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IOT BASED HEALTH MONITORING AND ANALYSING SYSTEM USING THINGSPEAK CLOUD & ARDUINO

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ABSTRACT

Recent developments in ICT and the emergence of Internet of Things (IoT) have opened up new avenues for research and exploration in the all fields including medical and healthcare industry. Hospitals have started using the cell instruments for communication intent and for this intent internet of things (IoT) has been used and fused with Wi-Fi sensor node. Novel method to utilize IoT within the field of scientific and crafty wellness care are presented. The majority of the survey shows the different healthcare approaches used in the IoT are similar to, wireless well-being monitoring, U-healthcare, E-healthcare, Age-friendly healthcare techniques. In present project, we have designed an IOT Based Patient Health Monitoring and analysing System using Arduino.sensors, and ESP 8266 wireless module. We have used ThingSpeak IOT platform and API for storing and retrieving data. ThingSpeak is an open-source Internet of Things (IoT) application and API to store and retrieve data.. This present system could measure the pulse rate ,body temperature , blood pressure and communicate patient,s family members and physician .

Keywords — Internet of Things (IOT), Information and communication technologies (ICT), Healthcare, Wi-Fi sensor, Medical emergency.

I INTRODUCTION

In recent years internet of things (iot) is widely used in medical field to provide better health care. Iot in healthcare is the key player in providing better medical facilities to the patients and facilitates the doctors and hospitals as well. The internet of things provides network connectivity of inter-connected devices, apps, sensors which enhances this system to gather and exchange data. The specialty of iot in healthcare system is the regular monitoring a patient by checking various parameters measured and sent by the sensors attached to the patient's body . Though in the conventional medical systems , many devices equipped with sensors are present in hospitals.in areas where the epidemic is spread, it is always a better idea to monitor these patients using remote health monitoring technology. So Internet of Things (IoT) based health monitoring system is the current solution for this kind of situations [1]. Remote Patient Monitoring arrangement empowers observation of patients outside of customary clinical settings (e.g. at home), which expands access to human services offices at bring down expenses [2].

A number models for IoT in Healthcare and the prediction of various types of diseases using various techniques have been reported..

Ahn et al. [3] implemented a system for measuring the physiological signals in sitting position such as ECG and BCG by using a smart chair that senses the non-constrained bio-signals and can be monitored using a monitoring system such as the one they had developed providing a classic example of the application of iot in healthcare.

Dwivedi et al. [4] developed a framework in order to secure the clinical information that has to be transmitted over the internet for Electronic Patient Record (EPR) systems in which they propose a multi-layered healthcare information system framework which is a combination of Public Key Infrastructure, Smartcard and Biometrics technologies.

Lopes et al. [5] proposed a framework based on IoT for the disabled people so as to study and find the IoT technologies in healthcare segment that can benefit them and their community. They took two use cases to study the latest IoT technologies and its application that can be used mainly for the disabled people.

Nagavelli and Tyagi [6] explored the role of IoT in healthcare and studied its technical aspects to make it reality and identify the opportunities for which

they propose a cloud based conceptual framework in which the patients' medical data and information can be securely transferred, with the permission of patient and their family by building a network among patient, hospital, doctors, Labs etc.
.

The primary reason behind this is to relieve patient from the expensive clinical aid, overcome the shortage of doctors and therefore providing enhanced care and service to patients.

Though these IOT based technology having these features is already available is not accessible and affordable by most of the people in developing countries. Hence we propose a simple IOT based remote health monitoring system using Arduino, wi fi module, and sensors .

The objectives of this project are To obtain the real-time medical information about a• patient via IoT. Processing and classification of information gathered• about the patient. To provide Internet of Things based healthcare• solutions at anytime and anywhere.

