INTERNATIONAL JOURNAL OF TECHO-ENGINEERING

ISSN : 2057-5688

IOT BASED PATIENT HEALTH MONITORING USING ESP8266

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Abstract - IoT is quickly changing the healthcare sector, thanks to a slew of new technological start-ups. An IoT-based Patient Health Monitoring System was developed using ESP8266 and Arduino throughout this project. ThingSpeak was its IoT platform utilised throughout this project. Then using HTTP protocol through the Internet or even a Local Area Network, Thing Speak is indeed an open-source Internet of Things (IoT) application and API. Pulse rate and temperature measurements were possible with this IoT gadget. Using an IoT platform, it constantly measures the pulse rate & ambient temperature..

Key Words: Health monitoring system, controller, pulse sensor, temperature sensor, IOT on the platform of things speak.

1. INTRODUCTION

Recent years have seen a rise in the use of wireless technology in either a variety of industries. Automation and control having benefited most from the Internet of Things in recent years. Biomedical care has been one of the newest trends in health care delivery. The Internet of Things (IoT) technology has opened doors not just in hospitals, as well as in personal health care. It is essential to note that doctors play a vital role, but the procedure of getting a check-up is cumbersome: first, a person must register, next he/she will be given an appointment, and finally the check-up report was produced. Due to the duration of the procedure, many individuals who are employed choose to neglect or postpone their physicals. As a result of this contemporary technique, the procedure takes less time to complete.

Researchers and medical experts have been working on improving health care and human pleasure for many decades. In the long run, it will be a worthwhile contribution to society. Since individuals are able to identify abnormalities in their bodies before they become severe illnesses. It is possible to monitor and care for the health of even a loved one from anywhere in the globe, thanks to the Internet of Things (IoT).

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In order to identify an illness, it is important to know the body temperature, heart rate, blood pressure, and breathing rate. This project uses IoT to provide temperature and heart rate data.

2. MOTIVATION

According to my study, there is indeed a shortage of adequate health care in rural regions. There is also a lack of appropriate quality of care for them. After the illness or fever has reached a critical stage, so many individuals seek medical attention. Many rural residents are unable to pay for therapy due to the high expense. We're aiming to simplify the initial stage of the treatment procedure with this project. Due to the fact that this project's goal is to provide a primary diagnostic parameter,

In underdeveloped nations, there are insufficient resources & management to address particular issues. A ordinary guy cannot afford to get a daily health checkup, which is costly and time-consuming. As a result, a variety of methods have been created to facilitate and guarantee the care of the unit. Using this method, equipment was handled securely, reducing the amount of time spent on the job.

In the long run, this will be a worthwhile contribution to society. Since individuals are able to identify abnormalities in their bodies before they become severe illnesses. In addition, anybody who is more concerned about the health of even a loved one may do so from anywhere in the globe by using IoT.

3. EXISTING SYSTEM

This may not be feasible to constantly monitor a patient's status in such a hospital if the nurse or doctor needs to physically travel through one person somewhere else for a health check. The nurse or doctor must examine the person's health there at time to detect any severe circumstances. This may put a burden on the physicians, who are responsible for caring for a large number of patients. Patient's unconsciousness makes pressing an Emergency Alert Button impossible in medical situations.

During general Internet communication, Hyper Text Transfer Protocol (HTTP) is among the application protocols being utilised to transfer data. As just a consequence, protocol latency and consequent performance loss are major issues when HTTP is being used for IOT connectivity. In addition, IP addressing is location-dependent, which complicates network management.

3.1 PROPOSED SYSTEM

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Our technology constantly monitors the vital signs of patients and detects any anomalies that may arise. The medical personnel receives the monitored data. This system notifies the medical personnel when a parameter is abnormal. As a result, the necessity for manual monitoring via medical personnel is reduced.

Sensor data would be sent to a cloud platform using Arduino and esp8266. The esp8266 module has indeed been programmed into the Arduino board, along with the API key obtained from the thingspeak web site. This thing speak access key allows any number of people to see all the medical record stored on the device.

