Revolution in IoT: Smart Wearable Technology

G. Sucharitha, Bodepu Tannmayee, and Kanagala Dwarakamai

1 Introduction to the Technology

What Is Technology?

The application of technology in scientific understanding to the practical purposes of human life or, as it is often said, the transformation and exploitation of the human world. The simplest form of technology is the development and use of basic tools. The prehistoric discovery of how to manipulate fire and the later Neolithic Revolution expanded the available food supplies, and the invention of the wheel allowed humans to move and manage their environment. Developments in historical times, including printing presses, telephones, and the Internet, have eliminated physical barriers to contact and made it possible for people to communicate openly on a global scale.

D. Sucharitha (✉)
Electronics and Communication Engineering, Institute of Aeronautical Engineering, Hyderabad, Telangana, India

B. Tannmayee · K. Dwarakamai
Electronics and Communication Engineering, Institute of Aeronautical Engineering, Hyderabad, Telangana, India

Faculty of Science & Technology, ICFAI Foundation for Higher Education, Hyderabad, Telangana, India
e-mail: bodepu.tannmayee18@ifheindia.org; kanagala.dwarakamai18@ifheindia.org

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1.1 Technology Related to IoT

The Internet of Things (IoT) has received extraordinary value in current years as it seeks to grant humans with innovative and smart technology and offerings in which all bodily objects around them are linked to the Internet and are capable to have interaction with each other. IoT products and services can be found from a range of sectors, including healthcare, hospitality, transport, infrastructure, education, and social services. Smart devices, frequently interconnected with cloud services, provide quick and international access and lead greater clients to take part in such technology. Figure 1 represents the logo of IoT [1].

The IoT system may be described as a set of interconnected smart units and objects that are supplied with special identifiers that are capable of interacting and transmitting records besides human or computing device intervention in order to reap the favored target. It covers a variety of technology, amenities, and standards. The IoT consists of individuals, objects, and information as primary agents. It is estimated that more than tens of billions of artifacts will be sections of this community by means of 2030. As shown in Fig. 2 we can apprehend the trust mannequin of IoT [2].

In order to monitor the room well and remotely, an IoT system, such as a shrewd home application, will use a couple of sensors and acquire information from very touchy and personal domains. This is, however, a digital contact where an energetic role is no longer performed by the individual. Security and, in specific, trust continues to be foremost challenges for clients and developers in this scenario.

History of Wearable Technology

Wearable technology can seem, at first glance, to be a latest improvement – we would possibly assume of the fictional spy devices of James Bond or the smart watches that are presently flooding the market. Despite this, wearable tech has been around for longer than we may assume and is helping shape the future of fashion.

Fig. 1 Model of Internet of Things

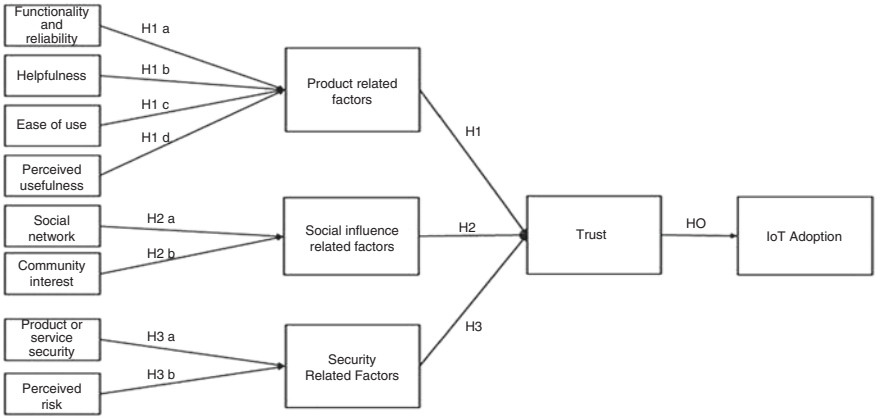

Fig. 2 IOT technology trust model

The pre-history of wearable devices begins with the watch, which was worn by individuals to tell time. The German inventor Peter Henlein produced tiny watches in 1500, which have been worn as collars. A century later, as the waistcoat grew to be a famous item, men commenced to put on their watches in their pockets, which led to the invention of pocket watches. In addition, wristwatches were produced in the late 1600s, however, had been generally worn as bracelets by women. The watch can get smaller and greater accurate with time. The use of the wristwatch used to be pioneered in 1904 by using the aviator Alberto Santos-Dumont as it allowed him to hold his hands unoccupied while piloting. This has demonstrated that the wrist is a cozy region to wear a watch and has prompted humans to start the use of wristwatches. People started out to boost wearable to be used for every event, from devices that assist them be successful in playing games, to finger rings used by retailers as a computer device, to digital hairbands used in theaters as a mask, and a wearable digital camera tied to a bird to take in-flight photos.

