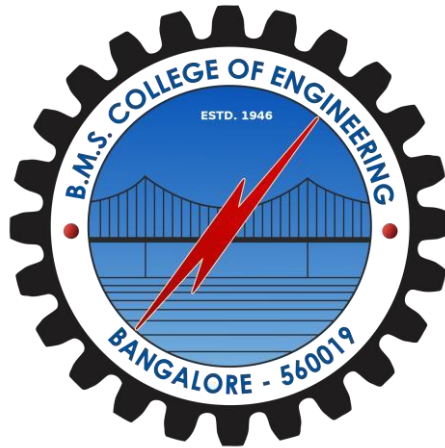# IOT LAB MANUAL-2020

Name: Sayed Ayman Bukhari

USN: 1BM18CS095

CONSOLIDATED LAB PROGRAMS

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

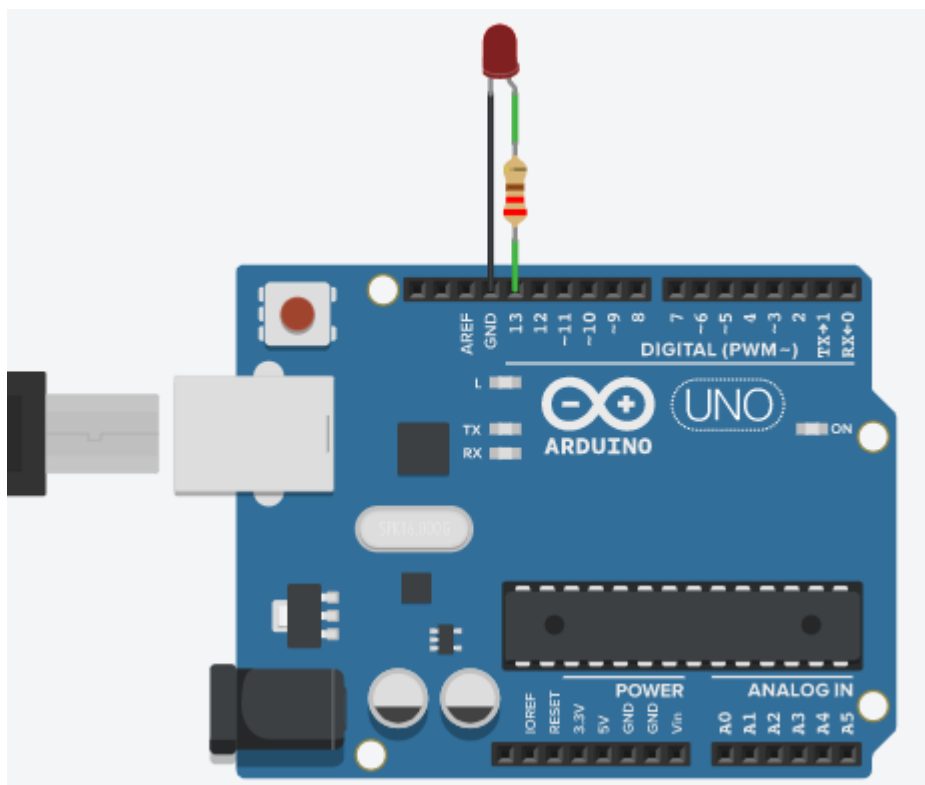**Program No : 01**

Program Title : Blink LED

Aim :

To turn a LED on and off repeatedly.

Hardware Required :

- Arduino Uno Board
- LED's

Circuit Diagram :

Written Code :

IoT LAB - 1

Sayed Ayman Bukhari
1BM18CS095

1) Blink Program

```
void setup()
{
    pinMode(13, OUTPUT);
}
void loop()
{
    digitalWrite(13, HIGH);
    delay(500);
    digitalWrite(13, LOW);
    delay(500);
}
```

Observation /Output :

The LED blinks.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 02
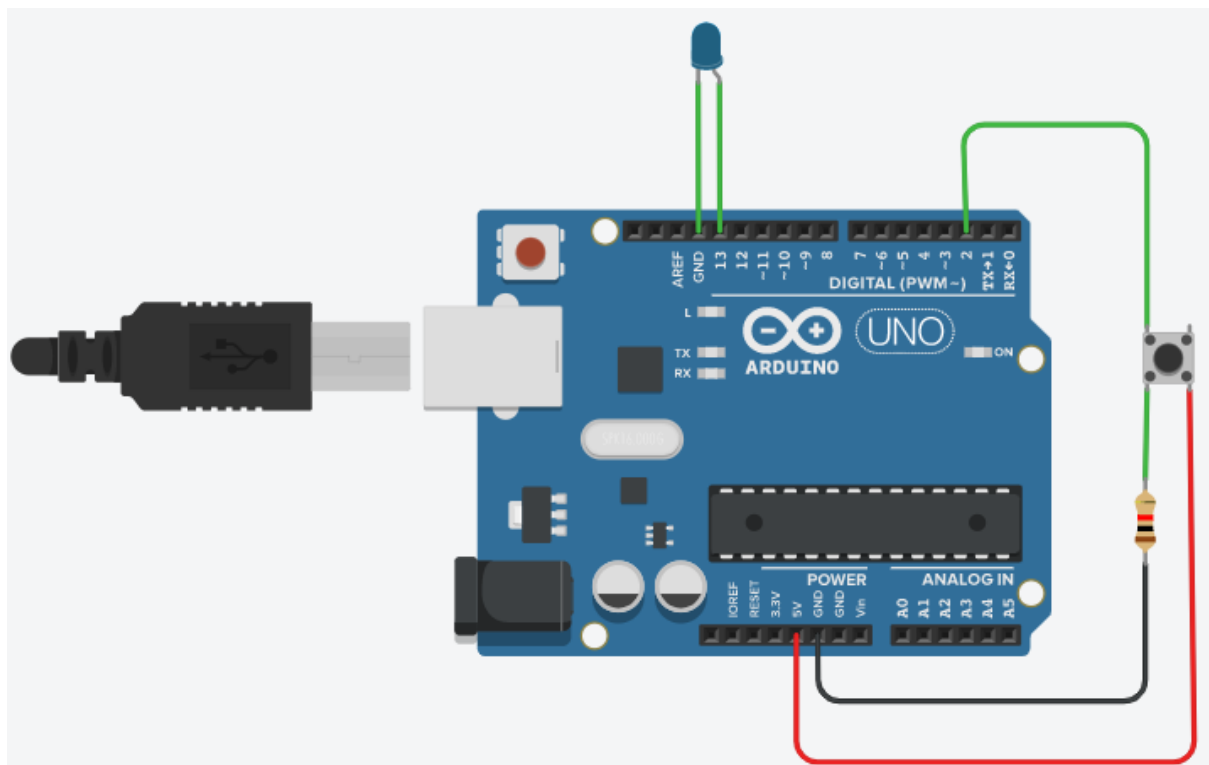
Program Title : Push Button Program

Aim :

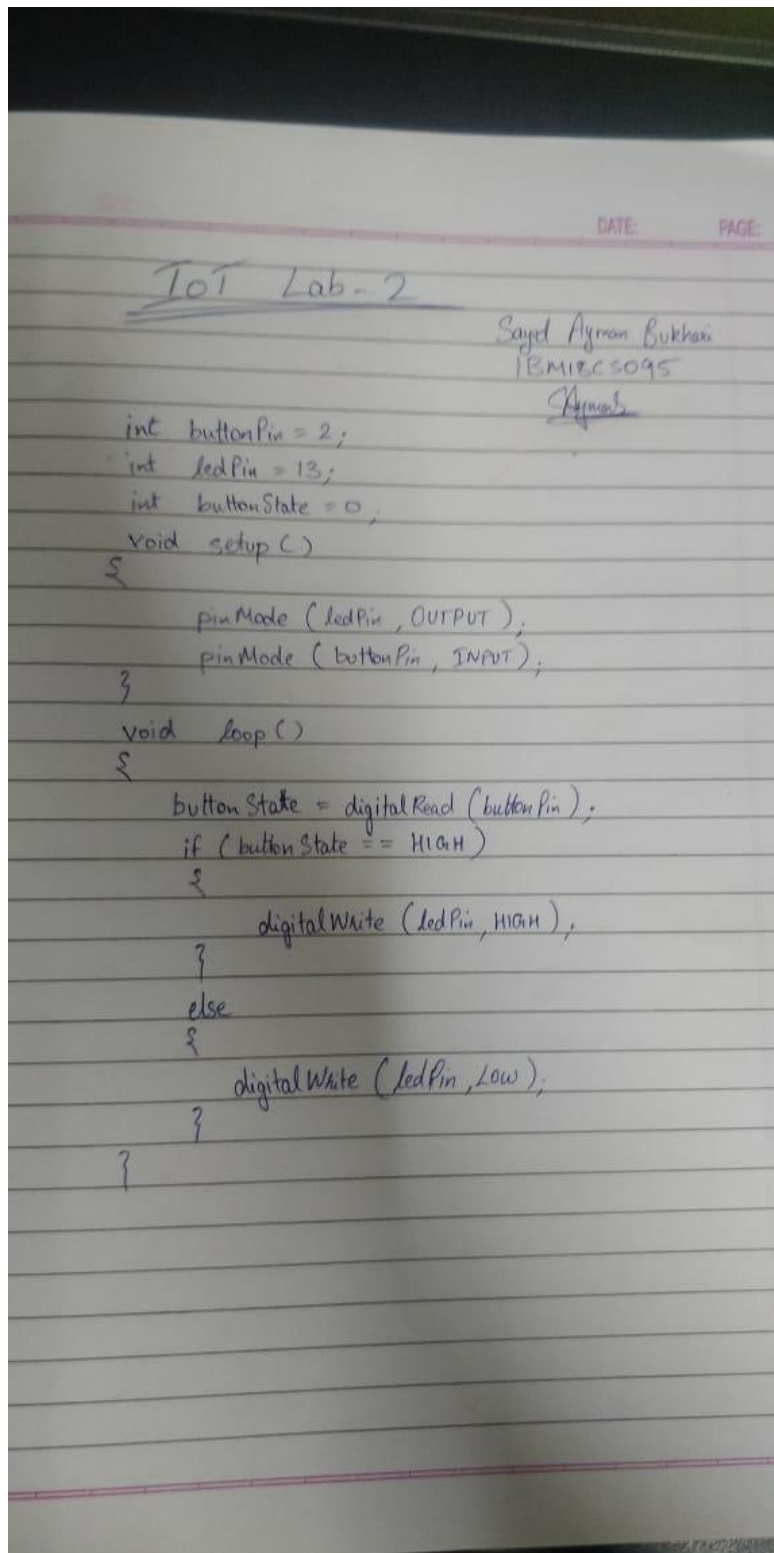To switch on the LED bulb using a button with an Arduino Uno board.

