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E-Business Standards and IOT Technologies Adoption in the Fashion Industry

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Abstract:
The fashion industry is experiencing a technological transformation with the advent of the Internet of Things (IoT). IoT has the potential to revolutionize the entire supply chain of the fashion industry by enhancing transparency, reducing waste, and improving sustainability. This research paper provides a review of the various IoT applications in the fashion industry. The paper covers the use of IoT in areas such as product design, supply chain management, inventory management, customer experience, and sustainability. The study highlights the benefits and challenges of implementing IoT in the fashion industry, including security and privacy concerns. The research paper concludes by discussing the future of IoT in the fashion industry ,RFID and the potential impact it could have on the industry.

Keywords
Fashion, supply chain, RFID standards, sustainability.

I. Introduction

In the last two decades, the internet has transformed several businesses. The internet has transformed the business paradigm in general and not only given businesses a platform. In the midst of the epidemic in 2020, we have seen enterprises becoming increasingly virtual. As a result, IOT, AR, and VR concepts are already some of the key instruments in the contemporary environment. Seen in the context of Industry 3.0, or a computer-driven industry, the textile industry today can be seen as bridging the gap between the development of a human-driven industry and that of an artificial one. With the advancements in cloud computing, enormous amounts of data can be stored and analysed quickly.

II. Conception of IOT

A network of physical items is the idea behind the Internet of Things (IOT). "Things" refers to items, hence the Internet of Things may be seen as including data exchange and, to a certain extent, manipulating physical objects through the use of sensors, software, and other technologies. Fingerprint scanners on our phones are an example of this technology in action; the sensor detects the fingerprints and, if a match is found, the phone is opened.

Today, if this technology is used in the industries, the benefits are enormous. It may significantly reduce human labour, mistakes, and variance. As a result, the industries are steadily adopting these technologies. One may also anticipate that the advent of 5G, which can transmit data at a rate of up to 20 GB/s, will have a significant influence on this technology in the near future.

III. Applications of Internet of Things in Textile Industry

3.1. Manufacturing Sector

The manufacturing industry, from the fibre to the final cloth, offers a wide range of applications for IOT. Using AI to recognise fibre properties and IOT to store and analyse data can help blends be optimised, which helps reduce differences in the finished product.

IOT integration in spinning and weaving machines may significantly reduce failures and optimise the operation. Monitoring intermediate operations and automatically transferring data from the blow room to the ring frame can improve quality, save time, manpower, paperwork, and machine downtime, increase output, and lower costs. This machine data monitoring can provide real-time process visibility. Also, it can aid in the quick identification of machine flaws and lengthen the life of the machine. Available on the Play Market is Rieter ESSENTIAL, an application from Rieter featuring these features.

3.2. Fashion and Designing and product Sector

Using current CADs and virtual digital sampling technologies, which create samples that closely resemble the final products, has minimised fabric waste and greatly increased system flexibility. With the present system, creating an e-product only takes a few clicks. The enormous volume of cloud data, client

internet searches, and the rapid and simple availability of new designs aid in the creation of products that meet the needs of the customer . One may anticipate that 3D printing and 4D printing will have a significant influence on the manufacture of final products in the future.

Automated embroidery machines have also advanced significantly because they offer improved precision, reproducibility, and efficiency in the creation of embroidery and designs. One only needs to enter designs into embroidery computer-aided design software, such as Richpeace, to obtain the desired designs. Aura, Baba, Maya, and a few other similar machine makers are possible. The E-Textile industry now has a lot of room to grow because to automated embroidery machines that can incorporate conductive yarns into clothing.

One factor that might support any textile product's claims of sustainability is traceability. Yet, in this fragmented textile supply chain, it is quite challenging to obtain accurate traceability. The use of IOT and cloud computing can be advantageous in this particular area. The most popular type of bar code is utilised for traceability. There have, however, been a few businesses (such as Textile Genesis) and technological advancements in this area.

3.3. Marketing Sector

The use of Internet of things has a lot of advantages in the sales sector for textiles. The main advantage being it facilitates the effective handling of big data. With better handling of big data, it helps in better understanding of the textile markets and customers. With better understanding of market and customer, it can help in a better and quick decision making. Even when a company is trying to introduce a new product, it can better predict the reaction of customers and also reduce the shelf life of the product.

