology and Gender Research. Photo: CITEC

of interaction and communication of visitors. In the smart apartment, the apartment itself and its robots should assist guests in everyday activities.

Eyssel's team is also working together with the v. Bodelschwingh Foundation Bethel (page 4 of this issue) on the KogniHome project, where they are researching social interrelations that result from a smart apartment. In order to understand what technical systems must do in the apartment, the team asks people who would live in the apartment in the future what they want and need from this environment. The apartment is equipped with a virtual dialogue assistant like the avatar Billie (page 2).

Eyssel's research group analyzes questions including: What is the impact of user and context features on the perception of the

virtual assistant? Which appearance ensures that the assistant is most widely accepted by the residents? "The group's research strongly contributes to CITEC's core goals: developing social, adaptive, and assistive interaction technology that enables users to communicate quickly, easily, and intuitively," explains Eyssel.

The researchers are also working on other topics that are beyond the scope of technical systems: "To find out if the behavior of another person changes when men and women are depicted in a sexualized way, we use, among other methods, eye tracking. By analyzing eye movements, we can determine whether a person is perceived as an individual, or as an object," says Eyssel. In addition to this, the group is researching how the threat of masculinity or femininity impacts a particular person, and whether sexual orientation can be recognized through voice.

The research group is cooperating with international researchers, including the EU research project Codefor (Cognitive Development for Friendly Robots and Rehabilitation) and the Thematic Network Interactive Intelligent Systems, which is funded by the German Academic Exchange Service (DAAD). Other collaborators hail from Japan, England, Scotland, Australia, Italy, Portugal, and the United States.

### Friederike Eyssel Organized Social Robotics Symposium

Held in November 2015, researchers from around the world attended the "1st Joint UAE Symposium on Social Robotics in Abu Dhabi in the United Arab Emirates. CITEC researcher Professor Dr. Friederike Eyssel (photo) was one of the



organizers of the event. From October 2014 until December 2015, Eyssel served as visiting professor in Psychology at New York University (NYU) in Abu Dhabi, United Arab Emirates. The symposium was hosted at NYU and the United Arab Emirates University. It brought together experts from engineering, robotics, and the social sciences to exchange views and discuss social robotics.

## Technology for a Self-Determined Life

CITEC and v. Bodelschwingh Foundation Bethel developing technical assistants for daily life



*Adamaas offers individualized assistance, for example when mixing cake batter. The virtual field appears directly in front of the user's face.*  
Photomontage: CITEC

Technology that helps one lead a self-determined life: this is the shared vision of the Cluster of Excellence Cognitive Interaction Technology (CITEC) and the v. Bodelschwingh Foundations of Bethel. Since 2011, the Cluster and the diaconical institution have cooperated as strategic partners and since beginning their cooperation, they have initiated five projects that run through 2018 and are funded with a total of 16 million Euro. The partner institutions are working together in these projects to develop technical assistants that can provide assistance to people, particularly those with chronic illnesses, cognitive and motor disabilities, and the elderly. They are also working on the ethical, legal, and social issues that



*Award for KogniHome: CITEC, Bethel, and 12 other partners are working on the large-scale project KogniHome, was honored as a selected "Landmark in the Land of Ideas."*

*Photo: Germany – Land of Ideas/A. Demandt*

arise with the use of assistive technologies. The v. Bodelschwingh Foundation Bethel, headquartered in Bielefeld, is dedicated to providing assistance and support to those in need. They operate service providers and institutions in eight federal states in fields ranging from geriatric care to services for the disabled, children and youth, as well as mental health.

The guiding idea behind this cooperation is that technology should not be "prescribed" to people: rather, the ideas of the research institution CITEC should align with the needs and desires of future users. The only ideas that will be implemented are those that are socially accepted – both from users and their relatives, but also from the workers that frequently accompany and assist in the use of this technology.

"The new systems will help support individual users to lead independent lives, but should also be capable of requesting assistance," says Professor Dr. Helge Ritter, Coordinator of the Cluster of Excellence. "They are personal assistants that follow the instructions of their users, instead directing what should be done. The assistive technologies are familiar with the personal characteristics of their user, and they learn to react accordingly based on their individual user."

Following these principles, the joint project

"Kompass" (2015–2018) is developing socially cooperative virtual assistants to serve as daily companions for people in need of support (page 2). The v. Bodelschwingh Foundation Bethel is also partner on KogniHome, the large-scale project to create a smart apartment, which is being coordinated by CITEC. In a sub-project of KogniHome with Bethel, researchers are working to find out what kinds of support users want from the smart apartment, and which kinds of assistance they definitely do not want. In another joint project called Adamaas, CITEC research groups and the eldercare and proWerk units of the Bethel Foundations are working together on electronic glasses that help remind the user of the individual steps in daily tasks like cooking: in a display on the glasses, users can get help with how to bake a cake, how to repair a bicycle, or do yoga exercises. The eye-tracking manufacturer SensoMotoric Instruments (SMI) is an industry partner on this project. The Federal German Ministry for Education and Research (BMBF) is providing funding for these three projects.

"These new systems should help to offset cognitive and physical disabilities," explains Helge Ritter. "In order to be used, the technology must thus be barrier-free and affordable." This strategic partnership is guided by the basic principle that technical assistance should not replace communication or contact, but should enhance it.

For more information, please visit: [www.cit-ec.de/en/bethel](http://www.cit-ec.de/en/bethel).

### Legal Notice

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