Analyzing Patient Health Information Based on IoT Sensors with AI

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ABSTRACT:

The IOT devices utilizes the several sensor devices that are able to collect a large volume of data in different domains which are processed by AI techniques to make the decision about the assistance problems. Among several applications, in our project, IOT with AI is used to examine the healthcare sectors to improve patient assistance and patient care in the future direction. An IOT sensor with AI is used to predict the exact patient details such as fitness tracker, medical reports, health activity, body mass, temperature, and other health care information which helps to choose the right assistance process. The patient information which is shared in the cloud environment is accessed and processed by applying the optimized machine learning techniques. It further examines the patient's details from the previous health information which helps to predict the exact patient health condition in the future direction. In this system, doctor and care takers can observe patient without exactly visiting the patient actually.

We proposed a nonstop checking and control instrument to screen the patient condition and store the patient information in sever utilizing Wi-Fi Module based remote correspondence. And furtherly they can upload medicines and medical reports on the web server which after can be accessed by the patient anywhere at anytime. It is very much easy process and convenient for both the doctors and patients. The efficiency of IOT sensor with an AI-based health assistance prediction process is developed by using the MATLAB tool. Monitoring and recording of various medical parameters of patient outside hospitals has become widespread phenomena. The reason behind this project is to design a system for monitoring the patient's body any time using internet connectivity. The function of this system is to measuring some biological parameter of the patient's body like Temperature, Heartbeat, Blood pressure, by using sensors and the sensors will sense the body temperature, heartbeat and blood pressure of the patient and sends the values to IOT Cloud platform through WIFI-Module. All information about the patient health will be stored on the cloud ,it enables the doctors to monitor patient's health, Where the doctor can contineously monitor the patient's condition on his smart phone. This system is based on client server application in which server stores data collected from client, role of client is to collect proper data from patient & transfer it to server. A remote health monitoring system using IoT is proposed where the authorized personal can access these data stored using any IoT platform and based on these values received, the diseases are diagnosed by the doctors from a distance. The

results showed that this project can effectively use WiFi technology to monitor patient health status. And the power consumption of Wi-Fi module can be reduced as much as possible

Key words: Embedded system, IoT, Patient monitoring system, Microcontroller.

INTRODUCTION

Internet of Things (IOT) and Artificial Intelligence (AI)plays a vital role in the upcoming years to improve the assistance systems. Now a days Internet of Things (IOT) is one of the effective and emerging technologies because it helps to interconnect computing devices and objects that can transfer the data from one place to another place. Most people thought that the diagnosis of diseases and patient assistant system consumed more amounts. Also, they thought that hospital services are not packet friendly which means, accessibility. Therefore, IOT sensor-related services were provided to the health care sectors for improving the people's hospitality in terms of ensuring accessibility. In addition, the IOT sensor-based disease diagnosis process enhanced the quality of treatment effectively. The main reason for utilizing IOT sensor devices in health devices was the patient workflow which was successfully maintained by using effective technologies and facilities. IoT sensor-based healthcare services. More ever, the IoT sensor helps to improve communication without requiring.

The utilized technologies increased data interoperability, data movement, information exchange, and machine-machine communication effectively. Due to the effective utilization of technologies and connectivity protocols, the patients' unnecessary visits were reduced, improving planning and allocations. Unlike the cloud storage, the IoT sensor device collected the patients' information and stored it until the physician retrieved it or the patient did the clinical analysis. In addition, the device itself had the data-driven analytic tool which generated the graph according to the deviations which improved the decision-making process with minimum errors. Once the gathered medical information had any threating activities or characteristics, then, the on-time alert was provided via the medical device. This alarm related data was transmitted to the physician for making the real-time tracking system and sending the alert message to the linked devices. Based on the alert, the respective treatment was provided, and the decision was handled successfully for enhancing the people life span. According to the discussion, it clearly showed that the IoT sensor device effectively monitored the patient's activities, alerting, tracking, providing better treatment, and improved patient care completely. From the analysis, it clearly stated that the IoT sensor device completely used to monitor the patient in the remote activity. The remote-based activity ensured the patient treatment also provided the drugs based on the disease effectively. Based on the discussion, several smart devices such as hearable, ingestible sensors, drug storage.