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4. RELATED WORK

In the modern health care system, technology is introduced, such as wearable devices or cloud computing. It allows for the capture of patient-monitored data and the transmission of that data remotely through IOT. Secure data transfer is required in order to make this connection. In this article, the goal is to transfer data in a secure manner while maintaining privacy. The suggested solution incorporates cloud computing and health care safety. The system consists of two main components: There are two stages to storing and retrieving data: storage and retrieval. For future usage, data is saved and updated at the storage stage of the project. Retrieve data from the cloud during the data retrieval step. Authenticated users may request access to the cloud server. Every 5 or 10 minutes, a patient wearing a wearable gadget updates their record. In emergency mode, this refreshes every 1 minute. At the cloud server, each patient has a unique address. WBAN telemonitoring system has developed to meet home-based mobile health & customised medicine needs[1]. WBAN is able to gather data from sensors and record the results of such collection. Resultant output is delivered wirelessly to the health monitoring system's controller. That study uses Zigbee technology within WBAN because of its assured delay really need health telemonitoring systems, which is addressed in this research. Ayush Bansal, Sunil Kumar, Anurag Bajpai, Vijay N. Tiwari, Mithun Nayak, Shankar Venkatesan, and Rangavittal Narayanan are working on developing a system that can identify catastrophic cardiac events.[2]

A trust-based health IOT protocol that incorporates risk categorization, reliability

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trust, & loss-of-health likelihood as design factors for decision making was presented by Hamid Al-Hamadi and Ing-Ray Chen [3].

To determine the viability of trust-based protocols, a comparison between them and baseline procedures was conducted[4]. Muthuraman Thangaraj Punitha Ponmalar Subramanian Anuradha. It allows for the creation of standard electronic medical records. Includes a real-world example of clever autonomous hospital administration using IOT. [5]

5. COMPONETS

Roll of component quantity

1. Arduino uno Read the data from the sensors and send data to cloud through esp8266.

2. Esp8266 wife module Connects to internet using Wi-Fi and sends data from Arduino to cloud.

3. Pulse sensor Gives a digital output to Arduino when figure is placed on it.

4. LM35 Temperature sensor Gives an analog output to Arduino.

5. 2x16 line LCD display Displays temperature and pulse rate.

6. Cloud i.e. thing speak Records all the data send from Arduino through Wi-Fi module 1 (API key)

6. SYSTEM AND OVERVIEW

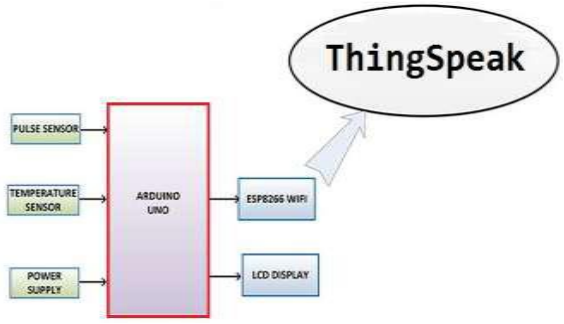

Fig-1: Block diagram of the system

The suggested system is shown in Figure 1. For data collection, health monitoring sensors are used. Controllers may be used to transmit data wirelessly over the internet. The server has indeed been tasked with data processing. This means that all data is gathered and compiled at the server level. Data management may be used to provide health-related information in a simple understood manner on a web page.

Data management may be used to provide wellness information in a quick understood manner on even a web page.

A. Objective

Health monitoring system to detect body temperature & heart rate to be developed Assist with the creation of a system that will keep patient cloud data for an extended length of time.

To analyse sensor data gathered.

B. Detailed Description of Component

1. Arduino uno:

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Open-source microcontroller board created by Arduino.cc, this Arduino Uno was based upon Microchip's ATmega328P chip. I/O pins upon that board allow everything to be interfaced with different expansion boards (shields) as well as other circuitry. Using the Arduino IDE programme, simulations are carried out. A USB peripheral is also integrated into the ATmega 16U2. It delivers serial data towards the main CPU. Power cable for Arduino Uno Standard A-B USB cable A total of 14 digital I/O pins are provided on the board..

