

---

**AI-POWERED IOT WEARABLE DEVICES FOR HEALTH  
MONITORING**

---

---

**Jaspreet Kaur<sup>\*</sup>, Suman Rani**

---

*Assistant Professor, Faculty of Computing, Guru Kashi University, Talwandi Sabo, PB,  
India.*

---

**Article Received: 9 May 2026**

**Article Revised: 29 May 2026**

**Published on: 19 June 2026**

**\*Corresponding Author: Jaspreet Kaur**

Assistant Professor, Faculty of Computing, Guru Kashi University, Talwandi Sabo,  
PB, India.

DOI: <https://doi-doi.org/101555/ijrpa.9604>

---

**ABSTRACT**

The advancement in health technologies has made medical diagnostics and patient observation much better. AI technology and IoT have been combined to form devices that track health conditions and give an instantaneous evaluation. Such devices include fitness wearables that have been equipped with sensors to obtain vital signs including blood pressure, heart rate, body temperature, and oxygen levels. The information is sent to cloud platforms, where AI systems check it for any patterns and predict potential health issues. This helps in monitoring patients identifying diseases early and managing healthcare more effectively. This article looks at how these AI-powered devices are designed how they work, their uses, advantages and challenges, in healthcare. The report also talks about research directions to make smart healthcare systems more efficient and reliable. It talks about making these technologies more efficient and reliable. The aim is to improve care and increase access to health services. As these technologies evolve, we can be optimistic about the future of healthcare.

**KEYWORDS:** Artificial Intelligence, Internet of Things, Wearable Devices, Smart Healthcare, Health Monitoring.

**1. INTRODUCTION**

Due to technologies, health care systems are improving and improving. These technologies are enhancing the treatment of patients and the services provided. The Internet of Things or IoT is a part of this. It enables devices that have sensors to communicate with other devices and share information via the Internet. Healthcare IoT devices can keep track of patients'

health in a timely manner. Medical monitoring systems are getting more and more efficient and intelligent. This is due to technology and artificial intelligence or AI. AI can analyse a large amount of health data collected from devices. They can identify patterns that could relate to health issues. This combination has resulted in the development of health monitors. This type of technology uses AI technology. The use of devices like wearables (fitness trackers, smartwatches, medical patches) can be helpful, as they allow for monitoring patients beyond the hospital walls. The devices gather health information. Post it online or to mobile apps. These AI techniques analyse the data. Notify if something doesn't seem right. With the advent of AI IoT technology for health care delivery, health care providers will be able to provide a health care service remotely. As a result, it will help decrease the number of hospital visits and assist in diagnosing diseases on time. The benefits that this technology could bring are helping to make wearable technology a part of contemporary healthcare systems. Healthcare IoT devices are continuing to get better. They will aid physicians and patients in novel ways.

## **2. Literature Review**

A variety of research has concentrated on using IoT and AI technology in healthcare monitoring systems. The initial work on healthcare systems using IoT focused on collecting patient physiological data using wireless sensor networks. Previous studies have demonstrated that wearable devices can accurately monitor vital signs such as heart rate and body temperature. Recent research has highlighted the combination of AI with IoT systems. Approaches like machine learning and deep learning in AI are employed to examine medical data and forecast possible health concerns. These techniques assist in automated diagnosis and the prompt identification of illnesses. Studies have explored the use of wearable devices to track chronic illnesses like diabetes, heart disease, and respiratory issues. Researchers have shown that predictive models powered by AI can detect abnormal health problems before they escalate into severe conditions. Different research has concentrated on privacy and security issues in healthcare systems utilizing IoT. Ensuring safe data transfer and storage is crucial because wearable devices gather important patient data. A prior study indicates that IoT wearables powered by AI might greatly enhance patient care and health tracking.

## **3. Architecture of AI-Powered IoT Health Monitoring Systems**

Internet of Things healthcare systems that have Artificial Intelligence capabilities usually have a part's that work together. These parts help to collect health information then they

process it. Finally, they look at it to see what it means. The Internet of Things healthcare systems use Artificial Intelligence to do all of this.



