Literature review on "Cloud based IoMT Framework for Automated Health Assessment and Management"

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Abstract: This paper presents a secure IOT-based health monitoring system that shortens the distance between a patient and the relevant medical organization. Vital signals captured from sensors are processed and encrypted using AES (Advanced Encryption Standard) algorithm before sending to the cloud for storage. A Node MCU microcontroller is utilized to carry out the processing and encryption functions, and for providing connectivity to the cloud over WiFi. In addition, a medical specialist can visualize the private health data in real time only after providing decryption credentials. Moreover, the proposed system provides an alert by sending an email to some patient relatives or coordinating specialist if vital signs are outside the normal rates. The proposed system provides privacy, security, and real-time connectivity for private health data records.

Keywords: Secure Health Monitoring, Internet-of-Things (IoT), Node MCU microcontroller AES Encryption

I. INTRODUCTION

Diseases are usually associated with changes in some physiological parameters in the human body such as heart rate, oxygen saturation, body temperature, blood pressure, etc. The diagnosis of these diseases involves making some checks in the hospital to measure the difference in measurements of physiological functions from normal rates and then determine the positive or negative presence of those diseases. Providing healthcare services is very important for people specially who have chronic diseases. Those people who need continuous healthcare which cannot be provided outside hospitals. With recent advances in IOT and wireless sensor networks, many attempts have been conducted to deliver patient data remotely without having to go to the hospital. This helps doctors/specialists to determine the appropriate action ahead or to send a specific equipped medical help. There are a variety of technologies around us, so we get benefits from connecting such technologies to build a new e-health system platform could help to achieve high quality health care services.

II. LITERATURE SURVEY

[1]Cost Effective Remote Health Monitoring System Based on IOT Using Arduino UNO
This paper is divided into two sections:
  i. Sensing unit
 ii. Data processing unit
iii. Data communication unit
The sensing unit mainly consists of two sensors which are used for the implementation of our system. The sensors are namely DS18B20 (Temperature sensor), KG011 (Infrared pulse sensor). DS18B20, developed by MAXIM IC is one wire sensor with digital output. Data processing unit consists of Arduino UNO, its IDE (Integrated Development Environment) and Ethernet shield mounted over Arduino board are used for processing the data i.e. health related data and sending over the internet to realize the ultimate aim. Data communication unit has cloud services of Blynk platform are used for storing the health related data. Overall the proposed paper provides Remote health monitoring system based on IoT, bearing low cost and low power.

[2] GSM based Health Monitoring System
The proposed project is wireless heart beat monitoring system using GSM Technology, which could potentially be an integral part of a suite of personal healthcare appliances for a large-scale remote patient monitoring system. Various types of transducers are used to sense various bio electrical signals. To sense the body temperature LM35 is used. Heart beat sensor is designed to give digital output of heart beat when a finger is placed inside it. This digital output can be connected

to LPC1114 directly to measure the Beats per Minutes. If measured values cross the limit of reference values then LPC1114 sends SMS to a particular mobile number stored in memory through GSM modem. LPC1114 continuously displays these variables on the LCD display.

[3] Mobile Patient Monitoring: the MobiHealth System

This project provides the forthcoming wide availability of high bandwidth public wireless networks will give rise to new mobile health care services. This project has developed and trialed a highly customisable vital signals monitoring system based on a Body Area Network (BAN) and a mhealth service platform utilizing next generation public wireless networks.The Sensors (on the body) is connected to Mobile Base Unit (gateway host) then to the Computing infrastructure (Healthcare provider). Self-supporting EISlab sensor and a TMSI front-end (right). Both approaches use Bluetooth for intra-BAN communication .The M-health service layer integrates and adds value to the intra-BAN and extra-BAN communication providers. The M-health service layer masks applications from specific characteristics of the underlying communication providers, such as the inverted consumer-producer roles.

