**********LED**********

```
#define LED1 10
#define LED2 11
#define LED3 12
#define LED4 13


void setup() {
  // put your setup code here, to run once:

  pinMode(LED1, OUTPUT);
  pinMode(LED2, OUTPUT);
  pinMode(LED3, OUTPUT);
  pinMode(LED4, OUTPUT);

}

void loop() {
  // put your main code here, to run repeatedly:
  digitalWrite(LED1, HIGH);
  delay(200);
  digitalWrite(LED1, LOW);
  delay(200);

  digitalWrite(LED2, HIGH);
  delay(200);
  digitalWrite(LED2, LOW);
  delay(200);

  digitalWrite(LED3, HIGH);
  delay(200);
  digitalWrite(LED3, LOW);
  delay(200);

  digitalWrite(LED4, HIGH);
  delay(200);
  digitalWrite(LED4, LOW);
  delay(200);

}
```

**********RGB LED**********

```
#define redpin 3
#define greenpin 5
#define bluepin 6

int r = 255;
int g = 0;
int b = 0;
void setup() {
  pinMode(redpin, OUTPUT);
  pinMode(greenpin, OUTPUT);
  pinMode(bluepin, OUTPUT);
}

void rgb(int r, int g, int b) {
  analogWrite(redpin, r);
  analogWrite(greenpin, g);
  analogWrite(bluepin, b);
}

void loop() {
  for (int i = 0; i < 255; i++) {
    rgb(r, g, b);
    g++;
    delay(10);
  }
  for (int i = 0; i < 255; i++) {
    rgb(r, g, b);
    r--;
    delay(10);
  }
  for (int i = 0; i < 255; i++) {
    rgb(r, g, b);
    b++;
    delay(10);
  }
  for (int i = 0; i < 255; i++) {
    rgb(r, g, b);
    g--;
    delay(10);
  }
  for (int i = 0; i < 255; i++) {
    rgb(r, g, b);
    r++;
    delay(10);
  }
  for (int i = 0; i < 255; i++) {
    rgb(r, g, b);
    b--;
    delay(10);
  }
}
```

INTERFACING DIAGRAM:

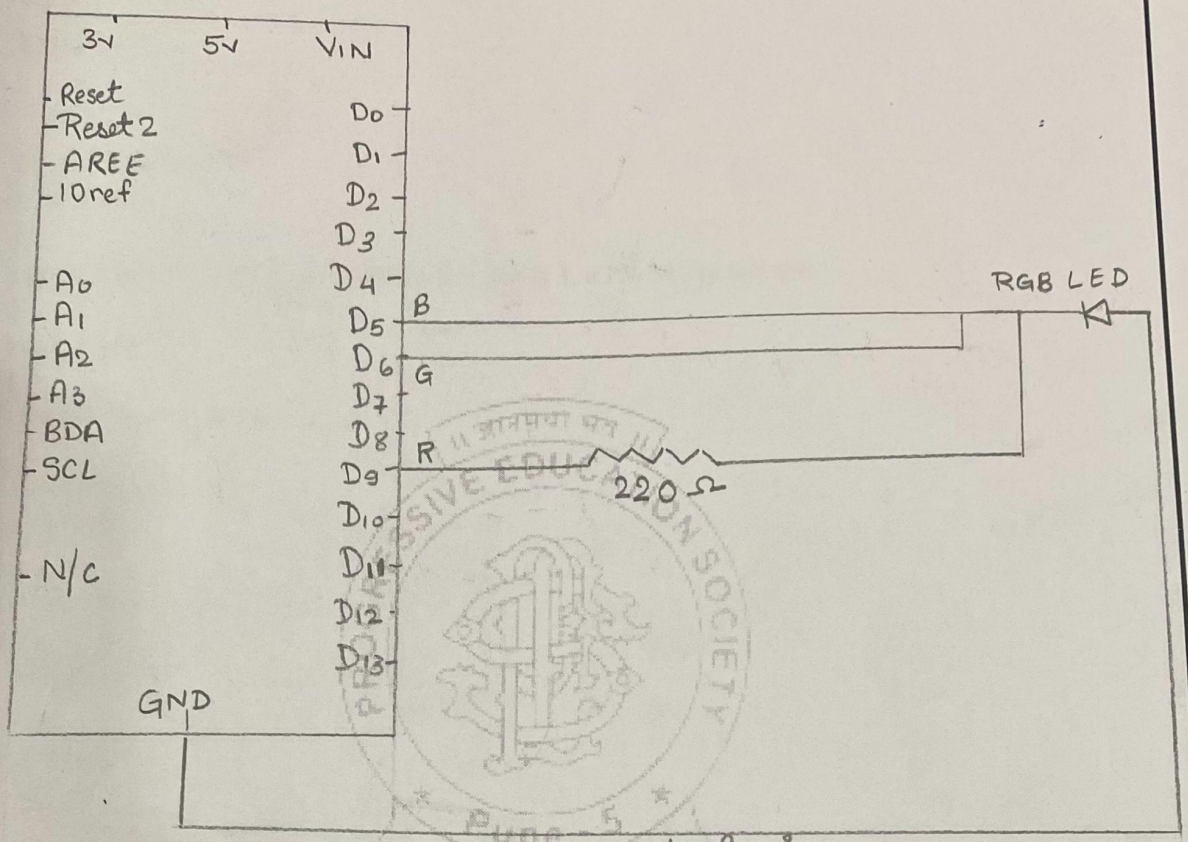


Fig: RGB LED Interfacing with Arduino.

