

IOT Based Patient's Body Temperature and Heartbeat Monitoring System.

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ABSTRACT— Now-a-days, the applications that Internet of Things (IoT) expedited to the globe, health care applications are the most significant unit among them. In general, IoT has been wide accustomed interconnection that has advanced the medical resources and to provide sensible and effective health care services to the individuals. The advanced sensors may be either worn or embedded into the body of the patients, so as to continuously monitor their health. The knowledge collected in such manner, will be analyzed, aggregative and deep-mined to try and do the first prediction of diseases. The process algorithms assist the physicians for the personalization of treatment and it helps to create the healthcare economical, at equivalent time, with improved outcomes. Also, during this paper, we tend to highlight the challenges within the implementation of IoT health observance system in the global world.

Keywords— Internet of Things, Healthcare system, Medical Devices, Sensors, Cloud Computing, Heartbeat Temperature, Body Temperature sensor, Android

I. INTRODUCTION:-

Hospitals forever would like higher management. The information of all patients ought to be handy enough. But also, there ought to be information prevention. Additionally, the patient information ought to be unbroken and non-public just in case, tending is that the most vital concern of the many countries within the world. Up the lives of patients particularly within the weaker components of the society that embrace the old, physically and mentally disabled yet because the inveterately sick patients is that the major issue to be improved. In existing system, the information is recorded in the form of work or on general storage server. However, typically that information is accessible to any or all the workers and doctors. Therefore, we have a tendency to area the unit proposing a

replacement method wherever patient and doctors ready to communicate through mobile application. In hospitals, there area unit provisions are continuous watching of patients. Their heartbeats area unit incessantly monitored. There's no provision to visualize the parameters once they come to home. And therefore, there's an opportunity that the malady could come once more. Patient's information (temperature, heart rate, position) are going to be oft measured and sent to server, amount of causation(say) each three min) will be set. Watching person learns patient specific threshold. Say the regular vital sign of a patient is 37 degree Celsius, whereas, one person feels feverish if his blood heat is 37 degree Celsius. By using associate averaging technique over a comparatively very long time. Observer will learn these thresholds for patients. Mistreatment humanoid application in doctor's sensible phone, doctor will read his patient's health standing. Once associate the parameter goes on the far side, the brink price he can get an alert notification.

1. Components Used:-

- Arduino UNO
- LCD Display
- Temperature Sensor LM35
- Pulse Sensor
- Wi-Fi Modem ESP8266
- Power Supply
- Connecting Wires

a) Arduino UNO :-

This device Arduino UNO is the degree ASCII computer file microcontroller board supported the conductor ATmega328P microcontroller and it was developed by Arduino.cc. The contingents on the board have various sets of digital as well as analog input and output (I/O) pins which will be coherence to varied extension boards (shields) and alternative

circuits.

The board has input pins comprising of 14 digital pins as well as output pins (six capable of performing Pulse Width Modulation PWM output), 6 analog input/output pins which is programmable pins which can be programmed with the help of Arduino IDE (where IDE stands for Integrated Development Environment) through B USB cable. The power provided to Arduino board is generally given by external 9-volt battery or through USB Cable connected to normal mobile charger. The voltage accepted by Arduino UNO generally ranges from 7volts to 20volts. The hardware information is generally gathered from Imaginative Common Attribution (ICA) share a like pair of 0.5 license and is offered on Arduino.cc (the official website of Arduino's). There are other Arduino such as Arduino Lily, Arduino Nano which uses same power supply methods with the same range of voltage and details can be available on the same website. The meaning of "UNO" is "one" in the language Italian Lingo which was chosen to mark the first ever release of this Arduino Computer board. This version usually has 1.0 version followed by Arduino IDE were the reference versions of Arduino series computer code is established. For this, UNO board is original and the earliest in the series of USB based Arduino boards. The Atmega 328 comes with preprogrammed bootloader that allows for uploaded the new code without the use of external hardware. The Arduino UNO was one of the best invention for computer based board so that working and interfacing with other peripheral devices becomes easy, and work can be carried out easily without hinderance. The fig. of earliest computer board is given below:-



Fig I: - Arduino UNO

b) 16X2 LCD Display :-

An 16X2 Liquid Crystal Display (LCD) is an electronic module which can be used to display the data with the help of liquid to provide an image which is transparent and can be easily visible. This

electronic device plays a major role in our DIY (Do It Yourself) project and in future can be helpful for those differently able communities who will use our product. This device translates 16 characters per line and in 2 such lines. The use of this 16X2 LCD is important as in this each character is displayed during 5X8 pixel matrix which is very prominent in our project.

