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BIO X CULTURE : TRACING THE HERITAGE OF SOUTH EAST ASIA THROUGH WEARABLE TECHNOLOGY

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ABSTRACT

The aim of this paper is to find meaningful connection and relationship between tradition and innovation and to demonstrate their functional implementation in the wearable technology applications. While developing the new field of smart textiles, this paper stresses the importance of learning from traditional crafts and the value of craftsmanship. Exploration and use of the traditional textile motifs or ornamental pieces popular in traditional dance found in Southeast Asia region in Thailand are the input for a discussion about the role of craftsmanship and skills in developing materials with interactive properties that is held with relation to the possibilities for societal sustainability. Translation of traditional textile structures to digital code using biological data to make 3D printed textiles is discussed in this paper. The relationship of the behavior of that printed textile unit and what kind of functionality we want to enable inside our clothes is also examined. Keywords: Textile, Cultural value, Biological data; cells, bacteria, 3D Printed Textiles, Textile Code, Textile Structure

TEXTILE & BODY

Textile and clothing are the human's oldest companions. We use clothing for protection, decoration, to express social class, mood, self-esteem, sexuality, profession, religion, and identity. Tradition plays an important role for inspiration and motivation. The thousands of years old costuming tradition is effectively used to hide, reveal, and disfigure the self that we present to the world. The remaining artefacts can be viewed as symbols representing continuity of the self through time. The world artifacts dates back to the early 1800s, meaning "something created by humans usually for a practical purpose; especially: an object remaining from a particular period" and "something characteristic of or resulting from a particular human institution, period, trend, or individual". The reason why we focus to capture the behavioral data is because vanishes. Ken Friedman wrote that there is another behavioral dimension in the designed world, hidden in plain sight. It unfolds before us. We walk through it, embedded in it as we shape it around us. It arrives with each moment of time and vanishes as time passes by. This is the enacted world that we experience and capture partially in memory. We can document behavior, describe it, plan it, and represent it, but we only realize it in the living web of action and interaction. We experience behavior as we enact it, and then it vanishes. After the fact, it becomes an account, a memory of some kind, or perhaps the story of a memory''[1].



Figure 1: The different pieces of the wearable devices: the ear piece, the sweater piece, and the skirt piece.

CULTURAL WEARABLE TECHNOLOGY

The aim of this project is to challenge the idea of using the traditional textile motifs or ornamental pieces used in traditional dance found in Southeast Asia region especially in Thailand to create wearable device that has a cultural meaning. The interactivity is based on the Behavioral Artefacts caress meaning, definition, what is caress: to touch or kiss someone in a gentle and loving way.

The questions are: to define how we tap into the many modalities of the body through clothing as the interface to help us navigate the world, communicate, entertain or generally bring us greater understanding of ourselves? What kind of information processing do we want to carry out on our bodies? What kind of functionality do we want to enable inside our clothes or jewellery? The design concept enables the product to focus on aesthetic considerations, which are paramount in decisions about what people would wear. Are they ready to be transformed into bioscapes or biological memory membranes, wearing the inner state out? Clothing is also one of our most intimate and personal technologies; it

functions as protection, disguise, and interface to the world. We developed wearable composition based on the form and function. The material selected for the project is lycra mesh. The stretch and recovery properties of the knit textile allows the fit of the garment to be very tight and to play the role of a second skin and barrier between the environment and the body. This particular quality of the textiles is valuable for the successful body contour and smooth technology placement.



Figure 2: The full body design and the inspiration behind the Bio X Culture collection.

BIOLOGICAL DATA TO CULTURAL VALUE

We design three wearable devices that reflect different functionalities and their philosophical and cultural values. Every piece borrows inspiration from Southeast Asia textile to visualize biological information inside the human body. The generative algorithm was developed to convert DNA sequence into an abstract pattern that will later be 3D printed on the fabric used for the wearable piece. We use ARHGAP11B gene and HTT-5 gene as the template and for the ear piece and the sweater piece.

ARHGAP11B is a gene that is Human specified, it appears after the divergence from chimpanzee and helps promote development and evolutionary expansion of the brain neocortex [2]. The serotonin transporter protein (5-HTT/SLC6A4) transports the neurotransmitter serotonin from synapses to presynaptic neurons [3]. Caspi and colleagues found that individuals with the shorter variant were more likely to become depressed following environmental stress [4].

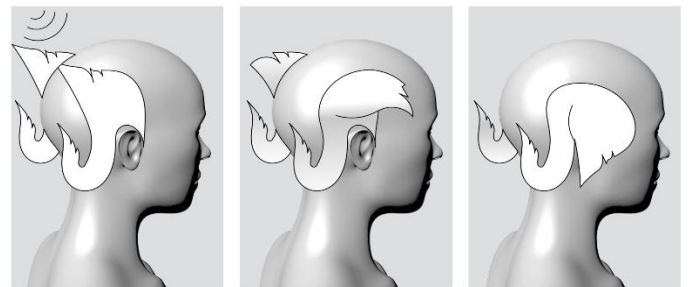


Figure 3: The ear piece changes shape when the noise level is higher than the threshold.

