SMART TEXTILES
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Smart Textiles

Smart textiles are the future of fashion; in one singles generation we became completely addicted to technology and it seems hard to stay away from our phones, the next thing is weaving interactiveness into clothing, wearable technology means adding functions to clothes. The first thing that comes to mind is a huge breakthrough in fashion since no major scalable inventions happened since Nylon was invented right before WWII in 1938. Now there is a race for this scalable smart textile collaboration between scientists and major brands are many but what concerns is the use of more oil in clothes with added conductive energy touching the skin on a daily basis. Usually, something is invented, and it takes a while until we learn the health costs of such conveniences. More people are looking for sustainable and organic fabrics these days but on the other hand, the technology use is increasing. Whoever invents a sustainable organic smart textile will probably become very wealthy. Some smart textiles are already commonly used, an example is the antimicrobial fabrics that became quite popular towards the end of the COVID pandemic, also LED clothes that are used for artistic performances, and sports shoes that track information like miles and calories spent. Smart textiles are divided into Passive Smart, Active Smart, and Very Smart:

Passive Smart

Passive Smart means that textiles are made to react a certain way, it's not adaptable to the user's control, and "provide the same function no matter of the environment is doing" (Ketley, 2016). Passive smart textile has an extra function but doesn't need the use of the internet for example. An example would be antimicrobial clothes. The antimicrobial fabrics work similarly to the way soap and hand sanitizers do, they attack the pathogen on the cellular level to prevent their growth" (Apexmills, n.d.), in the U.S. government regulations control antimicrobial fabrics by demanding it to also be nontoxic to be considered antimicrobial. This textile technology is very useful in the hospital for dressing wounds and for scrubs, it's also used in furniture textile, automotive, and fashion activewear. It's a very current widespread technology. Another common passive smart feature on textiles is UV protection. Airbrush is an ALO yoga fabric that is antimicrobial another passive function is the control of moisture.

Figure 1. Alo Fabric technology. https://www.aloyogab2b.com/img//ALO_FABRIC_GUIDE.pdf

Active Smart

Active Smart textiles include some level of interactions like buttons or a panel, "they do something as a result of the sensed environment" (Ketley, 2016). An example would be heated textiles such as Lommia heated jackets. Active Smart textiles usually use electricity to change "form, store and regulate heat" (Lommia, n.d.). Lommia is a patented active smart fabric that can be washed. The fabric controls heat, includes a touch sensor, and it has a panel that lights up. It's flexible and foldable like a normal fabric but with the added functionalities that can be used for safety and comfort purposes. It's sewable and bondable making it perfect for apparel and furniture use. How does it work? Lommia is a soft circuit called e-textile, used when standard PCBs can't be used. The technology was developed in Stanford's labs. This type of technology is not widespread yet but it's already a reality as the company is able to produce 20000 pieces per month.
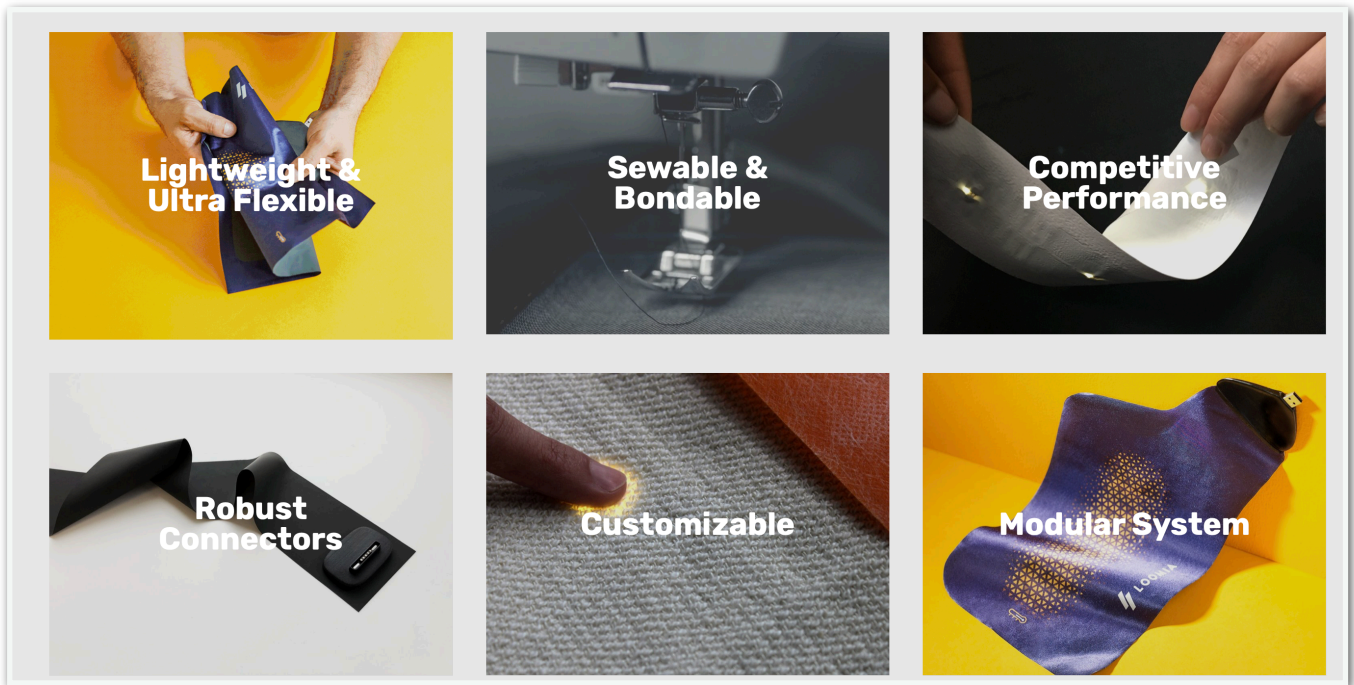
Figure 2. Active smart fabric Lommia. https://www.loomia.com/our-technology

Very Smart

      Much more complex systems are weaved into fabrics or adaptive wearable technologies that have "a range of behaviors that sense themselves and the external environment" (Ketley, 2016). An example would be IDTechX ChroMorphous color-changing fabric, a technology developed by the CREOL, The College of Optics & Photonics at UFC, University of Central Florida, that allows the fabric pattern or color to be changed by a smartphone. The new technology works by adapting to temperature changes in the body that are sensed by the microwires that are woven into the fabric (Chromorphous, n.d.). For the first time, the user can control these changes in color and pattern. The fabric can be washed, cut, and sewn. The technology is scalable but the patent is pending approval. So it's something that can become a reality in a near future.

In the future, it's clear the ultimate fashion luxuries will be related to the added functions in textile manufactury. Exclusivity related to technology is easier to patent than only a fast rotating

design with a branded logo so it seems like a great investment for major brands that will set small businesses and large businesses even more apart.

ChroMorphous can be used wherever you already find fabric. For accessories and clothing, ChroMorphous can utilize a small battery pack. For larger applications such as curtains or automobile upholstery, ChroMorphous can use the power source already available in those locations.

Figure 3. Color-changing fabric. http://www.chromorphous.com

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