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Smart Health Care System Using Internet of Things and Cloud

Nishkala H N[1], Dr Umesh D R[2]

[1]M. Tech (Computer Science and Engineering), Department of Computer Science, PES College of Engineering, Mandya

[2]Associate Professor, Department of Computer Science, PES College of Engineering, Mandya

Abstract: ***The world is facing problems, such as uneven distribution of medical resources, the growing chronic diseases, and the increasing medical expenses. Blending the latest information technology into the healthcare system will greatly mitigate the problems. This paper presents the smart health application system based on the health Internet of Things and cloud. The medical resources of many countries are limited. For example, in China, the development of medical resources is not balanced that 80% people are living in areas with limited medical resources while 80% medical resources are allocated at the big cities. Building smart health application system by effectively integrating medical health resources using intelligent terminals, health Internet of Things (IoT) and cloud computing is the important way to solve the above problems.***

Keywords: Internet of Things (IoT), wearable sensors, Raspberry pi, GPRS, Cloud

1. Introduction

The rapid development of Internet of things (IoT) technology makes it possible for connecting various smart objects together through the Internet and providing more data interoperability methods for application purpose. Recent research shows more potential applications of IoT in information intensive industrial sectors such as healthcare services. However, the diversity of the objects in IoT causes the heterogeneity problem of the data format in IoT platform. Meanwhile, the use of IoT technology in applications has spurred the increase of real-time data, which makes the information storage and accessing more difficult and challenging.

Figure: Smart healthcare system

Among the panoply of applications enabled by the Internet of Things (IoT), smart and connected health care is a particularly important one. Networked sensors, either worn on the body or embedded in our living environments, make possible the gathering of rich information indicative of our physical and mental health. Captured on a continual basis, aggregated, and effectively mined, such information can bring about a positive transformative change in the health care landscape. In particular, the availability of data at hitherto unimagined scales and temporal longitudes coupled with a new generation of intelligent processing algorithms can: facilitate an evolution in the practice of medicine, from the current post facto diagnose-and treat reactive paradigm, to a proactive framework for prognosis of diseases at an incipient stage, coupled with prevention, cure, and overall management of health instead of disease, enable personalization of treatment and management options targeted particularly to the specific circumstances and needs of the individual, and help reduce the cost of health care while simultaneously improving outcomes.

2. Literature Survey

Literature survey describes of how internet of things can implemented for the benefit of healthcare system. It also presents a review of wearable sensors those who equipped with the IoT technology and how the helpful improving health condition of the patients.

- Some of the framework to give some data about the patient status report to the hospitality without presence of doctor or nurse to monitoring the patients [1]. With the use of GSM, heart beat sensor, temperature sensor and raspberry pi to monitor the patient heath status and then for uploading that information to the server.
- A smart health care system at present stage is that when patient is at the rest position [4]. The phenomenon like blood pressure, ECG, Heart rate and temperature can only possible to measure while the patient is in hospital or at rest position.
- Method of patient monitoring system is monitor patient's body temperature, heart rate and Respiration rate and body movements using Raspberry Pi [5]. After connecting internet to the Raspberry Pi it act as a server.

3. Proposed System

Blood Pressure Monitoring

With the help of the wearable sensors we can monitor the patients' blood pressure. A motivating scenario in which BP must be regularly controlled remotely is presented by

showing the communications structure between a health post and the health center.

Body Temperature Monitering
Body temperature monitoring is an essential part of healthcare services because body temperature is a decisive vital sign in the maintenance of homeostasis. In the m-IoT concept is verified using a body temperature sensor that is embedded in the TelosB mote, and a typical sample of attained body temperature variations showing the successful operation of the developed m-IoT system is presented.

Heart Rate Monitoring
Wearable sensors those equipped with IoT technology can easily sense heart rate of the person who is wearing it. This sensor monitors the flow of blood through Finger. As the heart forces blood through the blood vessels in the Finger, the amount of blood in the Finger changes with time.

Smoke Detection
MQ-2 gas sensor is composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by Plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. This smoke sensor will detect the any hazardous gases around the person wearing it.

Fall Detection
The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 *g*. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pin. If it detects any emergency condition it will notify people around the patient through the buzzer.

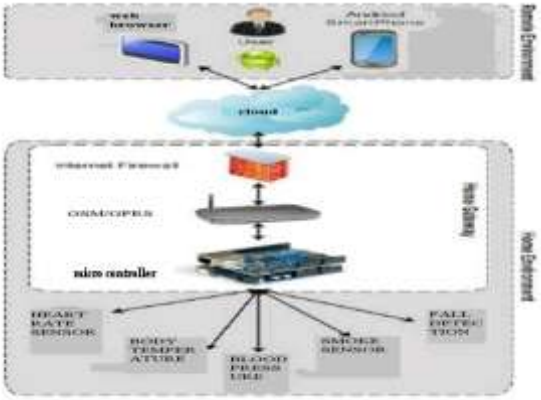

Figure: Flow chart of the system

Body temperature sensor is used to measure the temperature of the person wearing it. And these values send to ADC then through controller and GPRS stored in cloud. A Gas sensor is used to detect the leakage of gas in the environment where the embedded system is setup. If it detects gas leakage, it will also send the information. Pulse sensors measure the heart rate of the person wearing it and send the value. Accelerometer detects the tendency of fall of that person. Raspberry pi will collect these values and through GPRS it will store in the cloud.

Amazon Elastic Compute Cloud (Amazon EC2)
EC2 provides scalable computing capacity in the Amazon Web Services (AWS) cloud. Using Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

GPRS (General Packet Radio service)
General Packet Radio Services (**GPRS**) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users.

4. Results and Discussions

The expected result Renesas Microcontroller collects and stores the medical data through the sensors attached. The collected data is stored in the cloud. The information stored in the cloud helps in improving health of the patient.

5. Conclusion

In this project, we reviewed the current state and projected future directions for integration of remote health monitoring technologies into the clinical practice of medicine. Wearable sensors, particularly those equipped with IoT intelligence, offer attractive options for enabling observation and recording of data in home and work environments, over much longer durations than are currently done at office and laboratory visits. IoT technologies bring benefits to the doctors in monitoring the health conditions of remote patients and provide the immediate care for patients.

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