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Wearable technology clothing - the potential to adapt and succeed in the fashion retail

Abstract

Fashion and technology are two different spheres that have been brought together when the first calculator watch was introduced in mid 1970 therefore starting the presence of wearable technology. Since then, wearable technology has only been growing, entering not only accessories sector as the very first but also clothing and footwear. This paper reports whether wearable technology clothing and footwear have a potential to adapt and succeed in fashion retail. The issues that appear as obstacles to the wearable technology spreading into the fashion retail have been investigated and the possible solutions are discussed. The important factors that affect the purchasing behaviour of consumers with wearable technology clothing or footwear products are investigated.

Keywords: wearable technology, fashion retail, consumers concerns

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Introduction to wearable technology and smart clothing

Wearable technology refers to clothing and footwear that incorporate advanced electronic and computing technologies for the fashion industry. These types of garments are sometimes commonly called “smart/intelligent textiles and clothing”, “smart/intelligent fashion” or simply “wearables”. Wearable technology field is interdisciplinary as it brings concepts and expertise from a variety of disciplines, such as computer engineering, materials science, and textile design and fashion engineering.¹ ‘Smart clothing- intelligent garments that actually work for us in some way...’ says Olivia Gordon.² Clothing with electronics of computers and telephones embedded into them are not a dream of the future. They have been developed, and are changing not only the way we communicate but also use clothes.³

Recent years, set-up fashion houses and new designers of the industry have been specialising on wearable technology garments. Also, a few well-known fashion designers and brands have been focusing on moving one step forward by introducing wearables amongst all the other traditional collections they created. While some of the garments are currently only prototypes, others are actually available for purchasing online. An example is a London based fashion brand CuteCircuit who designs Interactive Haute Couture as well as Ready-to-wear collections. One of its most outstanding designs available on the website is the Stripy Dress, shown in Figure 1. It is made out of layers of silk organze-satin in black and translucent white, highlighting this 50s couture-inspired silhouette. The hem of the multi-tiered tulle underskirt features micro-LEDs for added glamour that shine through to create amazing animations. The dress has a controller and the battery is rechargeable via USB and can be fully charged in an hours. The long-life battery power can keep the dress working for the whole night.⁴

A dress shown in Figure 2, was designed by Pauline van Dongen, it can capture the sunlight and simply convert it into electricity. Its main specification is in the innovative integration of solar cells into textile, functioning as a fashion garment with an embodied interface. The shirt combines solar panels and flexible electronics that can collect energy from the sun in the daytime and convert into electric power.

The solar shirt is designed as everyday wear; it is capable of storing the amount of energy that is enough to charge a smartphone or any other USB compatible, portable electronic devices.⁵

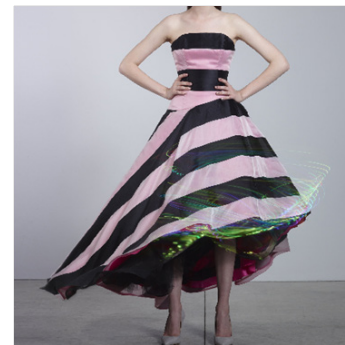


Figure 1 Stripy Dress.⁴

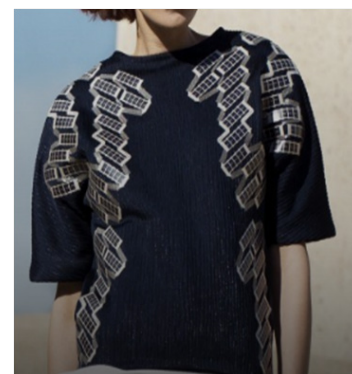


Figure 2 Wearable Solar.⁵

While sports footwear has proved to be early adopter of technology, fashionable footwear is accepting the technology very slowly. One of the examples are illuminating high- heels designed by Francesca Castagnacci, shown in Figure 3. Clad in fabric of the shoe is woven with really thin light-reflecting optical fibres and high-efficiency LEDs, allowing the shoe result luminescence. To create these optical effects, Castagnacci uses the concept of Luminex and Photonic fabrics.⁶



Figure 3 Fiber-Optic Heels.⁶

Function and aesthetics, obstacles to wearable technology and possible solutions

For the customer to be fully satisfied, the wearable technology product has to both look good and work. Both 'Form' and 'Function' are very important. While 'Form' embraces aesthetic concerns and how important it is to appreciate the end-user's culture, 'Function' embraces the general human body requirements, also the particular demands of the end use or activity.⁷ Wearable textiles and apparel must ensure reliability in functioning 'in relation to the technical and aesthetic concerns of the wearer, as well as from social, cultural and health perspectives.'⁷ According to Sandy Black, professor of fashion and textile design and technology at London College of Fashion, for fashionable smart clothing to succeed, the design has to be fully function and be very simple to use, regardless the sufficiency of technology. She believes that it is not happening just yet as people's focus is all on technology although good design input is needed right from the beginning. 'So many things have to come together- technology, design, power sources- and everything's moving at different paces.'⁸

Designers and companies creating wearable technology apparel must consider the target market and overview potential customer's profile well in order to design relatively. By investigating the wearer, their lifestyle demands in terms of behaviour, environment and peer group pressure, designers can become aware of the requirements of the clothing as well as wearable technologies and the applications. Also, those wearable technology items must have an appropriate functionality and be truly usable for the identified customer.⁷

Power source

Textiles Intelligence Limited in 2012, reported that the size and weight of the power supply devices integrated into the garments are one of the major obstacles to wearable electronics market growth. Today, batteries are the main power source used for some of the wearable technology garments, which is not ideal as they are too bulky and relatively heavy to be fully integrated into the structures of textiles and clothing systems. Furthermore, batteries often do not last long enough as well as they have to be removed before the garment is washed.¹

Having to supply the electric power to the batteries of wearable technology products when they go off can be very inconvenient as it can happen anywhere at any time. Although, the power source issue is one of a few that has a lot of effort put into its progress with new

developments like stretchable battery, 3D printed battery and wireless charging.

