



---

# Role Of Internet Of Things In Fashion And Textile Industry

**Pranav Nautiyal**, School of Computing, Graphic Era Hill University, Dehradun, Uttarakhand,  
[pranavnautiyal013@gmail.com](mailto:pranavnautiyal013@gmail.com)

**Deepti Negi**, School of Computing, Graphic Era Hill University, Dehradun, Uttarakhand,  
[deeptine@gmail.com](mailto:deeptine@gmail.com)

**Aditya Harbola**, School of Computing, Graphic Era Hill University, Dehradun, Uttarakhand,  
[adityaharbola@gmail.com](mailto:adityaharbola@gmail.com)

**Anupriya**, School of Computing, Graphic Era Hill University, Dehradun, Uttarakhand,  
[Anupriyasharma21@gmail.com](mailto:Anupriyasharma21@gmail.com)

**Jyoti Agarwal**, <sup>1</sup>Depr of CSE Graphic Era Deemed to be University, Dehradun,  
[itsjyotiagarwal1@gmail.com](mailto:itsjyotiagarwal1@gmail.com)

---

## Abstract:

Internet has changed the landscape of industries in two decades. Internet has not only provided a platform for business, but also changed the business model. Currently, amidst the pandemic in 2020, we have witnessed the businesses turning more and more virtual. As a result, the concepts of IOT, AR, VR have already become some of the important tools in the current scenario. Now if we consider the current Textile Industry, we stand in the industry 3.0, i.e. computer powered industry; one can consider it to be a bridge between the evolutions of a man driven industry into an artificial one. With the developments in Cloud Computing huge amount of data can be held and easily processed at a very short time. This has helped in the application of IOT, AR, VR in the Industries and Textile Industry is no exception. Several Companies have already taken initiatives on that route. As a result, the current Textile is in a swift transition from Industry 3.0 to Industry 4.0. So, the technology discussed here might not be very viable to the current market, however in the years to come this technology can be expected to be in mainstream.

**Keywords:** IoT, Web 4.0, Fashion, textile.

## 1. Introduction:

**Internet of Things:** The Internet of Things (IoT) represents a network of things that connect and exchange data with other devices over the internet by incorporating software, sensors, and other technologies. Smart smoke detectors, home energy monitoring and control, air quality sensors, or any other man-made or

natural object that are assigned an Internet Protocol (IP) address and can send data across a network are all example of things in the internet of things [1].

Internet of Things consists of devices like smartphones, wearables, and sensors etc. that are connected. It is possible to gather data, analyze it and make some actions depending on the analysis of the obtained data to learn from a process or assist with a specific task. So, to summarize, IoT entails an assorted ecosystem of tools and services that must work together to give a complete solution[2]. This technology helps to customize recommendations and optimize product assortment; to enrich pattern, design, and shape; better perceptive of consumers requirements and needs; to have additional insights to innovate and plenty more which enables it to have great scope in fashion and textile industry.

### **Fashion and textile industry introduction:**

The fashion industry may be defined as the business of creating garments, but it would gloss over the crucial distinction between fashion and textiles. Fashion combines its own preconceptions of style, individual taste, and cultural progress, yet apparel is useful clothing, one of mankind's basic requirements. The present clothes business sees its objective in the development, manufacture, promotion, and advertising of style based on want, rather than as a means of meeting a need. It reflects shifting consumer desires to be recognized by their clothing, or more popularly, to be recognized, which has influenced fashion throughout history[1].

Research, design, creation, production, and trading of textiles, fibers, and garments are all part of the textile business. Every firm involved in the development, manufacturing, and distribution of textiles is part of the textile industry, which is a worldwide phenomenon [3]. It begins in agriculture with fiber production, sheep and silkworm husbandry, and metal and mineral mining. These fibers are then turned into yarns, textiles, and clothing. Spinning mills, weaving mills, knitting mills, dyeing mills, and clothing are all included. This business also includes enterprises that offer buttons, zippers, knitting materials, sewing machines and yarns, linens, weavers, and drapery equipment[2].

### **2. How does IoT work?**

An IoT ecosystem is made up of web-enabled smart devices that use embedded systems like CPUs, communication hardware, and sensors to collect, communicate, and respond to information from their environment. IoT devices can transmit sensor readings with an IoT gateway or other edge device, which can then be sent to the cloud for processing or inspected onsite[4]. These devices may periodically communicate with one another, and act based on the information they acquire. People can interact with the equipment to set them up, provide them directions, or extract information, but the machines do most of the job without human intervention.