**Figure 1: Architecture of AI-Powered IoT Health Monitoring System.**

### 3.1 Sensor Layer

Wearable devices have sensors that collect information from our bodies. These Wearable devices are really good at gathering data about our health. Wearable health gadgets usually have sensors that track our heart rate, temperature and other important things like ECG and blood pressure and how we move around. Wearable devices are very useful for tracking movement and other physiological data, from our body.

### 3.2 Communication Layer

The information that we get from devices needs to be sent to the processing units. We use things, like networks and Bluetooth and Wi-Fi and ZigBee to do this. These are the systems that we usually use to send information from devices to processing units. We have to send the information from devices to processing units so that it can be used.

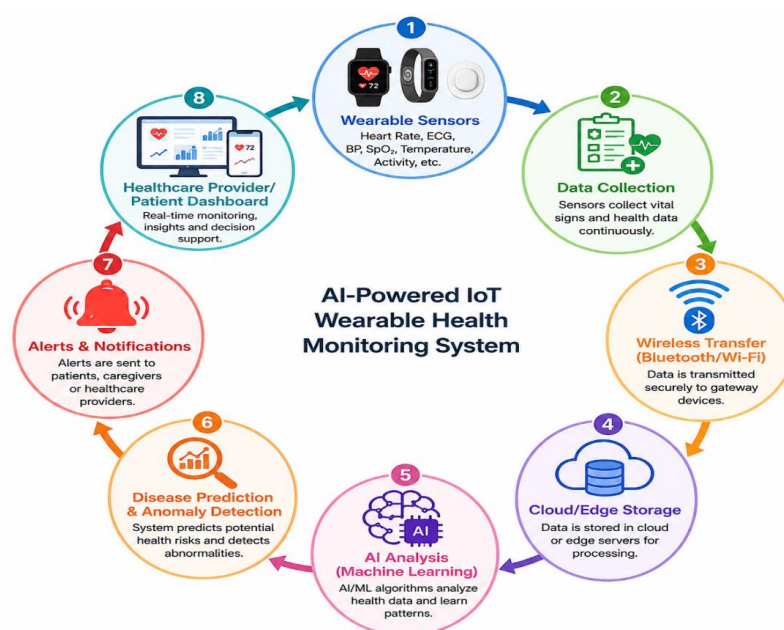
### 3.3 Data Processing Layer

In this part the algorithms of intelligence look, at the data that has been collected. The techniques of machine learning are used to look at the health data and find things that happen a lot and diseases that're not common. The artificial intelligence algorithms do this by using the machine learning techniques to examine the health data and detect trends and uncommon diseases like the artificial intelligence algorithms do.

### 3.4 Application Layer

Healthcare providers and patients can keep an eye on their health information. Get alerts through things, like web pages and mobile apps that the application layer gives them. Healthcare providers and patients use these things to stay on top of their health information. The application layer is what provides these web pages and mobile apps to healthcare providers and patients.

