Patients Health Monitoring System Using IOT

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Patients Health Monitoring System Using IOT

Sudha Senthilkumar[1], Brindha.K[2], Abishek Kumar[3]

[1]Associate Professor, [2]Assistant professor(SG), [3]B.Tech (IT) Student, School of Information Technology and Engineering, Vellore Institute of Technology, Vellore, Tamil Nadu, India

Abstract

The past health survey shows death of few thousand people due to their heavy workload and mental pressure. Death of more patients is unavailability of doctors in critical situation. With the advancement in technology, the proposed system can monitor the patient's body condition uninterruptedly from anywhere in the world. The researcher is planned to make an inter-net of things for health care system which can monitor health of human being. In emergency situation notification will be send to doctors immediately. It takes the body parameters like Temperature, humidity, and pulse sensor and body movements. Analysis of patients' body data is done against the normal situation to track abnormal physiological parameters.

Keywords: Temperature, humidity, pulse sensor, body movements.

Introduction

Every year we hear about a new disease whose cure is not invented till now like in 2014 Ebola outbreak happened; in 2016 Avian influenza A (H7N9) virus outbreak. The past report shows few of them eradicated and still some of the disease exists today [1-2]. Its outbreak results in uncountable numbers of patients. It is very hard to maintain regulation of health of each patient. This paper presents a solution to patient monitoring system[6]. The researcher has used sensors to record body as well as surrounding conditions of patients. Each patient is monitored individually with a given set of sensors[7]. Sensors data is sent on cloud website like thingspeak periodically. The sensors read temperature, humidity, heartbeat and body movements. Data is sent on thingspeak website and analysis of data is done to trace abnormal condition of patients. Doctors are called to see the patients without loss of time. Notification is send using prowl and thinghttp integration. Notification is sent to doctors in emergency[5].

Proposed Scheme

The proposed system consists of Arduino mega as micro-controller unit. The various modules and components are combined are shown in the diagram. Two types of power supplies 3.3V and 5 V passed to the system and few modules are operated in 3.3 V. The digital sensors such as humidity, temperature, etc are linked to Arduino's digital pin and the sensor which generates the analog signal is linked to analog pin of the Arduino. The Wi-Fi module or the Ethernet Shield (HANRUN) is used in this system for inter-net connectivity [4]

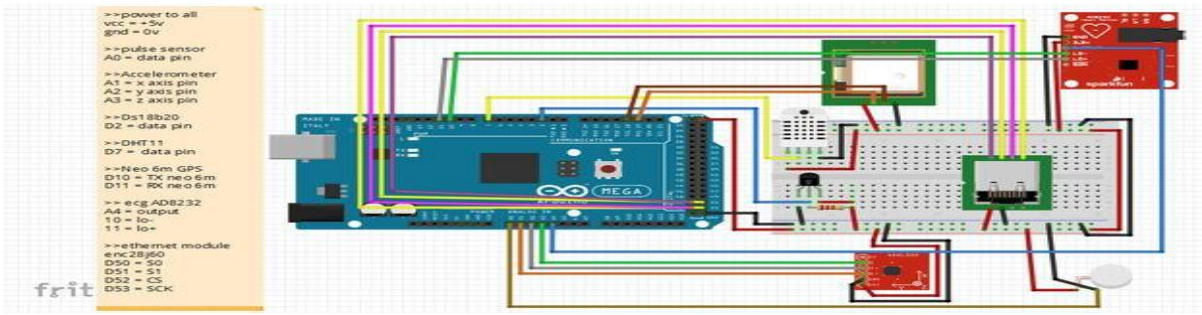

Figure 1. Proposed System Architecture

The digital / analog data are passed to the Arduino

by of internet connection and all the monitored data sent to the ThingsSpeak. The ThingsSpeak considered as cloud environment. When all the sensors are connected together ,sensors sense data from human body , then send that data to server[8]. After that these data is compare with standards values that are already stored in system. According to that normal and abnormal condition checking is performs. And if abnormalities occurred then it send message immediately to doctors to avoid critical condition. The system is controlled by administrator. It can control entry of new patient's details and doctors details .when it will get data from sensors and is displayed in separate UI page which refresh periodically and save data in database. Time interval is 10 seconds. When abnormalities occur, message is sent to doctor's mobile within 1 minute.

