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Emerging smart fashion and its scope in the future

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ABSTRACT

Smart fashion has recently attracted the attention of people and is slowly getting popularized. It is a new form of fashion with technology embedded in it, making our everyday activities more efficient and less time-consuming. This study provides information about how smart fashion is developing and the sectors where it is being actively adopted by professionalsand governments. The paper discusses the emergence and continual growth of smart fashion invarious domains: military, healthcare, and sports. Smart fashion for the elderly, smart textiles , and gadgets for the youth have also been included in the study. Smart fashion has not been extensively commercialized across different countries yet, however, this research work showsthe enormous potential it carries; it portrays how with the advancement of technology, it will become more and more aesthetically pleasing and comfortable for commoners and industrials.

Keywords: *Fashion, Emerging, Developing*

1. INTRODUCTION

Advancements in technology are constantly taking place, improving efficiency and commercializing tools and gadgets to make our lives comfortable. Smart fashion refers to clothing that enables increased functionality using digital devices, lights, batteries, or advancedfibers. Smart fashion has developed a lot in recent years with new technologies being introduced around the world. Smart fashion was invented in the 1990s when the technology of smart clothing started to develop into the LED T-shirts present today. However, smart textiles only started developing in the mid-1990s when a group of researchers wanted to come up with wearable computers. This new development of smart textiles had many benefits, the most significant benefits were its functionality, constant adaptability, and presence in the market. Some examples of smart textiles include UV protective clothing, plasma-treated clothing, and ceramic-coated textiles, among others [1]. The goal of smart fashion is to equip people so that they get their everyday work done more efficiently, as well as increase efficiency in various industrial sectors. This research work aims to analyze the emerging smart fashion technologies insectors like the military, healthcare, sports, and marine, as well as the various smart gadgets which have become an inherent part of the lives of the youth and the elderly.

2. SMART FASHION IN VARIOUS SECTORS

2.1 Military

Soldiers of the future are most likely going to be equipped with wearable technology soon. There are so many new technologies in the military field that have started becoming popular andknown on military bases around the world. An example of a smart fashion device in the militarysector is called BioHarness. The BioHarness is capable of measuring stress levels of humans and can be used not only for soldiers but also for firemen and even astronauts. This device enables the detection of the health status of the subject (heart rate, breathing rate, body temperature, blood oxygen saturation, position, activity, and posture), as well as external information (temperature, presence of toxic gases, and heat flux passing through the garments). At the moment, there are various smart textiles that are in the making for the military - still in their developmental levels. The military in the US is in collaboration with MIT and they are hopeful to create the uniforms of the future for their soldiers. The next steps for this process to continue and develop would be to present them to the labs, test, and experiment so that they can be out in the market soon. [2]

2.2 Healthcare

Smart textiles for healthcare vary around the world; they include textile sensors, actuators, andwearable electronics systems, among others. They are embedded into textiles that are able to transfer physiological data and enable wireless communication between the person wearing it and the operator, who would be the medical personnel in this case [3]. When a medical patient iswearing this

wearable device, it can indicate and give faster signals to the operator during an emergency. There can be multiple functions and many devices that can be added to explore different approaches according to the requirements. Smart fashion can be a future benefit for healthcare and as technology progresses; it can become the new normal for the healthcare industry. Healthcare smart fashion, thus, finds its use in hospital textiles and clothing for medicalpersonnel.

2.3 Sports

Sportswear has immensely changed over time: with new technology and fashion styles. Clothing is getting more breathable and lighter, making it the new norm in today's time. Some of the fibers and materials that are used in sportswear currently are microfibers and hollow fibers [4].

Microfibres are soft, durable, possess high absorbency, and are specially used in sportswear.They are usually made through metal spinning with process control, which results in a high-quality polymer [4]. Hollow fibers are flexible, have better recovery, and provide better thermal insulation by trapping air. They are very lightweight and soft which is why they are also used in a lot of thermal clothing. Some companies that have commercialized smart sportswear are Arion,Hexoskin, Quardio Core, and Catapult sports. Nowadays, there are numerous types of sportswearwith technological advancements installed in them to track fitness and health limits. This can bebeneficial in terms of health, fitness, comfort, and even clothing style. The different materialsand styles of sportswear also vary which makes the selection much wider for people to purchasefrom. Some examples of these materials include fleece fabrics, terry cloth, and stretch fabric.Smart fashion will continue to grow bigger and have more options in the sportswear sector in theupcoming years.

