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International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Internet of Things in Health Care Systems

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ABSTRACT:

IoT technology integration has revolutionized the healthcare sector in recent years by providing cutting-edge solutions for patient care, diagnostics, and monitoring. The abstract delves into the various uses of wearable technology, data analytics, smart healthcare infrastructure, and remote patient monitoring among the many other applications of IoT in healthcare. IoT in healthcare organizations can lower costs while improving patient outcomes. But this change also brings up questions regarding privacy, data security, and specific regulations. An overview of the Internet of Things' changing role in healthcare is given in this abstract, along with some of the technology's possible advantages and disadvantages.

Keywords: Cutting-edge, Wearable technology, and remote patient monitoring.

INTRODUCTION:

In order to enhance patient care, monitoring, and wearable technology, the Internet of Things, or IoT, is being incorporated into the healthcare ecosystem. These gadgets gather information and send it via the internet so that medical professionals can decide with greater knowledge. Key elements of IoT in healthcare include the following:

Remote Patient Monitoring: Thanks to IoT devices' ongoing ability to measure patients' vital signs including blood pressure, glucose levels, and heart rate, medical practitioners may keep an eye on their well-being from a distance.

Wearable Technology: Fitness trackers and smartwatches are two examples of wearable Internet of things (IoT) devices that may track sleep patterns, exercise levels, and even irregular heartbeats. These gadgets enable people to take charge of their medical

Environmental Monitoring: IoT sensors can keep an eye on the humidity, temperature, and air quality in healthcare facilities to guarantee that patients are comfortable and safe.

Equipment connectivity: Internet of Things (IoT) enables the connection of ventilators and ECG equipment to central monitoring systems.

This guarantees prompt maintenance and malfunction alerts.

Predictive analysis: Healthcare professionals can take preventative measures by using data from IoT devices to anticipate disease outbreaks, patient readmissions, and other trends.

Internet of things in healthcare system brings a numerous benefit like we can access the consultant doctor through mobiles, laptops

METHODOLOGY:

Doctors will have a comprehensive understanding of their patients because to wearable technology like smartwatches and fitness tracking systems.

Fig 1.1: Internet of Things communication between physician and patient.

This form of communication primarily takes place on the following types:

1. **Cloud storage**: It has also been demonstrated that big data healthcare requires cloud storage that can hold large amounts of diverse data. Imagine if one thousand people each wore a single pulse sensor that used an LPWAN (low power wide area network) to interact hourly with a cloud storage database.

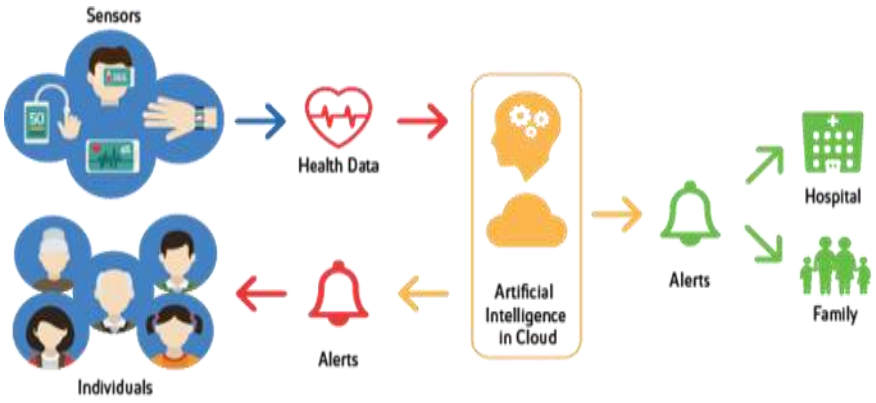

Fig 1.2: The communication between doctor and patients by using cloud storage.

