IOT BASED PATIENTS TRACKING SYSTEM

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Abstract - *Internet of Things (IOT) is going to change the world in the upcoming days. Majorly it helps to improve efficiently in the area of transport and health. In the health department the patients can be constantly monitored using a microcontroller called Arduino-uno, ESP8266 Wifi module and using various sensors. The work which is targeted to monitor the patients is done effortlessly. It will detect the patient's heart pulse rate using pulse rate sensor and body temperature using LM35 sensor. This also sends SMS and an email to the doctors and to their loved ones when their value falls to critical. The recordings will be updated over ThingSpeak and Google Sheets which can be viewed from anywhere in the world. An emergency button will be given to the patient to alert by sending SMS and mails.*

Key Words: IOT, HEALTHCARE, THINGSPEAK, EHM

1. INTRODUCTION

Nowadays IOT plays a major role, moreover it is the trendsetter. Especially it is indeed to have IOT in the field of medicine. People even after spending a lot during their difficulties of health are not able to get a standardized hospitality from the hospital side. So having a smart system which could increase efficiency and promote effortless works with maximum care for the patients can be implemented. So people will be monitored throughout and the reports will be taken continuously. Internet of Things (IoT) is a growing present concept that has an effect on many aspects of human life. Various processes of different concepts including data acquisition, data transmission, and data analytics enable IoT based systems to support smart solutions especially for health care and monitoring. [1]

The patient's heart pulse rate and the body temperature is monitored and sent to Thingspeak which is cloud based and an emergency button will also be given to the patient. This also can be implemented in the rural areas. This can be framed into different forms. [2]

1.1 Pulse Rate Sensor

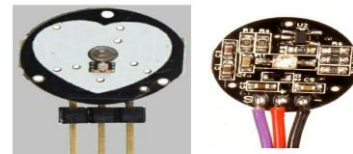This sensor is a plug and play sensor for Arduino. The sensor clips onto a finger to measure the heart pulse rate.

FIG 1: Pulse Rate Sensor

The front of the sensor is covered with the Heart shaped logo. This is the side that makes contact with your body which is the skin. On the front you see a small round hole, which is where the LED shines through from the back, and there is also a little square just under the LED. There are three wires coming out of the sensor, Signal(S), Vcc(3 - 5 V) and GND.

1.2 LM35 Temperature Sensor

LM35 is an analog linear temperature sensor. Its output is proportional to the temperature (in degree Celsius). The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every oC rise or fall in temperature. It can be operated from a 5V as well as 3.3 V supply and the standby current is less than 60uA.

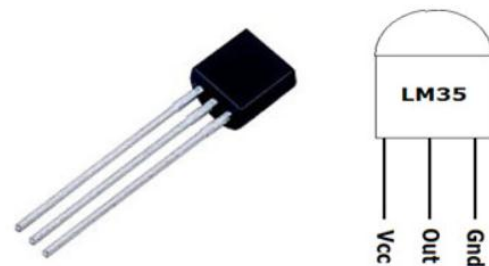This is used to take the body temperature of the patients.

FIg 2: LM35 Temperature Sensor

1.3 ESP8266 Wifi module

ESP8266 is the name of the microcontroller developed by Espressif Systems which is a company based out of shanghai. This microcontroller has the ability to perform WIFI related activities hence it is known as a wifi module.
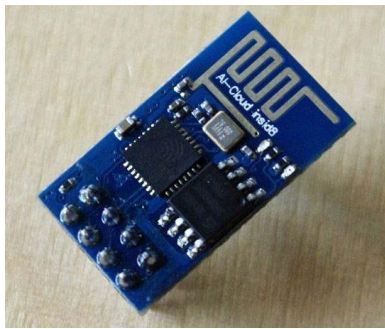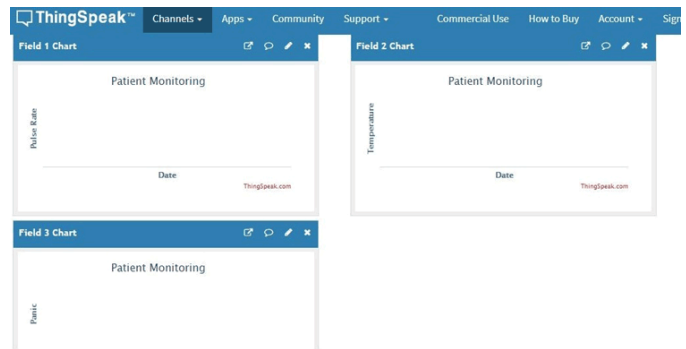
Fig 3: ESP8266 Wifi Module

2. Recording Patient's Data

As far as IOT is concerned, we use Thingspeak tool to record patient's data. **ThingSpeak** provides a very good tool for IoT based projects. By using ThingSpeak site, we can monitor our data and control our system over the Internet, using the Channels and webpages provided by ThingSpeak. ThingSpeak **'Collects'** the data from the sensors, **'Analyze and Visualize'** the data and **'Acts'** by triggering a reaction.

We will use ThingSpeak to monitor patient heartbeat and temperature online using the internet. We will also use **IFTTT** platform to connect ThingSpeak to email/message service so that alert message can be sent whenever the patient is in critical state.[3]

Fig 4: Block diagram

2.1 Usage of Thingspeak

First of all create an account in Thingspeak. Now go to the 'Channels' menu and click on **New Channel** option on the same page for further process. Now you will see a form for **creating the channel**, fill in the Name and Description as per your choice. Then fill 'Pulse Rate', 'Temperature' and 'Emergency' in Field 1, Field 2 and Field 3 labels, tick the checkboxes for the Fields. Also tick the check box for 'Make Public' option below in the form and finally Save the Channel. Now your new channel has been created.

