



# PRESIDENCY UNIVERSITY

**(Established under the Presidency University Act, 2013 of the Karnataka Act 41 of 2013)**

## Internet Of Things

### Lab Record

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ROLL NO: 20181CSE0621

SEC: 6-CSE-10

COURSE CODE: CSE 220

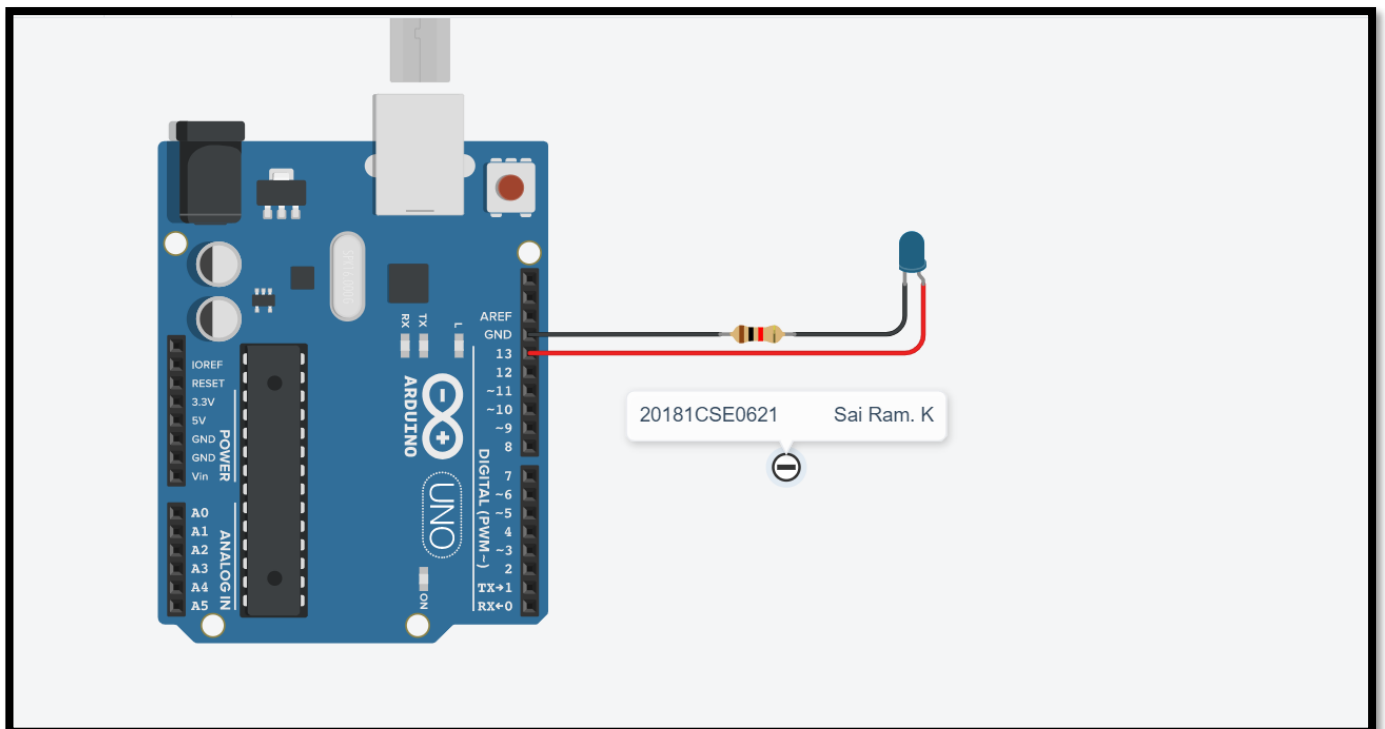
## **EXPERIMENT - 1**

**AIM:** Write the Code to Blink an LED on ARDUINO UNO R3. Compile and verify the result on ARDUINO IDE.

### **Components Required:**

Arduino, LED , Resistors, Breadboard

### **Initial Circuit Design:**



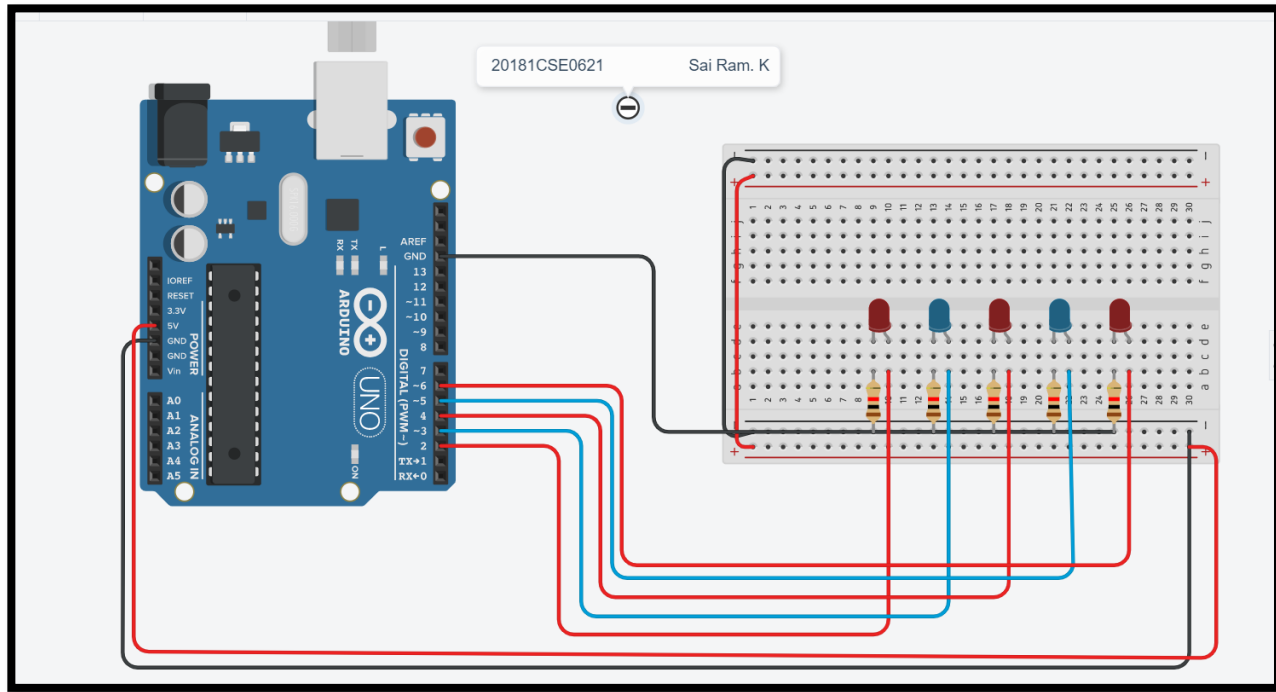
### **Arduino Sketch:**

```
void setup()
{
  pinMode(13, OUTPUT);
}

void loop()
{
  digitalWrite(13, HIGH);
  delay(1000); // Wait for 1000
  digitalWrite(13, LOW);
  delay(1000); // Wait for 1000
}
```

```
delay(1000); // Wait for 1000  
millisecond(s)  
}
```

