# Smart Patient Care System

Farhana Alam
*2018-1-60-025*
*East West University*
email: 2018-1-60-025@std.ewubd.edu

Sarder Iftekhar Ahmed
*2018-1-60-181*
*East West University*
email:2018-1-60-181@std.ewubd.edu

Fatematuz Zohara
*2018-1-60-230*
*East West University*
email:2018-1-60-230@std.ewubd.edu

***Abstract*—The target of this project is to assist physically sick people residing at home and elders, who are unable to do regular tasks as per their needs. A patient needs constant monitoring and care from other people, but others might not be available all the time. This system will be made to create an environment for the patient where some of their basic needs will be automatically adjusted. This system will continuously monitor the There is an alarm system at a set time every day to remind the patient. The screen will also show which drugs will be needed at that time. With changes in ambient temperature The system will automatically change the fan speed accordingly. When the environment becomes dark, this will be the arrangement The lights will turn on automatically without any human interaction. The scheduled time for the patient to sleep, and the lights will go off when the environment is bright enough.**

***Index Terms*—Arduino Uno,LCD screen,Heart Beat sensor,LDR,LED,DC Fan,**

## I. Introduction

Currently, the healthcare system is going to change from a traditional approach to a modernized patient centered approach [1]. This system will continuously monitor the heart beat rate and the temperature of the patient's body.The microcontroller collects the data using sensors [2]. If any anomalies detected, it will alert others via an alarm, so that the situation can be handled as fast as possible. An alarm will go off at a scheduled time every day to remind the patient to take medicines. It will also show which medicines to take that time on a screen. When temperature of the environment changes, the system will automatically change the speed of the fan accordingly. This is especially helpful when the patient is unable to move or sleeping. Light sensitivity based indoor light controlling: If the environment goes dark, this system will automatically turn on the lights without any human interactions. Also, the light will turn off at a scheduled time for the patient to sleep, and when the environment is bright enough for no artificial lightings.

## II. Related Works

There are many research available on this topic. A research conducted on 2016 reveals proposed a Wi–Fi based wireless sensor network for monitoring purpose [3]. This study has been the motivation for improving on the Smart Patient Care System.

## III. Methodology

A smart patient care system will continuously monitor the patient and the room with ATmega328P Microcontroller.DS3232 time sensor gives real time. SDA is connected with A4 pin and SCL with A5 pin. A buzzer BUZ1 is added with pin 13.When alarm time will come ,then buzzer will active. At the same time medicine list will show in LCD.1 LDR (Light Dependent Resistor) Sensor is connected with pin A2 and there is dc supply of 5 volt.1

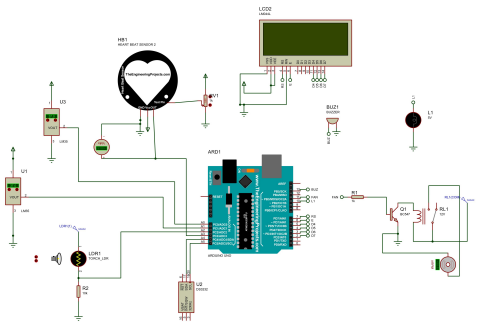

Fig. 1. Smart Patient Care System

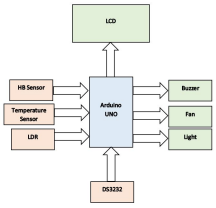


Fig. 2. Flowchart of the system

There is a power in pin of LM35 temperature sensor and pin 3 is grounded. Pin 2 is the output pin of sensor directly connected with Arduino (pin A1). In pin 11 of Arduino there is connected a fan .when temperature more than 22 then fan will start and up to 37 fan speed will be increased 0 to 100In heart beat sensor there is four pin. One is grounded ,one for power ,one pin for test and another one gives output. Heart beat sensor is connected with Arduino with pin A3.1 Here we have used 20,4 LCD. There is 14 pin in LCD .1,5 is grounded and 2,3 is for power supply. Pin 4,611,12,13,14 is connected with Arduino 2 to pin 7.1

## IV. Required Components

1. ATmega328P Microcontroller (Arduino Uno) 2. LCD screen 3. Heart Beat sensor 4. LM35 temperature sensor 5. DS3232 real-time clock module 6. LDR (Light Dependent Resistor) Sensor 7. Buzzer 8. DC Fan 9. LED 10. Power supply 11. Resistors 12. Potentiometer

### *A. Arduino Uno*

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz 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.

