A PROJECT REPORT ON

SMART HEALTH MONITORING SYSTEM

Bachelor of Technology
In
Electrical and Electronics Engineering

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Subject:

Measurement and Instrumentation (EEE2004)

CERTIFICATE

This is to certify that the project work entitled **“SMART HEALTH MONITORING SYSTEM”** that is being submitted by **Lakshmi Sathyan K, Shruti Suresh Nair, Prakriti Dey, Vishnu A, Nitin Flavier M** for Measurement and Instrumentation is a record of bonafide work done under my supervision. The contents of this project work, have neither been taken from any other source nor have been submitted for any other CAL course.

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Date:01/12/2021

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PROF. THAMILMARAN A

ACKNOWLEDGMENT

Hereby we take this opportunity to earnestly acknowledge and thank the sincere efforts of our faculty **Prof. Thamilmaran A**, senior Asst Professor Dept of Electrical Engineering for his valuable guidance and feedback that helped us in completing this project.

Sincere thanks of gratitude to our non-teaching staff **Mr. Deepaprasath S** for his constant guidance, valuable suggestion, and cooperation throughout.

The team is grateful to the institute, **Vellore Institute of Technology** for this precious opportunity. We learned to put forward all our ideas into one single project and helped each other with it throughout.

All in all, we would like to thank everyone involved in this project and helped us with their suggestions to make the project better.

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ABSTRACT

The project presents a “Smart Health Monitoring system” that uses biomedical sensors to check a patient's health status and uses the internet to inform the concerned.

The project includes a working model which is capable of doing multiple tasks. It incorporates the use of sensors to measure parameters like human body temperature, distance, pulse rate, etc. If the recorded value is abnormal according to the code parameters, it alerts the user using a buzzer and shows the result on the LCD display to notify the user. The biomedical sensors here are connected to an Arduino UNO controller to read the data which is in turn interfaced to an LCD display/serial monitor to see the output. This is very useful for self-health analysis and also alerts the user regarding the same.

INTRODUCTION

Telemedicine information systems have become increasingly essential, particularly intelligent systems used to provide high-quality healthcare monitoring, which saves on medical and manpower costs. With newer technologies, computer-based portable embedded devices have taken our healthcare to another level, So that people may manage their daily routine checkups at home. In addition, this is important to provide people continuous monitoring in non-clinical environments. However, such health management can only be achieved if these computer-based portable monitoring devices with smart sensor technologies are available.

Hence, we have come up with a prototype of a portable smart health monitoring system that can be used by people both indoors and outdoors for multiple purposes as mentioned earlier. In our work, there is a complete package of hardware and software. Different biomedical sensors like temperature, heartbeat rate sensors are interfaced with Arduino UNO microcontroller and get the reading from sensors.

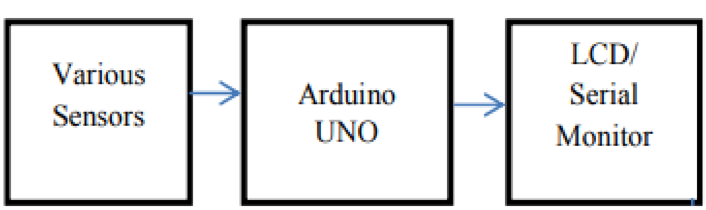
The project aims at executing 4 different tasks by using a single Arduino UNO board and other required sensors. The end product was created so that it is user-friendly. It includes pushbuttons providing the user to choose what task to do according to their need and it also encompasses a buzzer and LCD board so as to alert the user with the information regarding the task done.

Aim:

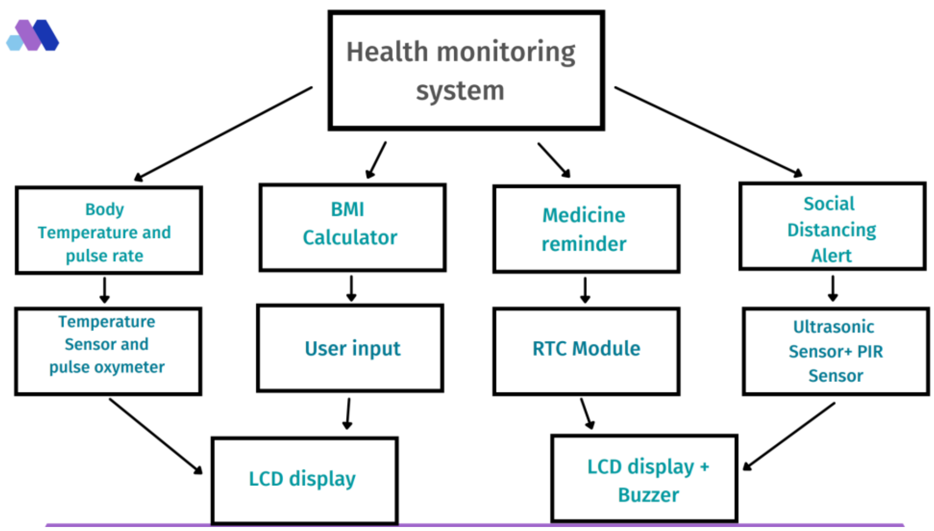
To create a "`SMART HEALTH MONITORING SYSTEM" with multiple functionalities such that the system is capable to do multiple tasks, one at a time using pushbuttons.

It facilitates the following activities:

- Social distancing alerts
- Temperature and pulse rate measurement
- BMI calculation
- Medicine intake reminder



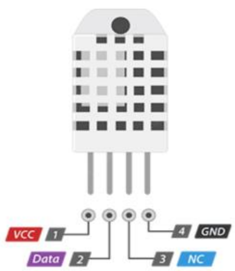
BLOCK DIAGRAM

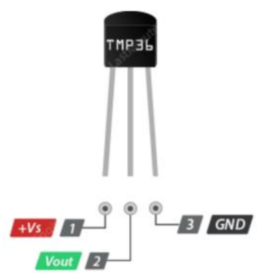


HARDWARE DESCRIPTION

1. **Arduino Uno**: It is a microcontroller based on the ATmega328P. It has 14 digital I/O pins (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. This controller has everything needed to support the microcontroller by simply connecting it to a computer with a USB cable or powering it with an AC-to-DC adapter. The adapter can be connected to the Arduino Uno by plugging into the power jack of the Arduino board. Similarly, **the battery** leads can be connected to the Vin pin and the GND pin of the POWER connector. The suggested voltage range will be 7 volts to 12 volts. The operating voltage of this microcontroller is 5v.The 14 digital pins on the Arduino Uno can be used as input & output with the help of the functions like pinMode(), digitalWrite(), & Digital Read().It offers UART TTL-**serial communication,** and it is accessible on digital pins like TX (1) and RX (0).