The wearable current technology is linked with both abundant computing and wearable arrangement's history and development. By incorporating it into day-by-day life, wearables make the technology ubiquitous. Developers have sought to raise or enlarge the affectivity of clothing via the records and enhancement of wearable computing or to produce wearable as accessories successful of granting surveillance of people, normally monitoring behavior through small wearable or compact non-public technology. The computed self-movement entails monitoring important points such as movement, moves, and coronary heart beat rate.

In both of these solutions to the imaginative and prescient of ubiquitous computing, the roots of contemporary wearable technology are impacted. The calculator watch, which used to be utilized in the 1980s, was one early piece of regularly adopted pre-modern wearable technology. The listening to useful resource was a portable system long before.

Let's see how wearable technology has evolved throughout the decades:

In the 1950s, wearable tech started in a very different way from today's recognizable devices, with Sony's first transistor radio making its debut in 1955. "The Sony TR-55 served as the template for portable devices we use today. Everything from the iPod to the Game Boy can trace its primary handheld plan to the TR-55's form factor."

A secret Bluetooth microphone used to be built-in into a pair of jewelry by Ilya Fridman in 2008.

In late 2010 Fitbit unveiled its first phase counter; Fitbit units have especially focused on health monitoring. Fitbit is now owned by Alphabet and is no longer an unbiased enterprise of wearable electronics.

Smart watches persisted to be delivered in the following years with the use of critical electronics groups as well as new startups. In September 2013, the Samsung Galaxy Gear used to be one of the first options. In April 2015, Apple followed with the Apple Watch more than a year later [3].

Oculus launched a kickstarter initiative in 2012 to begin sales of the first augmented reality headset for consumers. HTC launched a new age of VR headsets in 2016, permitting humans to stroll freely inside a virtual environment.

2 Technologies of IOT

The main technologies involved in IoT are categorized as follows:

- **Identification Technology**

This type of technology is used for position and observation purposes, as the name implies. Various representations of these technologies are given in Table 1. RFID, WSN, QR code, barcodes and intelligent sensors, etc. are examples. Linked RFID systems include a reader to collect the data and a transmitter to relay the data. Compared to similar solutions, RFID tags are pricey like WSN [4].

- **Communication Technology**

Table 1 Key technologies of IOT

Technologies of IOT	
Identification technologies	QR code RFID Barcode WSN
Communication technologies	Zigbee Li-Fi Z-Wave Wi-Fi MQTT NFC Bluetooth Powerline area network

Such data transfer can be followed. Zigbee, Z-Wave, MQTT, Bluetooth, Li-Fi, Wi-Fi, Near-Field Communication (NFC), HaLow, Powerline area network, and others are all examples.

- Zigbee: It is a short-range protocol used to create a small network, i.e., about 20 m. Generally, these are used in home automation.
- Z-Wave: It is a wireless protocol for a long range protocol, i.e., around 100 m. Every Z-Wave will have a fascinating ID called network ID, and there will be a node ID for each device in the Z-Wave network. In home automation, it is also put to use. It can interchange data at a high speed, unlike Wi-Fi.
- Bluetooth: Usually used in day-to-day applications, it is a short-range protocol. For example, we can retrieve the information on the paired device on our smartphone using Bluetooth.
- Li-Fi (light fidelity): This is also a wireless short-range protocol. Here, in the form of light, the transfer of data takes place.
- Wi-Fi: This is a medium-range network that is commonly used on a local area network. This has more versatility.
- Near-Field Communication (NFC): It is a protocol for very short-range networking, i.e., around 4 m. It provides point-to-point communication between devices. For instance, we can share the screen of our smartphone with a smart TV using NFC.
- HaLOW: Wi-Fi is close to this. The main difference is that this is a medium-range protocol and, relative to Wi-Fi, the data transmission rate is minimal.
- Powerline area network: It is a wired communication network with a long range. For data transmission, it utilizes power lines.

Voice User Interface (VUI) and Wearables

The design of VUI was once especially complicated in the past. The accumulation of difficulties is inherent in speech recognition, because of their transient and intangible nature, and VUIs are often rife with main contact obstacles.

In comparison to visual interfaces, they have gone after verbal commands and moves have been conveyed to the user. A visual performance in response to the vocal information, such as a smart watch as seen in Fig. 4 (e.g., Siri on an Apple Watch) [5], is one technique employed with modest results.

Even, the same difficulties and problems of the past are generated by developing the individual interface with these kinds of technologies. We can see the VUI smart speaker functionality here in Fig. 3.

