Interactive Digitalwear with Wearable Technology: ViViTi

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Abstract. The purpose of this study is to provide useful information and service to users through 'ViViTi', wearable computer based interactive digital wear. This study is to provide 'emotional service' of digital wear that can satisfy the emotional need of users by paying attention to human intangible 'emotion'. This study devised a product considering problems which were drawn from cases of existing digitalwear and whether the product can be commercialized is verified.

Keywords: Wearable Computer, HCI(Human-Computer Interaction), Emotional Communication, Interactive Digitalwear

1   Introduction

In today's society, paradigm which is quite different from paradigm in a materialistic age which was based on machinery and technical skills is required. As hardware oriented society has become soft, life design which focuses on using leisure time to create a new life is considered important. In other words, people have begun to pursue consumption which considers time which people spend in using goods more important than consumption of goods itself [1]. Fashion market which is closely related to consumers recognizes such a new paradigm and evolves to provide new service which considers quality important to consumers. Clothes which are equipped with information and service and provide more valuable experience have been studied.

The purpose of this study is to computerize(informationization) human intangible 'emotion' by uniting wearable computer and clothes and use it as an element of expression of 'emotional interaction' among users and propose service as language which delivers a story that contains pleasure, amusement and feeling. This study is to verify whether a product can be commercialized as human friendly interactive digitalwear [2], [3].

2   Related Works

Interactive digitalwear can be classified into networking interactive clothes and sensor based interactive clothes. Networking interactive clothes and sensor based interactive

clothes have in common that when two or more people meet and their clothes contact each other or are placed close, letters or figures are implemented by a sensor which is contained in clothes [4].

Hug shirts devised by Francesca Rosella, an Italian is digitalwear make it possible for a person who wears it to feel hugging of the other party who is located at a long distance. Skin Dress devised by Phillips is interactive digitalwear which emits lights and changes shape of clothes according to emotion of a user. Smart Second Skin devised by Jenny Tilloson perceives emotion of a user and emits fragrance which matches emotion.

As mentioned in above mentioned cases, digitalwear makes it possible for people who wear it to share each other's feeling [4]. Digitalwear clothes which are based on human feelings(emotion) enable people who wear to commune with each other in a more meaningful manner.

Fig. 1. Interactive Digitalwear with emotion

3   Interactive Digitalwear : ViViTi

′ViViTi' which is a combination of the words Vivify and T-shirt is interactive digitalwear which ordinary T-shirt and wearable computer are combined. Computing devices are used for various uses such as entertainment beyond computing. Computers move to portable computers from desktop computers [1]. 'ViViTi' was designed to accommodate such a new lifestyle.

3.1 Process

<Figure 2> shows production process of 'ViViTi'. Market research was conducted and goals were set to provide useful digitalwear and find problems. Based on market research, composition of digitalwear and interaction scenario were actualized. Digitalwear prototype was produced based on design and system. A product was provided to people to draw questions to be addressed in the future based on problems of 'ViViTi'.
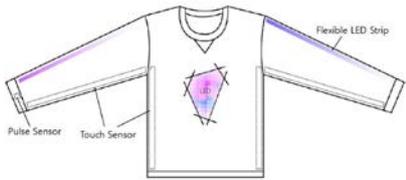
Fig. 2. Process

3.2 Composition and Interaction scenario

This study produced two sets of 'ViViTi' and implemented one to one (1:1) interaction. Main objective of 'ViViTi' is emotional interaction among users. Interaction scenario for young lovers who are smooth in emotional communication was composed. Computing was designed so that a change in emotion of users can be captured in real time via wearable computer. 'ViViTi' is suitable to be used in active entertainment field [6].

Table 1. ViViTi Composition and Interaction Scenario

Composition	Interaction Scenario
	1. Push power button installed in a lining in clothes 2. Heartbeat sensor which is attached to clothes measures heartbeat in real time 3. LED located in heart operates at the same speed with heartbeat of a user 4. Sensors which are attached on arms of clothes contact each other 5. LED which is attached on arms of clothes operates whenever it contacts

3.3   Implementation

3.3.1 Cloth Design

People tend to pursue their unique style but do not prefer abnormal style in purchasing clothes [2]. Considering above mentioned tendency, 'ViViTi' was designed based on simple man to man T shirt so that it can be worn as ordinary clothes as well as for events. T shirt was lined to prevent devices attached to clothes from contacting skin of a user [5]. Soft light with feeling of water color painting is produced in 'ViViTi' by designing in such a manner that LED is expressed after passing clothes surface. 'ViViTi' is digitalwear with artistry which only digital can provide and is acceptable to both man and woman.

Table 2. Design elements applied to ViViTi

Design Element	ViViTi

Wearability	Clothes is lined to prevent users from feeling uncomfortable
Functionality	′ViViTi' can be worn as ordinary clothes as well as for events
Aesthetics	′ViViTi' provides beauty which is differentiated from existing clothes by using LED

3.3.2 Wearable Technology

Arduino which is installed on a lining of 'ViViTi' produced in this study adjusts input and output devices. Pulse sensor and touch sensor along with conductive thread were used as input device. LED(flexible LED strip) was used as output device. A heartbeat sensor was attached to a part which a wrist and clothes contact and measured heart rate of a user in real time. Measured heart rate is printed out in LED of heart. Heartbeat sensor plays a role of expressing exchange of feelings among users by reacting to feelings of users. Touch sensor was attached to the inside of arms and sides considering frequency of physical contact between lovers. LED located on arms operates every time the inside of arms and sides contact which expands human physical contact with digital output device and forms new communication in a digital environment.

Table 3. Base Technology

Base Technology	ViViTi
Material	Man to man T shirt with ordinary cotton, Conductive Thread
Component	Arduino, Pulse Sensor, Touch Sensor, LED(flexible LED strip), Battery, Battery Case
Computing	-Value which is input through heartbeat sensor is converted to mean value and then printed out in LED of heart -LED of arms line is printed out with signal of contact (LED ON)/non contact (LED OFF) in touch sensor

Fig. 3. Implementation Images

4   Conclusion

  This study inquired a feasibility of digitalwear as emotional service by analyzing emotion based digitalwear cases. This study examined whether emotional service is feasible based on 'ViViTi' that is interactive digitalwear.

  'ViViTi' provides emotional service which is differentiated from existing clothes and enables people who wear it to interact with each other. In addition, 'ViViTi' has design elements which people prefer. 'ViViTi' is digitalwear that can satisfy people. However, it will take considerable time to commercialize 'ViViTi'. Further research should be carried out to improve 'ViViTi' by conducting evaluation and analysis of 'ViViTi'. In addition, further research should be conducted to optimize 'ViViTi' as goods of digitalwear.

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