2. **Temperature sensor**: The temperature sensor used is TMP36/DTH22.It is a **basic digital temperature and humidity sensor**. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin, no analog input pins are needed. Its temperature measuring range is from -40°C to +125°C with +-0.5 degrees accuracy. It consists of an NTC temperature sensor/Thermistor to measure temperature. A thermistor is a thermal resistor – a resistor that changes its resistance with temperature. The term “NTC” means “Negative Temperature Coefficient”, which means that the resistance decreases with the increase in temperature. There is a small PCB with an 8-bit SOIC-14 packaged IC on the other side. This IC measures and processes the analog signal with stored calibration coefficients; does analog to digital conversion, and spits out a digital signal with the temperature.





3. **Pulse sensor**: The Pulse sensor used is **SEN-11574**. A pulse sensor or any optical heart-rate sensor, for that matter, works by shining a green light (~ 550nm) on the finger and measuring the amount of reflected light using a photosensor. Human blood has the ability to absorb green light. The redder the human blood, the more green light is absorbed. When the blood is pumped through the finger with each heartbeat, the amount of reflected light changes and creates an output signal in the photosensor. This signal is generally small and noisy, therefore the signal is passed through an R/C filter network and then amplified using an Op-Amp to create a signal that is much larger, cleaner, and easier to detect. Basically, it has three pins namely GND, VCC, and signal respectively. The signal pin is the output signal connected to the analog input of an Arduino.

4. **Ultrasonic Sensor:** The Ultrasonic sensor used is **HC-SR04**.It consists of two ultrasonic transducers. The one acts as a transmitter which when a pulse is applied to a trigger pin converts electrical signals into 40 kHz ultrasonic sound pulses which are 8 in number. These 8 pulses travel to the receiver end and during this time period, the Echo pin goes HIGH to start forming the beginning of the echo-back signal. When those pulses are reflected back, the Echo pin goes low as soon as the signal is received. This produces a pulse whose width varies, depending upon the time it took for the signal to be received. The width of the received pulse is then used to calculate the distance to the reflected object.

   Distance = Speed x Time

   This is the formula used to calculate how far the object is from the sensor, provided the speed of sound is 340m/s and the width of the pulse is Time.

5. **Switch /push button :**Push Buttons are normally open tactile switches. Push buttons allow us to power the circuit or make any particular connection only when we press the button. Simply, it makes the circuit connected when pressed and breaks when released. When the pushbutton is open (unpressed) there is no connection between the two legs of the pushbutton, so the pin is connected to the ground, and we read a LOW. When the button is closed (pressed), it makes a connection between its two legs, connecting the pin to 5 volts of Arduino UNO, so that we read a HIGH.

6. **LCD / Serial monitor** : Displaying unit used is 16x2 LCD. It means that there are two rows in which 16 characters can be displayed per line, and each character takes 5X7 matrix space on LCD. It is the **HD44780U dot matrix LCD controller.**

7. **Buzzer:** Active Buzzer consists of a solid, plastic coat on the bottom and a label that says to remove it after washing. Only requires an external DC voltage to make it sound (batteries or USB from Arduino). An active buzzer has a built-in oscillating source, so it will make sounds when electrified.

SOCIAL DISTANCING ALERT

In the world where we currently reside, an increase in different kinds of commutative diseases is observed. Hence social distancing has become a viable requirement. It is well known that prevention is better than cure. The most efficient way to keep oneself safe from viruses is maintaining a safe distance when in public.

It is tedious to have a look around and be conscious throughout while in public points, hence a device that alerts u when someone approaches u closer than the safe distance would be a viable alternative.

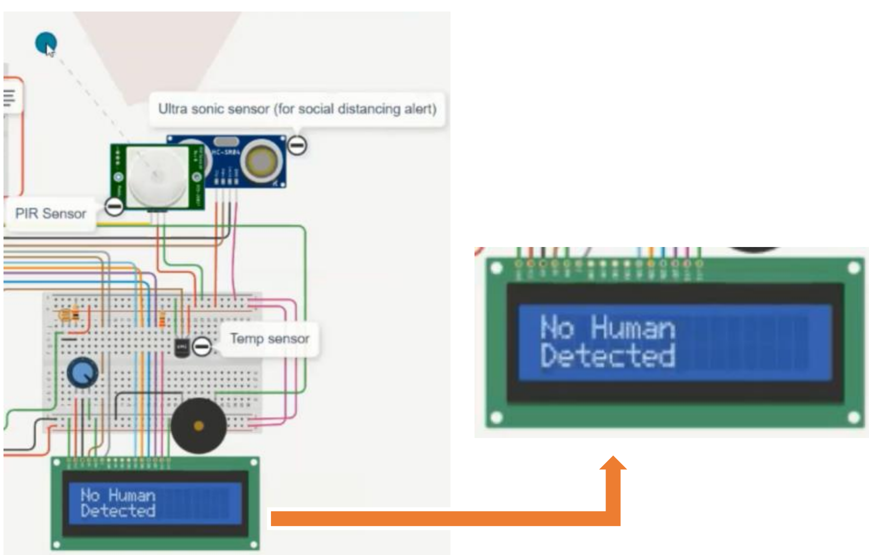
The first functionality of our project is alerting close interference of humans beyond safe distance. It is designed and coded such that when there is any human intervention beyond a safe distance of 1.5m the buzzer rings and the LCD notifies the user.

Here for this task, the circuit requires the use of 2 sensors i.e., the ULTRASONIC SENSOR and the PIR SENSOR. The ultrasonic sensor emits radiations that bounce off the surface of the obstacle and the receiver end of the sensor then inputs these reflected radiations. The distance from the obstacle is hence measured.

