HEALTH MONITORING SYSTEM

A PROJECT REPORT

in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

IN

ELECTRICAL ENGINEERING

Under the Guidance of

Tathagata Chatterjee

Project Carried Out At

Academy of Skill Development

ASD
Skills For Employment

Submitted By

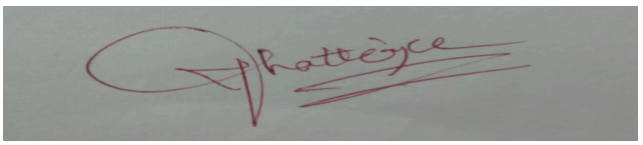
Anirudda Choudhury, Ayon Roy, Akrity Pandey, Alfia Naaz, Aritra Dam, Aditi Kumari

NETAJI SUBHASH ENGINEERING COLLEGE, KOLKATA

ASD
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Certificate from the Mentor

This is to certify that **Aniruddha Choudhury , Ayon Roy , Akrity Pandey, Alfia Naaz , Aritra Dam , Aditi Kumari** has successfully completed the project titled **HEALTH MONITORING SYSTEM** under my supervision during the period from February to May which is in partial fulfillment of requirements for the award of the B.Tech and submitted to Department **Electrical Engineering** of **Netaji Subhash Engineering College.**



Signature of the Mentor

Date: 04/06/2021

ACKNOWLEDGEMENT

I take this opportunity to express my deep gratitude and sincerest thanks to my project mentor, **Tathagata Chatterjee** for giving the most valuable suggestion, helpful guidance and encouragement in the execution of this project work.

I would like to give a special mention to my colleagues. Last but not the least I am grateful to all the faculty members of **Academy of Skill Development** for their support.

In association with



1. **Title of the Project:** Health Monitoring System
2. **Project Members:** a) Aniruddha Choudhury (Team Leader)
   b) Ayon Roy
   c) Akrity Pandey
   d) Alfia Naaz
   e) Aritra Dam
   f) Aditi Kumari

3. **Name and Address of the Guide:**

   Tathagata Chatterjee

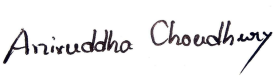
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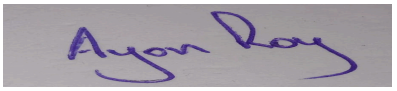
   Ardent Computech Pvt Ltd (An ISO 9001:2015 Certified)

   Module 132, SDF Building, Sector 5, Salt Lake, Kolkata - 64

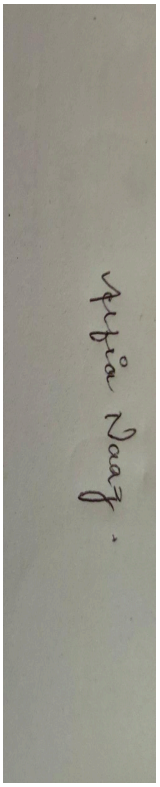
4. **Educational Qualification of the Guide:** M.Tech, B.Tech
5. **Working / Training experience of the Guide:** 3 Years

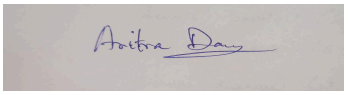
MEMBERS:

1.Aniruddha Choudhury 

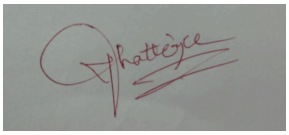
2.Ayon Roy 

3.Akrity Pandey 

4.Alfia Naaz 

5.Aritra Dam 

6.Aditi Kumari 



Signature of Approval

Date: 04 /06/2021

PROJECT RESPONSIBILITY FORM

GROUP NO.	SL.NO.	NAME OF MEMBER	RESPONSIBILITY
3	1	Aniruddha Choudhury (Team Leader)	Programming & Circuit Designing
	2	Ayon Roy	Circuit Designing & project report
	3	Akrity Pandey	Documentation & circuit designing
	4	Alfia Naaz	Project execution & documentation
	5	Aritra Dam	Programming & project execution
	6	Aditi Kumari	Project report &documentation

Each group member must participate in project development and developing the ideas for the required elements. Individual group members will be responsible for completing tasks which help to finalize the project and the performance. All group members must be assigned a task.