2.**IOT in healthcare protocol applications:**

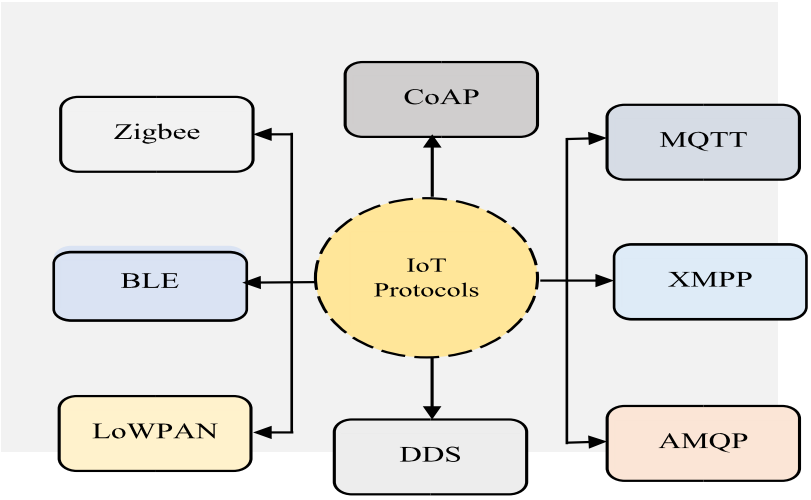

Fig 1.3: IOT in healthcare process based on these applications.

Zigbee: Designed to facilitate low-cost, low-power wireless machine-to-machine (M2M) and internet of things (IoT) networks, Zigbee is a standards-based wireless technology.

Constrained Application Protocol: (CoAP) is a specific web transfer protocol designed to interact with Internet of Things nodes and networks.

Bluetooth Low Energy (BLE): BLE enables dual-mode devices to share a single radio by using 2.4 GHz radio frequencies. One of the top Internet of things is BLE (IoT).

XMPP: This stands for Presence and Extensible Messaging Protocol. It is a real-time communication protocol built on top of Extensible Markup Language (XML).

MQTT: A machine-to-machine (M2M) network protocol for message queuing, MQTT is a lightweight publish-subscribe protocol.

It is intended to be connected to distant areas.

DDS: Machine-to-machine data distribution service for real-time systems. Seeks to make high-performance, scalable, trustworthy, and real-time possible.

Advanced Message Queuing Protocol: AMQP, is a published open standard for wire communication.

RESULTS:

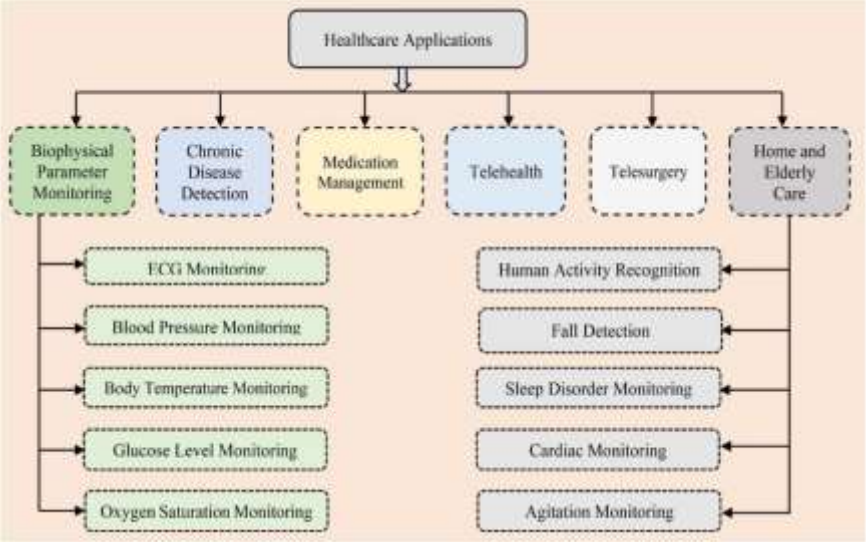

Fig 1.4: Healthcare Applications

This image is a flowchart that illustrates a variety of healthcare applications, including medication management, telehealth, telesurgery, chronic disease detection, biophysical parameter monitoring, and home and elder care. Subcategories inside each of these main categories offer more information about the many kinds of health care and monitoring.