We do not wish to be notified by any obstacle. What matters to us is human interference; hence we use the PIR sensor. This receives and detects infrared waves from animate obstacles like humans.

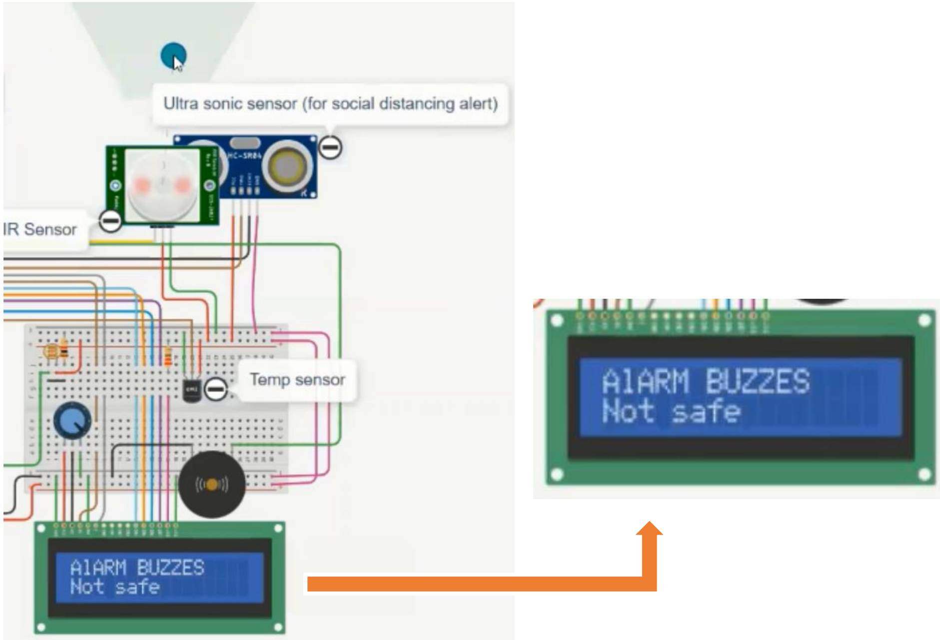
Thus, the system alarms only when the obstacle is animate and is at a distance lower than 1.5 meters.

Case 1: When distance is less than 1.5m



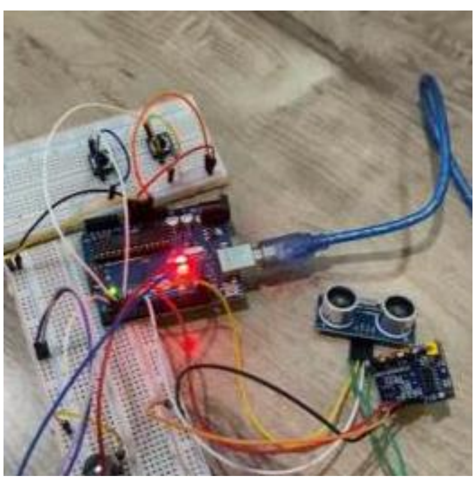
(Software simulation diagram: when the obstacle is at a safe distance)

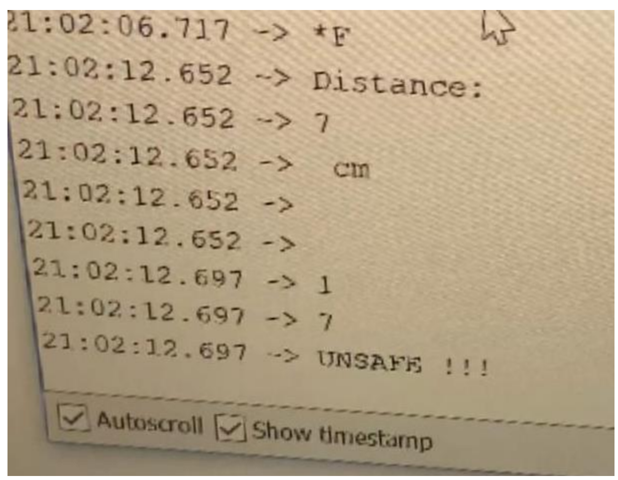
Case 2: When distance is more than 1.5m



(Software simulation diagram: when the obstacle is not at a safe distance)

Snips of the Simulation





BODY MASS IDEX (BMI) CALCULATOR

Body Mass Index (BMI) is a measurement of a person's weight with respect to his or her height. It is more of an indicator than a direct measurement of a person's total body fat. BMI, often, correlates with total body fat. This means that as the BMI score increases, so does a person's total body fat.

The WHO defines an adult who has a BMI between 25 and 29.9 as overweight - an adult who has a BMI of 30 or higher is considered obese - a BMI below 18.5 is considered underweight, and between 18.5 to 24.9 a healthy weight.

Body Mass Index (BMI)	Weight Status
Below 18.5	Underweight
18.5 - 24.9	Normal
25.0 - 29.9	Overweight
30.0 plus	Obese

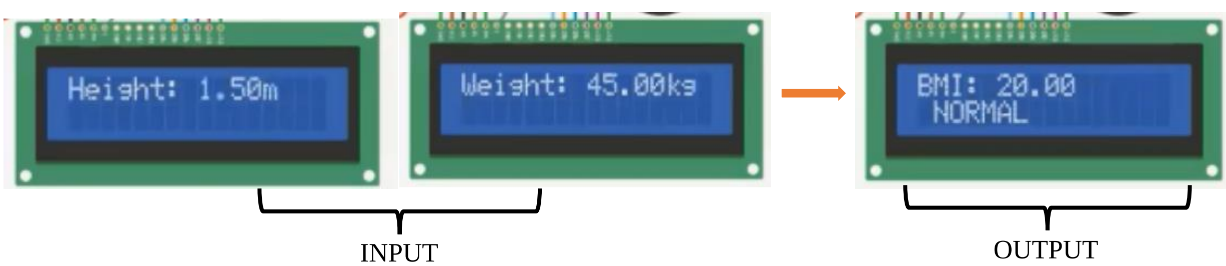
The formula used for calculating the BMI is:

BMI = (Weight in kilograms) divided by (Height in meters squared)

$$\boldsymbol{BMI = \frac{weight(kg)}{(height\ (m))^2}}$$

Here the project incorporates BMI calculation as its 3rd functionality. Here the input is taken from the user and displayed on the LCD screen. The calculation is then done using the software algorithm. The calculated BMI is then later displayed on the LCD screen along with the health status.

