

Smart Textiles

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Technology is ever changing and fabrics are functioning like never before. Smart textiles are functional fabrics and give a different approach from an everyday fabric's typical use. There are three different smart textiles which are passive smart, active smart, and very smart. All three types of textiles each use technology in different ways to benefit the wearer.

Passive smart textiles are referred to as the "first generation" of smart textiles (Vogt, 2019). They are the first smart textiles that came about. Passive smart textiles are passive as they can only sense information but don't adapt to that information they received. This type of garment would provide the same function regardless of what's going on with the environment. They don't adapt to the information they sense. Uniqlo's Heattech collection consists of passive smart textiles. The garments have temperature regulating properties and have fibers that help retain heat. Uniqlo's Heattech collection was created to make lightweight clothing to layer under an outfit to keep people warm (Uniqlo brings Heattech technology to an entire clothing collection, 2018). The collection's items contain micro acrylic fibers that help retain heat as it absorbs moisture from the body and turns it into heat (Uniqlo brings Heattech technology to an entire clothing collection, 2018). One function includes a mesh construction of micro acrylic air pockets that confine air for insulation (HEATTECH 2020 Fall/Winter Collection: UNIQLO US, 2020). The turtle neck in Figure 1 is part of the Heattech collection. Rather than providing heat by reacting to a cold environment, the garment retains heat no matter what the circumstance.

With active smart textiles, the name says it all. They adapt and respond to changes in the external environment or in response to the wearer. These textiles are active in that they may change shape or regulate heat (Vogt, 2019). Loomia's H1 heated jacket is a perfect example of an active smart textile. With its wool tweed, great for insulation, it's made for aesthetics aside

function. The jacket has a wire-free circuit board called the Loomia Electronic Layer which provides heating, lighting, touch sensing and the ability to transmit data (McDowell, 2019). It is the heart of the fabric because it senses the cold and transmits the data throughout providing the right heat setting. The jacket is perfect for women on the go because it adapts to the different temperatures and environments. Most heated jackets are designed by men but research shows women actually tend to get cold more easily so Loomia made the H1 jacket as a result (Dimitrova, 2019). The Loomia Electronic Layer is what brings the three back heating sections for warmth in any environment. One doesn't need an app to control the heating levels. Each jacket has a small battery pack that fits into the outer pocket as pictured in Figure 2. The heating can be switched on and off using the jacket's adapter cable (Dimitrova, 2019). All these qualities are the qualities of a passive smart textile.

Last and the most advanced textile, is the very smart textile and includes qualities of both passive smart and active smart textiles but is the most advanced. These textiles usually include processors. ChroMorphous is a fabric that is temperature controlled and the colors and pattern appearance can be changed, using a smartphone. Each woven thread is supplied with a micro wire and a color changing pigment (see Figure 3) (Sardone, 2019). The woven threads are made from a synthetic polymer and the pigment responds to change in temperature by changing the color of the thread (2019). ChroMorphous is different in that it not only changes the appearance of the color but the pattern too. It's not something that is usually seen. The innovative fabric can also be used for furniture and home decor.

As time goes on, and there's continuation of the development of textiles, features and capabilities will expand. All three textiles are a reflection of how technology of textiles advance over time.



Figure 1. A turtleneck top from the Uniqlo Heattech collection.

<https://news.yahoo.com/uniqlo-brings-heattech-technology-entire-clothing-collection-125108528.html>



Figure 2. (2019) Anatomy of the H1 Heated Jacket.

<https://www.interlaced.co/article/loomia-launches-womens-self-heating-jacket-1553786399>



Figure 3. (2018) Yourhandbag can change its color thanks to Chromorphous. (Image Courtesy of UCF)

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Figure 3. (2018) [Your handbag can change its color thanks to ChroMorphous] [Photograph] *UCF*.
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