HARDWARE MODULE

Arduino mega

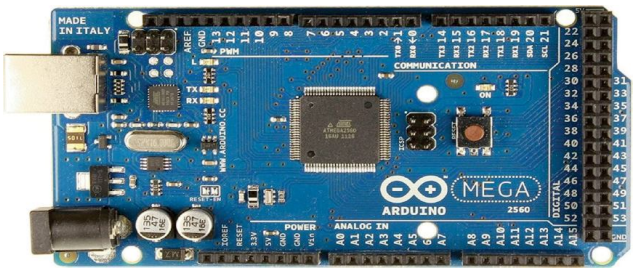

Figure 2: ARDUINO MEGA

It consists of 54 digital pins. Each of pins on the Mega can be used either as an input or output, using various function such as pinMode(), digitalWrite(), and digitalRead() functions [11]. They operated at 5 volts. Each pin can receive or provide a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. Some of pins have special features [4].

- Serial: 0 (RX) and 1 (TX); Serial 1: 19 (RX) and 18 (TX); Serial 2: 17 (RX) and 16 (TX); Serial 3: 15 (RX) and 14 (TX). Used to transmit (TX) or receive (RX) and TTL serial data.
- External Interrupts: 2 (interrupt 0), 3 (interrupt 1), 18 (interrupt 5), 19 (interrupt 4), 20 (interrupt 3), and 21 (interrupt 2). The above pins can be configured to trigger an interrupt on a low, high or falling edge.
- PWM: 2 to 13 and 44 to 46. These pins Provide 8-bit PWM output with the analogWrite() function.
- SPI: 50 (MISO), 51 (MOSI), 52 (SCK), 53 (SS). These pins support SPI communication.
- LED: 13. There is a built-in LED connected to digital pin 13. When the value of pin is HIGH, the LED is on, when the value of pin is LOW, it is off.
- I^2C: 20 (SDA) and 21 (SCL). Support I^2C (TWI) communication using the wire library (documentation on the Wiring website). Note that these pins

SENSORS

DHT11

The dht11 (humidity and temp. sensor) read the temperature and humidity of surrounding around patients and send the data back to serial monitor in module testing[4]. It has one data cable to read the surrounding. After reading data from surrounding, it also sends the data to thingspeak using esp wifi module.[9]

WIFI

The Nodemcu wifi module take SSID, password to connect to wifi and thingspeak api to connect to the thingspeak server using port 80. It sends the data to thingspeak after every 20 seconds. It uses espwifi header file is required to send and connect.[10]

ACCELEROMETER

Accelerometer used adxl335 to read the movement of patients and to record it and send respective data to thingspeak website .It uses three connections each one for x, y, z direction[3]

GPS (neo -6s)

It makes a connection to GPS satellite to read the data and send the data to thingspeak website through wifi module. It consists of one antenna and receivers. It read the longitude and latitude of our system on earth.

PULSE SENSOR

It read the heart beat and sends the data to arduino to serial plotter and serial monitor. It has three connections one of them is used to read the heart beat and other two is used to make connection.

Patient Monitoring System Architecture

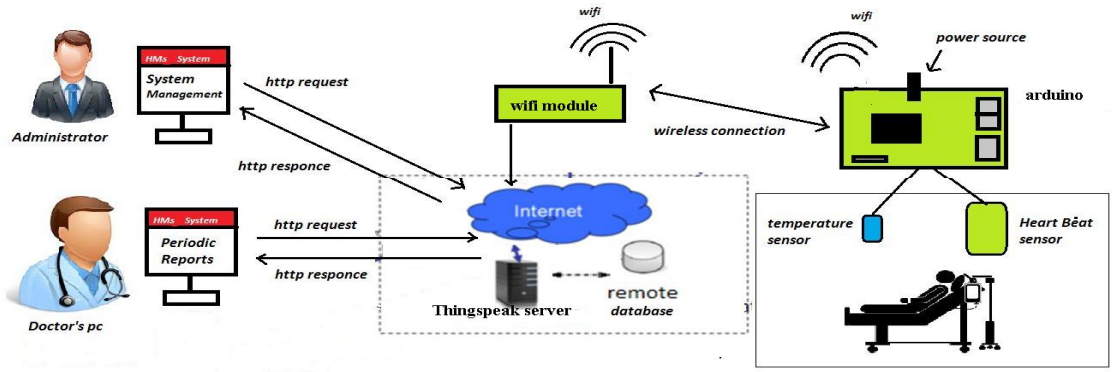

Figure 3 Patient Monitoring System Architecture

The patient's monitoring system is implemented using the following algorithm.