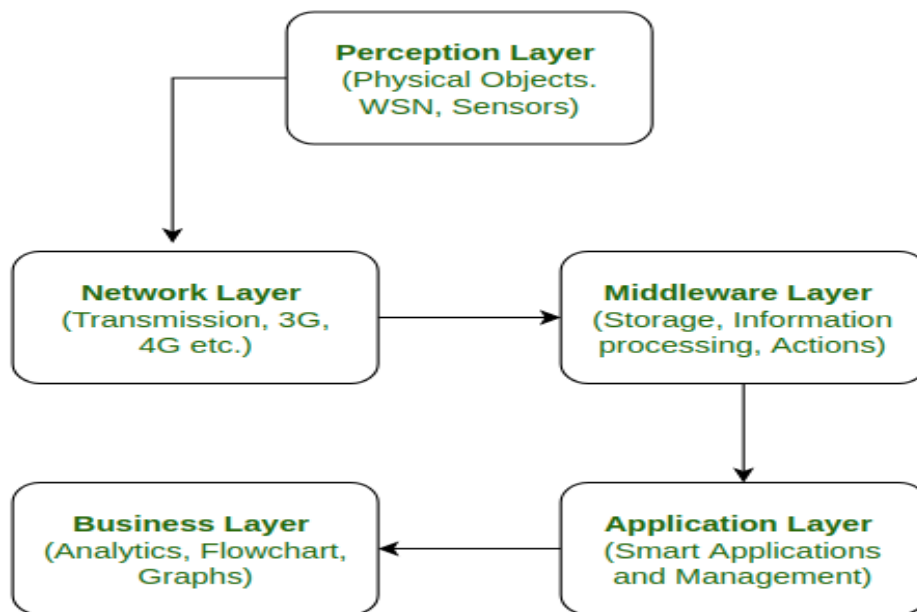


Figure 1: Layered Architecture of Internet of Things

- **Perception Layer:**

A variety of sensors and actuators are employed at the perception layer to collect relevant data such as temperature, humidity levels, threat monitoring, and noises, among other things. The major aim of this phase is to gather data from the environment and communicate it on to the next level so that decisions may be taken depending on that knowledge.

- **Network Layer:**

It is the layer that connects the perceptual and middleware layers, as the name implies. It uses networking technologies such as 3G, 4G, UTMS, Wi-Fi, infrared, and others to obtain data from the perception layer and transfer it to the middleware layer. Because it is responsible for interaction between the perception and middleware layers, it is also known as the communication layer. All data transfers are carried out in a secure manner, with the information collected remaining private.

- **Middleware Layer:**

The Middleware Layer includes radical functions such as storage, computing, processing, and action taking. It saves all datasets and sends the necessary info to the machine depending on its address and name. It may also make judgments based on computations performed on sensor data.

- **Application Layer:**Based on data collected from the middleware layer, the application layer handles all application processes. Sending emails, setting alarms, security systems, turning on or off equipment, smartwatches, smart farming, and other tasks are all part of this application.

- **Business Layer:**

Any product's performance is determined not only by the technology utilized in it, but also by how it is provided to its users. These responsibilities are handled by the device's business layer. It includes creating process map, graphing, analyzing outcomes, and determining how the device may be enhanced, among other things.

### **3. Application of IoT in Fashion and Textile Industry**

#### **3.1 Enables predictive and condition-based maintenance services**

Predictive maintenance is done by examining the health and working of devices on a frequent or continuous basis. Organizations can predict, plan for, and take appropriate steps in advance of events like part replacement or system failure thanks to data generated by IoT devices that link varied items and services. To prevent any commercial disturbance, predictive maintenance is often conducted while the device is functioning under typical working circumstances.

#### **3.2 Enables tracing and tracking of used products and materials**

- Track and trace systems enhance the integrity and legality of supplies, modules, and items from the instant raw ingredients are acquired to the minute completed items are distributed.
- Quality and accountability solutions ensure that the proper merchandise is delivered to the customer. Clients will be more faithful if the completed items fulfil the client's criteria, thanks to such approaches.
- These technologies can detect faults, determine what induced them, as well as determine which samples are afflicted. This is critical for reducing risk, safeguarding client relationships, and ensuring vendor responsibility.
- Barcode printing and scanning, RFID tags, and digital data are all examples of track and trace technologies that give effective transparency for components or parts at any stage in the production phase, and even after sales.
- Transparency guarantees that product recalls are managed effectively and efficiently. It ensures customer safety and business consistency by rapidly announcing returns and eliminating recalled products from the distribution chain.
- Administrators may gain real-time actionable information by analyzing resource utilization. It may be used to keep track of goods, machinery, and utilization, as well as schedule and supervise staff.
- It also entails tracking and tracing device utilization to guarantee appropriate treatment, avoid problems and excessive wear and tear, and gather data on the tools' placement, health, power consumption, and performance.