### *B. Heart Beat sensor*

There are many ways to measure heart rate and the most precise one is using an Electrocardiography

But the more easy way to monitor the heart rate is to use a Heartbeat Sensor. It comes in different shapes and sizes and allows an instant way to measure the heartbeat.

Heartbeat Sensors are available in Wrist Watches (Smart Watches), Smart Phones, chest straps, etc. The heartbeat is measured in beats per minute or bpm, which indicates the number of times the heart is contracting or expanding in a minute.

### *C. LM35 temperature sensor*

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. The sensitivity of LM35 is 10 mV/degree Celsius. As temperature increases, output voltage also increases.

### *D. DS3232 real-time clock module*

A real-time clock (RTC) is an electronic device (most often in the form of an integrated circuit) that measures the passage of time.

Although the term often refers to the devices in personal computers, servers and embedded systems, RTCs are present in almost any electronic device which needs to keep accurate time of day.

### *E. LDR (Light Dependent Resistor) Sensor*

It stands for Light Dependent Resistor or Photoresistor which is a passive electronic component, basically a resistor which has a resistance that varies depending of the light intensity. A photoresistor is made of a high resistance semiconductor that absorbs photons. The resulting free electrons conduct electricity resulting in lowering resistance of the photoresistor. The resistance is very high in darkness, almost high as 1M but when there is light that falls on the LDR, the resistance is falling down to a few K depending on the model.

### *F. LCD screen*

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. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden. For instance: preset words, digits, and seven-segment displays, as in a digital clock, are all good examples of devices with these displays. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements.

### *G. Buzzer*

A buzzer or beeper is an audio signaling device,[1] which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

### *H. LED*

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor.[5] White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

### *I. Potentiometer*

A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.

### *J. DC Fan*

The direct current fans, or DC fans, are powered with a potential of fixed value such as the voltage of a battery. Typical voltage values for DC fans are, 5V, 12V, 24V and 48V.

## V. Conclusion

The aim of this project was to design a system which can sense the temperature of room and patient and give a solution according to condition.This system will continuously monitor the the patient. There is an alarm system to remind the patient. The screen will also show which drugs will be needed at that time. From this study we can conclude that the proposed system is low cost and compact as compared to the other tracking systems in use for same application. It is very easy to program and modify because it is Arduino based. The designed system is easy to use and provides better efficiency.

## REFERENCES


[1] B. Karthik, L. D. Parameswari, R. Harshini, and A. Akshaya, "Survey on iot & arduino based patient health monitoring system," *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, vol. 3, no. 1, pp. 1414–1417, 2018.

[2] A. Rahaman, M. M. Islam, M. R. Islam, M. S. Sadi, and S. Nooruddin, "Developing iot based smart health monitoring systems: A review.," *Rev. d'Intelligence Artif.*, vol. 33, no. 6, pp. 435–440, 2019.

[3] P. Sivasankari, M. Anbarasan, and M. Moses, "Arduino based human health care monitoring and control system," *IOSR Journal of Electrical and Electronics Engineering*, vol. 11, no. 3, pp. 9–18, 2016.

