An Experimental Research Project - Wearable Technology for Embodiment of Emotions

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ABSTRACT

Clothing is the most intimate artefact that interacts with both body and society. Over the past quarter century, with the introduction of new technologies, people are experiencing unprevented changes in their behaviours and way of living. Technology is becoming a large part of daily life and its unchecked influence has many emotional consequences, many of which are overlooked. The aim of this research is integrating textiles with new technologies to create garments that provide new social interactions and avenues for emotional expression. The experimental project has been done to explore new possible interaction scenarios through wearable technologies by turning an intangible phenomenon, emotion, to a tangible artefact. The paper refers to the research question 'How can an intangible fact, *which is known as existing but doesn't have a physical matter,* emotion, be embodied and transmitted through technology?'* by means of a theoretical study on wearable technologies and its role in emotional communication, following with an experimental project carried out as both virtual and real prototypes. This paper not only focuses on the prototyping process, but also addresses the user experience during the interaction by various user perception tests.

Categories and Subject Descriptors

A.0 [GENERAL]: Conference Proceedings
H.5.2: User interfaces, User-centred design.

General Terms

Measurement, **Performance**, **Design**, **Experimentation**, **Human Factors**, **Theory**

Keywords

Wearable Technologies, Social Interaction, Emotion, Mediation, Intangible

1. INTRODUCTION

Due to the increasing amount of developments in communication and network technology, the meaning of social existence is changing. Nowadays, people are getting closer to the idea of being technological extension of consciousness, therefore they often perceive themselves as form of information. [1] In this digital world, people hardly receive physical information perceived by their five senses. The human senses are the portals where through people can connect to and experience the physical world. Nevertheless, with the influence of the digital technologies into people's daily lives, while the human body remains captive in the physical world, visual and auditory senses enter to the sea of digital information. [2] Therefore *Tangible User Interface* [3], which creates a bridge between the abstract, digital world and the objects in the physical world, has become an important area where designers can find solutions to create innovative and intelligent interfaces.

With the new trend of tangible interaction now people look for products, which refer not only to usability, but also to human

emotions. Therefore emotion, as an intangible fact, has started to be embedded into products to create new user experiences and improve the affective aspect through involving more human senses, such as touch.

On the other hand, in fashion, wearable technology has become an interesting field where different disciplines meet to create both aesthetic and functional clothes. While technology is becoming a kind of extension of the body, the oldest cover of the human being -garment- has been seen as an ideal element to bridge the gap between the human body and digital world. This paper focuses on how garments can be mediums to communicate intangible facts in society by exploring the fusion of fashion, emotion and technology. It addresses to new scenarios of sensing, communicating, and interpreting the emotions through wearable technology and its' effects on the user's perception.

2. NEW COMMUNICATION TECHNOLOGIES AND ITS IMPACT ON USERS' BEHAVIOUR

Connectivity has become an important phenomenon of the last decades with the rise of *network society*. At the end of 2001 the number of Internet users in the world has passed the threshold of 500 million (up from 16 million in 1996) [4]. Currently, people have become well-equipped technological nomads, carrying gigabytes of data, have the means of accessing to available information and connect with people whenever required. The fact being always connected has been reshaping the social bonds and dynamics. Dijk says in The Network Society that the density of contacts and ties within social units of network society is relatively low as compared to traditional families, neighbourhoods, communities and organizations in the mass society [5]. Rather than functioning in discrete, bounded groups, people choose to be in fuzzily bounded networks, moving as individuals [4]. While the social bounds are dissolving in the ambiguity of relationships, people may have the need to delink themselves in their close relationships, which are mostly built on intimacy and trust. Generally in body-to-body interaction and relationships people negotiate trust through the exercise of the emotional intelligence [6]. As a result of the new technologies, people are now more connected with the rest of the world, but are more isolated from their intimate relationships such as close friends and family where the emotions play a big role in communication.

Today, as Maeda says, the expression of emotion is no longer seen as a weakness but a desirable human trait to which everyone immediately relate in their life [7]. Although there are various ways to express emotions such as verbal or non-verbal, in face-to-face conversations misunderstanding is very common due to the wrong interpretations of those expressions. When the communication is obtained by technology, this possibility can increase. For instance, the written form of communication, such as instant messaging, is more likely to be ambiguous because of the missing cues which especially transmit emotion and on which spoken communication usually depends [6]. Therefore, this continues impact of communication technologies on people's daily lives can make designers ask this question: How can an intangible fact, *which is known as existing, but doesn't have a physical substance,* "Emotion", be mediated and transmitted through technology?