Date: 04 /06/2021

Name of the students : 1.Aniruddha Choudhury (Team Leader)

2. Ayon Roy

3. Akrity Pandey

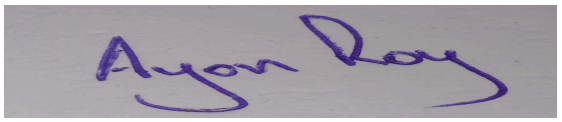
4. Alfia Naaz

5. Aritra Dam

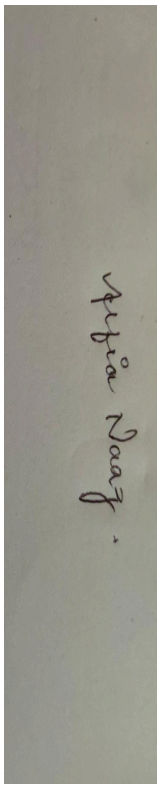
6. Aditi Kumari

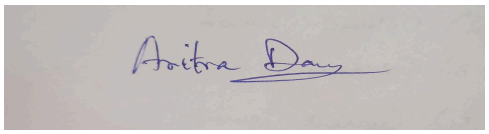
Signatures of the students:

a. 

b. 

c. 

d. 

e. 

f. 

DECLARATION

We hereby declare that the project work being presented in the project proposal entitled **"HEALTH MONITORING SYSTEM"** in partial fulfillment of the requirements for the award of the degree of **BACHELOR OF TECHNOLOGY IN ELECTRICAL ENGINEERING** at **ARDENT COMPUTECH PVT. LTD, SALTLAKE, KOLKATA, WEST BENGAL,** is an authentic work carried out under the

guidance of **MR. TATHAGATA CHATTERJEE**. The matter embodied in this project work has not been submitted elsewhere for the award of any degree of our knowledge and belief.

Date: 4TH JUNE,2021

Name of the Students : 1.Aniruddha Choudhury (Team Leader)

2. Ayon Roy

3. Akrity Pandey

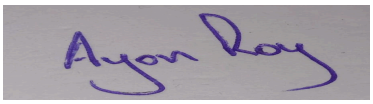
4. Alfia Naaz

5. Aritra Dam

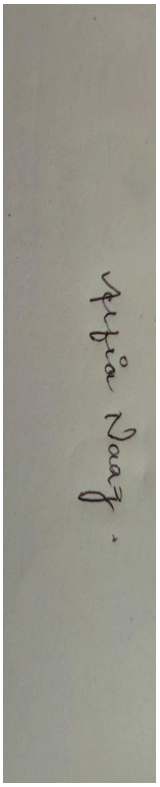
6. Aditi Kumari

Signature of the students

a. Aniruddha Choudhury

c. 

c. Akrity Pandey

d. 

e. 

f. 

PROJECT OBJECTIVE

In a world where rapid technological advancements in the field of health and medical science are revolutionizing the ways of diagnosis, we, through our project on Health monitoring system, have focused on checking the basic parameters of health like heart rate, blood pressure and body temperature to come served in a plate in a user friendly and easily manageable monitoring device by using the concept and technology of Arduino.

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1.	Project Component List
2.	Description of each component

3.	Project discussions
4.	Project steps
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PROJECT COMPONENT LIST

Sl No.	NAME OF THE COMPONENT	NO. OF UNITS
1	Arduino UNO R3	1
2	20 x 4 LCD Display	1
3	10K Ohm Potentiometer	1
4	220 Ohm Resistor	2
5	Heartbeat sensor module with probe(finger based)	1
6	Breadboard	1
7	Connecting wires	1
8	Temperature sensor	1
9	Sunrom bp sensor ,serial out model #4118	1
10	LED(red)	1

COMPONENT DESCRIPTIONS

1)Arduino UNO R3: Arduino UNO is a microcontroller board based on the ATmega328P.It has 14 digital input/output pins(out of which 6 can be used as



PWM outputs),6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. Simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2)20 x 4 LCD Display:

A **liquid-crystal display** (**LCD**) is a flat-**panel display** or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.