Specifications of LCD Display: -

LCD Display (16X2) have the following outlines:-

- It has duty cycle of 1/16.
- From this, LED for source can be driven that is by Pin 1, Pin 15, Pin 16 or A and K.
- It had cursor which includes 5X8 dots.
- Power supply supported is +5V and also supported for +3V.
- It can easily work for 4-bit mode or 8-bit mode.
- Custom generated characters can be viewed.



Fig II: - LCD Display (16X2)

c) Temperature Sensor LM35 :-

Temperature Sensor LM35 could be a temperature measuring instrument which is associated with analog output voltage that is directly proportional to temperature. It can provide an output voltage in Centigrade (Celsius) or Fahrenheit. It does not need any external standardization electronic equipment. The sensitivity of LM35 is ten mV/ degree stargazer.

As the temperature will start to increase, then additionally output voltage also will increase. Eg. 250 mV means that 25 degree Celsius.

It is a 3-terminal sensing device wants to live encompassing temperature starting from -55 degree Celsius to one hundred fifty degree Celsius.

LM35 offers temperature output that is a lot of precise than thermal resistor output.

2. Flow Chart:-

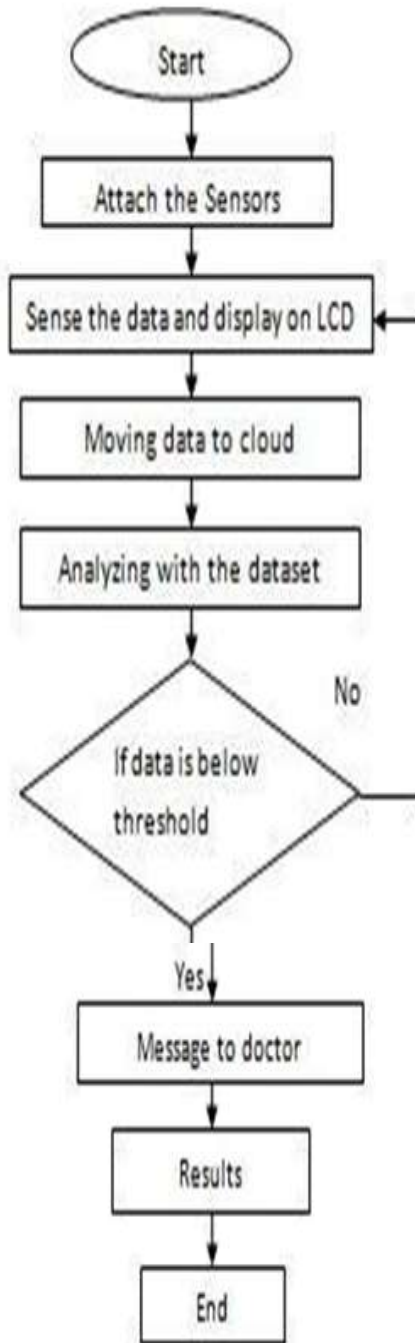


Fig VI: - Flow Chart

3. Block Diagram: -

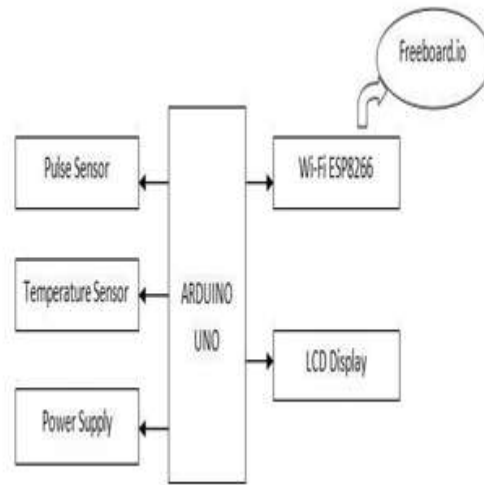


Fig VII: - Block Diagram

4. Algorithm:-

- Step 1** Place the finger on pulse sensor and patient body in contact with temperature sensor.
- Step 2** The data of patient's body temperature and heartbeat shown into the 16X2 LCD.
- Step 3** Patient body data is save and send to the IOT platform which is thingspeak via wifi module ESP8266.
- Step 4** The data changes in every minute when sensors are connected to human body on Thingspeak platform.
- Step 5** Graph made on the Thingspeak platform of sensors output.
- Step 6** Data sends to the doctor or relatives for general routine via internet.

