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Implementation of IOT in Health Care

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Abstract: The Internet of Things (IoT) is a computer process in which each physical object is connected with sensors, microcontrollers, and transceivers to enable communication and is created with appropriate protocol stacks to allow them to interact with one another and communicate with humans. Diverse dispersed devices aggregate, analyse, and communicate real-time medical information to the cloud in IoT-based healthcare, allowing for the collection, storage, and analysis of enormous amounts of data in new ways, as well as the activation of context-based warnings. This unique information acquisition paradigm enables continuous and ubiquitous access to medical information through the Internet from any connected device. Because the battery power of each IoT device is limited, it is best to reduce power consumption to extend the life of the healthcare system. This paper describes how to use the ZigBee mesh protocol to construct an IoT-based in-hospital healthcare system. The establishment of a healthcare system can monitor the physiological characteristics of in-hospital patients on a regular basis. As a result, IoT-enabled devices improve the quality of treatment through regular monitoring, lower the cost of care, and actively participate in data collecting and analysis.

Introduction:

Things interact with the Internet via sensors, microcontrollers, and transceivers for enabling communication, and are constructed with appropriate protocol stacks to allow them interact with one other and communicate with users, thereby becoming a constitutive part of the Internet. Nowadays, the Internet has an impact on a variety of areas of a potential user's daily life. Several IoT applications are being created with these considerations in mind, in which every physical object is connected to the Internet via sensor devices. The healthcare industry's reliance on IoT is growing by the day in order to improve access to care, improve quality, and lower costs. The combined practise of well-being, healthcare, and patient assistance is defined as personalisedhealthcare, depending on an individual's unique biological, behavioural, and cultural traits. This empowers each and every individual by adhering to the basic healthcare principle of "appropriate care for the right person at the right time," which leads to more desirable outcomes and increased satisfaction, hence lowering healthcare costs. Instead of expensive clinical care, an efficient healthcare service should focus on prevention, early pathology detection, and homecare.

IoT allows for the personalization of healthcare services by preserving each patient's digital identity. Many health concerns have gone unnoticed in traditional health-care systems due to a lack of ready-to-access healthcare services. However, pervasive, non-invasive, and powerful IoT-based devices have made it easier to monitor and analyse patient data. Various distributed devices acquire, analyse, and transfer real-time medical information to the cloud in IoT-based healthcare, allowing for the collection, storage, and analysis of massive data streams in new ways, as well as the activation of context-dependent warnings.

This novel data collecting paradigm enables continuous and ubiquitous medical device access through the Internet from any connected device.

Survey: In India, a survey was done to examine how different medical centres operate and how healthcare delivery has improved since the introduction of information technology. In many hospitals, patient records were found to be missing, according to a survey, were not well managed, nor were patient referrals. Various hospitals relied on paper documentation to some extent. Because there were no facilities to precisely measure the patient's condition, In the past, healthcare was of poor quality. The study was conducted. shown that healthcare facilities can be bettered by using with the aid of information technology, primarily electronic Medical Records (EHRs). The usage, according to the poll, is Because of this, the use of EHRs is decreasing and they are more prone to failure. the level of difficulty it entails approach also termed as WebEHR. This approach provides the web based connectivity among various healthcare centers, thus simplifying the maintenance and sharing of data.

Healthcare is one of a person's most fundamental requirements. Physicians, on the other hand, are not transparent with each and every patient in terms of care and money. Another issue with the healthcare system is the lack of medical facilities that can trace a patient's medical history in order to provide appropriate treatment. As a result, it is vital to optimise the healthcare system in order to increase its efficiency.

Aim and Objectives: IoT holds a great potential to meet the needs of healthcare :

1. The aim of this thesis is to develop an application/architecture, which is capable of monitoring the health of infants.
2. It is being applied to improve the access to care, to increase the quality of care, and to reduce the cost of care.
3. Monitor the health status of an infant by a sensor, which creates information that passes through a network so that it can be communicated or analyzed.