A 20x4 **LCD** means it can **display 20** characters per line and there are **4** such lines. In this **LCD** each character is **displayed** in 5x7 pixel matrix. This **LCD** has two registers, namely, Command and Data

3)10K ohm Potentiometer:

A **potentiometer** is nothing but a **resistor** with one variable end. For a **10k potentiometer**, if we measure the resistance between terminal 1 and terminal 3, we will get a value of **10k** because both the terminals are fixed ends of the **potentiometer**.



4)220 Ohm Resistor:

Resistors are used to reduce current flow and the voltage levels within circuits.



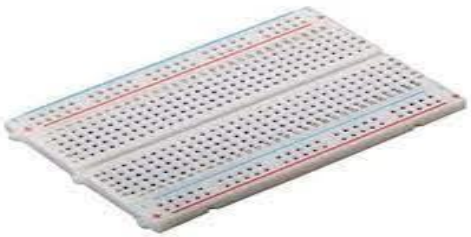
5) Heartbeat sensor module with probe (finger based):

Heartbeat sensor provides a simple way to study the function of the heart which can be measured based on the principle of psycho-physiological signal used as a stimulus for the virtual-reality system. The amount of the blood in the finger changes with respect to time. The sensor shines a light lobe (a small very bright LED) through the rear and measures the light that gets transmitted to the Light Dependent Resistor. The amplified signal gets inverted and filtered, in the Circuit. In order to calculate the heart rate based on the blood flow to the fingertip, a heart-rate sensor is assembled with the help of LM358 OP-AMP for monitoring the heartbeat pulses.



6) Breadboard:

A **breadboard** is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The purpose of the **breadboard** is to make quick electrical connections between components- like resistors, LEDs, capacitors, etc- so that you can test your circuit before permanently soldering it together.

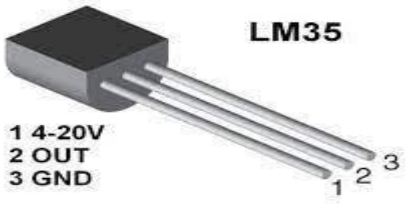


7) Connecting wires:

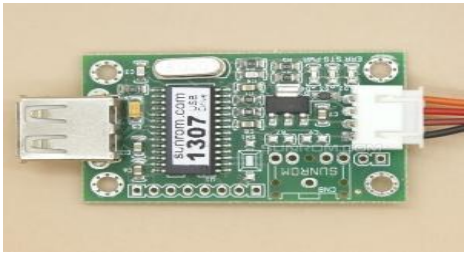
Connecting wires act as the medium for electric current to travel from one point on a circuit to another



8) Temperature sensor: **Temperature sensor** is a device which is specifically designed to measure the hotness or coldness of an object. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). With LM35, the temperature can be measured more accurately than with a thermistor. It also possesses low self-heating and does not cause more than 0.1 °C temperature rise in still air. The operating temperature range is from -55°C to 150°C.



9) Sunrom BP sensor, serial out model #4118: The **Blood Pressure Sensor** is a non-invasive **sensor** designed to measure human **blood pressure.** It measures systolic, diastolic and mean arterial pressure utilizing the oscillometric method.



10) LED (red): A light-emitting diode (**LED**) is a semiconductor device that emits light when an electric current is passed through it.



PROJECT DISCUSSION

This Health Monitoring System measures Heart Rate in BPM, Body Temperature in Fahrenheit, and Systolic and Diastolic value in mmHg of Blood Pressure and shows the values in an LCD screen.