Hardware Required :

- Arduino Board
- LED bulb
- Push Button
- Resistor - 1K ohm

Circuit Diagram :

Written Code :

IoT Lab-2

Sayed Ayman Bukhari
1BM18CS095
Ayman

```
int    buttonPin = 2;
int    ledPin = 13;
int    buttonState = 0;
void   setup ()
{
        pinMode ( ledPin , OUTPUT ).
        pinMode ( buttonPin , INPUT );
}

void   loop ()
{
    buttonState = digitalRead ( buttonPin ).
    if ( buttonState == HIGH )
    {
        digitalWrite ( ledPin, HIGH ),
    }
    else
    {
        digitalWrite ( ledPin, LOW );
    }
}
```

Observation /Output :

The LED bulb lit up when the button was pushed.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 03

Program Title : LED Fading Program

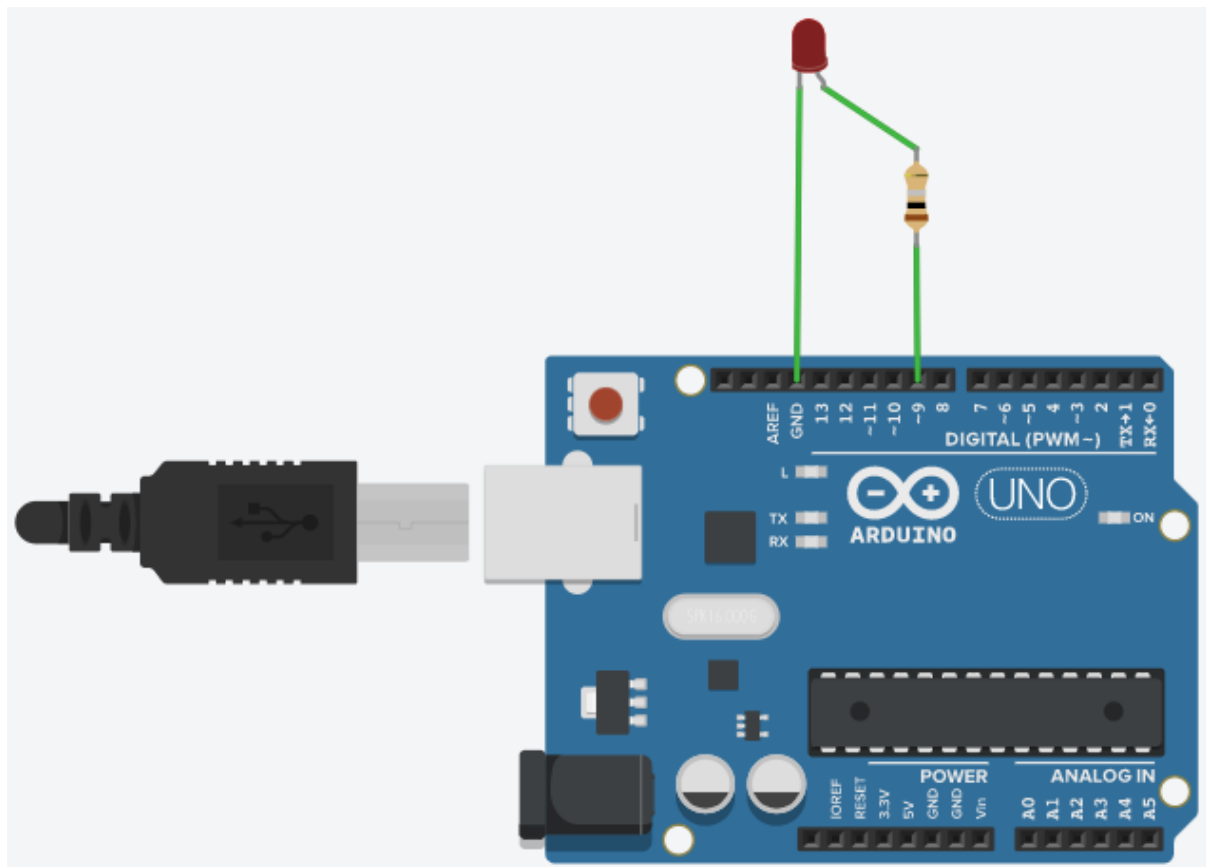**Aim :**

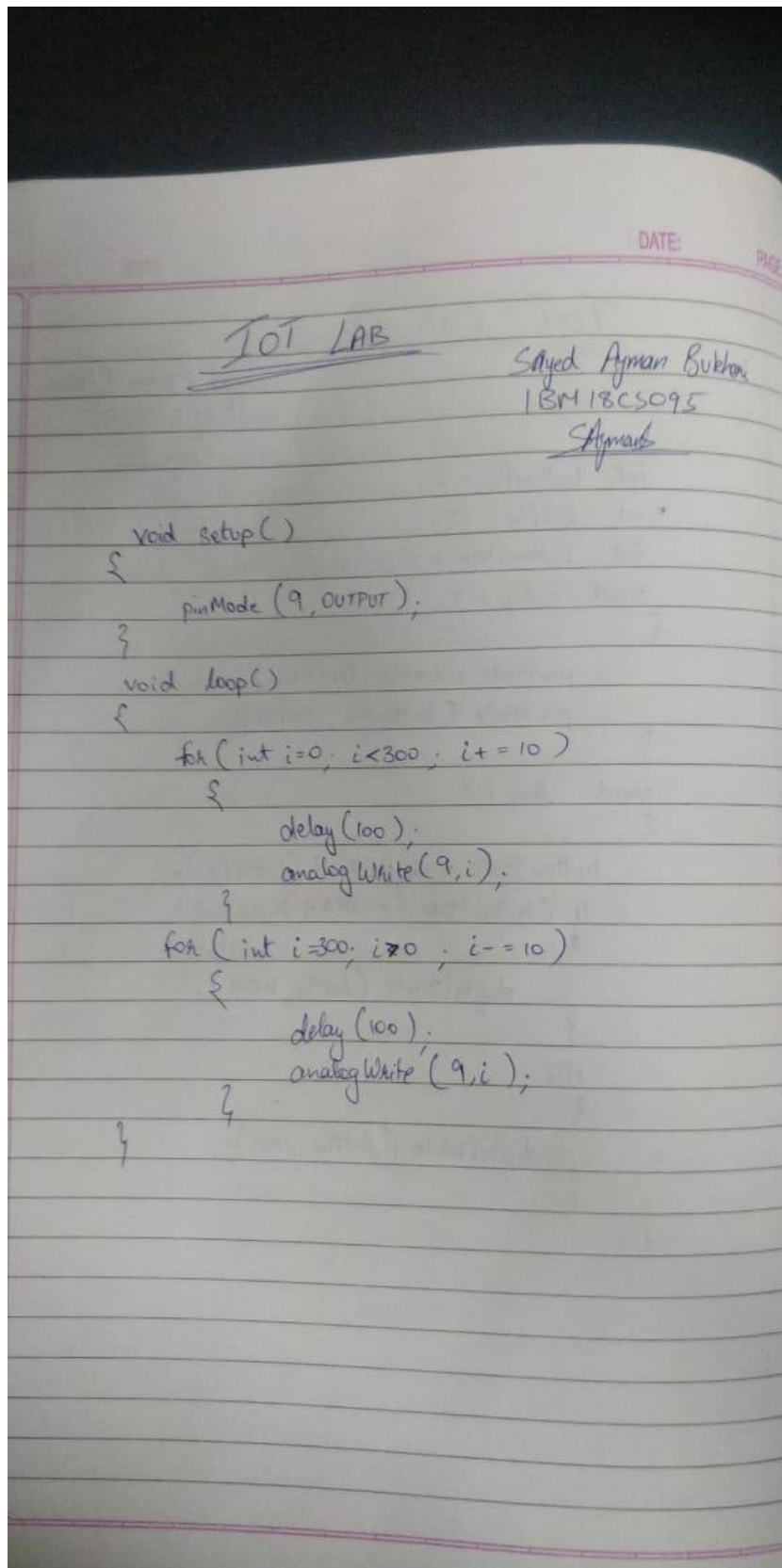To fade a bulb on and off using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- LED bulb
- Resistor

Circuit Diagram :

Written Code :

IOT LAB

Sayed Ayman Bukhari
1BM18CS095

```
void setup()
{
    pinMode (9, OUTPUT);
}
void loop()
{
    for ( int i=0; i<300 ; i+ = 10 )
    {
        delay (100);
        analogWrite (9,i);
    }
    for ( int i=300; i>0 ; i-- = 10 )
    {
        delay (100);
        analogWrite (9,i);
    }
}
```

Observation /Output :

The LED bulb was faded on and off with a delay of 100ms.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 04

