Smart Health Management using IoT

Project report submitted in partial fulfillment of the requirement for the degree of Bachelor of Technology

in

Computer Science and Engineering/Information Technology

By

Tejeshwar Thakur (141249)

Under the supervision of

Dr. P.K.Gupta

to

Department of Computer Science & Engineering and Information Technology

Jaypee University of Information Technology Waknaghat, Solan-173234, Himachal Pradesh

Candidate's Declaration

I hereby declare that the work presented in this report entitled **" Smart Health Management using IoT"** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering/Information Technology** submitted in the department of Computer Science & Engineering and Information Technology**,** Jaypee University of Information Technology Waknaghat is an authentic record of my own work carried out over a period from August 2017 to May 2018 under the supervision of **Dr.P.K.Gupta,**Associate Professor **of CSE& IT**.

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

Tejeshwar Thakur,141249

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

Dr.P.K.Gupta

Associate Professor

Dept. of CS & IT

Dated: 18th May'18

ACKNOWLEDGEMENT

It is our privilege to express our sincerest regards to our project supervisor **Dr. P.K.Gupta**for their valuable inputs, able guidance, encouragement, whole-hearted cooperation and direction throughout the duration of our project.

We deeply express our sincere thanks to our Head of Department **Prof. Dr. SatyaPrakashGhrera** for encouraging and allowing us to present the project on the topic "**Smart Health Management usingIoT**" at our department premises for the partial fulfillment of the requirements leading to the award of B-Tech degree.
At the end I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project work.

Dated: 18th May'18 Tejeshwar Thakur (141249)

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Internet Objects (IoT) can be a building that reflects a connected set of anyone, anything, anytime, anywhere, any service, and any network. Things on the Internet can be a big advantage in next-generation technologies that can affect the entire business. Benefits typically include advanced communication of these devices, systems, and services that go beyond machine-to-machine (M2M) objects. Therefore, automation can be considered in almost all areas. IoT provides acceptable solutions for a variety of decent applications.

Medical care and medical care is one of the most attractive application areas for Internet things. IoT has the ability to generate many medical applications, such as tele-health surveillance, fitness programs, chronic diseases and health care. Compliance with treatment and receipt of medicines and caregivers is another possible application. As a result, it is considered that a variety of medical devices, sensors, imaging devices and imaging devices are good things or things that are intrinsically close to Internet objects. Square scale for Internet-based services things, which are supposed to reduce costs, improve the quality of life and enrich the user experience. From the perspective of a health service provider, the Internet can reduce the time the device crashes by remote delivery. In addition, the Internet can properly verify the optimal times to renew the supply of different devices for fast and continuous operation. In addition, the Internet provides the economic design of limited resources by ensuring its best use and repairing additional patients.

Figure 1 shows recent trends in health care. Easy economic interactions through transparent and safe ownership among patients and hospitals can be a upcoming trend. Updated health care networks, drawn by wireless technology units, must support chronic diseases, early diagnosis, period monitoring and medical emergencies. Medical portals, medical services and databases play a vital role in establishing medical records and in providing health services upon request to interested parties.

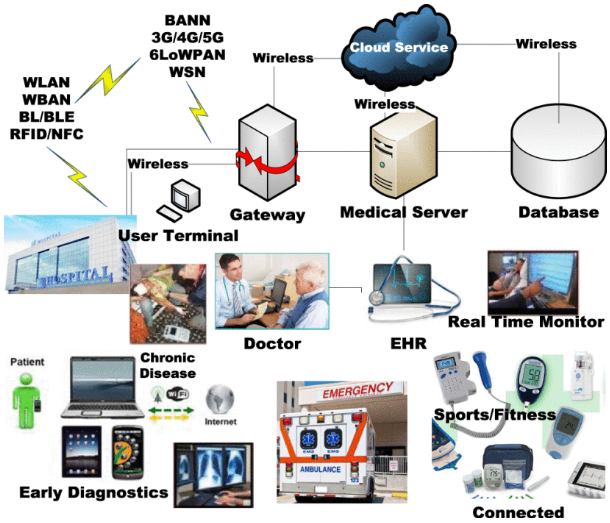


Figure 1.Healthcare trends

In recent years, this area has attracted considerable interest from researchers to manage the potential of Internet things in medical care by examining various practical challenges.

As a result, there are currently many applications, services and prototypes in this area. Trends in health care analytics on the Internet include structured objects, network platforms, services, new applications, capabilities, security, and more. At this stage, a fundamental understanding of the current Internet-based analysis of things in the context of health care should be helpful to the various stakeholders who are attracted by additional analysis. This report examines trends in online health care analysis and reveals a number of issues that need to be solved on their own to reformulate health care technologies through Internet Of Things (IoT). In this respect, this document contributes to:

• Classify studies on Internet health care networks in three directions and provide a summary of each system.

• Provides a comprehensive study of health care services and applications on the Internet.

• Highlight the different industrial efforts to adopt products and models of health care compatible with the things Internet.

• Highlight various policies and methods that can help researchers and policy makers to integrate Internet innovation into health technologies, as follows.

• Provide open challenges and problems that need to be addressed to create powerful technologies for internet health care things.

1.2 PROBLEM STATEMENT

Create an automated system (configuration) using a smartphone that can monitor the patient's status automatically, create alerts and manage records in the cloud server.

In addition, the sensors can be used to store data from clinical applications in remote health monitoring systems for long-term recording, administration, and clinical access to the patient's physiological information.

Using the information provided the doctor can create a very accurate diagnosis of your health and advocate for treatment.

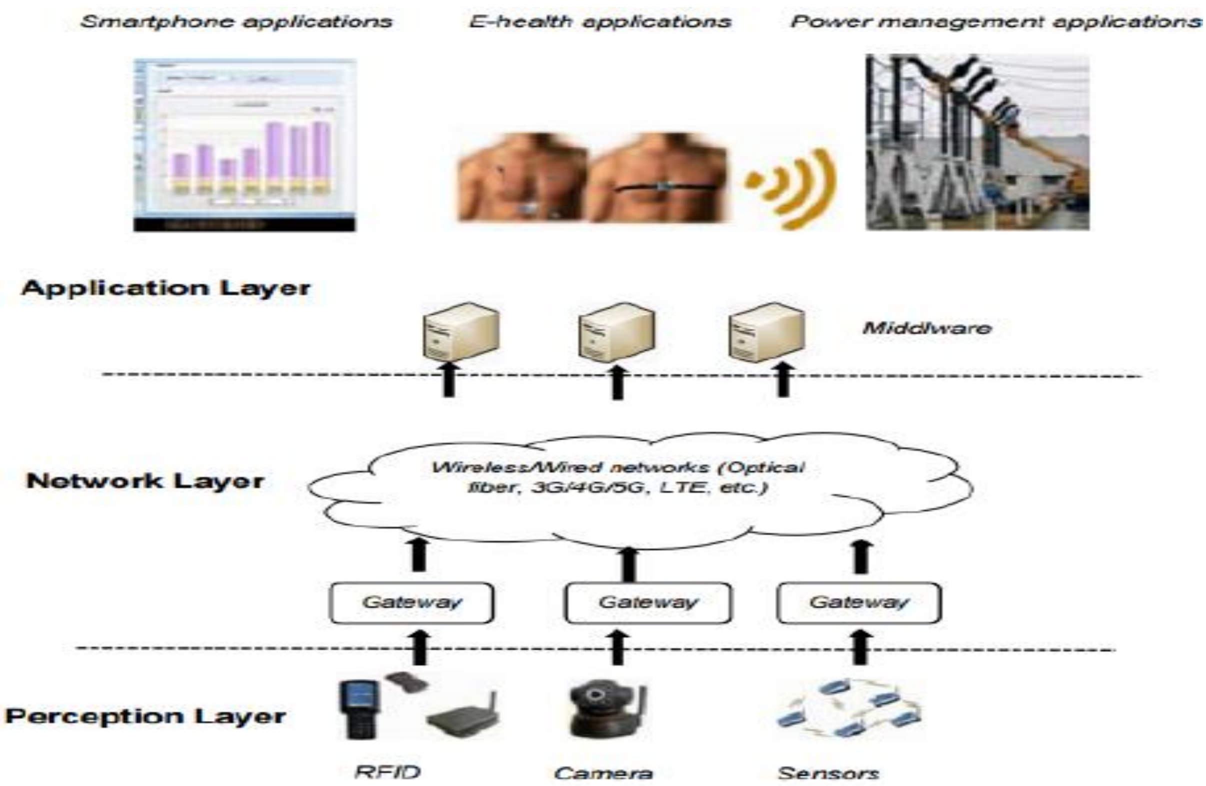


Figure 2.Proposed Architecture

1.3 OBJECTIVE

Health is the metabolic and beneficial level of the organism. In humans, the ability of individuals or communities to adapt and manage once they face physical, psychological, mental and social differences. Monitoring the patient's health status is a difficult task. Patients in the process of maturity should be particularly obliged to carry out a periodic follow-up and their loved ones should know their health status from time to time while they work.

In this report, our main objective is to monitor the patient's health using sensors and networks. Internet is used to inform the lover if there is a mess or not. The health monitoring system will control the patient's pulse pulses per minute and temperature.

If the system detects a sudden change in the patient's heartbeat or temperature, the system will automatically alert the user of the patients who are on the IOT in the cloud and also provide details about the heartbeat and the temperature of the patient on the Internet.

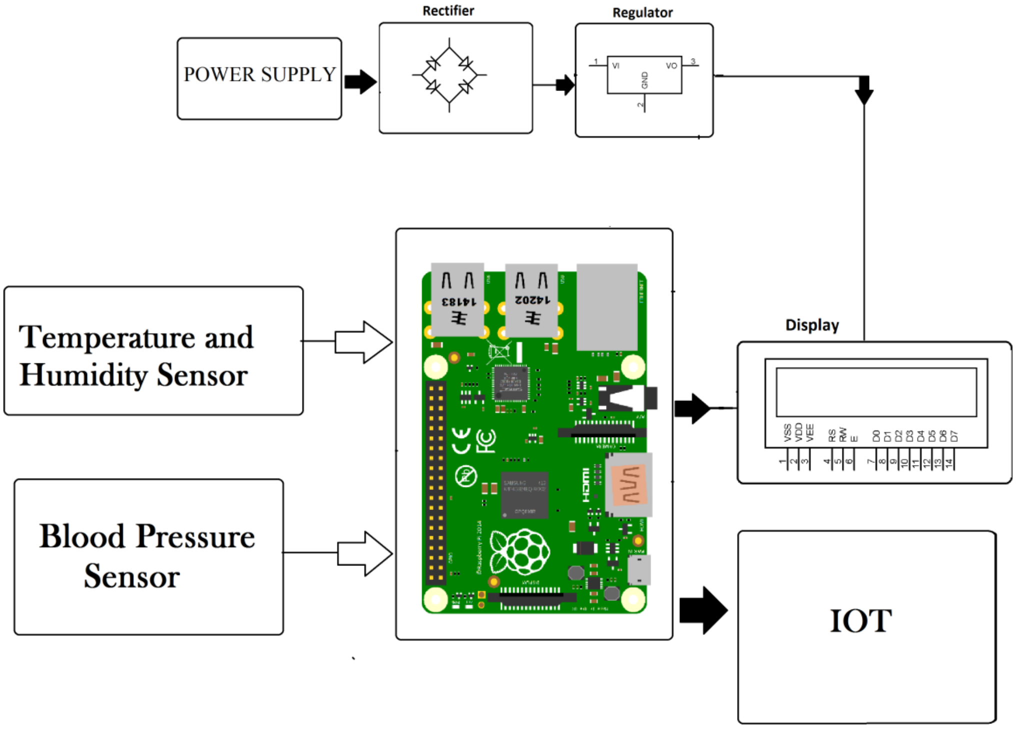


Figure 3.Illustration

1.4 METHODOLOGY

1.4.1 SYSTEM ARCHITECTURE AND WORKING MODE

As a multilayered structure, the proposed system proposal is displayed in Figure 3. As seen in the bottom row, the mobile device is used by the patient. It is also capable of detecting and manipulating individual signals or other physiological signals. For example, the motion detector is used primarily to choose whether the patient is doing high intensity or potential falls. Pulse frequency sensors determine whether the patient's body condition is normal or not. If an irregular condition is detected during a patient move, the system can now be alerted to escape a sudden scenario. The central level is a smartphone that uses Android.