To measure the Heart Rate, we need to put our index finger on the Heart Beat Sensor, to measure Body Temperature, we need to put the Temperature Sensor under the armpit or in the mouth under the tongue and to measure the Blood Pressure, we have to put the Cuff around the bare upper hand. Then the sensors will send their analog values to the Arduino UNO. The analog values obtained by the sensors will be converted to conventional units by the program coded for that purpose and displayed in the 20X4 LCD Display. If the values observed are not in the normal range, appropriate message will be displayed and the red LED will glow to warn about the same.

PROJECT STEPS

As mentioned above, we have used 3 types of sensors and the concept of Arduino to build this project. The temperature sensor LM35 will give an analog input of the body temperature which will be processed by using the variable "tmp", converted to the conventional Fahrenheit unit and stored in the variable "fahrenheit". The heartbeat sensor module with a finger-based probe will get analog inputs of the heartbeat which will be processed through the variable "heartValue" to get the average BPM and last but not the least, the Sunrom BP sensor will measure the systolic and diastolic blood pressure and the values will be stored in variables "sys" and "dia" respectively. Finally, all of the values, viz, BPM, Heart rate and Blood pressure (systolic and diastolic) will be displayed on the 20×4 LCD Display. Abnormalities in the readings, if any, will be displayed accordingly. Besides, the red LED will glow in case any anomaly is detected.

The coding required for the aforementioned system is given herewith :

SOURCE CODE:

```
#include <LiquidCrystal.h>

int heartPin = A0;

int tempPin = A1;

int LED = 10;

float heartValue = 0;

char sbuffer[30], ch;

unsigned char pos;

float sys, dia;

int count = 9;

unsigned long starttime = 0;

int heartrate = 0;
```

```
boolean counted = false;
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

void setup (void) {
pinMode(LED, OUTPUT);
lcd.begin(20, 4);
Serial.begin (9600);
}

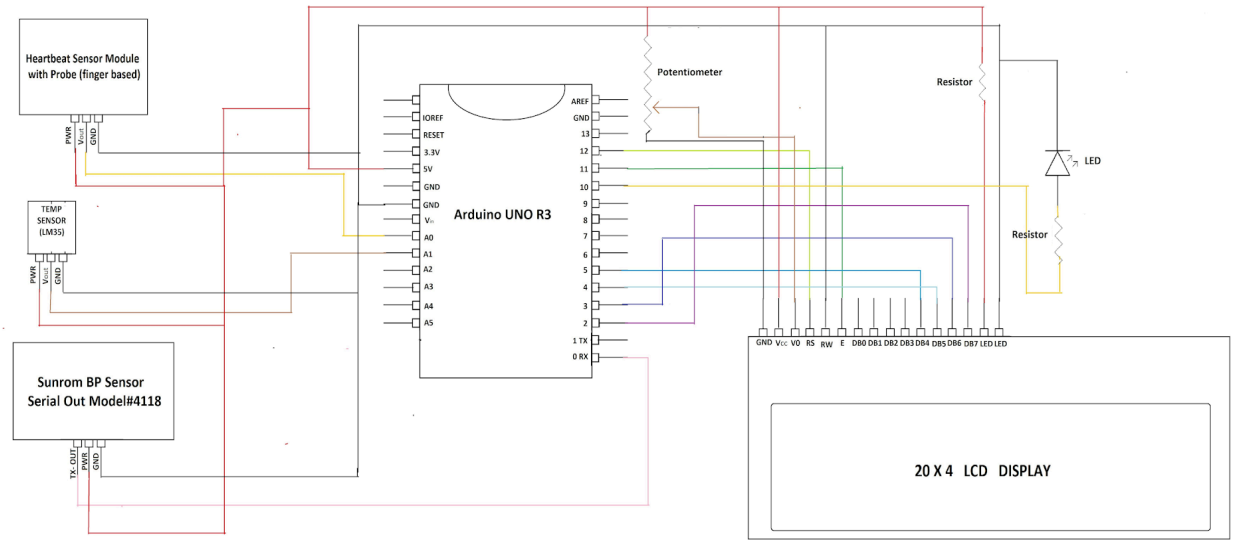
char mygetchar(void)
{
 while (!Serial.available());
 return Serial.read();
}

void loop ()
{
int tmp = analogRead(tempPin);
float voltage = tmp * (5000/1023);
float fahrenheit = (voltage*9/50)+32;
starttime = millis();
while (millis()<starttime+10000)
{
heartValue = analogRead(heartPin);
if (heartValue > 550 && counted == false)
{
count++;
counted = true;
}
else if (heartValue < 550)
{
```

```
counted = false;
}
}
heartrate = count*6;
ch = mygetchar();
 if(ch==0x0A)
 {
    pos = 0;
    sys = ((sbuffer[1]-'0')*100) + ((sbuffer[2]-'0')*10) +(sbuffer[3]-'0');
    dia = ((sbuffer[6]-'0')*100) + ((sbuffer[7]-'0')*10) +(sbuffer[8]-'0');
 }
else
{
    sbuffer[pos] = ch;
    pos++;
 }
count = 0;
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Heart Rate ");
  lcd.print(heartrate);
  lcd.print(" BPM");
  lcd.setCursor(0, 1);
  lcd.print("Temp ");
  lcd.print(fahrenheit);
  lcd.print(" *F");
  lcd.setCursor(0, 2);
  lcd.print("BP ");
  lcd.print(sys);
  lcd.print("  ");
  lcd.print(dia);
```

```
  lcd.setCursor(0, 3);
if(heartrate<60)
 {
  lcd.print("HR LOW ");
  digitalWrite(LED, 1);
 }
if(heartrate>100)
 {
  lcd.print("HR HIGH ");
  digitalWrite(LED, 1);
 }
if(sys<100 && dia<60)
 {
  lcd.print("BP LOW");
  digitalWrite(LED, 1);
 }
if(sys>135 && dia>85)
{
  lcd.print("BP HIGH ");
  digitalWrite(LED, 1);
}
if(fahrenheit>99)
{
  lcd.print("FEVER");
  digitalWrite(LED, 1);
}
else
{
 lcd.print(" ");
 digitalWrite(LED, 0);
} }
```

