

If We Could Picture Ourselves On A Dark Stormy Summer Night, Could A Tiny Raindrop Light Us Up?

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ABSTRACT

Technology seems to grow largely and is continuously evolving, it is perceived from another angle - in a cognitive way. Features of cognitive processes play an important role in perception such as touching, experiencing and feeling, giving it a new meaning: embodied technology. In this paper, an aspect of embodied technology is described as something shaped on and into the skin - electronic skin. Researches at the Massachusetts University of Technology and companies such as Philips (Far-Future Design Concepts) have been developing innovative design concepts in relationship with skin and technology. Some are developed for medical and others for aesthetic purposes. Embracing different theories and ideas, this paper will describe a possible futuristic vision of the skin. The skin will become the new interface, where tiny light particles, such as LED devices, will be implemented into the epidermal layer of the skin via microcapsules. The objective of the futuristic concept is to provoke new ways of understanding the skin, as well as thinking about the thin line between the reliability of the technology and the impact it has on our daily interactions.

Keywords

Technology, Cognition, Electronic Skin, Light, Interaction.

1. INTRODUCTION

Bill Gates once stated, *“Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important”*. I argue that this statement clearly shows that technology conveys the way information travels or is perceived – for example communication. If not directly occurring, communication needs a medium to happen; however, before the tool plays its role, interaction between people has to take place. It is a tool that helps people to improve practices and theories; in this way the tool shapes based on the individual’s needs.

Technology seems to evolve with greater speed, making a wide impact on our everyday life. Since from the late 19th Century, in which the first telegraphers were invented to run railways safely, from fibers for optical telecommunications to computer science and networking, systems have evolved and expanded, increasing

their complexity [15]. From my point of view, the only limits are the human creativity and imagination. If we could picture ourselves on a dark stormy summer night, could a tiny raindrop light us up? Our skin would have a new role as an interface, which converts the outside world into something that is processed in our brain and represented on the skin itself. Could it be the start of something attractive or even repulsive for the person itself and the surrounding environment?

1.1 Technology and cognition

Continuously evolving, technology is perceived from another angle - in a cognitive way – since it is based on a thought process behind the behavior [16]. Cognizing, such as thinking, understanding and knowing, is a mental state, which develops into cognitive technology in that stage, when the capacity of the performance goes beyond the limits of the brain perception [3]. Features of cognitive processes play an important role in perception such as touching, experiencing and feeling; giving it a new meaning: embodied technology (Figure 1). I argue that embodied technology develops new forms of cognitive interpretations, improving interaction between people and artifacts and also leading the way to perceive and sense the world - as a result of cognition - with different tools, like epidermal electronics.

Nowadays, some technologies try to shape devices that embrace a form of a circuit situated on our bodies; others implement electronic ink into the skin. The aim of the professionals and researches is to use the skin as an output device from the body itself, giving it a new function exceeding protection, sensation, thermoregulation and control of evaporation [9].

This paper presents the relation between skin and technology and how it can be used to outline a new form of non-verbal, embodied expression.

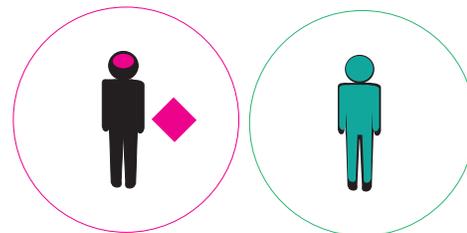


Figure 1. Traditional technology vs. embodied technology

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2. THE VISUAL EXPRESSION

I agree that professionals have been working on implementing visions and studying the relationship between everyday technology and the skin. The visual expression offers the body a new story to tell, a new narrative to describe reactions.

2.1. The “hybrid-media” skin

Experts such as Olivier Goulet and Yann Marrusich have been investigating the mutation of the skin, and if such, on the correlation between natural and artificial skin. Oliver Goulet’s “SkinBag Corps” is an assortment of accessories, bags and garments made from synthetic skin involving distinctively folded textures [1]. Yann Marrusich on the opposite, introducing the skin project “Blue Remix”, tries to replicate the body’s inner-processes through the skin using blue-tinted biological liquid (Figure 2) [6]. Just like the vision of this paper, both examples invite the reader to explore himself in relation to the environment and opens up the reflective paths between the inside and the outside world.