LITERATURE SURVEY

According to the different author opinion, healthcare applications have enhanced using the internet of things (IoT) because it effectively collected the patients' information in real-time application. More ever, for attaining the remote monitoring process, the IoT sensor was very useful. It reduced the complication rate and enhanced the treatment procedure. Even though, the assistance rate should be further improved with minimum complexity and maximum accuracy. For attaining this, in this work, an optimized artificial intelligence technology with the internet of things is used. Based on the discussion, iterative golden section optimized deep belief neural network approach is used to examine the IoT sensor based collected patients' health information. The detailed study of the work is discussed in further chapters.
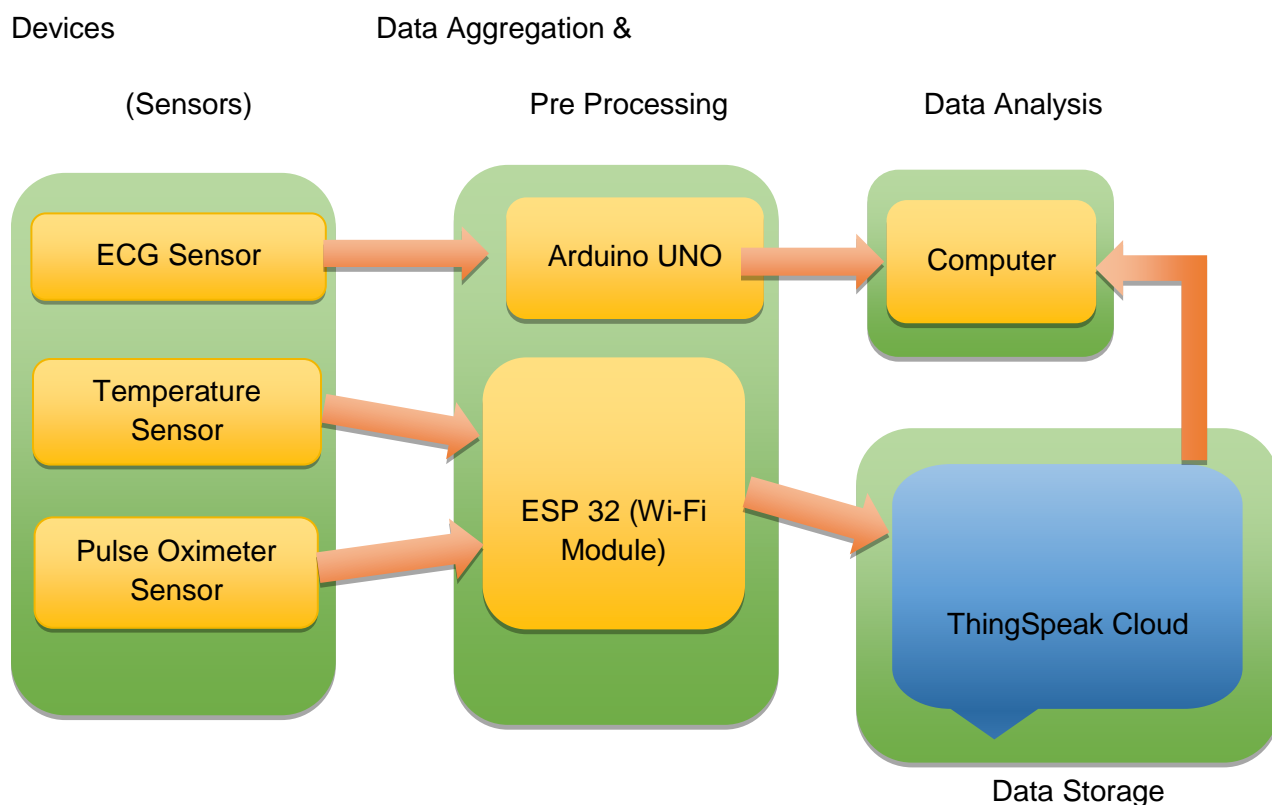
There are various vital parameters in this system. They are ECG, Heart Rate, Heart Rate, Pulse Oximetry. The Tele-medical System is the system which focuses on the system which focuses on the measurement and evaluation of these vital parameters. In android smartphones there are two different designers of a (Wireless) Body Networks, The Real Time System Features Several Capabilities. Data Acquisition in the (W) ban plus the use of the smartphone sensors, Data Transmission and Emergency Communication with first responders and clinical server. It is very important to save the Energy Efficient Sensors. This can be compensated. In the first ZigBee based approach, sensor nodes acquire physiological parameter perform signal processing and data analysis and transmit measurement value to the coordinator node. Sensors are connected via cable to an Embedded System in the second deign. In the both types of system, Bluetooth is used for transferring the data to an android based smartphone.