CONCLUSION:

**********LDR**********

```
int ldrPin = A4; // Analog input pin for LDR int ldrValue; // Variable to store
LDR value
void setup()
{
pinMode(ldrPin,INPUT);
Serial.begin(9600); // Initialize serial communication for debugging
}
void loop()
{
int readValue;
float realValue;
readValue = analogRead(ldrPin);
realValue = (5.0/1024.0)*readValue;
Serial.println(realValue);
delay(1000);
}
```

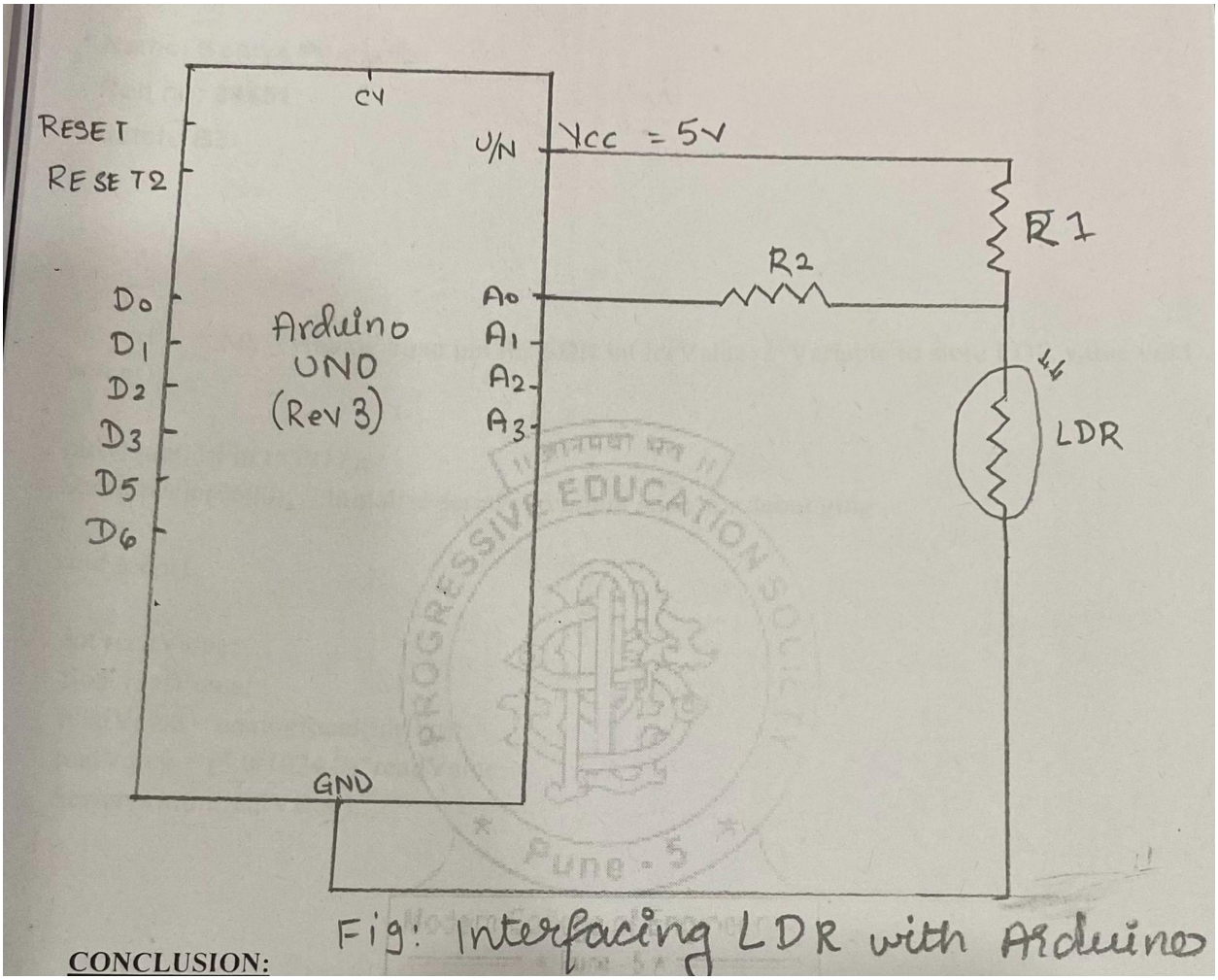


Fig: Interfacing LDR with Arduino

CONCLUSION:

**********LCD**********

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(6,7,2,3,4,5);   //lcd object


void setup() {
  // put your setup code here, to run once:
  lcd.begin(16, 2);
  lcd.print("BE ECE");
}

void loop() {
  // put your main code here, to run repeatedly:

}
```

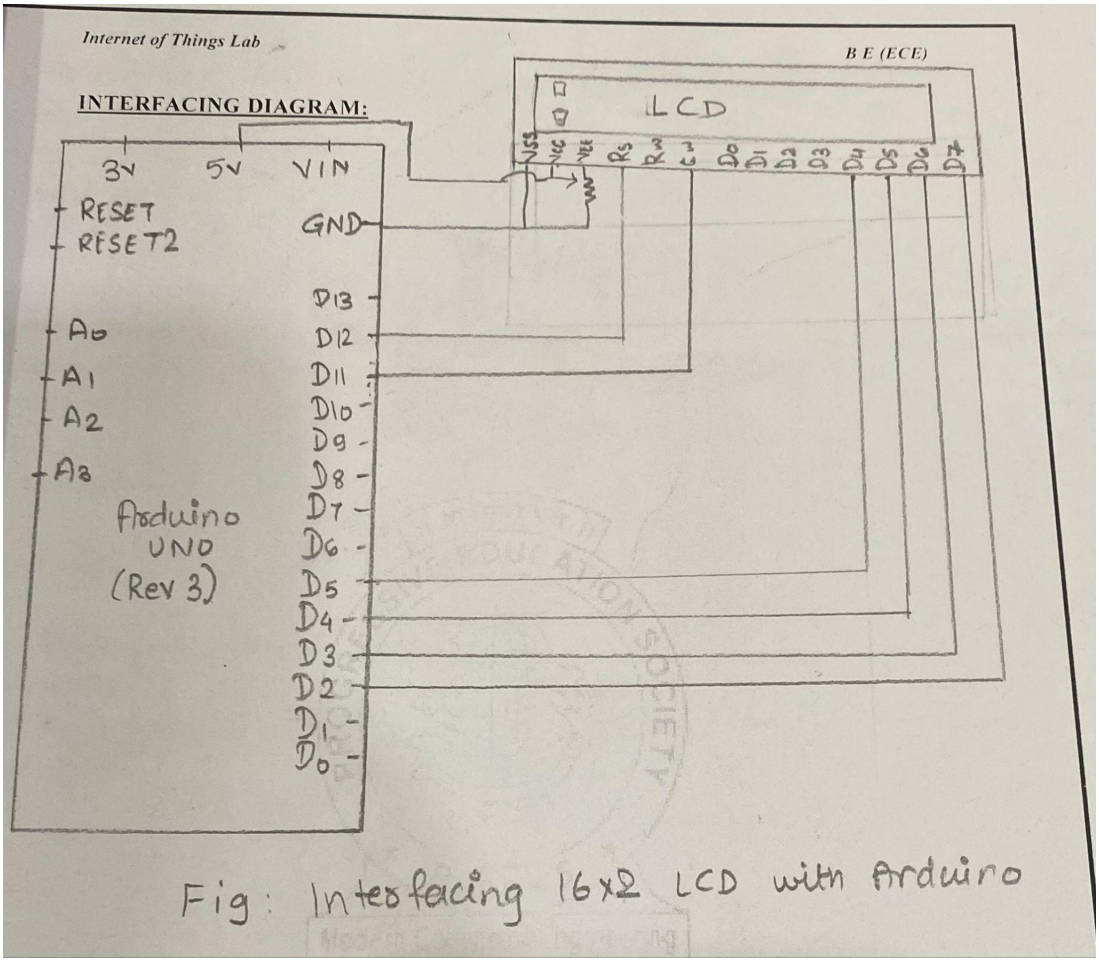
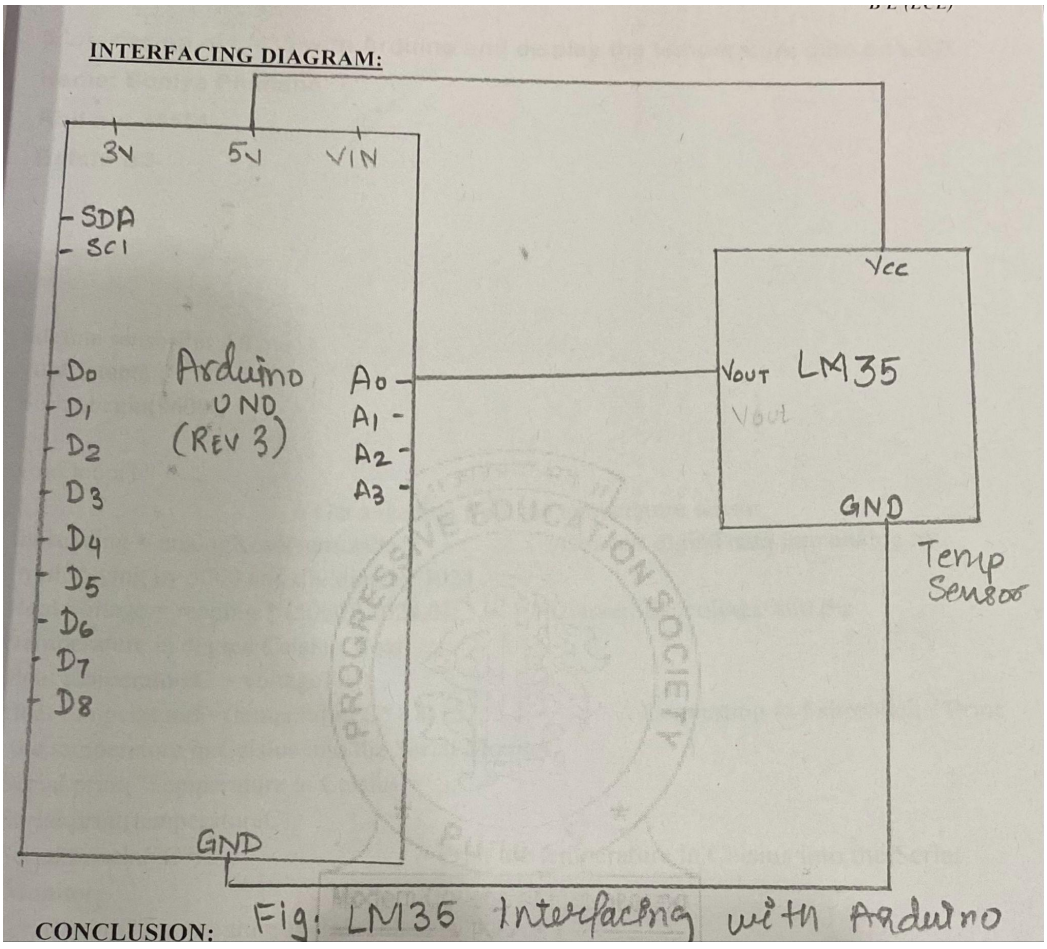


Fig: Interfacing 16x2 LCD with Arduino

**********LM35 TEMPERATURE SENSOR**********