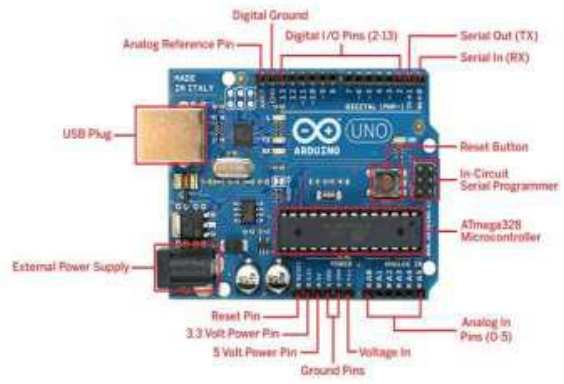

Fig-2: Arduino uno

2. Temperature Sensor:

The linearly proportional outputs voltage is provided by the LM35 family of accuracy integrated-circuit temperature devices. Unlike linear temperature sensors calibrated using Kelvin, the Lm35 series are precision integrated since it doesn't need a significant constant voltage to be subtracted from of the output to get suitable Centigrade scales. To achieve typical temperature accuracy of ±¼°C at room temperature, as well as a range of -55°C to 150°C, there is no need for external calibration nor trimming upon that LM35 device.

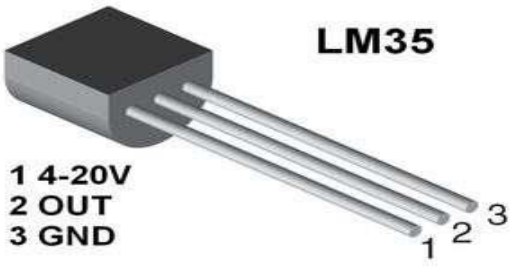

Fig-3: LM35

3. Pulse Sensor:

Introducing the Pulse Sensor, simple pulse rate sensor with Arduino that plugs right in. Heart rate data may be readily integrated into projects both students and also by artists, sportsmen, makers, game and smartphone developers. This circuit consists of an optical amplifier and a noise-suppressing circuit sensor combined together. Pulse sensor may be attached to earlobe as well as fingertip and connected to Arduino for heart rate reading. This pulse sensor contains three pins: VCC, GND, and Analog Pin, which makes it simple to use the sensor.

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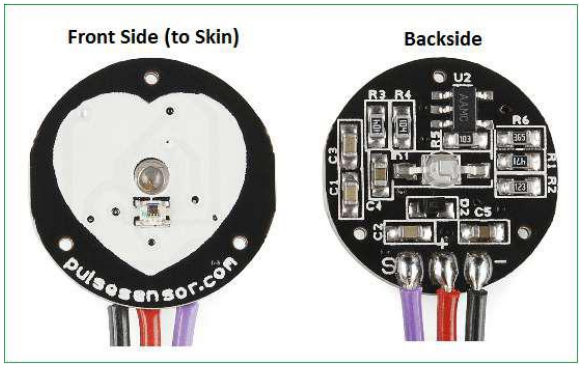

Fig-4: Pulse sensor

4. Wi-Fi Module:

Combined with TCP/IP protocol stack, this ESP8266 wi-fi modules may give any controller connection to something like a wi-fi network. 802.11 b/g/n protocols are used. During standby mode, power consumption will be less than 0.1mW.

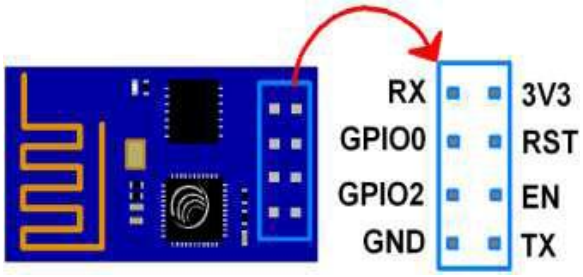

Fig-5: ESP8266

5. IoT Platform (thing speak):

a) Send information to the server using the Think Talk platform from every Internet-connected device.

b) On the basis of real-time data, you may set actions and notifications.

c) Thing Speak Server is an open-source data platform & API for both the Internet of Things that allows you to gather, store, analyse, display, and act on sensor-generated data.

d) At modest, noncommercial projects (3 million messages per year or 8,200 messages per day), Thing Speak was offered for no charge. It is sold in increments of 33 million messages annually (90,000 messages per day).

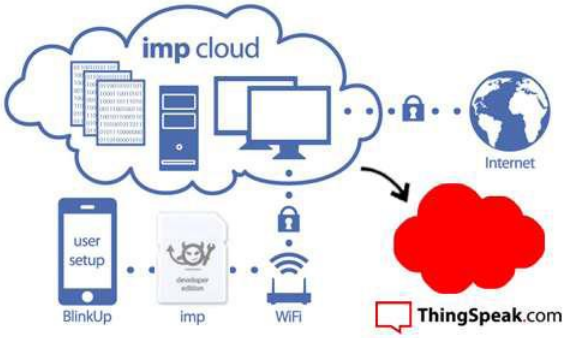

Fig-6: overview of Thing speak

C. Circuit Diagram and Connections

Assemble this circuit as indicated in the picture below to create an IoT-based patient healthcare monitoring system utilizing ESP8266 and Arduino.

