

Module 3 Paper

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Introduction

Smart textiles and garments have captivated the fashion industry, making impactful strides pertaining to the industry's future. As innovation demands change, smart textiles present just that by implementing technology into these textiles and garments. Also referred to as e-Textiles, smart textiles are broken up into three categories based on their performance and functionality. Passive Smart, Active Smart, and Very Smart are the umbrella terms used to categorize the respective smart garment. The purpose of smart textiles and garments is to make technology fashionable. The garment does not need to be the flashiest or most luxurious, however, the functionality and exact purpose of the garment is essential to the end product as a whole. To fully comprehend what smart textiles and garments are, Passive Smart, Active Smart, and Very Smart textiles must be thoroughly explained in addition to their effectiveness.

Passive Smart Textiles and Garments

Passive smart textiles and garments can be perceived as the most common smart garment. As the name suggests, the technology implemented in this smart textile is passive and grants little to no user control (Kettley, 2016). These textiles usually give the same feedback no matter what space it performs in. This draws back to the functionality and purpose of smart textiles being that some possess more functions than others. For example, the passive smart textile is only able to comprehend and react to the environment it is in. Despite having limited functions, passive smart technology serves a hefty market and efficiently fulfills consumer needs. A prime example would be Uniqlo's Heattech collection. The thermal wear-based collection comes in a variety of silhouettes and styles and is infused with a fabric that locks in moisture, keeping body temperature warm. It may seem like a less valued tier smart textile compared to its counterparts, but Heattech according to Uniqlo created well over 9,000 prototypes. "The brand claims they went through 10,000 prototypes before finalizing the moisture-absorbing fabric, which boasts the ability to keep you warm and not let heat escape (Saunders, 2021)". These textiles do not need electrical wires as sensors to be deemed passive smart textiles. It is the technology and performance of the textile that attributes to which category it is placed in. Some even consider

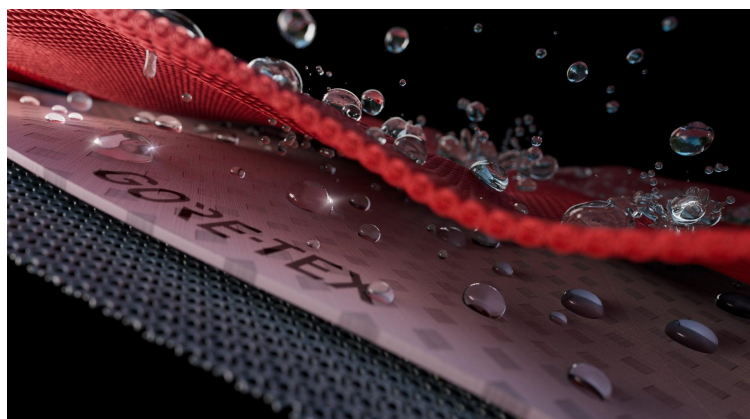


Figure 1. Gore-Tex

https://www.gore-tex.com/en_uk/blog/outdoor-fabric-care-guide-part-1-how-to-wash-gore-tex-apparel

Passive smart textiles as the oldest out of the three, as garments made decades ago, are able to mimic or even outperform some of the new technology. Smart textiles like passive smart are very common and can be found in most cases. Take Gore-Tex for instance, the water-resistant textile has been used by many leading businesses such as Nike which has a market share of 62% (Cascade, 2021). Gore-Tex not only activates when it interacts with liquids but also works as soon as the person moves. Gore-Tex senses activity and opens up to introduce cool air through its micro-pores. This smart textile does not demand electricity, wires, or sensors to be effective. The common denominator when identifying a passive smart textile/garment is that it reacts the same way to the environment it is introduced to each time. The garments are not able to collect data nor give feedback to the consumer. Active smart on the other hand has the potential to do so.

Active Smart

Active Smart textiles are interactive and require user control. Unlike passive smart textiles, active smart textiles have distinct reactions to the environment it is placed in. Based on the data it collects, active smart textile hence the name works actively to collect data to properly adjust to the environment in the future. These textiles and garments have basic programs implemented in them to make this possible. Active Smart textiles do require electricity, as LED lights and other features are used to communicate to the user that the garment is at work. These lights have the ability to communicate a variety of things to the consumer in regards to climate, body temperature, and even breathing patterns. E-textiles have also been included into things beyond clothing. A unique active smart textile some car owners are familiar with is the car seat warmer. These textiles are bedded with a special leather and bonded with heating technology. Adjustments to the heat can be adjusted in addition to which areas of the seat should exert it. Consumers have been known to appreciate the convenience of comfort from these textiles appreciating the satisfaction it gives them. A car owner of a heated car seat expressed that the car seat makes them feel alive (Hoby, 2020). The main components of active smart textiles are the control settings and the data presented to the user. It is significant to note that not all of these



Figure 2. Nike BB Adapt

<https://news.nike.com/news/nike-adapt-bb>

smart textiles are able to document data, but there are controls that can help adjust to user preferences. Another example of an active smart textile in action has been seen on the Nike Adapt. The Nike adapter is a self lacing basketball sneaker that comes with adjustable buttons for both lacing and comfort. The sneaker also comes with an app to record user movement, with the intention to recommend lifestyle changes and performance alterations. The sole purpose of the shoe is to overtime adjust to the consumer's foot, eliminating the chances of discomfort in the future. "The Adapt BB — the BB stands for "basketball" — built on Nike's decades-long dream to create an auto-lacing smart shoe that adapts to wearers' feet" (Carman, 2019). Active Smart textiles have opened the door for many innovative breakthroughs in the fashion industry, but the surface has only been scratched. Very Smart textiles and garments have shown great promise and potential.

Very Smart Textiles and Garments

Very Smart Textiles are intricate technology wise and are capable of performing many tasks. Very Smart textiles are built off the foundation of passive and active smart textiles. However, this tier of garments is distinctive due to its complex technology. The functions of this textile are capable of compute and store an immense amount of data and the user has access to a variety of settings to alter. An example of this can be the Apple watch. With interchangeable



Figure 3. Apple watch showcasing "Time to stand up" alert

<https://www.techjunkie.com/disable-apple-watch-stand-reminders/>

wristbands and a microchip placed in the watch body, the Apple watch is able to identify when the user is moving, the location the user is in, and heartbeat. Very Smart textiles are usually the most interactive and encourage two-way communication. For instance, the Apple Watch has an app installed that encourages the user to stand up if they have been sitting down for a long

period of time. “The Stand Reminder on Apple Watch will give you a gentle tap every 50 minutes to let you know it’s time to stand up (Writtenhouse, 2020)”. This garment is the most advanced out of the three yet has room for growth as malfunctions and hardware issues can come into play.

Conclusion

To fully comprehend the usage and performance of e-Textiles, it is important to know that performance and capabilities play a major role in their classification. Each smart textile may serve a specific market but that does not take away the effectiveness each garment is able to provide in certain circumstances. The future of fashion relies on innovation and creativity, things that smart textiles have been able to showcase .

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