## Output Screenshots:



### i)To blink two LED's alternatively

Aim: Blink LED's Alternately

Components: Arduino UNO

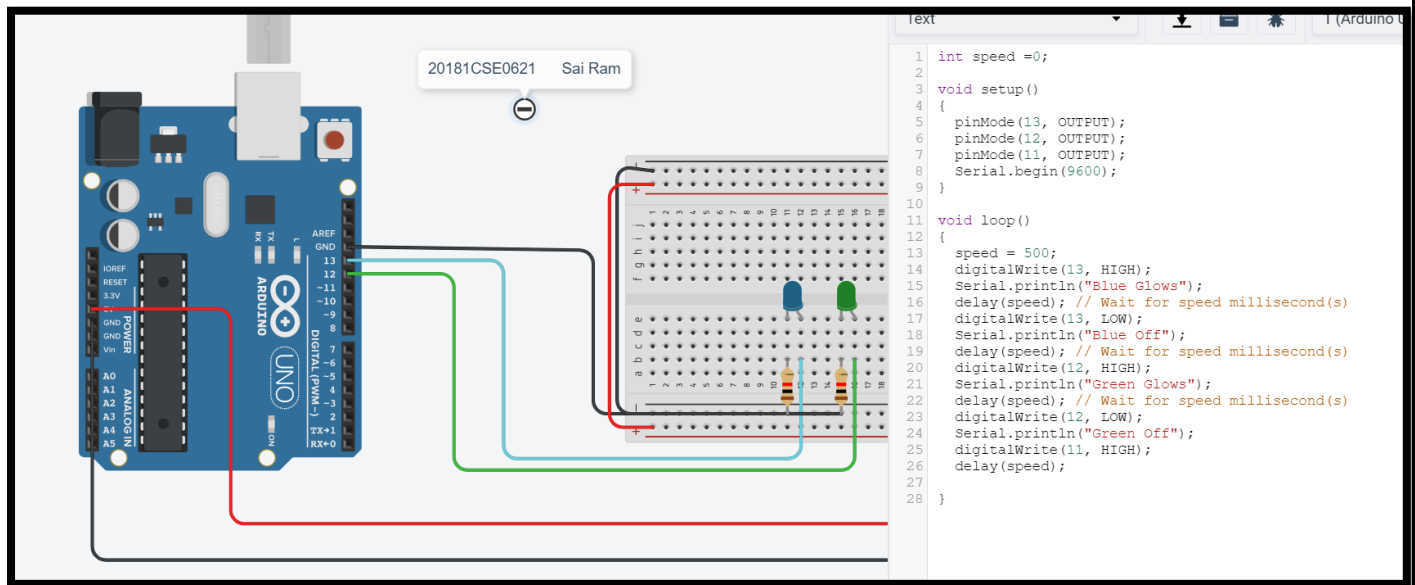
LED

Resistor

Tinker cad Simulator

Bread board

## Circuit diagram:



## Sketch:

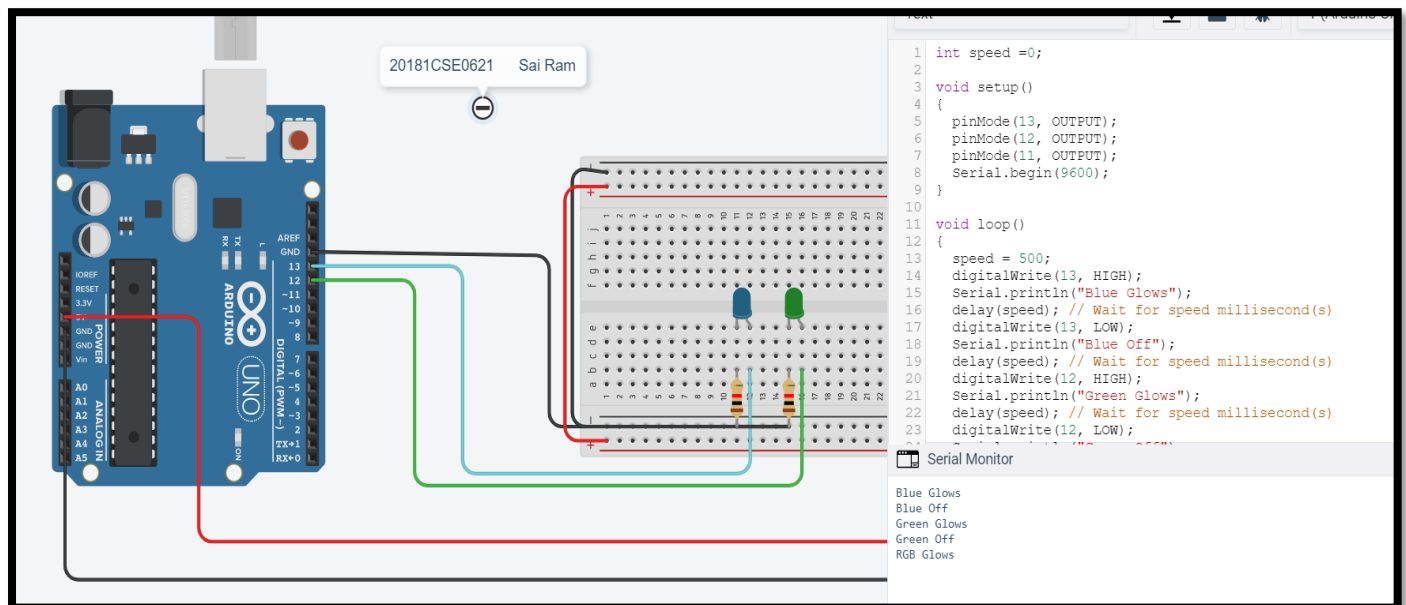
```
void setup()
```

```
{
  pinMode(13, OUTPUT);
  Serial.begin(9600);
}
```

```
void loop()
```

```
{
  digitalWrite(13, HIGH);
  Serial.println("led1 is on");
  delay(1000); // Wait for 1000 millisecond(s)
  digitalWrite(12, HIGH);
  digitalWrite(13, LOW);
  Serial.println("led2 is on");
  Serial.println("led1 is off");
  delay(1000); // Wait for 1000 millisecond(s)
  digitalWrite(12, LOW);
  Serial.println("led2 is off");
}
```

## Output Screenshot:



## ii) To blink ODD and EVEN LED's

Aim: Blink led's ODD AND EVEN

Components: Arduino UNO

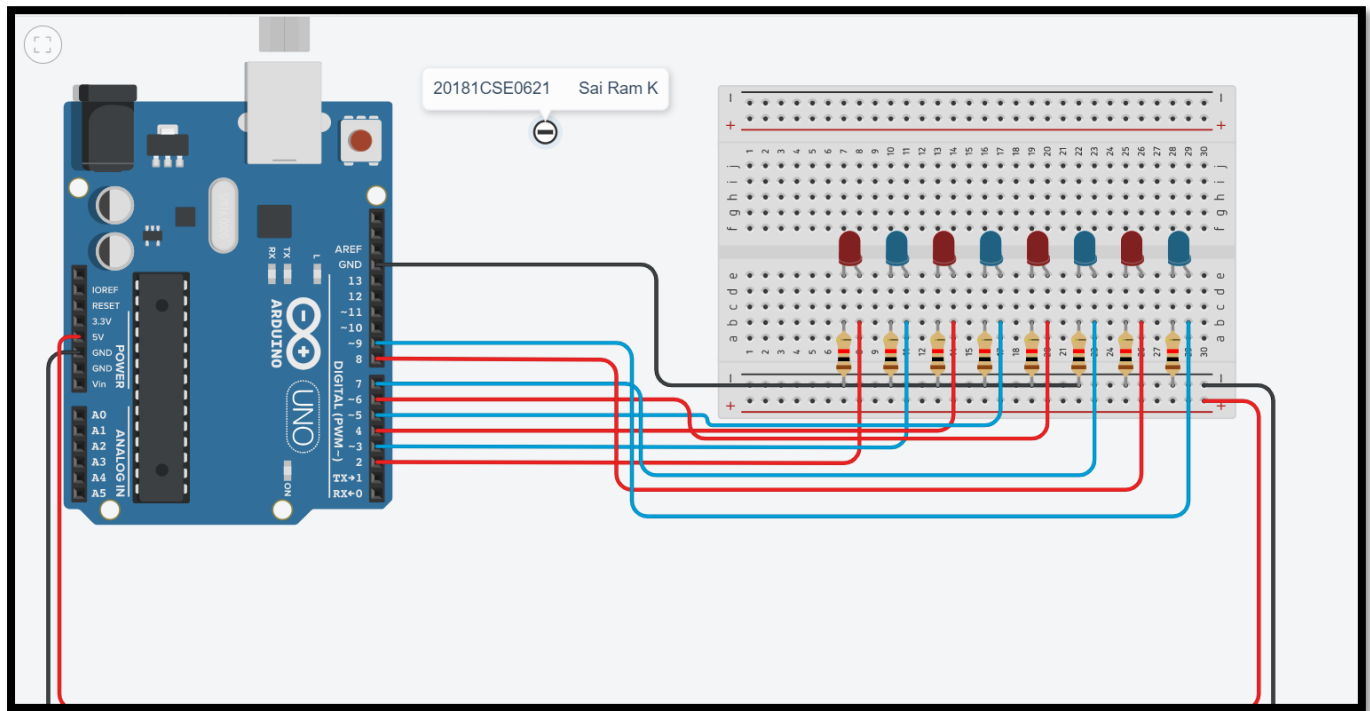
LED

Resistor

Tinker cad Simulator

Bread board

Circuit diagram:



### Sketch:

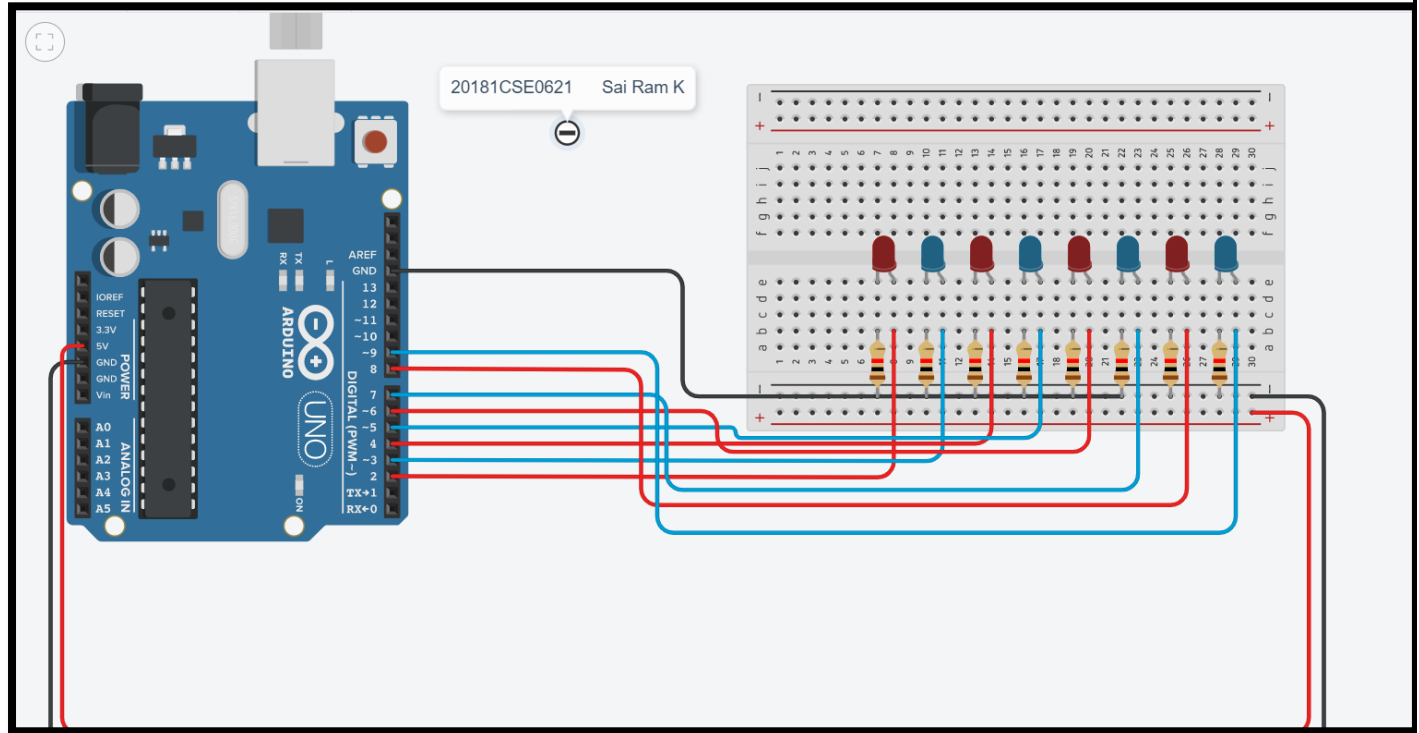
```
int ledPins[]={2,3,4,5,6,7,8,9};
int lightModulo=0;
void setup()
{
  for(int i=0;i<8;i++)
  {
    pinMode(ledPins[i], OUTPUT);
  }
  Serial.begin(9600);
}
void loop()
{
  int timer=1000;
  Serial.println(lightModulo);
  for(int i=0;i<8;i++)
  {
    if(i%2==lightModulo)
    {
      digitalWrite(ledPins[i],HIGH);
    }//end of if
    else
    {
      digitalWrite(ledPins[i],LOW);
    }//end of else
  }//end of for
  lightModulo--;
  lightModulo=abs(lightModulo);
```

```

delay(timer);
}

```

## Output Screenshots:



### iii) Scroll LED's

Aim: To Scroll the LED's

COMPONENTS: Arduino UNO

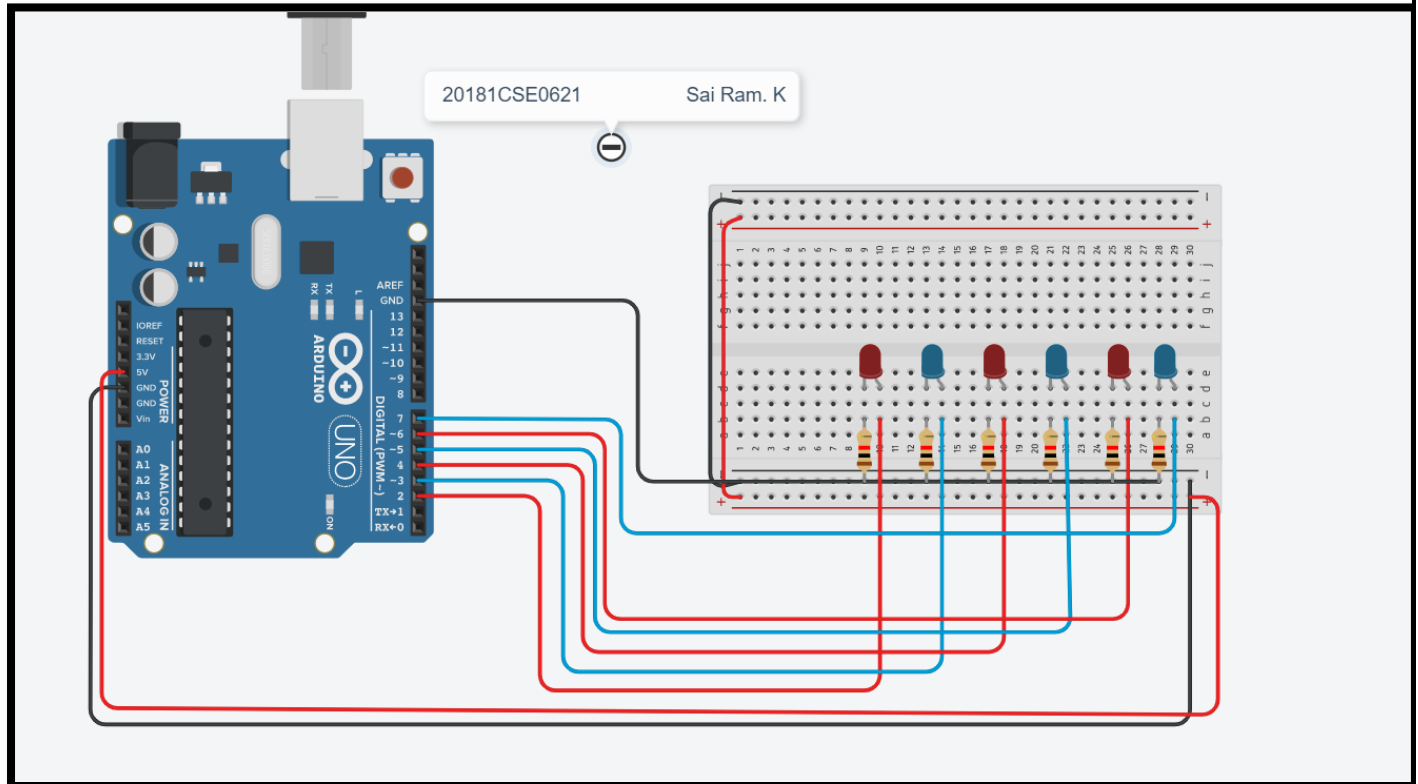
LED

Resistor

Tinker cad Simulator

Bread board

Circuit diagram:

**Sketch:**

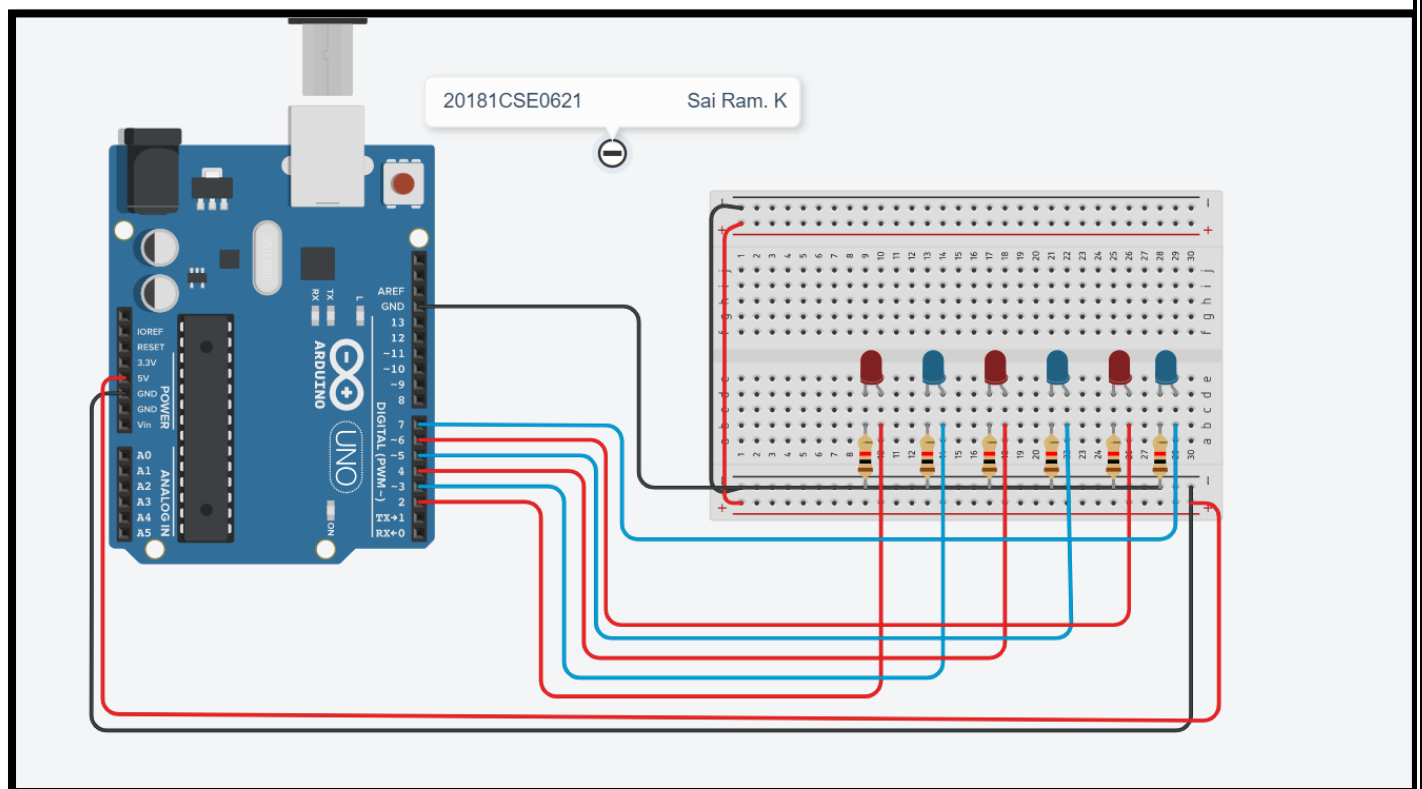
```
int i;
void setup()
{
    pinMode(13, OUTPUT);
}

void loop()
{
    digitalWrite(8, HIGH);
    delay(1000); // Wait for 1000 millisecond(s)
    digitalWrite(8, LOW);
    for(i=9;i<=13;i++)
    {
        digitalWrite(i, HIGH);
```



```
delay(1000); // Wait for 1000 millisecond(s)
digitalWrite(i, LOW);
}
for(i=12;i>8;i--)
{
digitalWrite(i, HIGH);
delay(1000); // Wait for 1000 millisecond(s)
digitalWrite(i, LOW);
}
}
```

### Output screenshots:



## Experiment – 2

**Question :** Interfacing of Arduino Uno with LED and switch. Write a program to control LED using Switch.

Additional Programs:

- i) Single switch to control multiple LED's
- ii) Multi switches to control multiple LED's

**Aim :** Connecting a single switch to control a single LED.

**Components :** Arduino, bread board, jumper wires, resistor, pushbutton.

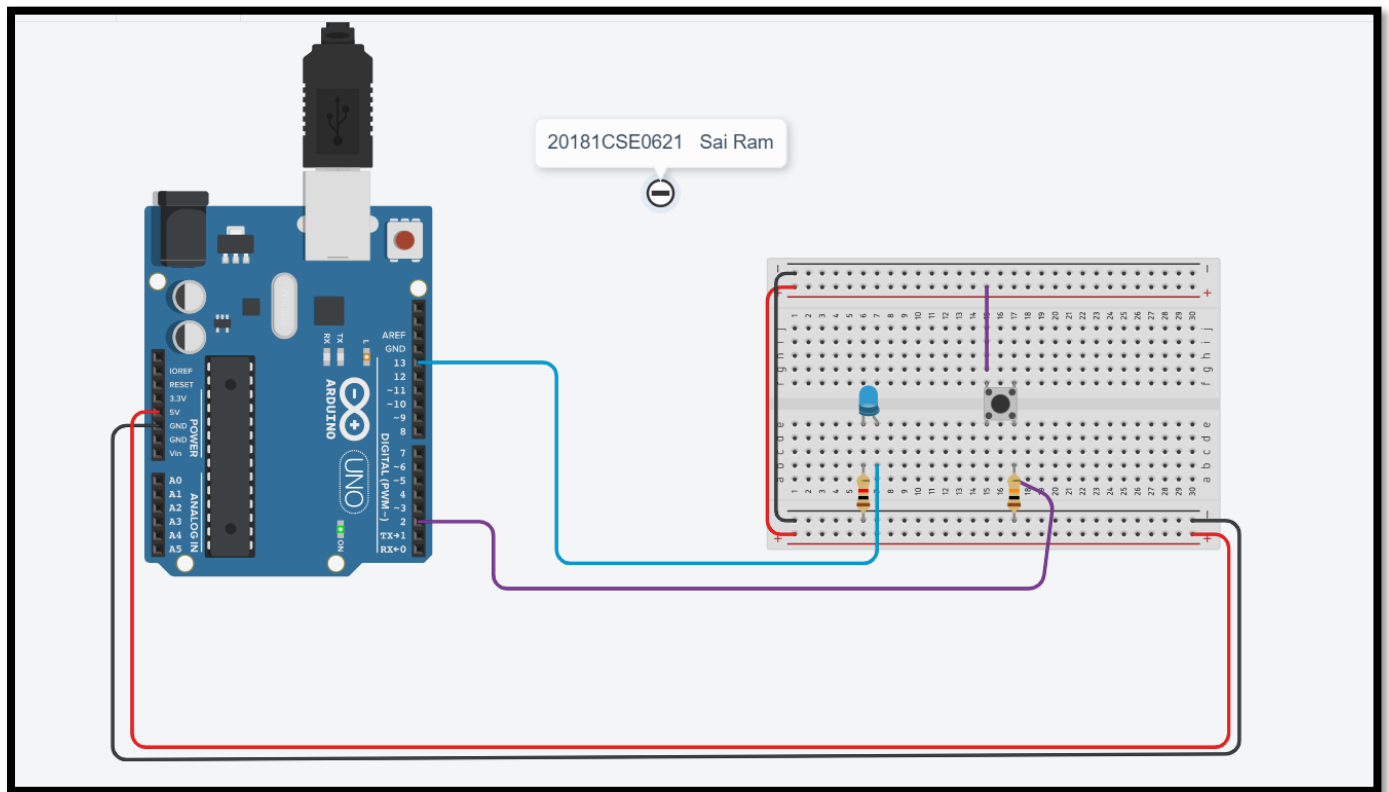
### **Sketch [Code] :**

```
int sbutton=0;

void setup()
{
    pinMode(13, OUTPUT);
    pinMode(2, INPUT);
    Serial.begin(9600);
}

void loop()
{
    sbutton = digitalRead(2);
    if (sbutton==HIGH)
    {
        digitalWrite(13, HIGH);
        Serial.println('On');
    }
    else {
        digitalWrite(13, LOW);
        Serial.println('Off');
    }
    delay(10);
}
```