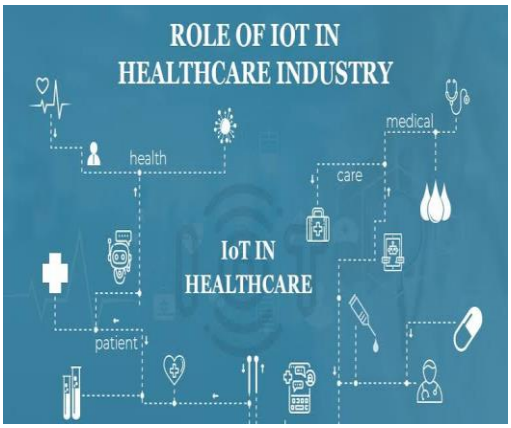

Fig 1: IOT in Healthcare

By using IOT based health care analyser

- The patient's physiological signs are obtained by the sensors joined on the patient body, which are then communicated to the far off base-station and furthermore to a PC.

- In indoor conditions, the sign strength of passages can be lost by 30-90% as it goes through the checks (for instance, when the two remote gadgets or transfer hubs are in various rooms, and the entryway which interfaces the rooms are shut).

- Normally in these type of frameworks, a crisis ready help utilizing short message administration (SMS) informing is additionally added for crisis reactions

II EXISTING SYSTEM In a hospital, either the nurse or the doctor has to move physically from one person to another for health check, which may not be possible to monitor their conditions continuously. Thus, any critical situations cannot be found easily unless the nurse or doctor checks the person's health at that moment. This may be a strain for the doctors who have to take care of a lot number of people in the hospital. Also, when medical emergencies happen to the patient, they are often unconscious and unable to press an Emergency Alert Button. One ofthe application protocols that are being used to transfer data isHyper Text Transfer Protocol (HTTP)for general communication over Internet. However, when HTTP is applied to communication in IOT,protocol over head and resulting performance degradation is a serious problem. Moreover, IP addressing depends on physical location, which causes the problem of complexity of network control.

III PROPOSED SYSTEM

Our system continuously monitoring patient's vital signs and sense abnormalities. The monitored data is delivered to medical staff. Upon encountering abnormalities, the system alerts the medical staff about the abnormal parameter.Thus, reduces the need for manual monitoring done by the medical staff. Our proposed system uses Arduino with esp8266 to send data from sensors to cloud platform that is thing speak. Arduino has been programed with esp8266 module which includes the API key provided by on the things peak site. Any number users can see the medical record recorded on the thing speak using the thing speak access key.

A. ***Arduino IOT cloud***

Arduino IoT Cloud is an application that assists producers with building associated objects in a speedy, simple and secure way. You can interface different gadgets to one another and permit them to pass on information. You can likewise screen them from anyplace utilizing a basic UI.

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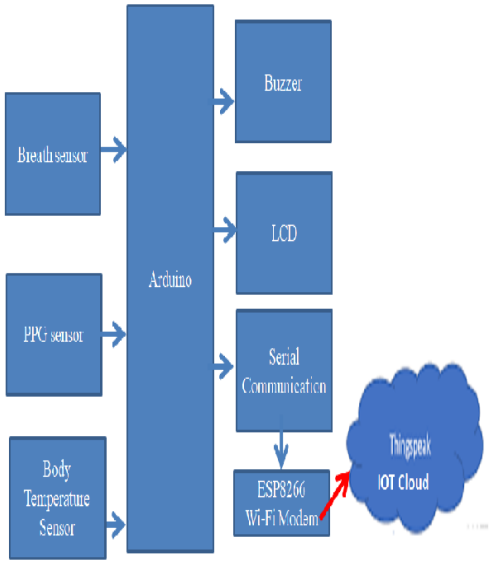

Fig 2: Arduino IOT cloud

Arduino IoT Cloud is fully integrated in the Arduino Create ecosystem and it will be able to generate a template code in Arduino IoT Cloud.

B. **THING SPEAK**

1. First of all, user needs to Create a Account on ThingSpeak.com, then Sign In and click on Get Started.

2. Now go to the 'Channels' menu and click on New Channel option on the same page for further process.

3. Now the screen show a form for **creating the channel**, fill in the Name and Description as per your choice.

4. The screen will show three charts. Note the **Write API key**, to use this key in this code.

5. Now, to use ***Thing HTTP*** app of the server to trigger the IFTTT applet for data entry to Google sheets and sends email/ sms.