- The data is collected using sensors and send using Ardunio. The patients wear the sensor on their body and data is collected. Some sensors are present in the room like DHT sensors to collect room temperature and humidity.
- The sensors data is send through wifi (esp8266 module) which is connected to Internet via router.
- The data is sent to thingspeak server and saved in to remote database.
- The administrator uses the data and analyzes it against normal situation. In case of emergency the doctor gets the message about patient's situation and his/her ward information's.

Results

Due to vast changes in the IT domain, the proposed system should be capable of adopting any changes. In this system sensors can be included without affecting other parts of the system and play a vital role in maintenance. The system designed to adopt any further modifications. The result shows the system provide good performance and accuracy. Figure 4, 5, 6 and 7 show the result of temperature, humidity, latitude and longitude.

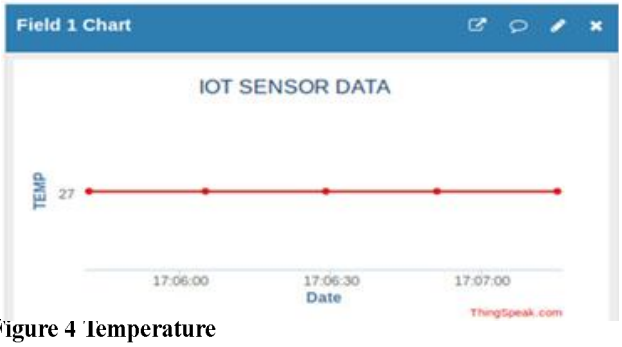

Figure 4 Temperature

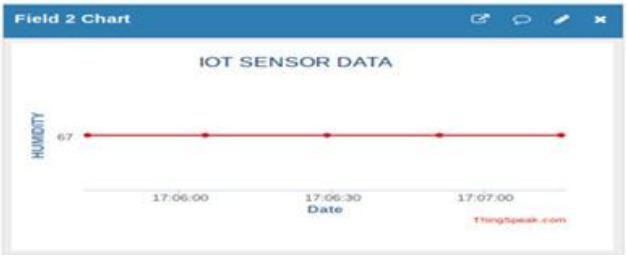

Figure 5 Humidity

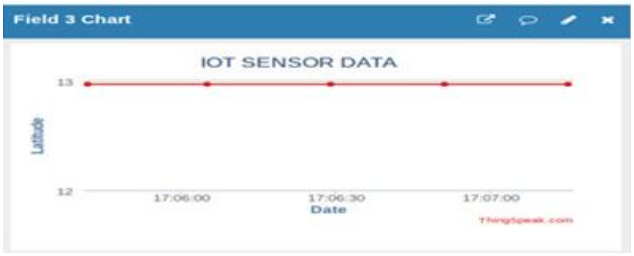