3. MEDIATION OF EMOTION THROUGH TECHNOLOGY

Design and emotion has become a broadly explored area, which can turn technology into meaningful forms. Jensen [8] was mentioning that consumers could shift from buying products to experiences and emotions transmitted by products. The intangible values of the user experience, such as emotions, take an important part in designing new products which are nowadays integrated with new technologies. In order to fulfil the emotional aspect of design, many researchers develop methodologies and theories such as, Norman and Desmet [9, 10]. For instance Desmet found a non-verbal measurement tool in order to analyze emotions caused by various objects. While, Norman generated three-levels for emotional design: visceral (appearance, touch and feel), behavioural (pleasure of use) and reflective (self image, personal satisfaction). Thus, the designer of the new technologies should bear in mind those methodologies and the emotional aspect in order to create new ways of user interaction.

In this new era of communication technologies, the gap between the digital and the real has been expanding. To the fact that being connected but not physically, people have started to invent new ways of expressing their emotions - which is a missing part in virtual communication- through their keyboards. A mediated emotion means that an emotion felt, narrated or showed is produced or consumed, for instance in a telephone or mobile phone conversation, mediated by a computational electronic device [6]. For instance, people broadly use the ASCII-based codes known as emoticons in emails and chat to compensate for lack of contextual information in the form of facial expressions, gestures or tone of voice [11]. Through new applications of technology, the classic keyboard and mouse can include natural, human-like functions, such as understanding and mimicking social and behavioural gestures [12].

On the other hand, Affective Computing, giving computers the ability to recognize, express and have emotions [13], is an emerging area of research. Emotion can occur due to a complex integration of different components both cognitive factors and physiological arousal (according to Schacter-Singer [14]), and also measurement methods of emotions can vary. Therefore, there are three types of methods to measure emotions: physiological (ex. heart rate, skin conductance), psychological (self reporting), and behavioural (facial expression, gesture, posture) [15]. For more reliable measurement, different methods can be merged in order to understand the complex mechanism of emotions. For instance, a person can have an increasing heart rate but it cannot point out the happiness by its own. In the literature there are many studies done in this area to measure emotions by using laboratory techniques. With the possibility of wearable technologies, emotions might be detected and communicated in order to enhance the wearer's psychological state and create new communication patterns in interpersonal relationships. Wearable Technology, which will be addressed in the following section, has emerged as a new research area to bridge the gap between intangible facts of communication and physical body.

4. WEARABLE TECHNOLOGY AS TANGIBLE INTERFACE

Clothes are the most intimate surfaces between our surroundings and bodies, which are constant transmitter and receiver of emotions, experiences and meaning [16]. While Seymour mentioned that garments are often referred as "second skins" [16], in 2005 Turkle in the paper *The Second Self*: *Computers and the Human Spirit*, claimed that computers are able to serve as a "second selves" [17], This analogy can give rise to a new integration for a common fact: being an extension, a second layer of the body, which communicates the inside with the outside world. While technology is getting intimate, insofar beneath the skin, the wearable technology is becoming an emerging area where the innovation can occur in many directions to turn the intangibility of inner state into tangible artefacts.

Due to the emerging area where fashion meets technology, one of the roles of the designer should be creating socially acceptable, aesthetic forms for the integration of technology with daily life clothing. Combining the aesthetics of fashion with the intelligence of technology, garments can become tangible interfaces that transmit data. There are some fashion designers, such as Caglayan [18], who have already tried to combine fashion with technology. His works showed how garments can be dynamic displays of the human body in such an aesthetic way.