### **Output Screenshots :**



### ■ Single switch to control multiple LED's :-

**Aim :** To connect a single switch to control multiple LEDs

**Components :** Arduino, bread board, jumper wires, resistor, pushbutton.

### **Sketch [Code] :**

```
void setup()
{
  pinMode(13, OUTPUT);
  pinMode(12, OUTPUT);
  pinMode(2, INPUT);
  Serial.begin(9600);
}
```

```
void loop()
{
  if(digitalRead(2)==HIGH){
    digitalWrite(13,HIGH);

    digitalWrite(12,HIGH);

    delay(800);

  }

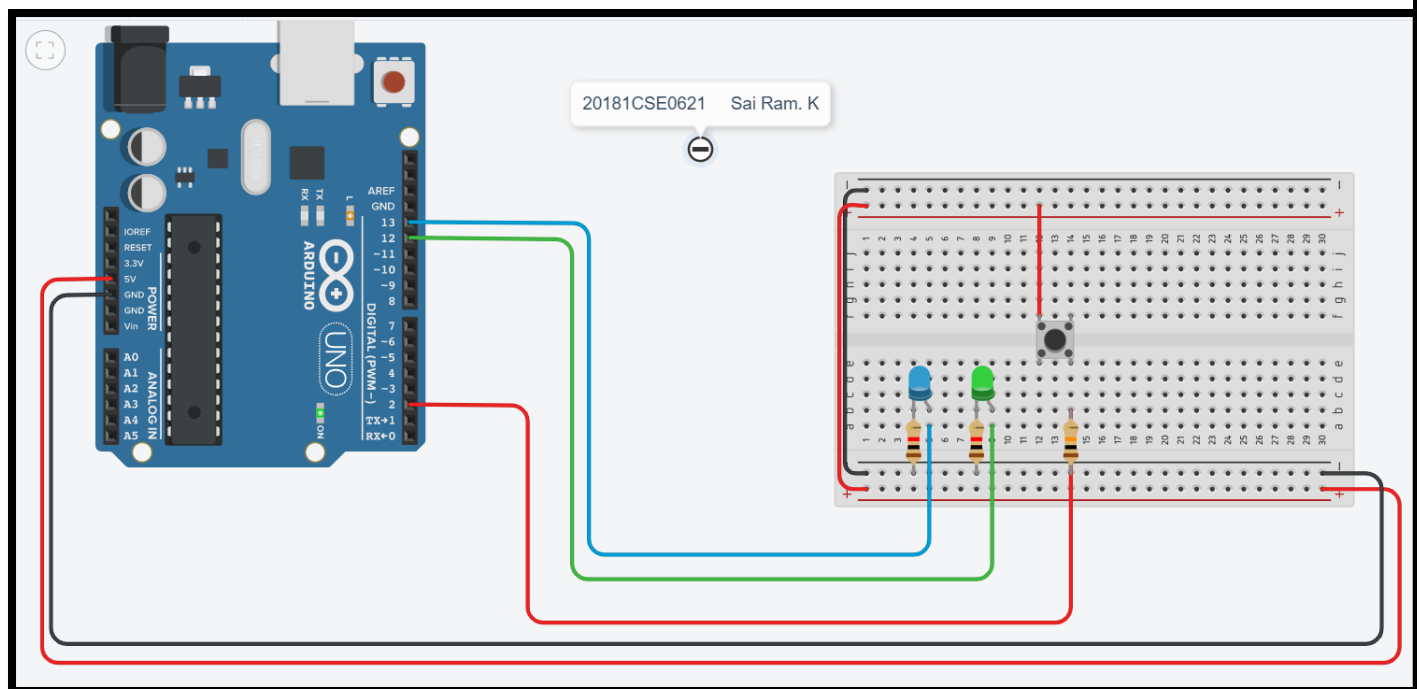
  else{

    digitalWrite(13,LOW); }

    digitalWrite(12,LOW);

  }
}
```

### Output Screenshots :



## ■ Multiple switches to control multiple LED's :-

**Aim :** To connect multiple switches to control multiple LEDs

**Components :** Arduino, bread board, jumper wires, resistor, pushbutton.

### **Sketch [Code] :**

```
int b1=0,b2=0,b3=0;

void setup()
{
    pinMode(13, OUTPUT);
    pinMode(12, OUTPUT);
    pinMode(11, OUTPUT);
    pinMode(10, INPUT);
    pinMode(9, INPUT);
    pinMode(8, INPUT);
}

void loop()
{
    b1 = digitalRead(8);
    b2 = digitalRead(9);
    b3 = digitalRead(10);
    if (b1==HIGH){
        digitalWrite(13, HIGH);    }
    else {
```

```
digitalWrite(13, LOW); }
```

```
if (b2==HIGH){
```

```
    digitalWrite(12, HIGH); }
```

```
else {
```

```
    digitalWrite(12, LOW); }
```

```
if (b3==HIGH){
```

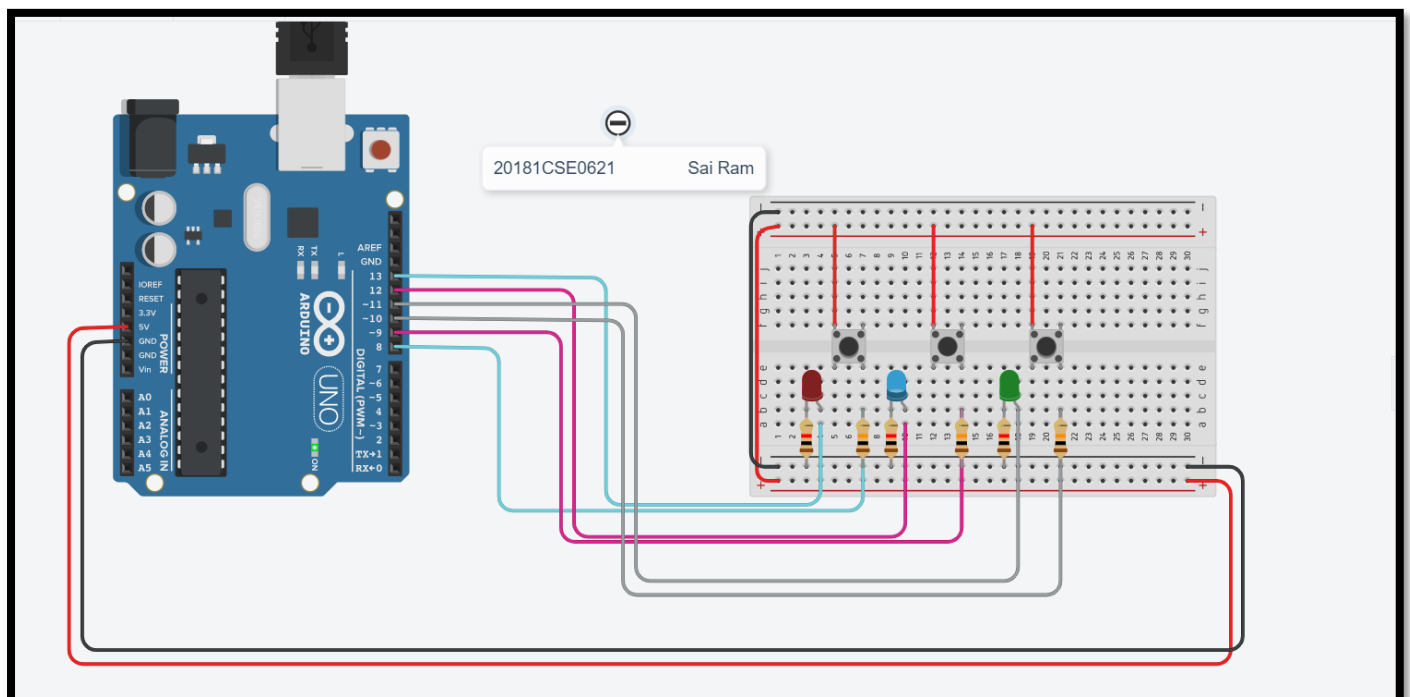
```
    digitalWrite(11, HIGH); }
```

```
else {
```

```
    digitalWrite(11, LOW); }
```

```
}
```

## Output Screenshots :



## Experiment – 3

### Potentiometer

**Question :** Interfacing of Arduino Uno with potentiometer and LED. Write a program to vary the intensity of LED using a potentiometer.