The physiological data absorbed by the mobile station will be displayed on the smartphone screen. If necessary, you can issue vibration and sound alarm. With Android built-in smartphone, patient status will be determined by GPS or Wi-Fi. In an emergency scenario, the patient's mobile phone path can be saved in the web server database and displayed on the page. Online. During this report, the wireless protocol is used because of the connection between the smartphone and the mobile station.

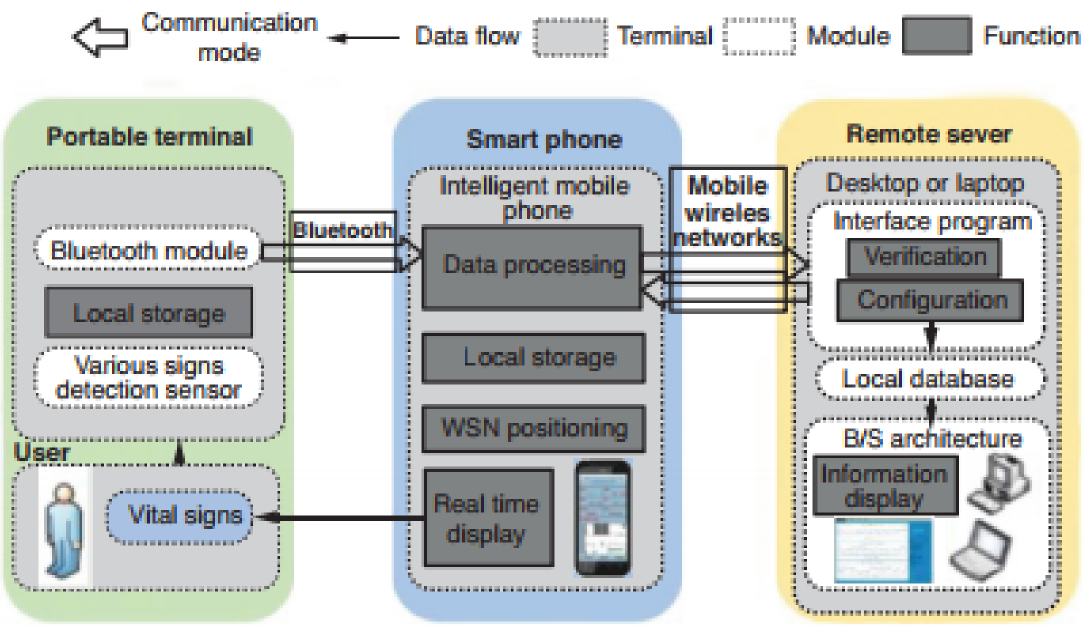


Figure 4. This is the architectural view of the system.

At the top is the remote server, provides a fixed connection channel for smartphones. This channel includes network configuration and management functions. You can also perform station logging, configuration, security, and more. Smartphone data will be stored in a predefined format to form complete medical records. To provide an appropriate note, the server software supports the B / S structure, where the web page is used to display real-time monitoring information for physicians and family members authorized to access the data. The observed information contains physical properties, contrast curves, and location. Patients can view specific information anywhere via their web browser. The proposed system provides two methods of action:

• Monitor normal status: Patient information and information will be saved on the smartphone, which can display curves.

• Answer pop-up: If there are abnormal phenomena, the smartphone will send an alarm and it will become an emergency. Status and information will be constantly updated with real-time mode. The doctor can move quickly before anything else arrives at the patient. For mobility and convenience needs, a mobile phone network is used to transfer data between a smartphone and a web server. This will be discussed in detail below.

1.4.2 PORTABLE TERMINAL

For patients, especially the elderly, physiological signals, such as pulse and body position, should be monitored in real time. A reliable and portable device is the key to effective control of medical care. As a basic functional unit of this system, the mobile device is absorbed by frequency and pulse frequency sensors that are also connected to the microcontroller panel, i.e. the Intel Arduino Uno panel. Figure 5 shows how the sensors are connected to the body.

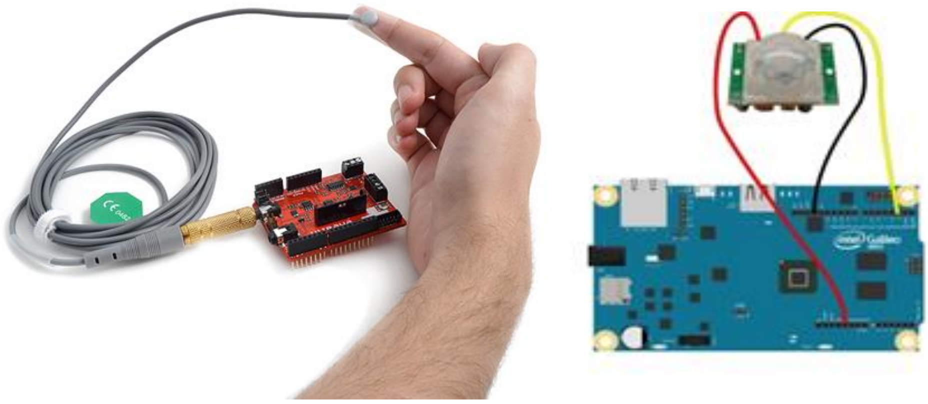


Figure 5.Sensor connected with a human and further connected with the Intel Galileo microcontroller board

What I can calculate with existing smart medical wearables?

- Mundane activities (steps, calories, travel)
- Pulse ECG
- Sleeping quality
- Brain activities
- Blood pressure
- Blood oxygen level
- Blood glucose level
- Cardiac fitness
- Mental Stress
- Body Temperature
- Baby and foetal monitors
- Blood alcohol content
- Pulmonary reading

CHAPTER 2: LITERATURE SURVEY

2.1 SMART HEALTH CARE SYSTEM USING INTERNET OF THINGS

Health is a basic need. It is a human right to stimulate good medical care. Currently, India faces many health problems because of scarce resources. This article provides a review of the concept of finding health problems using the latest technology, Internet and things. This
Using this method, physical parameters of the patient will be measured in real time. The sensors collect the patient's body parameters and transfer this information to Arduino Uno, which then transfers this information to the cloud using a WLAN module.
This knowledge is stored in a MySQL database server that manages information and provides access. The user will read this knowledge with the help of the Man Mechanical application.
Which will be installed on your phone, tablet, or sensitive computer?
If the information is abnormal, the patient receives a notice that caregivers can receive by mail. With the help of several higher knowledge algorithms, elections will be created and people will be able to access the information accordingly. The patient will have a medical history, thus providing high-quality medical care for all and providing a fault-free and patient-free communication.

2.1.1 HEALTH CARE SYSTEM

The smart city is nonsense. Many researchers and international companies have defined their application and cloud computing at a higher level.

•This health care system is a comprehensive system with a comprehensive method of contact for users and health care providers. This technique is used for temperature and pacemaker. They feel the temperature in line with their work.
So, with the help of a small control tool, we can get information that can be processed more.
During this system, the Arduino UNO uses the ATmega 328P microcontroller.
• Provide a 2-way cloud communication system layout. Here, real-time health records record exactly what information the sensor has detected so that my SQL database server is used.
• First, the remote health monitoring system is the integration of 3 parts:
(1) Data acquisition
(2) cloud system
(3) Health Portal in real time

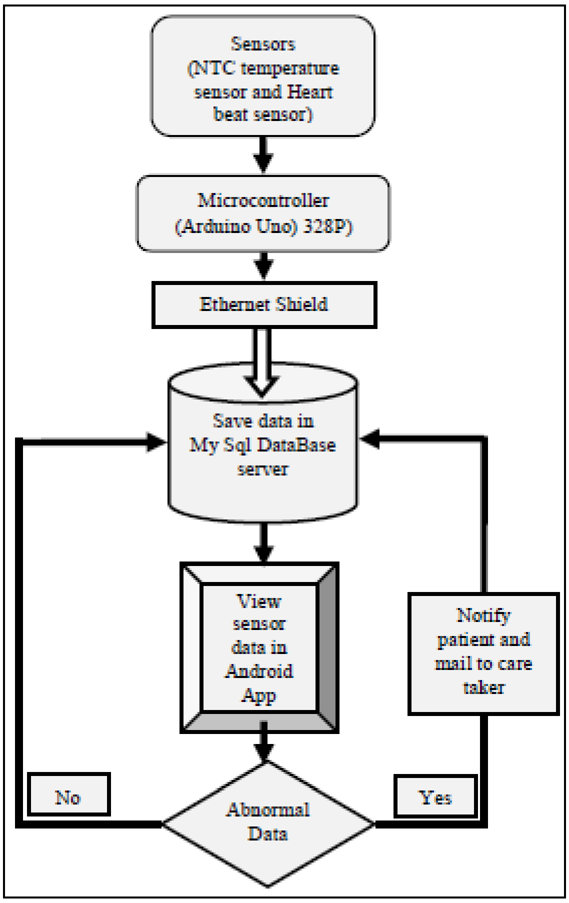


Figure 6: This is the Sysem

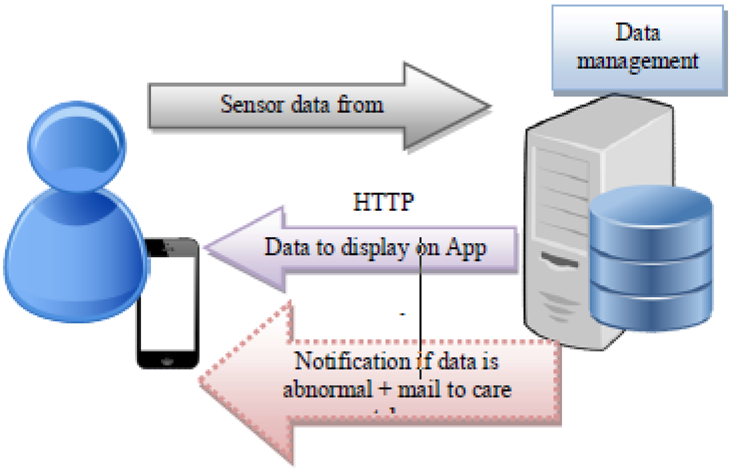


Figure 7: Above is the architecture

2.1.2ARCHITECTURAL OVERVIEW

We use the shield of the Arduino electronic health center with 9 types of body sensors that are quite different from the kitchens. Advance after sensor readings: body temperature, blood oxygen, pulse, blood glucose meter, manometer, air flow, ECG, EMG, body location and GSR.

