USER STUDY ON EMOTION AND WEARABLE TECHNOLOGY

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ABSTRACT

This paper contains the user study on human emotion displayed on wearable technology. The study tried to investigate the context and the means of a person who would like to express his/her emotions explicitly through wearable devices with the use of real-time generation of colors and patterns on them. Our study shows a very few people wanted their emotions to be exposed without knowing and most of them wanted their emotions to be expressed sometimes depending on specific context. We revealed the gap between the designer's belief and what the user's desire. Most of the participants did not appreciate the technology for displaying emotion in public and in some cases it seemed people's awareness and imaginations are limited to this new phenomenon.

1. INTRODUCTION

Emotions are regarded as process and appraisal functions that control our behavior and attitude. According to Castelfanchi (2000), emotions are subjectively experienced states, and we all react differently depending on our background, previous experiences, mental and physical state and other individual factors as well as social settings. Human experiences emotion on a particular environmental setting as inferred by the intelligence and further influence back his/her decision making process (intelligence) as well as other people within the context. Emotions are classified in many ways by different theorist, such as Izard (1977), Mowrer (1960), Tomkins (1984) and others that we did not consider to discuss in this paper. However, a deeper list of emotions, categorized in short tree structure, is described by Parrot (2001).

As different from the natural expression, the alternative way of expressing emotion could be useful in certain situations where a person desires attention that could not have been achieved otherwise. This is a social phenomena rather than a technical solution to this idea of having emotion being expressed in an alternative way and we therefore move forward for a user study where we found interesting user appreciation for both technical and social contexts. In terms of affective interaction, we call it 'human-human' interaction via wearable technology. Before we design and develop ideas, we must consider people's response to the use of technology for both sensing and expressing emotion. Our user study concerned with a device that would sense emotional state of a person in some way, e.g., ELF measured by electroencephalography (EEG), and would be expressed through changing color and pattern in his/her wearable like shirt, skirt, wrist band etc. The questionnaire comprised 10 multiple choice questions related to our study. Thirty five people volunteered to participate from five west European states. The targeted age group was university students of age between 22 and 27.

2. RELATED WORKS

At St Andrew's University, a type of fiber optic has been developed that allows light to glow out of it and it can be woven into different types of clothing to change the color of the cloth (St Andrew's University Research Lab, 2010). As a result, a white dress can glow red color by turning color changing knob attached with the garment. In our study we considered this technology to be useful where the colors are regulated automatically depending on our emotional state of mind. Researchers at MIT Media Lab are working on a device that will help autistic people to determine if they are boring or annoying the person they are talking to (Yang, 2006). An embedded camera on eyeglass is used to take snaps, and images are transferred to a computer that uses image recognition software to characterize emotions and alerts the wearer accordingly. Considering the needs of disabled users and their inability to express emotions was a good source of inspiration to our design process. Memory-rich clothing is a type of garment that displays their history of use with the help of touch sensors (Berzowska and Coelho, 2006). A microphone and a number of light points like a flower pattern are incorporated into the dress. The microphone records voice whenever your partner whispers into your ear and lights are turned on automatically. Afterward, the lights turn off gradually and one by one depending on how long the intimate event has continued. Walonick carried out a research on human brain wave that corresponds to emotion and also looked into the possibility of shifting the brain wave to bring change to a person's mood (Walonick, 1990). His paper encouraged us to use this technology for effectively sensing the user emotions by appropriate interpretation of brain wave and then generating corresponding colors and patterns on wearable items. It should be noted that color and pattern correspondences are highly subjective and a cultural issue.

3. FORMULATION OF QUESTIONAIRE

The questionnaire we developed was basically goal oriented. Therefore, the preset goal was to determine whether the technology can assist people to display emotions enabling a social interaction more affective and by which fashionable way user would like to express it. We have formulated our questionnaire based on the following criteria.

1. How, when and what emotions are to be expressed?
2. How the technology can help expressing the emotions? and
3. What other context can make use of this technology?