PROPOSED SYSTEM

As we are dealing with E-Health Care Monitoring System, our system design is based on the Wireless Sensor Networks (WSN) and Smart Devices. It is very important to have strong networks between doctor, patient, and care givers judges the condition of the patient. Sensors are used to monitor the patient surrounding as well as health, these sensors are medical and environmental sensors. Sensors are relayed to the prior devices through the transmitter and them to the end user. In this system, doctor and care takers can observe patient without exactly visiting the patient actually. We proposed a nonstop checking and control instrument to screen the patient condition and store the patient information in sever utilizing Wi-Fi Module based remote correspondence. And furtherly they can upload medicines and medical reports on the web server which after can be accessed by the patient anywhere at any time. It is very much easy process and convenient for both the doctors and patients. With the help of this data, doctors can understand and observe patient from private home i.e., patient to public health care Centre patient. This is the cost reducing technique. We have also defined the sets of add on services which include real time health advice and action (Retina) and parent monitoring.

This paper describes the implementation of a Telemedicine System for Patient Monitoring using Mobile Telephony, using this application any patient can be monitored with Rs232 interface. The system proved to be quick and reliable. Therefore, it represents an applicable solution to Telehomecare. Additionally, the high costs involving the conventional internment and the frequent problems in patient transporting do necessary a different way of providing good medical care. This system is based on client server application in which server stores data collected from client, role of client is to collect proper data from patient & transfer it to server. A remote health monitoring system using IoT is proposed where the authorized personal can access these data stored using any IoT platform and based on these values received, the diseases are diagnosed by the doctors from a distance.

Block diagram

Devices (Sensors)   Data Aggregation & Pre Processing   Data Analysis

ECG Sensor → Arduino UNO → Computer

Temperature Sensor → ESP 32 (Wi-Fi Module)

Pulse Oximeter Sensor → ESP 32 (Wi-Fi Module)

ESP 32 (Wi-Fi Module) → ThingSpeak Cloud

Data Storage

As we can see in the above block diagram, there are four blocks namely Devices (Sensors) block, Data Aggregation and Pre-Processing block, Data Storage block and Data Analysis block. In the first block we are having ECG Sensor, Temperature Sensor and the Pulse Oximeter Sensor. All these three sensors will be enabled and the data from ECG Sensor is given to Arduino UNO. The remaining two sensors' data is fed to ESP 32 (Wi-Fi Module). Next, we are writing the sensors data from ESP 32 to Thing Speak Cloud i.e., we are storing the data. Thereafter, the computer will read the data from Thing Speak Cloud and performs data analysis. Similarly, the computer will also read the ECG Sensor data from Arduino UNO and gives out the resultant ECG graph.

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The reason that we are not giving the ECG Sensor data to Thing Speak because, we cannot get the ECG graph in online mode.