The communications shield is configured in the best electronic health shield to produce a wireless connection, such as Bluetooth and Wi-Fi, from the mobile tablet sensitive coordinator, as shown in figures 2.1 and 2.2, separately from figure 2 Configure and test the wireless connection of the connection shield. Arduino wants a voltage supply of 3.3V for most of the 12V, to control the circuit. The Electronic Health Shield constantly detects it and sends it to Arduino for further communication.

The data of the Arduino panel arrives at a server through a connection interface. Non-formal manual movement is performed between the server and the Arduino connection mode, before the transfer of information. Once our application detects the status data in one of the 3 receiver ports, the activator is configured that leads to other modules of the application.

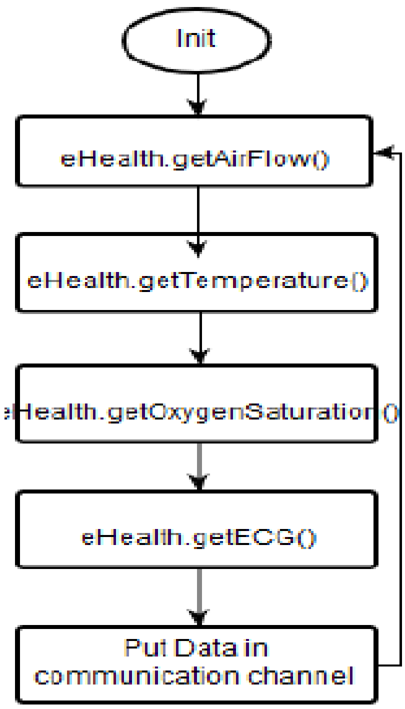
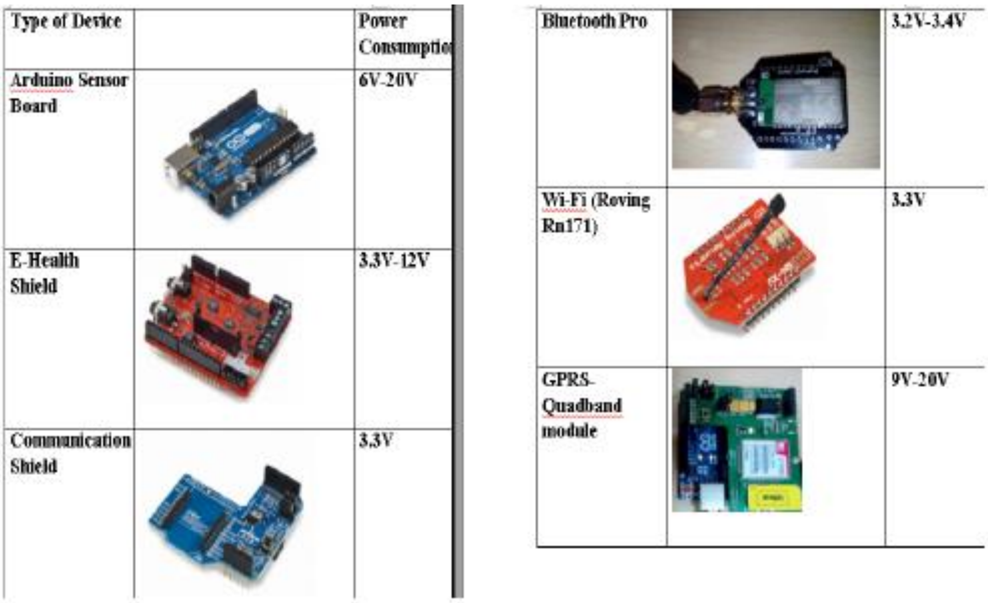


Fig. 8 Flow-Chart for the Sensing Algorithm



Type of Device		Power Consumption
Arduino Sensor Board		6V-20V
E-Health Shield		3.3V-12V
Communication Shield		3.3V
Bluetooth Pro		3.2V-3.4V
Wi-Fi (Roving Rn171)		3.3V
GPRS-Quadband module		9V-20V

Fig. 9 Power Consumption List for Different Devices Used in the Architecture

A diagram is drawn in arduino for the live readings of the detection elements completely different from the patient. This drawing is done with the rule to detect completely different parameters, which is as follows:

When the startup program reaches hundreds, the measurement of the port information is corrected and some necessary digital pins are allocated at their predetermined price. These pins can get relevant information for electronic health sensors.

• The first information is extracted from the patient's body and renewed in the effort.

• This information is then sent to Arduino for further processing.

Once the information is collected and the work redone to clean up the form's operation, the switchers are completely different for several sensors.

Transferred information, such as step-by-step body temperature, proportional blood chemistry, heart rate per minute, etc., is put online for any operation.

• If the connection between the Bluetooth device (WT12-A) and the mechanical touch phone is processed, the specified commands must be created in the originally selected device, and then the acknowledgment section is about to communicate with the device. mechanic.

• However, if a connection is established between the Arduino RN-XVe module and, therefore, the mechanical node, the base is designed so that the sensor component is part of the fixed access point.

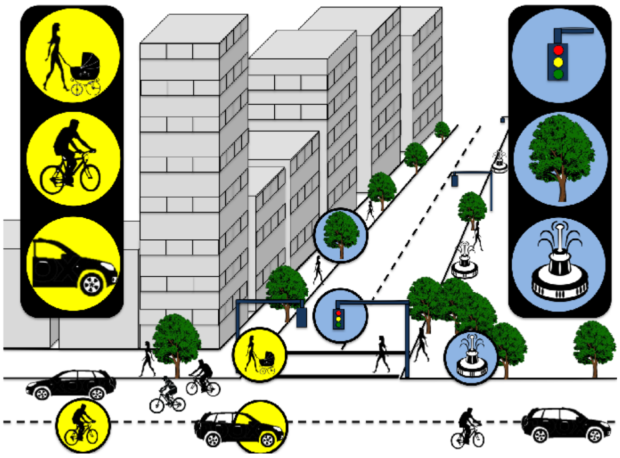


Fig. 10 Graphical representation of our application example: citizens with children, cyclists and cars; traffic lights, sensors in trees and fountains.

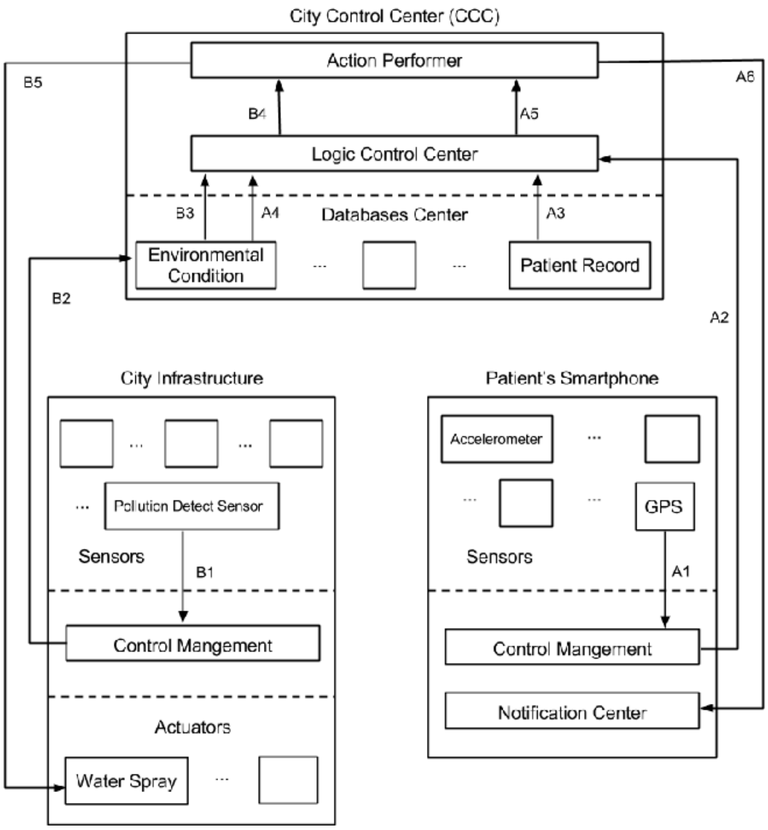


Fig.10 Architecture of the s-Health application

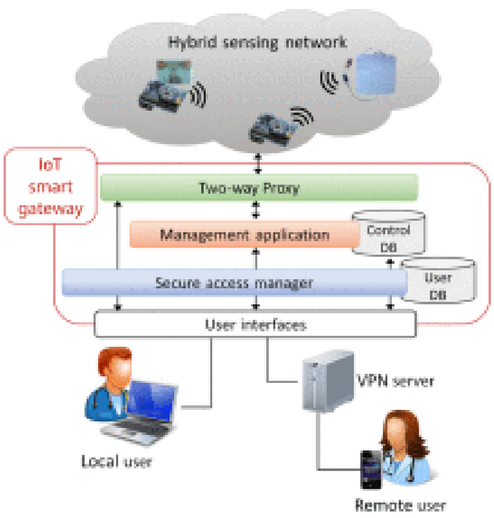


Fig. 11 Overview of the SHS architecture

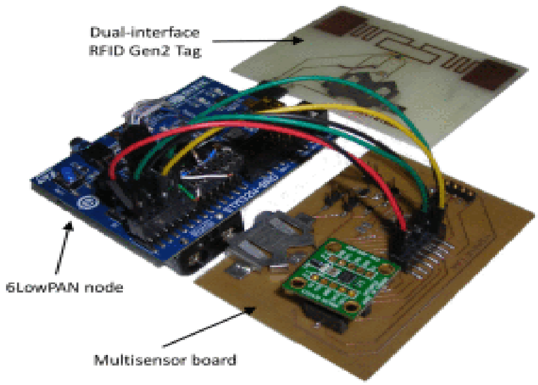


Fig. 12 Interconnected prototype boards realizing the HT architecture envisioned in figure

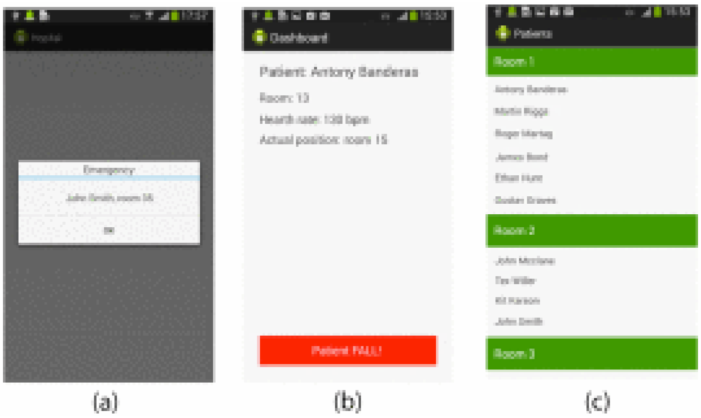


Fig.13Screenshots of the Medical App

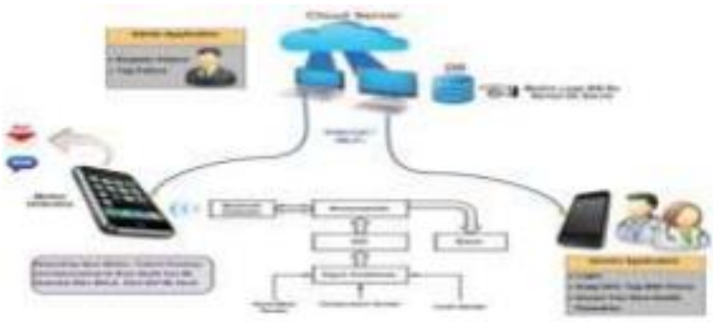


Fig. 14 Proposed System Architecture

The current medical care system includes manual intervention when taking notes, updating notes on a computer, and records are kept under a unique definition that is assigned to each patient. This process is usually very slow and prone to errors as there is a disappearance between data collection and access to information.