## **4. IoT in Fashion Industry**

### **4.1 Safety and Comfort:**

The safeguarding of the human body from severe conditions is among the most important roles of clothes. Which is why, to improve safety, innovators are constantly tinkering with clothes and technologies. Poor visibility, heat management, and severe cold are all concerns that IoT-powered gear is being utilized to solve.

Fashion designers may already incorporate sensors into textiles owing to the rapid advancement of IoT systems. These types of clothes may capture massive amounts of data from their users. The sensors, for example, may track pulse rate, cardiac output, and vital signs, among many other things.

### **4.2 Fitness:**

The primary goals of training smartwear are to enhance form, boost efficiency, and collect biometric information during training for later analysis and evaluation. There are several applications, but most organizations in this field focus on training professionals who are dedicated about increasing their performance. Devices can be considerably more specialized, such as targeting muscle activity, to boost efficiency.

Athos, a firm established in the United States, supplies equipment that measures muscle reaction to exercises and program that reflects finished information to sportspersons. Measuring muscle participation may appear to be a difficult task, but simple posture tracking is indeed an option. The Nadi X Yoga Pants are made specifically for this. The maker says that numerous accelerometers incorporated in the trousers detect posture and coach the wearer to attain ideal form while exercise.

### **4.3 Healthcare:**

With the technological advancement and the development of conductive threads, it is now feasible to incorporate ultralight sensors into clothing in a manner that enables for prolonged skin contact. These devices' output can be used to track present protracted disorders, while also help avert and diagnose them. The dependability and endurance of integrated sensors and connections, the existence of large energy supply, and the unintentional exorbitant cost of apparel are all issues for such clothing. Although battery / power adapters are available in a range of sizes, they are nonetheless apparent and must be recharged on a regular basis to ensure continuing usage.

Sensor-embedded apparel are being manufacture by a smart apparel firm Hexoskin which is Montreal-based. Their garment is presently being used by the Canadian Space Agency for study, and astronauts are wearing it to gather clinical information. Apparel with embedded detectors are made by Mayant Inc and Skiin. You may transfer information from sensors to your software for examination using small devices. Health-monitoring undergarments and clothes with inbuilt warming components are also available from the firm.

Few examples of IoT technologies used in fashion industry are as follows

### **AMAZON ECHO:**

ECHO LOOK is a hands-free camera and fashion companion that works with Alexa and offers a fashion check feature to receive a second perspective on your attire. ECHO LOOK, allows users to observe themselves from all angles in the Echo Look app, examine images and videos of clothes, choose favorites, and arrange looks into Collections. It also helps to discover new products and trends, as well as see which colors you wear most frequently.

#### **LOOMIA:**

It creates soft, flexible electronics that can raise the temperature, illuminate, detect, and monitor data while blending seamlessly into soft objects. The LOOMIA Electronic Layer (LEL) is a soft flexible circuit that may be incorporated into clothing for purposes such as heating, illumination, detecting, and data gathering. The LEL works well with the material selected by the customer.

#### **5. Conclusion:**

The fashion industry's future appears to be exciting as technology continues to make breakthroughs and progress, strengthening the potential of a single strip of cloth. Why should our apparel be outside of the multitude of technology that blends into our everyday lives, attempting to revolutionize all facets of our existence. However, it must be recalled at all times that the fashion business is a product of its clients' wants, and that all enterprises operating within this industry must first and foremost attend to their emotional requirements in order to succeed in their use of the Internet of Things.

#### **6. References:**

1. <https://textilelearner.net/internet-of-things-iot-in-fashion-industry/>
2. <https://textileinsights.com/2021/07/30/role-of-iot-internet-of-things-in-the-fashion-industry-2021/>
3. <https://www.analyticssteps.com/blogs/what-role-iot-fashion-industry>
4. <https://www.just-style.com/the-internet-of-things-iot-in-apparel/>
5. <https://textilevaluechain.in/in-depth-analysis/articles/textile-articles/application-of-iot-in-textile-industry/>
6. <https://neuronicworks.com/blog/iot-in-fashion-tech/>
7. <https://www.clariontech.com/blog/how-iot-transforms-the-way-to-a-more-sustainable-textile-manufacturing>