Program Title : Potentiometer
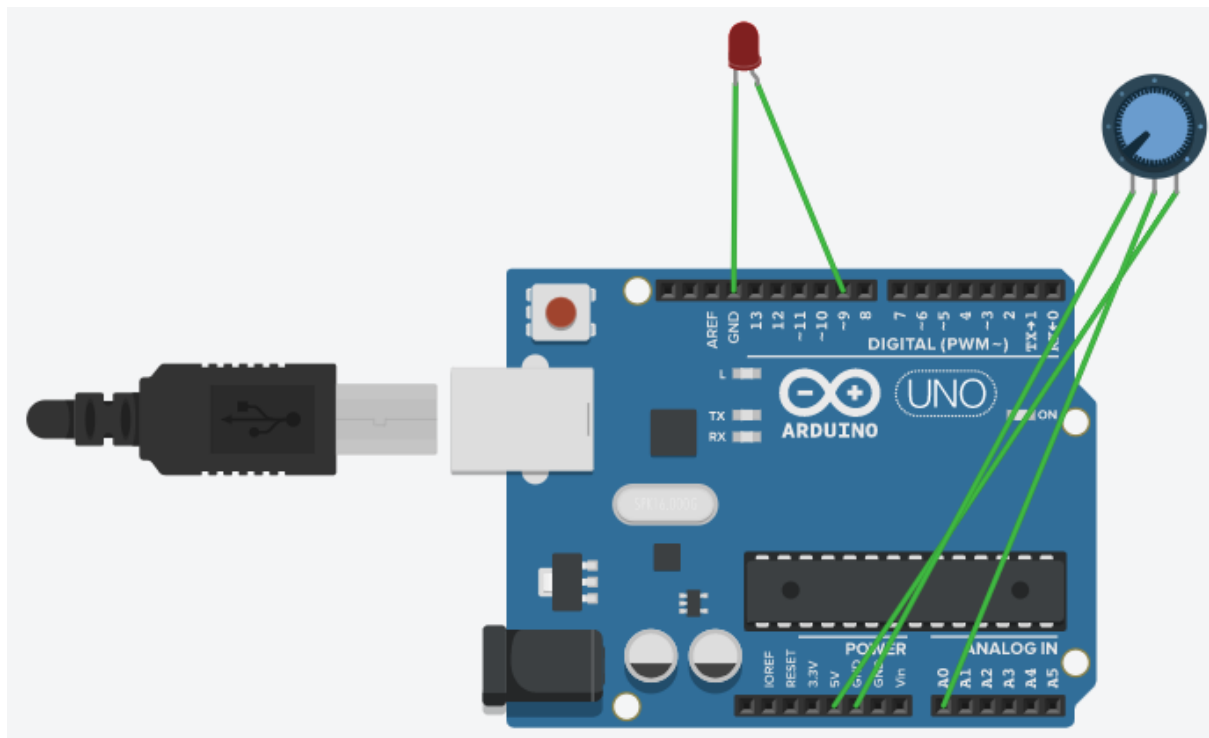
Aim :

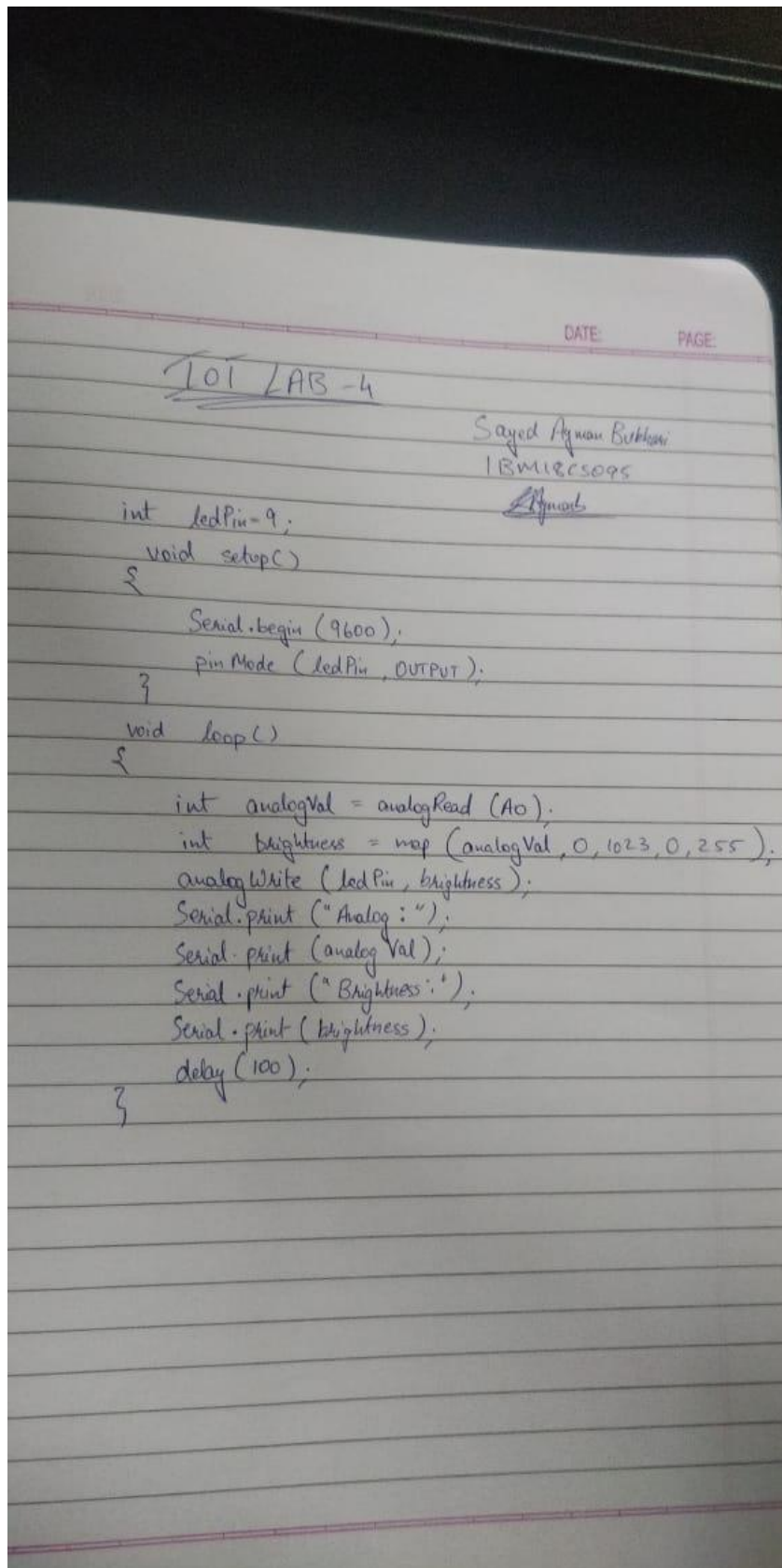To control the brightness of an LED using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- LED bulb
- Potentiometer

Circuit Diagram :

Written Code :

IOT LAB - 4

Sayed Aynan Bukhari
1BM18CS095

```
int ledPin = 9;
void setup()
{
    Serial.begin (9600);
    pinMode (ledPin, OUTPUT);
}

void loop()
{
    int analogVal = analogRead (A0);
    int brightness = map (analogVal, 0, 1023, 0, 255);
    analogWrite (ledPin, brightness);
    Serial.print ("Analog: ");
    Serial.print (analogVal);
    Serial.print ("Brightness: ");
    Serial.print (brightness);
    delay (100);
}
```

Observation /Output :

The brightness of the LED bulb increased/decreased upon turning the potentiometer knob..

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

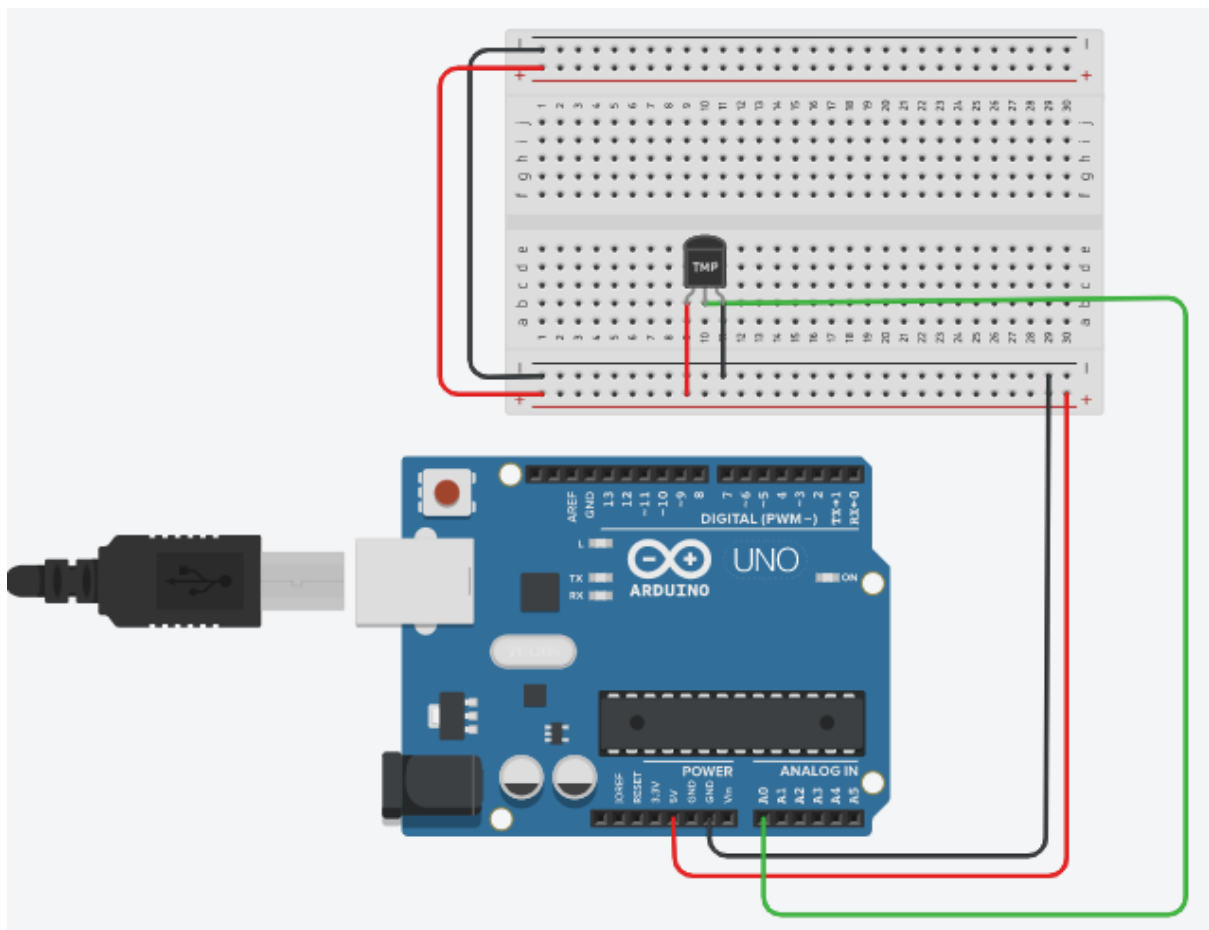**Program No : 05**

Program Title : Temperature Sensor

Aim :

To record the temperature in Celsius and Fahrenheit using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- Temperature Sensor

Circuit Diagram :

Written Code :

IOT LAB - 5

Sayed Ayman Bukh
IBM18CS095

```
int outputpin = 0;
void setup ()
{
    Serial.begin (9600);
}
void loop ()
{
    int rawvoltage = analogRead (outputpin);
    float millivolts = (rawvoltage /1024.0)* 5000;
    int tempc = millivolts /10;
    int tempf = ( (tempc * 9)/5 + 32);
    Serial.print ln (" Temperature : ");
    Serial.print (" Celsius :");
    Serial.print ln (tempc);
    Serial.print (" Fahrenheit :");
    Serial.println (tempf);
    delay (3000);
}
```

Observation /Output :

The Temperature is observed in the serial output.