PROJECT CIRCUIT DIAGRAM



Circuit diagram of 'Health Monitoring System'

RESULT

The results obtained can be summarized as follows:-

I.) Checking heart rate:

- Display the heart rate.
- If the heart rate is less than 60, the LCD will display **"HR LOW"** and the LED turns ON.
- If the heart rate is more than 100, the LCD will display **"HR HIGH"** and the LED turns ON.

II.) Checking blood pressure:

- Display systolic and diastolic blood pressure.
- If the Systole and Diastole readings obtained are lesser than 100 and 60 respectively, the LCD displays **"BP LOW"** and the LED turns ON.
- If the Systole and Diastole readings obtained are higher than 135 and 85 respectively, the LCD displays **"BP HIGH"** and the LED turns ON.

III.) Checking the body temperature:

- If the temperature reading is higher than 99°F, the LCD prints **"FEVER"** and the LED turns ON.

The LED will remain OFF if all of the readings obtained are in the normal range for the human body.

CONCLUSION

In the above mentioned system, we have proposed a health monitoring system. It is a user friendly system, simple and power efficient. The main objective of the experiment was successfully achieved. All the individual modules like Heartbeat detection, blood pressure module, temperature sensor etc. gave out the intended result. Most importantly, all the components used our project design are available easily. From an engineering perspective, the project has seen concepts being acquired through coding and designing the circuit, with the technology of Arduino practically applied. The knowledge of Electric circuit analysis was used during designing and application of the individual modules and the knowledge of software programming were used to code the program and complete the desired project.

REFERENCES

The following sites were used as references for the completion of the project:

- www.sunrom.com
- TinkerCad
- www.electronicshub.org