

# DESIGN AND DEVELOPMENT OF IOT BASED HEALTH MONITORING SYSTEM USING ARDUINO UNO

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**Abstract:** Health care has been the concern for everyone. It is the need to get the minute information about the basic health parameters in the real time. In such a case the major requirement has been the installation of small, efficient, reliable and economical system. These needs let us to the formation of system using Arduino UNO and IoT. This system gives the information about early health conditions of the patient. The health parameters once been monitored can be send to the cloud using Cloud computing techniques. Readings of the sensor can be sent to cloud so that people can see real time data and can help to monitor it from far away place.

**Key Words-** *IoT, health monitoring System, heart beat, temperature*

## 1. INTRODUCTION

Due to the busy schedule of one's life it has become a major need to get things done in a faster and easier manner. Health care is the concern for everyone, to get the minute information about the basic health parameters is the need for today. Many of us have elderly person and younger children whom we need to care about. In such a case our proposed system gives a simple way to monitor the health parameters for the elderly patients or of the younger children in the house in case they are ill. Various other such systems are in practice like GSM based health monitoring system which sends the information using SMS. The drawback of this system is that it cannot be used for smaller level. The Internet of Things (IoT) is inter communication of embedded devices using networking technologies. Today everyone is so busy in their lives; even they forget to take care of their health. By keeping all these things in minds, technology really proves to be an asset for an individual. With the advancement in technology, lots of smart or medical sensors came into existence that continuously analyzes individual patient activity and automatically predicts a heart attack before the patient feels sick. Therefore, identifying the correct sensors is important. This paper present design of a low power, more reliable, nonintrusive, system which monitor and gather information of the body and send the parameters through wireless technology (IoT). We use the Arduino UNO board to implement this system. Here sensor readings can be given to the end users either to doctor or to patient for continuous monitoring. After monitoring the health parameters it is send to the cloud using Cloud computing.

Section 1 gives detailed introduction about the proposed system. Section 2 describes the working of the proposed system section 3 gives analysis of the result and section 4 gives the conclusion and the future scope.

## 2. PROPOSED SYSTEM ARCHITECTURE

Here the health monitoring system is proposed, which can sense heart beat and body temperature. These parameters are then processed by Arduino UNO and send to the cloud. From the cloud more number of users can have access to the data and can be utilized in a efficient manner for monitoring the patients vital parameters.

### 2.1 BLOCK DIAGRAM

The block diagram of the proposed approach is given below

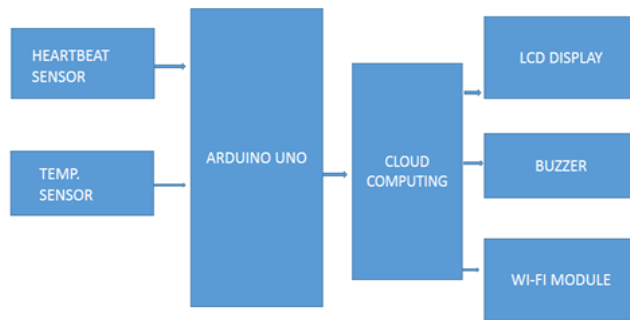


Fig. 1 Block diagram of health monitoring system.

Above block diagram depicts the behavior of the health monitoring system . The first two blocks are that of the sensors (lm35 temperature sensor and heart pulse sensor ). The medical parameters that is the temperature and heart beat is measured via these sensor. These data is then given to the Arduino UNO analog pins A0 and A1, the measured data is then processed and corresponding health conditions are computed . This data is then given to the cloud via the serial monitor which communicates with the cloud using esp8266 (wi-fi module).The data then can be visualize on the serial monitor , a buzzer is attached for alarming condition

2.2 FLOW CHART

The detailed working of our project is explained in the following flowchart.