Figure 6 Latitude

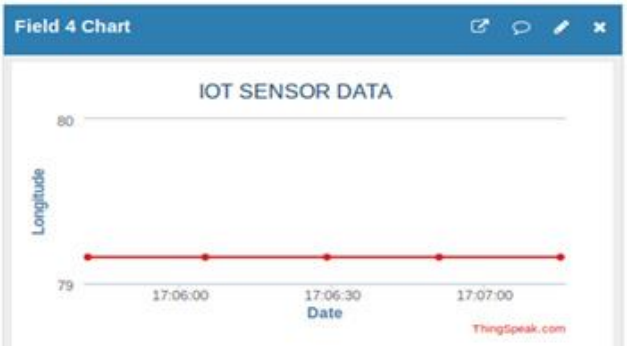

Figure 7 Longitude

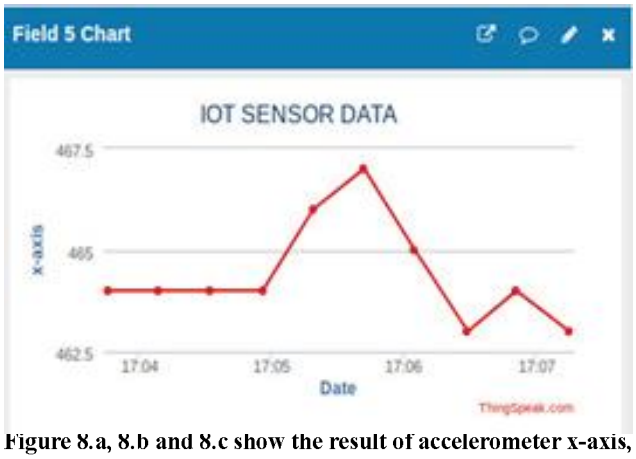

Figure 8.a, 8.b and 8.c show the result of accelerometer x-axis, y-axis and z-axis direction.

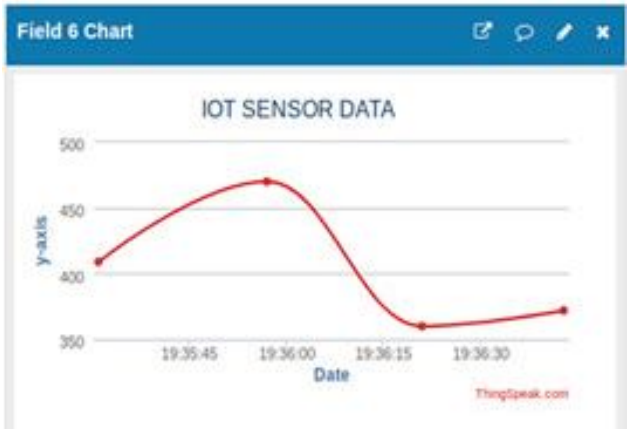

Figure 8.a X-axis

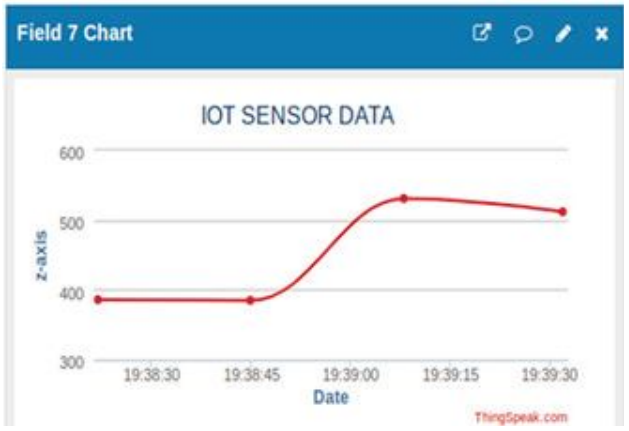

Figure 8.b Y-axis Figure 8.c Z-axis

Figure 9 shows the result of ECG data.

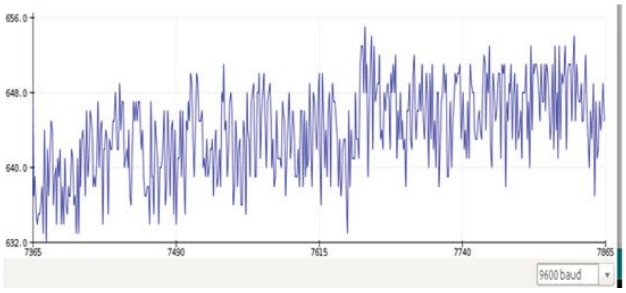

Figure 9 ECG data

Conclusion

The proposed health care system based on internet of things. It stores the person sensitive information in to cloud and they can check their sensitive information at any time. In emergency situation notification will be send to doctors immediately. It takes the body parameters like Temperature, humidity, and pulse sensor and body movements. Analysis of patients' body data is done against the normal situation to track abnormal physiological parameters. The system result shows that it monitors the patient condition and any change in the normal condition, message alert pass to registered user.

Conflict of Interest – NIL

Source of Funding- Self

Ethical Clearance – NIL

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