LumiTouch: An Emotional Communication Device

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ABSTRACT

We present the Lumitouch system consisting of a pair of interactive picture frames. When one user touches her picture frame, the other picture frame lights up. This touch is translated to light over an Internet connection. We introduce a semi-ambient display that can transition seamlessly from periphery to foreground in addition to communicating emotional content. In addition to enhancing the communication between loved ones, people can use LumiTouch to develop a personal emotional language.

Based upon prior work on telepresence and tangible interfaces, LumiTouch explores emotional communication in tangible form. This paper describes the components, interactions, implementation and design approach of the LumiTouch system.

Keywords

Ambient media, telepresence, tangible interfaces, emotional communication

INTRODUCTION

Photographs of loved ones are symbolic of a personal connection and provide a constant reminder of the emotional feelings contained in that particular snapshot of time. Couples who are living or working separately often gaze at a photograph of their loved one and wonder, "Are they thinking of me? If only I could share my feelings..."

Picture frames are used to display these photographs, to highlight the significance of the static image. The LumiTouch system was designed to allow geographically separated couples to exchange and share their sentimental feelings. The LumiTouch attempts to enhance the symbolic power of the picture frame, by providing a subtle real-time communication link.

RELATED WORK

Previous work on abstracted telepresence using picture frames [1][2][3] have concentrated on detecting presence.

LumiTouch focuses on communicating emotional content in addition to presence detection. LumiTouch is designed to be an asymmetric, bi-directional channel of communication. It is similar to the symmetric, haptic approaches embodied in inTouch [4], and handJive [5]. Until the recent introduction of web enabled devices, this particular combination of asymmetric (touch-to-light) and bi-directional data direction has been rarely explored in communication devices.

While existing technology already enhances the connections between people, most require active focused participation. New communication devices tend to be multimedia, supporting many different types of content (integrating text, audio, video). Over time, users feel the need to augment these existing communication mediums to convey emotional qualities. LumiTouch explores a design that solely supports emotional content.

IMPLEMENTATION

Part of the design emphasis was on what technology could be reasonably expected to operate in a user's home office environment. Figure 1 depicts the basic system components that are embedded in an ordinary picture frame.
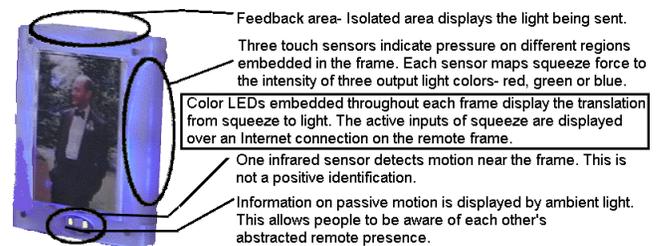

Feedback area- Isolated area displays the light being sent.

Three touch sensors indicate pressure on different regions embedded in the frame. Each sensor maps squeeze force to the intensity of three output light colors- red, green or blue.

Color LEDs embedded throughout each frame display the translation from squeeze to light. The active inputs of squeeze are displayed over an Internet connection on the remote frame.

One infrared sensor detects motion near the frame. This is not a positive identification.

Information on passive motion is displayed by ambient light. This allows people to be aware of each other's abstracted remote presence.

Figure 1: Components of the LumiTouch system

USER INTERACTIONS

The LumiTouch is designed to be used like the picture frame, and remain visible in everyday life. The use of light as both an ambient representation and active data transmission allows the user's attention to transition between passive and active. Figure 2 shows that this device is also in the relatively unexplored gray region between ambient and direct communication.

Figure 2: Attention requirement spectrum

Figure 3: (Clockwise) A LumiTouch when off, a user working with LumiTouch in passive mode, the feedback panel on top lights up when sending a message, the display lights up when receiving a message, a user interacting with LumiTouch.

Passive Communication

When a user is in front of her LumiTouch, the corresponding LumiTouch will emit an ambient glow to indicate her remote presence. This additional background information helps people figure out if there is a recipient on the other end, or also if it is a convenient time to increase interaction levels (e.g. start active communication mode or use an alternative, like a phone).

Active Communication

When a user picks up the picture frame and squeezes, the feedback display area illuminates to show that the picture frame has been squeezed. The display colors are transmitted over the Internet to the corresponding remote LumiTouch. The display varies depending on the squeeze attributes (where, how hard, and how long the user squeezed). While the recipient party can simply enjoy this display, s/he has the option to pick up the frame and squeeze back a response to the first user, and begin an interactive exchange.

Interpersonal Language

The system was intended to allow users to develop an abstract form of emotional language. People could communicate in real-time by sending each other color mixtures and light patterns. The combination of colors and force allowed a grammar, while the duration of squeeze provided syntax for creative interpersonal dialect between two people.

PRELIMINARY OBSERVATIONS

Preliminary testing was done with users who were not emotionally involved with each other. Figure 3 illustrates some user interactions. More than one user noted that they would find having a personal LumiTouch useful.

The generation of an abstracted language was observed in many cases. Users created different combinations of light intensities, colors, and pulses and agreed with each other upon private meanings to their interaction. One user used a pulsing green and blue series to communicate "good luck". A flashing red meant, "Good bye, I'm busy now."

An observer commented that they would like to give LumiTouch to a sibling who is currently in the hospital. People who are unable to actively communicate for long periods of time (e.g. sick or elderly) might be able to use the passive transmission of LumiTouch. Similarly users who lack the required dexterity or concentration for pushing numerous buttons might appreciate this system due to its small number of simple grasping inputs.

Another observer noted that a potential problem might arise from the asymmetry of participation. One person is in active interaction while the other person passively perceives ambient data. The transmitting person may be anxious and expect that the receiver respond. However, if someone is so anxious that they feel the need to communicate immediately, they can just use the phone, or other higher-bandwidth alternative.

CONCLUSION AND FUTURE WORK

In closing, we have described our design of an emotional communication device that can transition between passive and active mode seamlessly. We have also outlined some preliminary observations of the usability of LumiTouch. It appears the dual level of attention this device supports appeals to people. Eventually we hope LumiTouch will aid in explorations of the development of interpersonal emotional language. We hope to gather more data by adding support for the manipulation of real-time data to the LumiTouch. Users could record and replay the touch history, like a voice mail message. Maybe the history of touch "conversations" and patterns can be documented.

ACKNOWLEDGMENTS

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