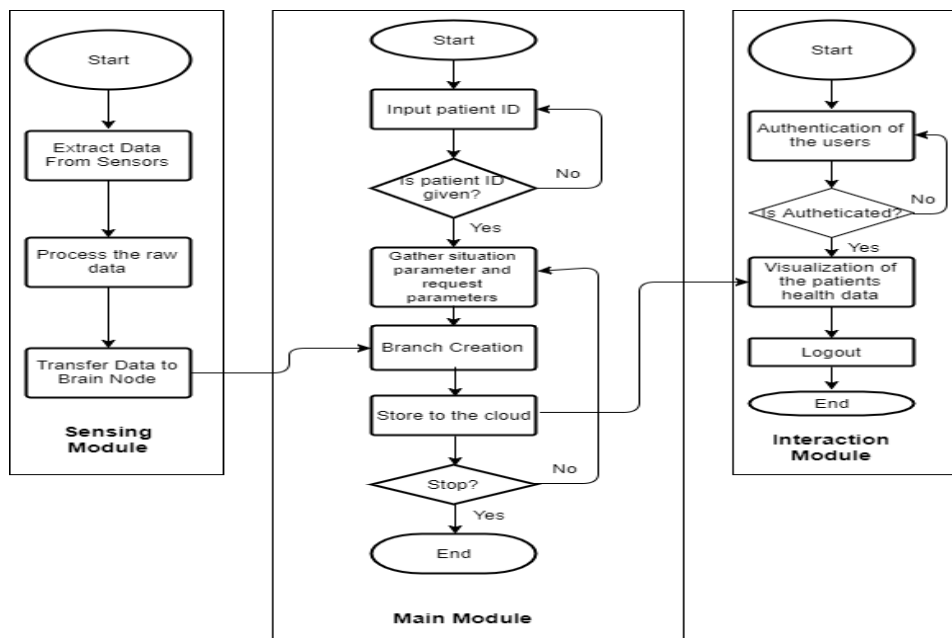


Fig. 2 System Flowchart of the Proposed System.

Above flow chart explain the working of the proposed system , it is been divided into three units-

1. Sensing unit
2. Main Module
3. Interaction Module

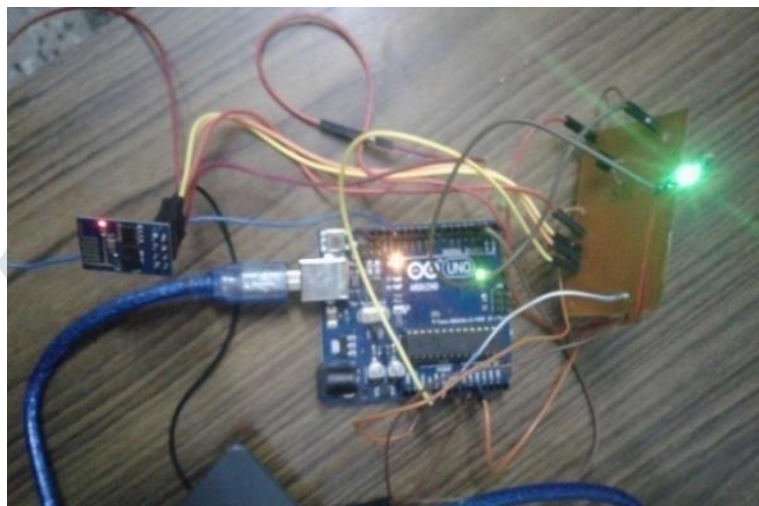
**Sensing unit** – The sensing unit has sensor which sense the medical parameters i.e the temperature and heart pulse of the patient. These sensors sense the parameters, process them and transfer it to the main module i.e to the analog pins of the Arduino UNO board.

**Main Module**- In this module the processing of the data which is acquired by the arduino UNO is done. The data obtained via the analog pins is processed within the board and pass to the thingspeak channel through the ESP8266 (wi-fi module). There is a special provision in Thingspeak to keep our data private/public, for this a certain unique API key is provided to the channel's user. To monitor the patients health one has to login through the patients ID and give a valid API key for the same. The data is processed till it gets the input from the sensors.

**Interaction module**- Valid channel ID and API key can only be used to log in to the channel. If any sort of authentication error occurs the channel cannot be accessed by the user. This provide security in case of private channels. Once the user is successfully logged in to the channel he can then access the information which is basically in the form of graph.