Case 1: Normal BMI



Case 2: Abnormal BMI

(LCD Board Displays)

TEMPERATURE SENSOR

In the wake of the covid pandemic, the most effective way of identifying any covid symptom has been by the measurement of body temperature and then determining whether the person is experiencing any symptoms of COVID-19 or not.

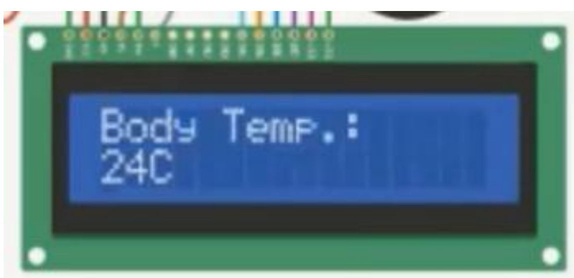
The second functionality of our project is temperature and pulse measurement. Here the temperature and pulse are measured together and hence the results are visible on the LCD screen together.

For this, we have used the DHT22 temperature module for measuring the body temperature and then have included the safe range of temperature with the safe range being below 36 degrees Celsius.

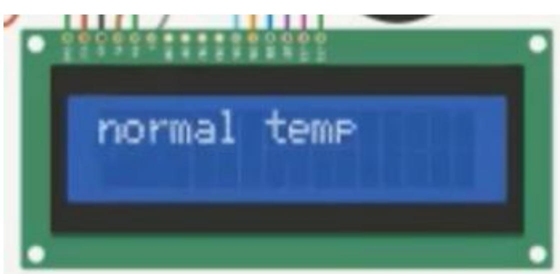
To measure the temperature, we need to hold the DHT22 in our hands, and then after a few seconds the temperature is shown on the LCD screen and if the temperature is unsafe i.e. it is more than 36 degrees Celsius, then the buzzer starts ringing and we are notified.

Case-1:

When the temperature is normal, it is shown on the lcd screen along with the term “normal temp”.



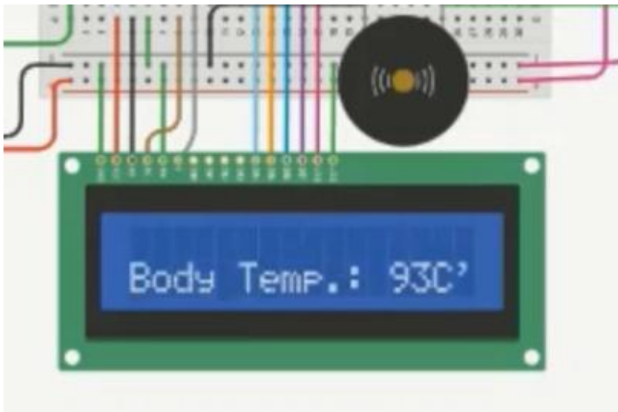
Body temperature measurement



LCD screen showing normal body temperature

Case-2:

When the temperature is high i.e., higher than the specified range in the code then the buzzer starts buzzing and has it is deemed unsafe.



Here the temperature is very high, so to notify the unsafe temperature, the buzzer starts buzzing.

PULSE SENSOR

Along with the measurement of the temperature, we have also included the measurement of pulse in our project.

Measurement of pulse helps in identifying a lot of problems as a normal pulse rate signifies that the person’s heart is working well and efficiently. But if there’s any abnormality in the pulse range, there can be a lot of underlying symptoms such as palpitations, dizziness, fainting, chest pain or shortness of breath.

The normal pulse rate of a healthy adult lies between 60-100 bpm per minute. This value may change for people who are more physically active.

In our project, we have used the SEN-11574 pulse sensor. To measure the pulse, we need to hold the pulse sensor in our hands, then after a few seconds the body temperature and the pulse measurement are visible on the LCD screen.

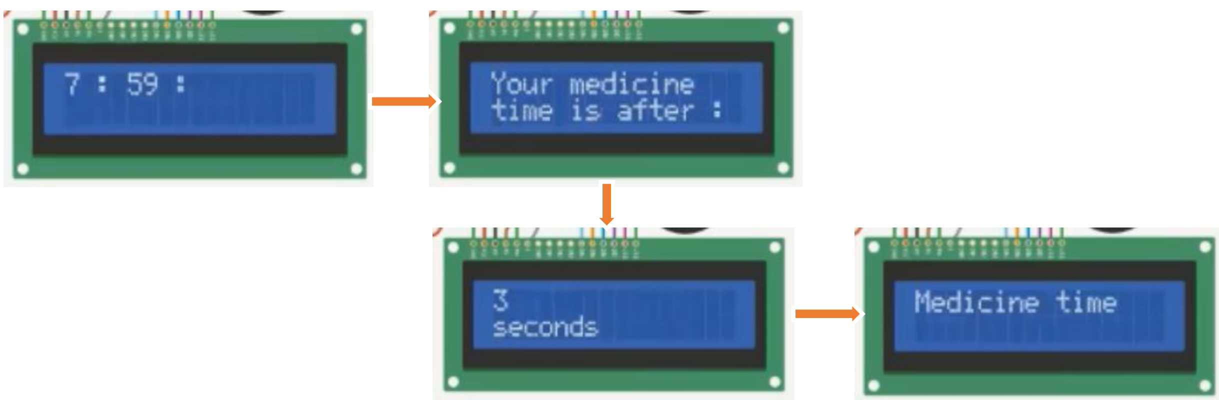
MEDICINE REMINDER

The fourth functionality of this device is medicine reminder. With the help of one of the push-button or switches, we can start the timer which will give an alert to us at our given medicine time.