Washability and durability

The washability and durability of the wearable technology clothing is currently still one of the issues preventing customers' acceptance and adaption of the products.⁷ It is a common sense that one of the main questions when purchasing a product is how to maintain it, how it needs to be washed or cleaned. When it comes to wearable technology clothing, many areas of it are power-supplied by batteries that would have to be removed before washing. This raises a question whether the product can be as durable as consumers would like it to be with integrated technology having to withstand the constant wear and tear of the actual material of the garment.

Advanced core technologies, which would resist standard washing techniques, must be created towards the elimination of this issue. Also, large-scale uptake could be achieved by the development of the appropriate flexible encapsulation solutions.⁷

Important factors rating when purchasing wearable technology clothing or footwear products

In this study, over 100 participants originated from the UK, and other different European countries as well as those outside the EU were asked to rate the importance of the aspects provided, which they would think about when purchasing wearable technology product. The aspects include design and aesthetics, price, functionality, power supply, and others which allowed participants to specify something else that may appear as a matter for them. Participants were able to give any number of stars from 1 to 6 to each aspect; the highest number corresponds to the biggest concern and so on. Participants were, however, unable to give the same number of rankings to more than one aspect. The reason for that was to achieve more accurate results in order to identify the aspects from the most to the least important.

As we can see in the column chart below (Figure 4), design and aesthetics aspect have the highest- 6 star rating. Price, however, comes the second as the majority of the participants gave 5 stars to it. This data shows that cost takes the second place following design and aesthetics which was expected. It is the fact that every human being first sees the design of the product and if attracted to it, an interest in the price is caused.

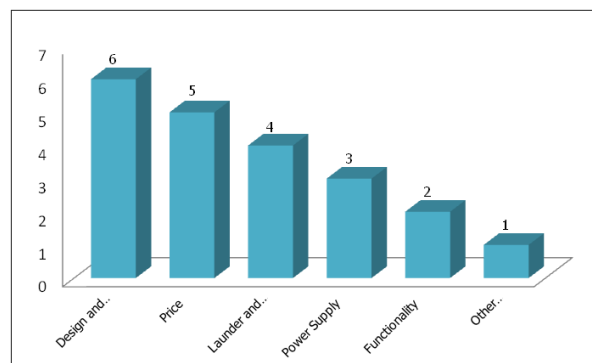


Figure 4 Concerns when purchasing a product.

Such results, revealing design and aesthetics and price as the biggest concerns, support the statement in section 2. GfK analyst J. Martin, who although talking about wearable technology devices, stated that not creating a sleek design but also right pricing has to be offered for the product to succeed and get the market moving.⁹

Launder and durability was rated 4 stars, what makes it a third biggest participants' concern when buying wearable technology item. This outcome is consistent with McCann and Bryson's work (refer to section 2), documented in *Smart Clothes and Wearable Technology*, stating that washability and durability is one of the issues preventing people's acceptance of wearable technology products.

Power Supply was rated quite low with the outcome of 3 stars, meaning that the consumers do not contemplate about the size of batteries, how long they last and how they are integrated into the garment or a pair of shoes. These results are very unexpected, considering the fact that technology is a field, which usually does associate with power sources and supply. It being integrated into fashion could be thought to still be associated with those aspects and concern people even more. Surprisingly this is not the case, design and aesthetics is still significant matter, as it would be in traditional fashion.

Functionality, in terms of full responsiveness to all the body needs, not only technologically was rated with only 2 stars, while other was the last selection for most of the participants.

Majority of the participants specified comfort as other aspect important to them, which was not on the list. However, this matter could be ascribed to functionality as responding to all needs of the body would mean comfortable in all ways. Another aspect specified by participants was safety; they would be worried about possible electroshock if wearing some of the underwear pieces. Although this would not be a case in most of the items as they would not be available if they were not safety checked.

Another very interesting observation by one of the participants under the other aspects section: how healthy is it for our bodies to be carrying around electronics extremely close to our body? Certain vibrations of electric and currents interfere with the vibration coming from our own body. This is a fact and not merely 'hippy' queries. By all means it is certainly a really good remark and could be beneficial for some companies, brands and designers to take it into consideration when aiming to create and provide successful products.

Conclusion

The following conclusions can be made through the study of consumer's opinions on fashion and wearable technology.

- i. Power source, washability and durability are the important factors that affect the functionality of wearable clothing and technology.
- ii. Among the predetermined factors 'design and aesthetics, price, functionality, power supply' for this research project, that may affect consumers purchasing behavior, it was found that 'design and aesthetics' was rated the highest, followed by 'price' and 'functionality', and 'power supply' was rated as the least.

From consumers rating results, it implies that most of the consumers consider purchasing wearable clothing very much the same as normal fashion wear. Wearable technology and the important functionality and use it involves haven't been taken as important, this might be due to the lack of understanding of wearable technology and its cost for certain end uses.

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None.

Conflicts of interest

The authors declare that they have no competing interests.

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