```
void setup() {
  // put your setup code here, to run once:
Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
 unsigned int temp = analogRead(A0);
  temp = map(temp,0,1023,0,500);     //10mV = 1'C
  Serial.println(temp);
  delay(2000);
}
```



```
**********RPi IR SENSOR**********
import time
import RPi.GPIO as GPIO

RUNNING = True

HIGH  = 1
LOW  = 0
DetectPin = 4
led = 8

def InitSystem():
        GPIO.setmode(GPIO.BCM)
        GPIO.setup(DetectPin,GPIO.IN,pull_up_down=GPIO.PUD_UP)
        GPIO.setup(led,GPIO.OUT)
        return



def DetectPerson():
        while True:
                input_state = GPIO.input(DetectPin)
                time.sleep(0.3)
                if input_state == 0:
                        return LOW
                else:
```

```
                    return HIGH



try:
        print ("\nCounting using IR LED\n")
        print  ("-----------------------------------------------\n")
        InitSystem()
        count =0;
        while RUNNING:
                state = DetectPerson()
                if state == LOW:
                        count+=1
                        print ("person count =%d" %count)
                        GPIO.output(led,LOW)
                        time.sleep(1)
                        GPIO.output(led,HIGH)

# If CTRL+C is pressed the main loop is broken
except KeyboardInterrupt:
   RUNNING = False



# Actions under 'finally' will always be called
finally:
```

Stop and finish cleanly so the pins

are available to be used again

GPIO.cleanup()

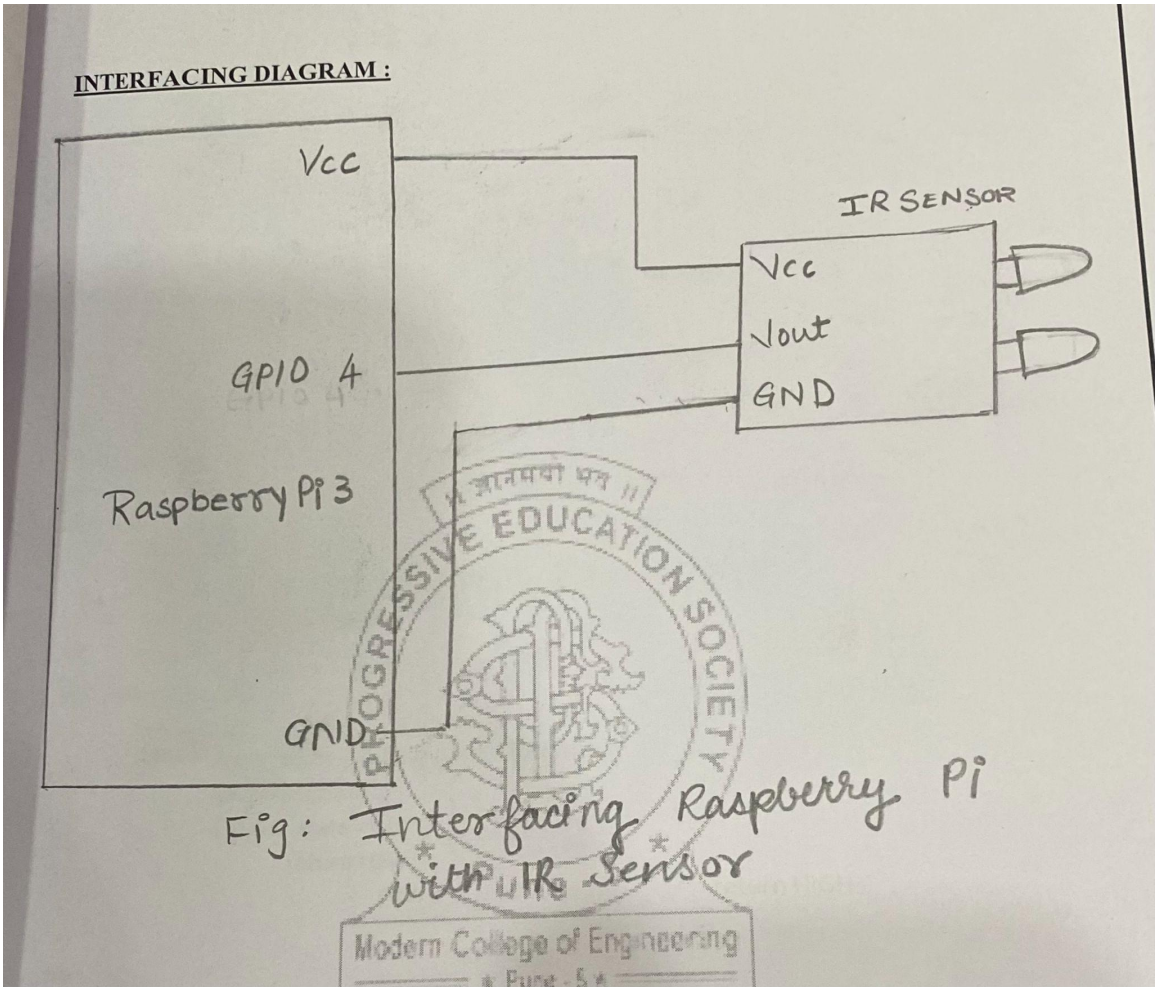


Fig: Interfacing Raspberry Pi with IR Sensor

**********Rpi LED**********

import time

from gpiozero import LED