In another work, use the Android app to view patient data using an open source platform. This system helped the doctor monitor patient data and displays it via a portable device.

Progress in mobile discovery and communication infrastructure has enabled widespread development of standard medical devices for patient monitoring. However, these devices did not penetrate clinical practice, mainly due to the lack of research on "smart" methods of analysis that are strong enough to support widespread dissemination. Current systems are often subject to high rates of false alarms and the inability to deal with sensors calculated in a logical manner. This document has two objectives:

• Propose a new system dedicated to patients for analysis and inference in the presence of uncertainty in the data, which usually occurs due to the transformation tool and incomplete data.

• Demonstrate the method using a large clinical trial in which 200 patients were followed using the proposed system.

The latter provides necessary evidence that e-health surveillance can be achieved within a broad global clinical framework and that this method can improve patient outcomes through personalized medical care.

2.2 SMARTHEALTH: CONTEXT-KNOWLEDGE OF PARADIGM OF SMART HEALTH

In this article, they present the new concept of intelligent health, a complement to the context of mobile health in smart cities. They offer a general description of the main knowledge areas that are involved in the construction process of this new concept. In addition, they discuss the key challenges and opportunities that S-Health will identify and provide common ground for future research.

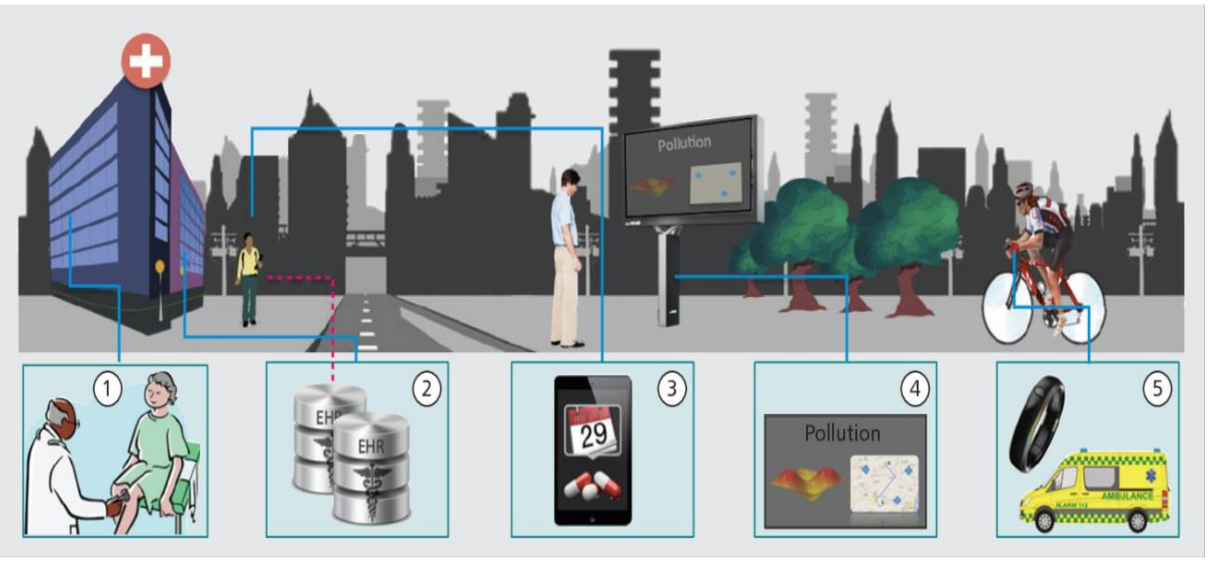


Fig15. It depicts how a smart city works.

CHAPTER-3 SYSTEM DEVELOPMENT

The IoTenable remote health surveillance system has great advantages over the old health surveillance system. The health screening components have become small and highly portable, allowing patients to use them 24 hours a day for observation.

The virtual patient has micro-physiological conditions because the patient is real. The doctor will see the patient several times a day, however, significant health problems will occur at any time. Therefore, the monitoring of health information 24 hours a day, 7 days of how to access patients with Internet things through the network and through alternative devices, the patient's health status can be monitored constantly, allowing the discovery of serious illness in a timely manner) So that appropriate measures could be taken. In addition, the Internet will facilitate the collection of health records. The generation of mathematical information related to the state of health can be achieved by machines. It is a variety of knowledge that is faster, bigger and error-free, and no manual forms can be achieved. Statistics, police investigations, and disease risk mapping can be made using telemedicine.

3.1 DESIGN

In this section, the health monitoring system on the Internet has been described as things. The health monitoring system includes many sensors connected to a person and communicates with the data collection unit and the processing unit. The data collector and the processing unit can be a specialized device and a computer. The assembly unit is responsible for assembling all the sensor data from the acute sampling frequency, it forms the body in our design, we use an UNOcontroller controlled by the UNO. The computer used in the hospital as a treatment unit for our health control structure. The collector uses a serial USB connection to connect to the data processing unit. Data received from the assembly unit processed in the data processing unit, that is, in the computer. The data can be used to draw graphs and graphs (for example, a graph of ECG data) and interactive services are provided to users based on this data. This system can accept valuable medical advice from physicians interested in patients, and can adjust alarms or medication reminders in a timely manner, dates and graphs that show the design of the health surveillance system. The system consisting of 3 units: patient unit, doctor unit and server unit. The server unit consists of two units: local and remote. The remote unit allows the storage and distribution of data to doctors and.

3.2 DESIGN REQUIREMENTS:

3.2.1ARDUINO UNO:

ARDUINO UNO development board along with some sensors that include:

- Heart rate sensor
- Temperature sensor

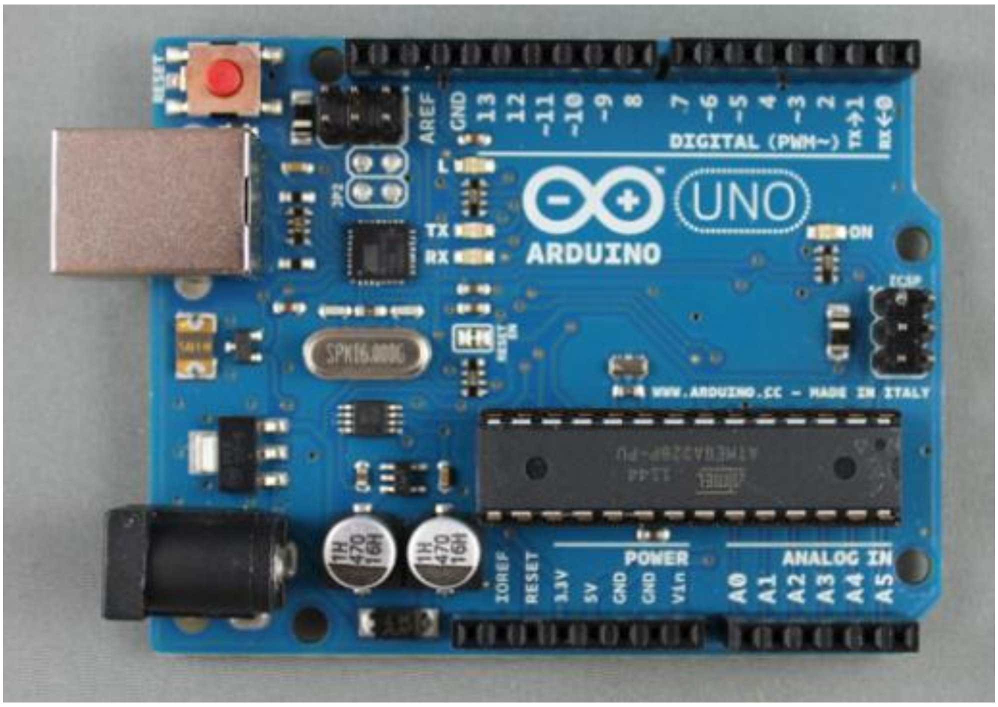


Fig 16. Arduino UNO

3.2.2 PIN DESCRIPTION:

Arduino Uno's Physical Specifications:

Table 3(a)

Pin Category	Pin Name
Power	Vin, 3.3V, 5V, GND
Reset	Reset
Analog Pins	A0 – A5

Input/Output Pins	Digital Pins 0 - 13
Serial	0(Rx), 1(Tx)
External Interrupts	2, 3
PWM	3, 5, 6, 9, 11
SPI	10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK)
Inbuilt LED	13
TWI	A4 (SDA), A5 (SCA)
AREF	AREF

Arduino Uno's Technical Specifications:

Table 3(b)

Microcontroller	ATmega328P – 8 bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage	7-12V
Input Voltage Limits	6-20V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 mA
DC Current on 3.3V Pin	50 mA
Flash Memory	32 KB (0.5 KB is used for Boot loader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz

3.2.2 HEARTBEAT SENSOR

Fig. 17 Heart rate sensor

This is a a heartbeat sensor which senses the heart beat of a person. This is a low cost sensor and uses the technology of IoT(Internet of Things).

3.2.2.1 PRINCIPLE OF HEARTBEAT SENSOR

The principle behind the operation of the Heartbeat is Photoplethysmograph. According to this principle, differences in blood volume are measured in the member by fluctuations in the amount of light passing through that member.

In general, the light supply in the heartbeat device is the diode emitted by the infrared light and also the detector will be any type of eye detectors, light binaries, LDR (light-based resistor) or optical transistor. With these two factors, ie light source and detector, we can regulate it in two ways: rocket sensor and reflector sensor. In a deceptive transport device, the light supply and the detector are placed in front of each other and the finger of the person must be placed between the transmitter and the receiver.

The reflector on the other side contains a display light and a side-by-side detector, and the person's finger must also be placed in front of the device.