We can use an RTC module –(Real-time clock) for this purpose in which we don't have to give the input timing at the pressing of the switch. Due to defective components and lack of time, we didn't use the RTC module in our project, instead, we made an algorithm which we ask for the current time at the pressing of the switch button from the user as the input data. The code is written in such a way that it follows a 24-hours clock and will act as a timer.

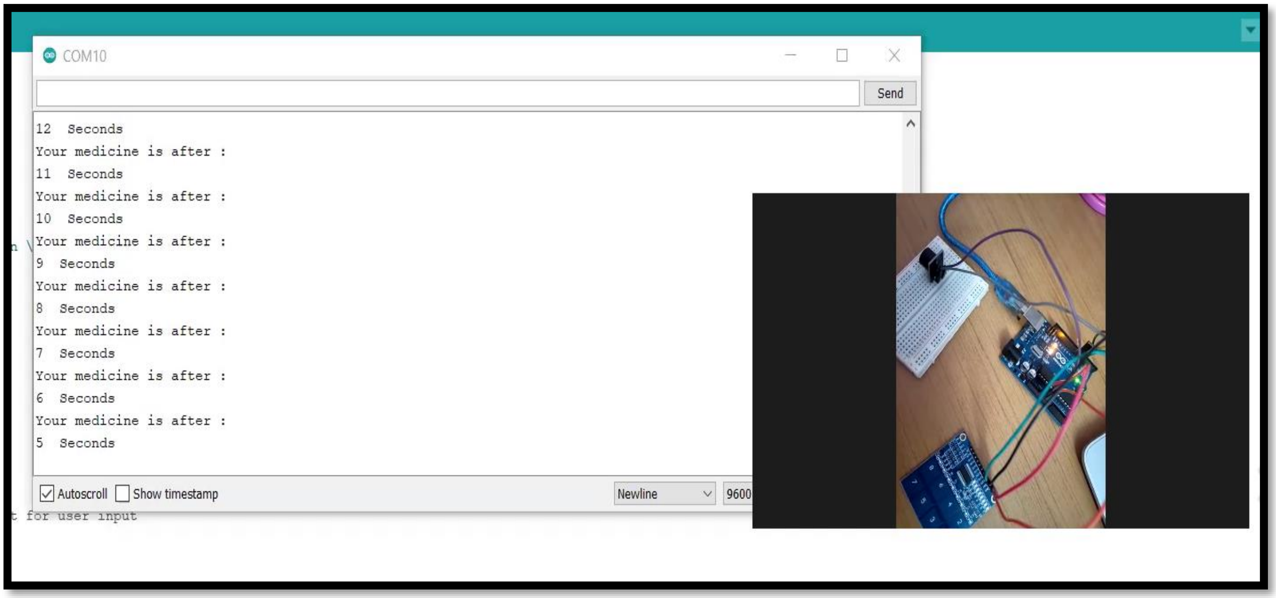
In our project, we have taken the medicine intake time as 8 am and 8 pm. So, whenever we switch the medicine reminder on, the system will ask us to input the current time. The algorithm will then calculate the time left for the next round of medicine intake depending upon whether the input time is before 12 pm or 12 am. Once the alert is given by the buzzer at the given reference time, the system will display the time left for the next round of medicine intake.

Without the help of the RTC module, we have successfully deployed the medicine reminder that we had planned to. We can change the reference time according to our need and this project can actually be used by any person even with the prototype that we have developed. It will be as effective as any other system available in the market or simply our mobile's alarm.



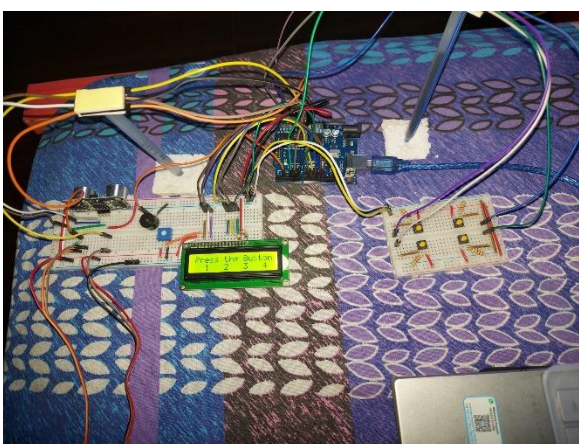
(LCD Board Displays)

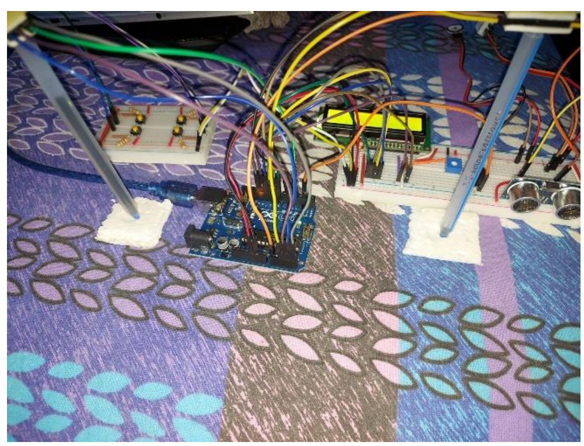
Software Simulation result:



(Count Down for Medicine reminder along with the hardware circuit)