Biophysical measurement: it uses a recognized measurement technique to quantify physical changes that occur over time in relation to a certain indication. This offers statistically sound data that can serve as the foundation for determining the influence and degree of change. It includes the following parameters, among others: body temperature, blood pressure, and ECG monitoring.

Chronic disease detection: The process of screening, diagnosing, and subsequently following the course of an illness or condition and the efficacy of a treatment is known as disease detection and monitoring.

Medication management: it is a service designed to assist patients in keeping track of their prescription drug schedules, side effects, and adjustments. It's a guided medication-taking technique that offers several advantages, particularly in the field of mental health.

Telehealth: This refers to the practice of providing medical care remotely through the use of technology. This covers virtual visits via your tablet, laptop, or smartphone in addition to electronic record exchange and prescription monitoring.

Telesurgery: Also known as remote surgery, telesurgery is a newly developed surgical instrument that links patients and surgeons who are separated by distance using wireless networking and robotic technology.

Home and elder care: This type of care encompasses helping the elderly with household chores like cooking and cleaning as well as reminding them when to take their medications. Seniors who get home care assistance might also benefit from companionship, socialization, and cognitive stimulation.

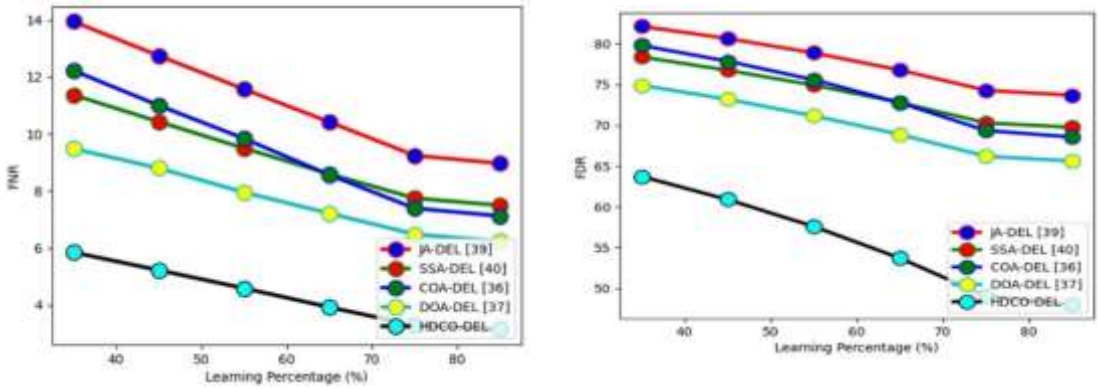

Fig 1.5: IOT based graphs

The graphs show how five different meta-heuristic algorithms perform in terms of accuracy, F1-score, false negative rate, and false discovery rate. The goal of the project is to create an Internet of Things (IoT) system that can classify students' health state using deep learning techniques and gather and process massive volumes of data from their health sensors. According to the study, the suggested approach can deliver better health treatments and increase the efficacy and accuracy of student health monitoring. Big Data utilizing MapReduce and a Deep Learning Framework for an IoT-based Student Health Monitoring System.

CONCLUSION:

Ultimately, I draw the conclusion that IOT technology is lowering healthcare expenses and enhancing patient outcomes. Along with an exponential growth in connected devices, IoT is enabling patients to access care from home through telemedicine and remote patient monitoring. This reduces the need for hospital visits and readmissions. Every IoT device communicates data packets, which require reliable connectivity, storage, and security. An organization's management, monitoring, and security of massive volumes of data and connections from scattered devices present challenges when it comes to IoT.

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