VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI

A Project Report

On

"SMART HEALTH MONITORING SYSTEM"

Submitted in Partial fulfillment of requirement for the
Bachelor of Engineering
in

Computer Science & Engineering

By

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
ACCREDITED BY NATIONAL BOARD OF ACCREDITATION
RAO BAHADUR Y MAHABALESHWARAPPA ENGINEERING COLLEGE
ACCREDITED BY NAAC WITH B++
CANTONMENT, BALLARI-583104, KARNATAKA

2021 – 2022

VEERASHAIVA VIDYAVARDAHKA SANGHA'S

RAO BAHADUR Y MAHABALESHWARAPPA ENGINEERING COLLEGE

(AFFILIATED TO VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM. APPROVED BY AICTE, NEW DELHI & ACCREDITED BY NAAC WITH B++)

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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"CERTIFICATE"

This is to certify that Project work entitled **"**SMART HEALTH MONITORING SYSTEM**"** is bonafied work carried out by **ANNAPOORNA G 3VC19CS400, K PRASAD 3VC19CS407, VINIT K 3VC19CS414** of 8th Semester in Partial fulfillment for the award of degree of Bachelor of Engineering in **Computer Science & Engineering** of the **Visvesvaraya Technological University,** Belgaum during the year **2021-2022.** It is certified that all corrections / suggestions indicated for internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirement in respect of project work prescribed for the **Bachelor of Engineering Degree**.

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ACKNOWLEDGEMET

The satisfaction and euphoria that accompany the successful completion of any task would be incomplete without the mention of the people who made it possible, whose constant guidance and encouragement crowned our effort with success.

We express our sincere gratitude to our Principal **Dr**. **T Hanumantha Reddy** for giving us an opportunity to carry out our academic project.

We wish to place on record our grateful thank to **Dr. H Girisha**, Head of the Department, Computer Science and Engineering RYMEC, Ballari for providing encouragement and guidance.

We hereby like to thank **V Shiva Kumar**, Assistant Professor, Department Computer Science and Engineering, on their periodic inspection time to time evaluation of the project and for the support, coordination, valuable suggestions and guidance given to us in completion of the project. Also we thank the members of the faculty of Computer Science and Engineering Department whose suggestions enable us to surpass many of these seemingly impossible hurdles. We also thank our guides and lastly we thank everybody who has directly or indirectly helped us in the course of this Project.

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Abstract

Health is the most important and essential part of the life for Human begins. Health state of physical mental, and social well-being not entirely the absence of disease. To maintain the good health, The Healthcare system is essential Humans. Healthcare is given the more importance now days with the advent of the corona virus. Health Care System is needed for the aged peoples and also for physical challenged people. The Continues health monitoring system is very much need for the Bed-ridden patients who are partially or fully paralyzed as a result of a stroke.

So in this aspect, a IOT based health monitoring system is the best solution for epic Pandemics and for other disease patients. Internet of Things (IOT) is the new revolution of internet which is the growing research area especially in the health care. These remote health care monitoring has evolved in such a place. IOT monitoring of health helps in preventing the spread of disease as well as to get a proper diagnosis of the state of health, even if the doctor is at far distance. A portable physiological checking framework is displayed, which can constantly screen the patient's heartbeat, temperature and other basic parameters of the room. We proposed a nonstop checking and control instrument to screen the patient condition and store the patient information's in server.

A Smart health monitoring system using IOT is proposed where the authorized Doctor or person can access these data stored using IOT platform and based on these values received, the diseases are diagnosed by the doctors from a far distance. The core objective of this project is the design and implementation of a smart patient health tracking system that uses Sensors to track patient health and uses internet to inform their loved ones in case of any issues. The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure

PROJECT WORK 2021-22

SUBJECT: PROJECT **SUBJECT CODE:18CSP83**

PROJECT TITLE: SMART HEALTH MONITORING SYSTEM

BATCH NO: C7 **SECTION: C** **GUIDE: V SHIVA KUMAR**

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CO NO.	Course Outcomes
C413.1	Understand and analyse the requirements of the end user considering economic, social and environmental factors for providing a feasible solution with strong basics of Computer Science subjects.
C413.2	Design, develop and demonstrate feasible solution for the identified problem with good literature survey using modern tools.
C413.3	Prepare well-structured report of the project with plagiarism check and communicate the same in different phases / journals/ conferences / project exhibitions.
C413.4	Coordinate and execute the assigned task and evaluate with the team members within in specified time in concern with the project guide.

CO-PO MAPPING

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C413.1	3	3				3	3				3	2	3		
C413.2			3	3	3							2		3	
C413.3								3				2			2

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LIST OF ABBREVIATION

- SHMS …… Smart Health Monitoring System.
- IOT …… Internet of Things.
- AC …… Alternating Current.
- DC …… Direct Current.
- V_{CC} …… Voltage Common Collector (Digital Power Supply).
- GND ……. Ground.
- IE ……... Interrupt Enable.
- IP ……... Interrupt Priority.
- ISP ……. In-System programmable.
- UART …… Universal Asynchronous Receiver Transmitter.
- LM 35 …… Temperature Sensor.
- DHT 11 ……. Humidity & Room Temperature Sensor.
- GPRS ……. General Packet Radio Services.
- GSM …….. Global System for Mobile.
- GPS ……..... Global Positioning System.
- SIM ……..... Subscriber Identity Module.
- SIMCOM ……... Simultaneous Communication.
- LCD ……... Liquid Crystal Display.
- LED ……... Light Emitting Diode
- mAh ……... Mill Ampere Hour.
- Li-ion ……. Lithium-Ion.
- MOSFET ……... Metal Oxide Semiconductor Field Effect Transistor.

CHAPTER 1

INTRODUCTION

Health is the most important thing for the Human being the health is the most important asset in our life. The healthy minds stay in health body. Health is the state of complete how we think and feel and also being physical good. The good health is point of control stress and living a longer life, and more active life. To maintain the good health and physically active life health care system is more essential for human beaning's the health care is helping to restore to good condition of health. Health is surviving the people to keep the optimum state of the health.

In the field to keep health in good condition, the health care system is essential and Health care is commonly considering as an important factor for promoting the physically, mental and social well-being of people around the world. Health care system is now become information-intensive for business by the Hospitals, primary care centre, clinics, and laboratories, the cost-effectiveness for balancing quality of care with cost containment. The IOT based Health Care System is the best chose and also solution for the Health Monitoring System.

The Internet of Things(IOT) narrate the network of physical objects that are drive in with the sensor, Software and Mechanics for the cause for connecting and sending data with other devices or system (Fig 1.1). The IOT is the best platform form the remote based Smart Health Monitoring System it solves and it cache many infeasible and make as feasible, IOT offers less expensive, less power consumption, connectivity, conventional. Easy to analysis patient where the demand of doctor can be reduced, the single doctor-patient relationship is being replaced by this in which the group of patients is managed by the single doctor and also a group of health care professionals each specializing in one aspect of care.

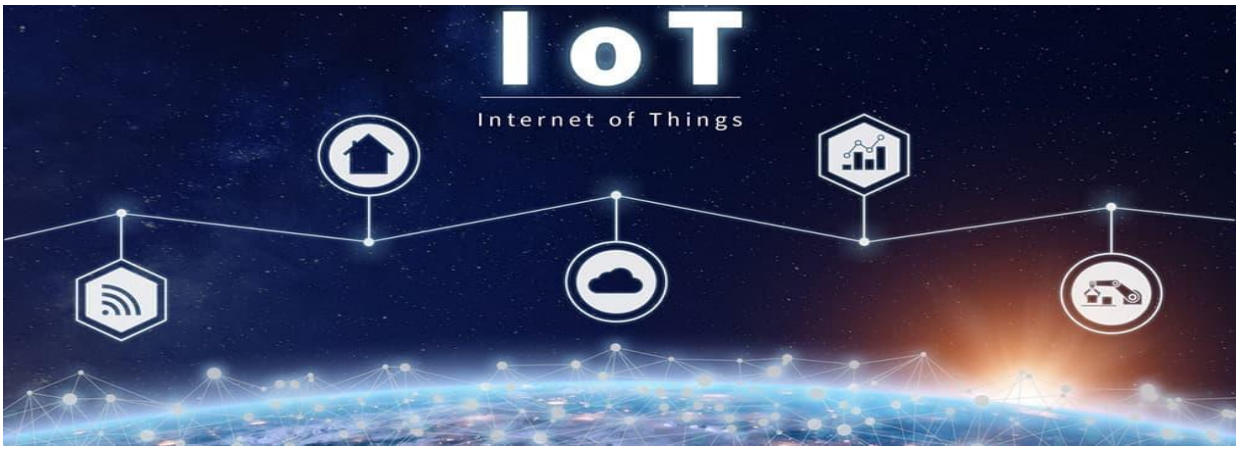


Fig 1.1 Internet of Thing

1.1 Problem Statement

Health is a one of the major prime factor for human beings to sustain a good health condition then good health care system needed. Now a day's Health care system more needful in present situation's like covid pandemic. In the covid pandemic lots of peoples lost their life by not getting treatment the and also not getting the bed in the hospital's. Good and flexible Health Care System is needed for the aged peoples and for physical challenged people. The Continues health monitoring system is very much need for the Bed-ridden patients who are partially or fully paralyzed as a result of a stroke. For the finical backword peoples and also ruler area peoples it's too difficult to visiting hospital. There some exiting health monitoring system they are not steady to monitor the health. And also doctor should present in near the patient to view the patient health data. To get the better of from this scenario Remote Health Monitoring system is finer Feature.

1.2 Existing System

The number of researchers have proposed in IOT Based Health monitoring system and the prediction of various types of diseases using various technique. In the existing systems evacuate more distinct classifying in the proposed system. In the existing health monitoring system in IOT based Health Monitoring system pulse sensor, temperature sensor and Bluetooth module they have used the data is viewed in the location of patient only. In some exiting system Wi-Fi Module along with the sensor and view the data cloud. And the existing IOT based health monitoring system are run on AC power supply.

1.3 Proposed System

In fast-track growth of automation IOT is best scaffold for the remote based Smart Health Monitoring System. We proposed the health monitoring with the basic parameter of penitent and room condition along with nonstop health monitoring system (Fig 1.2). The essential basic parameter human health is pulse rate and body temperature are main parameter to know the health condition of the human. We designed the system with the use of Pulse sensor for pulse rate, LM 35 sensor for body temperature, DHT 11 sensor for to know humidity and room temperature. The surrounding condition also important for the health of the patient health also dependent on humidity and room temperature.

The GSM module is used to hook up the internet to send the data in cloud where the doctor can approach the patient health condition from for destination. We made the health monitoring system run on the battery power the battery is charge with the solar power and also the battery is charge with the AC power. By this two method we proposed continues health monitoring system. The patient health can be monitored in LCD display near patient and IOT cloud used if the doctor is far-away from the place. We designed the health monitoring system not susceptible on the other technologies is should work Remote areas with in the Room condition.

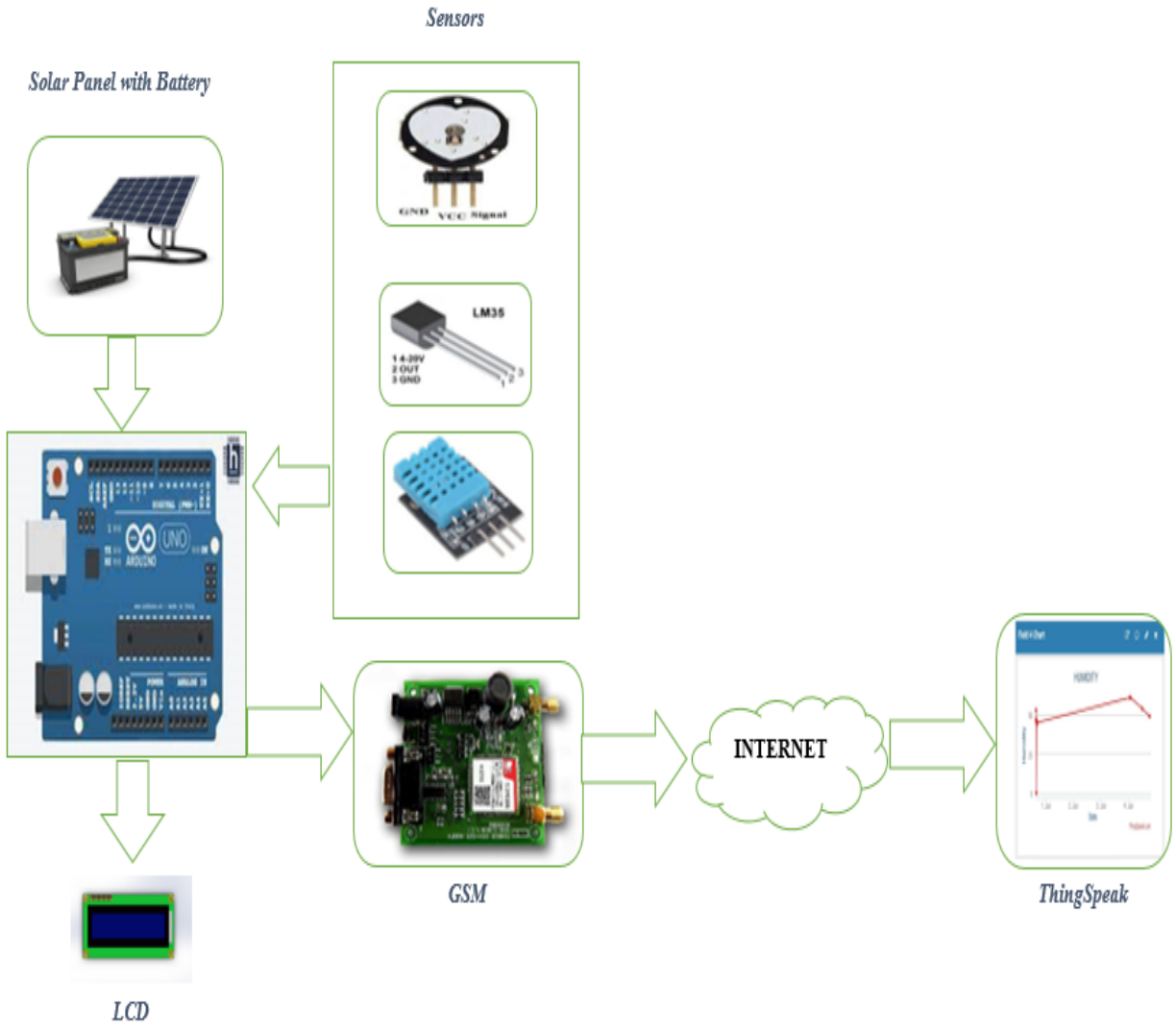


Fig 1.2 Proposed System

1.4 Objective

Our foremost objective is to invent the Smart Health Monitoring System to monitor the patient health condition in continues without any interruption (Fig 1.3). The Smart Health Monitoring system in invited in the manner of inexpensive and is easy to use for the users. The Smart Health Monitoring system is easy deploy in the field of the patients. We deigned Smart health monitoring system is come up with many pull backs of existing system and its trouble solution for in the field of health care system. IOT based health monitoring service helps in preventing the rapid spread of disease like covid and also as well as to get know a proper diagnosis for diseases, even in the situation where physician is unavailable.

Fig 1.3 Objective of the Project

CHAPTER 2

SYSTEM REQUIREMENT ANALYSIS

The Smart health monitoring system is IOT based and also it is energy harvesting system. SHMS is we invited by using IOT components Smart health monitoring system is containing the both hardware and software

2.1 Hardware Requirement

2.1.1Arduino Uno

The Arduino UNO is a standard board of Arduino. The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits (Fig 2.1).

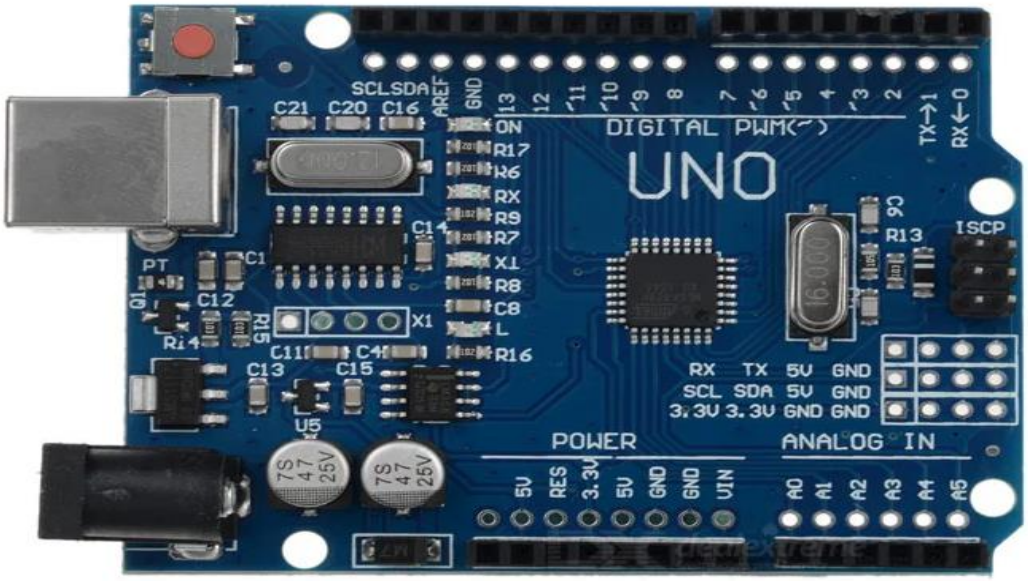


Fig 2.1 Arduino Uno

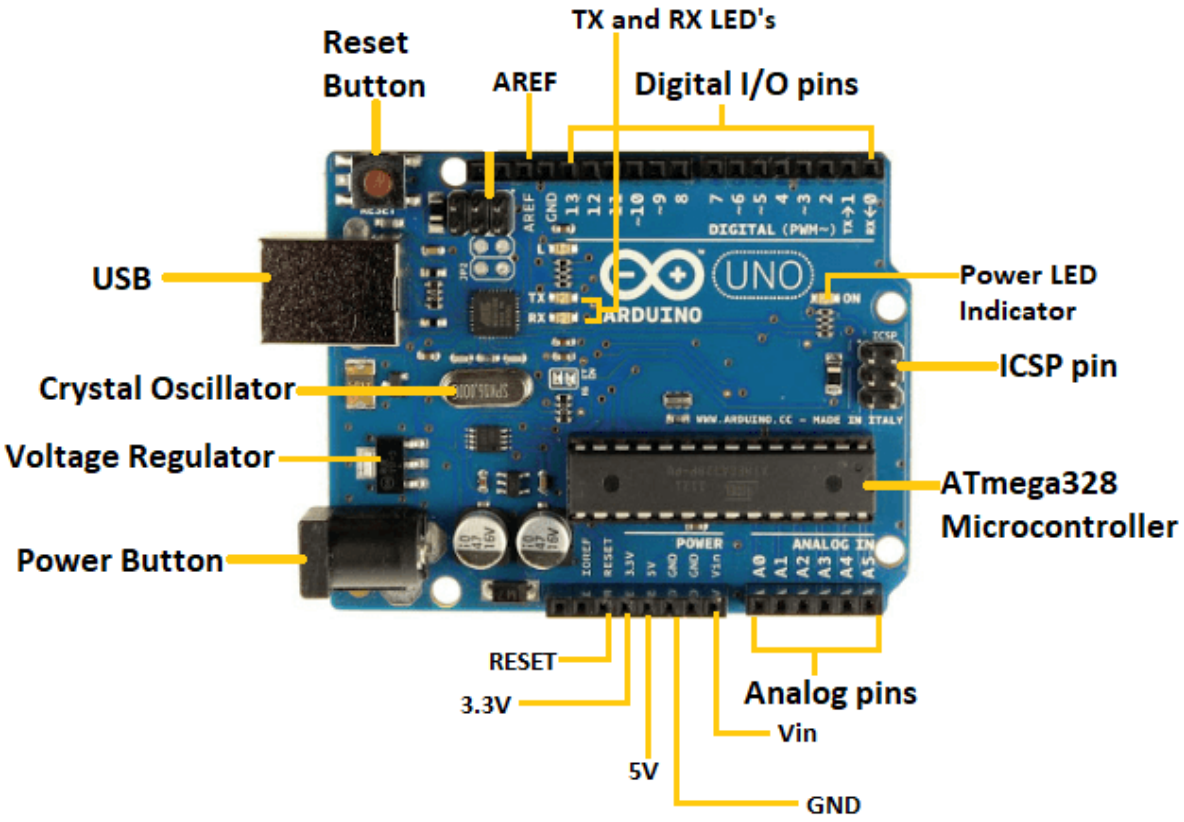


Fig 2.2 Arduino Uno Pin diagram

- **ATmega328 Microcontroller**- It is a single chip Microcontroller of the ATmega family. The processor code inside it is of 8-bit. It combines Memory (SRAM, EEPROM, and Flash), Analog to Digital Converter, SPI serial ports, I/O lines, registers, timer, external and internal interrupts, and oscillator (Fig 2.2).
- **ICSP pin** - The In-Circuit Serial Programming pin allows the user to program using the firmware of the Arduino board.
- **Power LED Indicator**- The ON status of LED shows the power is activated. When the power is OFF, the LED will not light up.
- **Digital I/O pins**- The digital pins have the value HIGH or LOW. The pins numbered from D0 to D13 are digital pins.
- **TX and RX LED's**- The successful flow of data is represented by the lighting of these LED's.
- **AREF**- The Analog Reference (AREF) pin is used to feed a reference voltage to the Arduino UNO board from the external power supply.
- **Reset button**- It is used to add a Reset button to the connection.