Fig 5: ThingSpeak Channels Chart

Now, we will use the ThingHTTP app of the server to trigger the IFTTT applet for data entry to Google sheets and send email/sms. ThingHTTP enables communication among devices, websites, and web services without having to implement the protocol on the device level. You can specify actions in ThingHTTP, which you want to trigger using other ThingSpeak apps such as React.

To make New ThingHTTP, we will need URL for triggering which we will get from IFTTT. [3]

2.2 Configuring IFTTT

Login to IFTTT and search for **Webhooks** and click on it. Then Click on **Documentation.** Type "Patient_Info" in the event box and copy the URL. We will use this URL in ThingHTTP. Now let's make an Applet to link ThingHTTP to Google sheet and to send email/sms. After that we will jump to complete our ThingHTTP. Click on "+this" and search for Webhooks and click on it. Choose the trigger as "Receive a web request"Type the Event Name which is the same as what you write in the event box in the webhooks URL. Click on Create Trigger.
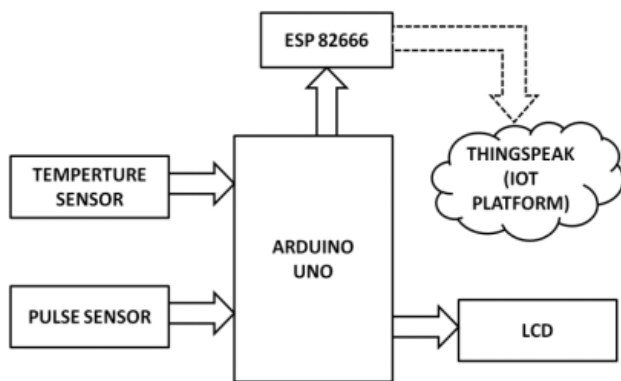

Fig 6: IFTTT Create Trigger

Click on "+that" and search for Google Sheets and click on it. Click on **Add row to spreadsheet**. Give any name to your sheet. In formatted row box, you have date and time, event name, BPM value and body temperature which will be written as shown. Review your applet and click on finish. In the same way, we have to make applet for

sending email when **Panic or Emergency** is occurred. So again click on "+this" and select *Webhooks*, then in event name enter "Panic". In "+that" search for Gmail and click on it. Now, click on Send an email and type the email you wish. Type the body content you wish to send in the email and click on create action. Review it and finish.

2.3 ThingHTTP for connecting ThingSpeak with IFTTT

Click on New Thing HTTP. Give any name and Paste the URL that you copied from the webhooks documentation. After filling the information, click on *Save* Thing HTTP.

In the same manner, we have to make ThingHTTP for "Panic". Follow the same steps.

In the URL, write **Panic** in place of **Patient_Info.** Body remains empty and all other information is the same as in the previous ThingHTTP. Save it. Now, we have to make *React* to trigger the URL.React works with ThingHTTP app to perform actions when channel data meets a certain condition. To make React, click on Apps -> React. Click on **New React.** Give name to your React. Condition type as Numeric and Test Frequency as on Data Insertion. Choose the Condition on which you want to trigger the URL. Select your channel from the *If Channel* drop down menu. Choose field. Choose ThingHTTP from Action drop down menu and select the ThingHTTP. Select "Run action each time condition is met" and click on *Save React*. In the same way, make React for the Panic as shown. Select "Run action each time condition is met" and click on Save React.
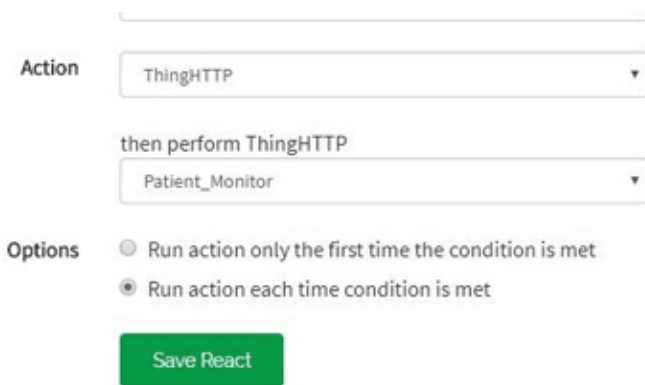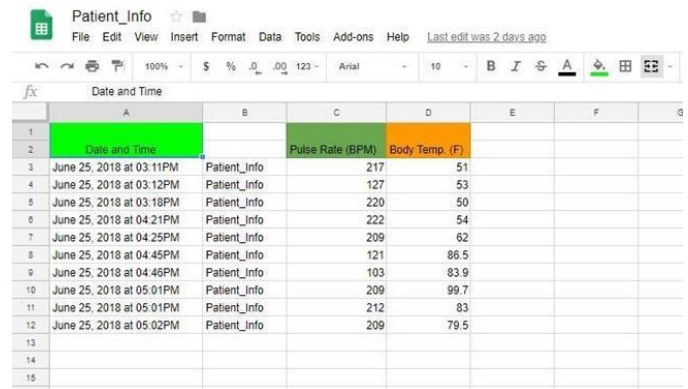

Fig 7: Creation of React

3. Results

When you are done with hardware component setup and you upload the code to the Arduino and open the Serial monitor to see what's going on. You will see data is updated defined in the Google sheets on Google drive, after the interval you defined in the timer setting.

Fig 8: Datasheet of Patient

Also, When the Emergency button is pressed accordingly an email will be sent to the given email address.

4. Conclusion

This paper presents the importance of IOT in the field of medicine. The doctors will get the information of the patients very easily and they are monitored properly and equally. As the information is stored in the cloud anyone and anywhere in the world can access.

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