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Name : Sayed Ayman Bukhari , USN : 1BM18CS095

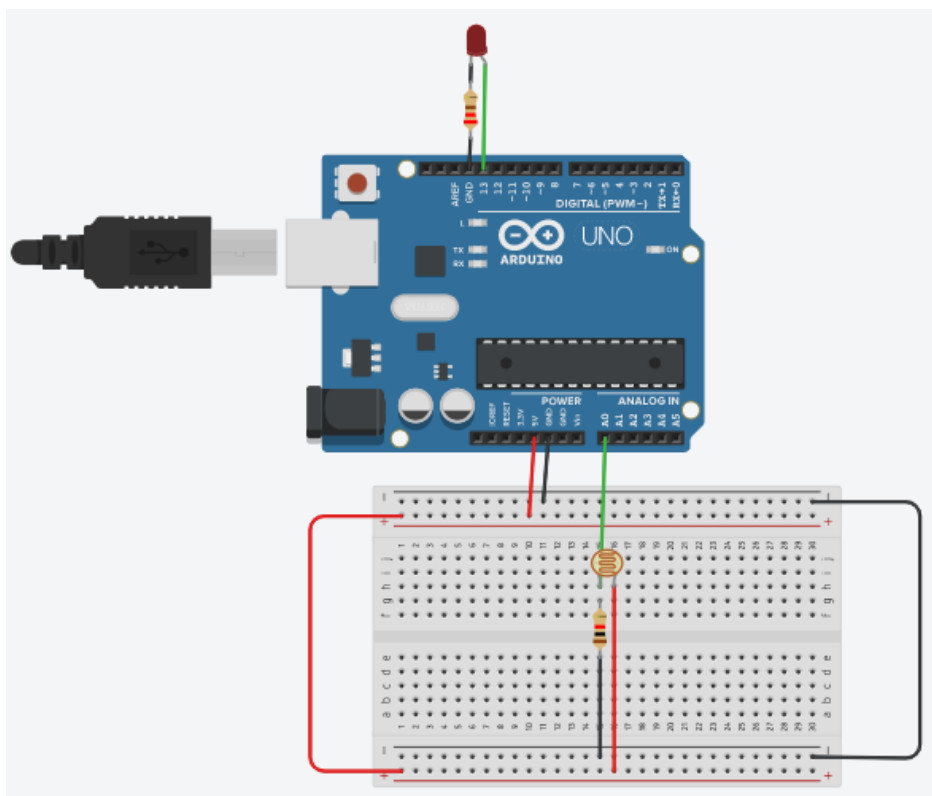**Program No : 06**

Program Title : Light Sensor

Aim :

To turn on and off an LED beyond a certain threshold using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- LDR
- LED
- 2 Resistors

Circuit Diagram :

Written Code :


```
IoT LAB - 6

                                        Sayed Ayman Bukhari
                                        IBM18CS095
int ldrpin = 0,                         Ahmad
int ldrvalue = 0;
int threshold = 500;
Void setup()
{
    Serial.begin (9600);
    pinMode (13, OUTPUT);
}

void loop()
{
    ldrvalue = analogRead (ldrpin);
    Serial.print ("LDR Value : ");
    Serial.println (ldrvalue);
    delay (100);
    if( ldrvalue <= threshold )
    {
        digitalWrite (13, HIGH);
    }
    else
    {   digitalWrite (13, LOW);
    }
    delay (1000);
}
```

Observation /Output :

The LED turned off as the light increased beyond the threshold.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 07

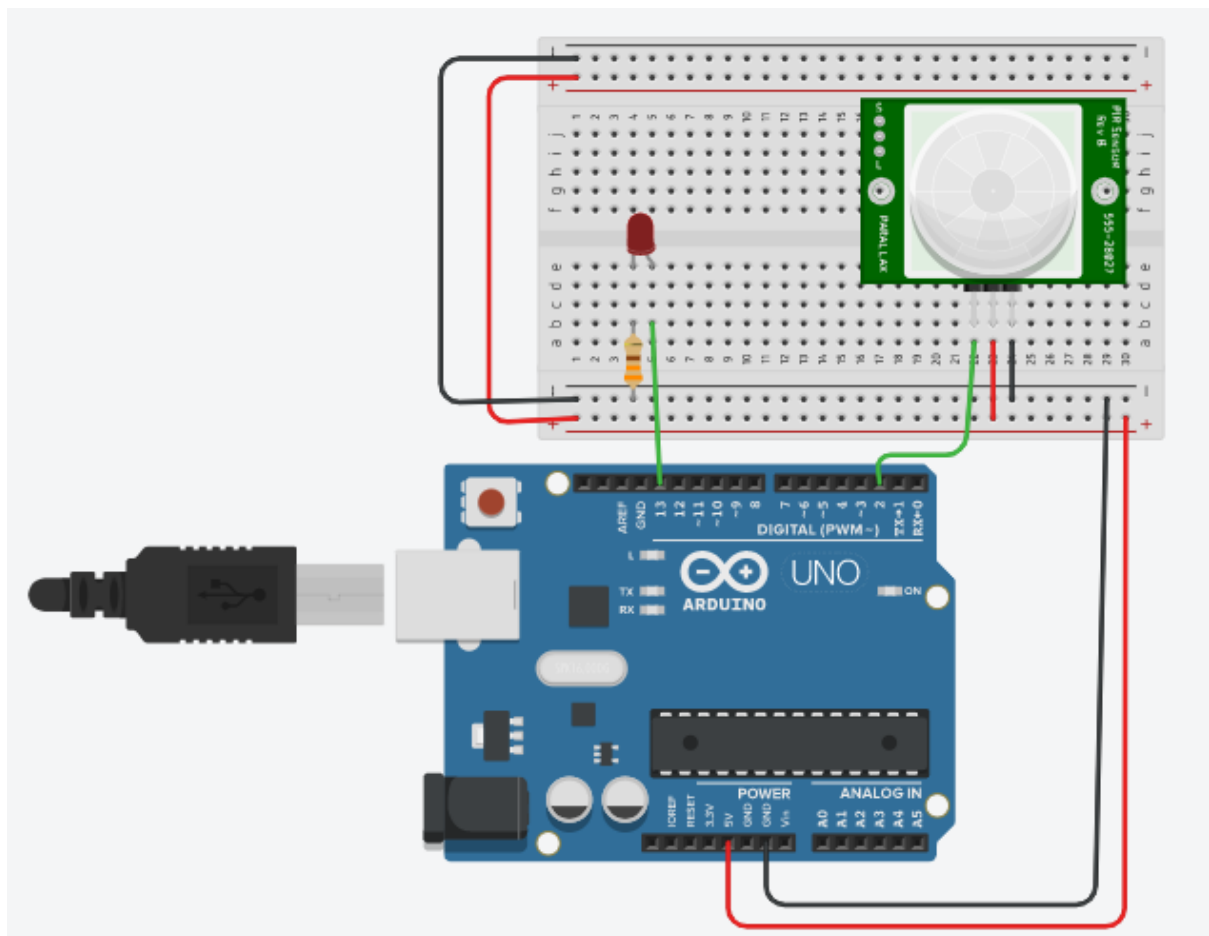**Program Title : Passive Infrared Sensor**

Aim :