- **USB**- It allows the board to connect to the computer. It is essential for the programming of the Arduino UNO board.
- **Crystal Oscillator**- The Crystal oscillator has a frequency of 16MHz, which makes the Arduino UNO a powerful board.
- **Voltage Regulator**- The voltage regulator converts the input voltage to 5V.
- **GND**- Ground pins. The ground pin acts as a pin with zero voltage.
- **Vin**- It is the input voltage.
- **Analog Pins**- The pins numbered from A0 to A5 are Analog pins. The function of Analog pins is to read the Analog sensor used in the connection. It can also act as GPIO (General Purpose Input Output) pins.

2.1.2 Pulse Sensor

A pulse sensor detects and monitor the pulse value of the patient. The pulse is wave is the change in the volume of a blood vessel that occurs when the heart pumps blood, this is a hear beat detecting and biometric pulse rate sensor (Fig 2.3). The operating voltage is ranges +5V otherwise +3.3V

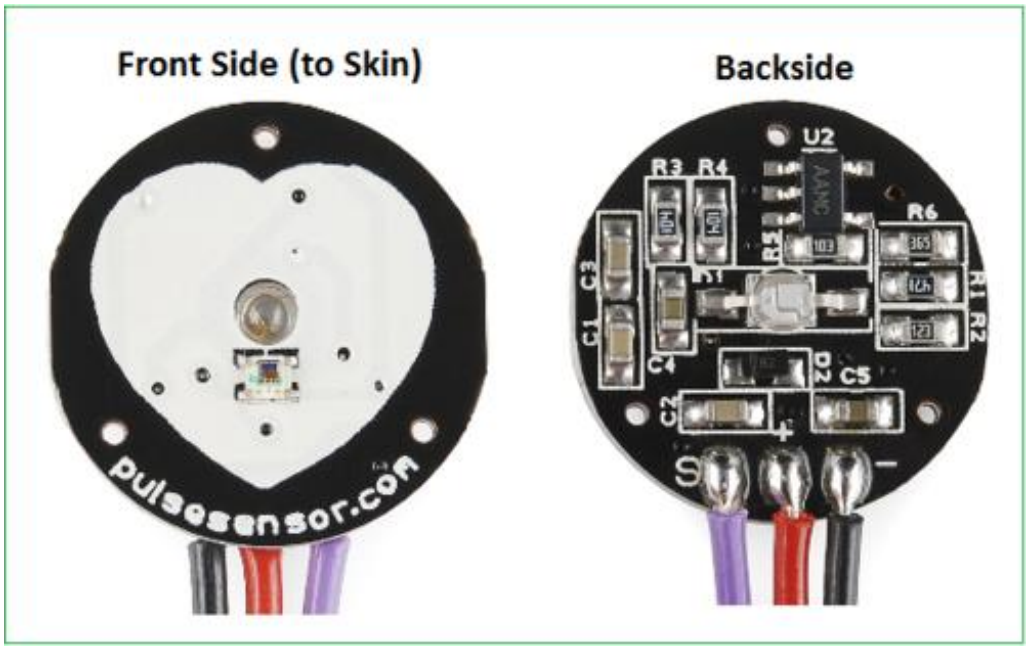


Fig 2.3 Pulse Sensor

Specifications

- This is a hear beat detecting and biometric pulse rate sensor
- Its diameter is 0.625
- Its thickness is 0.125
- The operating voltage is ranges +5V otherwise +3.3V
- This is a plug and play type sensor
- The current utilization is 4mA
- Includes the circuits like Amplification & Noise cancellation
- This pulse sensor is not approved by the FDA or medical. So it is used in student-level projects, not for the commercial purpose in health issues applications.

Pin Configuration

The heartbeat sensor includes three pins (Fig 2.4):

Fig 2.4 Pulse Sensor Pin diagram

- Pin-1 (GND): It is connected to the GND terminal of the system.
- Pin-2 (VCC): It is connected to the supply voltage (+5V otherwise +3.3V) of the system.
- Pin-3 (Signal): It is connected to the pulsating o/p signal.

How Does Pulse Sensor Work?

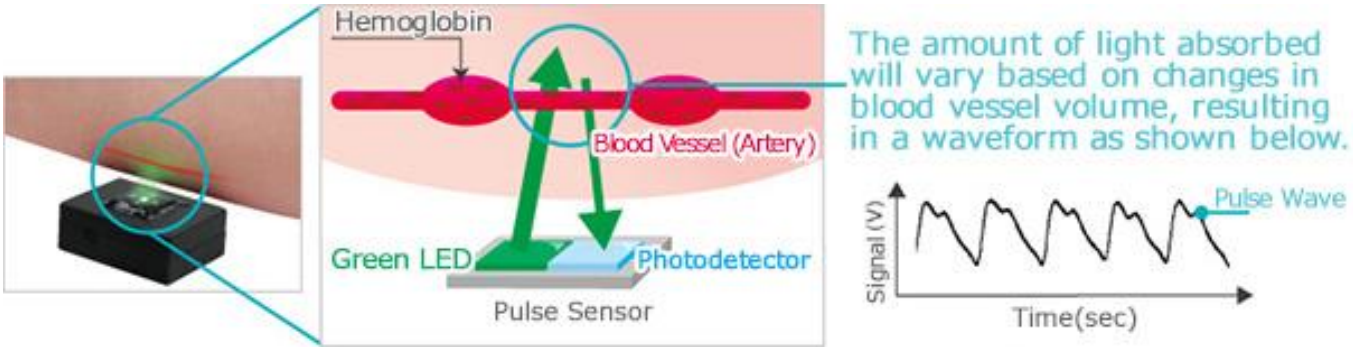


Fig 2.5 Working of Pulse Sensor

- The pulse sensor working principle is very simple. This sensor has two surfaces, on the first surface, the light-emitting diode & ambient light sensor is connected. Similarly, on the second surface (Fig 2.5), the circuit is connected which is accountable for the noise cancellation& amplification.

- The LED is located above a vein in a human body like ear tip or fingertip, however, it must be located on top of a layer directly. Once the LED is located on the vein, then the LED starts emitting light. Once the heart is pumping, then there will be a flow of blood within the veins. So if we check the blood flow, then we can check the heart rates also.

- If the blood flow is sensed then the ambient light sensor will receive more light as they will be reproduced by the flow of blood. This small change within obtained light can be examined over time to decide our pulse rates.

2.1.3 DHT11 Sensor

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino to measure humidity and temperature instantaneously (Fig 2.6).

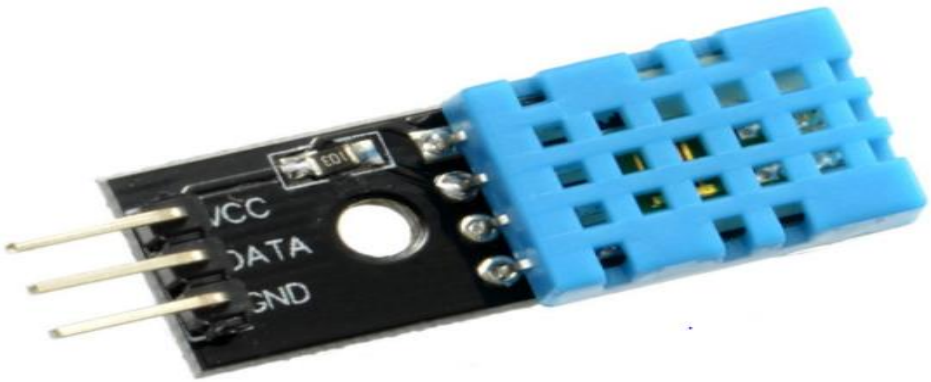


Fig 2.6 DHT 11 Sensor

DHT11 Temperature and Humidity Sensor can measure temperature and humidity with calibrated digital signal output. It is highly reliable and excellent long-term stability. This sensor includes an element and a sensor for wet NTC temperature measuring. It is excellent quality, fast response ,anti-interference with high performance.

This board can be easily connected to any MCU or Arduino boards or directly to esp. The serial interface system is integrated to simply connect with most of the devices. It is small size, low power, enabling a variety of applications.

Specifications:

- Supply Voltage: 3.3V-5V
- Temperature measurement range: 0~50 degrees
- Temperature measurement error: ±2 degrees
- Humidity measurement range: 20%~95%RH
- Humidity measurement error: ±5%RH

Pin Configuration

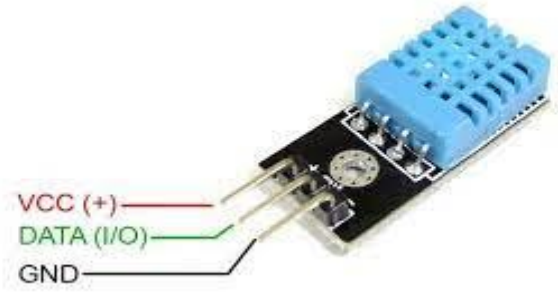


Fig 2.7 DHT 11 Pin diagram

- Pin-1 VCC: external 3.3V-5V (Fig 2.7).
- Pin-2 Data: Digital/Analog output interface, could be connected to MCU IO port.
- Pin-3 GND: Connected to ground of circuit

2.1.4 LM 35 Sensor

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling (Fig 2.8). The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies.

As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy). The LM35-series devices are available packaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D devices are available in the plastic TO-92 transistor package. The LM35D device is available in an 8-lead surface-mount small-outline package and a plastic TO-220 package.

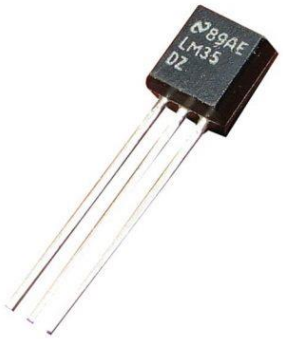


Fig 2.8 LM 35 Sensor

Specifications:

- Input Voltage is 35V and -2V respectively. Typically, 5V.
- Can measure temperature ranging from -55°C to 150°C
- Output voltage is directly proportional (Linear) to temperature (i.e.) there will be a rise of 10mV (0.01V) for every 1°C rise in temperature.
- Drain current is less than 60uA
- Low cost temperature sensor
- Small and hence suitable for remote applications

Pin Configuration

- Pin-1 VCC: Input voltage is +5V.
- Pin-2 Data(Out): Analog output interface, could be connected to MCU IO port (Fig 2.9).
- Pin-3 GND: Connected to ground of circuit.

Fig 2.9 LM 35 Pin diagram

2.1.5 LCD Display

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data (Fig 2.10).

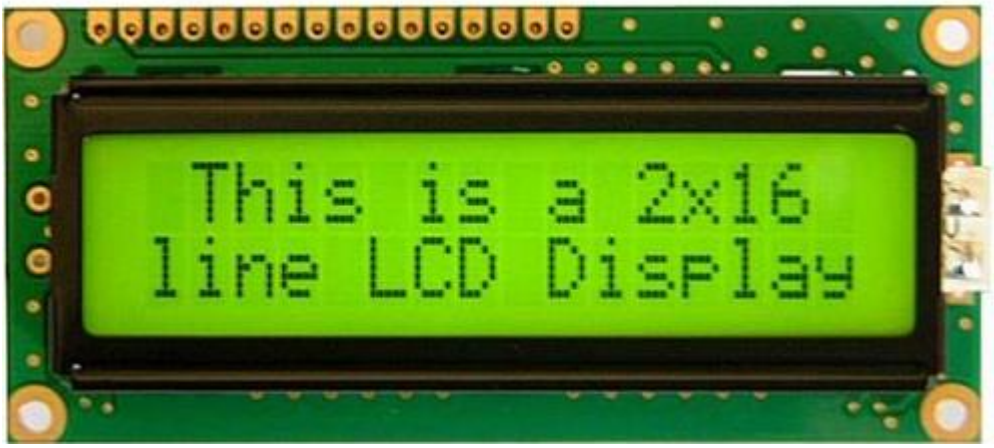


Fig 2.10 LCD Display

Specifications

- The operating voltage of this display ranges from 4.7V to 5.3V
- The display bezel is 72 x 25mm
- The operating current is 1mA without a backlight
- PCB size of the module is 80L x 36W x 10H mm
- HD47780 controller
- LED color for backlight is green or blue
- Number of columns – 16
- Number of rows – 2
- Number of LCD pins – 16
- Characters – 32
- It works in 4-bit and 8-bit modes
- Pixel box of each character is 5×8 pixel
- Font size of character is 0.125Width x 0.200height

Pin Configuration

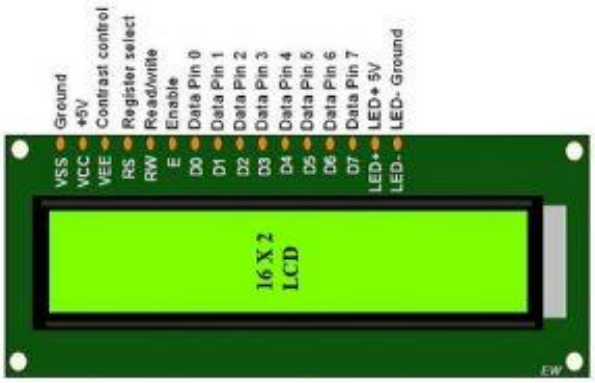


Fig 2.11 LCD Pin diagram

- Pin1 (Ground): This pin connects the ground terminal (Fig 2.11).
- Pin2 (+5 Volt): This pin provides a +5V supply to the LCD
- Pin3 (VE): This pin selects the contrast of the LCD.
- Pin4 (Register Select): This pin is used to connect a data pin of an MCU & gets either 1 or 0. Here, data mode = 0 and command mode =1.
- Pin5 (Read & Write): This pin is used to read/write data.
- Pin6 (Enable): This enables the pin must be high to perform the Read/Write procedure. This pin is connected to the data pin of the microcontroller to be held high constantly.
- Pin7 (Data Pin): The data pins are from 0-7 which are connected through the microcontroller for data transmission. The LCD module can also work on the 4-bit mode through working on pins 1, 2, 3 & other pins are free.
- Pin8 – Data Pin 1
- Pin9 – Data Pin 2
- Pin10 – Data Pin 3
- Pin11 – Data Pin 4
- Pin12 – Data Pin 5
- Pin13 – Data Pin 6
- Pin14 – Data Pin 7
- Pin15 (LED Positive): This is a +Ve terminal of the backlight LED of the display & it is connected to +5V to activate the LED backlight.
- Pin16 (LED Negative): This is a -Ve terminal of a backlight LED of the display & it is connected to the GND terminal to activate the LED backlight.

2.1.6 GSM MODULE

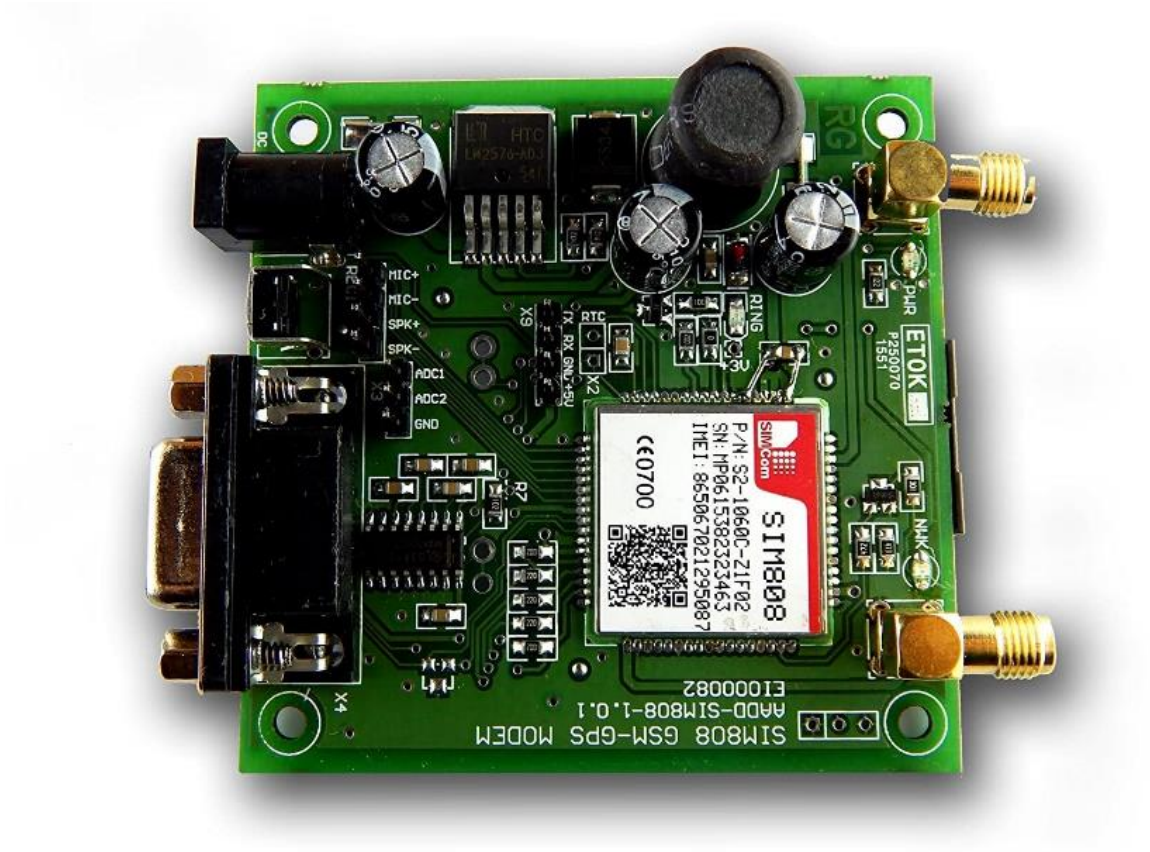


Fig 2.12 GSM Module

This is a GSM & GPS Modem based on Simcom's SIM808 Module. This GSM-GPS Modem is perfect for projects which require both GSM Modem & GPS Module (Fig 2.12). SIM808 module is a GSM and GPS two-in-one function module. It is based on the latest GSM/GPS module SIM808 from SIMCOM, supports GSM/GPRS Quad-Band network and combines GPS technology for satellite navigation.