For the ear piece, we create a shape-changing device that is inspired by “Kaii chiak” (or chorn Jzu), an ornamental piece placed behind the ear used in the performance called “Khon”, a traditional dance found in Southeast Asia region especially in Thailand. Based on the historical document, this jewelry piece is designed to transfigure the performers into divine being characters. The form of Kaii chiak, which has many fractal structures dispersed around the ear, resembles divinity design in Southeast Asia. This kind of composition exaggerates the facial structure in an intriguing way. With the inspiration from “Kaii chiak”, our device aims to help transform and improve human wellbeing like the function of Kaii chiak in the dance costume. Human nowadays are living in the age of generated in last 2 years. People are craving to connect with social media and internet which has tremendous information transferring and generating at all times. Perception toward media has been disrupted by an overwhelming

creation of contents from users, which few of them are trustable. Media literacy which is the ability to access, analyse, create, and evaluate messages received from television, radio, Internet, time where there are many noise in the information. Not only informatics noise, noise pollution which is the disturbing or excessive noise that may harm the activity or balance of human or animal life caused by machines and transportation systems and other sources are also problematic to human. Noise pollution affects both health and behaviour. Unwanted sound (noise) can damage psychological health. Noise pollution can cause hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects.



Figure 4: Kainchiak, the cultural reference for the design of the ear piece.

We developed wearable device based on the form and function of Kainchiak which help transform human into more idealistic version of human being by enclosing human sense when noise pollution are perceived. The device contains microphone and arduino circuit, which serve as a sensor for pollution. The voice recognition software were deployed to search for keywords of hate speech, and violence information. The system also monitor the level of noise receiving by the microphone. These two conditions trigger the part of the jewelry inspired by “Kainchiak” to change its shape in order to obstruct those pollution by folding its shape around human ears and eyes. These shape changing device

demonstrates the concept of future human where progress does not always come with more quantity of data, but rather meaningful and peaceful information.

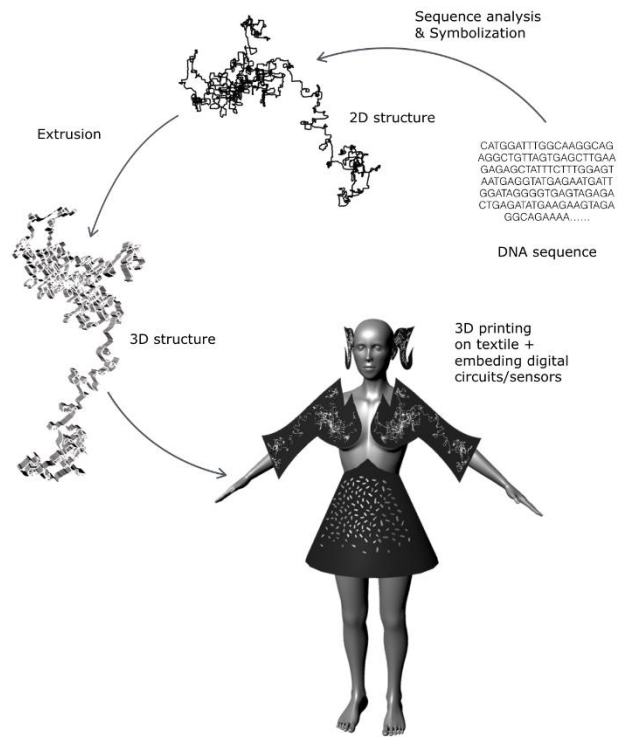


Figure 5: The process of converting biological information to 3D structures for 3D printing on textiles.

These artistic wearable device also stimulate a question of censorship, whether it is our choice or not to cease receiving information? For the sweater piece, we 3D print the generative design based on HTT-5 gene on the fabric. HTT-5 involve in neurotransmitter serotonin regulate which play a critical role in human happiness. This approach of making the technology invisible requires the technology to be embedding into the garment itself, using conductive thread, Lily Pad microcontroller, addressable 3 colour pixels and touch sensor. Each pixel is individually addressable (with conductive yarns) and is controlled to slowly change colour.

Each colour change can be programmed in the custom electronics board or controlled in real time when the display is connected to a computer through the serial port. The visual colour composition of the textile animates through several different patterns, resulting in a smooth transition between different designs. The design allows for the creation of many dynamic The outer layer of the garment is focusing on using the 3D printing technology as embroidery of gold filament to carve out an altogether new aesthetic territory using the human data for the inspiration ,with the intention of using it to preserve traditional embroidery.

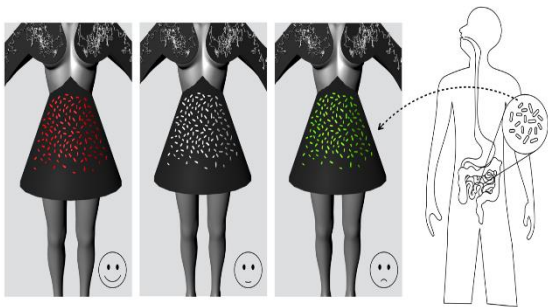


Figure 7: the color of the LED under the 3D printed bacteria liked structure change to reflect the health of microbiome inside human body.

For the Skirt piece, the main idea is to develop a platform that allow human to sense the health of their microbiome inside of their gut. Recent technological advancements help understand the relationship between human microbiome and our health [5]. Even though, there is no sensor that can monitor that kind of information. We imagine the future cloth will be able to display it to trigger behavioural change in the people that wear them.

CONCLUSION

The communication between textiles and human provide a crucial “carrier” service, helping to bond the

relationships between others and us and with the society as a whole. The new revolutionary wave of clothing and accessories is heading towards being smart and interactive , valuing our need for connectedness and sharing While developing the new field of smart textiles, it is a need and importance of learning from traditional crafts and the value of craftsmanship.

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