General IoT in Healthcare:

Medical data is transformed into insights by the Internet of Things, allowing for better patient care. Healthcare is becoming increasingly technologically savvy, with a focus on linking disparate systems. As a result, IoT is critical in healthcare. All of that information can be placed in the cloud via devices like connected sensors and other types of gadgets that individuals can wear, and the doctor/caregiver can simply monitor the patient's real-time information. Medical data is transformed into insights by the Internet of Things, allowing for better patient care.

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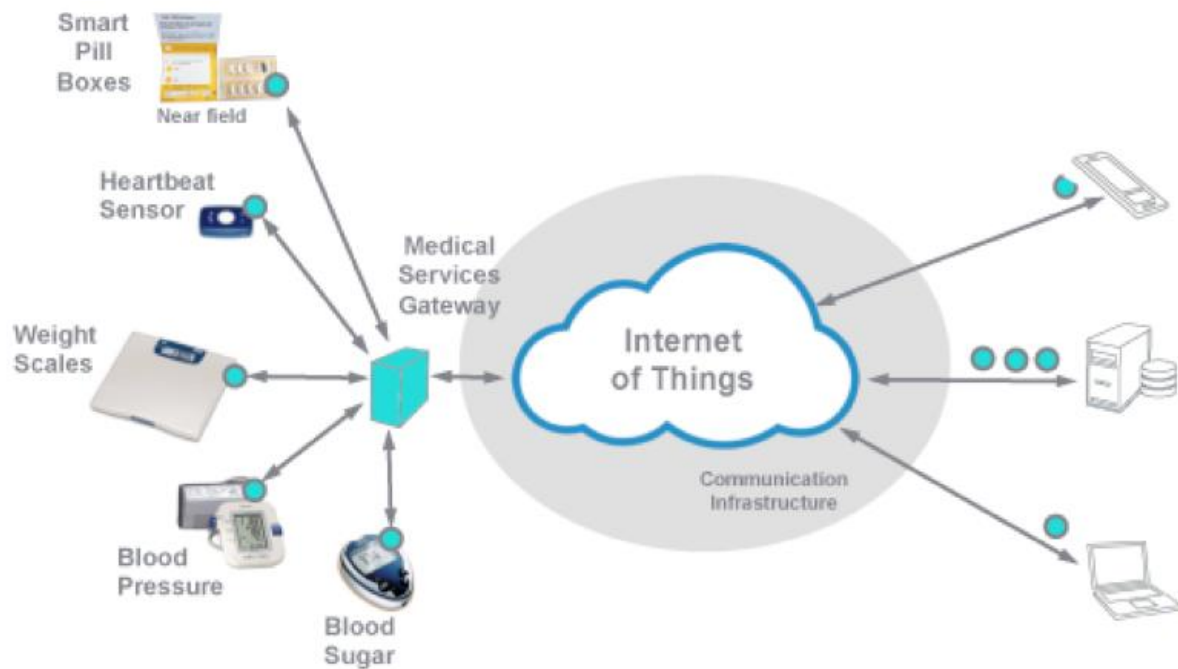

Figure 1: General IoT in healthcare

By collecting data from bedside devices, viewing patient information, and assessing the complete patient care system in real-time, IoT can support potentially life-saving applications in the healthcare business. Many healthcare devices are in use around the world today, which is a problem because it can lead to data loss and diagnostic errors. To overcome this, the acquired data will be kept in the cloud*.*

Caregivers or doctors can quickly monitor and manage the patient's health, allowing them to save valuable minutes each day. The caregiver/expert or doctor can deliver a remote diagnostic and track medical assets without having to individually visit each patient. The proper department in the hospital can be located using the sensors and Wi-Fi while sensory information can be retrieved.

A. Clinical Care: The patient is constantly monitored thanks to an IoT-driven sensor. Due to their physiological status, which is monitored noninvasively, the patient demands close attention. The patient's condition is monitored by a sensor that collects physiological data from the patient to be assessed via gateways. The data gathered will be saved in the cloud.