```
led1 = LED(8)
led2 = LED(10)
led3 = LED(9)
led4 = LED(11)

while True:
    try:
        led1.off()
        time.sleep(0.5)
        led1.on()
        led2.off()
        time.sleep(0.5)
        led2.on()
        led3.off()
        time.sleep(0.5)
        led3.on()
        led4.off()
        time.sleep(0.5)
        led4.on()
        time.sleep(0.5)

    except KeyboardInterrupt:
        print("closing")
        exit()
```

INTERFACING DIAGRAM 1:

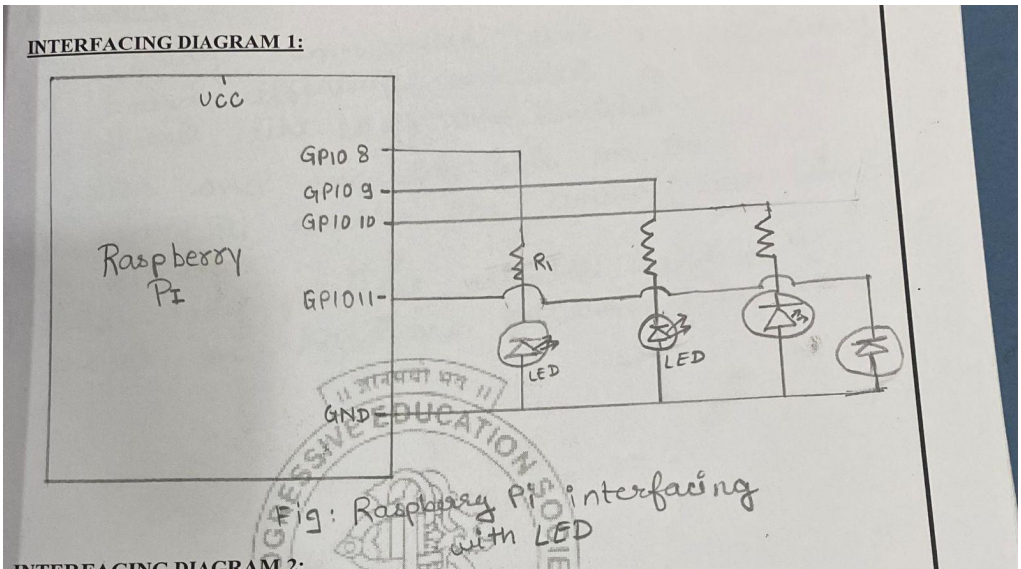


Fig: Raspberry Pi interfacing with LED

INTERFACING DIAGRAM 2:

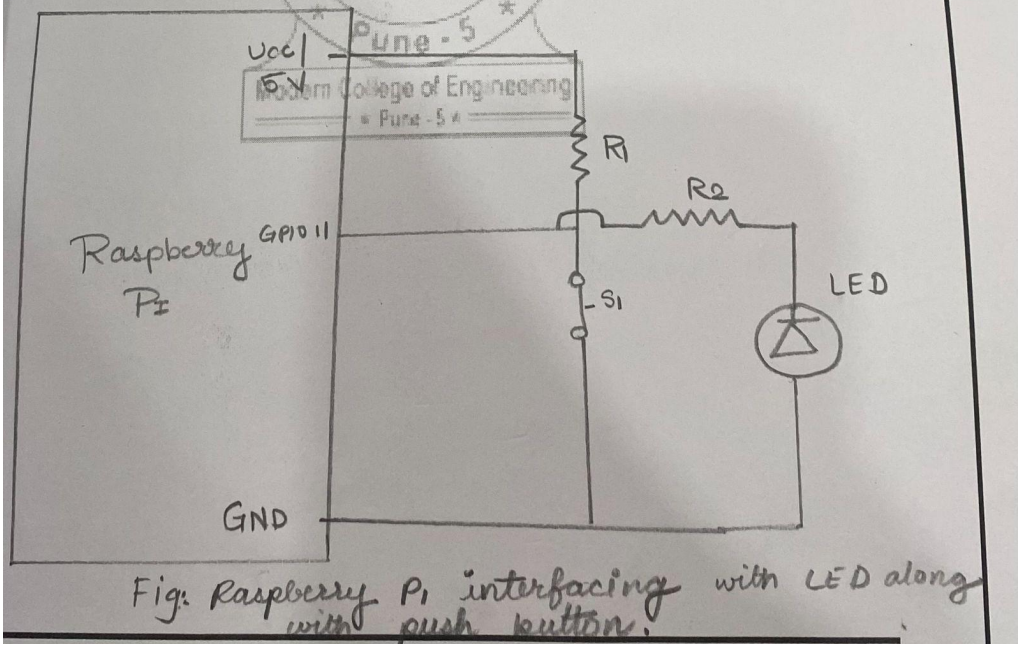


Fig: Raspberry Pi interfacing with LED along with push button.

**********RPI BUZZER**********