3.2.3 TEMPERATURE SENSOR (LM 35)

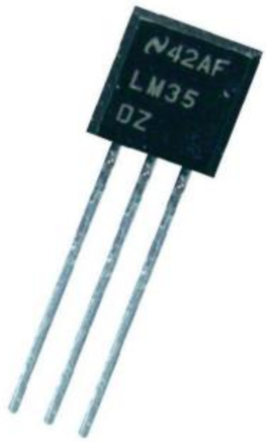


Fig 18. Temperature Sensor LM35

The temperature device of the LM35 series can be a fully integrated circuit whose electric output is linear with respect to the centimetre temperature. These sensors have another feature in the Kelvin calibration sensors and do not need to set the DC voltage of their output to obtain an appropriate average measurement.

3.2.4 LCD DISPLAY MODULE

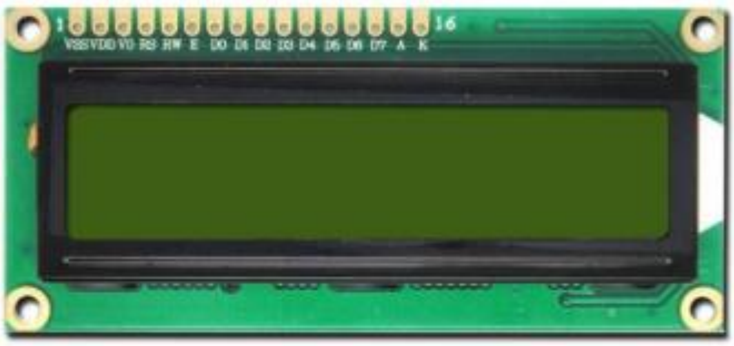


Fig.19 LCD Display

This is a 16*2 Liquid Crystal Display(LCD). It is connected with the Arduino UNO microcontroller board to show the live readings of the data whether it be heartbeat, temperature, blood pressure, humidity etc.

3.2.5 ESP8266 Wi-Fi MODULE

Fig 20.WiFi Module

The Wi-Fi module consists of TCP/IP protocol that provides connectivity to the WiFi network connection

CHAPTER -4 WORKING PRINCIPLE

4.1 HOW TO START IT OFF?

First, we'll connect ESP8266 with Arduino. ESP8266 works with three.3V and if you give 5V of Arduino, it will not work properly and you should suffer from injury. Connect the VCC as well as CH_PD to the three.3V pin of Arduino. The RX pin of the ESP8266 works in three.3V and can not connect to Arduino after connecting it to Arduino. Therefore, we will have to build a possible divider so that 5V can be converted to three.3V. This will be done by connecting 3 asynchronous resistors, which we will do within the circuit. Connect the TX pin of the ESP8266 pin nine from Arduino and also the RX pin from the ESP8266 to the pin ten of the Arduino through the resistors.

The ESP8266 WiFi module provides access to Wi-Fi or network. It is a terrible device at a very low cost and makes you very powerful. It will communicate with any microcontroller and is one of the main devices in the IOT platform.

After that connect the pulse sensor to the Arduino. Connections the heartbeat sensor element is very simple. The pulse sensor has 3 pins. Connect the 5V and also the ground pin of the pulse sensor to 5V and also the ground of Arduino and also pin the signal to A0 from Arduino.

Then connect the LED to the 13 pin of Arduino. It is not necessary to connect the resistor because Arduino contains the built-in resistor in the thirteen pin.

Finally, we'll connect the LCD with Arduino.

4.2 CIRCUIT DIAGRAM:

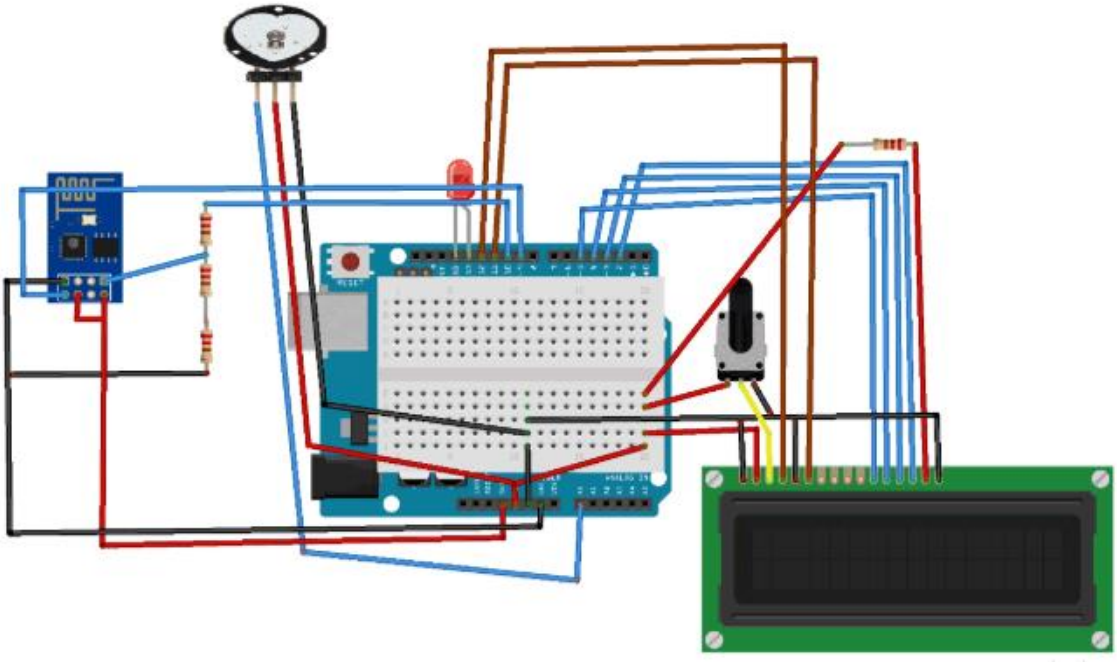


Fig.21 Circuit Diagram

The links of the LCD screen are as follows:

• Attach pin 1 (VEE) to the bottom.

• Attach pin 2 (VDD or VCC) to 5V.

• Attach pin 3 (V0) to the centre pin of the 10K potentiometer and connect the two opposite ends of the potentiometer to the VCC and also to ground. The potentiometer is used to manage the distinction of the LCD screen. The potentiometer for values in excess of 10K can also work.

• Attach pin 4 (RS) to pin twelve of the Arduino.

• Attach pin 5 (read / write) to the bottom of the Arduino.

• This pin is rarely used, therefore connect at the end.

• Attach the half-dozen pins (E) to pin eleven of the Arduino. The RS and E pins are management pins that do not send information or characters.

• The next 4 square shaped pins of the measurement data pins that mostly communicate with the Arduino.

• Join pin 11 (D4) to pin five of Arduino.

• Join pin 12 (D5) to pin four of Arduino.

• Join pin 13 (D6) to pin 3 of Arduino.

• Join pin 14 (D7) to pin two of Arduino.

• Fix pin 15 to the VCC via the 220-ohm electrical device. The resistor will be used to adjust the brightness of the tail light.
• Greater readings wil make the backlight darker.
• Attach pin 16 at the bottom.

4.3 THINGSPEAK TOOL

ThingSpeak is an Internet Of Things (IoT) that allows you to collect and store sensor data in the cloud and develop Internet applications things. The ThingSpeak ™ IoT platform provides applications that allow you to analyze and visualize your data in MATLAB® and then work on data. Sensor data can be sent to ThingSpeak from Arduino®, Raspberry Pi ™, BeagleBone Black and other devices.

4.4 THINGSPEAK SETUP:

ThingSpeak provides a very good tool for Internet-based projects. Using ThingSpeak, we can monitor our data and control our online system using the channels and web pages provided by ThingSpeak. ThingSpeak "collects" sensor data, "analyzing and visualizing" data and "actions" by stimulating the reaction.

We have already used ThingSpeak in the weather station project using Raspberry Pi and using Arduino, check it out to learn more about ThingSpeak. Here, we briefly explain how to use ThingSpeak for the IoT heart-tracking project.

First, the user must create an account on ThingSpeak.com, then log on and click Start.

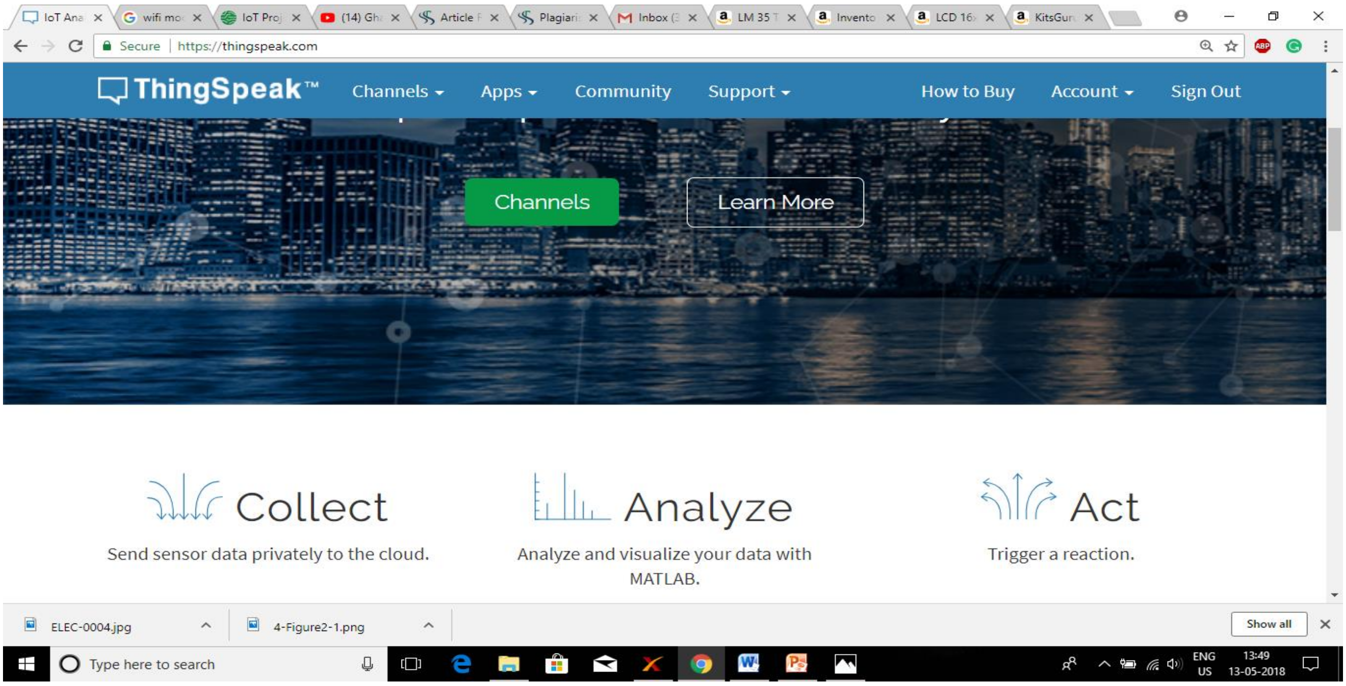


Fig.22 ThingSpeak

Once you have created an account, go to Channels and create a new channel.

