INTELLIGENT CLOTHES FOR EVERYDAY FASHION

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ABSTRACT

What are the reasons that wearables have not caught on and why do we hardly see these new aesthetic and functional expressions outside exhibitions, conferences, and stage performances? I propose that one reason is the aesthetic expression of wearables. Prototypes and commercially available wearables tend to be aesthetically and material wise quite far from the aesthetics and the material (fabric) of the clothes we normally wear. Many wearabes e.g. use LEDs as an aesthetic expression, which, however beautiful it might look, is quite far from what everyday clothes look and feel like, seeing that everyday clothes are mostly based on fabric. This project explores the question: How can we make wearables that relate to current, mainstream fashion trends, which is, mostly based on fabric, and yet still bring new expressions to the table?

INTRODUCTION

Investigating wearables, I have come across many fantastic ones. Most of them are very elaborate and intriguing designs, most of them are also designed for performance or art exhibitions and not so often for a commercial, mainstream market. I wanted to challenge this through exploring the materials and the aesthetics of the design. In order to do so, I worked with design constraints developed from a review of the wearables that currently make up the commercial, the artistic and the research area of wearables.

Design Constraints:

- The wearable cannot contain LEDs.
- The wearable cannot react to uncontrollable stimuli from inside or outside the body.
- The wearable cannot be targeted for art or performance.
- The wearable should be inspired by current fashion and appeal to fashion- and tech conscious women, age 25-35.

Instead of working with LEDs – which is very common in the field of wearable and intelligent clothing – this exploration focused on thermochromic inks that change color according to temperature. In this case the change occurs at 27°. Thermochromic inks were chosen because I wanted the design to be based on fabrics and because they hold quite a lot of potential in order to comply with current fashions trends, which, among other things, are very focused on textile print.
Besides exploring thermochromic inks, the process also included explorations in pigment inks (inks which does not change color), conductive thread, heating pads, transistors, batteries and the LilyPad Arduino – all elements which are included in the final design.

DESIGN METHODOLOGY

The research was mainly practice led and very inspired by Linda Worbin's work described in her dissertation "Designing Dynamic Textile Patterns" (Worbin, 2010). Worbin explores new ways and methods of research and ways of working with new materials such as thermochromic inks (Ibid).
The design methodology for this project was to explore the materials, but with guidance by using methods from fashion such as moodboards and target group. The design goal was thus not clear from the beginning – other than resulting in a wearable fashionable design complying with the above-mentioned constraint. During the material explorations, the properties of the materials became clearer and thus also the boundaries and the possibilities of designing with them. The method used for the design process was iteration between fashion moodboards and material explorations as seen in fig. 1.

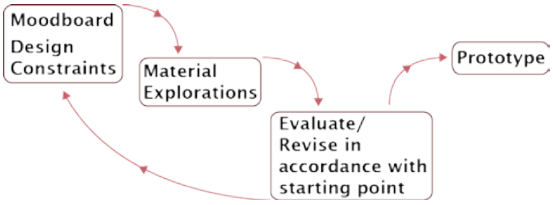

Figure 1 – the design method and process.

MATERIAL EXPLORATIONS

When working with textile design, there are many design variables, which has to be accounted for, i.e. color and shape. But when working with thermochromic inks, an extra variable is the fact that the designer cannot predict the outcome of the colors, which makes working with thermochromic inks a bit like working blind with colors (Worbin, 2010).
I had to develop a test method in order to understand the changes happening in the thermomchromic- and pigment inks. I tested three different binders (a binder is a substrate for the ink) on three different colors of fabric; black, white and gray. It was done with the same combinations of pigment and thermochromic colors in order to register the differences and the pros and cons of the different background colors and the properties of the binders (see fig. 2).

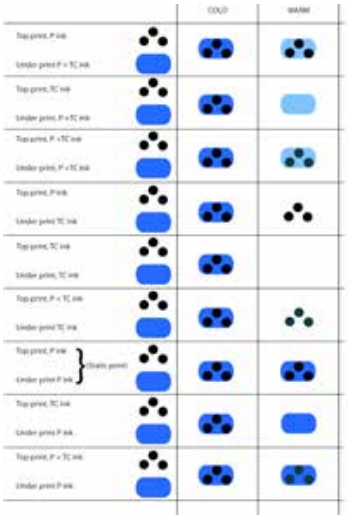

Fig. 2 – the first row indicates the top and bottom print and the mix of inks. The second row is what the print looks in it's cool state and the third row is what the print looks like in it's warm state. Some inks change a lot, some do not change at all.

The explorations proved, that the design would have to be done on a white/light piece of fabric in order to get a final design which was aesthetically pleasing for a piece of clothing – bright, clear colors and a soft surface

At the same time as testing the inks, I was testing different conductive threads and heating pads. In order to design a suitable match between the thread, the pads, the inks and fabric, finding out the properties of the different conductive threads and heating pads was crucial.

The properties of the materials and the evaluation with the moodboard, revealed that a simple pattern was a good solution for the final design. Moreover, when the thermochromic colors resemble the pigment colors in their cool state, but change when heated, the most surprising and interesting designs evolved, which seem to hold the most potential for a fashion design (see fig. 4).

Figure 4 – the same colors in their respective cold (left) and warm (right) state.

THE FINAL DESIGN

The final design is a feminine shirt, size 38, in the classic hounds tooth pattern. Since the design is aimed for the fashion market, it was important to make it suitable and believable for this, by keeping it up to date with the current trends, which was done, as explained above, by the use of moodboards during the entire process of exploring the materials. The shirt comes in two versions; one has color changing features on the pocket, the other on the collar. Color changes happen, when the wearer buttons the collar or the pocket. This way, it is up to the wearer whether or not she wants the shirt to change expression.

FUTURE WORK

1) Explore materials with color changing properties in aiming at designing a wearable with overall changeable visual expression
2) Explore how the wearer can be in complete control of the expression on the wearable even when in a warm environment, maybe by using other color changing inks or inks that change at a warmer temperature than 27° C/ 80.6 Fahrenheit.
3) Explorations into power options. Next prototype use Heatit°C, an open-source electronics platform currently being developed, which can precisely output high current.
4) Further xplorations into how fashion methods and material explorations can be combined.

REFERENCES

http://www.heatit.cc

Worbin, L. 2010. Designing Dynamic Textile Patterns, University of Borås Studies in Artistic Research no. 1, 2010, University of Borås.