To turn on a LED when motion is detected using an Arduino Uno board.
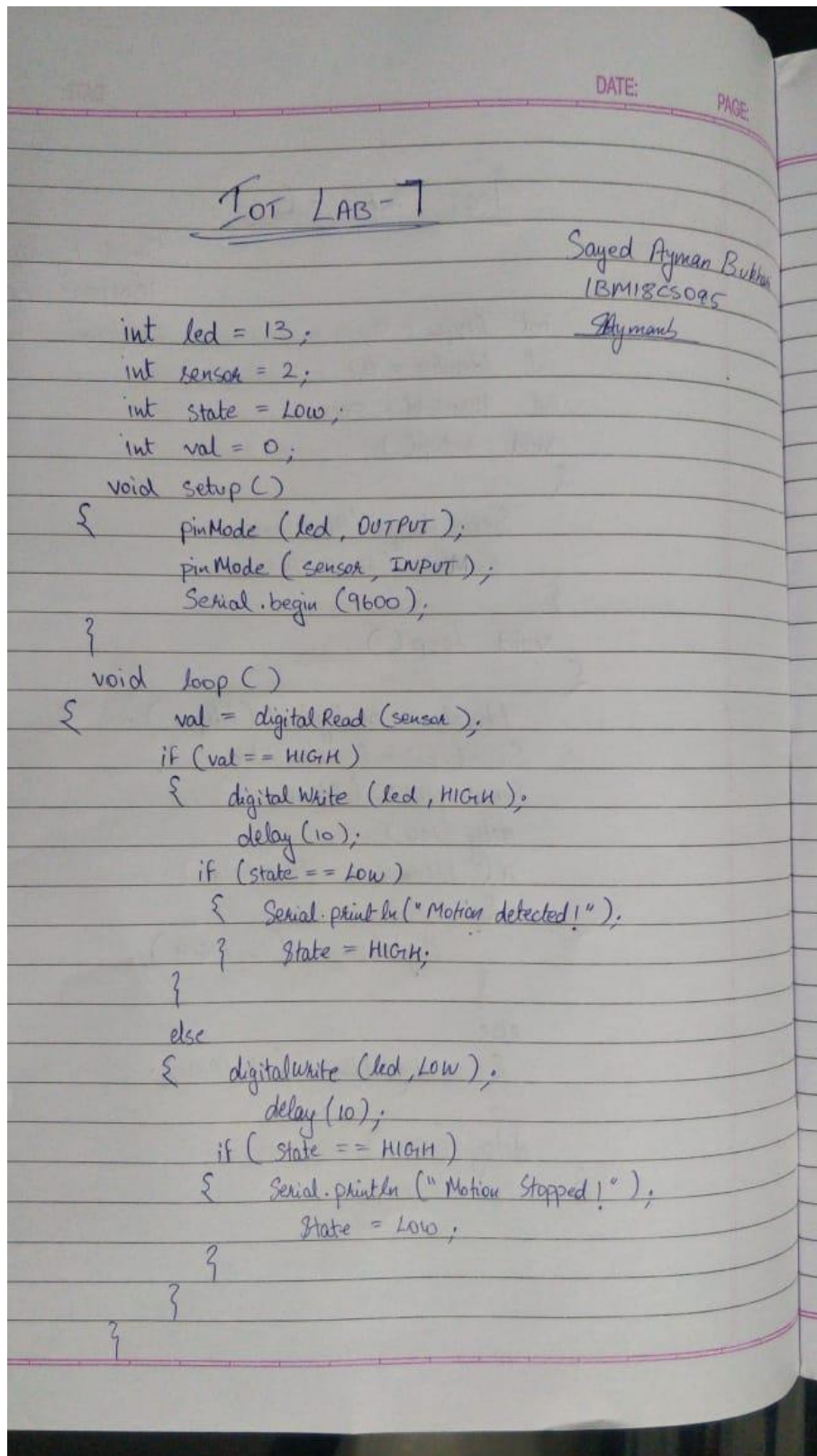
Hardware Required :

- Arduino Uno Board
- LED
- PIR
- 330 Ohm Resistor

Circuit Diagram :

Written Code :


```
                                    DATE:              PAGE:

                IoT LAB-1

                                    Sayed Ayman Bukhari
                                    IBM18CS095
    int  led = 13;                  Aymanb
    int  sensor = 2;
    int  state = Low;
    int  val = 0;
    void setup ()
    {      pinMode (led, OUTPUT);
           pinMode (sensor, INPUT);
           Serial.begin (9600);
    }

    void  loop ()
    {      val = digitalRead (sensor);
         if (val == HIGH)
         {   digitalWrite (led, HIGH);
             delay (10);
          if (state == Low)
          {  Serial.println ("Motion detected!");
          }  state = HIGH;
         }

         else
         {   digitalWrite (led, Low);
             delay (10);
          if (state == HIGH)
          {  Serial.println ("Motion Stopped!");
             state = Low;
          }
         }
    }
```

Observation /Output :

The LED is turned on when motion is detected.

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Name : Sayed Ayman Bukhari , USN : 1BM18CS095

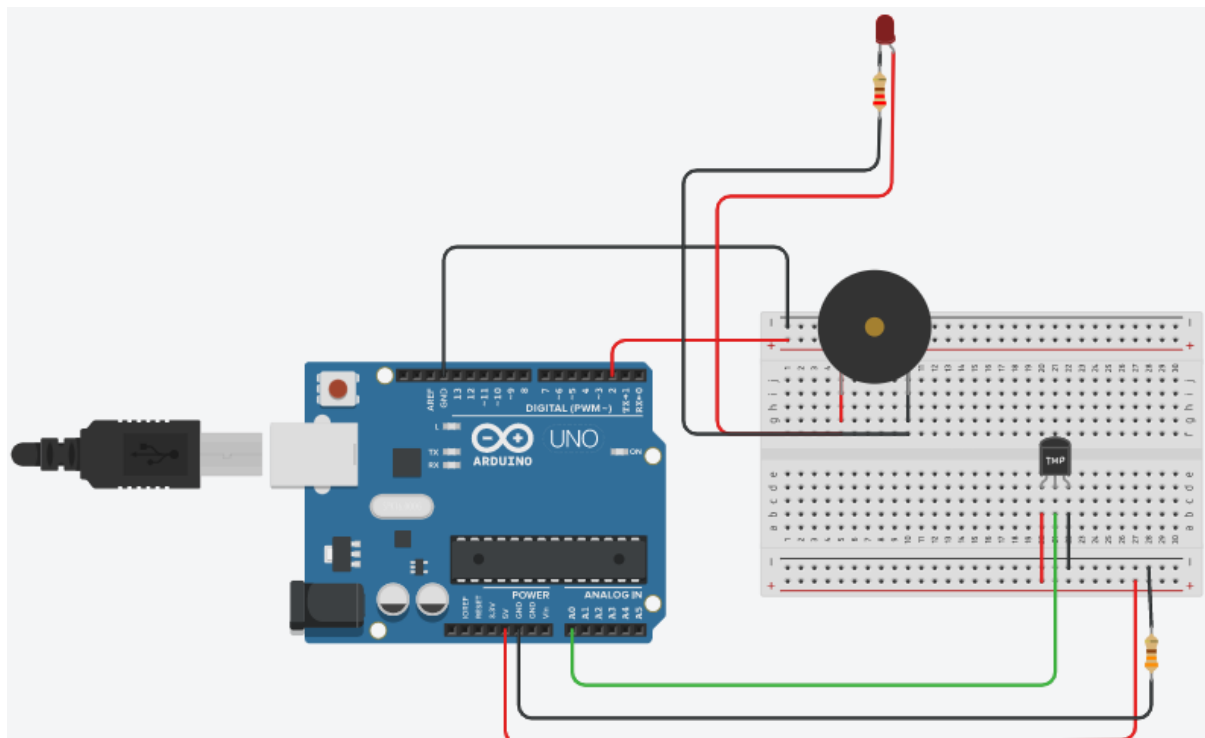**Program No : 09**

Program Title : Fire Detection

Aim :

To turn on a LED and buzzer upon detecting a fire (aka high temp) using an Arduino Uno board.
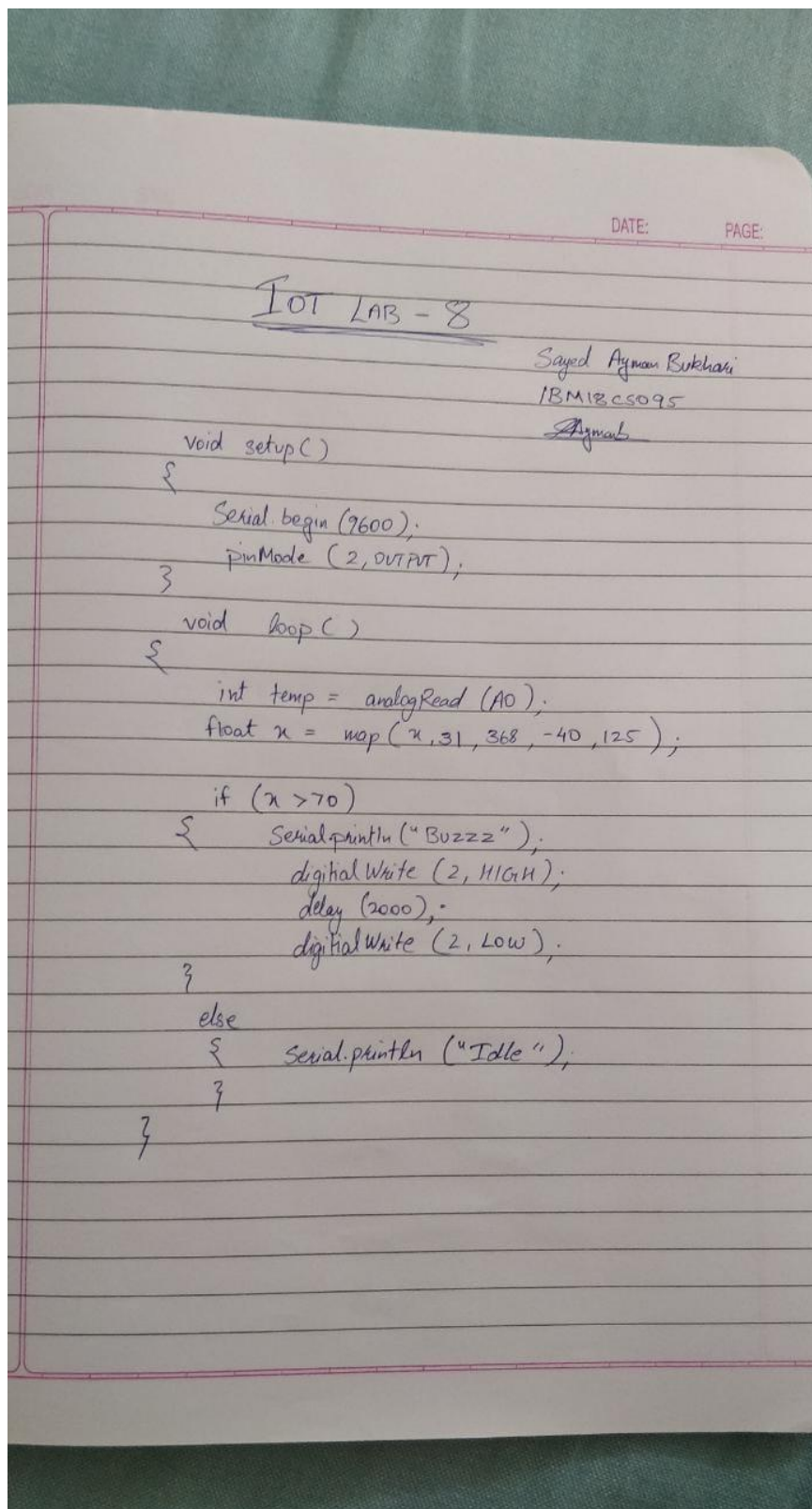
Hardware Required :