## 4. Working Mechanism of AI-Powered Wearable Devices

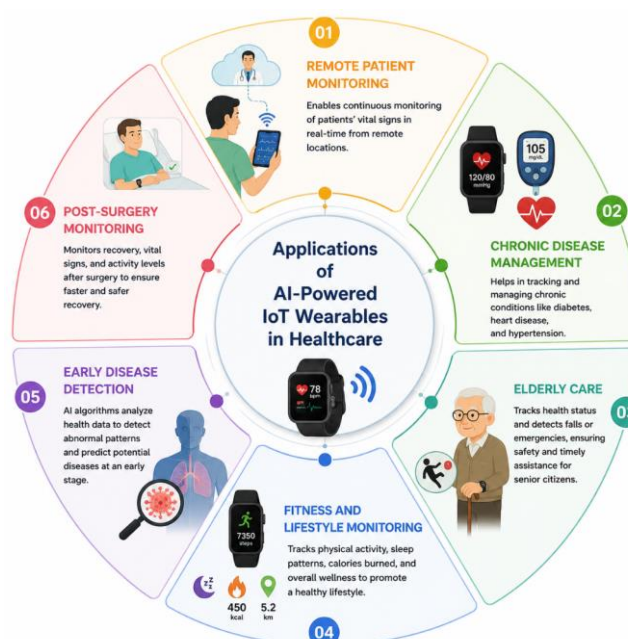


**Figure 2: Circular Workflow of AI-Powered IoT Wearable Health Monitoring System.**

Wearable health monitoring systems powered by intelligence work by collecting, sending, storing, checking and responding to data in a proper way. These systems allow for ongoing health tracking by using cloud computing, wireless connections, sensor technology and artificial intelligence. They use devices with built-in biosensors to collect a person's biological data. This data includes health information like blood pressure, heart rate, body temperature, oxygen levels and activity levels. The person's health is monitored all the time through data collection. The collected data is then sent to a device like a smartphone using wireless methods such as Bluetooth or Wi-Fi. This device acts as a bridge to send data from the device to distant computers. Once sent the data goes to cloud or edge computing systems for processing and storage. Cloud systems have a lot of computing power and flexible storage making it easy to handle amounts of health data. This way healthcare professionals can access the data from anywhere. The wearable health monitoring systems powered by intelligence

make it possible to track health continuously. The artificial intelligence, in these systems helps to analyse the data and provide insights. The data collected is used to monitor health and provide feedback. At this point the data that has been collected is looked at using artificial intelligence methods, such as machine learning and deep learning algorithms. These algorithms look for patterns. Compare the current data with what happened in the past and they find things that are not normal or that are different from what usually happens with medical conditions. Artificial intelligence systems can also tell us about health problems that might happen in the future by looking at the data and this helps healthcare people take care of patients before problems start. The system sends out alerts and notifications when it finds differences or bad health conditions. These alerts are sent to patients the people who take care of them or healthcare providers using messaging platforms, dashboards or mobile apps. This makes it less likely that patients will have health problems and it helps them get medical care quickly. In the end wearable health monitoring devices that use IoT and artificial intelligence collect data in time and they can analyse it and respond quickly which makes healthcare services better and more accurate and reliable. The use of intelligence and IoT in wearable health monitoring devices really helps patients and healthcare providers. Wearable health monitoring devices that use intelligence and IoT are very useful for patients and for the people who take care of them. The data from health monitoring devices that use artificial intelligence and IoT is very important, for healthcare providers.

## 5. Applications of AI-Powered IoT Wearable Devices



**Figure 3: Applications of AI-Powered IoT Wearables in Healthcare.**

### **5.1 Remote Patient Monitoring**

Doctors can keep an eye on patients from a distance with technology that always keeps track of important health signs. This helps doctors stay on top of things without having to see patients in person all the time.

### **5.2 Chronic Disease Management**

For people with long-term conditions like diabetes and heart disease ongoing health tracking can be really helpful. It allows them to stay on top of their health and catch any problems early. Remote monitoring also helps doctors keep track of patient's progress.

### **5.3 Elderly Care**

Wearable technology is a help for senior citizens tracking health issues and recognising emergencies, like falls. This gives family members and caregivers peace of mind knowing they can get help quickly if needed.

### **5.4 Fitness and Lifestyle Monitoring**

Many wearable devices track physical activity sleep patterns and calorie consumption to help people live a healthy lifestyle. This information can motivate people to make changes and stay on track.

### **5.5 Early Disease Detection**

AI systems look at health data to spot signs of disease, which allows for timely medical help. Doctors can then step in. Provide treatment before things get worse. Early detection really improves chances of getting better. Early detection really improves chances of getting better.