It features ultra-low power consumption in sleep mode and integrated with charging circuit for Li-Ion batteries, that make it get a super long standby time and convenient for projects that use rechargeable Li-Ion battery. It has high GPS receive sensitivity with 22 tracking and 66 acquisition receiver channels. Besides, it also supports A-GPS that available for indoor localization. The module is controlled by AT command via UART.

Specifications

- Quad-band 850/900/1800/1900MHz
- GPRS multi-slot class12 connectivity: max. 85.6kbps(down-load/up-load)
- GPRS mobile station class B
- Controlled by AT Command (3GPP TS 27.007, 27.005 and SIMCOM enhanced AT Commands)
- Supports charging control for Li-Ion battery
- Supports Real Time Clock
- Integrated GPS/CNSS and supports A-GPS
- Supports 3.0V to 5.0V logic level interface as well as RS232 Interface
- Low power consumption, 1mA in sleep mode
- Supports GPS NMEA protocol
- Standard SIM Card
- 12V DC supply

2.1.7 Solar Panel and Battery

Solar Panel

A solar panel is actually a collection of solar (or photovoltaic) cells, which can be used to generate electricity through photovoltaic effect. These cells are arranged in a grid-like pattern on the surface of solar panels (Fig 2.13).

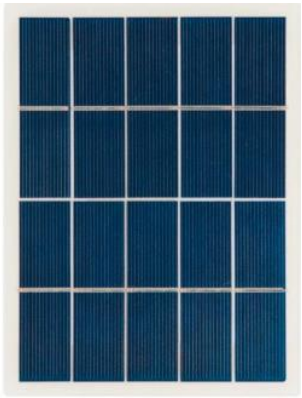


Fig 2.13 Solar Panel

Fig 2.14 Solar panel with Battery

Specifications:

- Maximum Power: 5W
- Open Circuit Voltage (Voc) : 11.2V
- Short Circuit Current (Isc) : 0.61A
- Voltage at Maximum Power (Vmp/Vmpp) : 8.3V
- Current at Maximum Power (Imp) : 0.58A
- Operating(Nominal) Voltage : 6V
- Dimension: 304 X 184 X 22 (in mm)

Battery

Fig 2.15 Li-ion Battery

Lithium-Ion Battery for robotic applications. Very lightweight and small size compared to Ni-Cd, Ni-MH and Lead-acid batteries (Fig 2.15). Very long life without losing charging capacity. Weights just 41 gm.

Lithium polymer battery, also known as polymer lithium battery, is a kind of lithium ion battery of chemical battery. Compared with other batteries, it has the characteristics of high energy, miniaturization, and light weight. For the ultra-thin characteristics, it can be made into batteries of different shapes and capacities to meet the needs of some products. The theoretical minimum thickness can reach 0.4mm Lithium polymer battery usually consists of several identical

parallel secondary cells to increase the discharge current, or several battery packs in series to increase the available voltage.

Specification

- Battery Type: Lithium ion Battery
- Voltage: 3.7V
- Capacity: 3500mAh
- Max. Operating voltage range: 2.75V to 4.2V
- Max. Charging voltage: 4.2V± 50mV
- Max. Charging current: 2A

2.1.8 TP 4056 Module

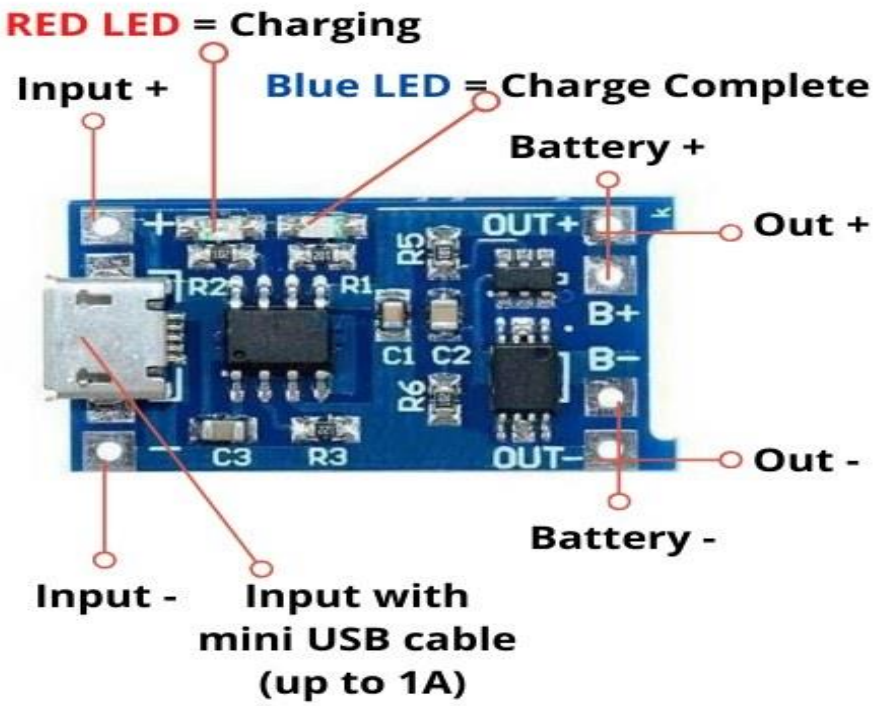


Fig 2.16 TP 4056 Charing Module with pin diagram

This module is made for charging rechargeable lithium batteries using the constant-current/constant-voltage (CC/CV) charging method. In addition to safely charging a lithium battery the module also provides necessary protection required by lithium batteries.

This module uses the TP4056 / TC4056 Li-Ion charge controller IC and a separate protection IC .There are other types of modules on the market that use the TP4056 / TC4056 but lack any protection circuits or ICs to provide the necessary protection needed with lithium batteries (Fig2.16). This module uses both the TP4056 / TC4056 and the DW01A Li-Ion battery protection IC, which together in combination provide the following protection features:

- Manage the constant current to constant voltage charging of a connected lithium battery
- Over-discharge protection - keeps your battery from being discharged below 2.4V, a healthy minimum voltage level for your battery

  If a connected battery has been discharged below 2.4V the module will cut output power from the battery until the battery voltage has been re-charged above 3.0V (the over-discharge release voltage), which at that time the module will again allow discharge of power from the battery to a connected load. Although the module cuts output power from the battery during an over-discharge situation, it still allows charging of the battery to occur through the parasitic diode of the discharge control MOSFET (FS8205A Dual MOSFET).

- Overcharge protection - the module will safely charge your battery to 4.2V
- Overcurrent and short-circuit protection - the module will cut the output from the battery if the discharge rate exceeds 3A or if a short-circuit condition occurs
- Soft-start protection limits inrush current
- Trickle charge (battery reconditioning) - if the voltage level of the connected battery is less than 2.9V, the module will use a trickle charge current of 130mA until the battery voltage reaches 2.9V, at which point the charge current will be linearly increased to the conFigd charge current.

Specifications:

- This module can charge and discharge Lithium batteries safely
- Suitable for 18650 cells and other 3.7V batteries
- Charging current – 1A (adjustable)
- Input Voltage: 4.5V to 8V
- Full charge voltage 4.2V
- Protects battery from over charging and over discharging.

2.2 Software Requirement

As explained earlier our project requires two-part hardware and software. Hardware parts are explained above and software requires as follows: -

2.2.1 Arduino IDE

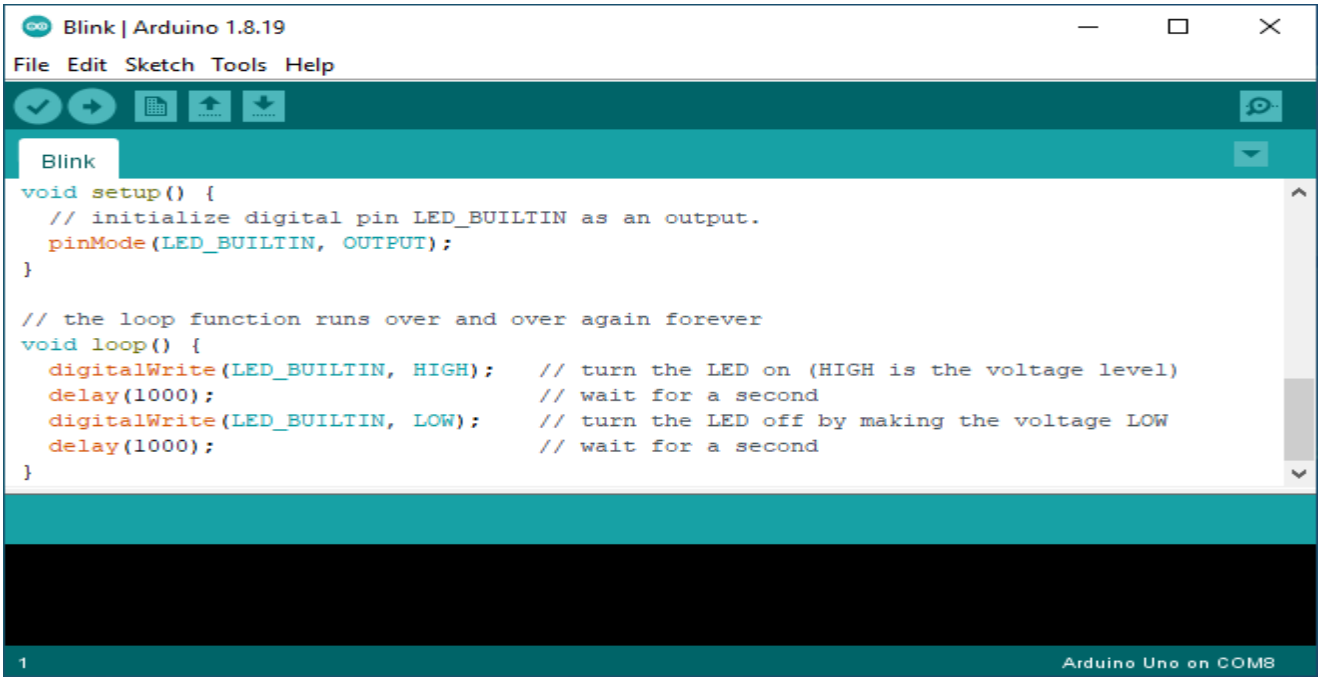


Fig 2.17 Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them (Fig2.17).

Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension (.ion). The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the conFigd board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

- 

  Verify Checks your code for errors compiling it.

- 

  Upload Compiles your code and uploads it to the conFigd board. See uploading below for details. If you are using an external programmer with your board, you can hold down the "shift" key on your computer when using this icon. The text will change to "Upload using Programmer"

- 

  New Creates a new sketch.

- 

  Open Presents a menu of all the sketches in your sketchbook. Clicking one will open it within the current window overwriting its content. Note: due to a bug in Java, this menu doesn't scroll; if you need to open a sketch late in the list, use the **File | Sketchbook** menu instead.

- 

  Save Saves your sketch.

- 

  Serial Monitor Opens the serial monitor.

Additional commands are found within the five menus: **File**, **Edit**, **Sketch**, **Tools**, **Help**. The menus are context sensitive, which means only those items relevant to the work currently being carried out are available.

File

- New Creates a new instance of the editor, with the bare minimum structure of a sketch already in place.
- Open Allows to load a sketch file browsing through the computer drives and folders.
- Open Recent Provides a short list of the most recent sketches, ready to be opened.
- Sketchbook Shows the current sketches within the sketchbook folder structure; clicking on any name opens the corresponding sketch in a new editor instance.
- Examples Any example provided by the Arduino Software (IDE) or library shows up in this menu item. All the examples are structured in a tree that allows easy access by topic or library.
- Close Closes the instance of the Arduino Software from which it is clicked.
- Save Saves the sketch with the current name. If the file hasn't been named before, a name will be provided in a "Save as.." window.
- Save as... Allows to save the current sketch with a different name.
- Page Setup It shows the Page Setup window for printing.
- Print Sends the current sketch to the printer according to the settings defined in Page Setup.
- Preferences Opens the Preferences window where some settings of the IDE may be customized, as the language of the IDE interface.
- Quit Closes all IDE windows. The same sketches open when Quit was chosen will be automatically reopened the next time you start the IDE.

Edit

- Undo/Redo Goes back of one or more steps you did while editing; when you go back, you may go forward with Redo.
- Cut Removes the selected text from the editor and places it into the clipboard.

- Copy Duplicates the selected text in the editor and places it into the clipboard.
- Copy for Forum Copies the code of your sketch to the clipboard in a form suitable for posting to the forum, complete with syntax coloring.
- Copy as HTML Copies the code of your sketch to the clipboard as HTML, suitable for embedding in web pages.
- Paste Puts the contents of the clipboard at the cursor position, in the editor.
- Select All Selects and highlights the whole content of the editor.
- Comment/Uncomment Puts or removes the // comment marker at the beginning of each selected line.
- Increase/Decrease Indent Adds or subtracts a space at the beginning of each selected line, moving the text one space on the right or eliminating a space at the beginning.
- Find Opens the Find and Replace window where you can specify text to search inside the current sketch according to several options.
- Find Next Highlights the next occurrence - if any - of the string specified as the search item in the Find window, relative to the cursor position.
- Find Previous Highlights the previous occurrence - if any - of the string specified as the search item in the Find window relative to the cursor position.

Sketch

- Verify/Compile Checks your sketch for errors compiling it; it will report memory usage for code and variables in the console area.
- Upload Compiles and loads the binary file onto the conFigd board through the conFigd Port.
- Upload Using Programmer This will overwrite the bootloader on the board; you will need to use Tools > Burn Bootloader to restore it and be able to Upload to USB serial port again. However, it allows you to use the full capacity of the Flash memory for your sketch. Please

note that this command will NOT burn the fuses. To do so a Tools -> Burn Bootloader command must be executed.

- Export Compiled Binary Saves a .hex file that may be kept as archive or sent to the board using other tools.
- Show Sketch Folder Opens the current sketch folder.
- Include Library Adds a library to your sketch by inserting #include statements at the start of your code. For more details, see libraries below. Additionally, from this menu item you can access the Library Manager and import new libraries from .zip files.
- Add File... Adds a supplemental file to the sketch (it will be copied from its current location). The file is saved to the Data subfolder of the sketch, which is intended for assets such as documentation. The contents of the data folder are not compiled, so they do not become part of the sketch program.

Tools

- Auto Format This formats your code nicely: i.e. indents it so that opening and closing curly braces line up, and that the statements inside curly braces are indented more.
- Archive Sketch Archives a copy of the current sketch in .zip format. The archive is placed in the same directory as the sketch.
- Fix Encoding & Reload Fixes possible discrepancies between the editor char map encoding and other operating systems char maps.
- Serial Monitor Opens the serial monitor window and initiates the exchange of data with any connected board on the currently selected Port. This usually resets the board, if the board supports Reset over serial port opening.
- Board Select the board that you're using. See below for descriptions of the various boards.
- Port This menu contains all the serial devices (real or virtual) on your machine. It should automatically refresh every time you open the top-level tools menu.

- Programmer for selecting a hardware programmer when programming a board or chip and not using the on-board USB-serial connection. Normally you won't need this, but if you're burning a bootloader to a new microcontroller, you will use this.
- Burn Bootloader The items in this menu allow you to burn a bootloader onto the microcontroller on an Arduino board. This is not required for normal use of an Arduino board but is useful if you purchase a new ATmega microcontroller (which normally come without a bootloader). Ensure that you've selected the correct board from the **Boards** menu before burning the bootloader on the target board. This command also set the right fuses.

2.2.2 ThingSpeak

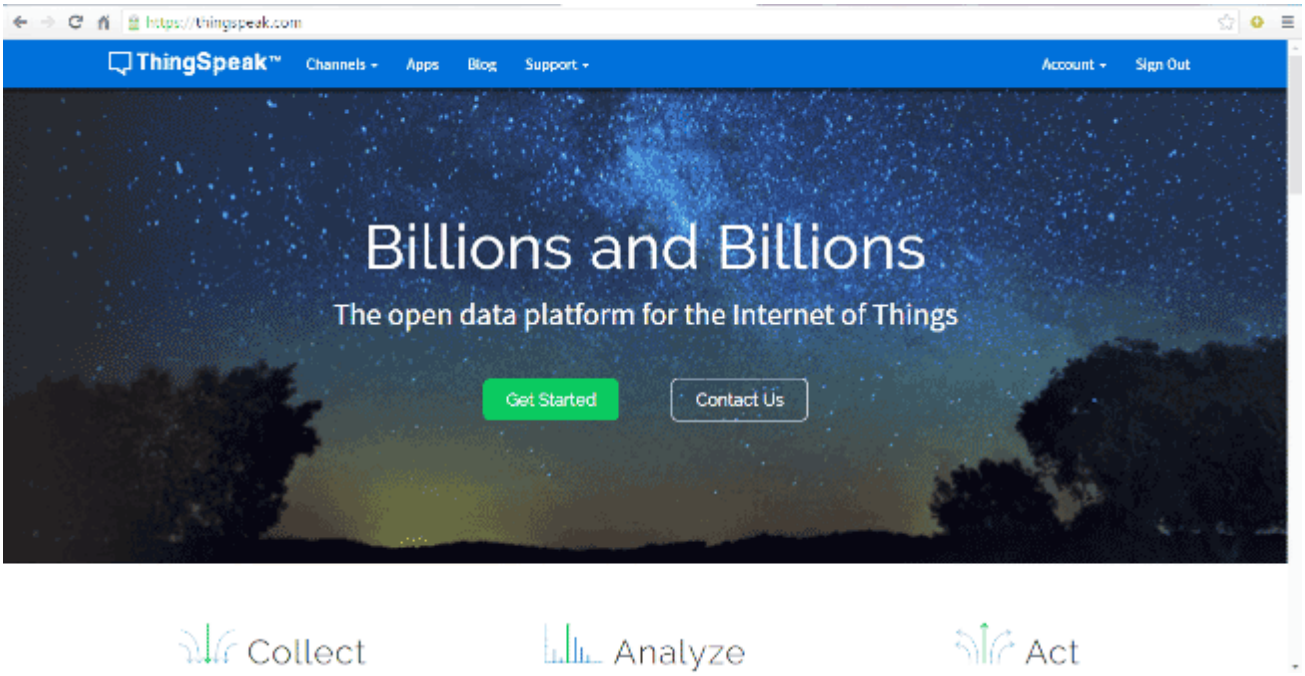


Fig 2.18 ThingSpeak

The Internet of Things(IOT) is a system of 'connected things'. The things generally comprise of an embedded operating system and an ability to communicate with the internet or with the neighbouring things (Fig 2.18). One of the key elements of a generic IOT system that bridges the various 'things' is an IOT service. An interesting implication from the 'things' comprising the IOT systems is that the things by themselves cannot do anything. At a bare minimum, they should have an ability to connect to other 'things'. But the real power of IOT is harnessed when the things connect to a 'service' either

directly or via other ‘things’. In such systems, the service plays the role of an invisible manager by providing capabilities ranging from simple data collection and monitoring to complex data analytics

ThingSpeak is a platform providing various services exclusively targeted for building IoT applications. It offers the capabilities of real-time data collection, visualizing the collected data in the form of charts, ability to create plugins and apps for collaborating with web services, social network and other APIs. We will consider each of these features in detail below.