A human consumer may also skip the natural comment loop of human-to-human interaction used to set up shared understanding while communicating with computers. They will try to give an order or inquire about something, hope that the machine will acknowledge what they say, and in return provide treasured information. Most modern voice AI is now not adequately advanced to draw on the conversation to achieve understanding and may even not be able to differentiate a new instruction from a previous explanation [6].

Moreover, speech as a means of human-computer interaction is still very inefficient. It would take too long, for instance, to deliver a menu of choices orally. Users

Fig. 3 Smart speaker VUI application

Fig. 4 Many smart watches, like the Apple Watch and the LG Sport, feature voice interface features

can't change the shape of the details visually, and they want to understand the direction to their target. Designers depend on Miller's Law when providing choices in a noticeable UI and normally have a maximum of seven options. The maximum decreases dramatically when a person is supposed to take note of an orally delivered list of picks (Fig. 4).

The challenges are real for VUI. However, a wise approach is to provide support for voice interplay to limit its usage to these areas where it is most useful, in any

other case to increase it with interface frameworks that use the other senses. VUI will continue to evolve and is an excellent visually impaired mobility option. The two most positive approaches to incorporate a VUI into the ordinary user interface are to acknowledge verbal entry and impart visual remarks [7].

2.1 Applications of Iot Technology

This technology has a range of functions in a wide variety of fields. Then there are numerous viable locations where we can harness the strength of the Internet of Things (IoT) to clear up day-to-day problems. It could be put to a lot of uses, however.

- **Smart Society and Smart Home**

  Nowadays homes and offices have been using IoT technology. Various digital units and HVAC systems, such as lamps, microwave ovens, refrigerator heaters, and air conditioners, are blended with sensors and actuators for the appropriate use of energy; monitoring and regulating the amount of heating, cooling, and lighting; space lights; and human presence which switches on when you enter. Wireless smoke and carbon monoxide sensors, sound alarms when fire or smoke is detected at home, as well as phone or e-mail signals add greater relief to life, which in turn lowers charges and will increase energy conservation. The IoT can be used to remotely manage and customize your domestic appliances. It may also be beneficial to pick out and deter theft.

- **Smart City**

  IoT technology can be used on a wider scale to make cities more effective. The aim of smart cities is to use the IoT to enhance the lives of humans through enhancing traffic management, monitoring the availability of parking spaces, measuring air quality, and even supplying warnings when trash cans are filled.

- **Smart Traffic**

  Currently the traffic control is a large hassle in the metropolitan cities. Managing them manually has grown to be almost impossible. This trouble may also be conquered through enforcing IoT for traffic management. This smart traffic monitoring makes use of sensors to accumulate raw visitor's data, which offers traffic updates to the driver, which allows him to make the decision for touring better route. This moreover facilitates individuals to book a cab without phone call and be picked up and additionally suggests cabs close to and moreover their movement in true time.

- **Smart Parking**

  Sensors will be installed in parking areas to determine whether or not the parking area is available. Driver's park their vehicle searching via the utility that affords

details on the nearest reachable parking slots, the price of parking relying on the statistics collected and analyzed by way of smart sensors that assist them store time and power.

- **Smart Waste Management**
  A garbage bin with sensors capable of analyzing and alerting the authorities when it is complete and needs to be cleared.

- **Smart Street Light**
  Sensors which might also analyze the context like time, season, or climatic stipulations will be embedded among street lights which will routinely turn lights on or off and set the dimming range of person or crew of lights supporting the context.

- **Smart Water Supply**
  Smart cities have to alter the grant of water to make sure that residents and agencies have adequate access to water. Wireless sensor helps monitor their water pipe structures more successfully and detects water leakage and indicates water loss, which in turn additionally saves money and natural resources.

- **Smart Environment**
  Detection of emissions and natural disasters is a very huge application of IoT. In order to limit air pollution, we need to modify emissions from factories and vehicles. We can display the launch of poison chemical compounds and waste in rivers and the sea, thereby stopping water contamination. We can also maintain tabs on the quality of consuming water supplied. By detecting tremors, we can ship warnings about earthquakes and tsunamis. In order to be alert in the event of floods, we need to hold the water ranges of rivers and dams beneath surveillance.

- **Air Quality Monitoring**
  Sensors are integrated to seize contextual data such as carbon monoxide (CO) amount, airborne nitrogen dioxide (NO2), sound levels, temperature, ambient humidity levels, etc. This offers non-stop contextual awareness, which helps to take action as soon as it hits the ordinary level.

- **Smart Water Quality Monitoring**
  Sensors that can detect history, such as water quality, water movement, velocity, temperature, water pollution, and water content, are placed in or flowed into the water. This helps to assess and monitor the water sources available for use in real time.