Figure 2. Blue Remix by Yann Marussich

2.2. The electronic skin: lights, humans and devices

I argue that there is a growing need for innovation, as teams like Philips and Roger’s team are putting additional money and effort into trying to attract the audience with fresh ideas and innovative products. Epidermal electronics is a class of electronic systems, which consist of ultra thin silicon transistors with elastic and flexible characteristics. These devices are directly applied on the skin and are invisible to the user. Other than being electronics, those devices may perform a wide range of tasks, such as measuring the temperature or heartbeat, or, by adding sensors electrical activity of an athlete muscle [8]. Epidermal electronics can be used in combination with LEDs (light emitting diodes) that can operate as photonic tattoos or LED tattoos [17]. Researchers at Massachusetts University of Technology have been developing multifunctional fibers with light emitting sensors used for medical imaging [2]. Integrated in the device, solar cells and wireless coils can be used as a form of power supply [4]. Another form of epidermal electronic is the Electronic Tattoo generated by Philips in the Far-Future Design Concepts (Figure 3). Among other epidermal electronic devices, Philips adds aesthetical value to the skin - giving new visually and emotionally powerful meaning. The tattoo is implemented into the human body through a small surgery and it consists of flexible pixel microcapsules, i.e. electronic ink. The image is created in that moment, when the bioelectricity field is generated and conducted to the matrices through the body, augmented by human touch [17]. According to

the designers, these tattoos should be able to respond also to neural and endocrinal variations.



Figure 3: Philips Electronic Tattoo

The visual spectrum has a range between 390 nm and 700 nm and seems to work best as sunlight for humans, which penetrates the earth’s atmosphere and is processed in the brain [10]. In contrast to other organisms, the human eye is limited to perceive only visual light - not ultraviolet or infrared, and because of specialized cells – so-called cones and rods - it elaborates only day and night vision [12]. Visual perception or rendering of visual information is a complex process and task of the human brain. Visual perception itself demands precise neural firing, which is why visual rendering has to be elaborate; otherwise it can be easily fooled by some psychological phenomena, such as hallucination and illusion [7]. Other aspects of light perception are attention, perceived control, environmental appraisal and affect. These can moderate several stress reactions or prevent tiredness [18]. Among these psychological effects, light can also affect biological processes such as circadian rhythms and metabolism regulating hormones and enzymes.

Electronic devices work in a similar way as human vision. For instance, devices interpret the light of its environment and once the light has been elaborated in a light sensory input, it is conveyed into electrical signals in a computerized system. Equally, objects can absorb, reflect and transmit light – or several devices can be used, such as photovoltaic modules, where energy can be conveyed. The photovoltaic method is used to convert sunlight into electricity using semiconductors – mostly silicon (mono-crystalline, polycrystalline and/or amorphous). Both big and small devices can be used, since they need a small amount of electrical energy to work [11].

3. THE VISION

Appearance and body image have always occupied the mind of humans – the color of the skin.

I believe that the skin itself has a significant influence on the image of a human being, how this image will be reflected upon others as well as how self-identity and socialization is treated. Skin is the most visible medium to provoke thinking, perceiving or other emotions, since through the skin humans communicate non-verbally to the world – using tattoos, piercing, mutilation, cosmetic surgeries, etc. Skin is the medium that divides the internal from the external world and its close relationship with the psyche allows expressing feelings or moods. Emotional factors,

such as stressful life events, can influence many skin diseases – that is well recognized in dermatology [14].

The skin also reveals and responds itself to emotions. The biology of the skin is very vascular, as the skin responds through vasodilation. When caring for someone, our skin feels more warm, soft, and pliable. On the other hand, when a negative factor such as threat or danger occurs, the human body sends the blood to the muscles making the skin feel cold, which typically causes goose bumps. Sometimes the skin gives the environment more insights on what is happening on the inside, than words could [13].