The core element of ThingSpeak is a ‘ThingSpeak Channel’. A channel stores the data that we send to ThingSpeak and comprises of the below elements:

- 8 fields for storing data of any type - These can be used to store the data from a sensor or from an embedded device.
- 3 location fields - Can be used to store the latitude, longitude and the elevation. These are very useful for tracking a moving device.
- 1 status field - A short message to describe the data stored in the channel.

To use ThingSpeak, we need to sign up and create a channel. Once we have a channel, we can send the data, allow ThingSpeak to process it and also retrieve the same. Let us start exploring ThingSpeak by signing up and setting up a channel.

CHAPTER 3

SYSTEM FUNCTIONAL SPECIFICATION

3.1 Functions Performed

The function performed in IOT based Smart Health Monitoring System categorized by two factor one is the doctor and another one is patient.

- **Patient:** The patient health condition is collected in form of data by the sensor which is connected to the patient. The patient is connected with the sensors and sensors integrated with the Arduino Uno Micro controller, here the sensor collects basic parameter of the patient health such as pulse rate, body temperature, and humidity. This collection of information is send through the GSM 808 Module to the ThingSpeak IOT Cloud for to analyse the Doctor.

- **Doctor:** The Doctor collects the patient health condition in the form of the data, the data is view in the ThingSpeak analyse the patient condition. Here in the absence of doctor the patient health condition diagnosis by the Medical officer and also continuously patient health is monitored.

3.2 User Input Specification

a) **Power Supply**:

Power supply is the initial needful for any electronic circuit. Present we use 5v dc battery to give power Arduino Uno and frequently we can give power directly from the computer.

b) **Pulse Sensor**

It collects the Patient pulse rate as the input.

c) **LM 35 Sensor**

It collects the Patient Body Temperature as the input.

d) **DHT 11**

It collects the Room Humidity as the input.

3.3 User Output Specification

a) **LCD Display**

LCD is the output unit to view the patient health condition.

b) **ThingSpeak Website**

The ThingSpeak is IOT Cloud is used view the patient health condition in virtually in website with the health pc.

3.4 Limitations

The Smart heath monitoring system have some limitation and restrictions

- The SHMS device is monitor only one patient health condition.
- For the SHMS device we used GSM module is little slower to send data to cloud it is delay in seconds.
- The ThingSpeak it is freely available for monitoring 10 patient's health condition, for more patients it is chargeable.

CHAPTER 4

SYSTEM DESIGN SPECIFICATION

4.1 System Architecture

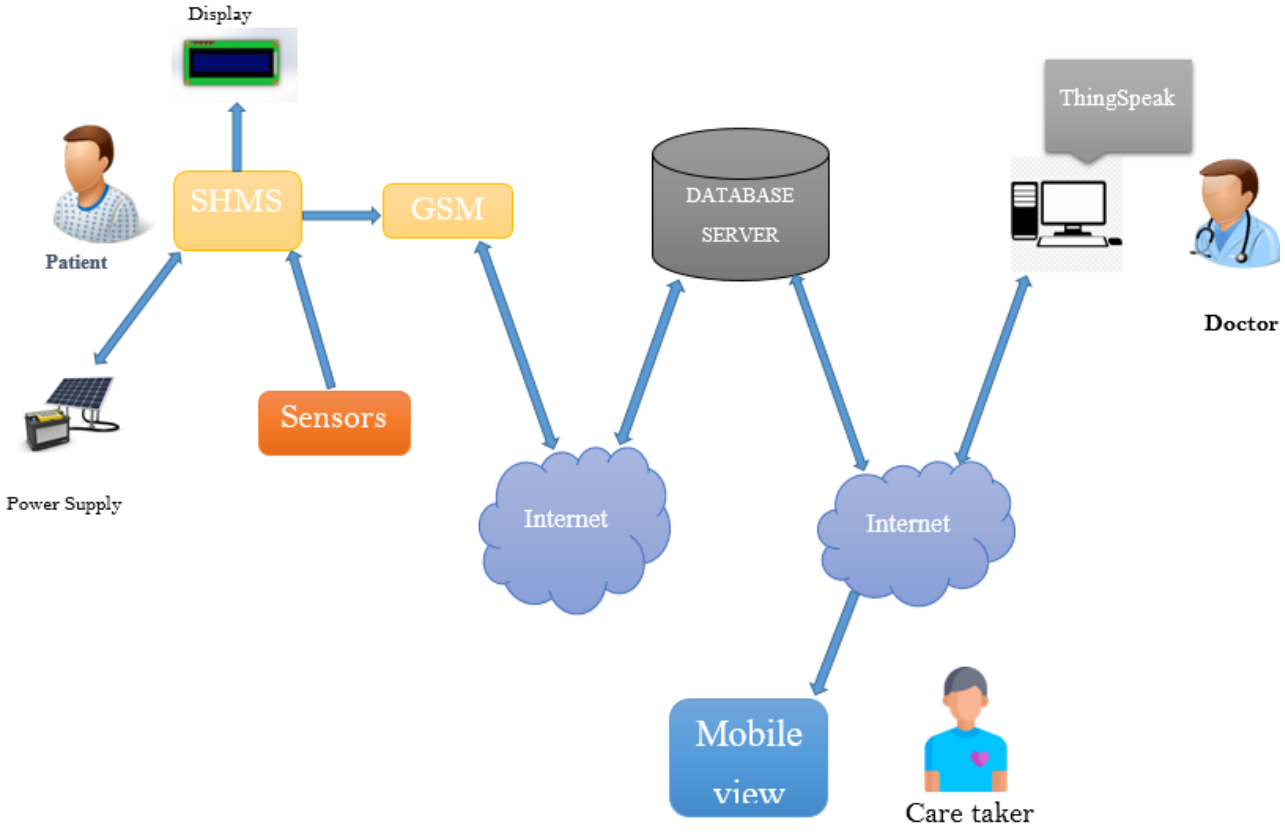


Fig 4.1 Architecture Diagram

The Smart Health Monitoring System Architecture is narrating the structure and how it is integrated with the environment (Fig 4.1). The architecture diagram show what are elements contain and how they are connected and interacting. The diagram says the patient is connected with SHMS device, the SHMS is containing power supply from the battery, sensors, GSM, LCD Display. Through the GSM it is connected to the internet transfer for the data in ThingSpeak. Another end Doctor is accesses ThingSpeak the Doctor is view the data in PC from for distance.

4.2 Sub System Architecture

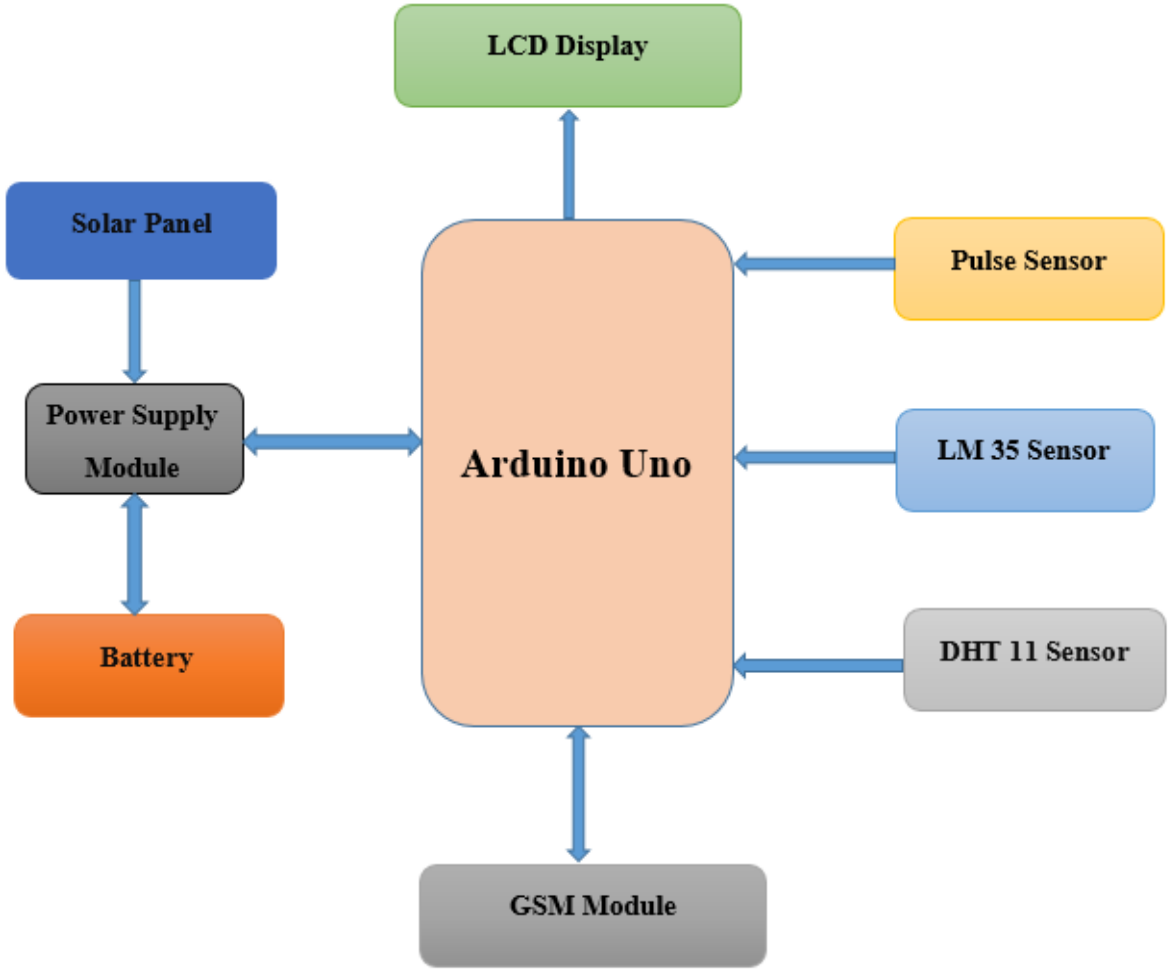


Fig 4.2 Sub-Architecture Diagram

The sub architecture is part of the SHMS Architecture the diagram show how hardware components are connected internally (Fig 4.2). The Sub architecture is containing Arduino Uno Microcontroller, Pulse sensor, LM 35 sensor, DHT 11 sensor, GSM module, LCD display, Power supply with the Battery. The main basic thing for run the SHMS power supply Module is connected to the Arduino Uno, and the all sensors, LCD are connected with Arduino Uno and GSM is interface with the Arduino UNO as Shown in the Diagram.

4.3 SYSTEM DATA FLOW DIAGRAM

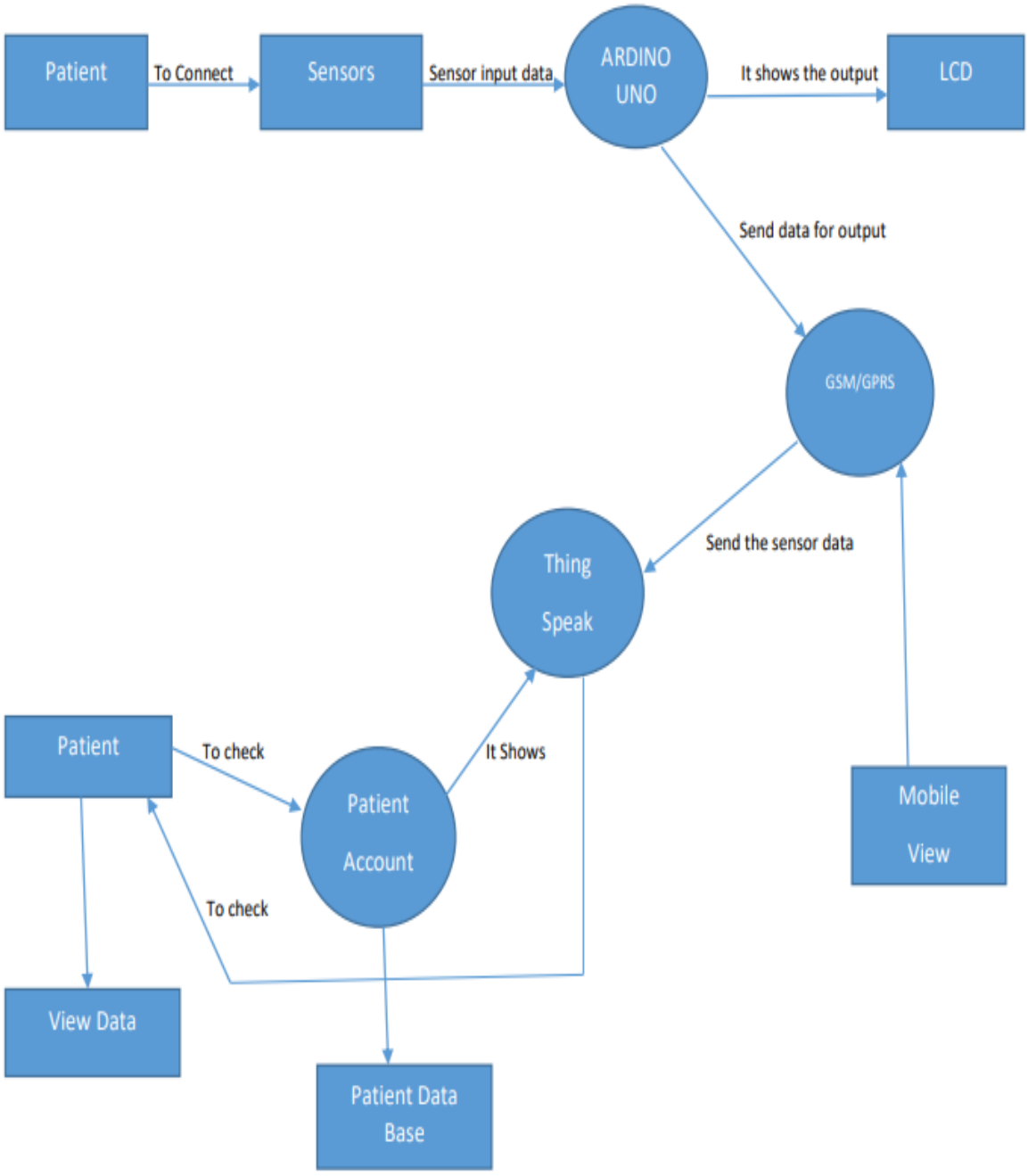


Fig 4.3 Data Flow Diagram

In this module we design structure of the data flow system is implementation of circuit. Various data can we used in this project is visualization in this diagrams. we use advanced microcontroller called Arduino Uno. It posses in construct with many integrant like analog to digital converter, clock of 16 MHz, shift registers (Fig 4.3).

In this system we use temperature sensor LM35, Pulse sensor, Humidity sensor DHT11 to use to detect temperature and heart beat and room temperature, humidity into appropriate voltage. This voltage is given to Arduino According to program it process the analog signal into digital and send it via GSM module to the Think speak website as seeing output. Example like a surrounding temperature of LM35 in degree centigrade.