- **Smart Sewage Water Management**
  Embedded sensors in the sewage reservoir assist to track the overflow of wastewater that flows into it, through continuous statistics on the quantity of wastewater that is contained. By means of these details, maintenance staff can prepare the water treatment technique to prevent overflow of sewage.

- **Natural Disaster Monitoring**

  Wireless monitoring sensors can be used to predict natural hazards, like earthquakes, landslides, forest fires, floods, etc. Such results enable the appropriate authorities to take measures before a tragedy happens [8].

- **Agriculture**

  Smart Farming: Sensors collect and analyze background information such as current temperature, soil moisture conditions, leaf moisture, and solar radiation, which in turn informs the owner of the water, chemicals, manure, or treatment needs for infected plants.

- **Healthcare and Health Tracking**

  In the healthcare sector, IoT is used to improve the quality of human existence by permitting humans to operate primary duties that have to be achieved by way of application. The sensors might also be hooked up on patient-used health monitoring devices. To improve the treatment and responsiveness, the statistics accrued from these sensors is made accessible on the Internet to doctors, household contributors, and other involved parties. In addition, IoT gadgets can be used to track modern medicines in an affected person and to examine the threat of new medicines in phrases of allergic reactions and negative reactions. Using the sensor and technology described above, we can manage the person's body temperature, heart rate, blood pressure, etc.

- **Pharmaceutical Products**

  The safety of the drug product is of utmost importance in the prevention of patient well-being. There are benefits attaching smart labels to medications and monitoring their status with sensors such as preserving storage conditions and expiry of medications that prevent patients from carrying expired drugs [1].

- **Food Sustainability**

  The packaged food we eat must go through various stages of the food cycle, such as production, harvesting, transport, and distribution. Sensors are used to detect contexts such as temperature, humidity, light, heat, etc., which accurately report variations and inform the persons concerned to prevent spoilage of food.

- **Supply Chains**

  The Internet of Things tracks each stage of the supply chain from packaging, production, distribution, storage, and product income to after-sales services, through the procurement of raw substances from manufacturers. This will assist to maintain the stock required for persisting sales, ensuring client pride and, in turn, elevated sales. Over the subsequent decade, IoT will generate $1.9 trillion in supply chain and logistics, according to Cisco's economic report. Using this, we can also diagnose if the devices need protection and repair. The Government of India has additionally determined to strengthen a hundred smart cities that will cover some of the above-stated IoT applications. In Fig. 5 we can examine the most popular IoT function rankings primarily based on net analytics [9].

2.2 *Some Smart Wearables and Appliances*

Smart wearables discovered in smart garb can be organized in accordance with a variety of criteria. There are various kinds of smart wearables as shown in Fig. 6. The IEC (International Electrotechnical Commission) TC (Technical Commission) 124, which strives to normalize the subject of wearable digital units and technologies, differentiates four special types of smart wearables [10].

- Wearable accessories: They are low-power devices that are tailored to the human body to be worn as add-ons such as smart watches, smart glasses, or health trackers.
- Textile/wearable fabric: They combine electronics with textiles for versatile fabrics. In 2011, the European Committee for Standardization categorized such wearables as practical fabric structures that interrelate with their surroundings (i.e., adapt or react to modifications in the environment).
- Wearable patches: They are skin patching units that are trendy and very thin.
- Wearable implantable: They are lightweight self-propelled wearables that are positioned into the human body besides any fitness issues.

Regulation concerned in the IOT smart clothing grant chain administration is shown in Fig. 7 Similarly, the IEC Standardization Group (SG) 10 on wearable smart units suggested that the previously listed kinds of wearables can be labeled in accordance to their position, close, on, or with a crew (e.g., the human body), distinguishing between:

- Wearable near body: They are supposed to be placed near the body, however, not directly in close proximity.
- Wearable on the body: They are set up on the body, in direct contact with the skin.
- Wearable in body: They're implanted inside the body.