When textile as a soft material meets with electronics, there are some factors which have to be considered by the designer, such as: fitting to the body, form, aesthetics and the most important factor is making them pleasurable. Based on the pleasure theory from Jordan and Tiger [9], wearable technology can create pleasure in different ways:

1. Physio pleasure: fit to the human body and movements

2. Socio pleasure: enhancing the interaction with others.

3. Psycho pleasure: people's reactions and psychological state during the use of the wearable.

4. Ideo pleasure: how others think about the wearable and what it communicates to others.

According to Desmet, there are four types of affective states (two axes: intentional vs. non-intentional, brief-permanent): emotions, moods, sentiments, personality traits [10]. Emotions last short time and they can be triggered by different outside affects. On the other hand, clothes with their semiotic codes have always been used to express moods, sentiments or personality traits. Through garments people express their gender, statue, occupation and personality in a non-verbal way. However, they are less suited to express emotion, as emotions are more dynamic and short lived. New technology can help in that, as they allow for more dynamic changes, such as changing form or color. Thanks to new technologies, people soon will want products that are not only tools, but 'living objects' that people can relate to; products that serve for not only functional utilities but also emotional ones [12]. Therefore, garments are becoming full of senses, answering both physiological, psychological and social needs of the future consumers who are surrounded by the emerging technologies. Through turning garments into intelligent interfaces which can answer these emerging needs, in this experimental project we address the issue of wearable technology based on various interaction scenarios.

5. EXPERIMENTAL PROJECT

The experimental study we mention in this section focuses on how garments can be mediums to communicate emotion as an intangible fact by exploring new applications of wearable technologies and creating a fusion of garments, emotion and technology. Wearable Technology can give new forms to social patterns through enforcing the wearer's existence in the social environment. Within the last twenty years communication technologies offer new ways of social connection through new applications, such as instant messaging, SMS, e-mail, telephone calls, social networks. These changes in communication technologies has increased the desire of individuals to be socially connected, but also has had its effect on quality of the interpersonal communication. The absence of the body as a medium in these new communication technologies may create misunderstanding or even miscommunication. As the emotional context, displayed by the body language (behavioral), is not communicated and the self-reporting (psychological) is left stand-alone. Emotional communication through wearable technology can be used to strengthen social bonds and reconnect people in a way where the emotions are not hidden anymore, but shown as tangible artifacts on the human body. Later this can help to transfer this information display apart from the human body to enforce the quality of communication over a long distance. To verify this hypothesis, the ongoing experimental project aims to discover new ways of sensing, interacting, and interpreting the emotions through developing new concepts and building both virtual and real prototypes.

Moreover, wearable technology still is a new phenomenon for people to accept in their daily lives, although there is a very fast adaptation with the new technology. This research aims to show avenues to designers to create pleasurable forms for the integration of technology with daily life clothing.
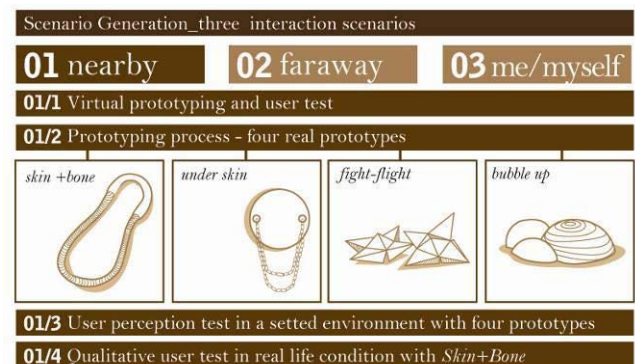

Figure 1: Experimental Research Process

5.1. Embodiment and Metaphor

According to Fishkin [19] the tangible interfaces can vary between two taxonomies -embodiment and metaphor- in order to create new user experiences. The embodiment is categorized as; 'Distant' (the output is separated from the input), 'Environmental' (output is around the user), 'Nearby' (the output is near to the input) and 'Full' (the output device is the input device). In the experimental project, these taxonomies were applied in three

different scenarios, which work with different accessories where the emotional embodiment occurs.

On the other hand, Fishkin [19] mentions a second taxonomy, Metaphor, in which the interface can be related to another matter. It consists of; 'No Metaphor' (no analogy to an existing object or action), 'Noun or Verb' (the interface looks like or acts like something else), 'Verb and Noun' (the interface looks and acts in a familiar way to another object) and 'Full' (there is no distinction between the virtual and physical object). In this research project, wearables behave as membranes, which metaphorically resemble the human skin. Human skin, the boundary between the self and the outer world, is a surface where the feelings are exposed without self control. When a person feels embarrassed or angry, it is often seen directly as a change on the skin. Stelarc [20] says: "We have considered the skin as surface, as interface, which has been as boundary for the soul, for the self, and simultaneously, a beginning to the world. Once technology stretches and pierces the skin, the skin as a barrier is erased." By the new technologies, it is possible to know what goes on under the skin, such as emotions. In this research project, emotional states are taken as intangible data which is communicated and transmitted by garments - human's intelligent covers.

