

16th Workshop "Be-greifbare Interaktion"

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ABSTRACT

Tangible interaction is centered around the manipulation of physical objects and the usage of the own body. It thus involves the environment and the physical context much stronger than purely visual or speech-based interfaces. The wide range of possibilities for integrating sensors and computing systems into the physical environment provides ample design space. The research field of *Tangible Interaction* investigates this scope scientifically and practically in order to enable meaningful and human-oriented applications. In this workshop, the German Informatics Society (GI) specialist group "Be-greifbare Interaktion" of the Department of Human-Computer Interaction offers a forum for the presentation of scientific discourse and interdisciplinary discussion. Contributions range from theoretical, critical and forward-looking reflections to design work and reports on practical implementations. The workshop opens the discussion to a broader audience of experts in order to disclose current developments and generate new impulses for the research field.

KEYWORDS

Be-greifbare Interaktion, Workshop, Human Computer Interaction, Tangible Interaction

1 INTRODUCTION

The terms *Tangible Interfaces* and *Embodied Interaction* refers to the development of computers fading into our everyday objects, smart objects becoming part of our environment, and our whole body being used to interact with computer systems [9]. Virtual and physical-material worlds merge and blend, posing new challenges and questions regarding the design and use of information technology and digital media [2, 8].

The impact and significance of this development can be illuminated from various perspectives. It affects our interaction with and through objects regarding our comprehension of the environment [11] and it thus influences our social and cultural use and perception of technology.

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This opens up new possibilities for users to recognize and comprehend content and actions. As a result, new opportunities emerge in areas such as learning, working, playing, and living. This workshop aims to foster theoretical and practical progress in the field by discussing current examples and advancements.

In computer-based work, the need to keep complex processes under control is often at odds with the ephemeral nature of the graphical representation of digital information. Tangibles, as embodiments of digital data and processes, provide a promising route out of this dilemma [5]. Tangibles are user interfaces that allow interactions with computing systems through the manipulation of physical objects. Intuitive and immediate understanding is to be enabled by the affordances of the objects used. Previous work has shown that tangible interfaces are oftentimes preferred over a graphical user interface with the same functionality [13]. By dissolving the boundaries between digital media and physical reality, Tangibles open up mixed spaces, creating new challenges for finding forms and shaping the underlying processes of interaction. The computer in its traditional form is envisioned to disappear and become invisible [12]. Aside from establishing tangible interaction techniques, research is increasingly focused on systematizing the field [4, 11].

This workshop organized by the GI specialist group "Be-greifbare Interaktion" intends to advance the discussion on this Tangible Interaction, both theoretically and practically, through research examples. This year, we specifically focus on sustainability, activism, and intimacy in regard to Tangible User Interfaces. However, contributions regarding the latest (technological) developments, Embodied Interaction, and Mixed Reality are welcome as well. For workshop submissions, we welcome theoretical discussions, reports on practical implementations, and system demonstrations.

The workshop is aimed at experts from science and practice and aims to stimulate interdisciplinary discourse between design, computer science, engineering, psychology, pedagogy, and media theory. We invite students and interested parties who do not belong to the GI specialist group "Be-greifbare Interaktion" to submit contributions [1].

2 WORKSHOP CONTRIBUTIONS

A total of four submissions were accepted to be presented at the workshop.

2.1 How Do Users Like Their Tangibles? – An Exploration of Interaction Techniques for Data Transfer with Everyday Objects

Emmert et al. [3] explored interaction techniques for data transfer using tangibles. As a preliminary evaluation has shown that users prefer using everyday objects as tangibles for file transfer, they used a phone, a watch, a pen, a card, a key, and a tissue as objects for their Wizard-of-Oz elicitation study. During this study, users were asked to imagine different scenarios and interact with those objects to transfer data. The study has shown that different objects afford different interaction techniques and the preferred object is highly dependent on the user's current situation.

2.2 From Trash to Treasure: Experiences from Building Tangible Artifacts out of Discarded Components

Schmid, Kalus, and Wimmer [10] experimented with electronics waste as prototyping material for creating interactive physical prototypes. Embedded in the context of an undergraduate university course for computer science students, they explored how properties and affordances of material and components found in the trash influenced students' design decisions when building their prototypes. They found that relying on waste as a prototyping material lead to a material-centered design approach. Moreover, waste produced by the course, as well as cost for procuring material, could be reduced. Authors' findings and the students' final projects are presented in a pictorial format.

2.3 Utilizing Liquid Transfer for Weight Simulation: Challenges and Future Directions

The position paper by Kalus, Klein, and Henze [6] discusses liquid mass transfer as a method to induce weight perception in Virtual Reality. This concept utilizes a tubing system to exchange liquid between two or more units, allowing users to experience different weight sensations. The paper provides a comparative overview of related work in this area along the lines of the main criteria. The article identifies limitations of existing prototypes and highlights that they cannot meet all the criteria, as these interfere with each other in the current approach. The authors suggest exploring alternative design considerations, such as separating the liquid supply from the user's body, and employing hand-tracking to improve weight interfaces for VR.

2.4 Bitplush: Unleashing the Paws-ibilities of Smart Materials in Smart Plush Toys

Kurze et al. present their research project "Bitplush" [7], that explores the use of smart plush toys to stay emotionally connected across distances. After ideation sessions, the researchers plan to iteratively couple handmade plush toys with hardware, such as sensors, actuators and smart textiles to process and perform multi-modal in- and output. The prototypes will be tested in field studies with groups such as grandparents or relationships across borders.

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