TaSST: Affective Mediated Touch

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ABSTRACT

Communication with others occurs through a multitude of signals, such as speech, facial expressions, and body postures. Understudied in this regard is the way we use our sense of touch in social communication. In this paper we present the TaSST (Tactile Sleeve for Social Touch), a haptic communication device that enables two people to communicate through touch at a distance.

Categories and Subject Descriptors

H.5.2 [User Interfaces]: Haptic I/O

Keywords

Affect; mediated social touch; haptics

1. INTRODUCTION

When we engage in social interactions with other people in co-located space, we use a range of different signals to communicate. These signals range from facial expressions, and body postures, to speech and other vocal utterances. An important part of these interactions is the communication of affect. While there is a large body of research available on the role of, for example, facial and vocal expressions in the communication, touch as a way to communicate affect, is comparatively understudied [7]. However, research has shown that touch is important in the forming of affiliative behavior and the maintenance of social bonds [10]. Furthermore, touch can increase compliance to requests [3], can have stress reducing effects [2], and can be used to communicate discrete emotions [6]. It is important to note here that the interpretation of touch is highly context dependent, is almost never unimodal, and is always bidirectional [7]. Other than for example vision or audition, when touching someone, you are always at the same time, being touched yourself. Furthermore, in social interactions, different touches can be used for the same expression (e.g. love can be expressed by caressing or a hug). Conversely, the same touch may

be interpreted differently given certain contextual factors, such as information from other modalities [7]. For example, when putting your hand on someone's shoulder while smiling, might be considered an expression of happiness, whereas the exact same touch but combined with a frown, instead of a smile, might be considered an angry expression.

The above describes touch as a communication modality in co-located space. However, touches can also be communicated across a distance using haptic feedback technology. This is referred to as remote touch, or mediated social touch [4]. Some similarities between the way people experience touch in co-located space and mediated touch have been found. For example, the effect of touch on compliance to requests has been found to be of similar size for touch mediated by technology, compared to real touch [5], and touch can be used to communicate discrete emotions [1]. However, recent findings indicate that mediated touch, either applied during emotional moments or at random, during an auditory story, does not have an effect on feelings of social presence towards the storyteller [9]. This suggests that the combination of modalities with mediated touch must be carefully chosen for remote touch not to feel as alien or detached. Indeed a number of devices have explored remote touch either unimodally or in combination with vision or audition (see [4] for an overview). Where most of these devices only communicate a single type of touch, our aim was to allow users to communicate different types of touch at a distance. For this reason we developed the TaSST (Tactile Sleeve for Social Touch)[8].

2. THE TASST

The TaSST is a smart-textile sleeve, consisting of an input and output layer, that can be worn on the forearm (see Figure 1). The TaSST is worn on the forearm because the forearm is relatively sensitive to vibrotactile stimulation [11] and is an appropriate location for most types of social touch [6]. The output layer is worn directly on the skin and contains twelve vibration motors (KOTL C1226A001F) arranged in a 4 by 3 grid. The input layer is strapped around the output layer and consists of knitted, conductive wool (Bekeart Bekinox w12/18)) pads, that combine capacitive and piezo-resistive sensing to detect different touch intensities. When two users both wear a sleeve, a touch on the input layer of one sleeve is felt as a vibration in the output layer of the second sleeve. This way different touches can be communicated over a distance.

Different design iterations of the TaSST were used to experiment with the communicative capabilities of the sleeve.

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Figure 1: The TaSST 2.0 featuring a capacitive/piezo-resistive input layer, depicted on the left, and a vibration motor output layer depicted on the right.

In a first study, participants received a number of different touches that were prerecorded by the experimenters using the input layer [8]. Participants received variations of simple, protracted, and dynamic touches [10] through the output layer and were asked to imitate the touch they thought they received.

Overall we found that participants were most successful in imitating protracted, simple, and dynamic touches respectively. Second, using an improved version of the TaSST, participants were presented with eight different emotion words taken from [6]. Participants were asked to express these emotions using the input layer of the sleeve, record the expressions using a computer program, and then play back the expressions to themselves. In addition, participants were asked to describe how they attempted to express each emotion. We found some indications for specific patterns in the expression of emotions using the TaSST, though results were inconclusive.

To date the studies conducted with the TaSST have focussed on the communicative capabilities of the sleeve in unimodal settings. However, as mentioned in the introduction, other modalities could be used to enhance expressions of mediated social touch. For example, the TaSST could be used as an additional modality in a video call, to enhance feelings of social presence and physical proximity. Furthermore, the TaSST could be used as an additional interface for communicating with virtual characters. The output layer of the sleeve could be used to receive touches from a virtual character, while the input layer could be used to touch a virtual character.

3. OUTLINE OF THE DEMO

In this demo, two TaSST sleeves will be used, allowing visitors to experience bi-directional tactile communication. Visitors will be separated by an opaque screen, and will be presented with a monitor running a video calling application (e.g. Skype). We will invite visitors to explore the use of the sleeve with and without visual feedback of the other visitor. The aim is to give visitors with a sense of being touched at a distance by another person, and to give them a sense of the influence of the visual and auditory modality on tactile communication. As outlined in the introduction, the combination of different modalities might have a strong

influence on the experience of mediated touch. Our aim is to introduce visitors to mediated touch as a novel affective communication modality in multimodal communication.

4. CONCLUSIONS

In this paper we introduced the TaSST, a wearable sleeve for mediated social touch. We outlined the demo setup, that aims to introduce mediated touch as a novel channel of for affective communication. Such a channel could potentially be relevant in remote communication (e.g. Skype), and interaction in virtual environments (e.g. communication with virtual agents).

5. ACKNOWLEDGMENTS

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