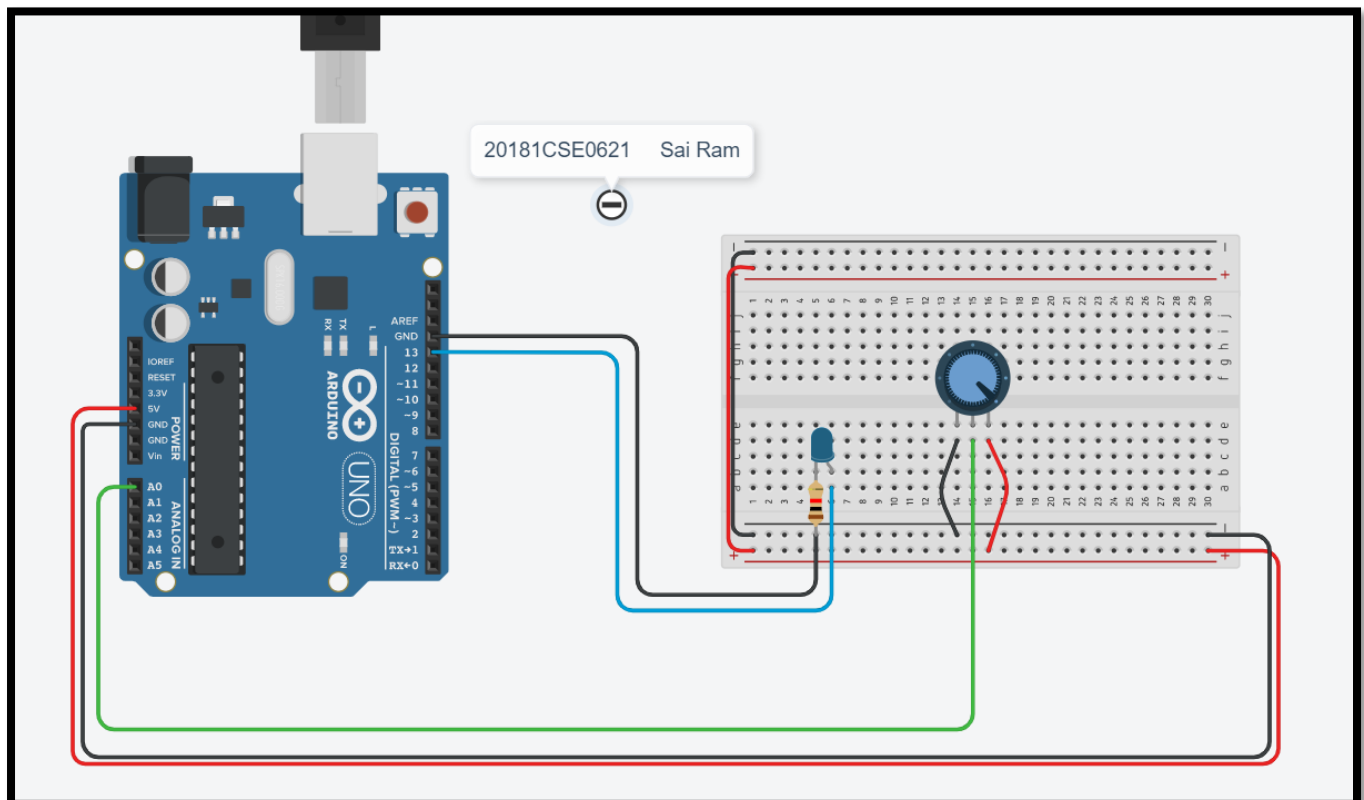
Additional Programs:

i) Adjust the brightness of LED without potentiometer.

**Aim :** Intensity of Led using Potentiometer ..

**Components :** Arduino UNO, Led, Potentiometer, Resistor, Tinckercad simulator .

### Initial Circuit Design :



### Sketch [Code] :

```
int sensor=0;

int pin=0,brightness=0;

void setup()

{
```

```
pinMode(13, OUTPUT);

pinMode(A0, INPUT);

Serial.begin(9600);

}

void loop()

{

  /*sensor = analogRead(0);

  digitalWrite(13,HIGH);

  delay(sensor);

  digitalWrite(13,LOW);

  delay(sensor);*/

  pin = analogRead(A0);

  brightness= map(pin,1,1023,1,255);

  analogWrite(13,brightness);

  delay(1000);

  Serial.print(pin);

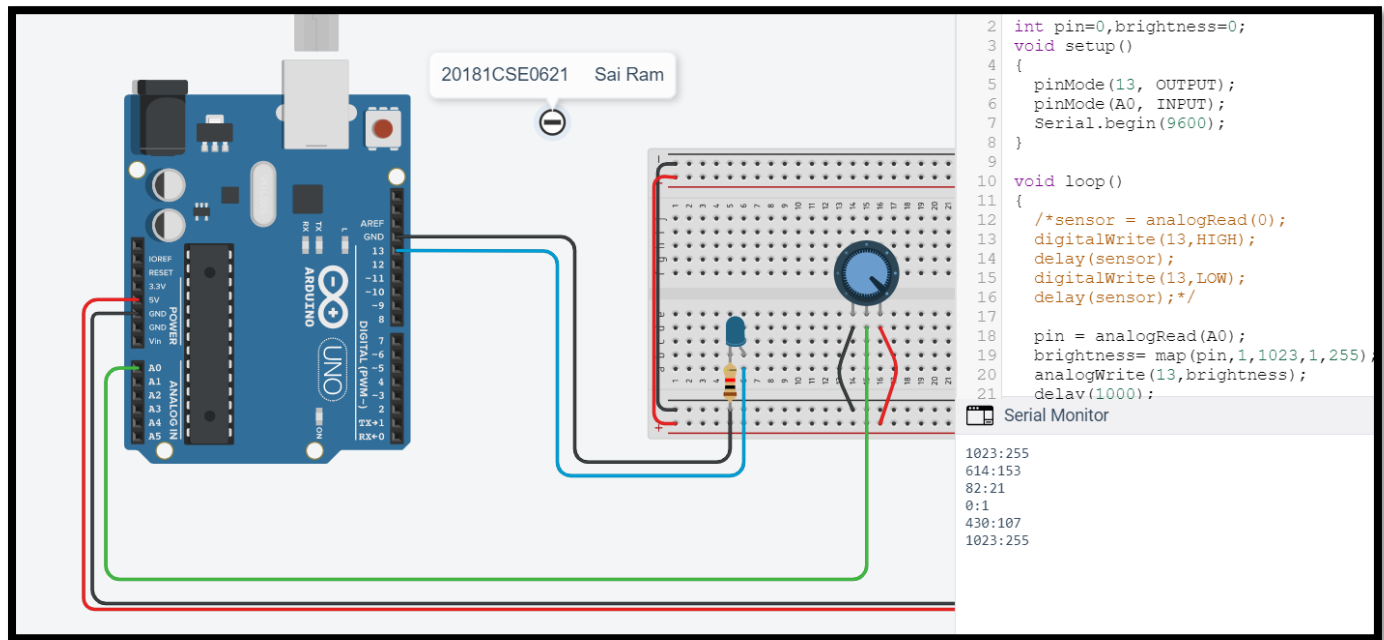
  Serial.print(":");

  Serial.println(brightness);

}
```

