



Human-Computer Interaction Group

University of
Konstanz, Germany

As told by Harald Reiterer | <http://hci.uni-konstanz.de>



How would you describe your research group?

Our research group is part of the Department of Computer and Information Science at the University of Konstanz, which is one of the nine Universities of Excellence in Germany. We are located in the southwest of Germany, an area with a strong tradition of engineering and the birthplace of many leading aviation and automotive companies. The small town of Konstanz is located on beautiful Lake Constance, close to the border with Switzerland. Our group designs visual, tangible, and social user interfaces to ubiquitous computing systems while following our vision of “blended interaction.” Based on embodiment theory, blended interaction describes the successful blend of physically embodied interaction and computational power. Our research and teaching unifies the areas of human-computer interac-

tion, information visualization, and usability engineering. We integrate user-centered design and traditional engineering methods into our research philosophy. Typically, we define our research around realistic application scenarios such as museums, design studios, libraries, or control rooms. Together with many partners from industry, we seek to identify the true needs of practitioners and then design and implement innovative user interfaces that live up to real-world requirements.

What is the focus of your activities?

Our work is focused on one common goal: to establish blended interaction as a new concept that accommodates particular characteristics of human interaction and embodied cognition as well as the latest technological developments in ubiquitous computing technology. Thus, our design approach is based on blends of real-world char-

acteristics and the digital world in four different design domains: Individual interaction design blends real-world interaction and objects with digital actions and representations in the form of natural user interfaces. Social interaction design blends the power of real-world social conventions in communication with the possibilities of interactive technologies such as multi-user interaction or tangible interfaces. Service and workflow design supports a fluid transition between real-world workflows and computer-supported services—for example, blending digital information-seeking activities with the real context of the physical library. Physical environment design blends the power of real-world devices, furniture, rooms, and buildings with the power of virtual means such as interactive tables or walls. In our view, such a holistic concept can offer a new quality of interaction in many different application domains.



What kind of facilities do you have?

We have four labs on campus. Our main lab is a ubiquitous computing room called the Media Room, which accommodates two interactive tabletops, multiple high-resolution wall displays, and a variety of mobile devices. This room provides a rich interactive space for exploring multi-user, multi-modal, and multi-device interactions for prototyping purposes but also serves as a controlled environment for user studies. The room also features an optical tracking system for gesture interaction and user identification. We are also very proud to have a “public-living lab” with tabletops and large displays situated inside the university library. It allows us to explore novel ideas with real library users amidst the library’s shelves and enables us to conduct longitudinal studies of new interaction concepts in realistic use contexts. Our usability lab is a fully equipped

laboratory for controlled user studies of traditional desktop applications. It features up-to-date facilities for eye tracking and controlled observations. Finally, our interaction lab is a workspace equipped with tools and machinery for working with hardware and electronics. It includes workbenches and soldering equipment for creating tangible interface artifacts.

How many people are in your group, and what is the mix of backgrounds and roles?

Currently one post-doc researcher, eight Ph.D. students working as research assistants, and about 15 research students work on our six research projects. Each project has a team of up to six members led by one or two research assistants. Their team members are typically undergraduate or graduate students who have decided to specialize in human-computer interaction. Our project teams are co-located in

offices in the same hall. Most of us have a background in computer and information science, but we also have some people who joined us from other fields such as design, psychology, and even mathematics, making us a quite interdisciplinary group. I’m head of the group, and my faculty position at the university is professor of human-computer interaction in the Department of Computer & Information Science. I established the lab in 1997 with an initial focus on visual information seeking systems. In the last few years our research has shifted toward more holistic interaction paradigms for the post-WIMP world.

What makes your group unique?

Our common vision, our research agenda, and our system-oriented approach make our group unique. We primarily create entire systems or applications with a practical value for their users rather than design isolated interaction



techniques or confine ourselves to pure observation and analysis. Our high-fidelity prototypes and tools usually meet criteria for real-world applications. We believe that this level of maturity is essential for extensive, iterative, and multidimensional evaluation studies that allow for more holistic and situated investigations “in the wild.” We have therefore developed our own open source software frameworks and the libraries ZOIL and Squidy, which help us to develop mature user interfaces rapidly. All our tools and frameworks have been designed in accordance with our common vision, blended interaction. This ensures consistency between different research projects and fosters cooperation between the members of our group.

How would you describe a day in the life of your group?

The key ingredients for our day-to-day work are ad-hoc discussions and design critiques. These are characterized by a friendly, creative, and spirited atmosphere. We reflect on our work frequently at all stages, whether it is presented as sketches displayed on our whiteboards, as paper prototypes, or as interactive prototypes in our labs. Our common vision of blended interaction ensures that all members of our group speak the same language and act toward our shared goal. As all research projects share the same technologies, we also have an intensive technological discourse. We also established a “demo or die” culture for exchange with other researchers or practitioners from

the industry. Each project team must be able to present its current work or a project milestone to visitors. This opens up great opportunities to improve our work based on valuable external feedback from the many practitioners and researchers that visit us. What’s more, we value regular demos not only for communicating ideas to others but also as an exercise in self-reflection and design verification.

What is the one thing you see as most important about what you do here?

We work hard to bring our vision to life. A very important part in this endeavor is our strong relationship with external partners. Cooperation projects with research institutions such as Microsoft Research



Cambridge enable us to explore the future of post-WIMP information management. We collaborate with car manufacturers such as Daimler AG (Mercedes-Benz) to develop novel interaction concepts for enhancing innovation workshops or for conducting user studies with mobile tool support. Together with Siemens AG we are working toward the control room of the future. We have also developed a variety of tabletop applications for museums and exhibitions with our partner ict AG. We strongly believe that our experiences in the course of these collaborations are the key for developing equally innovative and practicable visions of future human-computer interaction.

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KEY PROJECTS:

Blended Library (funded by the Baden-Württemberg Ministry of Science, Research and Art)

In this project we investigate novel interaction concepts for the library of the future by blending physical and digital knowledge-management and information-seeking strategies.

Blended Museum (with ict AG)

This project deals with the combination of virtual and physical museums. Our goal is to enhance the visitor's experience by developing innovative interaction techniques, information design, and mediation strategies.

Blended Interaction Design (funded by the German Research Foundation DFG)

This project explores novel approaches for supporting collaborative design activities and creativity methods with ubiquitous computing technology and computation-augmented design studio settings.

Holistic Workspace (with Siemens AG)

In this project we investigate interaction techniques for control-room scenarios that integrate a multitude of displays and input devices. Our goal is to develop a holistic workspace that is able to meet stringent requirements concerning safety matters.