- Arduino Uno Board
- LED
- Buzzer
- Temperature Sensor
- 330 Ohm Resistor
- 220 Ohm Resistor

Circuit Diagram :

Written Code :

```
IoT LAB - 8

                          Sayed Ayman Bukhari
                          IBM18CS095
                          Ayman

void setup ()
{
    Serial.begin (9600).
    pinMode (2, OUTPUT);
}
void loop ()
{
    int temp = analogRead (A0).
    float x = map (x, 31, 368, -40, 125);

    if (x > 70)
    {   Serial.println ("Buzzz").
        digitalWrite (2, HIGH);
        delay (2000).
        digitalWrite (2, LOW).
    }

    else
    {   Serial.println ("Idle");
    }
}
```

Observation /Output :

The LED and Buzzer are turned on when a fire is detected.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 10
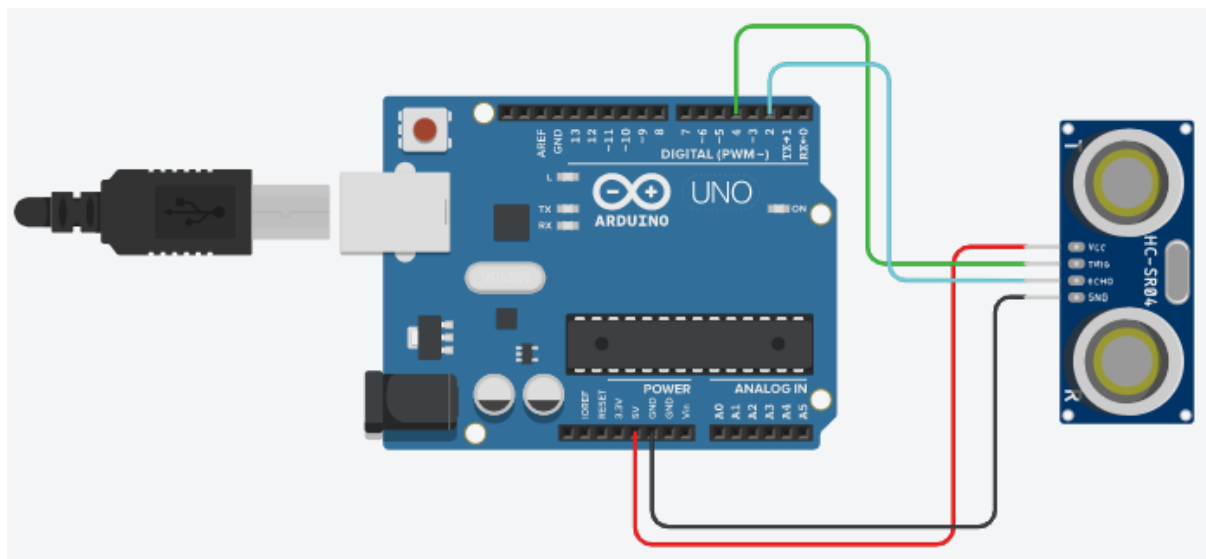
Program Title : Ultrasound Distance Sensor

Aim :

To measure distance using an ultrasound sensor and an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- HC-SR04 Ultrasound Sensor

Circuit Diagram :

Written Code :

IoT LAB - 10

Sayed Ayman Bukhari
1BM18CS095
Ayman

```
int trigPin = 4;
int echoPin = 2;
long duration, cm, inches;

void setup()
{
    Serial.begin(9600);
    pinMode(trigPin, OUTPUT);
    pinMode(echoPin, INPUT);
}

void loop()
{
    digitalWrite(trigPin, LOW);
    delayMicroseconds(5);
    digitalWrite(trigPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    pinMode(echoPin, INPUT);
    duration = pulseIn(echoPin, HIGH);
    cm = (duration/2) / 29.1;
    inches = (duration/2) / 74;
    Serial.print("Distance:");
    Serial.print(inches);
    Serial.print("in, ");
    Serial.print(cm);
    Serial.print("cm");
    Serial.print();
    delay(2000);
}
```

Observation /Output :

The distance was measured using the ultrasound sensor.

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Name : Sayed Ayman Bukhari , USN : 1BM18CS095

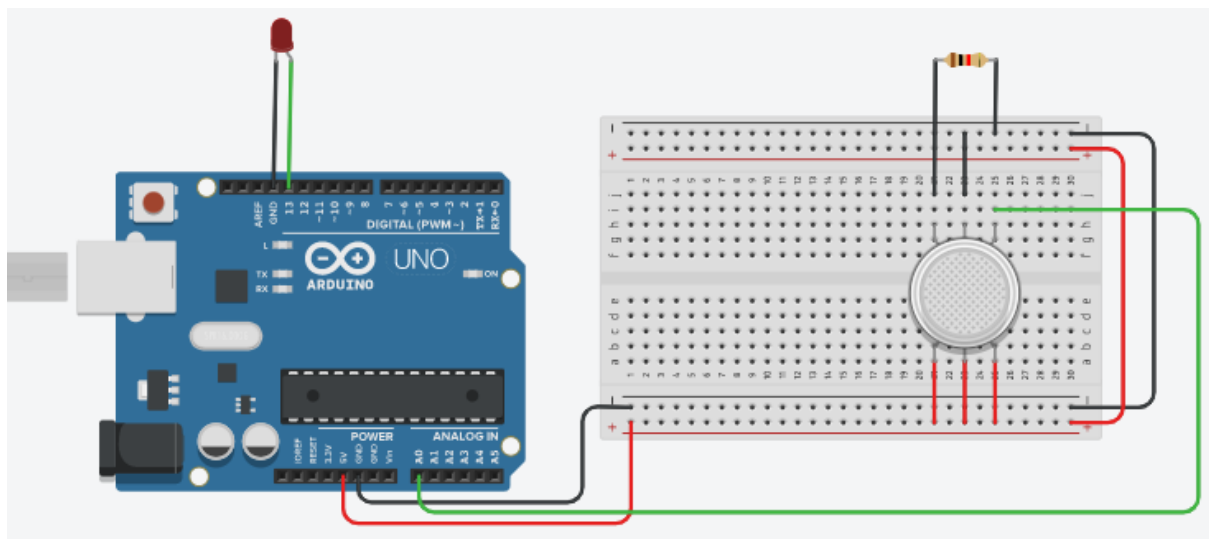**Program No : 11**

Program Title : Gas Sensor

Aim :

To notify if there is a gas leakage near the sensor using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- LED
- 330 Ohms Resistor
- Gas Sensor

Circuit Diagram :

Written Code :

IOT LAB - 11

Sayed Ayman Bukhari
IBM18CS095
S.Aymah

```
void setup()
{
    pinMode (13, OUTPUT);
    pinMode (A0, INPUT);
    Serial.begin (9600);
}

void loop()
{
    float gval = analogRead (A0);
    if (gval > 200)
        digitalWrite (13, HIGH);
    else
        digitalWrite (13, LOW);

    Serial.println ((string) "Gas Value: " + gval);
    delay (1500);
}
```

Observation /Output :

The LED is turned on when gas is detected.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 12
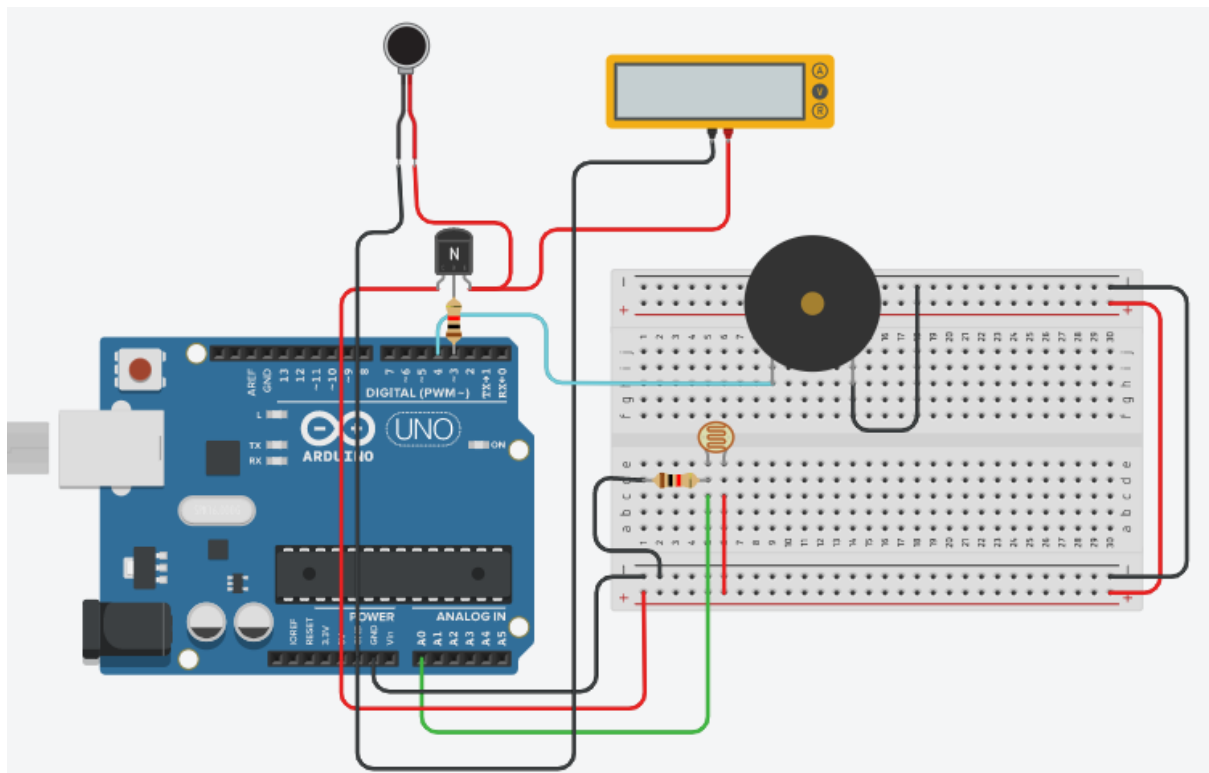
Program Title : Vibration + LDR

Aim :