This information is then sent to the caregivers/doctors wirelessly for further analysis as shown in Figure 2. This improves the quality of care and also reduces the cost for the patient's
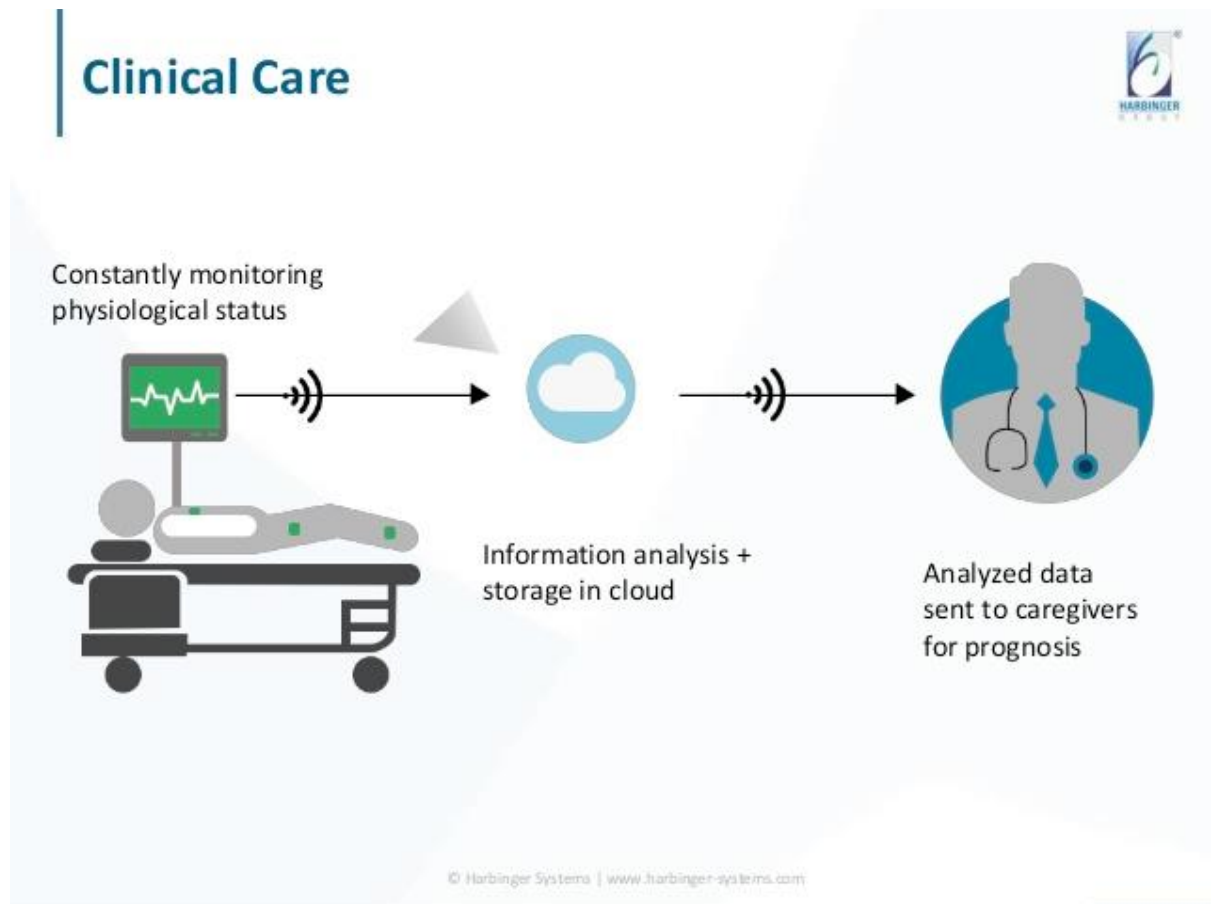
Figure 2: Clinical care system which constantly monitors the physiological status