4. STUDY RESULTS AND DISCUSSION

The number of participants in our study was 35 and we tried to make the participation geographically wide. The study included participants from Stockholm, London, Paris, Helsinki and Eindhoven. To keep our focus narrow, we avoided analysis by sex and participant's geographic locations which would produce a greater number of choices in reflecting the distribution. However, 80 percent of the participants wanted to express emotion based on context while 11 percent wanted to hide emotion. Only 9 percent wanted their emotions to be expressed always.
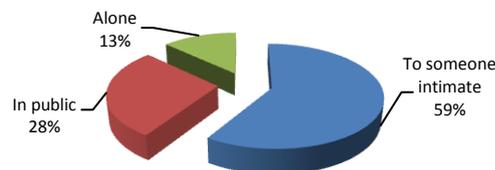

Figure 1: Context where people want to express emotion?

Making emotion visible is most likely to change our social behavior and would be a very sensitive social and cultural issue. However, in public, we have 28 percent participants willing to have their emotions

expressed while 59 percents of them are willing to express their emotion to someone intimate. This is a key figure for considering any technology based direct expression of emotions.
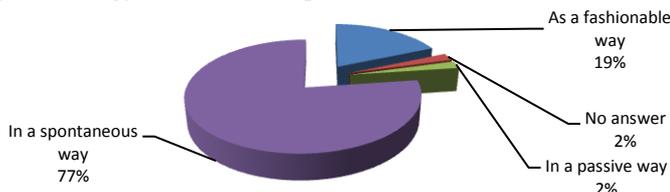

Figure 2: How people like to display emotion?

Most people wanted to express their emotions in a natural, spontaneous way. Only a very few wanted to express their emotions in a fashionable way using technology. The level of people's awareness of the technology and lacking the imagination of its social impact might have made them less interested to express emotion in a fashionable way.
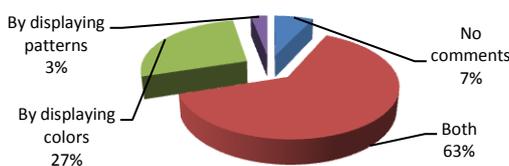
Figure 3: Which technique would be useful to display emotion?

If this technology is to use, people preferred to express their emotions by displaying colors and patterns together on their wearable as shown in Fig.3. This response is analogous to Kristina Höök's and her colleagues' work on eMoto (Ståhl et al, 2005). This is a very important finding that colors and patterns are a very useful tool to convey emotions. This could be interesting to know that apart from human, some species of squids are known to make communications between partners by generating colors and patterns on their skin.
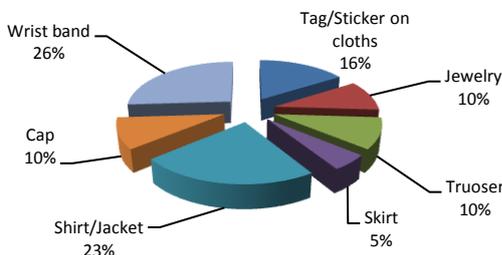

Figure 4: Which wearable item would be preferable to use with the technology?

One of the important aspects was to find people's taste about which wearable item to use for displaying emotion. Although wrist band hits the top, other options are not to be discounted since these choices are somewhat closely distributed. Once a product or idea is accepted then it can take different forms for different users.

This is observed that people prefer to express their emotion as it occurs naturally and also try to suppress some negative emotions in public. Emotion like joy and happiness could be the perfect candidate to express using eye catching wearable technology in social gatherings. Products of this kind could add some value in such context. This is also evident that some emotions could be shared in extreme private settings. If emotion is to experience alone, then no technology should therefore be necessary. Importantly, our study didn't consider the inclusion of mentally impaired people who are suffering from aphasia or autism, for instance. Further study on this user group may reveal valuable facts and help design more useful products.

5. CONCLUSION

It was very hard to make people imagine what it would look like to express emotion on something they wear. The future impact of such a product is fuzzy and uncertain in the context of common social interaction or in a person's life at the moment. It was almost taken granted from a relevant perspective that people would love to use this to get attention in the crowd, but result showed a different scenario. We expect its potential will become more evident to the common people as the applications of similar field evolve. The technology should also try out itself with service like eMoto (Ståhl et al, 2005) or product like memory-rich clothing and its influence in our daily life should be carefully studied. However, it won't be unrealistic to think of its use for the people suffering from autism or aphasia. It is incumbent upon us to carry on further study targeting the above group.

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