```
import time

import RPi.GPIO as GPIO
```

```
TRUE = 1

buzzer = 4

GPIO.setmode(GPIO.BCM)
GPIO.setup(buzzer,GPIO.OUT)

def buzzerState(val):
        GPIO.output(buzzer,val)

try:
   while TRUE:
        buzzerState(1)
        time.sleep(1)
        buzzerState(0)
        time.sleep(1)

# If CTRL+C is pressed the main loop is broken
except KeyboardInterrupt:
   RUNNING = False
   print "\Quitting"
```

```
# Actions under 'finally' will always be called
finally:
    # Stop and finish cleanly so the pins
    # are available to be used again
    GPIO.cleanup()
```

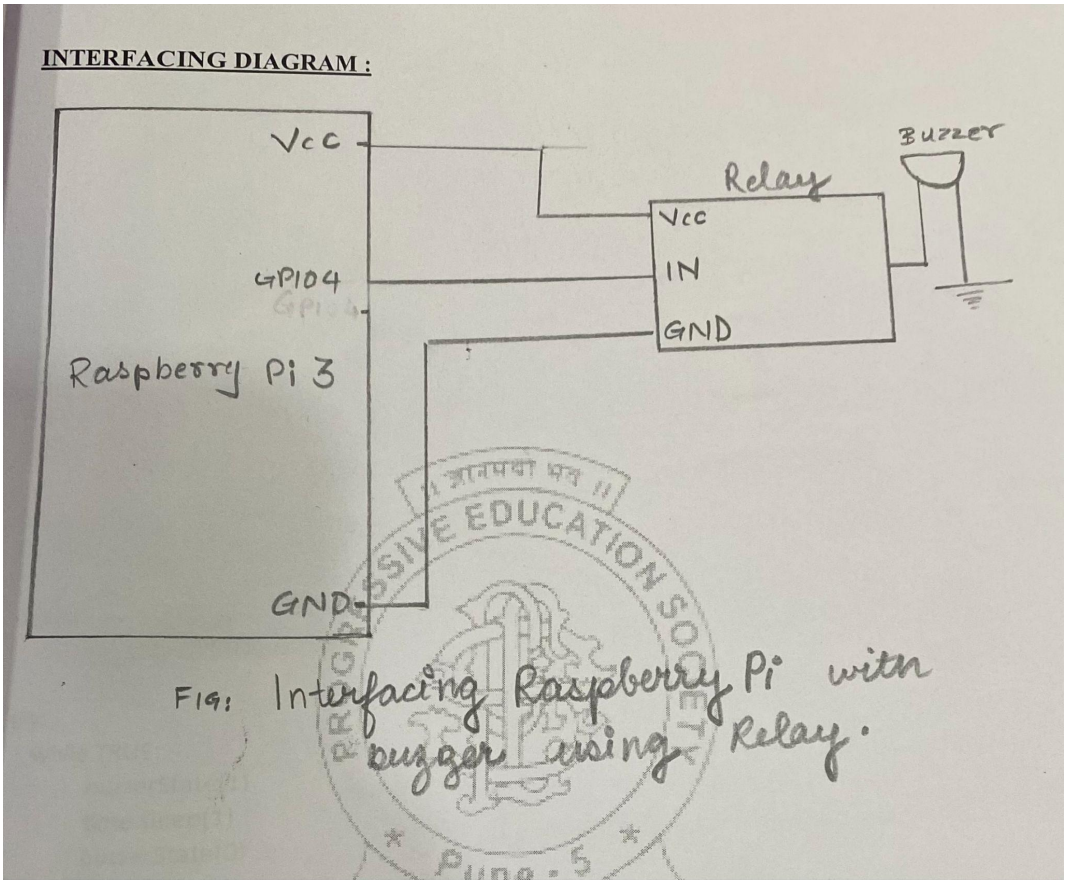


FIG: Interfacing Raspberry Pi with buzzer using Relay.

**********RPI ULTRASONIC**********

```
import RPi.GPIO as GPIO
import time
```

```
#GPIO Mode (BOARD / BCM)
GPIO.setmode(GPIO.BCM)

#set GPIO Pins
GPIO_TRIGGER = 27
GPIO_ECHO = 18

#set GPIO direction (IN / OUT)
GPIO.setup(GPIO_TRIGGER, GPIO.OUT)
GPIO.setup(GPIO_ECHO, GPIO.IN)

def distance():
    # set Trigger to HIGH
    GPIO.output(GPIO_TRIGGER, True)

    # set Trigger after 0.01ms to LOW
    time.sleep(0.00001)
    GPIO.output(GPIO_TRIGGER, False)

    StartTime = time.time()
    StopTime = time.time()