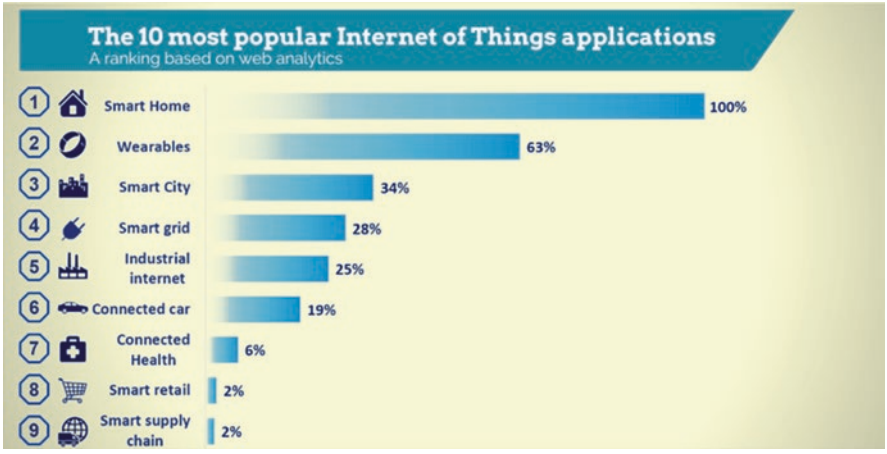

Fig. 5 Applications of Internet of Things

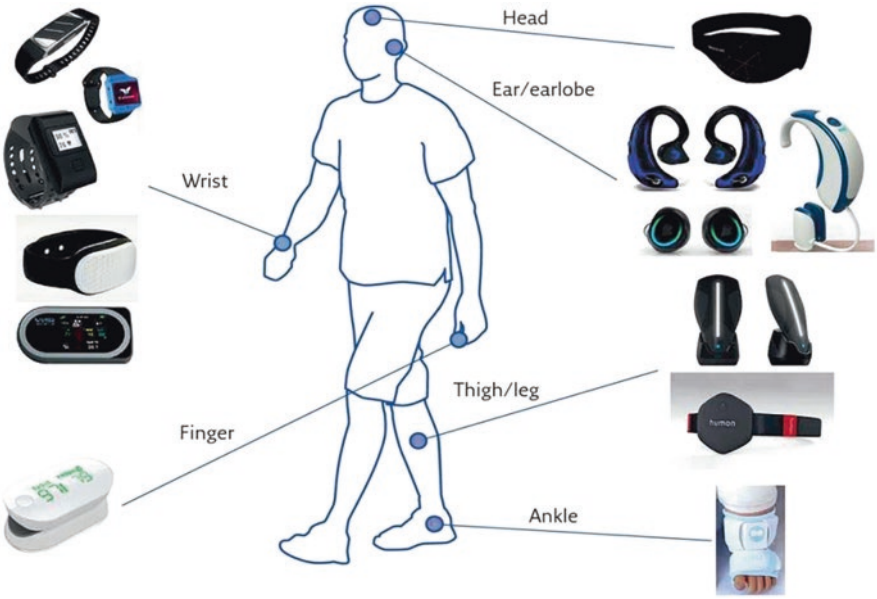

Fig. 6 Types of smart wearables

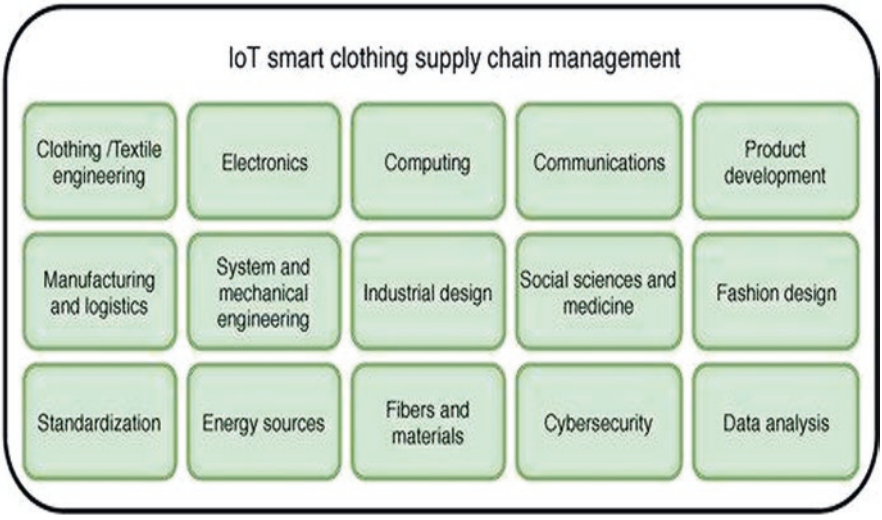

Fig. 7 IOT smart clothing supply chain management

- Electronic textiles: They use electronics and elements based totally on textiles [11].

Wearable Technology

Did you ever hear anyone point out that wearable technology wasn't quite sure what it meant, though? Simply placed, wearable technology is a typical concept for a collection of gadgets that are intended to be worn during the day, including fitness trackers and smart watches. In short, these items are sometimes referred to as wearables.

Wearable technology, wearables, fashion technology, smartwear, tech togs, skin electronics, and fashion electronics are smart electronic devices (electronic devices with microcontrollers) worn next to and/or on the skin surface where data such as body warnings, vital signs, and/or environmental data are sensed, processed, and transmitted, enabling instant bio data in some cases.

