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A report on the Classification of Smart Textiles

There are different types of textiles, natural, synthetic, regenerated, manmade and e-textiles or smart textiles. Smart Textiles are very popular as of right now as we can see how we are surrounded with technology pretty much every day. Most of us wear Smart Watches, so wearing smart clothing wouldn't really be a total different thing as we as consumers are expecting our designers to make apparel which does more than just looking pretty, we as consumers are looking for functionality and technology in our clothing and Smart Textiles check all of those boxes! Smart Textiles are further classified into 3 types: (1) passive smart, (2) active smart, and (3) very smart.

Passive smart textiles have simple reflex actions and they have no used control and they provide the same function regardless of the changes in the environment, they react in a way that is already determined. Active smart textiles are also known as interactive textiles as they are operated by the wearer and are controlled by an integrated button or panel. And lastly, Very smart textiles or super smart, ultra - smart textiles have a wide range of behaving to the environment they are exposed to such as a very smart textile would change color by being exposed to carbon dioxide or oxygen present in the air. These ultra-smart textiles not only behave but also self - adapt based on the changes in the environment that they can sense around them through the processor which is woven in its making.

EXAMPLE # 1

Google Jacquard uses our familiar clothing and accessory items and enhances them with technology by giving it a digital touch. As their [website](#) states, "Everything is Extraordinary" it is true because I am absolutely stunned by looking at their products and the interesting features they offer! They say that "their ambition is simple to make life easier" - which is truly displayed in their products as one can skip a song by swiping on one's jacket sleeve and can take a picture of something by simply tapping the shoulder strap on one's backpack.

I was particularly interested in the "*Trucker Jacket by Levi's*" as I love wearing denim jackets as they go with everything and are a classic! Here the left sleeve has the Jacquard tag tucked in, I feel that the tag is more like a chip as you can slide it in and take it out. I will classify this as an active smart or reactive, interactive textile as it can be controlled by the wearer by pressing the Google button and by using the Jacquard application on the phone. (See, Fig. 1). This text. Also gives its wearer a haptic feedback like light blinking and vibration, if the wearer forgets their phone somewhere. It also gives real-time updates about weather, news and sports. The battery of the Jacquard tag lasts up to 14 days. One can watch the jacket by simply removing the tag before washing, "other electronics contained in the jacket cuff are designed to go through standard consumer home washing". ([website / product specifications and under washing instructions](#)).

EXAMPLE # 2

Another innovation that I really liked is the *Bike - Powered Scarf Knitter / Cyclo - Knitter by George Barrat - Jones*. I feel that he has made a really cool invention by making the best out of waste. In his Imgur blog post he added pictures of how he used wood pieces to make the scarf

tower and an old bike to give it the spinning wheel mechanism. (See, Fig. 2). As he pedals forward, the yarn turns into a fabric within just five minutes which is the best part of it! He added, "I like making projects that are useful and make people smile. So I decided on making waiting for your train in the winter more enjoyable."(Barratt - Jones, 2018). He makes some attractive signage visuals so that the passerby's in the train station can read it and make their own scarves. It is also beneficial for them as in five minutes they are cycling and already generating heat for their body through this vigorous task plus they take home a 1.5-meter-long pure wool scarf! They are basically "getting hot to get warm" as the signage states.

I will classify the wool scarves made from this *Cyclo - Knitter* as a passive smart textile as it is basically a wool scarf which is going to provide the same function of keeping its wearer warm despite the changes in the environment. The wool scarf created from the *Cyclo - Knitter* gives no control to its wearer to reduce or increase the warmth given by the scarf. The wool scarf simply reacts in a predetermined way which is keeping it's wearer warm!

EXAMPLE #3

Lastly, the smart textile technology that totally blew up my mind is known as *CREOL's ChroMorphous technology*. CREOL is a College of Optics and Photonics at the University of Central Florida (UCF, which has successfully developed the "first - ever, active user - controlled, color changing fabric" - which allows its users / wearers to not just change the color of the fabric, but also allows them to change or add patterns to it. Large woven fabrics and cut - and - sewn textile products can now change their color and patterns through this *ChroMorphous technology*. (See, the purple tote bag in Fig. 3)I would have classified this as an active smart

textile if this only changed color on the user's control but since it is more than just changing color, adding patterns like stripes and also the textile changes its threads temperature. As "each thread woven into the fabric incorporates within it a thin metal micro - wire. An electric current flows through the micro - wires, thus slightly raising the thread's temperature. Special pigments embedded in the thread respond to this modification of temperature by changing its color."(Wearable Technology Insights, 2018).

Looking at all these technical facts, I will classify this as a very smart textile as in my opinion it is an ultra - smart textile which is also changing its threads temperature and is self-adapting as it can add stripes and other prints to its fabric and has also embedded entire *ChroMorphous technology* system into its threads.