## **6. Advantages of AI-Powered IoT Wearable Devices**

### **6.1 Continuous Real-Time Monitoring of Patient Health**

IoT wearables that have Artificial Intelligence capabilities make it possible to keep an eye on a patient's health all the time. There are sensors in these devices that always check things like heart rate, body temperature, oxygen saturation and how active a person is. These devices send a stream of information. This is different from the way of doing things in healthcare, where patient information is only collected when they go to the hospital. This means that the people taking care of patients can quickly see if there are any changes in a patient's condition and do something about it away. Continuous monitoring is really helpful for patients who have long-term health problems and for people who're very sick because it lowers the chance of unexpected medical problems happening. IoT wearables and continuous monitoring of health are very important, for patients.

## **6.2 Early Detection of Diseases**

One big advantage of combining AI and IoT in healthcare is finding diseases early. AI algorithms look at health data to spot patterns or unusual changes. These systems can find signs of diabetes, heart disease or breathing problems before they get worse. This early detection helps patients get better and reduces problems by letting doctors start treatment sooner. AI also helps predict health risks. It analyses data to forecast health issues. The use of AI and IoT in healthcare improves outcomes. Doctors can use AI-driven insights to make decisions. AI and IoT help healthcare providers take action early. Early detection and treatment are key, to patient outcomes. AI and IoT make it possible to identify health risks early.

## **6.3 Reduced Hospital Visits and Healthcare Costs**

AI-driven wearables help doctors keep an eye on patients from a distance. This means patients do not have to visit hospitals often. Patients can stay at home while doctors check on their health regularly. This also helps in cutting down on healthcare costs, hospital costs and travel costs. People who need monitoring, especially those living in remote areas can benefit a lot from this. The healthcare system can also reduce the load on hospitals and medical staff by reducing hospital visits. Doctors can access information remotely and patients can get the care they need without having to be, in the hospital. This way patients, doctors and the healthcare system all benefit from AI-driven wearables.

## **6.4 Remote Healthcare Services for Rural Areas**

People who live in the country or away from cities often have a hard time getting to hospitals and seeing specialists. Internet connected devices that people wear, like smartwatches can help with this problem. These devices have features that let doctors and nurses check on patients from far away. Medical staff in cities can look at the information from these devices. Talk to patients online. This means that people who live in the country can get help from their own homes. They do not have to travel a way to see a doctor. Internet connected devices and special computer programs make it possible for doctors to check on patients and talk to them in time. This is really good for people who live in areas because they can get help when they need it. Rural areas have Internet connected devices and telemedicine platforms that help people get care without leaving their homes. Rural areas have care that is available, to people who live there and that is Internet connected devices and telemedicine platforms.

## **6.5 Improved Decision-Making Using AI Analytics**

Artificial intelligence is really useful in healthcare because it can look at a lot of information quickly and get things right. Artificial intelligence looks at what's happening now and what

happened before to give doctors some really useful ideas, like what might happen in the future what could go wrong and what could be wrong with someone. This means doctors do not just have to think about what they see they can make decisions based on what the artificial intelligence says. The artificial intelligence is also good at helping doctors get the answer so they make fewer mistakes. When doctors know what is really going on with a patient, they can make a plan to help the patient that's just right for them. This makes the patient get better because the plan is based on the patient's health problems. Artificial intelligence helps with this. It is really good, for patients and doctors.

## **6.6 Enhanced Patient Engagement and Awareness**

Artificial intelligence is really useful in healthcare because it can look at a lot of information quickly and get things right. Artificial intelligence looks at what's happening now and what happened before to give doctors some really useful ideas, like what might happen in the future what could go wrong and what could be wrong with someone. This means doctors do not just have to think about what they see they can make decisions based on what the artificial intelligence says. The artificial intelligence is also good at helping doctors get the answer so they make fewer mistakes. When doctors know what is really going on with a patient, they can make a plan to help the patient that's just right for them. This makes the patient get better because the plan is based on the patient's health problems. Artificial intelligence helps with this. It is really good, for patients and doctors.