5.2. Scenarios

The research project consists of moving accessories and garments that help to improve the communication based on a system put together by three scenarios: *Nearby*, *Faraway* and *Me/Myself*.

Figure 2: Three wearable scenarios

In the first scenario, *Nearby*, the garment becomes an interface which exposes the inner state of the wearer and tries to enforce the communication between the wearer and the nearby person. This scenario is related to Fishkin's full embodiment, which the output and input occur in the same device. In this case, the garment is an additional tool to the wearer's bodily movements and emotional expressions, which are sometimes hidden. People occasionally try not to show their emotions such as shame or fear in public. The fact that emotions are intimate, they are more likely to be shown in close relationships, such as between love partners, family, close friends. Therefore, in this scenario close relationships were chosen as a target user group. The wearable can enhance the intimacy of the communication and add new dynamics to interpersonal relationships by exposing the emotions, which are felt instantly. Nowadays, personal privacy has become an important issue because of the wide availability and use of electronic networks augmenting the ease with which personal data can circulate [21]. In the *Nearby* scenario, to eliminate the negative side effect of privacy issue, we are focusing on intimate relationships where the partners are willing to express their emotions to each other.

In the second scenario, *Faraway,* the focus group consists of two people in a distant relationship, in which the emotions are communicated through modern communication devices. This type of scenario is based on Fishkin's distant embodiment, in which the output is removed from the input. In this scenario, one of the partners has a soft device where he/she can see and touch the emotional changes of the other person on the other side. By using a tactile and visual sensory and gesture-based interface, the device enhances the emotional part of communication in a distant relationship.

The third scenario, *Me/Myself* includes an interaction between the wearer and the garment. This is based on Fiskin's full embodiment where the output is on the input device. The garment records the emotional data and enables the wearer to be aware of her/his emotions by showing it on a tangible interface.

These three scenarios were developed in order to understand different levels of emotional communication and how to create a tangible interaction between various types of interpersonal relationships. We hypothesize that the tangible interface can enhance the emotional communication with more user contentment than text or spoken messages.

5.3. Virtual Prototyping and User Test

As a first step of the experimental project, a collection of dynamic garments were designed and built up by using a 3D modelling tool in a virtual environment in VP Lab of KAEMART group (www.kaemart.it). The garment is based on the dynamic folds, which subtly occur in vertical and horizontal direction on different parts of the dress. 3D visualization tool was used to animate the changes on the dress and show it to participants. Virtual modelling provided an advantage to do further modification on the dress according to the test results.

The virtual dynamic garment was shown to 5 male and 5 female participants in order to understand the user's perception on the garments, which can change shape and color according to the emotional state of the wearer. The participants were asked which kind of emotion they associate with the dynamic changes on the dress. Based on the Laban [22] theory, horizontal movements on the dress occur as spreading and enclosing, vertical movements occur as lengthening and shortening. The answers were analyzed in order to understand the relation between the form changes and the perception.

Spreading Sides was mostly associated with happiness, being self-confident and energetic. Because of the spreading form it was seen as a kind of extension of the body, which gives a stronger image.

Enclosing Sides was mostly associated with stress and anger. When the dynamic change is faster, it was seen as fear because of the sudden movement. Due to the fact that the wrinkles are on the shoulder it was mostly seen as a muscle stress and tension, therefore it was associated with stress.

Lengthening Up-Down was chosen as a communication of relaxation. Because the movement looks like stretching, the participants mostly associated it with relaxation and peacefulness.

Shortening Up-Down was associated with anxiety, depressed and disgust, which were varying from each participant.

Lengthening Down, different than lengthening Up-Down, was associated mostly with sadness and depression.

Shortening Up, different than shortening Up-Down, was mostly associated with happiness, being energetic and surprise.

Figure 3: The virtual model test results based on different scales of movements.

Beside the movements, the direction of the wrinkles was effecting the perception of the participants. For instance, the vertical wrinkles were associated mostly with active emotions such as anger, fear and stress, on the other hand horizontal wrinkles were associated with passive emotions such as relaxation, disgust or depress. When the form change occurred with two directional wrinkles both vertical and horizontal, participants were confused about the association of the emotions.