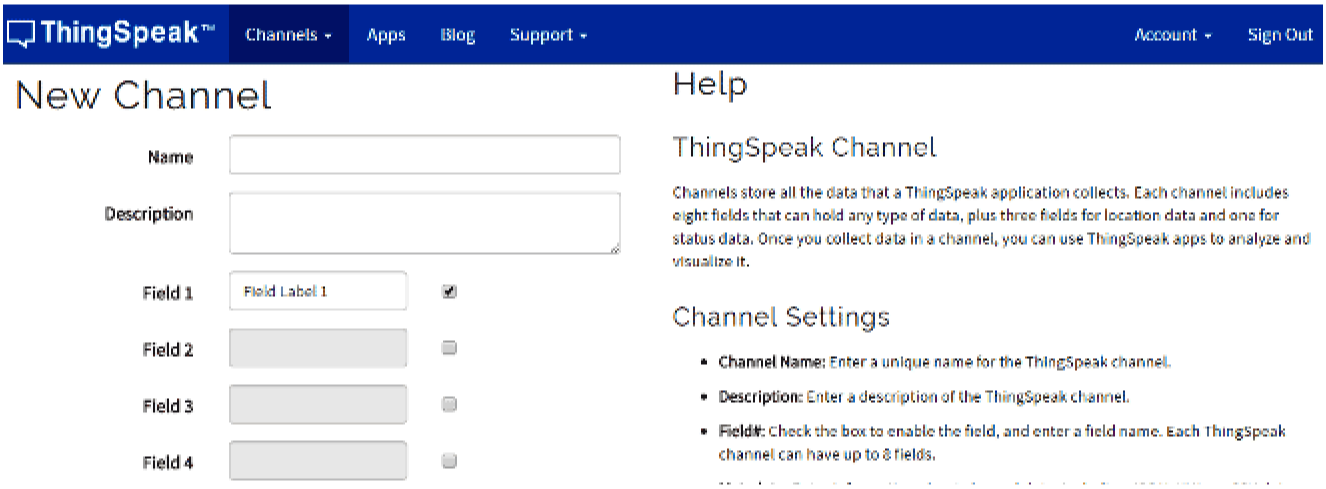


Fig 23. Setup of Channel

Then API write key from the API section. This requires code. Check onto full icon at the end.

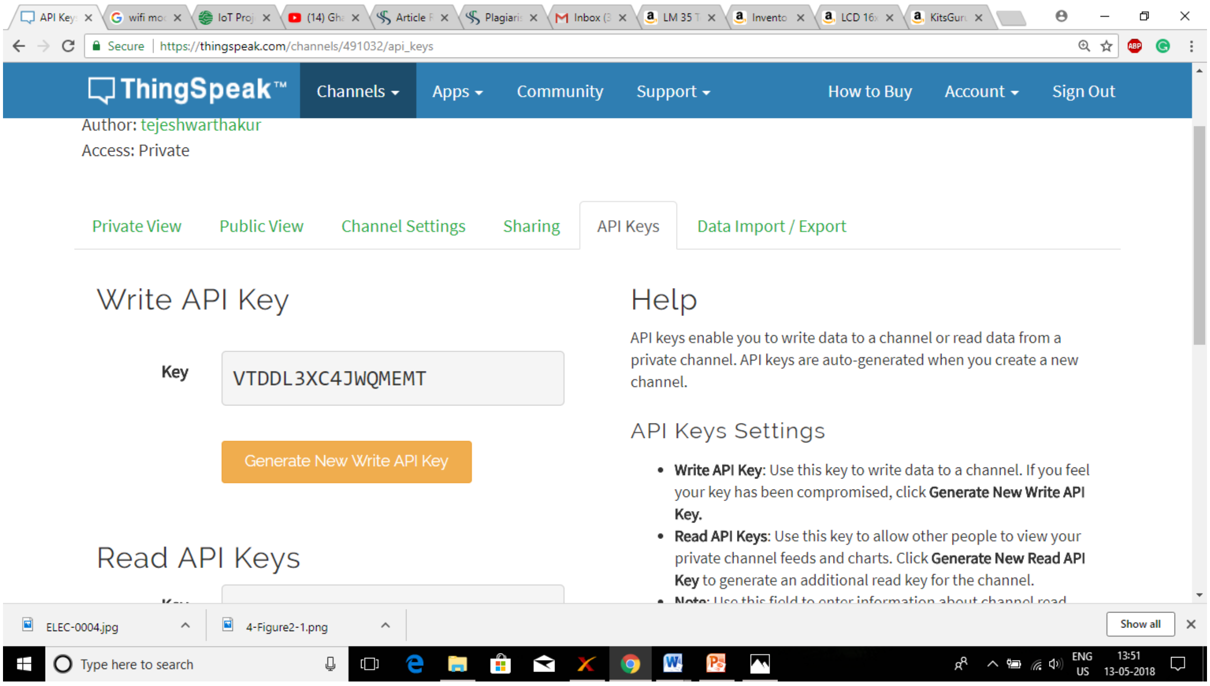


Fig.24 API Key

4.5 WORKING EXPLANATION:

First, we want to connect the heart rate sensor to anybody member where the heart rate is simply detected as a finger, see the video below.Arduino can convert this diversity to the per minute rate (BPM). The light-emitting diode connected to pin 13 flashes according to the heart rate.

ESP8266 can communicate with Arduino and can send information to ThingSpeak. ESP8266 can connect a network of routers that can simply provide in the code and can send sensor information via the Internet.

This information is displayed in ThingSpeak in a chart template that also shows previous readings and can be accessed from anywhere on the internet.

The connected LCD will display the heart rate.

Fig.25 Heartbeat chart

Fig.26 BPM

4.6 CODE EXPLANATION:

First of all, add the libraries. Software serial library is for enabling the RX and TX at pin 9 and pin 10. The default RX and TX pins of Arduino are pin 0 and 1 but if you want to enable it at other pins that you will have to use the software serial library. Then initialize the liquid crystal library (*LiquidCrystal.h)*and declare the pins at which you have connected the LCD.

```
#include <SoftwareSerial.h>

#define DEBUG true

SoftwareSerial esp8266 (9،10)؛

#include <LiquidCrystal.h>

#include <stdlib.h>

LiquidCrystal LCD (12،11،5،4،3،2)؛
```

Type in the name of your Wi-Fi along with the password and IP address of ESP8266 WiFi Module followed by the API key from ThingSpeak that you you got from the ThingSpeak site.

```
#define SSID "Your Wifi Name"

#define PASS "Your Wifi password"

#define IP "184.106.153.149"

String msg = "GET / update? Key = 9YS21NU0HY5YS1IKU";
```

The following code will start the LCD screen and set the baud rate. Enter the baud rate according to your ESP8266. Each ESP8266 has its own baud rate. Some have a baud rate of 9600, some have 115200 or whatever.

```
void setup ()

{

lcd.begin (16, 2);

lcd.print ("circuitdigest.com");

delay (100);

lcd.setCursor (0,1);

lcd.print ("Connection ...");

Serial.begin (9600); // or use the default value 115200.

esp8266.begin (9600);

Serial.println ("AT");

esp8266.println ("AT");

delay (5000);
```

```
if (esp8266.find ("OK")) {

connectWiFi ();

}

interruptSetup ();

}
```

Following the void function updatebeat () will send the data to the IP address we entered and will also put the data in the field we defined for the heartbeat.

```
voidupdatebeat () {

String cmd = "AT + CIPSTART = \" TCP \ ", \" ";

cmd + = IP;

cmd + = "\", 80 ";

Serial.println (cmd);

esp8266.println (cmd);

delay (2000);

if (esp8266.find ("Error")) {

come back;

}

cmd = msg;

cmd + = "& field1 =";

cmd + = BPM;
```

....

....

The following code will connect the ESP8266 with the Wi-Fi network you entered earlier, and then use that network to send the data to ThingSpeak.

```
booleanconnectWiFi () {

Serial.println ("AT + CWMODE = 1");

esp8266.println ("AT + CWMODE = 1");

delay (2000);

String cmd = "AT + CWJAP = \" ";

cmd + = SSID;

cmd + = "\", \ "";

cmd + = PASS;

cmd + = "\" ";

.... .....

..... .....
```

The following code will read the sensor and convert the sensor output to heartbeat per minute (BPM). It will also flash the LED connected to pin 13 according to the BPM.

```
ISR (TIMER2_COMPA_vect) {

cli ();
```

```
Signal = analogRead (pulsePin);

sampleCounter + = 2;

int N = sampleCounter - lastBeatTime;

if (Signal <threshold && N> (IBI / 5) * 3) {

if (Signal <T) {

T = Signal;
```

CHAPTER-5 OBSERVATIONS AND RESULTS

5.1 ORIGINAL CIRCUIT:

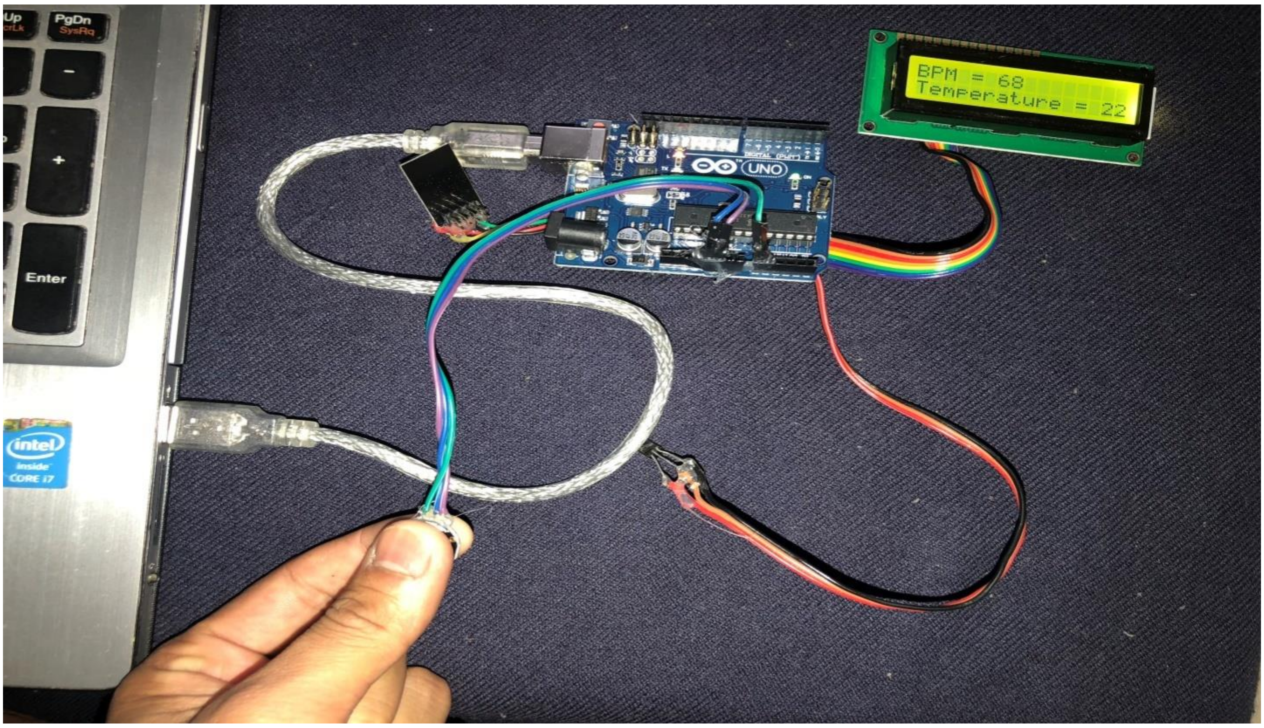


Fig.27 This contains an Arduino Uno board along with lcd display, ESP8266 Wi-Fi module, temperature sensor, heartbeat sensor, jumper wires and a connecting cable.