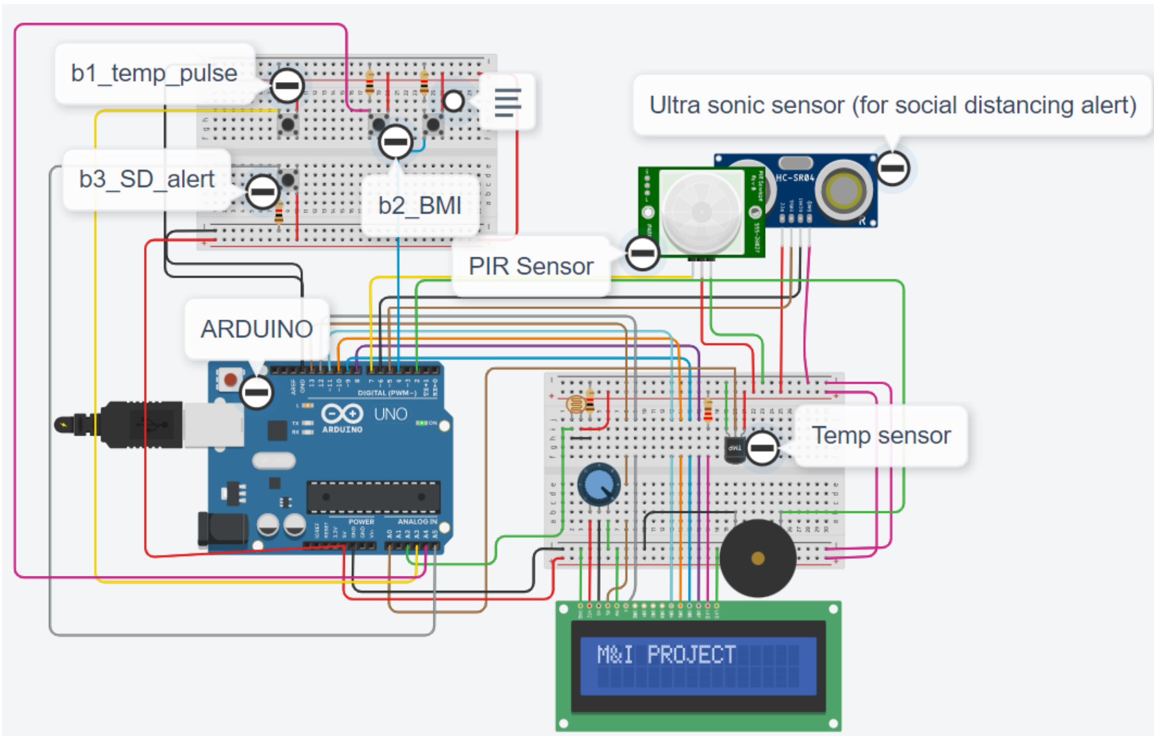
HARDWARE MODEL





CIRCUIT DIAGRAM (SOFTWARE)

The software used for the circuit simulation is Tinckercad. It is basically a web-based 3D CAD and an online simulator software that enables users to create 3D designs and program, simulate and assemble electric circuits.



Link of tinkercad :

https://www.tinkercad.com/things/4CEV6h4LKb7-smart-health-monitoring-system-mandiproject/editel

Link of Software simulation video :

https://www.youtube.com/watch?v=_D7kDkEAJco&list=PL7-aeq04AQh8bSyKtpirAmC2fIJYySOs0&index=1

Link of Hardware simulation video :

https://www.youtube.com/watch?v=kDjDmpwKJ5c&list=PL7-aeq04AQh8bSyKtpirAmC2fIJYySOs0&index=2

WORKING EXPLANATION :

The project has been designed in such a way that we can use any of the functionality at any particular time depending upon our need by switching on the switch or the push button. In the final hardware and software simulation video , we have first shown the temperature and pulse measurement of a person. The result of that is displayed on the LCD also on the serial monitor if the LCD is not available. Then we showed the working of social distancing reminder, for which we used ultrasonic sensor and PIR sensor. In a real hardware model, we can use 4 ultrasonic sensors to detect the presence of a person near to us from all 4 directions. Due to the budget limit and time concerns, we have limited the number of ultrasonic sensors. The system displays the distance between us and the other person and if the distance is less than a certain limit, it will give an alert by beeping the buzzer and will also show the same on the LCD.

Next, we have shown how BMI is calculated. We have taken the height and weight of the person as user inputs and then calculated their BMI. The LCD will display whether the person is obese, underweight, or normal weighted. The Buzzer will also beep if the BMI is not normal.

Then we have shown the medicine reminder part. We can set a particular time of the day as per our requirement. In this project, we have set it to 8 am and 8 pm and did the coding part accordingly so that it runs like a 24 hours clock. The LCD also displays the time left for the next round of medicine intake and the buzzer beeps exactly at the time set for medicine intake. It keeps buzzing for 10 secs. With the help of a switch we can turn it off anytime and whenever we start it again, we have to give the input at the current time

We could also use an RTC module to ease the working of medicine reminder where we don't have to give the current time as input and just need to press the switch in order to start the system.

The system can be switched on and off by giving the power supply to Arduino UNO either by connecting it to the laptop or using a 9 V battery since it’s a small model of the system proposed.

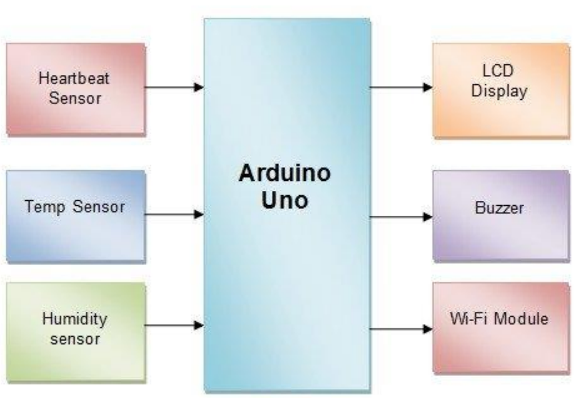
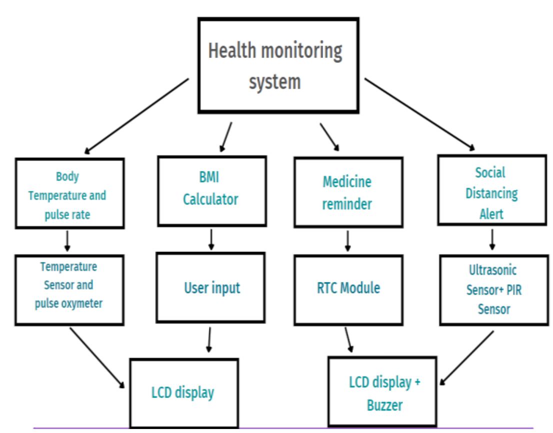
CODE

```
// only on pressing the buttons you can start measurement.
#include <DHT.h>
#include <Adafruit_Sensor.h>
#include <LiquidCrystal.h>
LiquidCrystal lcd(13, 12, 11, 10, 9, 8);
#define DHTPIN A0
#define DHTTYPE DHT22
DHT dht(DHTPIN,DHTTYPE);
float voltage;
float celsius;
int valPulse;
int pulsePin = A2;
//const int temperaturePin = A0;
String seconds;
long duration;
float BMI2;
int buzzerpin = 2,button_1=A3,button_2=A4,button_3=A5,button_4 = 4;

int pir_sensor = 7, triggerPin = 5, echoPin = 6, triggerpin_2 = 4, echopin_2 = 3;
int pir_reader, time, distance;
int minDistance = 100;
int maxDistance = 400;
float height2 ;
float weightKG ;

void setup()
{
  //pinMode(temperaturePin, INPUT);
  pinMode(button_1,INPUT);
  pinMode(button_2,INPUT);
  pinMode(button_3,INPUT);
  pinMode(button_4,INPUT);
  lcd.begin(16, 2);
  Serial.begin(9600);
  lcd.print("M&I PROJECT");
      {
       lcd.clear();
       lcd.setCursor(0,0);
       lcd.print( 86400-i + 28800);
       lcd.setCursor(0,1);
       lcd.print("seconds");
       delay(2000);
       lcd.clear();
      }
  }
 }
  delay(350);
  digitalWrite(buzzerpin,LOW);
  }
 }
```

