HEALTHCARE IN IOT

IOT Healthcare Benefits

The use of IOT technologies in healthcare offers great opportunities and benefits. Here are some of them:

Accessibility – IOT offers more effective and accessible telemedicine. Wearable products used by patients can have their data shared with physicians that can allow doctors to diagnose real-time vital signs.

Remote conditioning and patient monitoring – IOT devices can remotely monitor and collect real-time patient data. Healthcare professionals can analyze these data so that patients can be given medical advice without having to visit the clinic daily.

End-to-end connectivity – Healthcare service delivery can be made effective through AI machine-to-machine communication, information exchange, and data movement.

Affordability – Since IOT reduces the need for face-to-face visits, there is better allocation, and healthcare costs are cut down since IOT is being utilized for better resources and overall improves the allocation and planning

Accelerated processing of patient data – IoT devices can collect multiple data in real-time, making it easier for physicians to access information. IoT can automatically analyze these data for the diagnosis and give quick access to final reports. This will help speed up the decision-making and be given the proper course of action much faster than with raw data.

Reduced risk of error and miscalculation – Due to the human factor, some results may be subject to error. On the other hand, IoT devices are a reliable method of evaluating data.

On-time alert and tracking – On-time treatment is important in the healthcare sector, especially for treating patients with critical conditions. Thankfully, medical IoT devices can gather data that require a quick alert response. The ability of IoT devices to provide real-time alerting, tracking, and monitoring promotes improved treatment in the healthcare industry.

Facilitates medical research – The data collected in IoT devices can be used for research purposes that would otherwise take years to be collected. Data can be used for statistical study for medical research for bigger and better medical treatments.

Why It Is Important In Healthcare?

We can consider an IoT healthcare facility as a collection of ubiquitous computing that mainly deals with external activities. In healthcare, IoT-based healthcare systems collect a variety of patient data and get inputs from doctors medical professionals. Continuous glucose monitoring for insulin pens is the best example of this.

All these devices can communicate with each other and take important actions that would provide timely help to save someone's life. After collecting the data, an IoT healthcare device would send this critical information to the cloud so that doctors can act upon it. From this, we can say that the potential application of IoT in healthcare can improve not only a patient's health but also the health care employee productivity and hospital workflows.

IOT Healthcare Devices

While the most popular example of IoT in healthcare is remote patient monitoring—meaning IoT devices that collect patient data such as heart rate and body temperature—there are many other examples of IoT in the healthcare, such as:

Remote patient monitoring

Remote patient monitoring (RPM) is a subcategory of homecare telehealth that allows patients to use mobile medical devices and technology to gather patient-generated health data (PGHD) and send it to healthcare professionals. Common physiological data that can be collected with RPM programs include vital signs, weight, blood pressure and heart rate. Once collected, patient data is sent to a physician's office by using a special telehealth computer system or software application that can be installed on a computer, smartphone or tablet

Glucose monitoring

Patients who suffer from diabetes can have devices with sensors implanted in them, just below their skin. The sensors in the devices will send information to a patient's mobile phone when his or her glucose levels get too low and will record historical data for them too. This way, patients will also be able to tell when they are most likely to be at risk for low glucose levels in the future, as well as in the present.

Heart-rate monitoring

An IoT-based human heartbeat rate monitoring and control system is developed. This system uses the capability of a heart pulse sensor for data acquisition. A humans heartbeat is captured as data signals and processed by the microcontroller. The

processed data are transmitted to the IoT platform for further analytics and visualization. Experimental results obtained were found to be accurate as the system was able to sense and read the heartbeat rate of its user and transmits the sensed data via Bluetooth to the Android mobile app(Blynk) . From the results obtained, it was found that the heartbeat rate of low if >40 and <60, medium if >60 and <100, high if >100 and <150. Furthermore, this research paper presents an approach that is flexible, reliable, and confidential for a heartbeat rate monitoring and control system using sensor network and IoT technology. The implemented device can be deployed to the medical field to assist the medical practitioners to efficiently and reliably do their work without difficulties.