Although we created a set with color changing garments, most of the participants found form changes easier to associate with an emotion than the color changes. These findings showed us that the direction of the movement could be an important element of the language of the dynamic dresses.

5.4. Real Prototyping

The second stage of the research project foresees the real prototyping activities. As a first step in order to realize the *Nearby* scenario, in TU/e Wearable Senses Lab, the project was resulted in four prototypes, which were based on different emotion measurement methods, such as body arousal, self expression and body posture.

The prototyping process includes integrating electronics with soft goods, perception tests, human ergonomics, material touch and aesthetic aspects.
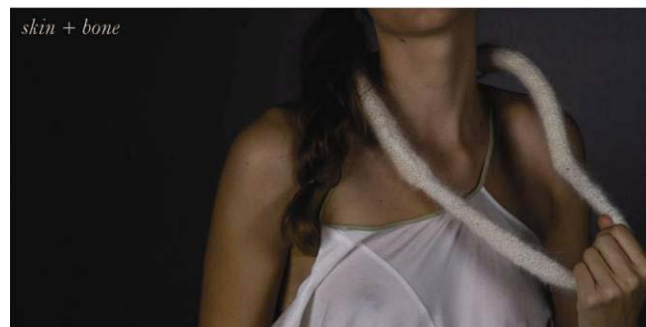

Figure 4: The *Skin-Bone* prototype worn by a female model.

The first prototype, *Skin-Bone,* is an emotional communication tool built by body sensors, electrical motor, and wireless network transmission, embedded in a garment worn by the participants. The prototype aims to monitor physical data of the body, mapping heart rate and skin conductance. It collects the data from the body of participant, and sends it to the computer by Bluetooth technology; therefore the participants could stay maximum 20 meters far from their computer. It enables the participants to interact and interpret their inner state through the movement of the prototype. When the wearer reaches to a stress level, the necklace starts moving up to the neck. By pulling the necklace down the wearer can be aware of her/his emotional state. Thus, this might help her/him to cope with the stress and the negative emotions.

The necklace consists of two different parts: one is the soft part, which acts like a dynamic skin moving around the neck; the other part is the hard part, which contains the electronic components that give life to the necklace and receive the data from the computer. The prototype has to be worn with two different sensors, which are on several parts of the body.
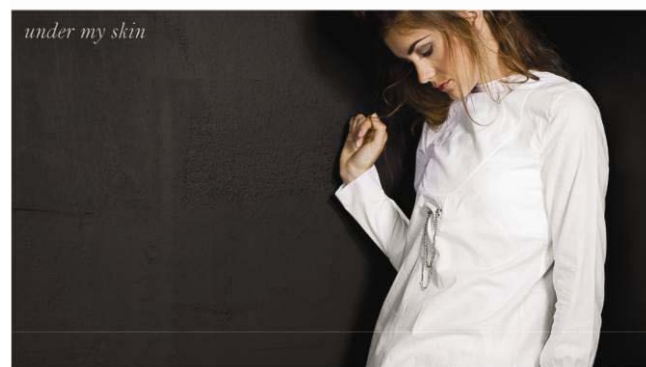

Figure 5: The *Under my Skin* prototype worn by a female model.

The second prototype is an underwear, which can be worn with daily clothes. *Under my Skin* is an accessory that senses happiness, joy and excitement. It works with small accessories that are attached over the garment to a servomotor which moves by the trigger of the sensor. *Under my Skin* would work with a heart rate sensor and a cognitive decision, which the wearer decides whether he/she feels positive or negative by placing the accessories on different parts of the body. Therefore, this prototype is based on a mix of cognitive and body arousal measurement methods.

Figure 6: The *Fight/Flight* prototype worn by a male model.

The third prototype, *Fight-Flight,* is a wearable for male users based on the shape of a holster that would sense stress through a bent posture or body tension. When stress is detected, the holster would respond by contracting and changing shape to a form with sharp edges. In order to release the holster the wearer must take a more relaxed and healthy posture. In this prototype, body posture is used in order to measure the emotional state that triggers the wearable.

Figure 7: The *Bubble-up* mock-up.

