Design of Rapid Internet of Device for Real Time Health Status Monitoring

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Abstract

The Development of computer technology "Internet of Things" has made virtual health monitoring possible without any interruption to the patients and doctors though physically separated. IOT is the state of the art modern technology spanning many applications in health industry as number of chronic diseases are increasing compared to the global population. Virtual health care systems extend numerous including Design of virtual assistance to aged people, Design of real time monitoring, Design of guidance and reporting systems, Design of Seamless diagnosis through connectivity by communication protocols system, Design of Health care data analytic system, Design of Quick Diagnosing and Decision Systems and Design of Medical Data Research System etc.,. In this paper a rapid IOT device is designed to remotely monitor the internal heat level and heartbeat rate of the individuals using heat and pulse rate sensors. This work will facilitate the timely monitoring, analysis and data driven decisions based on the health status of the individuals, also it establishes timely interaction of sensors, processor and thing speak with the human involving patients and doctors.

Keywords: Internet of Things, Temperature Sensor, Pulse Sensor, ThingSpeak

1. Introduction

In Internet of things various sensors are connected to network. These sensors perform data sensing and collect massive volume of data called big data. With this data the business patterns and future trend of any organization can easily be forecasted [1]. In IOT, sensors are the major component in any smart device, smart homes, smart agriculture, smart wearable's, etc. Large numbers of sensors are attached to make the environment smarter so that these devices can sense, interact, collect and communicate data. Sensors are no more conventional in which they performed only simple traditional conversions of physical inputs to electrical signals.

But, Now, In modern days, the role of sensors are economically and technically much tremendous [2]. Such smart sensors need to be fabricated, densely integrated and well maintained with built in intelligence. Because of built in intelligence of sensors, the data an organization collects help them to create predictive maintenance, manufacturing flexibility, enhanced productivity, increased sales, market growth, customer reliability, customer retention and customer satisfaction. Various types of sensors are Temperature Sensor,

Pressure Sensor, Temperature and Humidity Sensor, Gas Sensors, Proximity Sensor and Pulse Rate Sensor etc.

This work utilizes the merits of Temperature and Pulse Rate Sensor for easy interaction between doctors and patients though physically separatedHealth observing is the serious issue in this day and age. Because of absence of legitimate Health observing, understanding experience the ill effects of genuine medical problems [3]. There are loads of IOT gadgets now days to screen the strength of patient over web. Health specialists are additionally exploiting these savvy gadgets to watch out for their patients. With huge amounts of new medical services innovation new companies, Internet of Things is quickly changing the medical services industry[4][5]. Heartbeat rate and internal heat level readings are recorded over ThingSpeak and Google sheets with the goal that understanding Healthcan be observed from anyplace on the planet over web.

Experimental Design:

The aim of the work is to detect the status of the patient's temperature and pulse rate. It is very important for the life to check our daily status of the body. So, this device has been found for checking the daily health status. This device will help and guide any individual to maintain and monitor his or her health status at any time. This device has been made with the help of sensors like temperature sensor and pulse rate sensor. The temperature sensor will show the body temperature and pulse sensor will show the pulse rate (i.e.) heart beat levels. This device is initially connected with the ThingSpeak, which requires an individual to create user account [6]. This will help doctors to monitor the patients' health status easily and help patients to get them from fear about their conditions. Thingspeak will help to do this favor for the doctors and for the patients to recover quickly.
The main role of the ThingSpeak is to alert the doctors about patients if they reached an abnormal condition of pulse rate and temperature. This ThingSpeak will alert the doctors immediately and rescue the patients easily within the time and saves the lives.

The device will be accessed with the help of the Ardiuno platform. The code has been created for displaying the temperature and pulse rate of the patients in the output screen. This will help the doctors to solve the patient's problem easily and immediately [7].
Materials Required
1. Arduino Uno and Programming Cable
2. ESP8266 Wi-Fi module
3. LM35 temperature sensor
4. Pulse rate sensor
5. Push button
6. 10k Resistor
7. Male-female wires
8.   Breadboard

Pulse rate Sensor

PulseRate Sensor in Figure 1 is a very much planned attachment and-play pulse sensor for Arduino. [14] The sensor scratches into a fingertip or ear ligament and attached into Arduino. It contains open-source observing application that charts your heartbeat continuously.