### **Output Screenshots :**



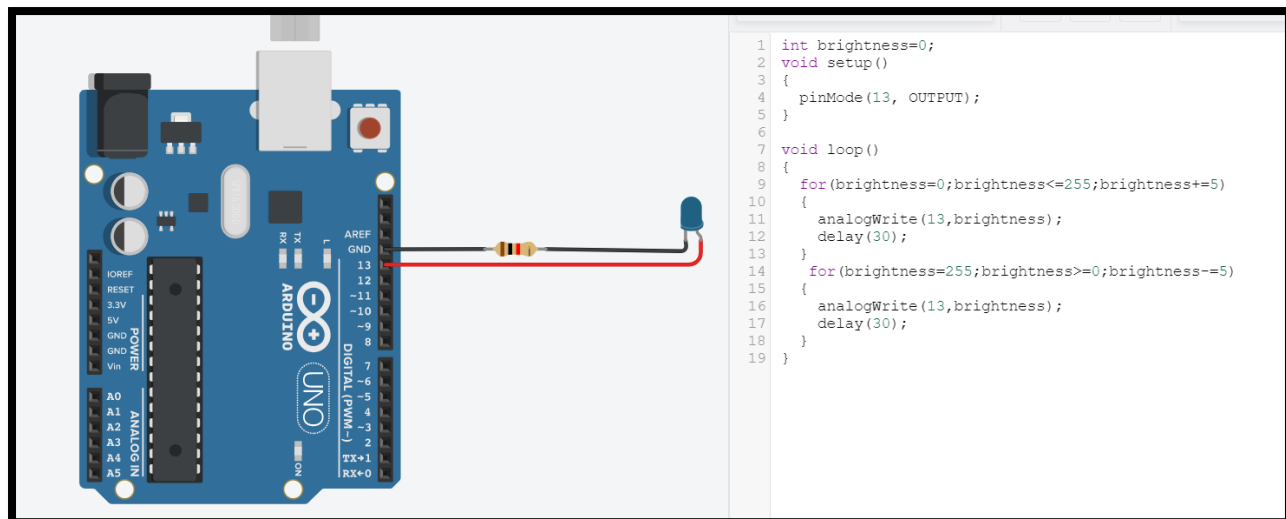


## B. Adjusting the brightness without Potentiometer :-

**Aim** : Intensity of Led without using Potentiometer ..

**Components** : Arduino UNO, Led, Resistor, Tinkercad simulator .

### Initial Circuit Design :



### Sketch [Code] :

```
int brightness=0;
```

```
void setup()
```

```
{
```

```
  pinMode(13, OUTPUT);
```

```
}
```

```
void loop()
```

```
{
```

```
  for(brightness=0;brightness<=255;brightness+=5)
```

```
  {
```

```
    analogWrite(13,brightness);
```

```
    delay(30);
```

```
  }
```

```
  for(brightness=255;brightness>=0;brightness-=5)
```

```
  {
```

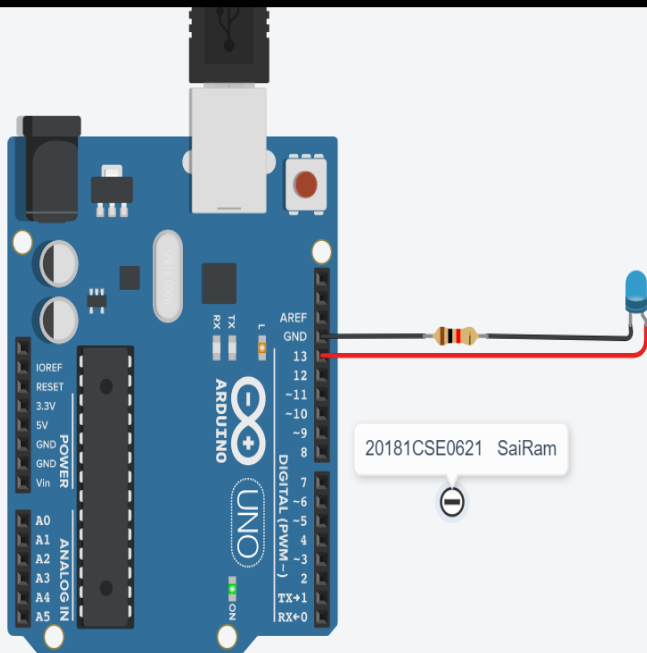
```
    analogWrite(13,brightness);
```

```
    delay(30);
```

```
  }
```

```
}
```

**Output Screenshots :**



20181CSE0621 SaiRam

Text

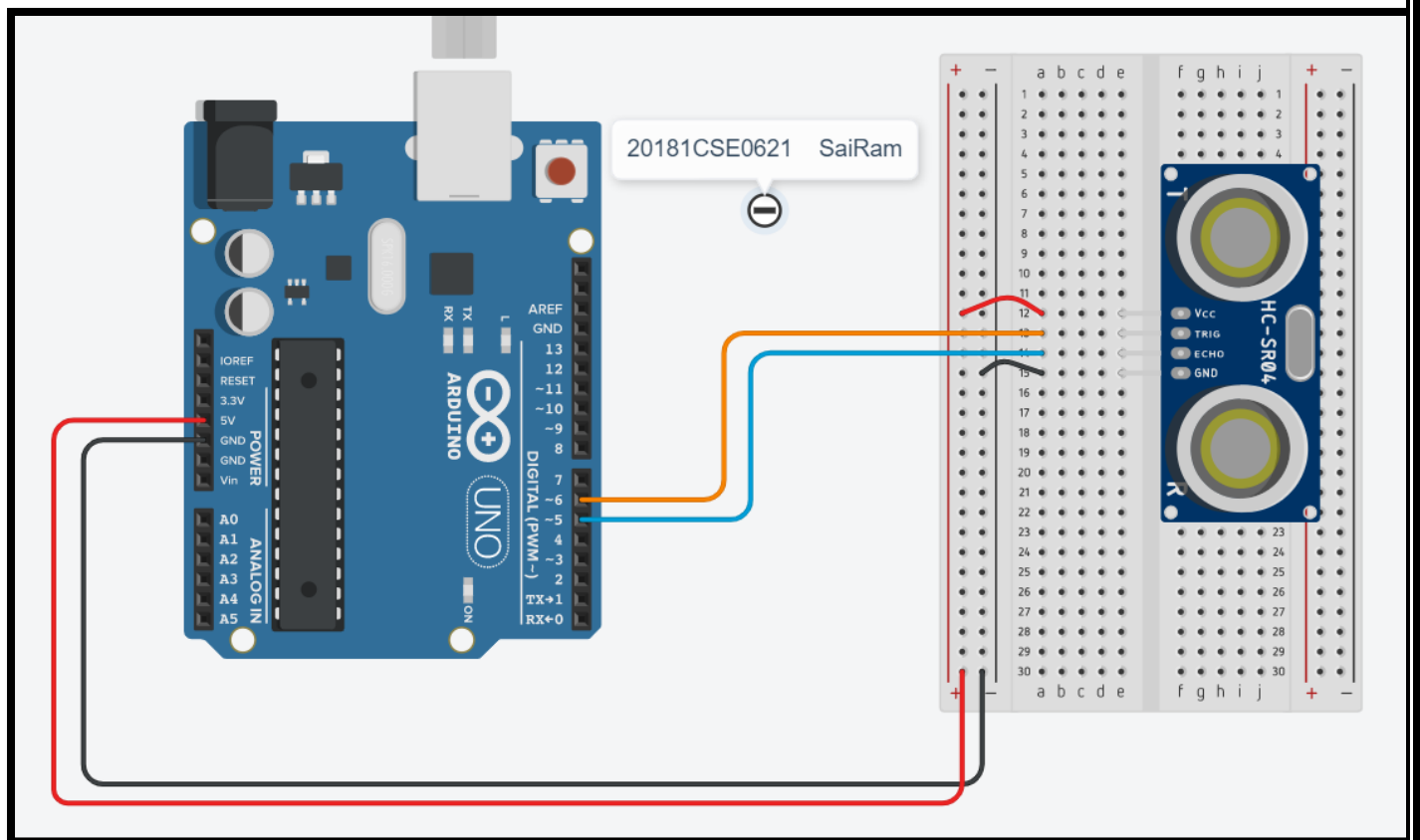
```
1 int brightness=0;
2 void setup()
3 {
4   pinMode(13, OUTPUT);
5 }
6
7 void loop()
8 {
9   for(brightness=0;brightness<=255;brightness+=5)
10  {
11    analogWrite(13,brightness);
12    delay(30);
13  }
14  for(brightness=255;brightness>=0;brightness-=5)
15  {
16    analogWrite(13,brightness);
17    delay(30);
18  }
19 }
```

