Original Research Paper

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Engineering

IoT BASED ECG MONITORING SYSTEM

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ABSTRACT In new era of recent world the Internet of Things (IOT) is an innovative technological model that can connect things from different fields through the internet. Health monitoring system with several sensor nodes are deployed on the different positions of the body are used in the measure of subject's blood pressure, body temperature, heart beat rate and Electro Cardio Gram. This project provides a wearable device which will continuously monitor the vital parameters such as temperature and ECG. This data is continuously uploaded into the server using the Wireless Fidelity (WIFI) which is in-built in CC3200. It will collect and transfer the information to the doctor at the earliest because of Internet of Things. The Internet of Things ensures the effective and efficient care of the patient. The usage of these advanced technologies eradicates all complications faced by the patients and data logging continuously. Internet of Things ensures the effective and efficient care of patient in any environment.

KEYWORDS : IoT, WIFI, Blood Pressure , CC3200

INTRODUCTION

A patient's blood pressure, temperature and heart Beat rate are some of the necessary parameter that are useful in identify medical deterioration and it must be recorded and measured accurately. The presented standard of care in most hospitals is continuous monitoring in intensive care areas and high-dependency, and continuous monitoring on general wards. Patients in intensive care units (ICUs) are can deteriorate very quickly and suffering life threatening conditions, therefore their vital signs are monitored frequently and in real time by attaching the patients to bedside monitors using multiple cables and wires. Though patients in ICU s are immobile and being tethered to the bed by cables and wires. This paper presents a patient's healthcare solution that combines MSP-CC3200 and web app in a wireless sensor network to monitor the health condition of patient and give a wide range of convenient healthcare services, comprehensive, and effective. The specialist or the person who takes care of the patient staying at a distance can effectively monitor the health conditions of the patients continuously. The CC3200 which is a flexible and programmable board provide an easy access to the network. In our system we are measuring patient's parameters (ECG, temperature) with different available modules. These module collected information and then given to CC3200 and then it is transferred to server.

Block Diagram

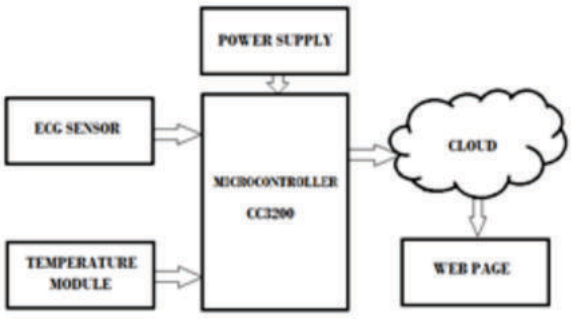

Figure 1.1

In this project some of the vital parameters such as ECG and temperature of a person is monitored. Temperature module and ECG module is used for the correct measurements. In figure 1.1 the microcontroller-CC3200 can accept various inputs from different sensor. The inbuilt WIFI module uploads the process data into the cloud. So the doctor can monitor the physical condition of patient being away from them. This in turn reduces the risk in travelling to the hospital by the patient. The doctor can continuously monitor and provide instant remedy if any abnormality is detected in the patient.

A ECG Sensing Network: The Electro Cardio Gram (ECG) sensing network is the heart of the complete system, which is responsible for collecting heart rhythms data from the body surface and transmitting these data to the Internet of Things cloud through a wireless channel. Wearable ECG sensors are used so that it will have little impact on the human's daily life. ECG data can be record over long hours or even days using these sensors. Then, the ECG signals are process through a series of filtering and amplification processes to improve the signal quality and to meet the necessities of wireless transmission. The ECG data gathered from sensors are transmitted to the IoT cloud via a Wi-Fi. These protocols can provide sufficient data rates for transmitting ECG signals with fulfilling power consumption.

Temperature Sensor

It measures the hotness and coolness of an body. Its working base is voltage which is read across the diode. When the voltage increases temperature also rises. It records voltage drop between voltage base and emitter. The amplification of difference in voltage will generate analog signal that is proportional to temperature The body temperature normally fluctuates over the day, continues monitoring of these small fluctuations is suggested by different researches for a variety of applications.

Internet of Things Cloud:

Internet Of Things Cloud (IoT) establish bridge between the physical device and Internet. The devices objects are connected to the cloud and create unique identification over the internet. IoT is mostly categorizing into six major layers. They are, Accumulation, Connectivity and protocol Communication, Cloud Server and Data Storage and Smart devices and Controllers, Data analysis and Computing, User Application and Report Generation.

AD8232:

The AD8232 is an incorporated signal conditioning block for ECG and other biopotential quantification applications. The supply current is usually 170μA and the temperature range and operating voltage is−40°C to +85°C and 2.0 to 3.6 V respectively.

Thingspeak

Thingspeak is an open-source Internet of Things platform predicated application and API to store and retrieve data utilizing the Hyper Text Transfer Protocol the Internet or a Local Area Network. ThingSpeak can a mass the data which might be digital or analog different types of sensors and visualize the data in alphanumeric or in graph forms. It in addition enables the sensor logging applications, location tracking applications, with status updates. It is a Cross-platform operating system. It additionally supports Arduino UNO, Arduino Nano, ESP 83266 and MATLAB and offers a wide range of flexibility.

Working Principle

The ECG pins are associated to AD8232 sensor through which it senses by placing its sensing tips on different places of patient body, at right leg, left arm and right arm AD8232 amplifies the signal at the sensing tips of the pins and convert this physical quantity which is in

analog nature into volts. These voltages are supplied to Node MCU which accumulate the data from the sensor by and send to the cloud. A cloud Internet of Things predicated platform application is utilized to post and visualize data on the cloud. Here we used such type of platform called ThingSpeak to post and visualize the data on cloud which updates continuously predicated on the data given by the Node MCU. The Node MCU provides the authenticate identification through which the target end users can authenticate for access and can avail the accommodations. One of the unique features about this model is that security because only the persons who are in need will have the concrete unique ID and password so that the quantifications or the status reports or the condition of the patient are less prone to errors like swapping the reports. After authenticate to the ThingSpeak separate channel for a particular patient and then define the field or the parameters that are to be quantified and then connect.

CONCLUSION

As health care services for a person are important part of our society, automating these services lessen the burden on humans and eases the measuring process. When beginning value is reached, the doctors can act more swiftly. The objective of developing monitoring systems is to reduce health care costs for the persons by reducing physician office visits, hospitalizations, and diagnostic testing procedure. Presently existing system is not wearable and compact. Hence it occupies more space and measurement capacity is not that good. But the system we proposed will collect and transfer the information to the doctor at the earliest because of IOT and the product is compact and wearable. So it is easy for the doctor to analyze the health condition of patient continuously .Since we use IOT ,it is easy to retrieve the previous record which is used for analyzing during complications.CC3200 of TI company is used for complete process which is cost efficient, the results are accurate and precise. It helps patients to avoid unexpected death and the doctors are able to suggest healthy diet to the patient from their place itself through IoT. Finally, the compared all proposed schemes and discussed a continuous long-term health monitoring system should be configured based on patient's needs and physician's recommendations.

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