A new way of implementing technology in and on our skin can stir heavy discussions on the interaction between the skin itself and both the user and the surrounding society. Using the principle of the Phillips electronic tattoo, which is performed by a small surgery on the skin, small microcapsules can be inserted in the external layer of the skin, i.e. the epidermis. My approach to the embodied technology concept would imply small photovoltaic modules that absorb light from the daily environment, and convey sunlight energy into electrical input. This electrical input would travel to Nano luminescent appliances that would express electrical input as light. While the electrical field is still conserved in the body, which is a great electricity conductor, the electrical field would pass the power to other microcapsules. Whenever an object, the rain for instance, would touch the skin, the charges would stimulate an electricity bio-field that would produce lighting on the skin (see Figure 4).

As stated above, the process of the cognition in relation to the perception would change with the transformation of the sensory input. The world around the user changes so the information we process is different; still we perceive and process with the same brain. How would the behavior behind the action change, for example the touch of the skin itself, would it be yet a meaningful action that adds expression to the appearance?



Figure 4: Rain augments the illumination of the skin (Edited)

4. DISCUSSION

How would the end user feel about its own lightened-up skin? A lot of research has been carried out regarding how light psychologically influences humans. If we assume that lighting has a positive affect on the human mental state, then we can relate our assumption to Robert Baron, a social and environmental psychologist, and his theory. His theory is grounded in the proponent of positive environmental conditions that lead to better performance, greater effort, less conflict and greater willingness to help others. Using illumination levels (various lightning conditions) lead to a positive effect on performance and cooperation effects [18]. If so, people would be naturally

motivated to complete their work and motivated to help others. People with mood disorders, such as Seasonal Affective Disorder, prefer high room illumination levels. If lights have a big impact on the human brain, we could erase or mitigate these mood disorders ourselves. Moreover, since photovoltaic modules need a small amount of electrical energy to work, people can find energy-efficient lighting preferable to conventional lighting. Another aspect to consider is, how this technology would influence our self-esteem. After all, illuminated skin can be considered as a new and innovative accessory to your skin, something even more powerful than a tattoo or a piercing.

If we think about society, could it be a new way of discriminating the other or accepting it as modern art? It is believed that humans need to make sense of what they see in order to fully comprehend and become involved in it [18]. According to the statement above, in order to accept something, society needs to know the message that stands beyond it. If the positive effects light has on the human brain could be presented, people would be more open minded to accept the new technology. The relationship between user and society is of utter importance (or partly) for individuals themselves. New social behaviors might arise and could be studied in order to develop fewer conflicts. One of the aims of the vision would be to generate a feeling of emotion when engaging in the interplay between skin and light and to create a new kind of non-verbal communication. Furthermore, the aspect of space is interesting. The user will create a new kind space, a better-looking environment.

As some people may have disorders where light is helpful, others fear light – photophobia. Photophobia, or intolerance to light, is not quite considered as a syndrome or phobia, but it is present from the moment of birth. No pathology is yet described or studied, but with time it can heal and disappear [5]. The vision of the illuminated skin could certainly have a negative affect on people suffering from photophobia. Another example where this technology would imply drawbacks is, when people would simply feel uncomfortable. In our every day life, we encounter people experiencing physical or/and emotional discomfort. The biggest accomplishment of this technology would be that people accept and are involved in a different kind of interaction, show feelings through light and make others feel comfortable and accepted. To conclude, the main intention of the paper is to raise discussion, provoke new thinking that one-day all of us could be hypothetically illuminated on a rainy day, and touch upon consequences, if any. Would it make us appreciate “the different” or would “the different” become just ordinary?

5. CONCLUSION

It is clear that demands for innovative design concepts grow with greater speed, as researchers try to connect technology and the body in different ways. The vision described in this paper is a skin carrying technology within itself, metaphorically illuminated by tiny raindrops, situated in a dark stormy summer night. Illuminated skin raises questions about differentiation, acceptance and self-motivation and self-esteem, and nevertheless, a form of technology that changes the final picture of cognition and the perception of the world. Intimate, interwoven interaction with no clear boundaries between end user and product, portrays new a tool for a better understanding of a new non-verbal interaction. Light has a positive effect on people’s mind – especially for those who suffer from light disorders such as Seasonal Affective Disorder. Light can also negatively affect people who suffer from photophobia. After all, this way of expression or representation

can develop new ways of non-verbal communication. However, the main aim would remain the interaction and behavior of the end user and the outside world. Moreover, further research needs to be done in the field of interaction design for better understanding of the illuminated skin, end user and surrounding environment.

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