    # save StartTime
    while GPIO.input(GPIO_ECHO) == 0:
        StartTime = time.time()
```

```
    # save time of arrival
    while GPIO.input(GPIO_ECHO) == 1:
        StopTime = time.time()

    # time difference between start and arrival
    TimeElapsed = StopTime - StartTime
    # multiply with the sonic speed (34300 cm/s)
    # and divide by 2, because there and back
    distance = (TimeElapsed * 34300) / 2

    return distance

if __name__ == '__main__':
    try:
        while True:
            dist = distance()
            print ("Measured Distance = %.1f cm" % dist)
            time.sleep(1)

        # Reset by pressing CTRL + C
    except KeyboardInterrupt:
        print("Measurement stopped by User")
        GPIO.cleanup()
```

INTERFACING DIAGRAM :

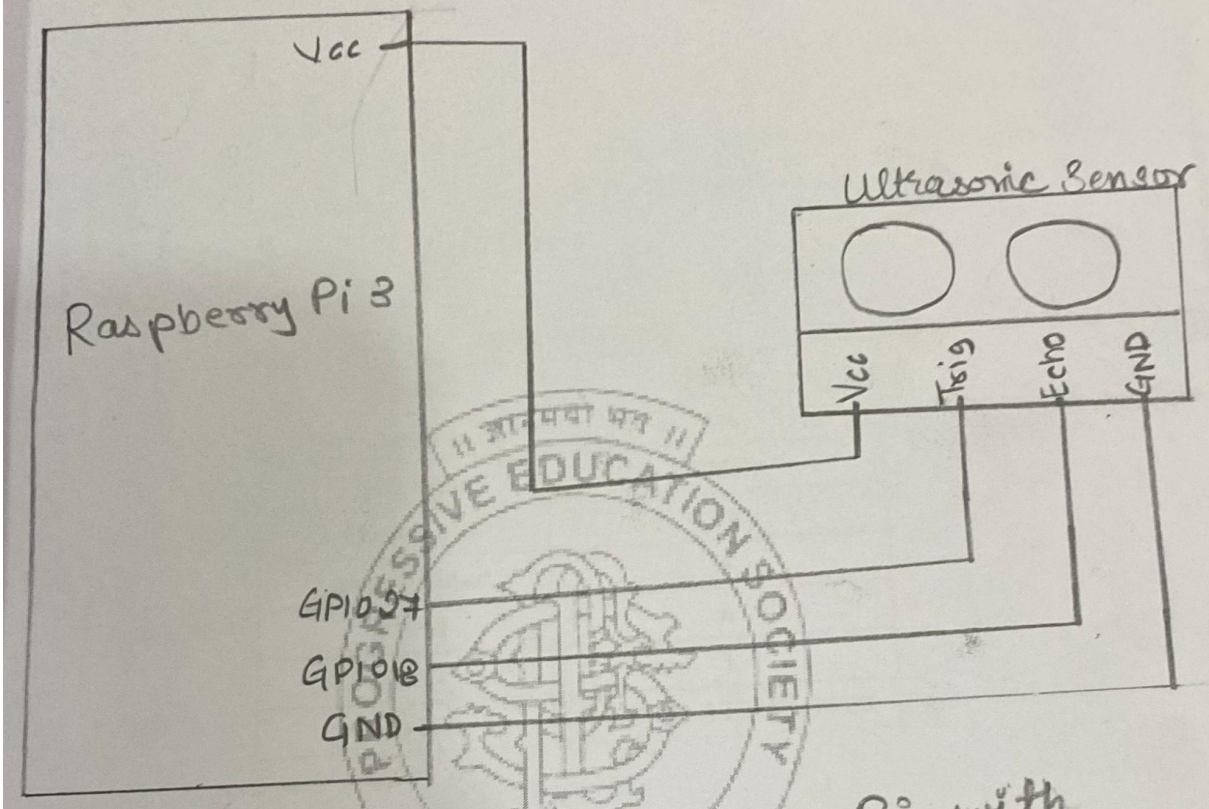
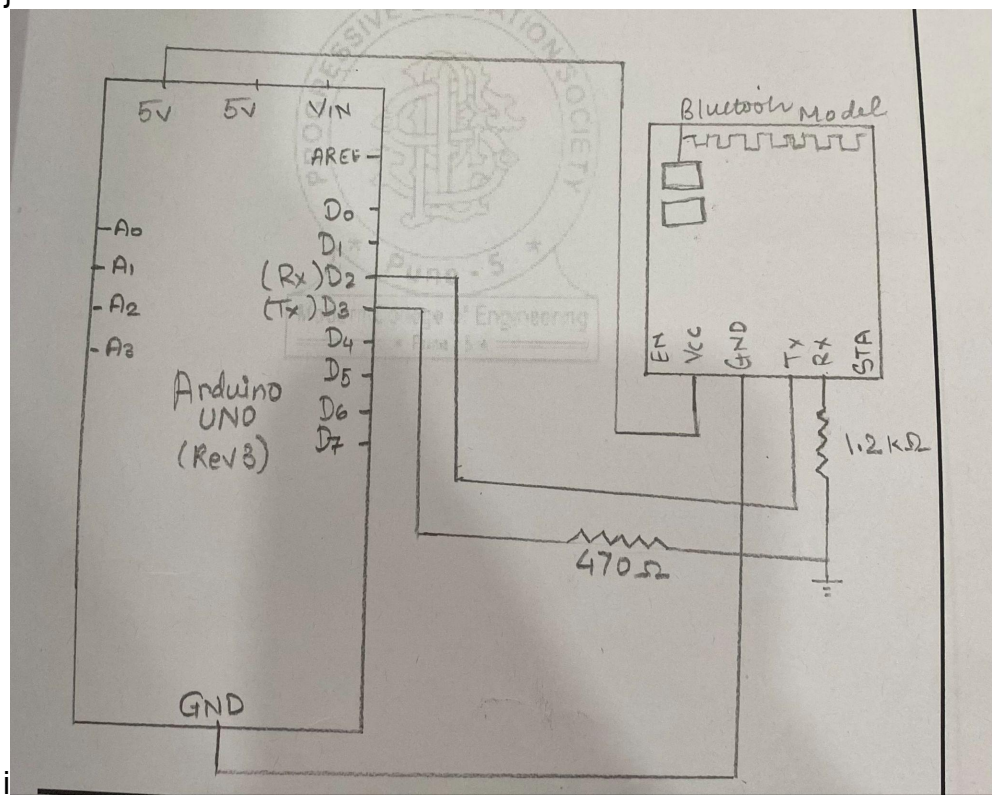


fig: Interfacing Raspberry Pi with ultrasonic sensor

Bluetooth ex