The fourth prototype, *Bubble-up*, is a garment that is worn on the waist representing the excitement feeling on the stomach. The bubble shape patterns enlarge with high arousal and turn the garment from a flat state to an outward state. This prototype remained as a primitive model which was not improved by integrating sensors, because of incoherent results attained in the perception studies.

After the prototyping process, for the further studies two different user perception tests were done in order to evaluate each prototype.

6. USER'S EXPERIENCE

A user's perception study was done through two different tests carried out firstly in a controlled environment, secondly in a real life condition. In the first user test, four different working prototypes were exposed to participants that could explore the products through interacting with them in order to describe their experiences and associations of emotions. It was a primary step to understand the user's perception towards the moving garments.

In pursuit of the first test, *Skin-Bone* was selected as the most communicative wearable. After it was completed as an advance prototype working with body sensors, a qualitative contextualized user experience test was done in order to understand the user's perception when the wearable was worn by the participant. The

communication of emotion between two people can only be unrestricted when they are in an intimate context and relationship. Therefore, a qualitative test was done in a real life environment in order to provide wider and substantial information.

6.1. Participants

We selected twelve participants for the first test of whom 6 were women and 6 were men. Their ages vary from 20 to 27 years. The results were obtained by observation and narration of the participants while observing and interacting with the wearables. Due to the fact that we needed more extrovert participants who could express his /her emotions comfortably, they were chosen among the design students.

For the *Skin-Bone* qualitative contextualized user experience test, we selected a couple who are both designers and together for a long time. The intimacy of the relationship gave us the possibility to observe the role of the wearable in an intimate relationship where it might be easy to expose emotions.

6.2. Prototypes

In the first perception test we used four prototypes. We selected the prototypes according to their different places on the body, and variable kinds of movements. For instance, while the Skin-Bone was having a shrinking movement, the Bubble-up was spreading out. Alternatively, while the Fight/Flight was covering the shoulders, the Under my Skin was indicating the chest area. The prototypes were dressed on four mannequins.

Figure 8: User perception test with four prototypes.

For the second user test, we used the *Skin-Bon*e prototype, which was functioning with two body sensors. It was worn by the female participant while observed by the male participant.

6.3 Observation

In the first user test, we collected data through a video camera, asking them to interact and express the emotions that the prototypes were communicating. The test let the participants describe their experiences spontaneously and besides, they were asked to fill a form where they wrote their impressions by positioning the emotions on the valance/arousal diagram.

The second test with the *Skin-Bone* was done in a real life environment without recording in order to create a more comfortable situation for the participants. After the test was completed, we asked questions to report their 1-hour experience. This report was recorded by a video camera..

7. RESULTS

Based on the user's perception studies, four different issues, which are *User Interaction, Aesthetics of dynamic and static form, Location of the garments on the body* and *Trust* are addressed in this section.

7.1. User Interaction

In the prototyping process, one of the most important factors was to design pleasurable, aesthetic and communicative products. Different materials have different visual and tactile features. For instance, using wool or felt creates more friendly touch experiences while interacting with them. Therefore, in the first perception test the participants were tending to touch the garments while they were moving. This tendency might be a reason of curiosity of the movement which invites to touch. For instance, a participant expressed her opinion about the *Fight/Flight* with these words:

FB: It feels like he needs an attention like a tender touch or hug.

In the second test, the participant, who was wearing the necklace felt comfortable to touch the necklace. Pulling the necklace down was felt relieving and even evoked relaxation. In the beginning of the evening the necklace took a big part in their conversation, being the topic and relating aspects of their personal state to the dynamics of the necklace. Later when the conversation got more intimate the necklace started to interfere. Pulling the necklace down frequently distracted them from their topic.

Besides, because the moving garment was a new object for the participants, it was drawn attention immediately and induced excitement. After the garment was accepted as a regular element of the context, the dynamic changes on the prototype could be read more correctly without any influence of excitement.