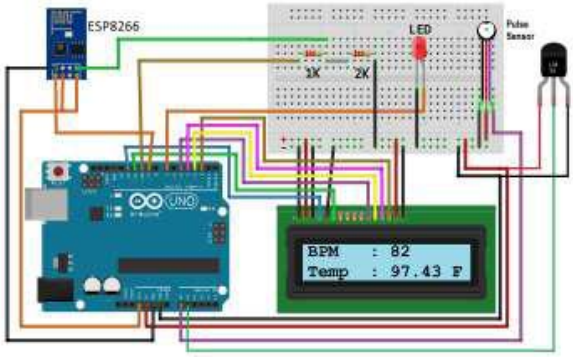

Fig-7: Circuit Diagram

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1. Connection of both the Pulse Sensor output pin with A0 upon on Arduino, as well as VCC and GND but at the other two pins
2. Connect your output pin of both the LM35 Temperature Sensor with A1 on the Arduino, as well as the other 2 pins to VCC and GND mostly on Arduino.
3. Led is connected to Arduino's digital pin 7 through a 220-ohm resistor
4. Connect pins 1,3,5,16 of the LCD to GND using a jumper wire.
5. To power the LCD, connect pin 2,15 of the LCD to the VCC line.
6. Connection of LCD pins 4, 6, 11, 12, 13, 14 to Arduino pins 12, 11, 5, 4, 3, 2
7. When connected directly to both the Arduino, device ESP8266's RX pin operates at 3.3 volts and would not interact with both the Arduino. As a result, we will need to create a voltage divider that converts 5V into 3.3V. 2.2k and 1k resistors may be used to accomplish this. ESP8266 RX pin is linked to Arduino pin 10 via resistors.
8. To do this, connect your ESP8266's TX pin towards the Arduino's pin 9.

D. Results

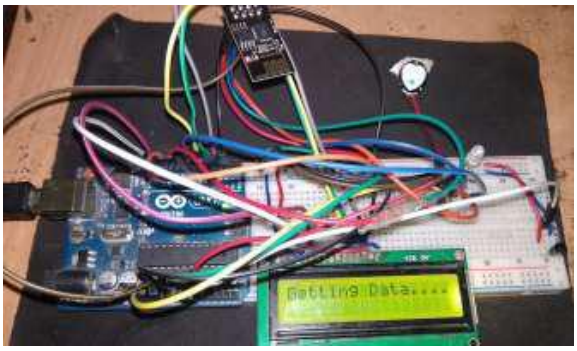

Fig 8: Interfacing of LCD and sensors with Arduino

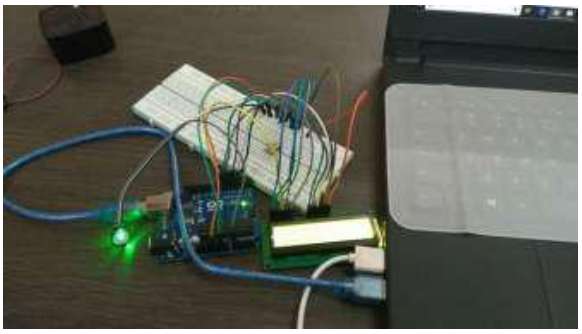

Fig 9: Setup of System

Fig 10: Result displayed on 2x16 LCD

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Fig 11: Graphs of sensor output on the thing speak

7. CONCLUSION

We saved data in the cloud, where it can be viewed at a certain time and kept secure. As an added benefit, cloud processing allows for patient updates to be kept up to date. Inside an emergency, specialists like physicians may quickly review patient data and take necessary action. As a result, providing appropriate advice at the right moment is essential to preventing crisis situations. The technology automatically generates a diagram of bodily changes and notifies the doctor of any recent changes in the patient's evets.

As a result of the importance of body temperature, your doctor is able to anticipate the patient's condition and also save time. For individuals who live in distant locations and don't have access to medical services, the initiative is very beneficial. As an example, a tiny home clinic at which a routine checkup may be performed.

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