This is the Arduino IDE along with the serial monitor in which the program code is being compiled and run:

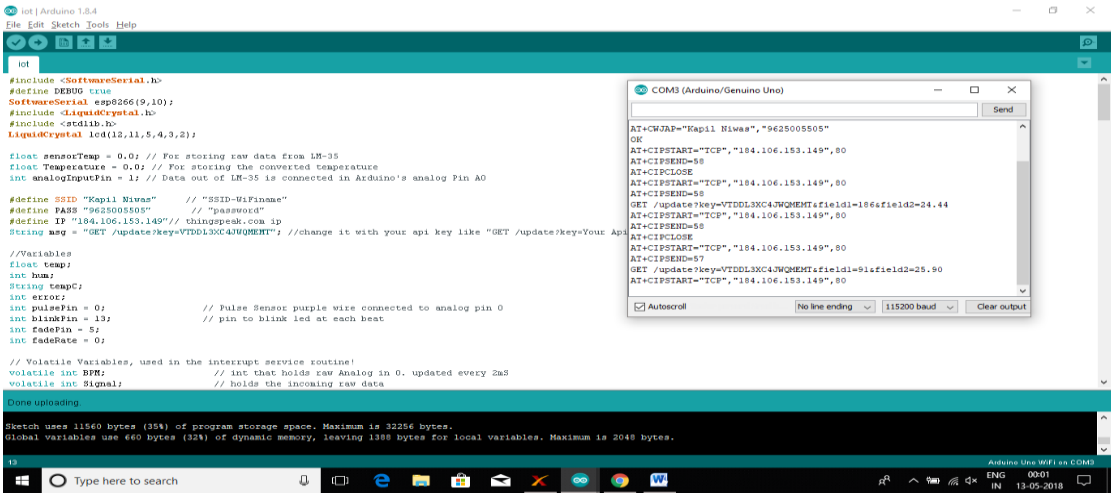


Fig.28 Code with Serial Monitor on Arduino IDE

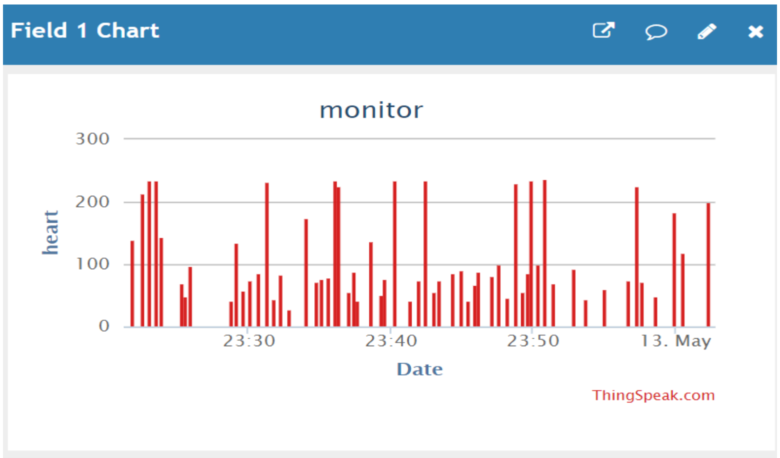


Fig.29 Some heart beat readings

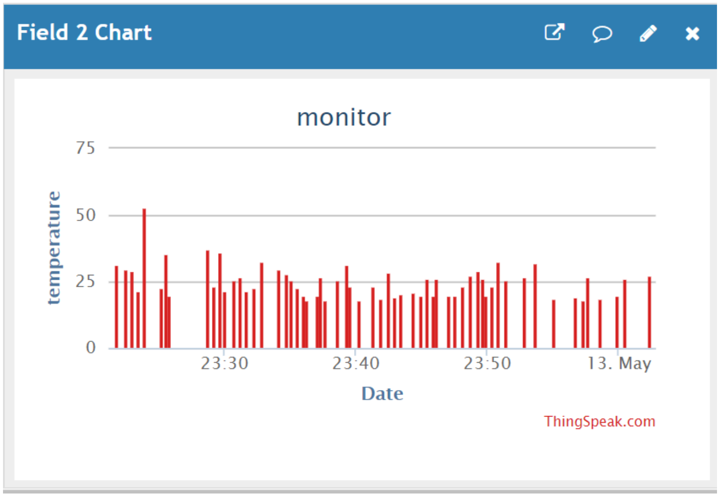


Fig.30 Some Temperature readings

These are some of the readings generated from our system using IoT with the help of ThingSpeak tool that uses MATLAB analytics. These are represented in the form of columns.

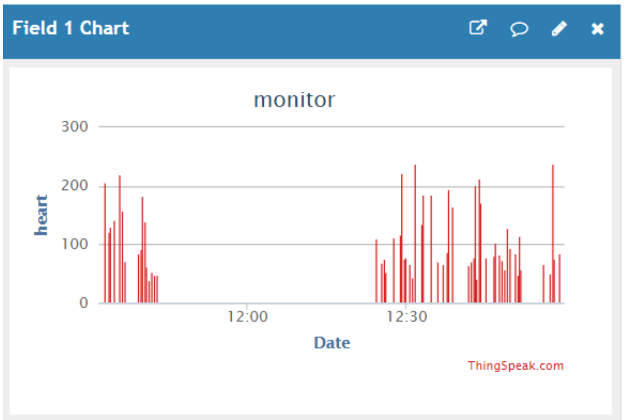


Fig.31 (a) Heart rate representation in the form of column

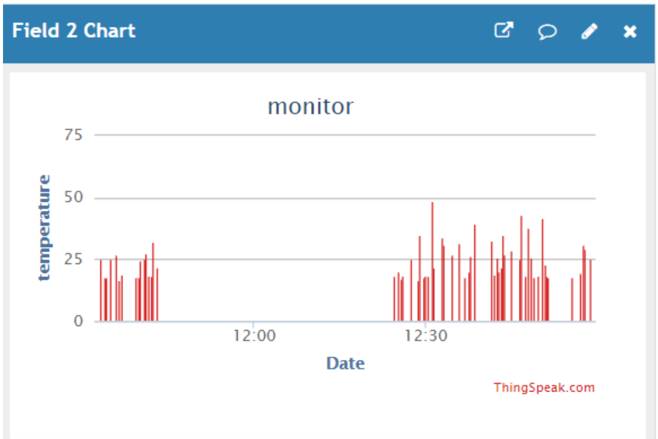


Fig.31 (b) Temperature representation in the form of column

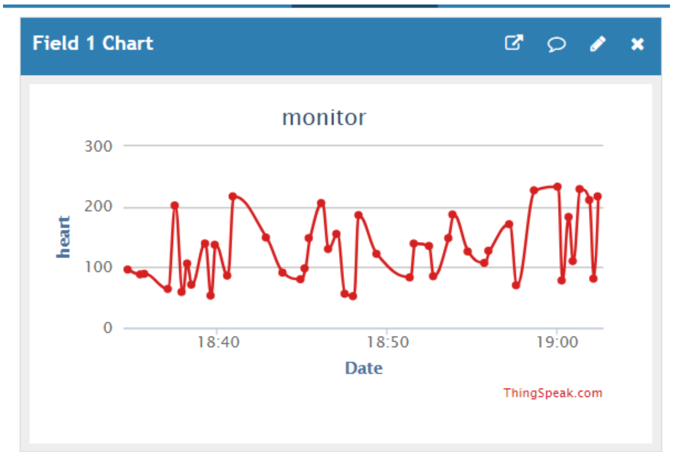


Fig 32. (a) Heart rate representation in the form of spline

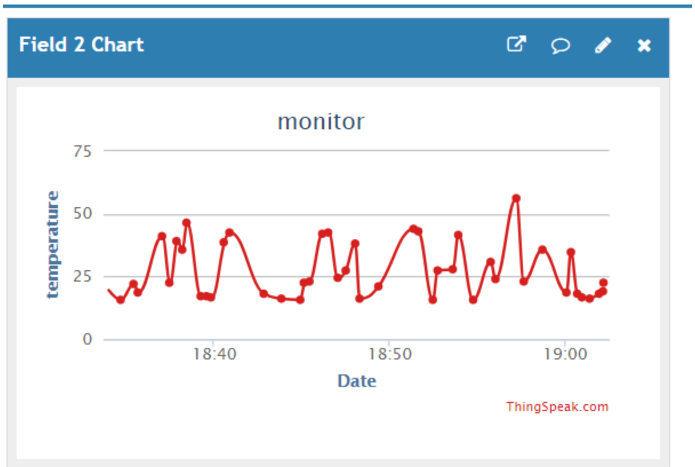


Fig 32. (b) Temperature representation in the form of spline

CHAPTER-6 PERFORMANCE ANALYSIS

The Intelligent Health Management System is implemented primarily through sensors and controllers. The sensors detect the heart rate, movement, temperature and other detection elements, and then send that data to the main control unit. These sensors can be heat regulators, pulse sensor, accelerometer, ecg sensor with sensors, blood pressure meter, etc., which require additional signal delivery equipment to communicate with the main console. Controllers can be personal computers / laptops, touch panels, smartphones, etc., connected to controllers such as programmable logic controllers or microcontrollers that receive sensor information, and according to the program.

The system can be changed based on the downloads. The programmable controller allows you to connect many sensors through different input and output units, both analog and digital. Communication plays an important role in this health management system for remote access to these processes. Various communication protocols are available for home automation systems such as RF, IR, DTMF, Wi-Fi, Bluetooth, GSM, Zigbee, Ethernet, IOT and PC Serial Communication. Work done As technology advances, health care is also becoming smarter.