### 3. RESULTS AND DISCUSSIONS

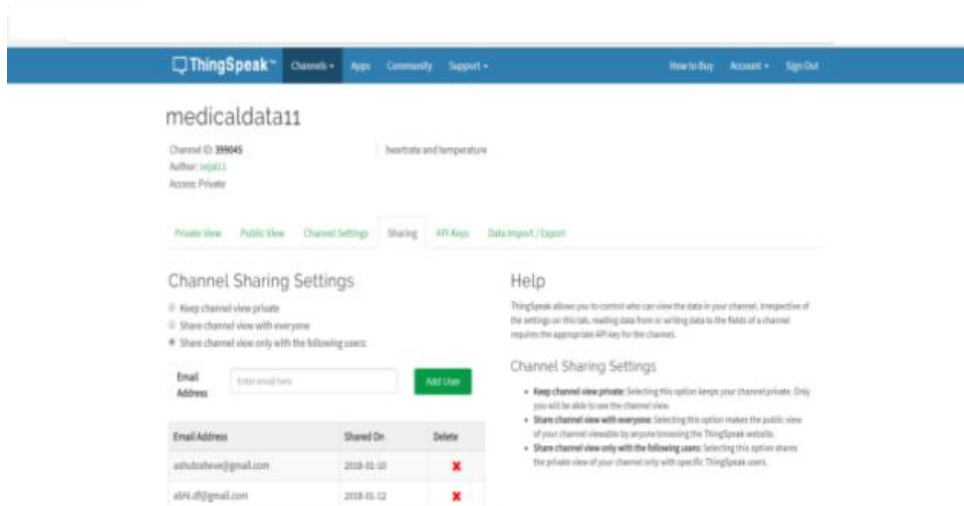
The proposed system is designed to monitor patients body temperature and heart pulse and sending the sensed data to cloud platform. The hardware designed for the proposed system is shown in the following figure-



**Fig.3 Hardware of the Proposed System.**

In the above figure, the connections of the sensor that is the temperature sensor (on pcb) and heart pulse sensor (green light) is made with the Aduino UNO board through the analog pins, also the Wi-fi module is attached to the Tx and Rx pins of the Arduino UNO . A USB cable is used to power the Arduino UNO board through the laptop.

The Data can be kept private or public . Here access is kept as private so that only authenticated users can have control over it . These settings are shown in the following figure:



**Fig 4. Thingspeak channel sharing settings window**

It displays the options to keep the channel view private or public. Parameters are sensed by the temperature sensor and heart beat sensor and sent to the cloud server (Thingspeak) through ESP8266 (Wi-fi module). Also, the data can be visualized and monitored in serial monitor window of Arduino ide. This window is shown in the following figure:

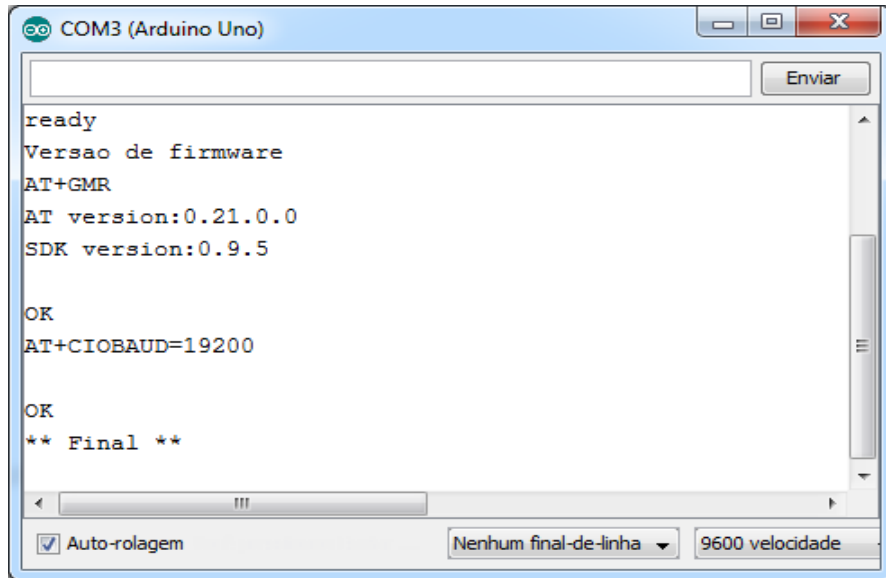


Fig. 5 Serial monitor window displaying output.

It shows execution of all the communication commands (AT commands) happening between Arduino UNO ,ESP8266 and Thingsepak. After handshaking the sensed parameters are displayed continuously on the serial monitor and are shown in the following figure.