```
int LEDpin=13;
void setup()
{
Serial.begin(9600);
pinMode(LEDpin,OUTPUT);
}
void loop()
{
if (Serial.available()>0)
{
char data=Serial.read();
switch(data)
{
case 'a': digitalWrite(LEDpin,HIGH);break;
case 'd': digitalWrite(LEDpin,LOW);break;
case 'r': for(int i=0; i<10; i++) {digitalWrite(LEDpin,HIGH); delay(500);
digitalWrite(LEDpin,LOW); delay(500);} break;
default : break;
}
}
}
```

i



```
const int ENA = 6; // PWM-enabled digital pin connected to ENA of the motor driver
const int IN1 = 7; // Digital pin connected to IN1 of the motor driver
const int IN2 = 8; // Digital pin connected to IN2 of the motor driver
void setup()
{
pinMode(ENA, OUTPUT);
pinMode(IN1, OUTPUT);
pinMode(IN2, OUTPUT);
}
void loop()
{
// Rotate the motor in one direction (forward)
analogWrite(ENA, 255);// Adjust the value (0-255) to control the motor speed
digitalWrite(IN1, HIGH);
digitalWrite(IN2, LOW);
delay(2000);
// Rotate the motor in one direction (backward)
analogWrite(ENA, 255); // Adjust the value (0-255) to control the motor speed
digitalWrite(IN1, LOW);
digitalWrite(IN2, HIGH);
delay(2000);
}
```

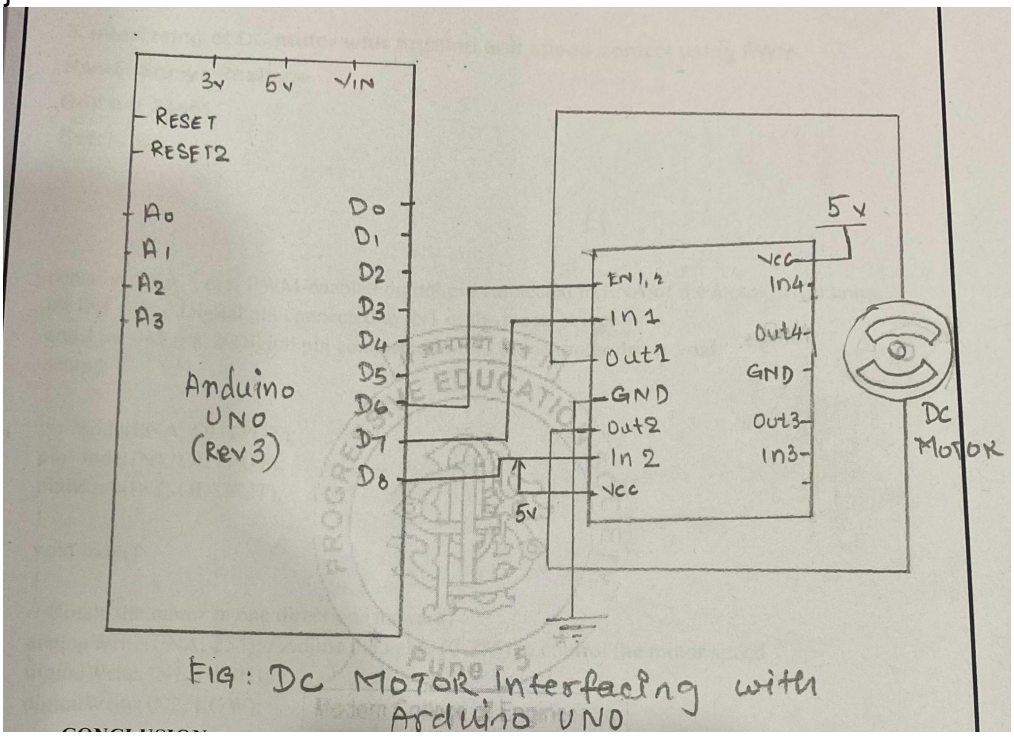


FIG: DC MOTOR Interfacing with Arduino UNO