5. Working of the Project:-

In this project, Temperature sensor and pulse sensor plays an important role. These sensors are connected to the Arduino UNO and Wi-Fi Module which is connected to the Arduino UNO. In that system, the patient's body temperature and heartbeat are checked through sensors. In that we use the Wi-Fi Module (ESP8266) which sends the data on IOT platform Thingspeak which is an open source platform. In that, we also use the LCD Display (16X2) which shows the data of heartbeat and temperature of patient's body.

The temperature sensor and pulse sensor senses the patient's body and the data is showed on the LCD Display. This data shows on the LCD Display sends to the IOT platform Thingspeak. The Arduino UNO is connected to the Wi-Fi module which sends the data to the IOT platform Thingspeak over internet. When the patient's body checks or senses through sensors then the data changes in every minute on Thingspeak platform. This Thingspeak platform makes the graph of all the data of body temperature and heartbeat recorded.

The average body movements data also shows on the IOT platform. We can access this Thingspeak platform from anywhere in the world because it have unique ID and password to login the account. In this way, the doctor check the data and compare the data from anywhere in the world. It saves the time and money because due to this, daily routine checkups are minimized. If the patient has any health problem then the patient can consult the doctor or can go to the hospital. Otherwise, there is no need for going to the hospital. In that way the system is very useful for the patients and also saves the time and money.

6. Related Work: -

Various latest technologies introduce data on cloud. This provides data of monitored patient's which was recorded and send to mobile phone or laptop or computer via IOT platform. This is the whole proposed system with the presence of security in healthcare and cloud on various recorded data. This whole cloud data can be shared with authenticated person as per request. This record can be updated by the person every 5 to 7 minutes. For emergency purpose, it can also be updated in every 1 minute. This will send data to phone using Bluetooth or NFC Technology.

WBAN is involving for the uses of Home based mobile health and personalized medicine via telemonitoring system. This is also able to collect data acquired from the sensor and then validate the output. The resulted output is sent wirelessly to health monitoring system. In this paper, Zigbee is used for this technology as it is a guaranteed delay requirement for health telemonitoring system communication. [6]

Another paper published that WAN network monitors data in health care system. For this, they established the network of WAN in range of 33 meters square at around 12 meters altitude. They explained by their research that the power which is totally consumed by LoRaWAN network was 10 times while that of GPRS is 20 milliamperere. The Maximum data rate of

LoRaWAN was 50 kbps which was in uplink and 50 kbps which was in downlink while in GPRS is 86.5 kbps for uplink and 14 kbps for downlink that was the total efficiency of this health monitoring system. [12]

II.RESULTS:-

Figure given below represents the data of pulse rate which was shown online on IOT platform- Thingspeak.



Fig VIII: - Heartbeat Sensor Graph.

Figure given below represents the data of temperature given below which was shown online on IOT platform- Thingspeak.



Fig IX: - Temperature Sensor Graph.

This shows the resulted data of body temperature and heartbeat. The temperature is in Fahrenheit and the heartbeat is in bpm.

Future plans of Project: -

- For further up gradation of this project, we can add various sensors like Blood Pressure, retinal size, age, and weight can also be included as the controlling sensors or parameters.
- We can develop this using Advanced GSM and GPRS technology in future.
- Also we can add eye blink sensor in future.

III. CONCLUSION :-

In this paper, we observe that the importance of IOT in health care systems. In that we connect the patient's body temperature and heartbeat data to the IOT which makes it time saving and pocket friendly.

This system can also setup in patient's house which is a big advantage of this system. By keeping all the parameters in mind we design such an useful system that is very much time saving and also it is financially good as it saves a lot of money.

Also, it can be very useful in case of emergency and also for regular normal routine checkups for continuous monitoring of health system.

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