4.4 Use case Diagrams

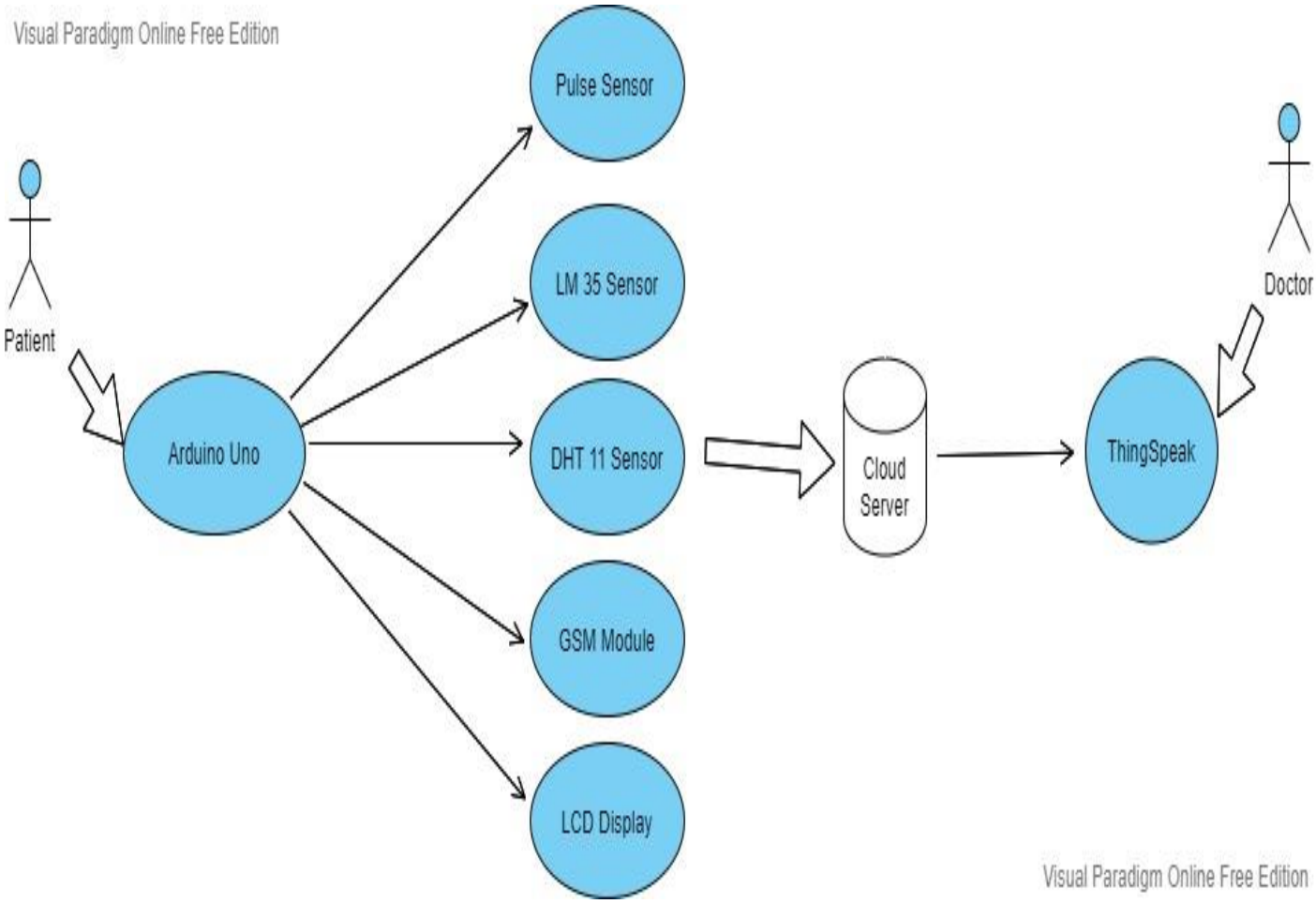


Fig 4.4 Use-Case Diagram

4.5 Sequence diagram

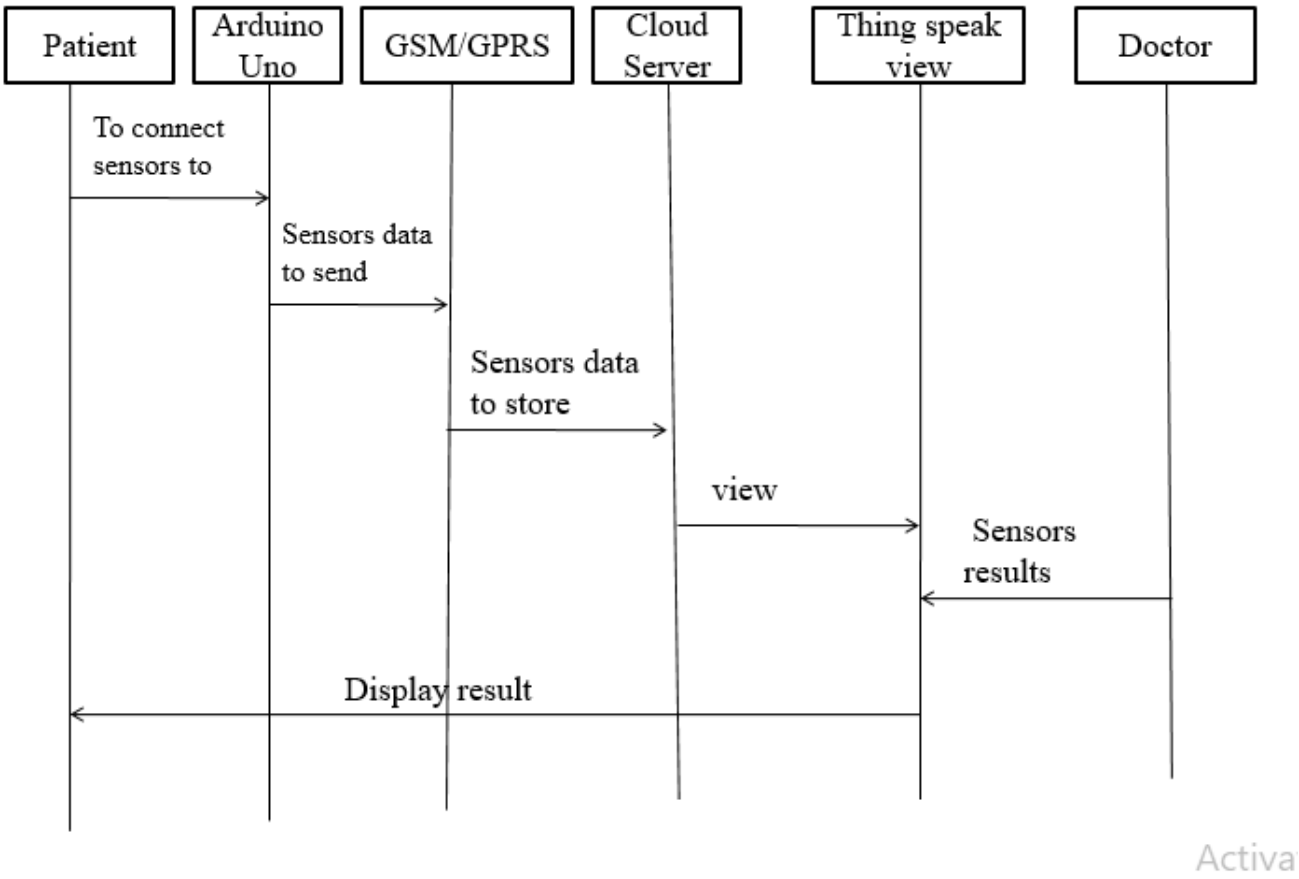


Fig 4.5 Sequence Diagram

CHAPTER 5

IMPLEMENTATION

5.1 Hardware Implementation

In this section we design our project Real Time Smart Health Monitoring System using Arduino and with the help of pulse sensor, temperature sensor LM35 and Humidity Sensor DHT 11 (Fig 5.1). The signals sensed from the patients is millivolt but the sensors volt will be 5v sensors will have the amplifiers the sensed signals is amplified and it won't cause harm to human health. Then the signals are send to the Arduino Uno Microcontroller. Here we use Arduino (ATmega328) as a controller. This signal is given to the Analog port (A0) (A1) and (A2) of the Arduino UNO. Arduino UNO collects analog data and converts this analog voltage into digital bits' form utilizing incorporated A to D Converter it metamorphosed analog voltage level in any number between 0 to 1023. It uses 10 bits for processing. This is given to the ATmega328 microcontroller, it then processes the digital data into the respective degree centigrade for temperature and to BPM for the heart rate. Using GSM 808 module the results will be continuously transmit to medical officer or to Doctor and the data will be stored directly to the database.

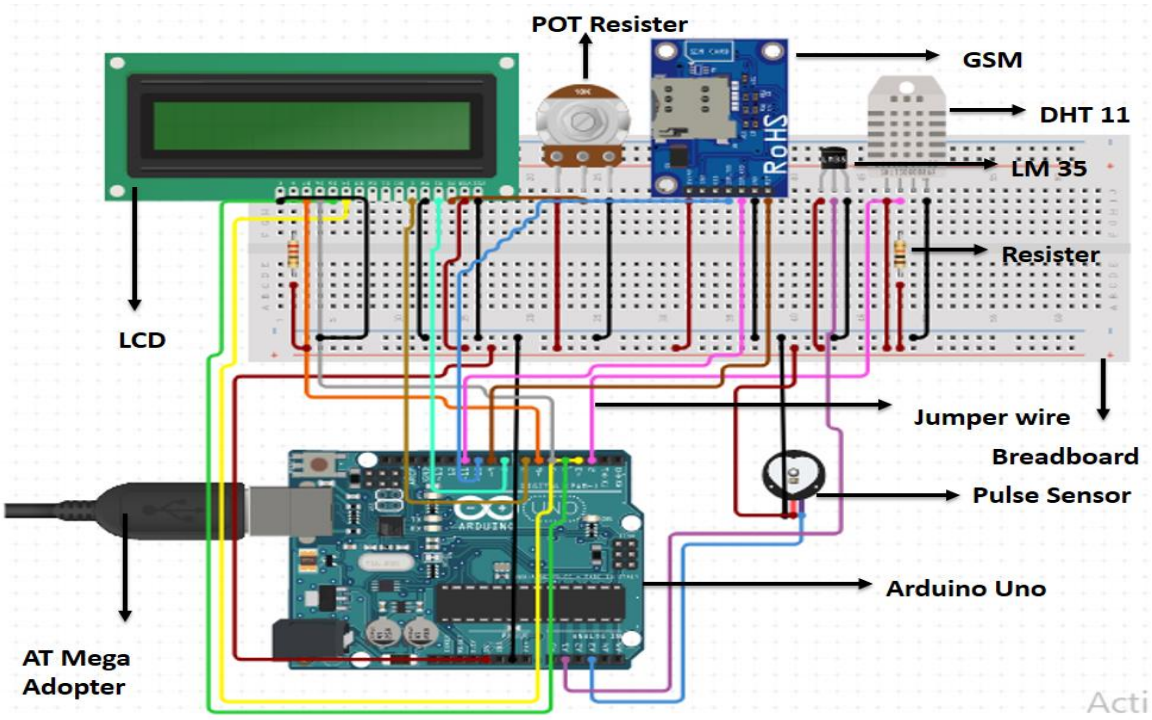


Fig 5.1 Circuit Diagram

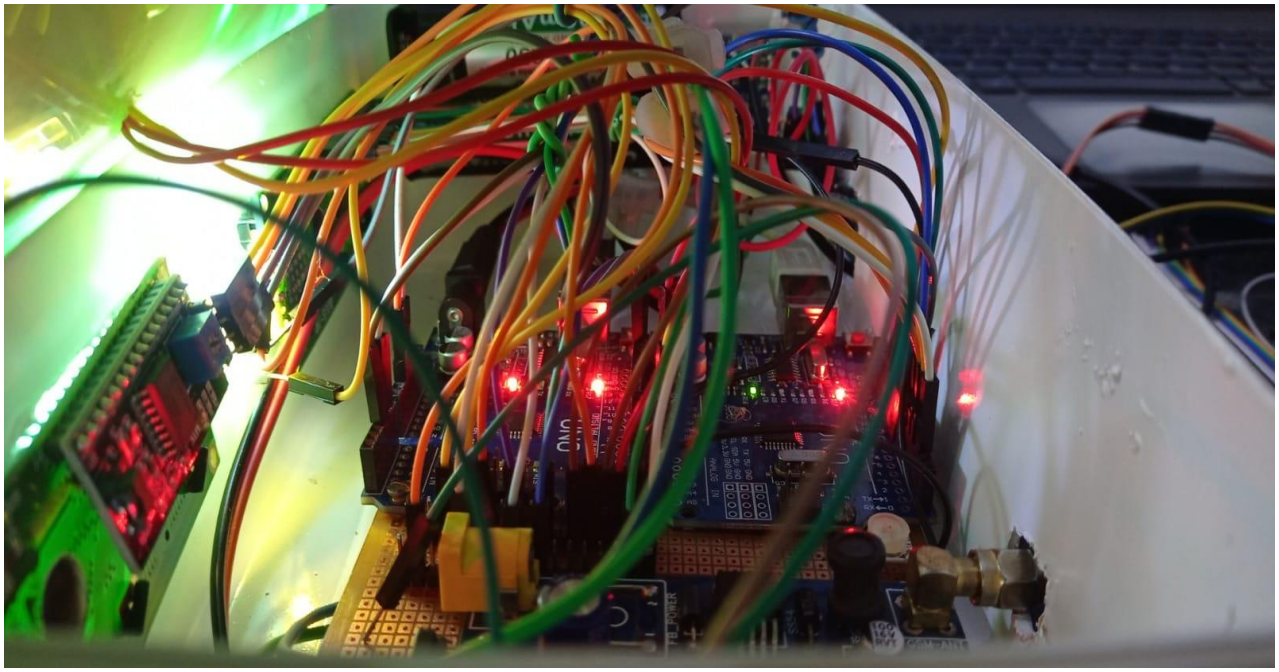


Fig 5.2 Hardware implantation 1

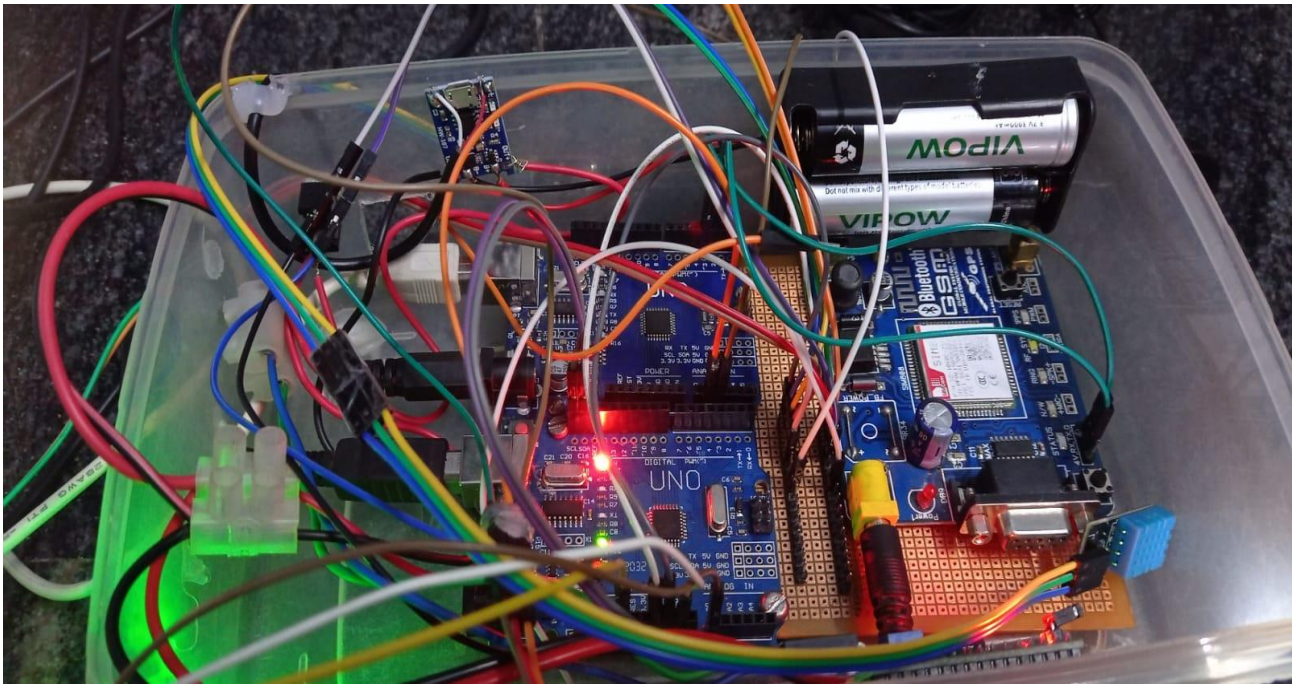


Fig 5.3 Hardware implantation 2

4.2 Software Implementation

For the software implementation the essential is software Arduino IDE. This software allow us to stuff the program in Arduino board.

Project Code

```
#include <SoftwareSerial.h>

SoftwareSerial gprsSerial(2,3);

#include <Wire.h>

#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2);

#include <String.h>

#include <DHT.h>

#define DHTPIN A2

DHT dht(DHTPIN, DHT11);

int val;

int tempPin=1;

byte heart[] = {

                0x00,

                0x0A,

                0x1F,

                0x1F,

                0x0E,

                0x04,

                0x00,

                0x00
```

```
                };
void setup()
                {
                 gprsSerial.begin(9600);
                 Serial.begin(9600);
                 lcd.init();
                 lcd.backlight();
                 lcd.setCursor(0,0);
                 lcd.print("****WEL COME****");
                 lcd.setCursor(0,1);
                 lcd.print("*******TO*******");
                 delay(2000);
                 lcd.clear();
                 lcd.createChar(1, heart);
                lcd.setCursor(0, 0);
                lcd.print("  ");
                lcd.write(1);
                lcd.print(" SHMS ");
               delay(3000);
               lcd.clear();
               Serial.begin(9600);
                dht.begin();
               }
```

```
void loop()
        {
        int t = dht.readTemperature();
        int h = dht.readHumidity();
        val=analogRead(tempPin);
        int mv=(val/1024.0)*500;
        int tempc=mv;
        lcd.setCursor(0,0);
         lcd.print(" BODY TEMP  :");
        lcd.print(tempc);
        lcd.setCursor(0,1);
        lcd.print("RT  : ");
        lcd.print(t);
        lcd.setCursor(8,1);
        lcd.print(" H  : " );
        lcd.print(h);
         if (gprsSerial.available())
        Serial.write(gprsSerial.read());
        gprsSerial.println("AT");
        delay(1000);
        gprsSerial.println("AT+CPIN?");
        delay(1000);
        gprsSerial.println("AT+CREG?");
         delay(1000);
```

```
gprsSerial.println("AT+CGATT?");
delay(1000);
 gprsSerial.println("AT+CIPSHUT");
delay(1000);
gprsSerial.println("AT+CIPSTATUS");
delay(2000);
gprsSerial.println("AT+CIPMUX=0");
delay(2000);
ShowSerialData();
gprsSerial.println("AT+CSTT=\"bsnlnet\"");
delay(1000);
ShowSerialData();
gprsSerial.println("AT+CIICR");
delay(3000);
ShowSerialData();
gprsSerial.println("AT+CIFSR");
delay(2000);
ShowSerialData();
gprsSerial.println("AT+CIPSPRT=0");
delay(3000);
ShowSerialData();
gprsSerial.println("AT+CIPSTART=\"TCP\",\"api.thingspeak.com\",\"80\"");
delay(5000);
ShowSerialData();
```

```
        gprsSerial.println("AT+CIPSEND");
        delay(4000);
        ShowSerialData();
        Stringstr="GET
        https://api.thingspeak.com/update?api_key=MUM56GU8YPU0G0TV&field1=0"+String(tem
        pc) +"&field2="+String(t) +"&field3="+String(h);
         Serial.println(str);
        gprsSerial.println(str);
        delay(4000);
        ShowSerialData();
        gprsSerial.println((char)26);
        delay(5000);
        gprsSerial.println();
        ShowSerialData();
        gprsSerial.println("AT+CIPSHUT");
        delay(100);
        ShowSerialData();
}
void ShowSerialData()
{
        while(gprsSerial.available()!=0)
        Serial.write(gprsSerial.read());
        delay(5000);
}
```

Pulse Sensor Code

```
#include <Wire.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
int pulsePin = 0;
int blinkPin = 13;
int fadePin = 8;
int fadeRate = 0;
volatile int BPM;
volatile int Signal;
volatile int IBI = 600;
volatile boolean Pulse = false;
volatile boolean QS = false;
static boolean serialVisual = true;
volatile int rate[10];
volatile unsigned long sampleCounter = 0;
volatile unsigned long lastBeatTime = 0;
volatile int P = 512;
volatile int T = 512;
volatile int thresh = 525;
volatile int amp = 100;
volatile boolean firstBeat = true;
volatile boolean secondBeat = false;
```

```
void setup()
        {
        pinMode(blinkPin,OUTPUT);
        pinMode(fadePin,OUTPUT);
        Serial.begin(9600);
        interruptSetup();
}
void loop()
{
        serialOutput();
        if (QS == true) // A Heartbeat Was Found
        {
                fadeRate = 255;
                serialOutputWhenBeatHappens();
                QS = false;
        }
        ledFadeToBeat();
        delay(20);
}
void ledFadeToBeat()
{
        fadeRate -= 15;
        fadeRate = constrain(fadeRate,0,255);
```

```
        analogWrite(fadePin,fadeRate);
}
void interruptSetup()
{
        TCCR2A = 0x02;
        TCCR2B = 0x06;
        OCR2A = 0X7C;
        TIMSK2 = 0x02;
        sei();
}
void serialOutput()
{
        if (serialVisual == true)
        {
                arduinoSerialMonitorVisual('-', Signal);
        }
                Else
        {
                sendDataToSerial('S', Signal);
         }
}
void serialOutputWhenBeatHappens()
{
        if (serialVisual == true)
```

```
        {
                Serial.print("*** Heart-Beat Happened *** ");
                Serial.print("BPM: ");
                Serial.println(BPM);
                lcd.clear();
                lcd.print("BPM: ");
                lcd.print(BPM);
        }
                Else
        {
                sendDataToSerial('B',BPM);
                sendDataToSerial('Q',IBI);
         }
}
void arduinoSerialMonitorVisual(char symbol, int data )
        {
        const int sensorMin = 0;
        const int sensorMax = 1024;
        int sensorReading = data;
        int range = map(sensorReading, sensorMin, sensorMax, 0, 11);
}
void sendDataToSerial(char symbol, int data )
{
        Serial.print(symbol);
```

```
        Serial.println(data);
}
ISR(TIMER2_COMPA_vect)
{
        cli();
        Signal = analogRead(pulsePin);
        sampleCounter += 2;
         int N = sampleCounter - lastBeatTime;
        if(Signal < thresh && N > (IBI/5)*3)
        {
                if (Signal < T) // T is the trough
                {
                T = Signal;
                }
         }
         if(Signal > thresh && Signal > P)
        {
                P = Signal;
        }
        if (N > 250)
        {
                if ( (Signal > thresh) && (Pulse == false) && (N > (IBI/5)*3) )
                {
                        Pulse = true;
```

```
digitalWrite(blinkPin,HIGH);
 IBI = sampleCounter - lastBeatTime;
lastBeatTime = sampleCounter;
if(secondBeat)
{
        secondBeat = false;
        for(int i=0; i<=9; i++)
        {
                rate[i] = IBI;
        }
}
if(firstBeat)
{
        firstBeat = false;
        secondBeat = true;
        sei();
        return;
}
word runningTotal = 0;
for(int i=0; i<=8; i++)
{
        rate[i] = rate[i+1];
        runningTotal += rate[i];
}
```

```
                rate[9] = IBI;
                runningTotal += rate[9];
                runningTotal /= 10;
                BPM = 60000/runningTotal;
                QS = true;
        }
}
 if (Signal < thresh && Pulse == true)
{
        digitalWrite(blinkPin,LOW);
        Pulse = false;
        amp = P - T;
        thresh = amp/2 + T;
         P = thresh;
        T = thresh;
}
if (N > 2500)
{
        thresh = 512;
        P = 512;
        T = 512;
        lastBeatTime = sampleCounter;
```

```
                firstBeat = true;
                secondBeat = false;
        }
        sei();
}
```

CHAPTER 6

SYSTEM TESTING

6.1 Test Approach

Our project is IOT based “Smart Health Monitoring System” by using Arduino Uno Microcontroller, biomedical Sensors, And GSM module. The Project made as explained in above chapters. It is needful to validate the system is working appropriately or not. It can be tested in two methods. The system should display the patient pulse rate, current temperature and Humidity. The system should also send the data to the concerned person or doctor in ThingSpeak cloud by using the GSM Module.