Link of full code :

CODE.docx

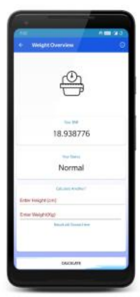
COMPARISON

<table>
<tr><th>Existing Projects</th><th>Our project</th></tr>
<tr><td>The existing projects either provide one or two functionalities at the same time or else they use multiple Arduino for various purposes.</td><td>We have integrated multiple functionalities like body temperature measurement, pulse rate measurement, BMI calculator, social distancing reminder, and medicine reminder into one single system using one Arduino.</td></tr>
<tr><td>We have not used any Wi-Fi module in our project as of now.</td><td>Keeping in mind the drawbacks of Arduino UNO, we came up with the idea of using switches for each function so that it could be used whenever it is required.</td></tr>
<tr><td>The existing projects use the RTC module for any kind of medicine reminders that are available today.</td><td>Without using the RTC module, we successfully created an algorithm that can be used for medicine reminders. The user only needs to enter the current time while switching on the medicine reminder.</td></tr>
<tr><td>Most of the existing projects will have a social distancing reminder with only a temperature sensor added on.</td><td></td></tr>
<tr><td>The available projects use user inputs to calculate BMI and they provide just the BMI.</td><td>In our project, although we take user input to get the BMI , in the future we have plans to get both height and weight of a person using different sensors. We give an alert using buzzer if the person is obese or underweight.</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

FUTURE SCOPE OF THE PROJECT

- We can use an ultrasonic sensor and a digital weighing machine to calculate the height and weight of a person in order to calculate the BMI of the person.
- The entire medical data acquisition could be made wireless and wearable.Such a package would contain the circuiting for inputs from ECG sensors, EEG sensors, pressure measurement and pulse rate transducers. This wearable module can transmit the data continuously over a fiber optic link or through an internet digital radio. The received data can be stored in separate memory and be processed by a microcontroller. This enhancement will enable monitoring of patients to be more flexible and strain-free.
- The output of each sensor can be made to obtain on a website or an app by using the back-end technologies and the data can also be stored for future purposes.
- Adding more sensors in the system and making it an all-in-one affordable device.






CONCLUSION

Hence a successful attempt was made to build a hardware such that it can perform multiples tasks using an Arduino Board and other required sensors. Simple push buttons are used in order to accomplish these tasks one at a time. This user-friendly model hardware and software has been successfully completed.

REFERENCES

1. IoT Based Emergency Health Monitoring System | IEEE Conference Publication

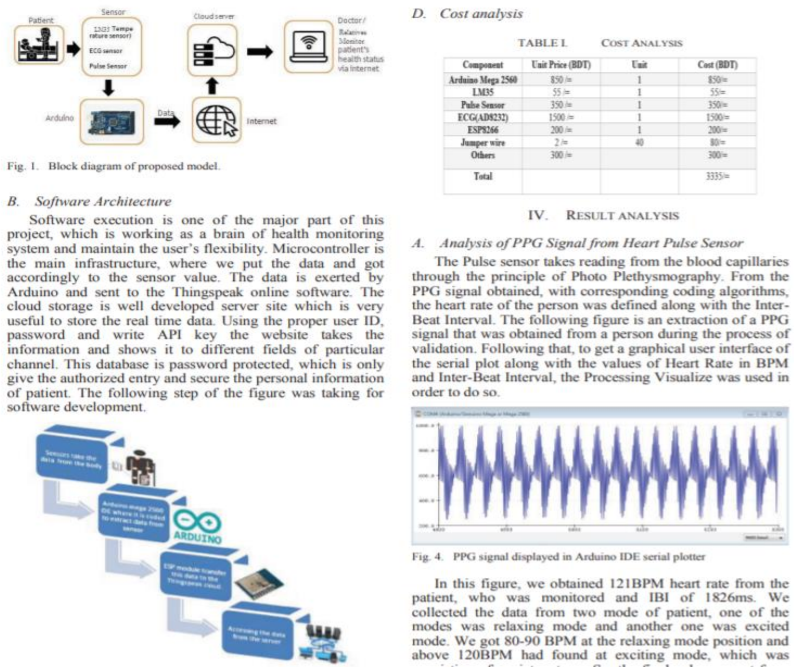


Fig. 1. Block diagram of proposed model.

B. Software Architecture

Software execution is one of the major part of this project, which is working as a brain of health monitoring system and maintain the user's flexibility. Microcontroller is the main infrastructure, where we put the data and got accordingly to the sensor value. The data is exerted by Arduino and sent to the Thingspeak online software. The cloud storage is well developed server site which is very useful to store the real time data. Using the proper user ID, password and write API key the website takes the information and shows it to different fields of particular channel. This database is password protected, which is only give the authorized entry and secure the personal information of patient. The following step of the figure was taking for software development.