[4] Iot Cloud: In Health Monitoring System

The proposed system shows the excellent sensitivity towards measurement of oxygen saturation and pulse rate of the patient, while conducting experiment with healthy person it gives accuracy up to 95%. The ESP8266 Wi-Fi card will connect to specified WiFi network, communication takes place between the controller,firebase and the vitals are acquired through the sensor from the patient. The sensors are attached to the gloves in such a manner that the sensor will get heart beat rate readings from index finger. Node MCU, Max 30100, LM35 temperature sensors are used. For the purpose of experiment, a patient is made to wear the glove, and account is registered in the HealthX website and login to the website as shown in Fig. 3. Once the patient is weared the glove and sensed, then vitals like Heartrate in bpm, Blood oxygen concentration, Body temperature with time and date attached are being uploaded to the Firebase database automatically and login to the website using this url.

[5] Automatic Wireless Health Monitoring System in Hospital for Patients

The purpose of this project is to measure the heartbeat of that particular person if high or low heart will come automatically it will sends a message through GSM. By using heart sensor we can calculate the heart beat rate it contains the high power LED and LDR to calculate the heart beat and if patient is not good it will sends a message through GSM. Any abnormalities in health conditions are informed via SMS to the indicated mobile number through GSM.

[6] IOT Patient Health Monitoring System

The Reason behind this project is to design a system for monitoring the patient's body at 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 continuously monitor the patient's condition on his Smart phone. In any critical condition the SMS will be send to patient's doctor.This project we can monitor patient's condition remotely and we can secure their lives by giving emergency alert in real-time.This project will be developed for the doctors to be aware of current status of the patient automatically and if there is any up normal change to confirm the doctor in time.

[7]Wireless Patient Monitoring System

The wireless patient monitoring system monitors the patients 24 hours daily by using computers so that the immediate action can be taken to help the patient. In the normal practice, Electrocardiography (ECG) machine will be used to record and send the patients' heartbeat rate data to the computer. In this study, a dedicated machine will be considered as a normal ECG in order to get the heart beat rate data. A variable voltage will be designed by using PIC16F877A microcontroller as a reading of the patients' heartbeat rate according to the amount of given voltage .Due to fast communication, easy to operate and low cost the Zigbee is became the choice for implementing the present wireless study.

[8]A smart system connecting e-health sensors and the cloud

Cloud service providers offer three different types of services in order to obtain their customers more flexibility, which are Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). SaaS provides remotely access to software applications and their functions as a Web-based service. (PaaS) offers application frameworks and operating systems, obtains to minimize the development efforts, and provides many applications in the cloud for users without installing any framework or software on their machines. (IaaS) offers a pool of cloud computing resources, including hardware, servers, networking components, and a massive storage space.
The contributions of this paper are:

- A framework for integrating WSN and cloud computing.
- A prototype implementation using e-health sensors and the Raspberry Pi.
- Applying data mining technique to extract an appropriate decision based on patient's condition and historical data.

III. PROPOSED WORK

Lack of continuity and coordination in care ,miscommunication and excessive costs have resulted in patient suffering.The project aims to build secure and real-time solution for private health data records stored in the cloud. The IoT-based health monitoring system that shortens the distance between a patient and the relevant medical organization it is not just about monitoring a chronic disease state but about helping by preventing it. The main advantage of this model for IOT-cloud based healthcare system is that it reduces the latency by saving the bandwidth .Compared to other technologies like Zigbee or GSM,wifi based connection provides fast communication between patient and doctor.

Vital signals captured from sensors are processed and encrypted using AES algorithm. A Node MCU microcontroller is utilized to carry out the processing and encryption functions, and for providing connectivity to the cloud over WiFi. In addition, a medical specialist can visualize the private health data in realtime only after providing decryption credentials. The proposed system provides an alert by sending an email to patient relatives or coordinating specialist if vital signs are outside the normal rates.

IV. CONCLUSION

This work provides a way to keep an eye on key biological indicators of a patient in a secure and real time basis. The AES is employed in the proposed system to secure patient data prior to storing it into the cloud. This ensures data privacy and the secure distribution of patient data in public networks. In addition, the proposed system provides an alert system by sending an email to some patient relatives or coordinating specialist if vital signs are outside of normal rates.so it saves the time, by giving the alerts it saves the patient life before it goes wrong.

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