Interactive Social Displays

Thies Pfeiffer and Marc Erich Latoschik

A.I. & V.R. Group, Faculty of Technology, Bielefeld University, Germany

Abstract

The mediation of social presence is one of the most interesting challenges of modern communication technology. The proposed metaphor of Interactive Social Displays describes new ways of interactions with multi-/crossmodal interfaces prepared for a psychologically augmented communication. A first prototype demonstrates the application of this metaphor in a teleconferencing scenario.

Categories and Subject Descriptors (according to ACM CCS): H.4.3 [Information Systems Applications]: Communications ApplicationsComputer conferencing, teleconferencing, videoconferencing

1. Introduction

Social presence is an important factor determining the success of today's and tomorrow's communication technologies. One prominent example of the advent of social awareness are the community building features subsumed under the label Web 2.0. Our project aims at the exploration and development of new methods to improve social presence in stationary and mobile communication applications and devices. We are trying to create rich augmentations on top of existing insufficient technical channels. Our hypothesis is that the interplay of these alternatives in interaction with the human capability to adaption should lead to a strengthening of social presence. For this we are developing technologies and methods allowing us to aggregate, interpret and represent implicit communication signals. Ultimately we will develop displays to make the implicit signals explicit.

2. Related Work

Shared virtual environments, especially those based on video technology, are an established technology. Prominent examples are, e.g., AliceStreet [Ali04] which represents participants with a live video feed, or Coliseum [BBT*03], which acquires a 3D-representation of the user. Our approach will go beyond audio and video channels, augmenting plain video information with displays of psychologically relevant factors. This idea can be thought of as an extrapolation of the smileys used in text based communication.

In recent years, emotional aspects gain significant interest in the area of Embodied Communicative Agents (ECAs).

Findings about the physiological response to an empathic interface agent [HP06] provide required insights for an appropriate and adequate ISD-design. Both research directions have significant impact on our work. Immersive Virtual Reality Environments with ECAs capable of displaying emotional states can be used as *emotional displays* first, to design repeatable and hence reliable user studies on physiological response mappings and second, as subsitutes or placeholders for one or more of the interlocutors.

3. Interactive Social Displays

PASION's primary goal is the development of methods to support social interactive communication on a broad range of devices (from mobile phones to immersive VR displays). We argue for a common interaction metaphor on all platforms, the *Interactive Social Display* (ISD).

ISDs offer a consistent view on all available information about a communication partner. As an element of design, the ISDs separate the area of content as a central element from the contextual frame providing a view on the available communication channels and sources of information. Besides channels for audio and video, the prototype (fig. 1) is already able to augment these channels with the information provided by biosensors presented on top of the content area. Currently, the ISD metaphor has been designed for a dyadic interaction. Future work will extend the ISD metaphor to include a rich framework to analyze the basal sensory data and ultimately make the emotional state of the interlocutor experienceable. Besides that, methods for aggregation of data

Figure 1: *The prototype of an immersive teleconferencing system using ISDs for psychologically augmented videoconferences.*

Figure 2: *Current work concentrates on integrating and mapping multimodal sensory input to emotional states of the fully articulated avatar Pasqual.*
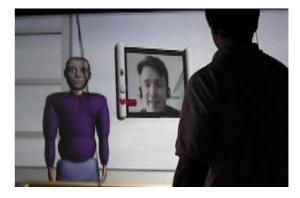
over groups of ISDs will be developed to get a summary of the emotional state of a communicating party. We believe that such an approach could successfully improve applications e.g. in the domain of education, in gaming or collaborative work.

In immersive virtual environments a single Interactive Social Display is represented by a frame similar to a scroll of parchment (fig. 2). An ISD can be dragged around in space and oriented by grasping and moving or rotating the hand. ISDs can also be scaled with bimanual manipulation. Several ISDs can be used concurrently and be arranged in space to constitute a comfortable communication environment. The user can manipulate channel markers (hovering icons in figure 1) using a speech and gesture interface, as well as using direct manipulation via drag'n'drop. These markers can be attached to the ISDs to activate or deactivate a desired channel.

The prototype already supports audio, video and gesture channels. Other channels, such as galvanic skin response and photoplethymography, will be added in the near future. The prototype includes a representation framework for emotional states and allows the visualization via an articulated avatar (fig. 2). This avatar provides a high-level mapping from emotional state representations to expressions, e.g. by synthesizing mimics, gestures and lip sync speech. The implementation of the prototype is based on the VR framework AVANGO [Tra01], work on videoconferences in and via VR systems [ref removed for review] and work on multimodal interaction design [ref removed for review] and parametric object modifications [ref removed for review] .

4. Conclusion

Creating social presence is a challange dominating current research in communication technology. The *Interactive Social Displays* are our first approach to open a broader range of modalities, extending speech and gesture, to human-

human communication in teleconferencing solutions and make them explicit.

For the VR prototype we decided to used a drag'n'drop interface to make the user *physically* interact with the system - expecting that this evokes a stronger feeling of physical presence. To which extend we have accomplished this still remains to be studied, also in comparing the VR prototype with prototypes for the desktop or pocket pcs.

The prototype can already be used as a research tool in Wizard-of-Oz like usability-studies with a confident interlocutor, where the information presented to the participant can be manually configured. In the context of our project we are cooperating with psychologists with a strong background in media analysis and communication research. This will allow us to concurrently evaluate our approach in an iterative manner. A special focus is on the effect of rich emotional displays such as Pasqual.

References

[Ali04]   ALICESTREET, LTD.:   Alicestreet Conference Center. Web address: http://www.alicestreet.com, 2004.

[BBT*03]   BAKER H. H., BHATTI N., TANGUAY D., SOBEL I., GELB D., GOSS M. E., MACCORMICK J., YUASA K., CULBERTSON W. B., MALZBENDER T.: Computation and performance issues in coliseum: an immersive videoconferencing system.   In *Proceedings of the eleventh ACM international conference on Multimedia* (2003), ACM Press, pp. 470–479.

[HP06]   H. PRENDINGER C. BECKER M. I.:   A study in users' physiological response to an empathic interface agent. *International Journal of Humanoid Robotics* (2006).

[Tra01]   TRAMBEREND H.:   Avango: A distributed virtual reality framework.   In *Proceedings of Afrigraph '01* (2001), ACM.