Advertising is another important aspect that is very much affected by IoT. Google's local search ads is a major example the advertisements. Advertisements now target a particular section of people, based on their searches. For instance a person who searches for clothing a lot, will be shown related advertisements.

3.4. E-Textiles

E-Textile is an emerging sector that is expected to grow at a rate of 30.4% as per a survey. This sector has a huge potential in future, currently it has application in medical, military, fashion, eco-friendly, energy and production sectors . Since majority of the applications are sensor-based, IoT and AR, VR, AI, Cloud Computing can have high impact on this sector in future.

3.5 IoT Inquiries in the Fashion industry:

Product design :

The IoT can be used to boost improve the design process by providing absolute-occasion data on services inclinations, flows, and feedback.IoT-authorized wearable maneuvers can accumulate data on consumer management that maybe used to design crop tailored to particular services needs.

Supply chain Management:

The IoT can improve supply chain perceptibility by permissive absolute-time following of commodity and matters. Sensors maybe used to monitor the movement of amount during the whole of the supply chain, permissive better inventory administration and lowering waste.

Inventory Management:

The IoT can also advance stock administration by providing absolute-time dossier on stock levels, admitting associations to optimize inventory their stock and humiliate costs. RFID tags and sensors maybe used to track the flow of output in real-time opportunity, admitting companies to counter fast to changes standard.

Customer experience:

The IoT can raise the client occurrence by providing personalized and common happenings. IoT-authorized maneuvers such as smart mirrors and in essence room used to change clothes in apps can determine customers accompanying a embodied buying experience.

Sustainability:

The IoT can help the clothing industry enhance acceptable by permissive better waste management and lowering the manufacturing's element footprint. IoT sensors maybe used to monitor and increase strength consumption to weaken waste and enhance sustainability.

Benefits and challenges of IoT in the clothing industry:

The benefits of achieving IoT in the fashion industry involve raised perceptibility, improved adeptness, decreased waste, and enhanced sustainability. However, IoT adoption again creates challenges, containing freedom and privacy concerns, dossier administration challenges, and the need for meaningful investments in foundation and electronics.

3.6 RFID

RFID technology has several advantages over traditional identification and tracking systems, such as barcodes or magnetic stripes. RFID tags can be read from a distance without the need for line-of-sight, and multiple tags can be read simultaneously, making it more efficient for tracking large numbers of items. RFID tags can also be read and written to, allowing for more dynamic and interactive tracking systems.

RFID technology has a wide range of applications across various industries, including retail, manufacturing, logistics, and healthcare. In the retail industry, RFID tags can be used to improve inventory management, reduce theft and fraud, and enhance the customer experience through personalized promotions and recommendations. In manufacturing, RFID can be used to track work-in-progress, monitor the performance of equipment, and improve quality control.

3.7 Smart Fabrics:

The emergence of smart fabrics, such as conductive fabrics, has enabled the integration of IoT technology into clothing. Smart fabrics can monitor body temperature, heart rate, and other physiological data, providing insights into health and wellness.

Virtual Try-Ons: IoT-enabled virtual try-on technology allows customers to try on clothes virtually using a 3D avatar. This technology enables customers to visualize how the clothes will look on them before making a purchase.

Connected Accessories: IoT-enabled accessories, such as smartwatches and fitness trackers, are becoming increasingly popular. These devices can monitor activity levels, heart rate, and sleep patterns, providing insights into health and wellness.

Supply Chain Transparency: IoT technology can improve supply chain transparency by enabling real-time tracking of products and materials. This technology can reduce waste, improve inventory management, and enhance sustainability.

Personalized Shopping Experience: IoT technology can provide a personalized shopping experience by collecting and analyzing data on customer preferences, shopping history, and behavior. This technology enables retailers to offer personalized recommendations and promotions, improving the customer experience.