CIRCUIT DIAGRAM
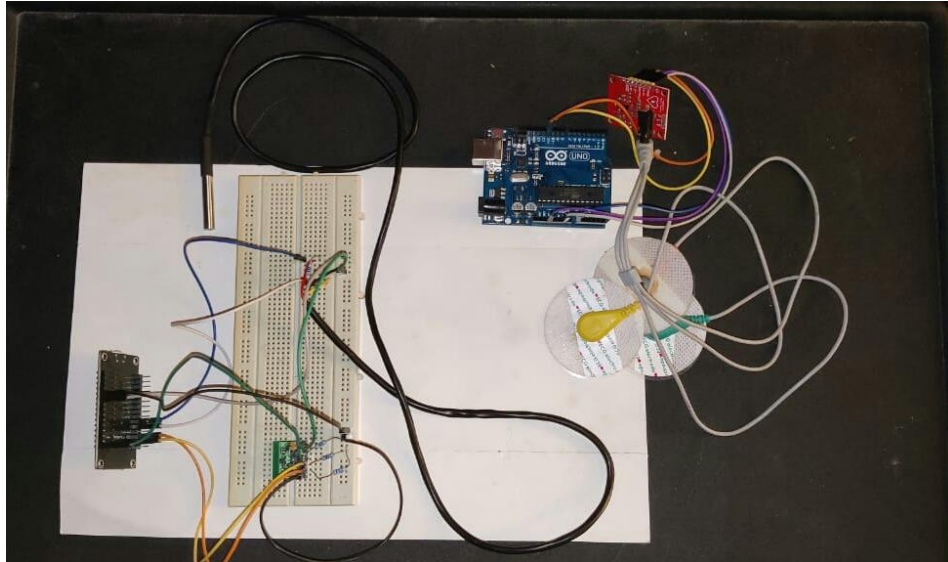
COMPARE THE DATA WITH STANDARD HEALTH CONDITIONS

Next step is to compare the obtained results with the standard health conditions. The standard health conditions of a healthy human being are :-

• The normal core body temperature of a healthy, resting adult human being is stated to be at 98.6 degrees fahrenheit or 37.0 degrees celsius. Though the body temperature measured on an individual can vary, a healthy human body can maintain a fairly consistent body temperature that is around the mark of 37.0 degrees celsius.

• A normal resting rate for a healthy adult is between 60 and 100 beats per minute (bpm). Human heart rates vary enormously with age, general health and physical exertion.

• A normal ECG is the one that shows sinus rhythm. Sinus rhythm may look like a lot of little bumps, but each relays an important action in the heart. The typical frequency range of ECG signals of healthy human in BPM can range from 0.5-100 Hz, sometimes reaching up to 1khz

Pulse Rate	Body Temperature		
	Low	**Normal**	**High**
Low	Bradycardia & Hypothermia	Bradycardia	Bradycardia & Fever

Normal	Hypothermia	Healthy	Fever
High	Tachycardia & Hypothermia	Tachycardia	Tachycardia & Fever

Table Standard Health Conditions

APPLICATIONS

• ECG monitoring.

• Temperature monitoring.

• Pulse rate monitoring.

Other notable applications such as:1. Glucose level monitoring.

2. Medication management.

3. Asthama monitoring.

4. Mood monitoring.

5. Wheelchair management.

6. Oxygen saturation monitoring.

7. Rehabilitation.

ADVANTAGES

• Simultaneous reporting and monitoring.

• Affordable price.

• End to End connectivity.

• Accurate data analysis.

• Remote medical assistance.

• Tracking system.

• Alert system.

• Improved decision-making process with minimum errors.

• Increased data interoperability.

 • Effective machine to machine communication.

LIMITATIONS

• Accurate power supply should be given to pulse oximeter in order to avoid voltage fluctuations.

CONCLUSION

The system introduced smart healthcare to monitor the basic important signs of patients like heart rate, body temperature. The rate of success between the observed data and actual data is approximately greater than 95% for all cases of the developed healthcare system. The system is very useful in the case of infectious disease like a novel coronavirus (COVID-19) treatment. The developed system will improve the current healthcare system that may protect lots of lives from death. In our project, an IoT based health monitoring system was developed. These sensor values are then sent to a medical server using wireless communication. These data are then received in an authorized personals smart phone with IoT platform. With the values received the doctor then diagnose the disease and the state of health of the patient. The Internet of Things facilitates that the individual prosperity parameter data is secured inside the cloud, stays in the hospital and reduced for conventional routine examinations and most important that the health can be monitored and the disease can be diagnosed by the doctor at any instant. These sensor values then will be sent to a medical server using wireless communication. Thus, with the help of IOT sensors and AI, the patient assistance has been improved to a reasonable extent.

FUTURE SCOPE

 IoT after getting the hold of many domains like Enterprises, Retails, Government, industrial, IoT is finally booming the healthcare domain also. Perhaps, no other sector has taken the great benefits of the Internet of Things than healthcare. Be it for doctors, researchers, patients or insurers, IoT in healthcare is actually a vibrant force. Doctors can now monitor patients' health and improvement continuously while patients, on the other hand, can connect with their doctors easily. Specialists and researchers got the chance to confer with one another across the globe about difficult health cases. Though technology cannot stop the population from aging or eradicating chronic diseases but it can at least make healthcare easier in a pocket. Hence, it is not wrong to say that Healthcare is one of the most exciting yet challenging verticals for IoT transformation while posing great future scope of IoT in Healthcare. With it, IoT app development is also gaining momentum in the healthcare domain. Before going any further, it will be wise to check out the stats for the IoT market trends to validate how the technology is

changing different domains. Once done with that, understanding how the technology is fueling healthcare will not be a task.

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