## **7. Challenges and Limitations**

IoT wearables equipped with AI features have some disadvantages, even though they offer many benefits:

### **7.1 Data Privacy and Security Risks**

Internet of Things wearables that have Artificial Intelligence features. Send very personal health information, like where you are what illnesses you have had and how fast your heart is beating. This information is often sent through networks and stored on cloud servers so it can be accessed by people who should not have it and it can be attacked by hackers. If someone with intentions gets into the system they can steal or change your health information and that can cause big problems, with your privacy and people using your personal information in the wrong way. Internet of Things wearables and Artificial Intelligence are supposed to help people. They also make it hard to keep your information private especially when it is shared between many different people and healthcare providers. To keep your information safe, we need to use codes to lock it make sure only the right people can get to it and have rules to

protect your data. Internet of Things wearables and Artificial Intelligence need to be secure so people can trust them with their health information.

## **7.2 High Cost of Advanced Wearable Devices**

Advanced AI wearables are usually more expensive because they use sensors, strong processors and modern communication tech. For people especially in developing countries wearables with ECG features, glucose monitors and smartwatches that track health can be quite pricey. The high cost is a problem for people with low incomes. It limits who can buy and use these wearables. Users also have to pay extra for software updates, maintenance and health services that require a subscription. To get more people to use these wearables we need to make them cheaper to produce and buy. Making AI wearables affordable is key, to getting more people to use them. This will help people, especially those who are low-income to track their health and wellness.

## **7.3 Limited Battery Life of Wearable Sensors**

Wearable technology needs batteries to work. Monitoring health all the time uses a lot of energy. Things, like sending data processing it in real-time and collecting data often all use up battery life. This means devices need to be recharged a lot. If the battery life is short, it can disrupt health monitoring. This can make the system less effective. If a device runs out of battery during an emergency important health alert might be missed. To solve this, we need to work on improving battery technology. We also need to make sensors that use power and improve how efficiently devices use energy. These are areas to research for wearable technology and health monitoring. The goal is to make sure devices can keep working without running out of battery. This will help people get the most out of their devices.

## **7.4 Data Accuracy and Reliability Issues**

Wearable technology is really helpful for getting a diagnosis and the right treatment. This is because it collects health data. Some things can make this data not entirely correct. For example, the quality of the sensors and where we place these devices on our body can affect the data. Even things like the weather and how much we move around can make a difference. If the data is not perfect the computer programs that look at it might get it wrong. This can cause problems because it might miss something or send out unnecessary warnings. This is not good for the people who are using these devices to get help. They might not trust the system anymore. The good news is that we can make these devices better. We can use good sensors and make sure they are working correctly. We can also use ways to look at the data and make sure it is accurate. This will help us get the information, from wearable technology and use it to take care of people.

### **7.5 Integration Challenges with Existing Healthcare Infrastructure**

Integrating wearables with AI capabilities into existing healthcare systems can be tough. One big challenge is combining data from devices with electronic health records or EHRs. This is hard because hospitals and healthcare providers often use software systems, data formats and standards. The lack of standardisation and interoperability makes it tricky to share data between devices and healthcare platforms. Healthcare workers might need training to use these tools properly. To overcome these challenges we need procedures, compatible systems and better cooperation between tech providers and healthcare organisations. In the future AI-driven wearable healthcare solutions are expected to get better more reliable and easier to access. This is thanks to improvements in cybersecurity, IoT technology and artificial intelligence. IoT wearables and AI capabilities will play a role in this. Healthcare systems will benefit from wearables with AI capabilities. The use of wearables and AI capabilities, in healthcare will become more common. AI-driven solutions will improve with the help of IoT wearables. The future of healthcare will involve wearables and AI capabilities working together.

### **8. Future Research Directions**

IoT wearable medical devices with AI features are really promising for the future. Technologies like edge computing, deep learning and big data analytics will make health monitoring devices even better. We need to work on making sensors more accurate using energy and keeping data safe when it's sent over. Also, if we connect these devices to telemedicine platforms people, in remote areas will get better healthcare services. The IoT wearable medical devices will be very helpful. These devices and AI will improve healthcare.