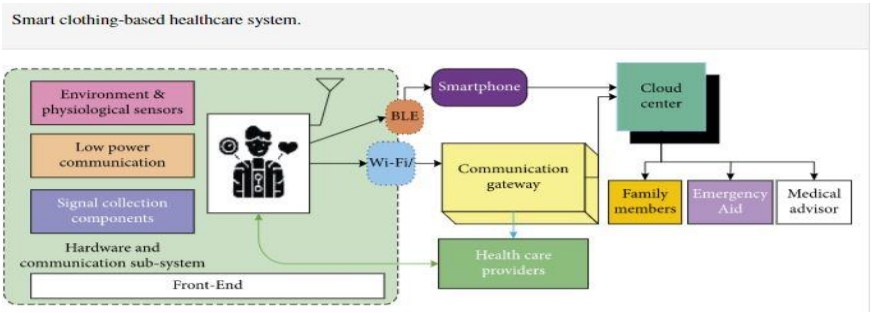
IV. Smart Clothing

The rapid fusion of textiles and electronics presently permits the smooth and widespread integration of sensors into textiles, as well as the production of conductive yarn. Smart fabrics, which can interface with smartphones to process biometric data such as temperature, respiration, heart rate, stress, movement, or even hormone levels, have the potential to bring in a new era in retail . Modern medicine, from prevention to sophisticated therapies, is built on earlier, accurate, and real diagnoses, supported by robust monitoring of the treatments. Smart clothing is capable of providing real-time sensor data with accuracy and reliability. Smart clothing is crafted by integrating smart wearables into garments, and it is a significant prospect for the future interface between the physical and digital worlds, replacing or extending smartphones and other portable connected gadgets

The role of wearable devices in smart clothing is critical; currently, in smart clothing, wearable is adapted to connect to numerous devices and utilize cloud services to improve user life experience . Wearable with smart clothing is efficient in terms of accuracy, comfort, usability, washability, and real-time monitoring assistance, which enhances the quality of service (QoS) and quality of experience (QoE).

(i) Monitoring Chronic Disease.

Patients with chronic diseases wear smart clothes in their everyday life to acquire noninvasive physiological data. This physiological data is logged in the cloud server to process and analyze health conditions. The system provides customers with individualized healthcare services in a variety of ways based on their diagnosed health state.



(ii) Training of Auxiliary Athletes.

The effective monitoring of athletes during rigorous training plays a crucial role, as smart clothing with sensory system assists in detecting fatigue in any area of the body. Three-axis acceleration, gyroscope, and electromyography (EMG) sensors are crucial to detecting movement and muscle strain of athletes.

(iii) Providing Emotional Care.

Emotional care is especially beneficial for single parents, long-distance truck drivers, and people suffering from mental illnesses. The system can deliver emotional care based on physiological data connected to the user's emotions. When the system detects a user in a negative mood, it provides emotional feedback such as voice reminders, tuning appropriate music, or playing selected video content.

V. Blockchain in Fashion

Blockchain was developed for business and supply chain applications as a private blockchain, as it provides privacy and controlled access to approved and identifiable participants. Depending upon the accessibility level, each participant has the right to access the subset of the information. Private blockchain encourages building trust and transparency among the participants in the supply chain. Furthermore, each player can sustain their strategic advantage without exposing all facts and methods to competing organizations. Conversely, the blockchain shall capture all transactional data and provide customized access to supply chain participants while remaining auditable and verifiable the fashion supply chain, including fiber producers, yarn manufacturing, fabric manufacturing, apparel manufacturing, retailer, and customer.

VI. Conclusion

Presently, IoT in fashion isn't just limited to the application of wearable's such as Google Glasses or smart watches, but it also involves the stitching of invisible sensors onto cloth fabrics or utilizing interconnected apparels to perform various functions such as notifying the user about the product's materials, assisting in detecting the product if its lost or even in facilitating style tips. It has reached to the stage where technology and fashion can be combined to develop clothing that can be used to measure heart rate between workouts, where baby outfits can assess a baby's sleep pattern or where outfits can protect the body skin from any pollution or decay. There is tremendous growth in fashion and retail sector due to which it enhances customer experience, reduce costs and improve overall performance. Currently, the sensors are being used to monitor customer satisfaction, provide supply chain insights, monitor food safety, and track assets and for many more application.

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