D. Cost analysis

TABLE I. COST ANALYSIS

Component	Unit Price (BDT)	Unit	Cost (BDT)
Arduino Mega 2560	850 /=	1	850/=
LM35	55 /=	1	55/=
Pulse Sensor	350 /=	1	350/=
ECG(AD8232)	1500 /=	1	1500/=
ESP8266	200 /=	1	200/=
Jumper wire	2 /=	40	80/=
Others	300 /=		300/=
Total			3335/=

IV. RESULT ANALYSIS

A. Analysis of PPG Signal from Heart Pulse Sensor

The Pulse sensor takes reading from the blood capillaries through the principle of Photo Plethysmography. From the PPG signal obtained, with corresponding coding algorithms, the heart rate of the person was defined along with the Inter-Beat Interval. The following figure is an extraction of a PPG signal that was obtained from a person during the process of validation. Following that, to get a graphical user interface of the serial plot along with the values of Heart Rate in BPM and Inter-Beat Interval, the Processing Visualize was used in order to do so.

Fig. 4. PPG signal displayed in Arduino IDE serial plotter

In this figure, we obtained 121BPM heart rate from the patient, who was monitored and IBI of 1826ms. We collected the data from two mode of patient, one of the modes was relaxing mode and another one was excited mode. We got 80-90 BPM at the relaxing mode position and above 120BPM had found at exciting mode, which was

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2. [Health monitoring system | IEEE Conference Publication]

PULSE OXIMETER	A gadget that measures the oxygen immersion of blood vessel blood in a subject by using a sensor joined normally to a finger, toe, or ear to decide the level of oxyhemoglobin in blood throbbing through a system of vessels Heartbeat oximetry is a noninvasive technique for checking a man's oxygen immersion (SO2) It's perusing of SpO2 (fringe oxygen immersion) isn't generally indistinguishable to the perusing of SaO2 (blood vessel oxygen immersion) from blood vessel blood gas investigation, yet the two correspond enough inside an adequate deviation with the end goal that the sheltered, advantageous, noninvasive, cheap heartbeat oximetry technique is significant for measuring oxygen immersion in clinical utilize In its most normal (transmissive) application mode, a sensor gadget is set on a thin piece of the patient's body, as a rule, a fingertip or ear cartilage, or on account of a baby, over a foot The gadget passes two wavelengths of light through the body part to a photograph finder
BLOOD PRESSURE SENSOR	BP is the weight applied by circling blood upon the dividers of veins At the point when utilized without assist determination, "pulse" ordinarily alludes to the blood vessel weight in the foundational dissemination The circulatory strain is normally communicated regarding the systolic (most extreme) weight over diastolic (least) weight and is measured in millimeters of mercury (mm Hg) Ordinary resting systolic (diastolic) circulatory strain in a grown-up is around 120 mm Hg (80 mm Hg), truncated "120/80 mm Hg" Circulatory strain shifts relying upon circumstance, movement, and illness states It is controlled by the apprehensive and endocrine frameworks Pulse that is low because of an illness state is called hypotension, and weight that is reliably high is hypertension Both have many causes which can run from gentle to serious Both might be of sudden beginning or of long-term Long haul hypertension is a hazard factor for some, ailments, including coronary illness, stroke and kidney disappointment
BUZZER	A bell or a beeper which is a sound flagging generally incorporated to caution about the inconsistency in the system or occurrence of any unexpected behavior It can be mechanical, electromechanical, or piezoelectric
LCD	Liquid precious stone shows a kind of show utilized as a part of computerized watches and numerous convenient PCs It is utilized to show the deliberate information

	Doctors: Show Sensor Data History
Classes	Doctor, User, Patient, Patient Appointment, Diseases And Symptoms.
Set Theory	Let Z = Be A System For Health Monitoring. Distinguish Input As I= $a_1 \ldots a_N$ Where a_i= No of Patients. Z= I Distinguish T As Output I.E. Fruitful Recommendation Z= I, M, N. Distinguish Process P Ia= Information Acquisitions Ce= Customer Embedded System Nets= Net Services, Z = I, M, Ia, Ce, Nets
Success Conditions	When The Correct Inputs Are Provided Then Patient Gets Proper Diagnose With Correct Physical Parameters.
Failure Conditions:	When Correct Inputs Are Not Provided Then System May Fail To Give Proper Medical Help.

With the expanding request, the vast majority of the nations receive this innovation and utilize gadgets to give nature of care to patients. Following of advantages of remote patient observing for persistent and suppliers are:

Table 3: Advantages in respect of Patient and Doctor

Patients:	1. Auspicious and Proper treatment at a beginning period. 2. Different specialists can assess the condition from the remote areas. 3. Vicinity of home and group. 4. Diminished travel and hold up time.

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3. IoT based Real Time Health Monitoring | IEEE Conference Publication

Proceedings of the Second International Conference on Inventive Research in Computing Applications (ICIRCA-2020)
IEEE Xplore Part Number: CFP20N67-ART; ISBN: 978-1-7281-5374-2

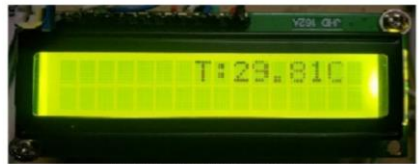
within a finger. It measures the amount of change in light absorption.

Wi-Fi module: This module [17] allows connectivity of the internet with the embedded applications. It uses the communication protocol. It transmits the values of sensors to the mobile application.

GSM module: It's a GSM modem with TTL output. It's a standard for [18] the mobile telephones. This module sends the message to the mobile if there is a sensor value crosses the threshold.

IV. RESULT AND ANALYSIS

In the proposed model, the vital parameters for the patient are acquired by attaching on the patient's body. The data is sent to the cloud via the Wi-Fi module. The sensors are interfaced with the processor Arduino. The patient can move freely if the patient wants. A fingerprint sensor is used so that an authorised person can only access the data. The basic hardware connections of the system are shown in figure 3. The processor process the data acquired by sensors and processed data is transferred to the cloud through a Wi-Fi module. The processed data can be seen on the webpage using the computer



(b)Temperature sensor output

(c) Pulse rate sensor output

(d) oxygen level sensor output

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