### **9. CONCLUSION**

The Internet of Things wearables that have intelligence are changing the way we take care of people's health. They do this by looking at a lot of data and keeping track of people's health all the time. This helps to make healthcare cheaper. It also helps doctors and nurses take better care of their patients. The Internet of Things wearables and artificial intelligence are making healthcare systems work better and respond faster to people's needs. Internet of Things wearables and artificial intelligence are making a difference. They help find health problems. There are some problems with Internet of Things wearables and artificial intelligence like keeping people's information safe and making sure they are reliable. People are working on making them better all the time. In the future Internet of Things wearables

with intelligence will be very important for taking care of people's health. They will help us have healthcare. Internet of Things wearables, with intelligence will play a big role in this.

## REFERENCES

1. Hamed Alemдар and Cem Ersoy, "Wireless sensor networks for healthcare: A survey," *Computer Networks*, vol. 54, no. 15, pp. 2688–2710, 2010.
2. S. M. Riazul Islam, Daehan Kwak, Md. Humaun Kabir, Mahmud Hossain and Kyung-Sup Kwak, "The Internet of Things for health care: A comprehensive survey," *IEEE Access*, vol. 3, pp. 678–708, 2015.
3. Sandeep K. Sood and Maheshwari Mahajan, "Wearable IoT sensor-based healthcare system," *IEEE Internet of Things Journal*, vol. 5, no. 3, pp. 1650–1661, 2018.
4. Joseph F. Kvedar, Michael J. Fogel and Joseph C. Elenko, "Connected health: A review of technologies and strategies to improve patient care with wearable devices," *Journal of Medical Internet Research*, vol. 18, no. 6, 2016.
5. Ali S. Albahri and Osamah S. Albahri, "IoT-based healthcare monitoring systems: A review," *Journal of Network and Computer Applications*, vol. 134, pp. 103–120, 2019.
6. Rajkumar Buyya and Amir Vahid Dastjerdi, *Internet of Things: Principles and Paradigms*, Amsterdam, Netherlands: Elsevier, 2016.
7. Feng Xia, Laurence T. Yang, Lizhe Wang and Alexey Vinel, "Internet of Things," *International Journal of Communication Systems*, vol. 25, no. 9, pp. 1101–1102, 2012.
8. Akram, W., & Kaur, M. AI-Driven Drug Discovery: Accelerating the Search for New Treatments.
9. Shancang Li and Li Da Xu, *Securing the Internet of Things*, Amsterdam, Netherlands: Elsevier, 2017.
10. M. Patel and J. Wang, "Applications, challenges, and prospective in emerging body area networking technologies," *IEEE Wireless Communications*, vol. 17, no. 1, pp. 80–88, 2010.
11. Dimitrios Georgakopoulos, Prem Prakash Jayaraman and Amit Sheth, "Internet of Things for healthcare: Opportunities and challenges," *Future Generation Computer Systems*, vol. 78, pp. 1–9, 2018.
12. Kaur, D. (2025). Chatgpt In Healthcare: Revolutionizing Patient Interactions And Medical Consultations While Navigating Ethical Challenges. *International Journal Of Research*, 6(2), 4708-4714.

13. Mohsen Guizani and Abdullah Gani, "AI and IoT based smart healthcare monitoring systems," *IEEE Access*, vol. 7, pp. 183–197, 2019.
14. Nabil Islam, Mustafizur Rahman and Md. Imran, "The Internet of Things for health care: A comprehensive survey," *IEEE Access*, vol. 3, pp. 678–708, 2015.
15. John G. Webster, *Medical Instrumentation: Application and Design*, 4th ed. Hoboken, NJ, USA: Wiley, 2014.
16. Sanjay Misra, Rajeev Tiwari and Mohamed S. Obaidat, "Internet of Things in healthcare: A survey," *IEEE Communications Surveys & Tutorials*, vol. 19, no. 3, pp. 1531–1564, 2017.
17. A. Rahmani, T. Gia and S. R. Moosavi, "Exploiting smart e-health gateways at the edge of healthcare Internet-of-Things," *Future Generation Computer Systems*, vol. 78, pp. 641–658, 2018.