The sensor front side is the made about with the Heart shape logo. Front side is associates with the skin. On the front you see somewhat round opening, which is the spot the LED transmits through from the back, and there is in like manner a little square basically under the LED. The square is an enveloping light sensor, like the one used in cellphones, tablets, and PCs, to change the screen quality in different light conditions. The LED shines light into the fingertip or ear ligament, or other tight tissue, and sensor scrutinizes the proportion of light that ricochets back.That is the manner by which it figures the pulse. The opposite side of the sensor is the place the remainder of the parts are mounted. There are three wires emerging from the sensor, Signal(S), VCC (3 - 5 V) and GND. Signal wire is associated with Arduino Analog pin.
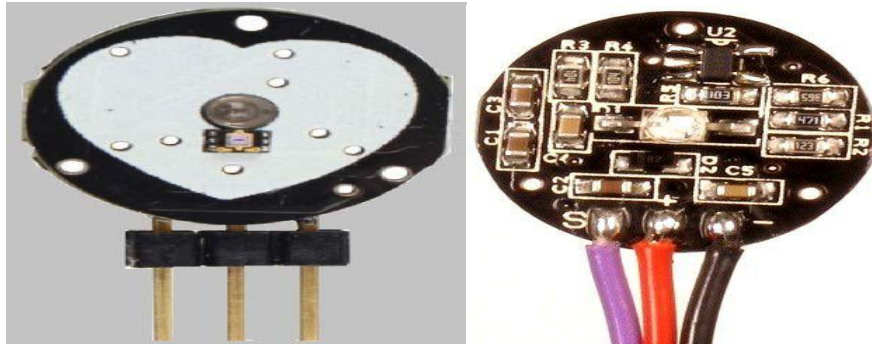

Figure 1. Pulse Sensor

Temperature Sensor LM35

LM35 in Figure 2 is a simple Liner temperature sensor. Its yield is relative to the temperature in degree Celsius. The working temperature extend is from - 55°C to 150°C. The yield voltage changes by 10mV because of each degree centigrade ascent or fall in temperature. It tends to be worked from a 5V just as 3.3 V gracefully and the backup current is under 60uA.[13]

Figure 2. Analog Linear Temperature Sensor

ESP8266

ESP8266 in Figure 3 is a Wi-Fi module also, it acts as a microcontroller developed by Express if Systems, operating at Shanghai. This microcontroller has the facility to communicate across the nodes and devices with the help of inbuilt Wi-Fi. Hence it is widely adopted as a Wi-Fi module connected with the Arduino boards [9].

Figure 3. ESP8266

There are two of approaches to work with your ESP8266 module. One is with the assistance of AT orders and the other is utilizing Arduino IDE. In this work AT orders are used to send the information from Arduino to the ESP 8266 Wi-Fi module.
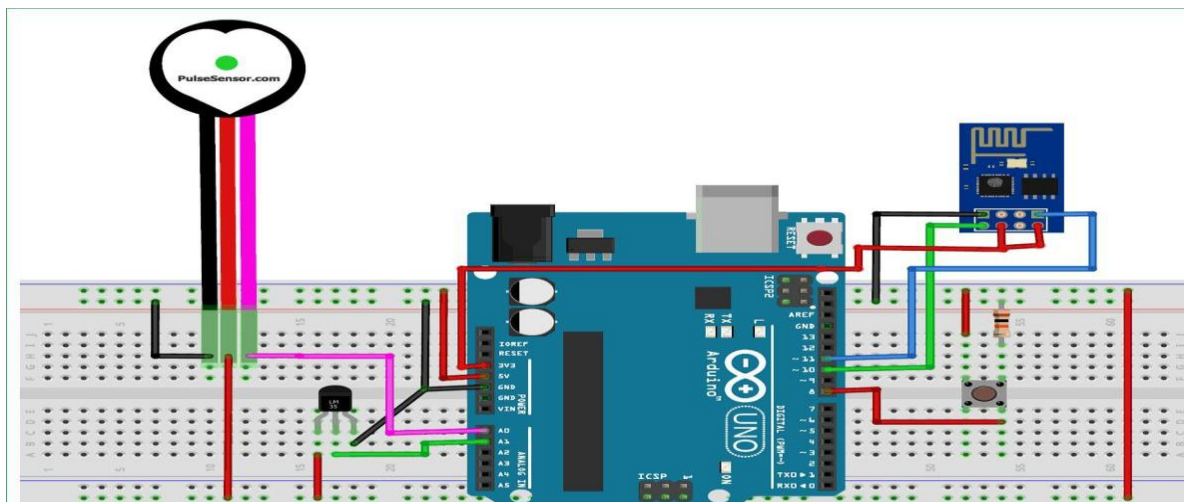

Figure 4. Circuit Diagram

The components are connected in the Breadboard according to the circuit diagram and specifications as mentioned in the following table. Here Vcc represents the voltage supply. GND represents the ground connection to avoid any short circuits. Tx represents the Transmitter and Rx represents the Receiver components of Arduino board.