6.1 REAL READINGS TAKEN FROM SPECIALLY MADE ELECTRONIC DEVICES:

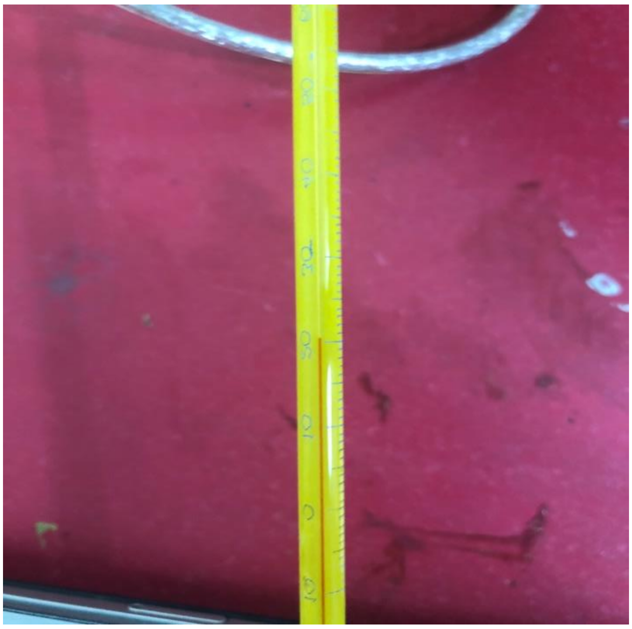


Fig.33 Thermometer (Reading=20.5)

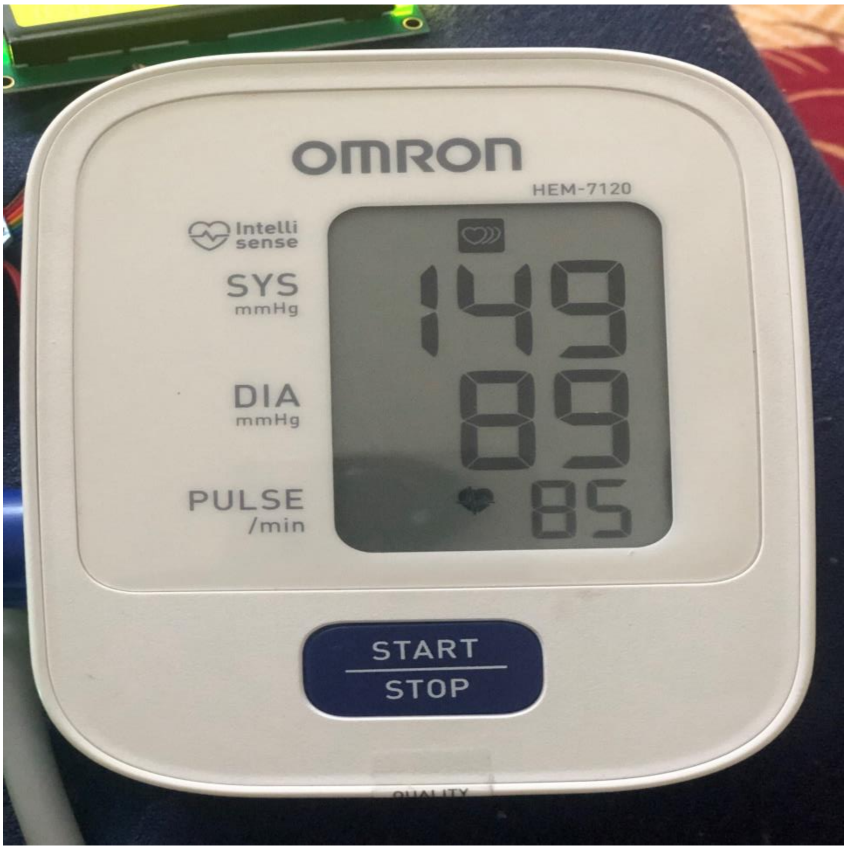


Fig.34 Blood Pressure and Pulse Rate monitoring device(Pulse Rate=85)

6.2 READINGS FROM THIS IOT BASED PROJECT:

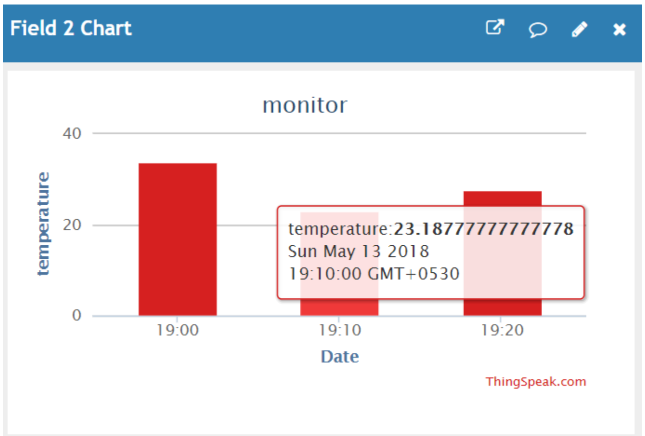


Fig.35 Average temperature of last 10 readings: 23.187777777777778

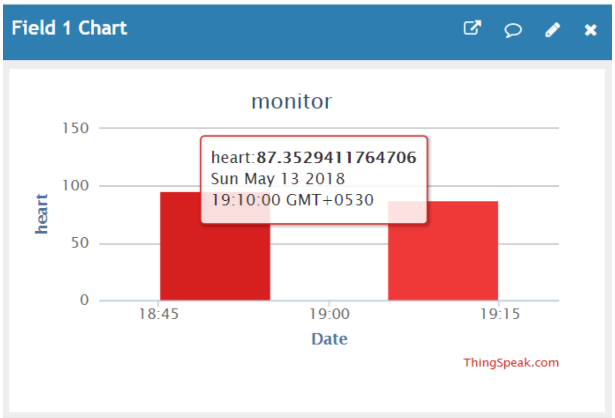


Fig.36 Average heart rate of last 10 readings: 87.3529411764706

6.3 ERROR DETECTION:

Table 6(a)

	Average Temperature	Average Heartrate
Self made model	**23.18**	**87.35**
Electronic devices	**20.5**	**85**
Error Detected	**+2.68**	**+2.35**

CHAPTER-7 CONCLUSION

In this report we have proposed a Wi-Fi remote monitoring and control system using the Arduino Uno controller, which can calculate the heart rate and temperature of a human body without going to the hospital. We have installed a continuous monitoring and surveillance mechanism to monitor the patient's condition and store patient statistics on the server. For performance evaluation, simulation results are obtained using ThingSpeaktool, a cloud that uses MATLAB for data analysis.

7.1 RISKS AND CHALLENGES

The benefits of network-related health care include some areas of concern. One of the main risks associated with the erosion of the Internet is the confidentiality of patient-sensitive data. Confidentiality of patient records is mandatory in the health care sector, and important data can be used incorrectly if the oppressors have access to it. Intentionally disrupting and disrupting the network is another threat to Internet things in the healthcare industry. Like any network technology, Internet objects are vulnerable to hackers, thieves, spies, etc., which can wreak havoc on medical crime.

7.2 FUTURE SCOPE

The scope of IoT based healthcare is used. The concept of smart healthcare will be an integral part of a smart city setup. People need not go to doctors and hospitals for regular checkups and can detect their problems through tests which can be made using smart healthcare involving a lot of sensors. Doctors will only be needed in cases of critical health conditions or emergencies.

REFERENCES

1. H [ill, Jim (September 12, 2015). "The smart home: a glossary guide for the perplexed". T3. Retrieved on March 27, 2017.

2. "5 open source home automation projects we like". Fast Company 2014-12-01. Accessed 22/11/2011.

3. "Best Home Automation System - Consumer Reports". www.consumerreports.org. Retrieved on 14/02/2016.

4. "Wireless sensor networks: concepts, applications, experimentation and analysis". 2016. p. 108. ISBN 9811004129. The use of standardized open standards on proprietary protocols gives the industry the freedom to choose among providers with guaranteed interoperability. Standardized solutions generally have a much longer lifespan than patented solutions.

5. "Research and Markets: Global Market for Home Automation and Control 2014-2020 - Lighting Control, Security and Access Control, HVAC Control Analysis of Industry 5 , $ 77 billion ". Reuters 2015-01-19. Archived from the original on 05/05/2016.

6. Home automation and wiring (1 ed.). New York: McGraw-Hill / TAB Electronics. 1999-03-31. ISBN 9780070246744.

7. Rye, Dave (October 1999). "My life in X10".Electronic Magazine of AV and Automation Industry.Electronic Magazine of AV and Automation Industry.Retrieved October 8, 2014.

8. "1.5 million domotic systems installed in the United States this year." www.abiresearch.com Accessed 22/11/2011.

9. Li, Rita Yi Man; Li, HerruChing Yu; Mak, Cho Kei; Tang, Tony Beiqi. "Smart home automation and intelligent home automation: Big Data Analytics approach" (PDF).International Smart Home Magazine. 10 (8): 177-198. doi: 10.14257 / ijsh.2016.10.8.18.

10. Preville, Cherie (August 26, 2013). "Control your castle: the latest in home automation". ACHRNewsACHRNews Retrieved 15 June 2015.

11. Asadullah, Muhammad (December 22, 2016). "An overview of home automation systems".Session document.IEEE.Accessed December 22, 2016.

12. Jin, M .; Jia, R .; Spanos, C. (2017-01-01). "Virtual occupancy detection: using smart meters to indicate their presence". IEEE transactions in mobile computing. PP (99): 1-1. doi: 10.1109 / TMC.2017.2684806. ISSN 1536-1233.

13. Jin, M .; Bekiaris-Liberis, N .; Weekly, K. Spanos, C. J .; Bayen, A.M. (2016-01-01). "Occupancy detection by environmental detection".IEEE Transactions in Engineering Science and Automation. PP (99): 1-13. doi: 10.1109 / TASE.2016.2619720. ISSN 1545-5955.

14. Berger, Lars T .; Schwager, Andreas; Pagani, Pascal; Schneider, Daniel M. (February 2014). Smart Grid Applications, Communications and Security.Devices, circuits and systems.CRC press.ISBN 9781466557529.

15. "Tips: smart appliances | Department of Energy". energy.gov. Archived from the original on 2015-09-29. Retrieved on 2016-04-20.

16. Griffiths, Melanie (June 2016). "Smart Home Security".Construction of houses and renovation.Retrieved February 27, 2012.

17. "Nest Protect | Smoke Alarms and CO - Consumer Reports News". www.consumerreports.org. Retrieved on 2016-04-20.

18. "Nest Protect | Smoke Alarms and CO - Consumer Reports News". Accessed 22/11/2011.

19. "Sure Flap - Smart Cat Flap Coming Soon - News - Smart Home Geeks". Smart Home Geeks. 2017-04-06. Retrieved on 2017-08-11.

20. "Best Home Automation System - Consumer Reports". Accessed 22/11/2011.

21. "Google's parent company is deliberately disabling some of its customers' old smart home appliances." Business Insider Accessed 11/22/2011.

22. Brush, A. J .; Lee, Bongshin; Mahajan, Ratul; Agarwal, Sharad; Saroiu, Stefan; Dixon, Colin (2011-05-01). "Domotics in nature: challenges and opportunities". Microsoft Research.

23. Insteon White Paper: Details (PDF).

24. Z-Wave frequency coverage (PDF).

25. "IoT experts worry about fragmentation - Mobile World Live". Mobile World Live. 2016-02-25. Accessed 22/11/2011.

26. "Fragmentation is the enemy of the Internet of Things | Qualcomm". Qualcomm 2016-02-19. Accessed 22/11/2011.

27. "Internet of Things: Opportunities and Challenges for Semiconductor Businesses". McKinsey & Company. Accessed 22/11/2011.

28. http://www.arm.com/zh/files/event/ATF2015SZ_A6_Thundersoft.pdf IOT Brings Fragmentation to the Platform

29. https://www.w3.org/Talks/2016/04-27-countering-fragmentation.pdf How to counter fragmentation with the network of things

30. Steve Kovach (July 30, 2013). "Android Fragmentation Report". Business Insider Retrieved 19 October 2013.

31. "Who needs the Internet of Things?" Linux.com | The source of Linux information. Accessed 22/11/2011.

32. "21 open source projects for IoT". Linux