Wearable devices such as activity trackers are an example of the Internet of Things, since "things" such as hardware, apps, sensors, and networking are effectors that enable objects, with the manufacturer, user, and/or other associated devices, to alternate information (including data quality) over the Internet, with the exception of requiring human interaction.

Wearable technology has a number of features that are increasing as the market itself grows. The popularization of the smart watch and fitness tracker continues to be prevalent in consumer electronics [12]. In addition to commercial applications, wearable technology is used in navigation systems, specialized textiles, and healthcare. Figure 8 represents certain wearable technical technologies used in different styles.

Issues and Concerns of Wearable Technology

The FDA has created a low-threat device practice that recommends that private health wearables are common health devices if they only receive weight loss, physical exercise, rest or stress control, mental acuity, self-esteem, sleep management, or sexual function knowledge. This was due to the hazards of secrecy involving the machines. These devices will be able to tell whether a person is displaying any health issues and have a course of intervention when larger and more of the devices become used properly and elevated quickly enough. With the growth in these devices being fed, this instruction was drawn up by the FDA to minimize the danger to an infected user in the event that the app does not work properly. Due to the fact that they help monitor well-being and foster liberty, there is also an infringement of privacy that ensues to collect information, the ethics of it is claimed as right. This is due to the large volumes of data that must be transmitted, which should exacerbate difficulties for both the customer and the businesses if access to this information is accessed by a third party. There was a concern with the Google Glass that surgeons used to use to recognize vital signs of a patient where there were privacy concerns related to the use of non-consented information from third parties. When it comes to wearable devices, the question is approval as right and it allows the opportunity to report and it is a concern because permission is no longer required when an individual is being monitored.

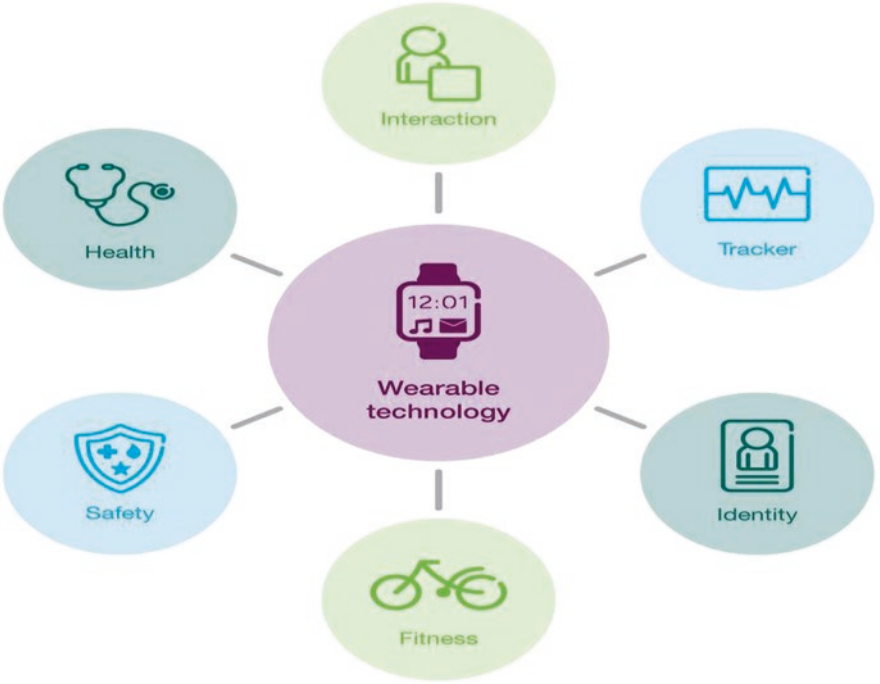

Fig. 8 Wearable technology

Wearable systems face numerous new reliability problems to smartphone designers and app developers as opposed to mobile phones. Restricted display space, limited processing capacity, limited volatile and non-volatile memory, unconventional system shape, proliferation of sensor information, diverse app conversation patterns, and constrained battery size can all lead to excellent software glitches and modes of failure. In addition, given that many of the wearable devices (either tracking or treatment) are used for health purposes, their accuracy and robustness issues can give rise to security concerns. In order to consider the reliability and safety properties of these wearable devices, some equipment has been produced. The early findings point to a weak wearable software spot where overloading of the devices can cause failures, such as an excessive UI operation [13].

3 Prototypes of Smart Wearables

Rosalind Picard and her students, Steve Mann and Jennifer Healey, created, developed, and demonstrated data collection and decision-making from "Smart Clothing," at the MIT Media Lab from 1991 to 1998, which tracked the wearer's ongoing

physiological data. Smart clothing, "smart underwear," smart shoes, and smart jewelers collected and included details on the affective state.