6.2 Test Plan

For testing the project, we make two parts. Initial step is used to validate the program, in this step we check the program is working appropriately or not. It is done by using Arduino IDE. Second part is used to check hardware component like Pulse sensor, LM 35 and Humidity Sensor, and the working of the GSM module.

6.2.1 Features to be Tested

After building the whole project as shown in the circuit diagram we test it, testing is done by steps

This project should satisfy some features. Features to be examine as follows: -

a) Pulse Sensor:
   The pulse senor should detect Pulse rate of patient properly.

b) LM 35 Sensor:
   LM35 should detect body temperature properly.

c) DHT 11 Sensor:
   DHT 11 should detect room temperature and humidity properly.

d) Arduino Uno:
   Arduino should collect on the all sensor data and give the required output to the GSM.

e) GSM Module:

GSM Module should connect to the internet and send the data ThingSpeak cloud.

6.2.2 Testing Tools and Environment

For examine the project we need some tools, like to test Arduino program the essential a software called Arduino IDE adopting this we can test the program that program is working properly or not. For hardware checking we require power supply and proper range of temperature and pulse sensor is test with Manually with living Man.

6.3 Test Cases

In this section we discuss about the inputs, expected output, testing procedure.

Testing tools must have as per the circuit is explained above.

6.3.1 Inputs

a) **Power Supply**:

Power supply is the initial needful for any electronic circuit. Present we use 5v dc battery to give power Arduino Uno and frequently we can give power directly from the computer.

b) **Pulse Sensor**

It collects the Patient pulse rate as the input. Pulse Sensor fits over a fingertip and uses the amount of infrared light emulated by the blood circulating inside to do just that. When the heart pumps, blood pressure rises sharply, and so do the amount of infrared light from the emitter that gets reflected back to the detector.

c) **LM 35 Sensor**

It collects the Patient Body Temperature as the input.

d) **DHT 11**

It collects the Room Humidity as the input.

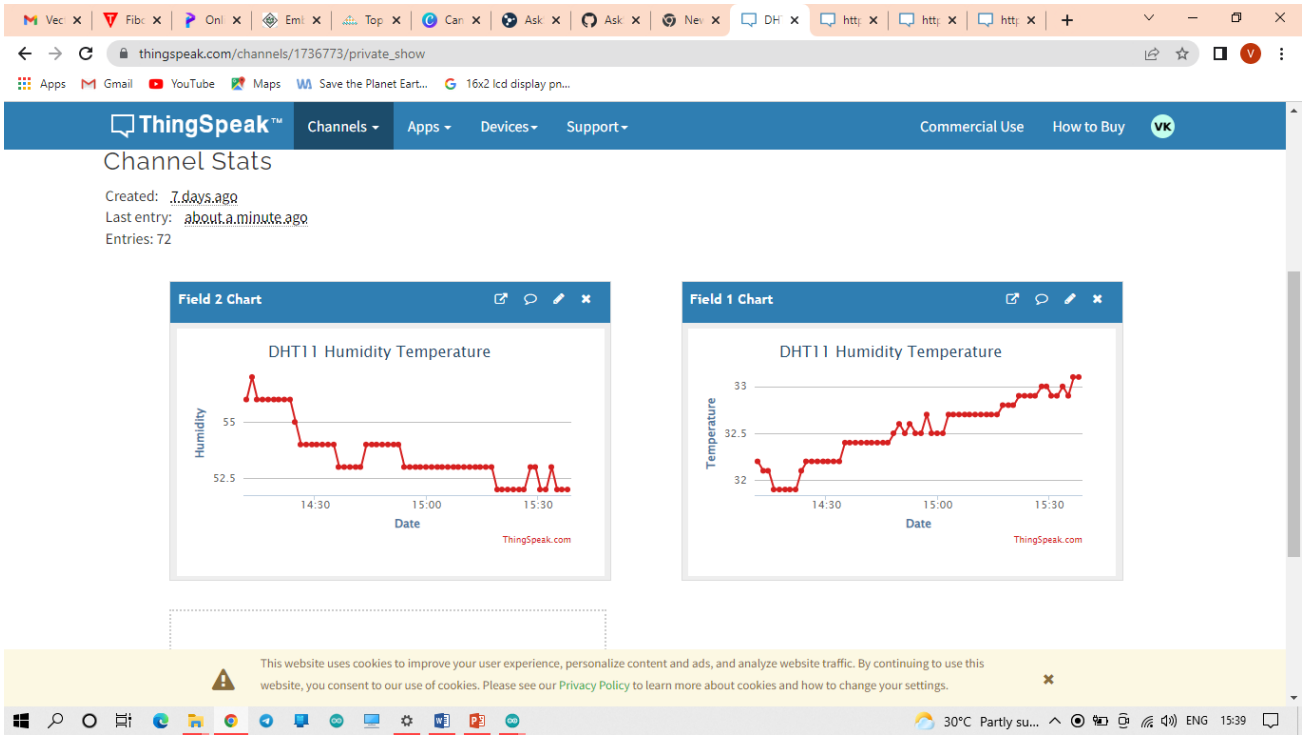


Fig 6.1 DHT 11 Testing

6.3.2 Output

Result of our project work is that the patient's basic parameter like pulse rate, body temperature or room humidity, pulse rate is very sensitive parameter if any physical or non-physical or intellectually change occur to human then it festally changes its value. The standard value human pulse rate is 72 bit/second (range is 72-98 for normal man), body temperature is 37 Degree Centigrade And. Room Temperature 30 Degree Centigrade and Humidity 60 Degree Centigrade (Fig 6.1). In our proposed design the new thing we add is we are combining three parameters in single device also we analyse the data in Arduino IDE that is main part of our project and the analysed data is send to the doctor using GSM. The fundamental objective of our research work to cut down the cost, manpower and the time to send the information, and make analysis as transparent as possible.