6. Thing HTTP enables communication among devices, websites, and web services without having to implement the protocol on the device level. You can specify actions in Thing HTTP, which you want to trigger using other Thing Speak apps such as **React**.

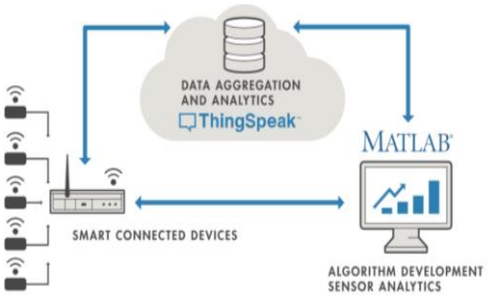

Fig 3: Think Speak IOT analytics platform

Complete procedure for using Thingspeak cloud is discussed in references[7,8]

C. **Components used**

Arduino Uno

Arduino is a computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),permitting the manufacture of Arduino boards and software distribution by anyone.

PPG Sensor

The Optical sensor is based on the principle of photo phlethysmography.

It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region).

In case of applications where heart pulse rate is to be monitored, the timing of the pulses is more important.

The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

Breath Sensor

The Breath Sensor measures breathing rate and relative depth of abdominal or thoracic breathing.

It is provided with an easy to apply elastic band and can be worn over clothing.

The Breath Sensor is usually placed over the abdomen. Respiration is often used in combination with the for HRV Training.

The Breath Sensor offers:

Two adjustable elastic straps,; small and large

Easy strap system and can easily be worn over clothing

Shielded cables for a minimum of noise and movement-artifacts

LCD Screen

LCD used in this study is HD1234. This is an alphanumeric kind of LCD with 16 pins. Of which Pins 7 to 14 are utilized as information pins, 11 to 14 pins are associated with port D of PIC16F877A microcontroller. There are 3 control pins RS (Pin-4), RW (Pin-5) and EN (Pin-6). The RS pin is associated with the twentieth Pin of miniature regulator. The RW pin is generally grounded. The RW is associated with 21th Pin. The EN pin is associated nineteenth pin. The LCD has two Rows and 16 Columns. The LCD is controlled up with 5V inventory associated with Pins 1(GND) and 2(Vcc). The Pin 3 is associated with Vcc through a Potentiometer. The potentiometer is utilized to change the difference level.

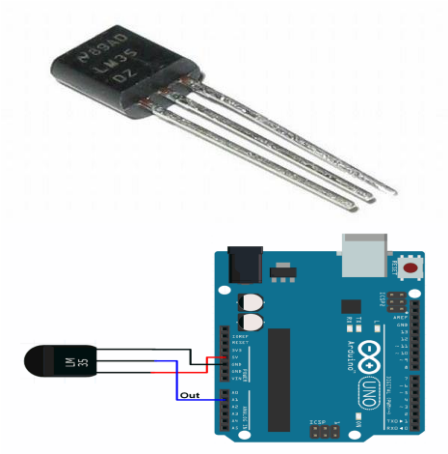

Fig. 4 LM35 sensor connected to Arduino UNO

ESP 8266 wi-fi module

ESP8266 Wi-Fi module is an independent framework on chip (SoC) with a coordinated TCP/IP convention stack that can give any MCU admittance to your Wi-Fi organization. ESP8266 is prepared to do either facilitating an application or offloading all Wi-Fi organizing capacities from another application processor. Each ESP8266 module comes pre-customized with an AT order set firmware. This implies that one can essentially attach this to your PIC microcontroller gadget and get probably however much Wi-Fi capacity that a Wi-Fi safeguard can offer (and that is barely out of the container). ESP8266 module is an amazingly savvy board with a colossal and an always developing local area. ESP8266 is an impressive, low cost Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller project via a UART serial connection.

- The module can even be reprogrammed to act as a standalone Wi-Fi connected device–just add power.