To turn on the vibrator when the LDR detects light using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- NPN Transistor
- Multimeter
- Vibrator Motor
- 1K Ohm Resistor X 2
- LDR
- Buzzer

Circuit Diagram :

Written Code :

IoT LAB - 12

Sayed Ayman Bukhari
1BM18CS095
S.Ayman

```
int motorPin = 3;
int sensorPin = AO;
int threshold = 400;


void setup ( )
{      pinMode (motorPin, OUTPUT);
       pinMode (4, OUTPUT);
       Serial.begin (9600);
}
void loop ( )
{

    int sensorValue = analogRead (sensorPin);
    Serial.println (sensorValue);
    if (sensorValue >= threshold )
       {
           digitalWrite (motorPin, HIGH);
           digitalWrite (4, HIGH);
           Serial.println ("Buzz Buzz, its ya boi lightyear");
       }
    else {
           digitalWrite (motorPin, LOW);
       }
    delay (1500);
    digitalWrite (4, LOW);
}
```

Observation /Output :

The vibrator and buzzer turns on once the LDR detects light.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

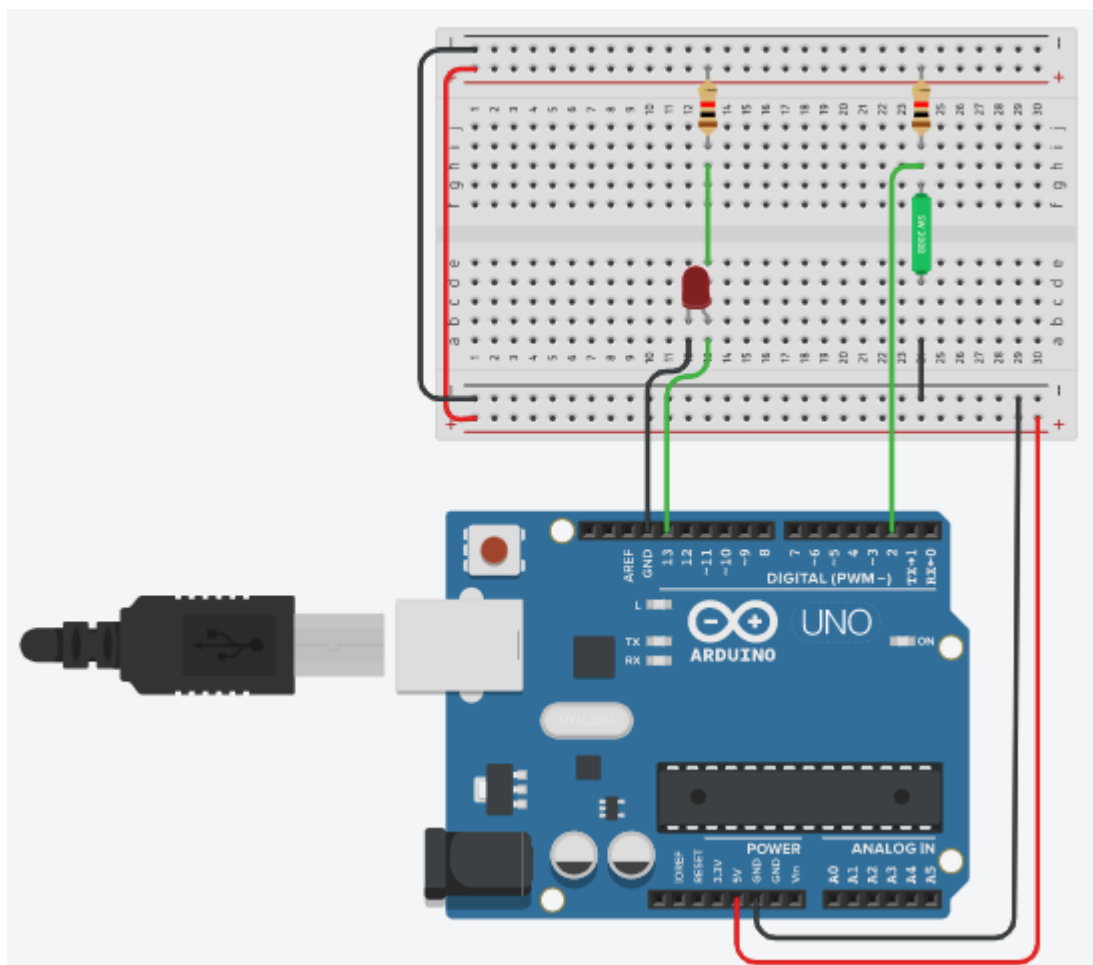**Program No : 13**

Program Title : Tilt Sensor

Aim :

To design a smart package handling system (Tilt & LED) using an Arduino Uno board.
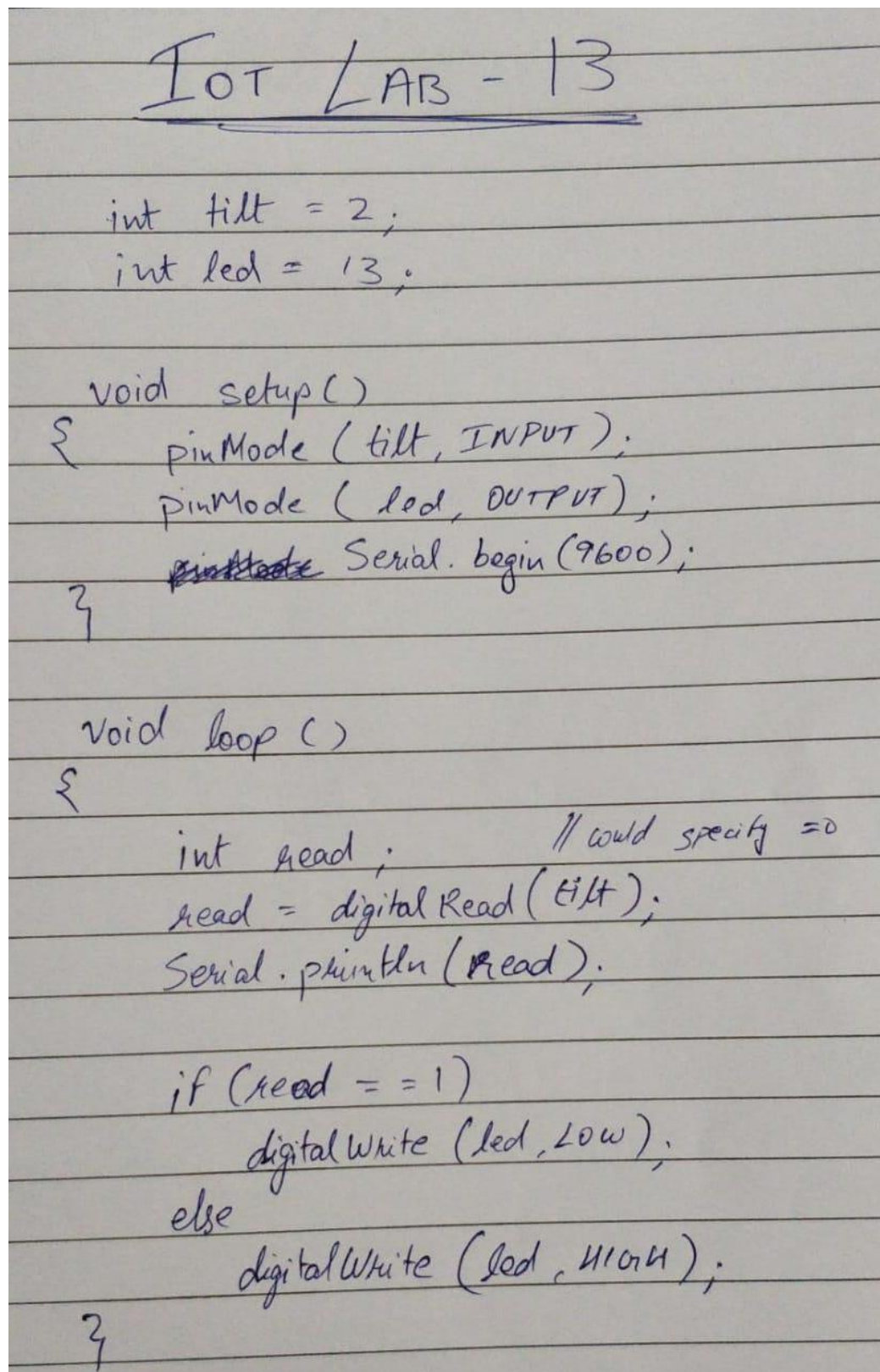
Hardware Required :

- Arduino Uno Board
- LED
- Tilt Sensor
- 2 Resistors – 1K Ohm

Circuit Diagram :

Written Code :

```
IoT LAB - 13

int tilt = 2;
int led = 13;


void setup()
{   pinMode (tilt, INPUT);
    pinMode (led, OUTPUT);
    pinMode  Serial.begin(9600);
}


void loop()
{

    int read;              // could specify = 0
    read = digitalRead(tilt);
    Serial.println(read);

    if (read == 1)
        digitalWrite(led, LOW);
    else
        digitalWrite(led, HIGH);
}
```

Observation /Output :

The LED was lit once tilt was detected.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 14