2.4 Smart Clothing for the elderly

Technology is made for everyday aspects to be more comfortable, and the people who need it themost are the elderly. So, it is important to bring up smart fashion for the elderly. The elderly need assistance and monitoring when they are in emergency situations in order to get immediate help. There are various aids including, robots and gadgets in clothing that have been commercialized and some are in their developmental phases. Wireless communication and Bluetooth can be associated and linked to clothing, to make them smart, so that communication and emergency situations can be taken care of faster and can be monitored at all times. This smart clothing system allows the elderly to easily access them as it is in a short-range distance at all times. Having this smart clothing system for the elderly is a very beneficial and safe way of monitoring and aiding/ caring for them. Although there are not those many options available at the moment, as technologies advance, there will most likely be various sorts of smart clothing made exclusively for the elderly [5].

3. SMART FASHION GADGETS

3.1 Fitbit Products

There are different variations of contrasting smart devices that are used today, some have been developed and some are still in the making at the moment. Technology has been associated andconnected with physical inactivity, healthy lifestyle technologies, such as wearable fitness -fitness bands and smartwatches. Fitbit offers several such fitness tracking products for all age groups. Children aged 11-12 have also started using Fitbit products which motivate self- monitoring and goal-setting behaviors such as increased physical activity levels [6]. Fitbit products have many individual components and features that allow an individual to monitor various aspects of their body and health. The Fitbit app allows users to monitor progress in physical activity, and goals, record workouts, compete with friends, as well as track sleep andfood patterns. These products have been a success, enabling new players to join the market. Some other companies that have smartwatches are Apple, Samsung Galaxy, Garmin, Fossil, andmany more.

3.2 Smart Glasses

Smart glasses introduce a digital world without limits. This section mentions a few smart glassesproducts, although some are in the making, however, some have hit the market profitably [7]. Spectacles by snap: This model of smart glasses spectacles 3 is a pair of sunglasses that can take 3D photos by pressing a button. After taking the photo you can connect and pair it to the Snapchat app and export it on your phone [8]. "Frames" by Bose: The aim of these glasses is to replace headphones. The sound is transmitted through bone induction, instead of putting buds in your ears as you do with headphones. According to 100BuyTech, this model provides the best audio experience compared to all the other bone conduction sound output these days. Its features include phone calls, listening to music, notifications from the phone, voice control, and head gestures [9].

"Gentle Monster" By Huawei: These are audio smart glasses that use directional speakers instead of bone conduction, which is far more common in other smart glassmodels. These glasses are the only fashion-centered glasses on the list [10].

Echo Frames by Amazon: These glasses can read out notifications from the user'sAndroid phone, ask Alexa to do things, and the "VIP" filter allows the user to read notifications out loud or keep them for later. They are more concerned about everyday use and support rather than music [11]. "Argon" by Solos: Solos aims to deliver augmented reality smart glasses that focus on everyday life. These glasses haven't been released yet, theyare still in development but they do have a campaign. These glasses have the unique feature of interchangeable frames. They also support health tracking, audio entertainment, and personal assistance through the AirGo mobile app [12]. Although all smart glasses have not become very common in the market yet and most are in the developmental stages, those in the market have been quite successful and received constructive criticism. Advancements in this field are a realitynot too far, and smart glasses will soon become as common as cell phones and laptops are today.

3.3 Piezoelectric shoes

In the last couple of years, the constant demand for energy-saving has brought continuous research on low-power devices, energy storage, and new sources of energy. Harvesting energy isa solution that involves capturing energy from the environment instead of

wasting it. The piezoelectric model (which converts mechanical work into electrical energy) has been one of the models that have been presented for this. The piezoelectric device is usually used and stored underneath the sole of an athletic shoe; this shape allows it to catch the vibration at the specific time of running and also provides output voltage and electric power. There have been various experiments on shoes, to see where the piezoelectric device should be placed to produce and giveout maximum energy. The piezoelectric shoes available in the market today have an energy harvesting circuit that is able to supply a current of 4mA for 5 seconds during a run, using a very small piezoelectric element [13].

4. CONCLUSION

The paper presents the recent developments and marketed products in a smart fashion and reveals the enormous scope of commercialization and advancement it entails. The smart fashion trends in the military, healthcare, and sports industry have been discussed using several examples. Smart clothing like the BioHarness, embedded wireless devices in clothing for medical emergencies, gadgets like Fitbit products, and smart glasses are the trending fashion norms, with continuous advancements and improvements being done based on consumer feedback. The paper mentions the popular brands and companies in the smart fashion business aswell as the upcoming technologies for making clothing comfortable and functional. It is not very far when smart fashion will become an inherent part of our lives.

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6. AUTHORS BIO

Gaurika Vaswani is a senior in Singapore American School. Growing up, she has always been fascinated by the fashion industry and is passionate to make an impact in the field. Withadvancement in technology, the fashion industry is blooming and she aims to use her research and innovative mind to create a new generation of wearable fashion.

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