7.RESULTS

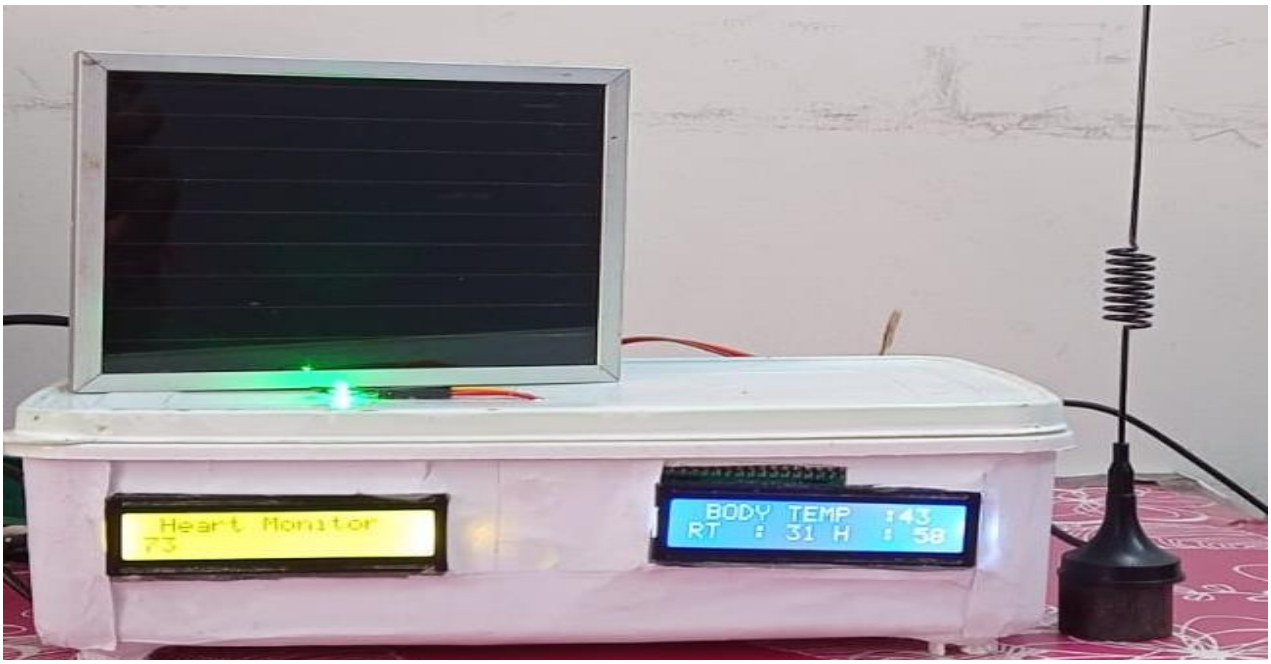


Fig 7.1 SHMS Device

Fig 2 SHMS Device Out Put

Fig 7.3 LCD Result

Fig 7.4 Result of Pulse Sensor in LCD

Fig 7.5 Result of DHT 11 in LCD

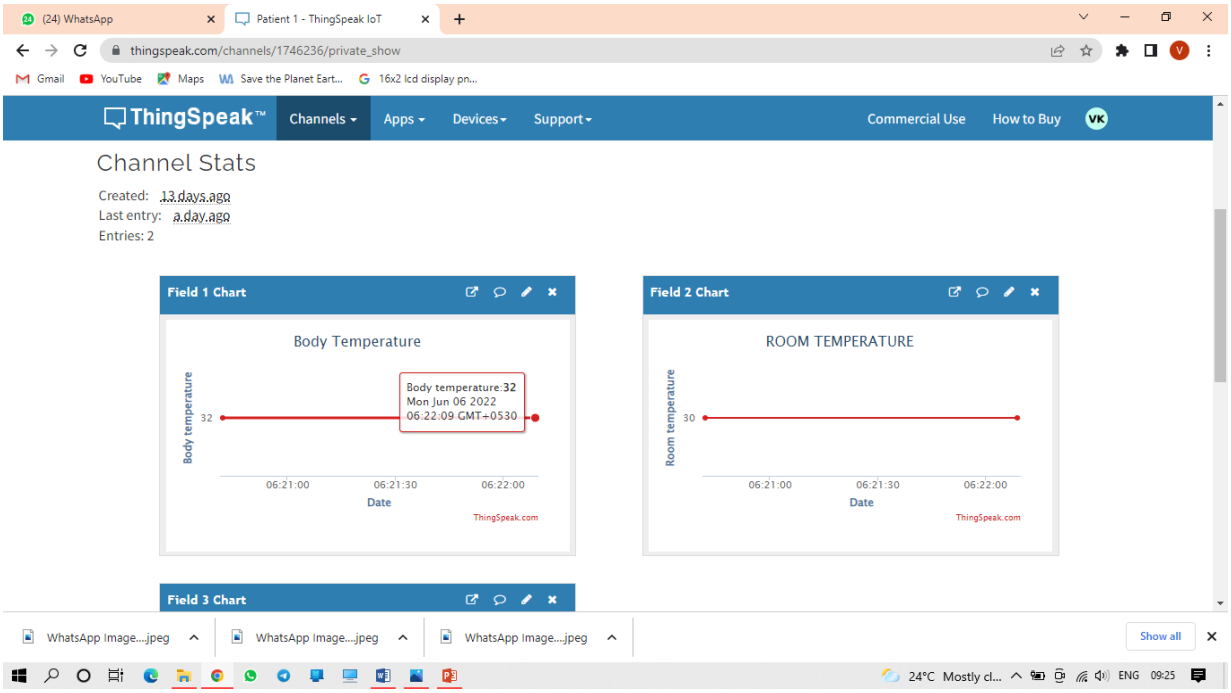


Fig 3 Result of Body Temperature in ThingSpeak

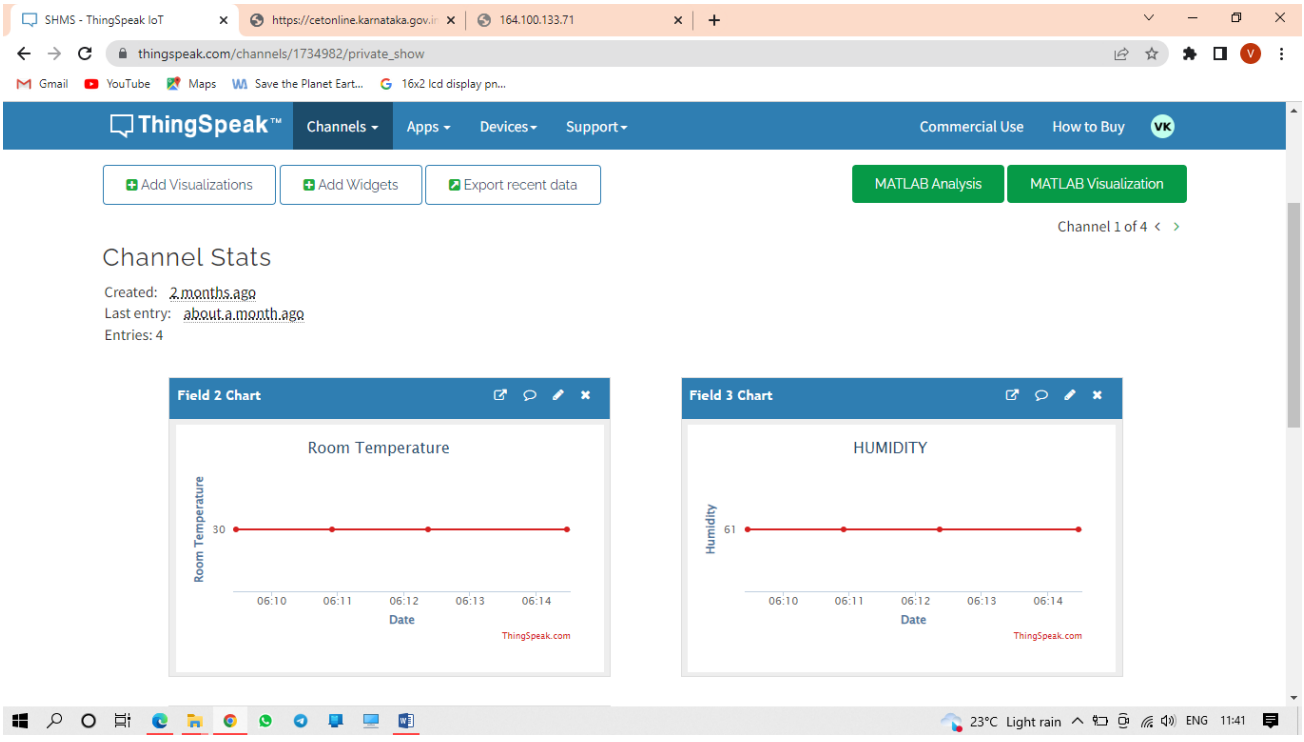


Fig 4 Result of Room Temperature and Humidity in ThingSpeak

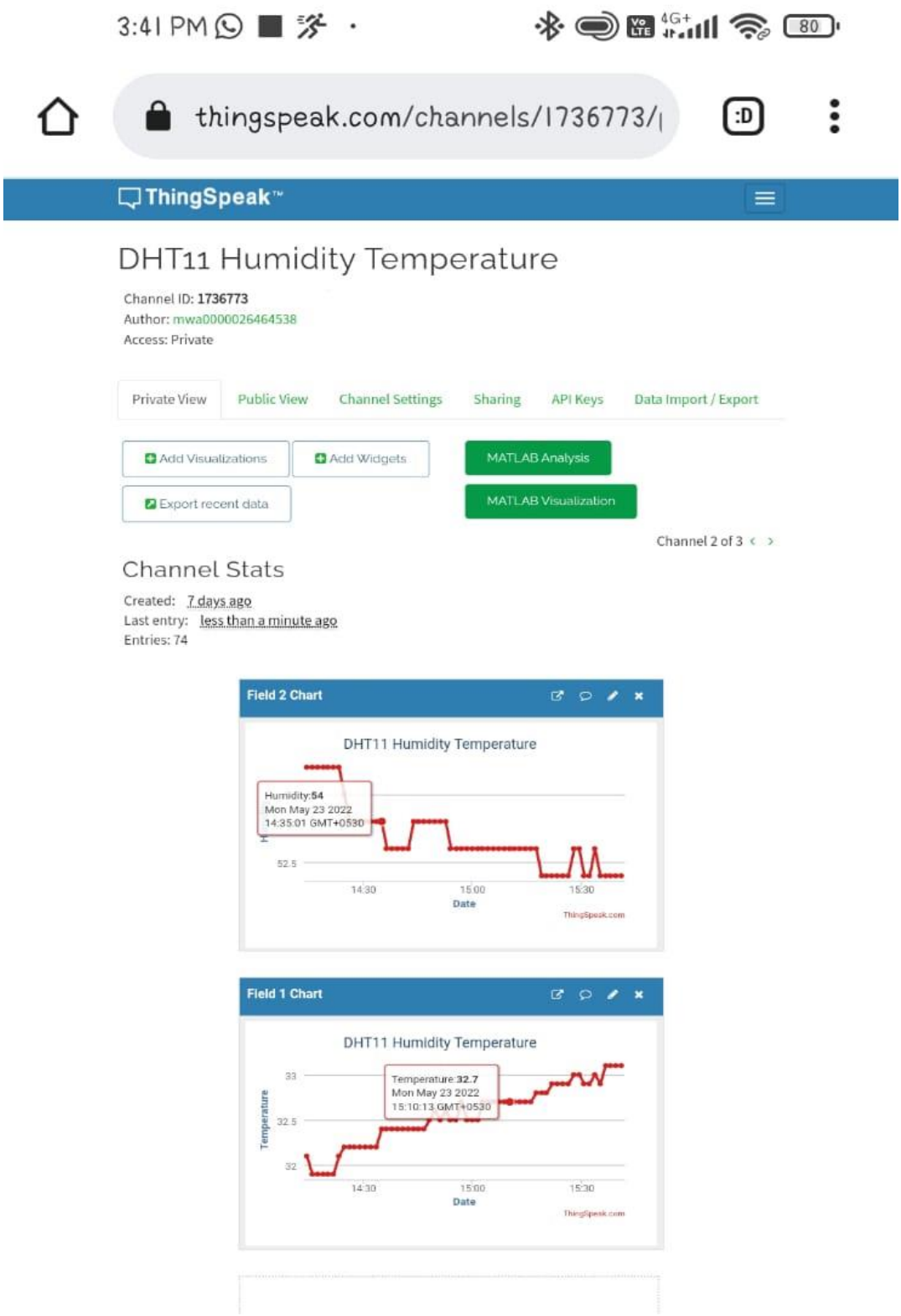


Fig 5 Result of Room Temperature Humidity in ThingSpeak view in Mobile

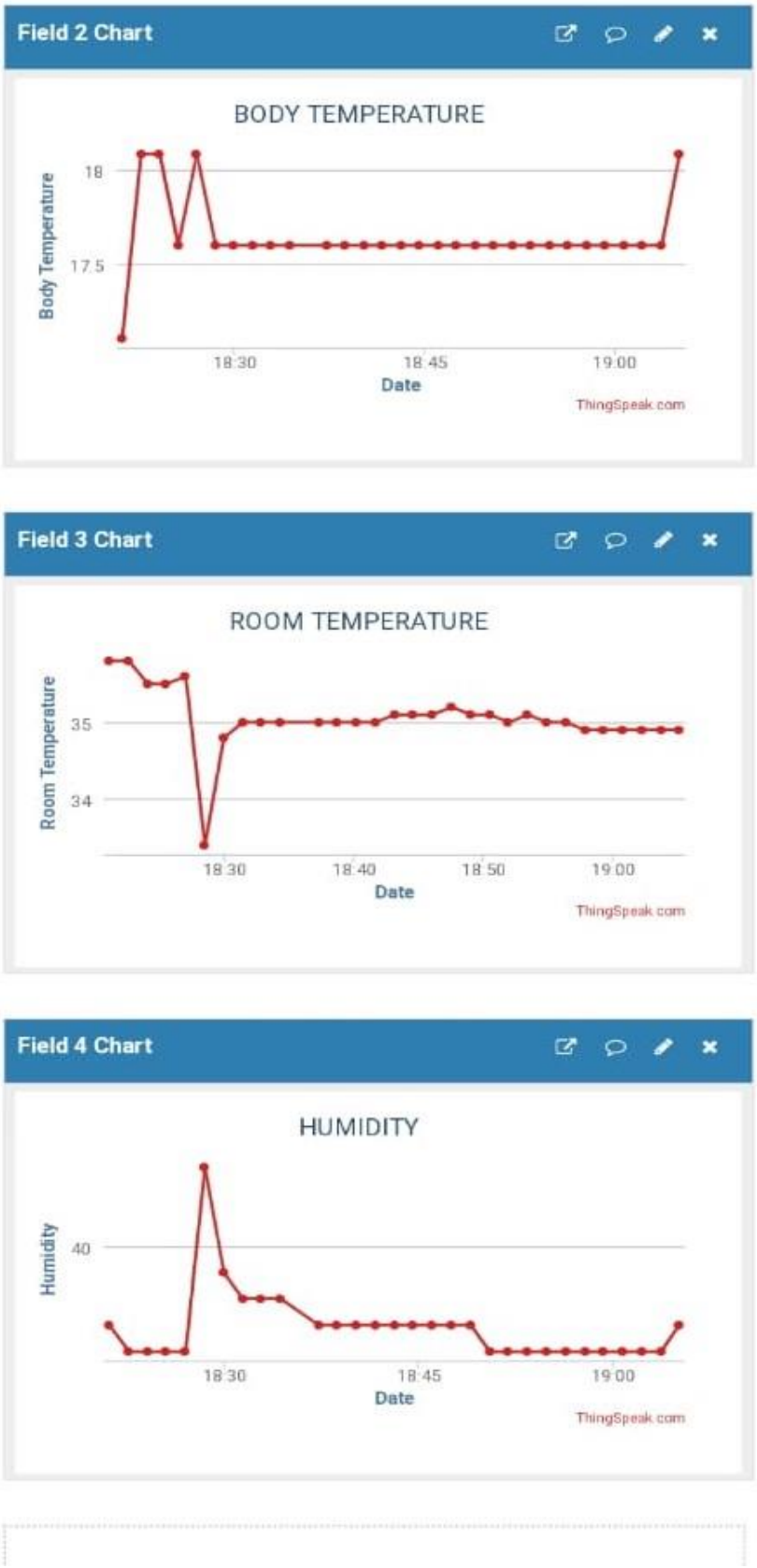
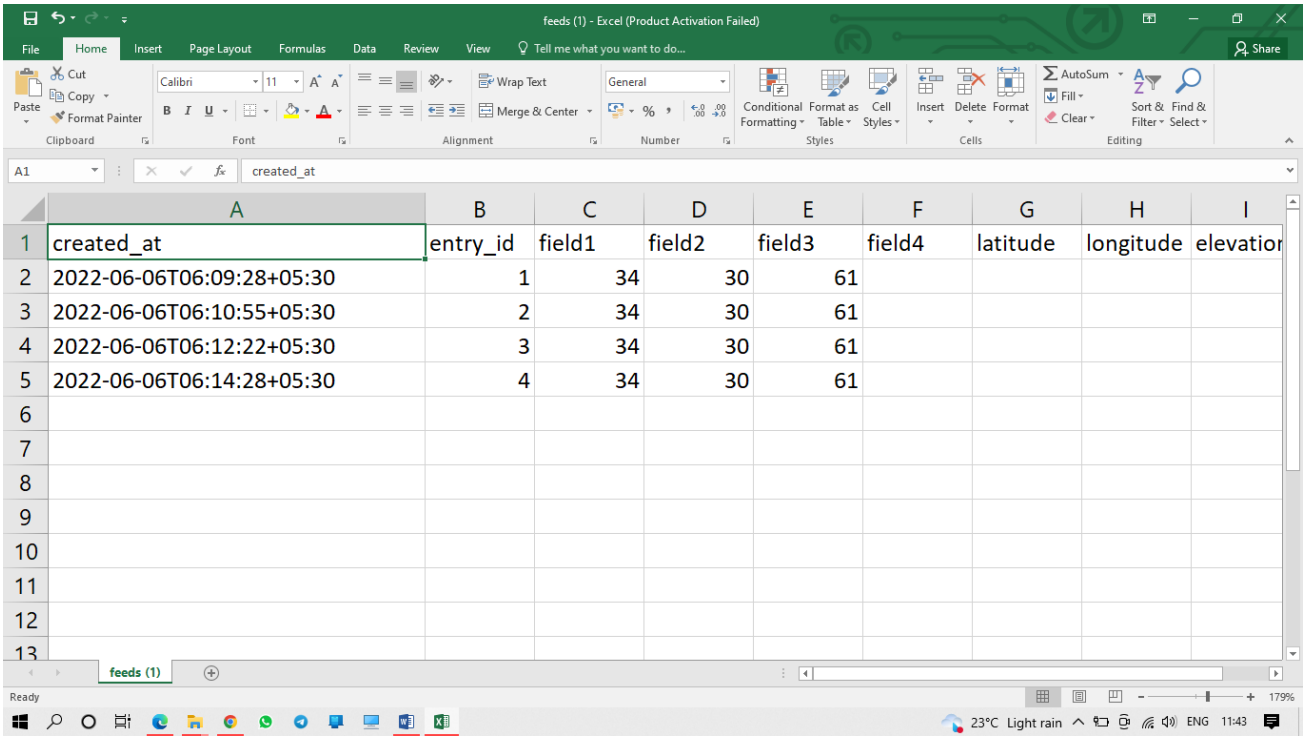


Fig 6 Result of Body Temperature, Room Temperature, Humidity in ThingSpeak view in Mobile



	A	B	C	D	E	F	G	H	I
1	created_at	entry_id	field1	field2	field3	field4	latitude	longitude	elevation
2	2022-06-06T06:09:28+05:30	1	34	30	61				
3	2022-06-06T06:10:55+05:30	2	34	30	61				
4	2022-06-06T06:12:22+05:30	3	34	30	61				
5	2022-06-06T06:14:28+05:30	4	34	30	61				
6									
7									
8									
9									
10									
11									
12									
13									

Fig 7.10 Result of SHMS Store in Data base

CHAPTER 7

CONCLUSION

This is the effective progress in the field of bio medical engineering, science and technology way for new invention. As we are moving towards new technologies compactness, easy handling electronic components are in roam nowadays. New products and new technology are being invented in the field IOT. ARDUINO was found to be more compact, user friendly and less expensive, which could be used in order to perform several repetitive tasks. A well-organized SHMS is advance to monitor the modernized status of the patient irrespective of the appearance of the doctor. The designed system gathers sensor data like temperature, blood pressure and pulse rate of the patient and modernized data to the doctor. The system is analyse experimentally and collected the data of patient to verify the status of patient. The doctor can monitor the progress of patient health and then to advise them about their health by the care taker.

CHAPTER 8

FUTURE ENHANCEMENTS

- This plan can be further extend by sensing and displaying other vital statistics of a patient like ECG, blood pressure, glucose level etc.
- The other thing which is to add is presently we are monitoring the data in LCD Display in future we can OLED Display with graphical Representation.
- And also now we connect the ThingSpeak Cloud to monitor the patient health condition in future we can Monitor the patient health condition in website with alerting.
- This project is we on one of the energy harvesting method is using solar energy in future we develop on other energy harvesting method like radio frequency method.

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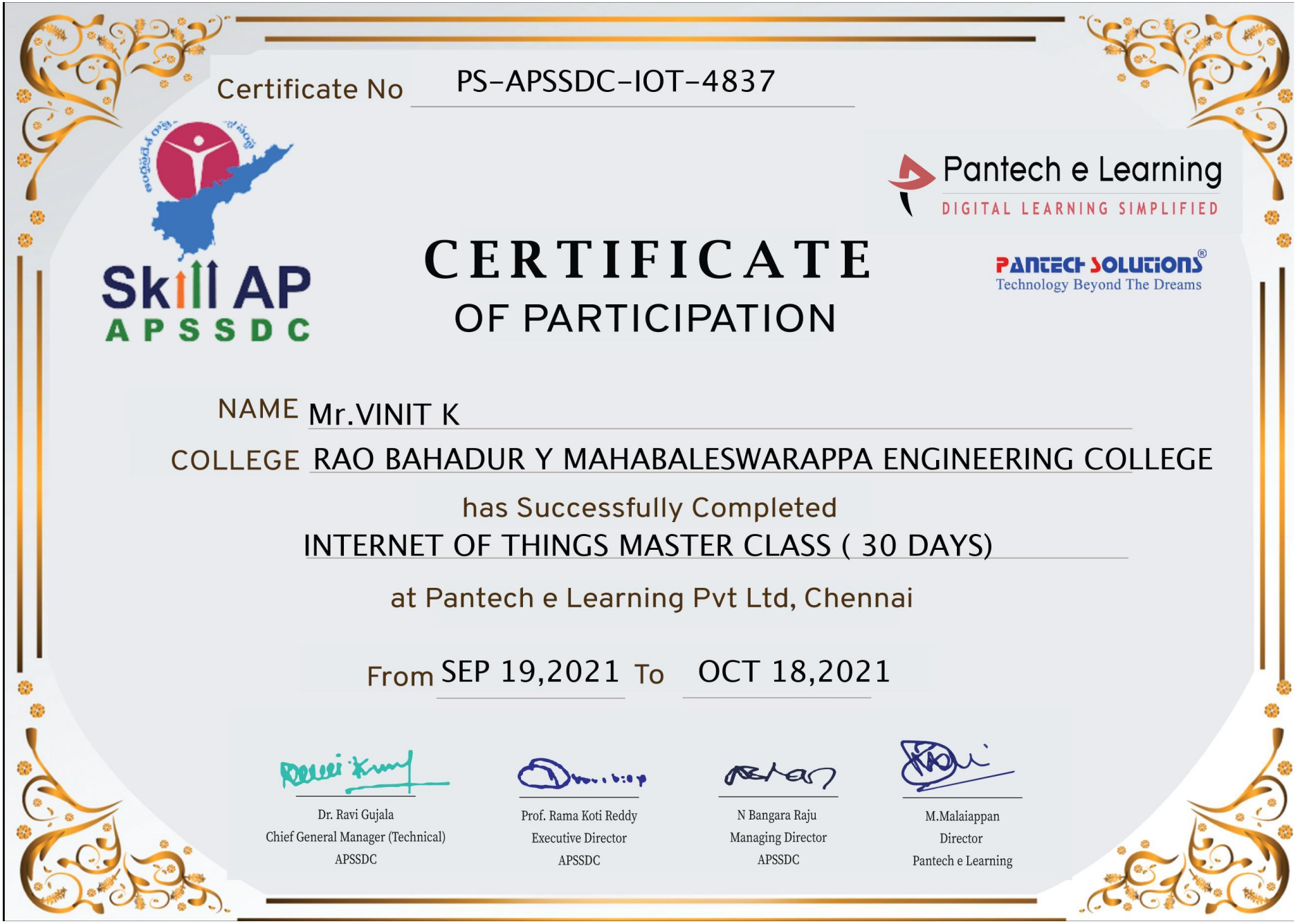

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Smart Health Monitoring System

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Abstract: *As we Know that Health is More Important for Human's to maintain good Health essential is Health care system and also to overcome from the disease. The health care is more importance in now a day in the occurrence of the corona virus. As view of now for corona virus, an IOT based health monitoring system is better solution for pandemic. The new revolution of internet is IOT is which is the expanding research area especially in the health care System. This is remote health care monitoring system where we can monitor from desire location.*

Keywords: IOT, GSM Module, Arduino Uno

I. INTRODUCTION

Health is a one of the most important factor for human beings to maintain a good health condition then good health care system needed. Now a day's Health care system more important present situation's like covid pandemic. And also, Health care System is needed for the aged peoples and also for physical challenged people. To overcome from this scenario Remote health Monitoring system is better solution. In rapid growth of technologies IOT is best platform for the remote based health monitoring system. IOT based health monitoring service helps in preventing the rapid spread of disease like covid-19 and also as well as to get know a proper diagnosis for that disease, even in the situation where physician is unavailable.

IOT monitoring of health helps in preventing the spread of disease as well as to get a proper diagnosis of the state of health, even if the doctor is at far distance. A portable physiological checking framework is displayed, which can constantly screen the patient's heartbeat, temperature and other basic parameters of the room. We proposed a nonstop checking and control instrument to screen the patient condition and store the patient information's in server. A remote health monitoring system using IOT is proposed where the authorized personal can access these data stored using any IOT platform and based on these values received, the diseases are diagnosed by the doctors from a far distance.

The main objective of this project is the designing and implementation of a Smart health monitoring system. It using sensors to track the patient health condition and uses internet to information to the person or patient. And we developing the health monitoring system is to reduce health care cost of the person by reduce in Meeting the doctors in the hospitals. Smart healthcare is important for people who need continuous monitoring which cannot be provided outside hospitals. It is also important at rural areas or villages where nearby clinics can be in touch with city hospitals about their patient's health condition. this work presents a smart health monitoring system that uses biomedical sensors to check patient's condition and uses internet to inform the concerned.

The biomedical sensors here are connected to Arduino Uno controller to read the data which is in turn interfaced to a web site and android application to developed to see the output. Data is uploaded to the server to store and for See visualizing it on a smartphone. An android application has been designed in order to easily see the patient's information by their doctors and family members.

The core objective of this project is the design and implementation of a smart patient health tracking system that uses sensors to track patient health and uses internet to inform their loved ones in case of any issues. The objective of developing monitoring system is to reduce health care costs by reducing physician office visits, hospitalization.

II. PROBLEM STATEMENT

Health is a one of the most important factors for human beings to maintain a good health condition then good health care system needed. Now a day's Health care system more important present situation's like covid pandemic. In the covid pandemic lots of peoples lost their life by not getting treatment the and also not getting the bed in the hospital's. Good

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and flexible Health Care System is needed for the aged peoples and for physical challenged people. The Continues health monitoring system is very much need for the Bed-ridden patients who are partially or fully paralyzed as a result of a stroke. For the finical backword peoples and also ruler area peoples it's too difficult to visiting hospital. There some exiting health monitoring system they will not continue monitor the health. And also, doctor should present in near the patient to view the patient health data. To overcome from this scenario Remote Health Monitoring system is better solution.

III. EXISTING SYSTEM

The number of researchers has proposed in IOT Based Health monitoring system and the prediction of various types of diseases using various technique. In the exiting systems quit more different the comparing with proposed system. In the existing health monitoring system in IOT based Health Monitoring system pulse sensor, temperature sensor and Bluetooth module they have used the data is viewed in the location of patient only. In some exiting system Wi-Fi Module along with the sensor and view the data cloud. And the existing IOT based health monitoring system are run on AC power supply.

IV. PROPOSED SYSTEM

In rapid growth of technologies IOT is best platform for the remote based Smart Health Monitoring System. Arduino Uno micro controller is used for Smart Health Monitoring System. We proposed the health monitoring with the basic parameter of patient and room condition along with nonstop health monitoring system. The basic parameter human health is pulse rate and body temperature are main parameter to know the health condition of the human. We proposed the system with the use of Pulse sensor for pulse rate, LM 35 sensor for body temperature, DHT 11 sensor for to know humidity and room temperature. The surrounding condition also important for the health of the patient health also dependent on humidity and room temperature.

The GSM module is used to connect the internet to send the data in cloud where the doctor can access the patient health condition from for distance. We made the health monitoring system run on the battery power the battery is charge with the solar power and also the battery is charge with the AC power. By these two methods we proposed continues health monitoring system. The patient health can be monitored in LCD display near patient and IOT cloud used if the doctor is not available on the location. We proposed the health monitoring system not depending on the other technologies is should work Remote areas with in the Room condition.

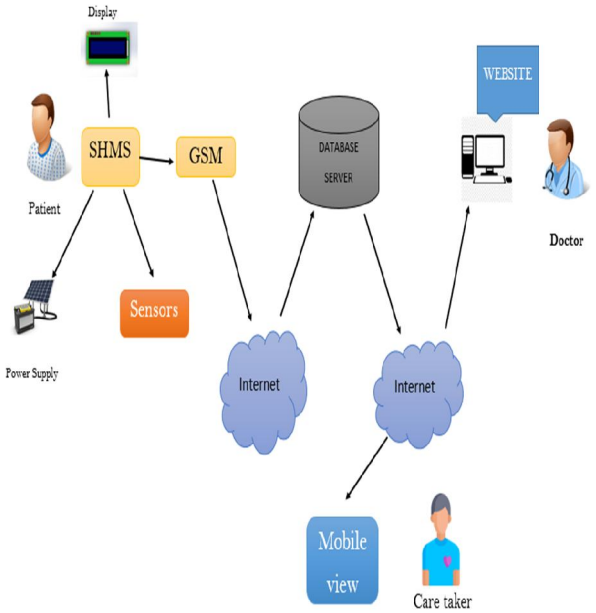

Figure: System Architecture

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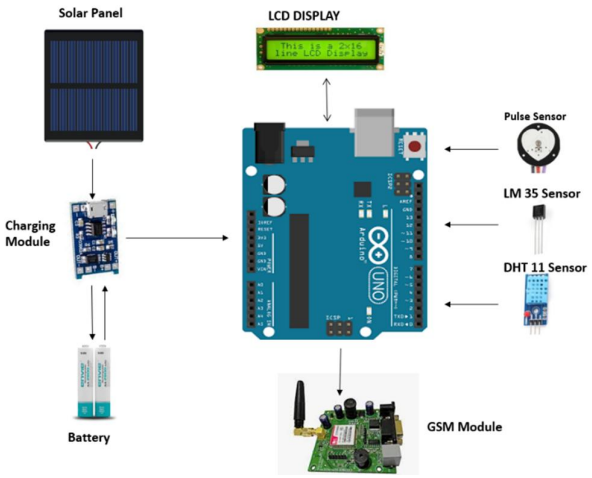

Figure: Sub System Architecture

V. IMPLEMENTATION

The our main is to develop the Smart Health Monitoring System to monitor the patient health condition in continues without any disturbance. We invited Smart health monitoring system is come up with many draw backs of existing system and its problems solution for in the field of health care system.