In conclusion, my favorite is the *ChroMorphous Technology Smart Textile* as I feel that is a very revolutionary invention for our fashion industry. I mean think about it, when we first started wearing smart watches which allowed us to change the color of our dials and play with the themes of our watch faces to give it a sporty, glam or digital look, how all of us started abandoning the traditional analog watches? Just like that, I feel if this technology spreads out in the fashion business it would be a great buy for a confused consumer like me as it is hard for me to pick between two colors of a dress, so instead of only picking one of them and having the remorse of not buying the other color later, I end up buying both the colors of the same style of dress. So, it would be great to be able to buy just one dress which can be changed into multiple colors and multiple patterns! Also, I feel that other than clothing if this technology is used for home decor that would be great, like imagine not having to go through the trouble of finding the perfect matching curtains as the color of your bedsheets!

Figures:

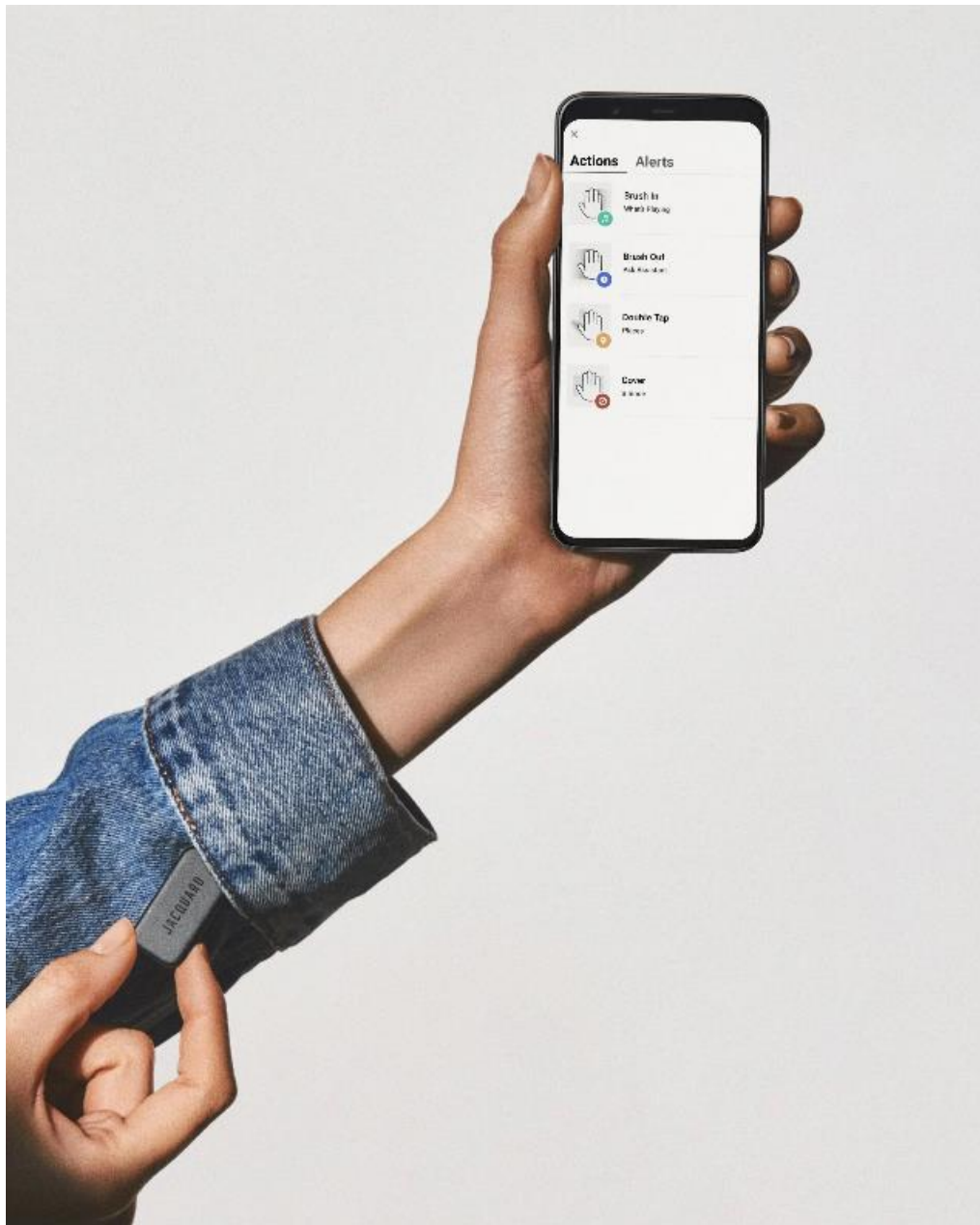


Fig. 1: The Google Jacquard Chip Inserted in the left cuff of the sleeve of the Levi's Trucker Jacket, which can be operated by the wearer using a cell phone application.



Fig. 2: Bike - Powered Scarf Knitter / *Cyclo - Knitter* by George Barrat - Jones.



Fig. 3: Active user-controlled color-changing fabric tote bag, by Chromorphous *technology*.

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