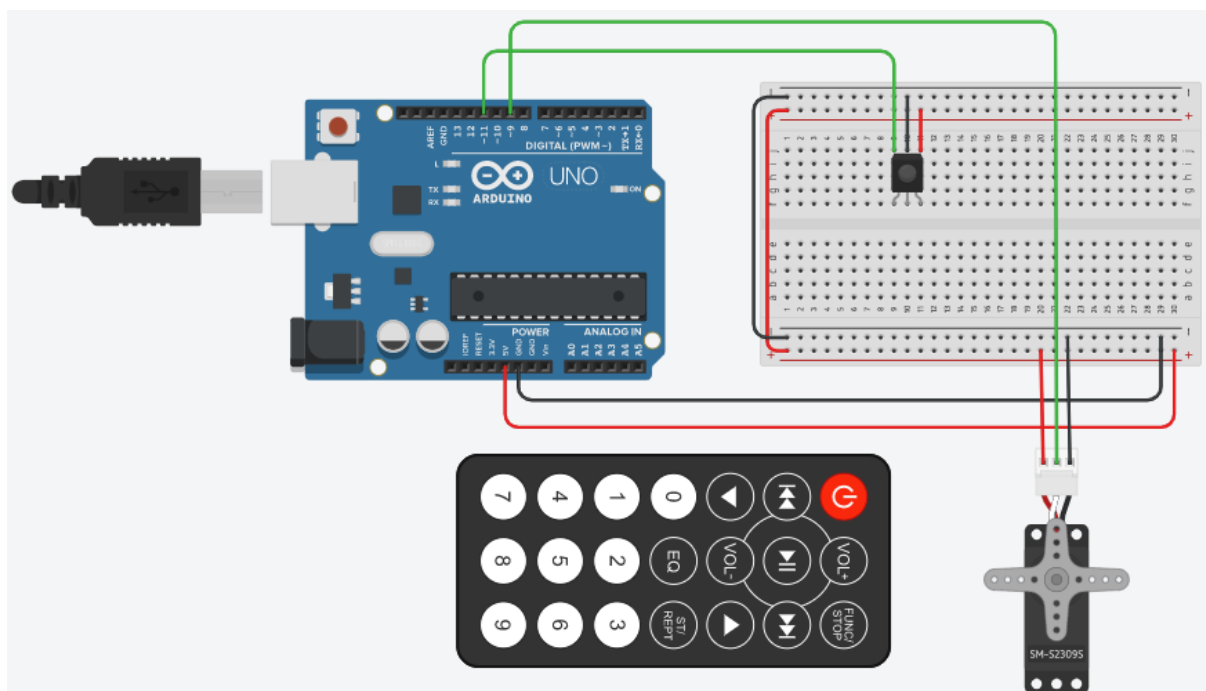**Program Title : IR based SERVO Motor Controller**

Aim :

To design IR based SERVO motor controller (Clockwise and Counter) using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- IR Sensor
- IR Remote
- Micro Servo

Circuit Diagram :

Written Code :

IoT LAB - 14

```cpp
#include <Servo.h>
#include <IRemote.h>

int RECV_PIN = 11;
IRrecv irrecv (RECV_PIN);
decode_results results;

Servo myservo;

void setup ()
{   Serial.begin (9600);
    irrecv.enableIRIn ();
}
void loop ()
{   if (irreve.decode (&results))
    {
        switch (results.value)
        {   case 0xFD60FF:
            myservo.attach (9);
            Serial.println ("start");
            break;

            case 0xFD609F:
            myservo.write (360);
            Serial.println ("Clockwise");
            break;

            Case 0xFDA05F:
            myservo.write (-360);
            Serial.println ("Counter Clockwise");
            break;

            case 0xFDA05F:
            myservo.attach (7);
            Serial.println ("Stop");
            break;
        }

        irrecv.resume ();
    }
}
```

Observation /Output :

The Servo motor turns clockwise and counter clockwise upon detection of IR signal from the remote.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 15

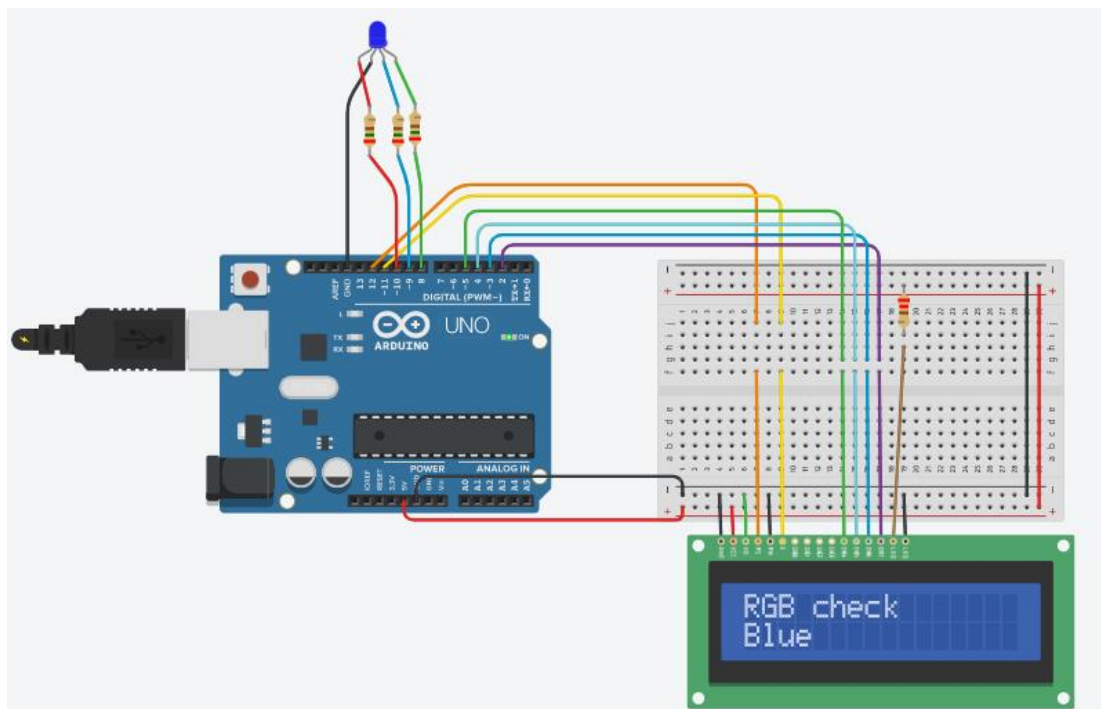**Program Title : RGB LED interfacing with LCD panel**

Aim :

To switch colours using a RGB led and display the current colour in the LCD display using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- RGB LED
- LCD Panel
- 4 X 240 Ohm Resistor

Circuit Diagram :

Written Code :

IoT LAB - 14

```
#include <liquidCrystal.h>
LiquidCrystal  lcd (12,11,5,4,3,2);


void setup()
{    pinMode (8,OUTPUT);
     pinMode (9,OUTPUT);
     pinMode (10,OUTPUT);


     lcd.begin (16,2);
     lcd.print (" RGB-check");
}

void loop()
{    lcd.setCursor (0,1);
     lcd.print ("Red ");
     digitalWrite (10,HIGH);
     digitalWrite (9,Low);
     digitalWrite (8,Low);
     delay (500);
     lcd.setCursor (0,1);
     lcd.print ("Blue ");
     digitalWrite (10,Low);
     digitalWrite (9,HIGH);
     digitalWrite (8,Low);
     delay (500);
     lcd.setCursor (0,1);
     lcd.print (" Green ");
     digitalWrite (10,Low);
     digitalWrite (9,Low)
     digitalWrite (8,HIGH);
     delay (500);
}
```

Observation /Output :

The LED turns from Red – Blue – Green and the name of the current colour is displayed on the LCD.

IOT LAB - 5th Sem

Name : Sayed Ayman Bukhari , USN : 1BM18CS095

Program No : 16
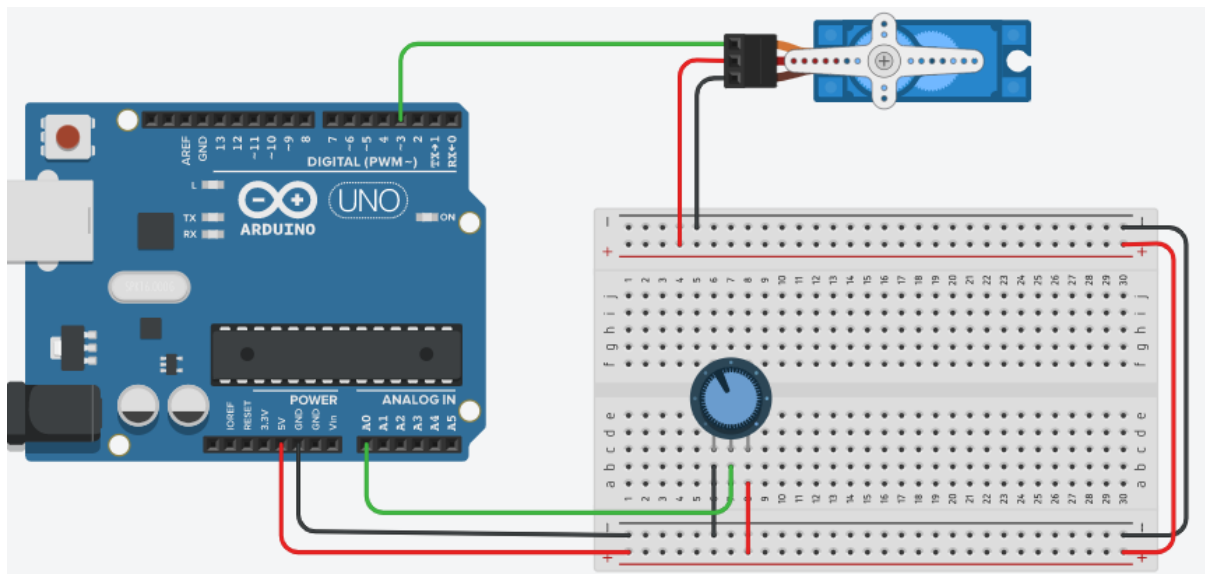
Program Title : Smart Irrigation

Aim :

To design a smart irrigation system (Potentio & Servo) using an Arduino Uno board.

Hardware Required :

- Arduino Uno Board
- Potentiometer
- Micro Servo

Circuit Diagram :

Written Code :

IoT LAB - 15

```cpp
#include <Servo.h>
Servo myservo;
int pos = 0;
int sensorpin = A0;
int sensorvalue = 0;


void setup()
{   myservo.attach(3);
    Serial.begin(9600);
}
void loop()
{   sensorValue = analogRead(sensorpin);
    Serial.println(sensorValue);
    if(sensorValue > 500)
    {
        for(pos = 0; pos <= 180; pos += 1)
        {   myservo.write(pos);
            delay(15);
        }
        for(pos = 180; pos >= 0; pos -= 1)
        {   myservo.write(pos);
            delay(15);
        }
    }
    delay(1000);
}
```

Observation /Output :

The Servo moves when the potentiometers resistance is above a certain level.