B. Remote Monitoring: In a remote health monitoring system, the general IoT tracks a patient's vital signs in realtime and reacts if there is a problem with the patient's health. As seen in Figure 4, a device is attached to the patient. It sends data regarding the patient's vital signs from the location where he or she is. A hospital is connected to the transmitter via a telecommunications network. A remote monitoring system at the hospital reads the patient's vital signs. The data can be electronically delivered in the same way that the sensor is implanted into the patient's body. The data will be sent to healthcare practitioners and carers in a secure manner.
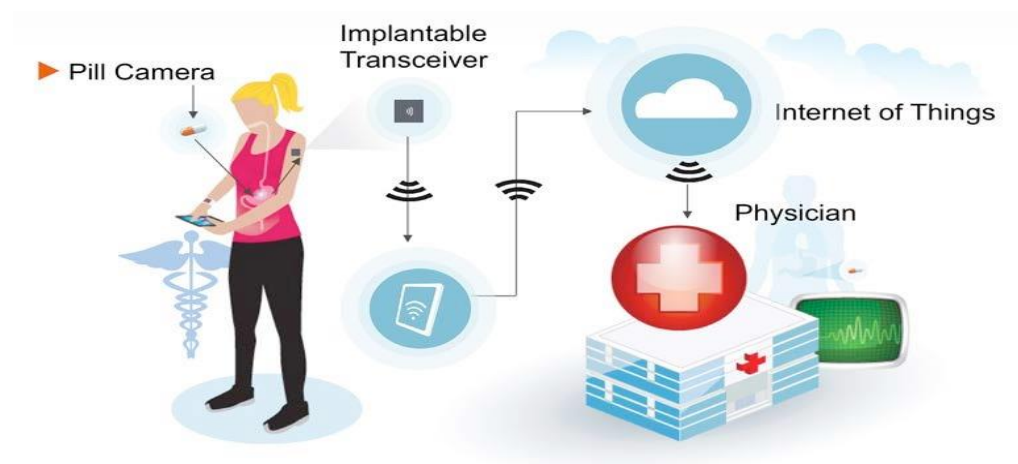
Applications for IoT in Healthcare:

Blood Pressure Monitoring: One of the most significant physiological indicators of the human body is blood pressure (BP). Blood pressure monitors that are both safe and easy to use have become commonplace. With the advancement of the healthcare system, healthcare equipment/systems are now connected with IoT devices or sensors, allowing patients and doctors/caregivers to communicate more easily. An IoT sensor is connected to an electronic blood pressure monitor, which collects real-time data on the patient's blood pressure levels.

Rehabilitation System: In terms of reducing challenges associated with ageing populations and when there is a scarcity of health specialists, a rehabilitation system can strengthen and restore functional capacities and improve the quality of life for those who are suffering from some disabilities. There is a smart rehabilitation method that is community-based and provides excellent treatment. An ontology-based automation designing technique linked to an IoT-based smart rehabilitation system can provide a convenient and appropriate interaction and allocation of medical resources based on patient needs.

Wheelchair Management: Wheelchairs are used by those who are unable to walk due to a physical disease or have other physical limitations. Wireless body area networks (WBANs) can connect smart objects to the Internet, allowing wheelchair users to use them as a people-centric sensing (sensor) device. When the human body falls out of the wheelchair, a pressure cushion (which is a resistive pressure sensor) will detect it. A smart wheelchair contains an additional accelerator sensor that detects the wheelchair's descent. From the hospital, the doctor or caregiver can keep an eye on the patient's data.

Healthcare Solutions Using Smartphones: For health care providers, mobile devices and healthcare apps offer numerous advantages (HCPs). Many medical healthcare applications, such as health records, information, and time, communication and consulting with doctors, patient continuous monitoring, and effective clinical decision making, are now available in a variety of methods and are ready to use. The usage of smartphone apps and sensors has enhanced the point of care as well as access to care, which will enable improved patient outcomes.

RESULTS AND CONCLUSION:

The Internet of Things (IoT) is a collection of technologies that enable a wide range of appliances, gadgets, and things to interact and communicate with one another via various networking protocols. Much of the information on the Internet is now provided by humans. Smart items give information in the case of IoT. IoT can be used for a wide range of applications, including healthcare, which is the primary focus of this research. Interconnected smart devices are used in healthcare systems to create an IoT network

for healthcare analysis, patient monitoring, and automatically recognising situations that require medical intervention.

However, there are some problems we need to solve. If we go in another area, which is not a home Wi-Fi network or business Wi-Fi network, it is getting trouble while connecting. It is quite difficult when getting to security matters. Also, the battery life time of the Smart Sock 2 sensor should be improved. The base station should come with a battery instead of plugging in all the time.

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