Hand hygiene monitoring

The system includes an audible reminder in the form of a human voice that reminds healthcare facility staff to sanitize their hands. Bluetooth technology in a badge worn by the healthcare workers communicates with IoT sensors affixed to soap and sanitizer dispensers in patient care areas.

When the staffer walks into or out of a patient's room, the IoT sensors detect that. The worker has a certain number of seconds to dispense sanitizer or soap. If they don't, a "Real-Time Voice Reminder" is triggered saying "Please sanitize."
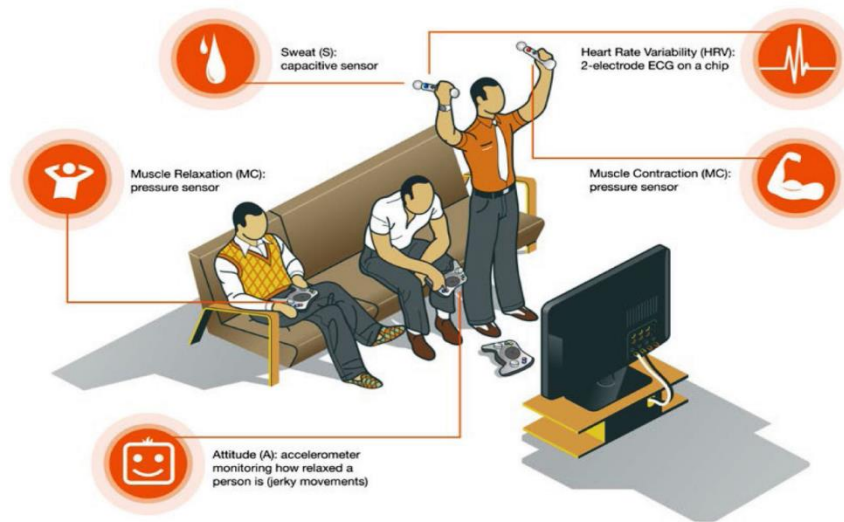
Mood monitoring

Figure 4: Context Awareness Using Emotion Sensing

Information about depression symptoms and patients' general mood is another type of data that has traditionally been difficult to collect continuously. Healthcare providers might periodically ask patients how they are feeling, but were unable to anticipate sudden mood swings. And, often, patients don't accurately report their feelings.

"Mood-aware" IoT devices can address these challenges. By collecting and analyzing data such as heart rate and blood pressure, devices can infer information about a patient's mental state. Advanced IoT devices for mood monitoring can even track data such as the movement of a patient's eyes.

Robotic surgery

IoT-aided robotic systems operate by establishing a connection between physical, network, and application layers. The physical layer consists of the sensors and/or actuators used to collect vital health information from the patient via smart devices like watches and rings. The robots then connect to form a multi-robot network of those sensors or actuators. In the network layer, the interconnections are improved to communicate effectively with controllers and network protocols. The application layer then takes the information, which is from the physical layer and retrieved via the network layer, and performs specified tasks accordingly.

What are the biggest IoT security risks and challenges?

IoT devices can be highly susceptible to cybercriminals who can hack into the system and compromise the Personal Health Information (PHI) of both patients as well as doctors. Here are some of the biggest IoT security risks and challenges:

Data breach – Hackers can gain access to patients' data and records.

Identity Theft – Hackers can use patient's electronic records to pose as the patient and use their IDs to buy drugs and medical equipment.

Fraudulent Insurance Claim – Cybercriminals may file fraudulent insurance claims under the patient's name.

Unauthorized Access – Hackers can gain access to systems when a breach happens.

Device Hijack – Hackers can take control of a medical device

Future Of IoT In Healthcare

We can consider an IoT unit as a device with a sensor that can interact with the physical world and send information to the Internet. All these Iot based healthcare devices can communicate with each other to take important actions that would provide timely help or even save a life.

After collecting passive data, IoT healthcare devices would send this critical information to the cloud so that doctors can act upon it. Thus, IoT-based healthcare services not only improve a patient's health and help in critical situations but also the productivity of health employees and healthcare organizations' workflows.

Conclusion

IoT changes the way the facilities are delivered to the healthcare industry. These technologies improve the product, causing a larger effect by bringing together minor changes.