Interactive Social Displays

Category: Research

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.

Keywords: conferencing, collaborative work, social presence, social interaction.

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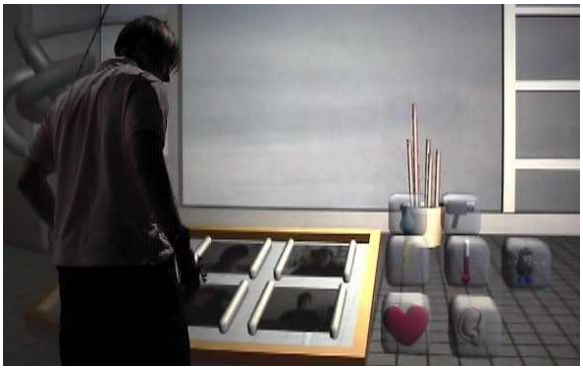

Figure 1: The prototype of an immersive teleconferencing system using ISDs for psychologically augmented videoconferences. ISDs of available contacts are arranged passively on the table.

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.

The PASION (Psychologically Augmented Social Interaction Over Networks) [4] project aims at the exploration and development of new methods to improve social presence in stationary and mobile communication applications and devices. We are participating in this effort, 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.

The poster will present our metaphor for social interaction called *Interactive Social Display* (ISD) and a first implementation.

2 RELATED WORK

Shared virtual environments, especially those based on video technology, are an established technology. Prominent examples are, e.g., AliceStreet [1] which represents participants with a live video feed, or Coliseum [2], 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.

The idea of augmenting existing communication channels is not new (e.g. the smileys used in text-chats) and we expect the reader to know at least some of the more prominent approaches. Further information will be provided by the thorough review in [3].

Recently, emotional aspects gain significant interest in the area of ECAs (Embodied Communicative Agents) [5]. Findings about the physiological response to an empathic interface agent [6] provide required insights for an appropriate and adequate ISD-design.

Both research directions have significant impact on PASION's goals. 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. Taking this idea even further, ECAs may be used as emotional translators between members of different social or ethnic groups with varying emotional expressions.

3 INTERACTIVE SOCIAL DISPLAYS

PASION's primary goal is the development of scalable methods to support social interactive communication. In this context, scalability refers to the number of active communication partners (up to several thousands) and a broad range of devices (from mobile phones to immersive VR displays). To approach the latter, we argue that we will need at least a common interaction metaphor on all platforms, centering our interface design. This core metaphor is the *Interactive Social Display*.

ISDs offer a consistent and configurable 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 prepared to augment these traditional channels with the information provided by biosensors. The sensory information is presented in a layer on top of the content area. In the current state of the project, the ISD metaphor has been designed for a dyadic interaction with one partner per ISD. 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 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.

3.1 Prototype for an immersive system

In immersive virtual environments a single Interactive Social Display is represented by a frame similar to a picture frame and not unlike a scroll of parchment, as it has a handle on each side. An ISD can be dragged around in space and oriented by grasping and moving or rotating the hand. When both of its handles are grabbed,

an ISD can be scaled by moving the hands together or apart. Several ISDs can be used concurrently and be arranged in space to constitute a comfortable communication environment. Figure 1 shows the user in the virtual environment of the prototype during the inspection of the interaction possibilities offered by the user interface.

There is a place for inactive ISDs representing the available contacts, realized as a horizontal table in the prototype. This spatial markup separates the passive space from the active space of interaction. Only ISDs in active space are establishing and maintaining communication channels.

On the right-hand side of the figure 1 there is a set of hovering icons representing *channel-markers*. The user can manipulate those icons using a speech and gesture interface (e.g.: "*Take* [demonstration] *that part and put it* [demonstration] *there...*" or "*please contact Mr. Anonymous*"), as well as using direct manipulation via drag'n'drop. Besides selection, scaling and positioning the main configuring interaction is attaching specific channel-markers to the distinct areas of the ISDs. The markers can be literally thrown at the ISDs, to activate or deactivate a desired channel.

As sensory input, 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 already 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 [5].

3.1.1 Technical Details

The implementation of the prototype is based on the VR framework AVANGO [10], work on videoconferences in and via VR systems [7] and work on multimodal interaction design [8] and parametric object modifications [9] .

The central interaction processing unit is based on a tATN (temporal Augmented Transition Network), a transition network for a parallel integration of gestural and speech input under consideration of the context of the application. The output of the network, a semantic description of the desired or initiated interaction, will then be given to an *interactionhandler* based on a finite state machine. The finite state machine provides contextual information about the current state of the application and checks the recognized interaction for plausibility.

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.

At the moment, the prototype already supports audio, video and gesture channels. Many others, e.g. heart frequency or skin conductance, are in preparation and mock-ups for the visualization exist. 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 the PASION 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.

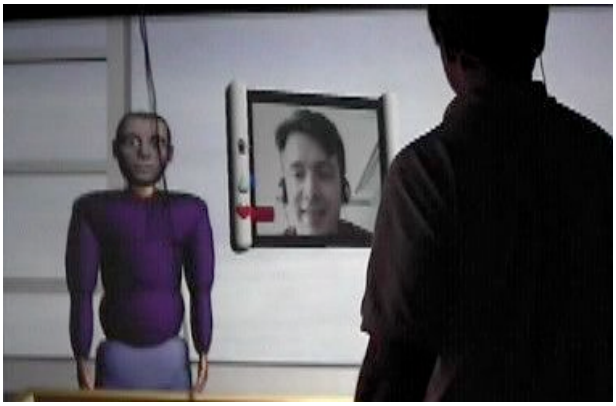

Figure 2: Current work concentrates on integrating and mapping multimodal sensory input to emotional states of the fully articulated avatar Pasqual.

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