**Code:**

```
#define USE_ARDUINO_INTERRUPTS true
#include <DS3231.h>
#include <LiquidCrystal.h>
#include <PulseSensorPlayground.h>
#include <Wire.h>

LiquidCrystal lcd(7,6,5,4,3,2);
DS3231 rtc(SDA, SCL);
Time t;
int buz = 13;
int hrs, mint, scnd;
int tempPin = A1;  //room temperature
int BtempPin = A0;  //body temperature
int fan = 11;
int temp, Btemp;
int tempMin = 22;
int tempMax = 37;
int fanSpeed, fanLCD;
int light = 10;
const int PulseWire = A3;
int Threshold = 550;
PulseSensorPlayground pulseSensor;

void setup() {
  Wire.begin();
  rtc.begin();
  pinMode(fan, OUTPUT);
  pinMode(light, OUTPUT);
  pinMode(tempPin, INPUT);
  pinMode(BtempPin, INPUT);
  pinMode(buz, OUTPUT);
  lcd.begin(20,4);
  Serial.begin(9600);
  rtc.setTime(10,0,0);
  pulseSensor.analogInput(PulseWire);
  pulseSensor.setThreshold(Threshold);
  pulseSensor.begin();
}

void loop()
{
   t = rtc.getTime();
   hrs = t.hour;
   mint = t.min;
   scnd = t.sec;

   //room temperature
   temp = analogRead(tempPin);
   temp = temp * 0.48828125;
   if(temp < tempMin)
   {
      fanSpeed = 0;
      analogWrite(fan, fanSpeed);
      fanLCD=0;
      digitalWrite(fan, LOW);
   }
   if((temp >= tempMin) && (temp <= tempMax))
   {
      fanSpeed = temp;
      fanSpeed=1.5*fanSpeed;
      fanLCD = map(temp, tempMin, tempMax, 0, 100);
```

```
    analogWrite(fan, fanSpeed);
  }


 //medicine alarm
  if((hrs == 10 && mint == 01 && scnd == 00) || (hrs == 15 && mint == 00 && scnd == 00)|| (hrs == 20 && mint == 00 && scnd == 00))
  {
   for (int i = 0; i<6; i++)
   {
    digitalWrite(buz,HIGH);
    delay(500);
    digitalWrite(buz,LOW);
    delay(500);
    lcd.setCursor(0,0);
    lcd.print("***Medicine Time***");
    delay(500);
    lcd.clear();
   }

   //printing all the medicines to take in LCD
    lcd.setCursor(0,0);
    lcd.print("Medicine List: ");
    lcd.setCursor(0,1);
    lcd.print("Paracitamol, Calbo");
    lcd.setCursor(0,2);
    lcd.print("Calcitrol");
    delay(1000);
    lcd.clear();

  }
```

```
//heartbeat
  int myBPM = pulseSensor.getBeatsPerMinute();
  if((myBPM>130 || myBPM<40) && myBPM!=0)
  {
   for (int i = 0; i<4; i++)
   {
    digitalWrite(buz,HIGH);
    delay(500);
    digitalWrite(buz,LOW);
    delay(500);
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Abnormal Heart Rate!");
    lcd.setCursor(0,1);
    lcd.print("BPM: ");
    lcd.print(myBPM);
    delay(1000);
    lcd.clear();
   }
  }

//body temperature
  Btemp = analogRead(BtempPin);
  Btemp = (Btemp * 0.48828125*1.8) + 32.0;
  if(Btemp>99)
  {
   for (int i = 0; i<4; i++)
   {
    digitalWrite(buz,HIGH);
    delay(500);
    digitalWrite(buz,LOW);
```

```
      delay(500);
      lcd.clear();
      lcd.setCursor(0,0);
      lcd.print("Abnormal Temperature");
      lcd.setCursor(0,1);
      lcd.print("TEMP: ");
      lcd.print(Btemp);
      delay(1000);
      lcd.clear();
    }
  }
  //light
  int l = analogRead(A2);
  int b = map(l,0,1023,0,255);
  if(b<220) //its dark
  {
   digitalWrite(light,HIGH);
  }
  if(b>=220)
  {
   digitalWrite(light,LOW);
  }
  if(hrs == 22 && mint == 00 && scnd == 05)
   {
     digitalWrite(light,LOW); //bedtime
   }

lcd.setCursor(0,0);
lcd.print("BPM: ");
lcd.print(myBPM);
lcd.setCursor(0,1);
lcd.print("BODY TEMP: ");
  lcd.print(Btemp);
  lcd.print("F ");
  lcd.setCursor(0,2);
  lcd.print("TEMP: ");
  lcd.print(temp);
  lcd.print("C ");
  lcd.print("FANS: ");
  lcd.print(fanLCD);
  lcd.print("%");
  lcd.setCursor(0,3);
  lcd.print("TIME: ");
  lcd.print(rtc.getTimeStr());
  delay(500);
  lcd.clear();
}
```