A smart health monitoring system we introduced a method which continuously monitors the patient health condition and automatically sends the data to server and also view in the website. So the doctor can access patient data continuously and we can intimate caretaker to advice patient health condition. In this project we came up with a proposal on nonstop health checking and control instrument to check the patient s condition and store the patient information in database server. A remote health care monitoring system uses IOT. Where the authorized person can gain access through these data stored using any IOT platform and based on these values received on patient information. The particular diseases are virtually diagnosed by the doctors from a far distance.

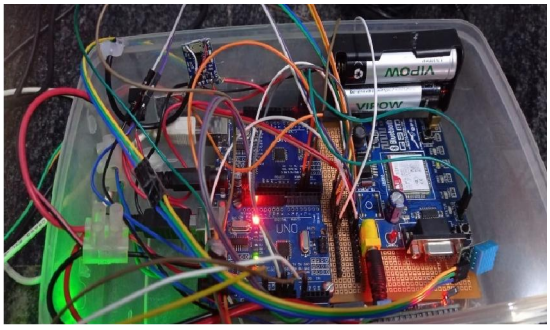

Figure: Implementation

Figure: SHMS System

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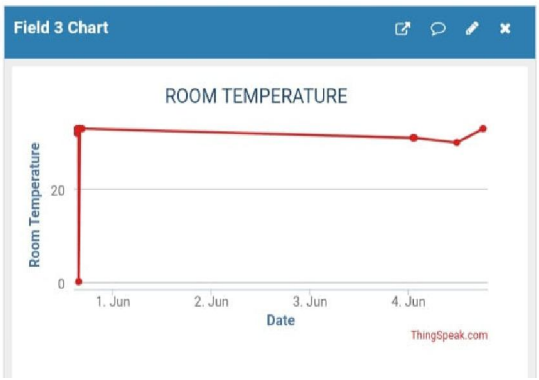
We proposed a nonstop patient health monitoring system and store the patient health information's in Thing Speak IOT Cloud. A remote health monitoring system using IOT is we proposed its work on solar power and battery it is cost efficient Smart health monitoring system

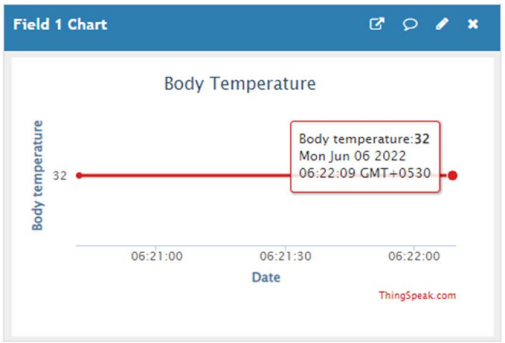
Figure: LCD Display Data

Where the authorized person can access these data stored using any IOT platform and based on these values received, the diseases are diagnosed by the doctors from a far distance.

Body Teamprature Data View in ThingSpeak



Room Teamprature Data View in ThingSpeak



Room Humidity Data View in ThingSpeak

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VI. CONCLUSION

- An efficient SHMS is developed to monitor the up-to-date status of the patient irrespective of the presence of the doctor.
- The system collects information like temperature, blood pressure and pulse rate of the patient and updates the same to the doctor.
- The system is evaluated experimentally and collected the sample data of ten patients to verify the status of patients.

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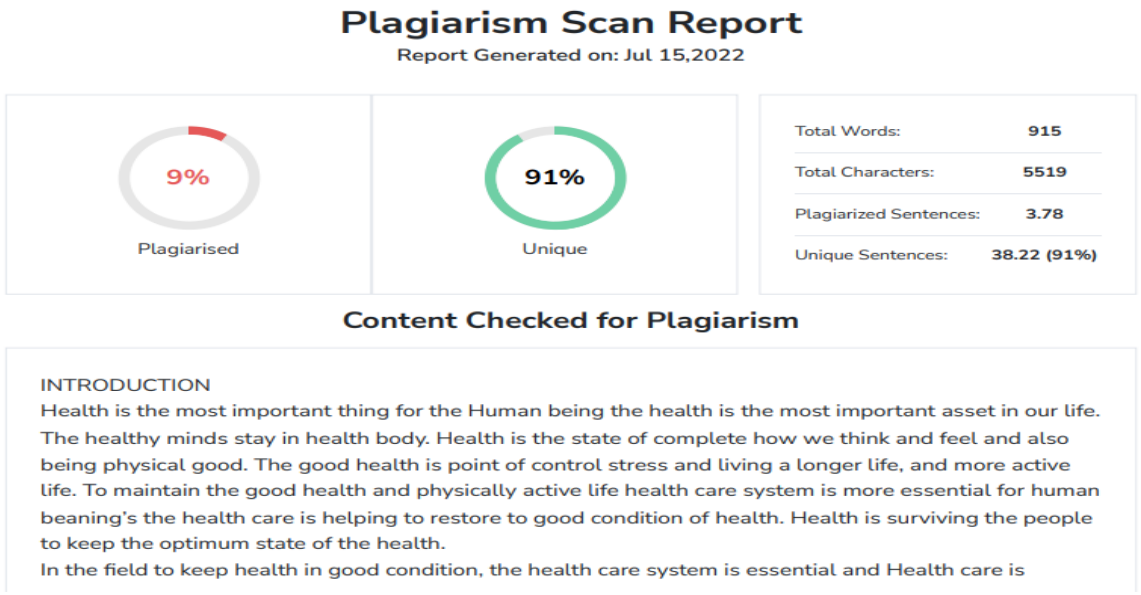
APPENDIX D: PLAGIARISM CHECK REPORT

Introduction Chapter Plagiarism



Plagiarism Scan Report

Report Generated on: Jul 15,2022

9% Plagiarised

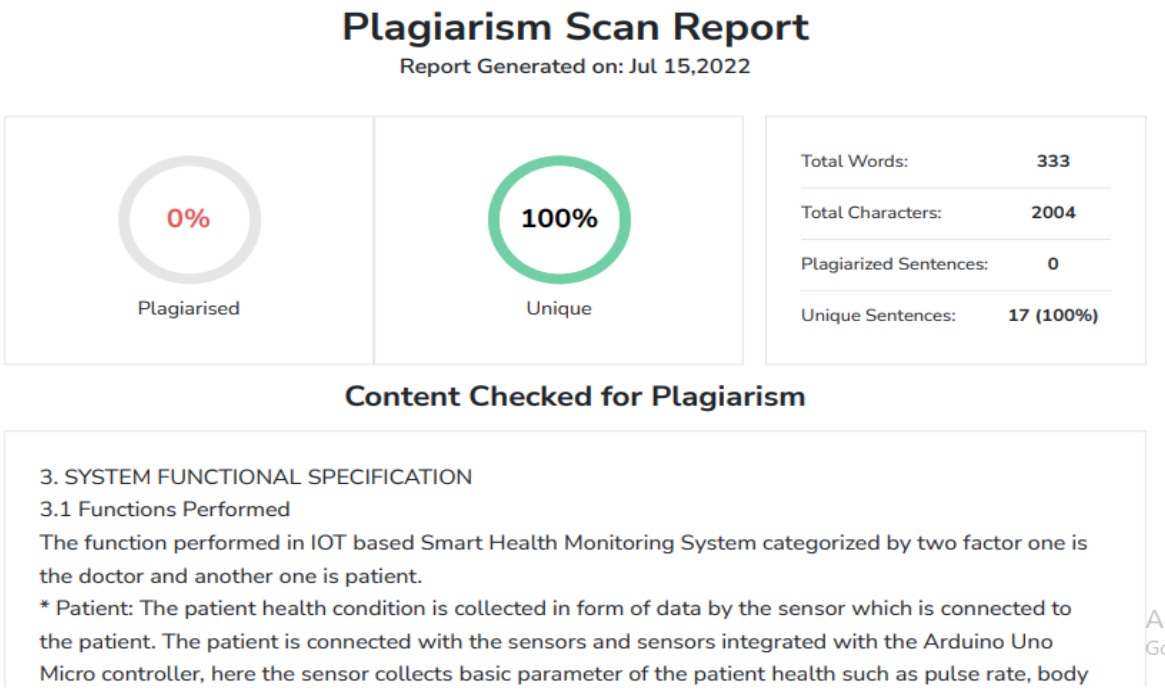
91% Unique

Total Words:	915
Total Characters:	5519
Plagiarized Sentences:	3.78
Unique Sentences:	38.22 (91%)

Content Checked for Plagiarism

INTRODUCTION
Health is the most important thing for the Human being the health is the most important asset in our life. The healthy minds stay in health body. Health is the state of complete how we think and feel and also being physical good. The good health is point of control stress and living a longer life, and more active life. To maintain the good health and physically active life health care system is more essential for human beaning's the health care is helping to restore to good condition of health. Health is surviving the people to keep the optimum state of the health.
In the field to keep health in good condition, the health care system is essential and Health care is

System Functional Specification Chapter Plagiarism



Plagiarism Scan Report

Report Generated on: Jul 15,2022

0% Plagiarised

100% Unique

Total Words:	333
Total Characters:	2004
Plagiarized Sentences:	0
Unique Sentences:	17 (100%)

Content Checked for Plagiarism

3. SYSTEM FUNCTIONAL SPECIFICATION
3.1 Functions Performed
The function performed in IOT based Smart Health Monitoring System categorized by two factor one is the doctor and another one is patient.
* Patient: The patient health condition is collected in form of data by the sensor which is connected to the patient. The patient is connected with the sensors and sensors integrated with the Arduino Uno Micro controller, here the sensor collects basic parameter of the patient health such as pulse rate, body

System Design Specification Chapter Plagiarism

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4.SYSTEM DESIGN SPECIFICATION
4.1 System Architecture

The Smart Health Monitoring System Architecture is narrating the structure and how it is integrated with the environment. The architecture diagram show what are elements contain and how they are connected and interacting. The diagram says the patient is connected with SHMS device, the SHMS is containing

Implementation Chapter Plagiarism

Plagiarism Scan Report

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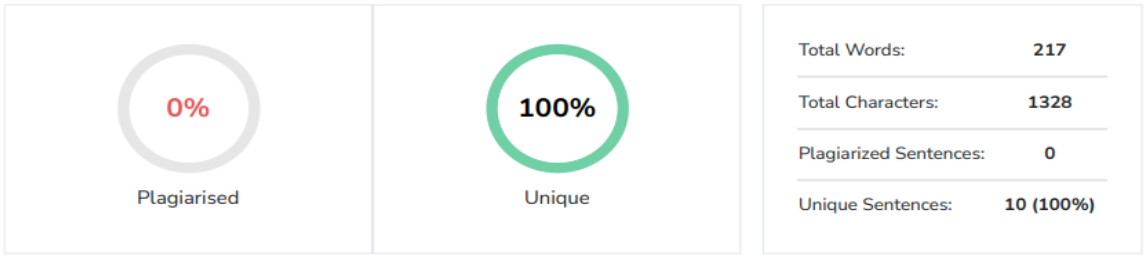
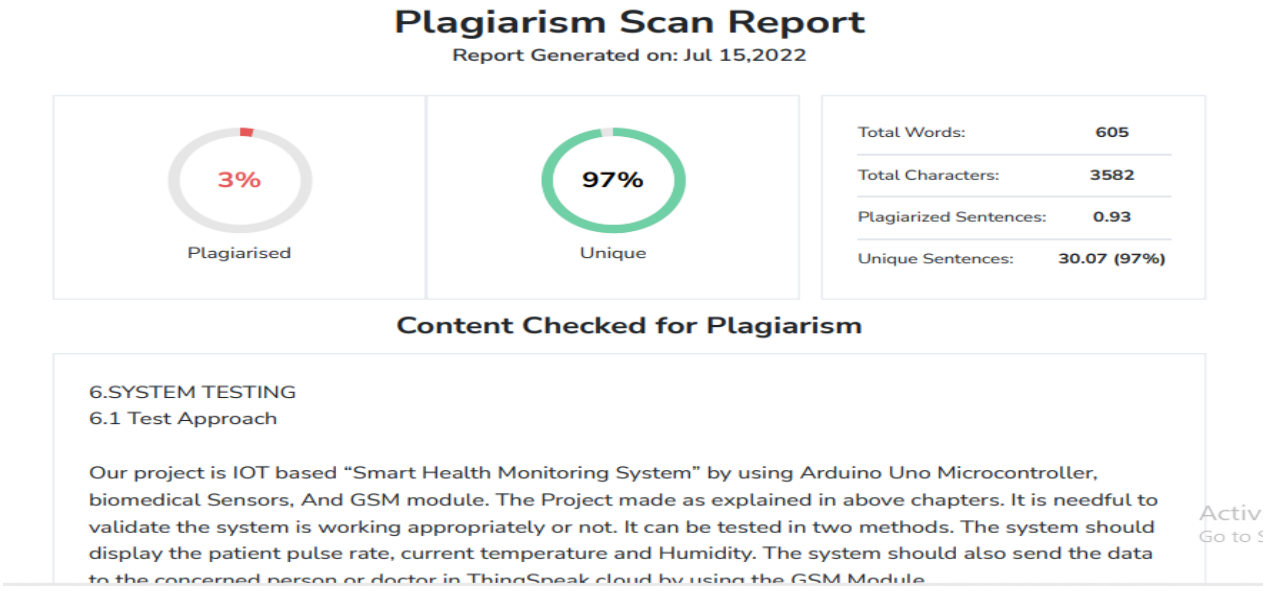


Content Checked for Plagiarism

5. IMPLEMENTATION
5.1 Hardware Implementation

In this section we design our project Real Time Smart Health Monitoring System using Arduino and with the help of pulse sensor, temperature sensor LM35 and Humidity Sensor DHT 11. The signals sensed

System Testing Chapter Plagiarism



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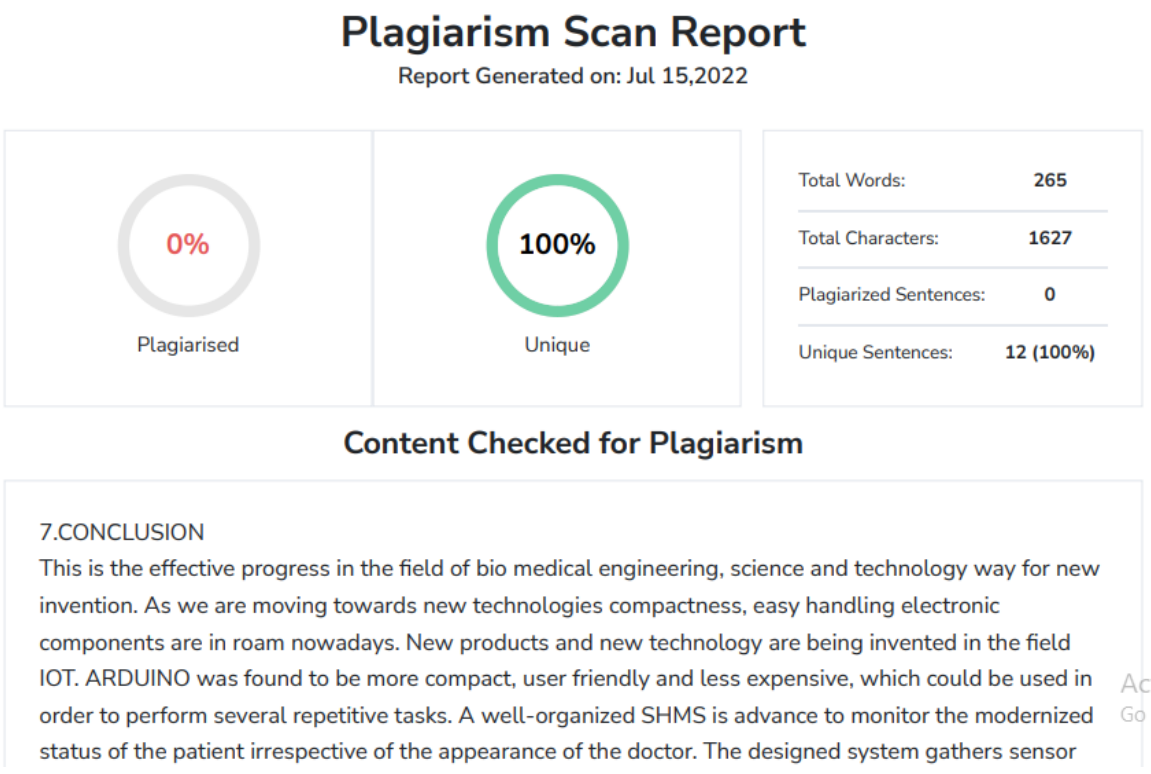
3% Plagiarised	97% Unique
Total Words:	605
Total Characters:	3582
Plagiarized Sentences:	0.93
Unique Sentences:	30.07 (97%)

Content Checked for Plagiarism

6.SYSTEM TESTING
6.1 Test Approach

Our project is IOT based “Smart Health Monitoring System” by using Arduino Uno Microcontroller, biomedical Sensors, And GSM module. The Project made as explained in above chapters. It is needful to validate the system is working appropriately or not. It can be tested in two methods. The system should display the patient pulse rate, current temperature and Humidity. The system should also send the data to the concerned person or doctor in ThingSpeak cloud by using the GSM Module

Conclusion and Future Enhancements Chapters Plagiarism



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0% Plagiarised	100% Unique
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Total Characters:	1627
Plagiarized Sentences:	0
Unique Sentences:	12 (100%)

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7.CONCLUSION
This is the effective progress in the field of bio medical engineering, science and technology way for new invention. As we are moving towards new technologies compactness, easy handling electronic components are in roam nowadays. New products and new technology are being invented in the field IOT. ARDUINO was found to be more compact, user friendly and less expensive, which could be used in order to perform several repetitive tasks. A well-organized SHMS is advance to monitor the modernized status of the patient irrespective of the appearance of the doctor. The designed system gathers sensor

APPENDIX E: INSTALLATION AND EXECUTION STEPS

INSTALATION STEPS

STEP 1: Check out the system requirement i.e, Windows/ MacOs /Ubuntu.

STEP 2: The OS which we deal with is Windows10 64-bit processor.

STEP 3: There should be minimum 5 Gbs disk space to download and install.

STEP 4: Go to the official site to download and install Arduino IDE using Google Chrome or any other web browser. OR click on the following link: http://www.arduino.cc/en/main/software

STEP 5: Select the Download Arduino IDE for windows Arduino IDE 1.8.19 Button.

STEP 6: Click on the Download Tab.

STEP 7: Save the .exe file to your hard drive.

STEP 8: Open the .exe file.

STEP 9: Select which folder to install the program to, then click “Install”.

STEP 10: The program to finish installing, then click “Close”.

CONFIGURING ARDUINO IDE

STEP 1: Connect Arduino Uno to USB Cable and Connect the USB cable to PC.

STEP 2: Check the Arduino Uno Working condition.

STEP 3: Launch Arduino IDE

STEP 4: Open your first project.

STEP 5: Select your Arduino board.

STEP 6: Select your serial port

STEP 7: Upload the program to your board.

SETTING UP THINGSPEAK

STEP 1: Go to ThingSpeak Home Page

STEP 2: Sign Up and Create New Channel with Required fields

STEP 3: On creating a new channel, get something called the API Keys.

STEP 4: Upload the API Keys in Arduino Program.

EXECUTION STEPS

STEP 1: Place the SHMS Device in required place.

STEP 2: Connect all sensor to the person.

STEP 3: Power on the SHMS Device.

STEP 4: The result is Displayed in LCD.

SETP 5: The and also SHMS Device will have uploaded Data in ThingSpeak Cloud.

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