The feature list is impressive and includes:

- 802.11 b/g/n protocol
- Wi-Fi Direct (P2P)
- soft-AP Integrated TCP/IP protocol stack

LM 35 –Temperature Sensor

LM35 is a temperature sensor which can measure temperature in the range of -55°C to 150°C.It is a 3-terminal device that provides analog voltage proportional to the temperature. Higher the temperature, higher is the output voltage.The output analog voltage can be converted to digital form using ADC so that a microcontroller can process it.

From the yield voltage of LM35 the body temperature is estimated. The interior ADC changes over the yield voltages from the LM35 which in turn relate to the temperature. The three pins of LM35 are VCC, Output and Ground.

Fig 5: Circuit model

Doctors' interface

Most of the IoT systems use a user interface that acts as a dashboard for medical caregivers and performs user control, data visualization, and apprehension. An ample amount of research has been discovered in the literature that has reported the progress of the IoT system in healthcare monitoring, control, security and privacy .

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Patient Interface

After effectively login of patient, it will direct to principle screen which will comprise of the individual data of a patient and request a determination of field to get the information of a specific field. After choosing the specific field, the all the required information will be displayed on the patient's computer/mobile screen which also provides the information the specific date and time. This information can be shared with any of their family members or relatives.

IV RESULTS

The various parameters like pulse rate, body temperature, sugar level and blood pressure are measured and analysed. The results are figures 6 to 11.This information can be shared with any of the patient's family members or relatives and doctor to analyze these results.

Fig 6: Performance variation and analysis of pulse rating

Fig 7: Performance variation and analysis of temperature

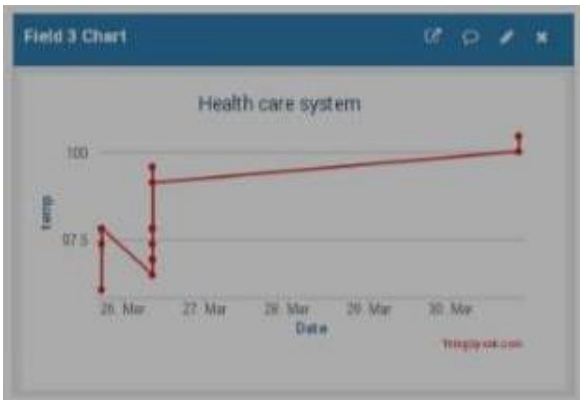

Fig 8: Performance variation of Temperature

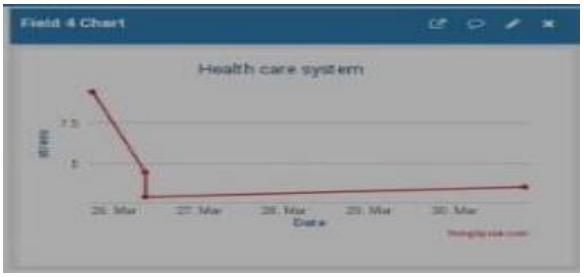

Fig 9: performance of sugar level

Fig 10: performance and analysis of sugar level

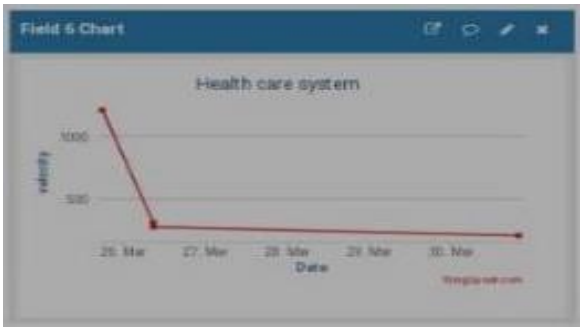

Fig 11: Performance and analysis of pressure

V CONCLUSION

The present system depends on the sensors attached to the body and the ambient conditions in which system sensors are present. It is contact less health monitoring which requires the patient to be present few meters away from the sensors.the present system can be xtended fall detection application to monitor chronically ill patients

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