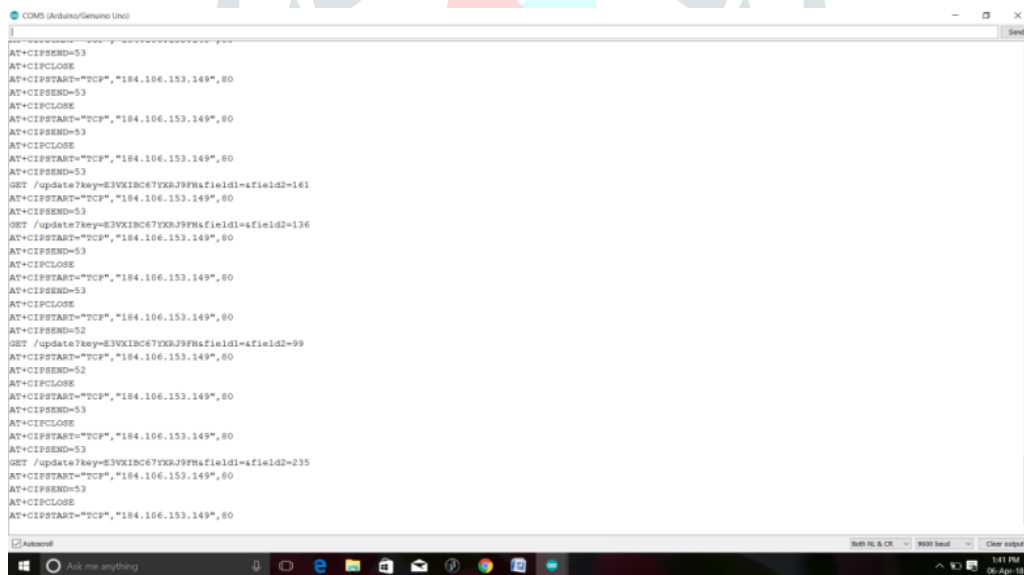
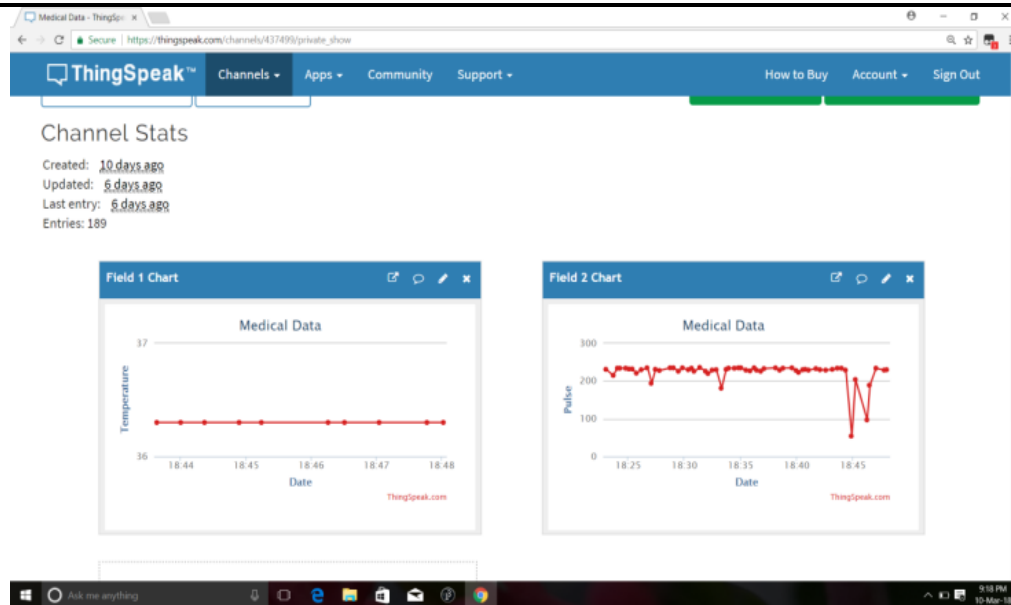


Fig.6 Serial monitor window showing temperature and heart pulse data.



**Fig.7 Thingspeak Window displaying the real time data of temperature and heart pulse**

In the above figure, the data sensed by the system is displayed on the Thingspeak platform. The first field window shows the temperature of the patient in terms of degree Celsius whereas, the second field window shows the heart pulse of the patient in terms of bpm (beats per minute). By moving the cursor at any particular point on the graph the date, time, measured value of the parameter and location at which the data is sensed is displayed.

#### 4. CONCLUSION & FUTURE SCOPE

system presented in the system measures and detect Human heartbeat and body temperature of the patient, sends the data to user or server end by using microcontroller with reasonable cost and great effect. From Experimental results, it is found that the proposed system is user friendly, reliable, economical. This system gives the easy and reliable solution to the patients and as well as to the doctors by which the health parameters can be viewed in any remote place by any device. There can be alarming systems attached in it for instant notifications to the doctors if any emergency occurs. In future, a portable Human Health monitoring system can be designed using Arduino.

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