In 2009 Sony Ericsson entered the London College of Fashion for a competition for digital textile design. The winner was a Bluetooth cocktail dress, which lights up when a call is made.

During a "Fashion Hacking" workshop at a New York City creative group, Zach "Hoeken" Smith of MakerBot fame made keyboard pants.

In Ireland, the Tyndall National Institute [17] has set up a "Remote Non-Intrusive Patient Monitoring" network to assess the quality of patient sensor information and how the technology can be used by end users.

More recently, CuteCircuit, a London-based design company, created costumes with LED lighting for singer Katy Perry so that the dresses would change color during stage shows and appearances on the red carpet, such as the dress Katy Perry wore at the 2010 MET Gala in NYC. As worn by singer Nicole Scherzinger in 2012, the CuteCircuit created the world's first dress to feature Tweets.

In 2014, Tisch School of Arts graduate students in New York designed a hoodie that sent pre-programmed text messages caused by gesture movements.

Designs began to appear for heads-up display (HUD) optical eyewear at about the same time.

Using a technique called holographic optics, the US military employs headgear with screens for soldiers.

In 2010, Google began designing prototypes of its Google Glass optical head-mounted display, which in March 2013 went into beta for customers [14].

3.1 Smart Wearables and HealthCare

To track the health of a person, wearable technology is also used. It can quickly capture data because such a computer is in direct contact with the user. It began as early as 1980, when the first wireless ECG was developed. It has seen rapid development in textile, tattoo, patch, and contact lens research over the past decades.

Wearables can also be used to gather the data on fitness of a person, which includes:

- Heartbeat
- No. of calories burned
- Steps walked
- Rate of blood pressure
- Dissipation of biochemical
- Exercising time
- Capture
- Physical shear [14]

These features, such as a fitness tracker or a smart watch like the Apple Watch Series 2 or Samsung Galaxy Gear Sport, are mostly packaged together in a single

device. Apps such as these are used for athletic activity and basic physical well-being control, as well as notification of extreme medical problems such as seizures.

Other technologies are currently being studied within healthcare, such as:

- Predicting mood, fatigue, and health
- Calculating alcohol level in the blood
- Athletic efficiency measurement
- Monitoring if the consumer is sick
- Long-term surveillance, reported by electrocardiogram and self-moistening, of patients with cardiac and circulatory problems
- Applications for well-being risk management, including frailty steps and risks of age-dependent diseases

While wearables can capture data in aggregate form, the ability of most of them to analyze or draw closure based on this information is limited; thus, most of them are mostly used for health information. (Seizure-alerting wearables that continuously evaluate the wearer's data and make a decision to call for assistance are an exception; the data collected will also provide physicians with reliable information that they may find helpful in diagnosis.) Wearables can account for human variations, but mostly collect data and implement one-size-fits-all algorithms.

There is an increasing trend in the use of wearables today, not just for customer self-tracking but also within organizational health and well-being programs. Since wearables create a massive data trail that employers can repurpose for reasons other than exercise, more and more research has begun to explore the dark side of wearables. Asha Peta Thompson, which produces woven power banks and circuits that can be used in infantry e-uniforms, founded Intelligent Textiles Limited, Intelligent Textiles.

How Can Wearables Affect Our Lives?

Wearable hardware has gone from being non-existent to being everywhere in only a few short years. Wearables have the power to trade our lives and culture, for greater or worse, because of this unexpected surge in popularity. Since they are so recent, it is impossible to explain what outcomes they will bring, although we can guess on the basis of our existing knowledge about them.

Will They Help Improve Our Health?

Many wearables give the physical workout the chance to tune and store it at a later time for observation. This can be an outstanding asset, helping us to set short-term and long-term goals and monitor our progress toward them. Wearables can also serve as source of encouragement and motivation through receiving real-time updates of our actions, such as standing or exercise reminders.

On the other hand, there is no guarantee that, over time, people will continue to use wearables. At first, they are really new and exciting, but a survey has shown that about 30% of individuals have avoided using them because they have not considered them helpful or simply grew tired of them.

Furthermore, many wearables have embedded cardiac sensors that send you readings of real-time heart rate. Although there have been instances of this role

helping to save lives, it must be remembered that they are not tools for healthcare and are no longer intended to diagnose or address any health problems. In addition, some have been shown to incorrectly measure heart rates, particularly during exercise.

Security of Information
Most wearables appear to have no safety precautions to keep their data secure. The fact that a lot of the information is unencrypted and that most of these machines relay information using Wi-Fi or Bluetooth links means cyber hackers can get their hands on it very quickly.