2. ThingSpeak

ThingSpeak is an excellent tool for designing and carrying out Internet of Things applications. With the help of ThingSpeak it is highly recommended to design applications to monitor data, control data over the world wide web [10].

ThingSpeak consists of channels and webpages which facilitate ThingSpeak to design applications. This highly recommended ThingSpeak helps in collecting data from the specified sensors, also promotes methods to analyze and visualize the collected data. In this work ThingSpeak is designed as a part of IoT patient health status monitoring system with the help of temperature and pulse rate sensors. Figure 5. Illustrates the workflow in measuring the temperature and pulse rate of an individual using

the designed IoT device. Initially all the required sensors and components are connected with the Arduino platform. The programming code is written to measure the temperature and pulse rate and run with the help of Arduino. The results are displayed using ThingSpeak account [11].
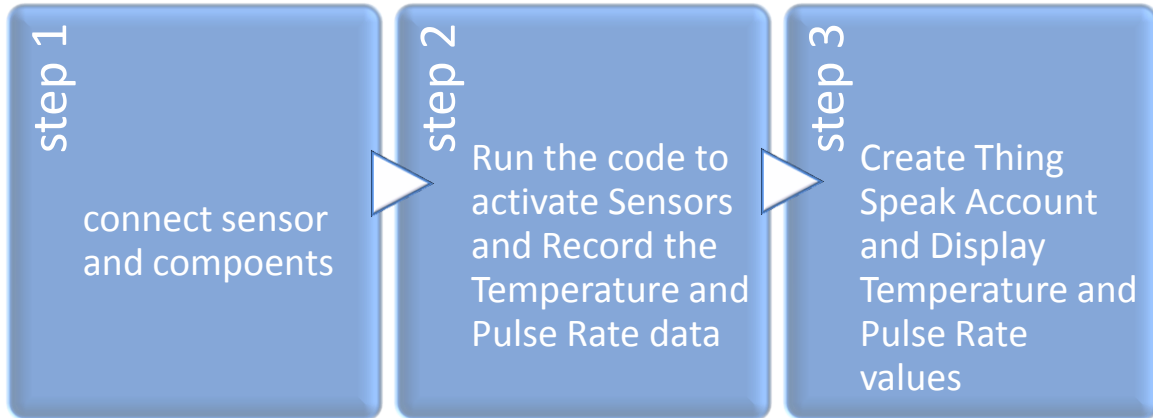
step 1	step 2	step 3
connect sensor and compoents	Run the code to activate Sensors and Record the Temperature and Pulse Rate data	Create Thing Speak Account and Display Temperature and Pulse Rate values

Figure 5. Workflow

The following result in Figure 6. Is created with the help of ThingSpeak account communicating the Date, Time, Pulse rate, and Temperature

	A	B	C	D	E	F	G
	Date	Time	Pulse rate (BPM)	Temperature (F)			
	30/04/20	09:10:25	217	51			
	30/04/20	10:30:20	127	53			
	30/04/20	11:15:45	220	50			
	30/04/20	05:12:53	209	79.5			

Figure 6. Sensor Data Recorded

3. Conclusion

The Internet of Things is a course of action of interrelated handling devices, mechanical and progressed machines ,each allotted a special identifier (UID). These remarkable gadgets are fit for moving information over an organization without expecting human to human or any PC collaboration. The Internet of Things is being hailed as the following wilderness in the advanced insurgency and with valid justifications [12]. Regardless, IOT can assist organizations with expanding profitability, reduced expenses, offer new items and benefits and convey new plans of action The significant uses of IOT in medical services are

decreasing trauma center stand by time, following patients, staff and stock, improving medication the executives and a lot more conceivable. By utilizing this planned IoT gadget an individual can undoubtedly recognize the human internal heat level and heartbeat rate. Further this work can be broadened using differing advancements like distributed computing and AI calculations to store, examine and perform order, relapse, bunching and affiliation planning.

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