7.2. Aesthetics of dynamic and static form

When the accessories appeared in aesthetically pleasant shapes, it was difficult for the participants to associate it with a negative emotion. In general disordered shapes communicate unpleasant emotions such as anger, depress. Therefore, a behaviour, which shifts between order and disorder, was associated as a change between pleasant and unpleasant emotion, such as relaxation and stress. For instance, in the example of the *Bubble-up* prototype we found confusing results, due to the disordered wrinkles in the textile that surrounded the bubbles. These wrinkles were associated with negative emotions while the expanding bubbles referred to more positive emotions. This was also mentioned in the paper from Overbeeke and Wensveen [23] as: *when people are in a positive mood they express this through the creation of symmetrical and balanced composition.*

Due to the fact that wearable technology is a new manner in the daily life, the participants were mostly impressed by the movement of the wearable. A self-moving garment was a sudden and unexpected thing for them. Therefore they might associate it with an active emotion, such as excitement and surprise.

The first perception test gave us some results about motion perception related to emotions. For instance, excitement was linked with fast movement and opening. Besides, relaxation was linked with slow movement and opening. Depression was shown on with slow movement and closing. And, finally, stress was shown with fast and closing movement.
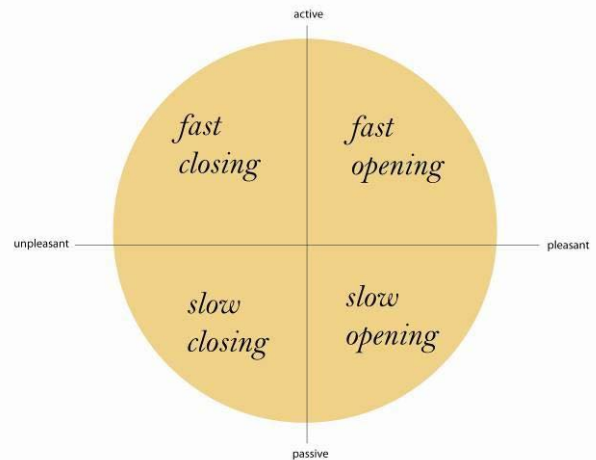

Figure 9: Motion-emotion perception results

In the second user test, the *Skin-Bone* was considered as aesthetically pleasant object that the participants didn't have problems to put on. It did not seem as a weird technological device, which they refused to wear. However, the fact that it has some organic attributes, due to its movement, the participants could perceive the necklace as a living object, an animal on their body. For instance, they reported their opinions:

FB: It is like a snake trying to move around the neck.

Because the necklace moves by itself, it was interpreted as something separate from the wearer, when the changes do not fit the users' expressions.

7.3. Location of the garments on the body

The location of the garments on the body effected the participants' perceptions, too. For instance, the shoulders were associated with stress and relaxation. On the other hand, the stomach was mostly associated with excitement or anxiety.

FB: Like a nervous feeling when you are anxious you feel it in the stomach.

FB: It is like stress. You have muscle tension on your shoulder when you get stress.

The participants were giving examples of how they feel when they are experiencing the emotions on their body.

7.4. Trust

The trust to the device was another issue that was observed. If the wrong body data combination triggers the wearable for detecting a specific emotion, the communication might fail. In the second user test, the participants reported that after one point they didn't take the necklace into consideration. They thought the necklace was moving without a certain reason. The fact that the necklace seems to move without its' wearer's control, it might cause mistrust. According to Picard [13], we should expect recognition rates to be different for person-dependent or person-independent systems. Therefore, in the future studies, we will work on a

confirmation system, which helps the system get to know the wearer by time through variable confirmations.

8. CONCLUSION

This research aims to understand the role of the wearable technology in emotional communication. The embodiment of emotions through wearable technology can be a solution to fulfil the lack of emotional expression in communication done with today's technological devices. This hypothesis is not only a future scenario for creating new tangible communication tool, but also it explores how garments can be used to bring human body and technology together by an aesthetic way and draws attention to the emotional aspect of the interpersonal relationships. This research project is an experimental work to show how an intangible fact, *Emotion*, can be mediated through wearable technologies by merging it with the aesthetical aspect of fashion.

As next step of this research project, there will be the prototyping of the faraway device, which is based on tactile communication. Tactile perception refers to the touching behaviour that frequently occurs during the social interaction. The faraway device provides a tactile connectedness through wireless communication technologies and sensors. In the next stage of the empirical research, the focus point will be the tactility, while in the first part it was about shape and movement, which are visual properties of the wearable device.

The experimental project could be an example to understand how emotions can be transmitted through wearable technologies. In the future, this research can open avenues to develop new social communication tools by bringing together various disciplines.

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