It's important to consider how this data turns into large information to be collected and used through organizations and governments. This means, whether you like it or not, that your tracked data could be used for advertising or fitness purposes. There are wonderful ways this information could be used; however, as with all huge information there is additionally a risk that it would be misused [15].

4 Advantages and Disadvantages of IoT

4.1 Advantages of IoT

The Internet of Things facilitates many benefits in daily life within the business sector.

The number of its edges is given below:

- **Communication**
  Since IoT has device-to-device compatibility where physical devices can stay attached, maximum transparency with less inefficiency and better quality is possible.
- **Automation and Control**
  Machines automate and monitor large amounts of information without human intervention, which leads to faster and more timely production.
- **Monitoring Saves Money and Time**
  Since IOT uses smart sensors to track various aspects of our everyday lives for different applications, it saves money and time.
- **Efficient Resource Utilization**
  If we understand the functionality and how each device operates, we will definitely increase the efficient use of resources and monitor natural resources.
- **Minimize Human Effort**
  As IoT devices communicate and connect with each other and do a lot of work for us, they reduce human effort.
- **Saves Time**
  Since it eliminates human effort, it certainly saves time. The primary factor that can be saved on the IoT platform is time.

- **Improve Security**
  Now, if we have a system that interconnects all of this stuff, then we can make the system more stable and effective.

- **Better Quality of Life**
  IoT-based technologies make our everyday lives more relaxed and better controlled, thereby enhancing the quality of life [16].

4.2 Disadvantages of IOT

As the Internet of Things enables a range of advantages, a number of challenges are also emerging. Some of the challenges facing IOT are set out below:

- **Compatibility**
  As IoT can interconnect products from various manufacturers, there is currently no international compatibility standard for labeling and monitoring equipment.

- **Complexity**
  The IoT is a dynamic and complex network. Any software or hardware failure or error will have significant repercussions. Also power failure can cause a lot of discomfort [17].

- **Privacy/Security**
  Many devices and innovations are involved in IOT and will be monitored by a variety of organizations. Since smart sensors relay a lot of context-related data, there is a high risk of losing private data.

- **Lesser Employment of Menial Staff**
  With the introduction of technology, everyday operations are simplified with less human interference using IoT, which in turn creates less human resource requirements. This is what causes the unemployment crisis in society [18].

4.3 Future Scope of IOT

The Internet of Things has risen as a global pioneer in science. In less time, it earned a great deal of praise. The advances in artificial intelligence and deep learning have also made it possible to automate IOT systems. Basically, to provide them with perfect automation, AI and ML implementations are blended with IOT systems. Because of this, IOT has also strengthened its utility area in a number of industries. Here, we will discuss the roles and potential reach of IoT in the sectors of healthcare, automotive, and agriculture in this segment.

New and advanced varieties of wearable science are being created by a number of industries, mainly in the healthcare zone where they are searching to take a step beyond health trackers and construct fitness care trackers. These may also be used to monitor things for diabetics, such as blood pressure, vital signs, or blood sugar levels. Also applied sciences such as smart hearing aids and eye output measuring glasses are becoming available to both clinical professionals and the ordinary public [19].

If the wearable gadget subject grows and matures, designers will have new opportunities to influence how the modern-day world communicates with individuals. When it blends with or enriches everyday human behavior, present-day science works better. This is true for any interface framework, not just wearables.

These gadgets are not designed to be dealt with in the same manner as a desktop or smartphone [20]. Manufacturers ought to understand how they are worn and how they can collect and convey knowledge to the wearer more discreetly and effectively. Some wearables also affect how other individuals respond to their responses.

In certain ways, the best wearable gadgets gracefully vanish into the background. Wearables shift technologies from the screen into real-world environments, providing creators with fresh and unique issues to consider as well as obstacles to address. Getting a chance to help shape the face of this technological revolution is thrilling.

Other accessories continue to evolve and gather momentum, such as pet trackers, smart jewelry, and AR/VR headsets. At the moment, there is a lot of scope for wearable devices. It would be interesting to see where things come from here and how they affect each of us individually and as a society [21].

5 Conclusion

Wearable technologies have evolved gradually in parallel with technological advancements like electronic chips, GPS systems, sensors, etc. The major applications of wearable technologies are in health industry, textile, and electronics industry. There are quite real wearable technologies. They are on the market and available for purchase and use in hospitals. However, now we have smart watches and smart glasses which have almost evolved throughout the world. The aim of the study is how these wearable devices became milestones for both ways of doing business for companies and for daily life of people. It may take some time for wearable technologies to become completely incorporated into healthcare; but for now, among the instruments we use to keep seniors safe, wearable technologies seem to be taking their place.

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