## Experiment – 4 Ultrasonic Sensor

**Aim :** To find distance of an object using ultrasonic sensor.

**Components :** Arduino, bread board, jumper wires, resistor, ultrasonic sensor.

### **Initial Circuit Design :**



### **Sketch [Code] :**

```
const int trig = 6; //trig pin connection
const int echo = 5; // echo pin connection

long duration;

int distance;

void setup()

{
```

```
pinMode(trig, OUTPUT);

pinMode(echo, INPUT);

Serial.begin(9600);

}

void loop()

{

    digitalWrite(trig,LOW);

    delayMicroseconds(2);

    digitalWrite(trig, HIGH);

    delayMicroseconds(10);

    digitalWrite(trig,LOW);

    duration = pulseIn(echo,HIGH);

    distance = (duration/2)/29.41;

    Serial.print("Distance = ");

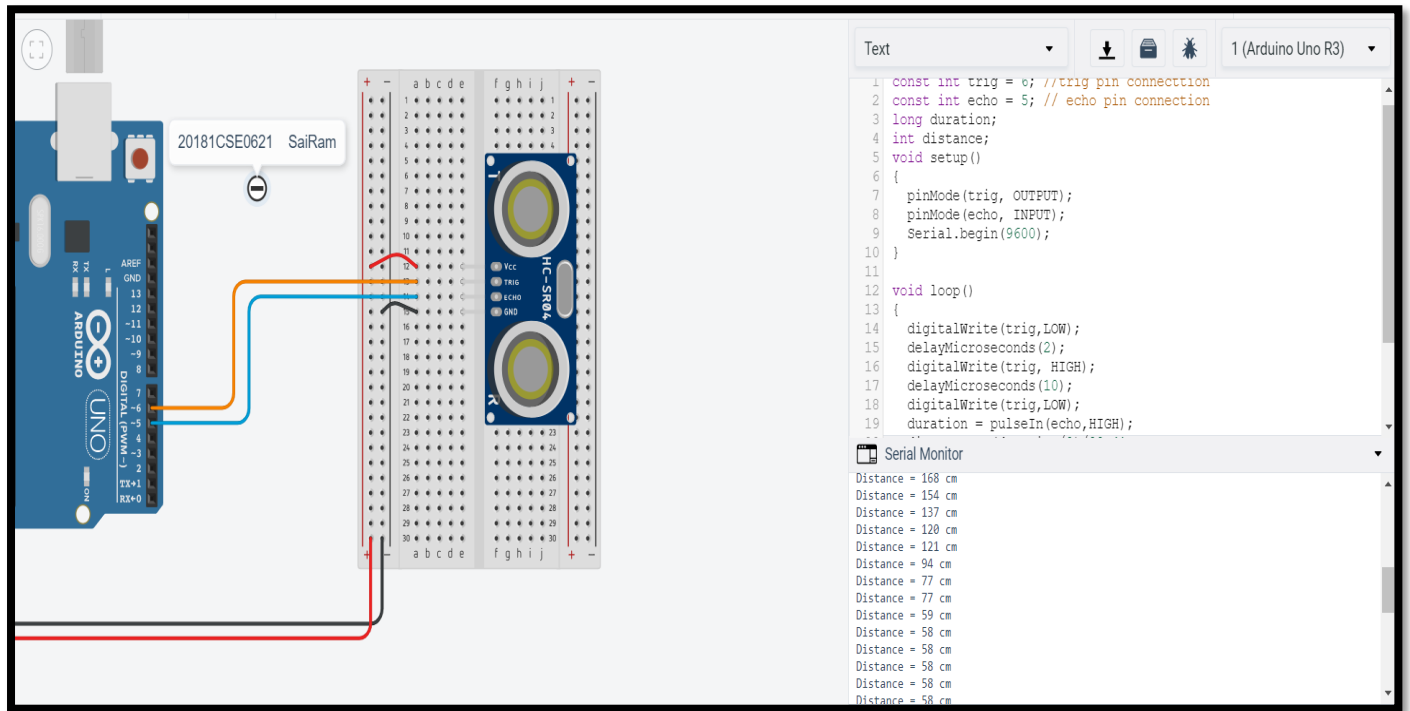
    Serial.print(distance);

    Serial.print(" cm");

    Serial.println("");

}
```

### **Output Screenshots :**

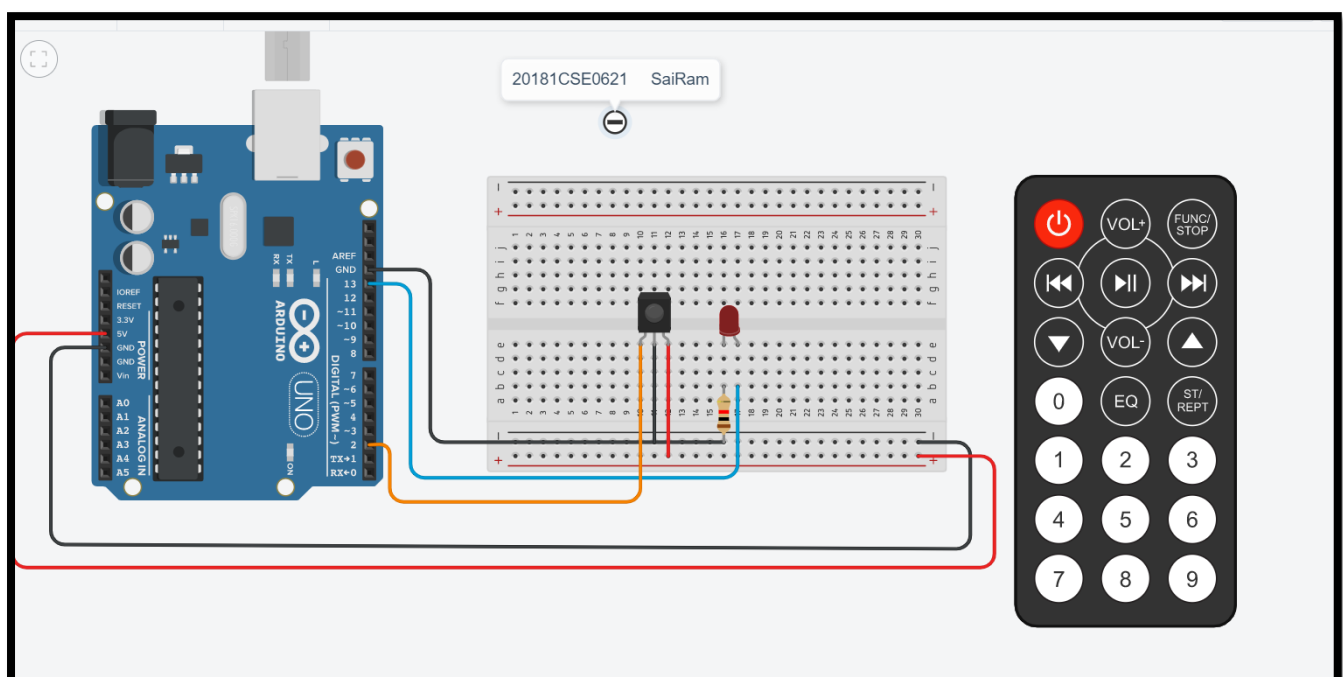


B. ]

**Aim :** To find distance of an object using ultrasonic sensor.

**Components :** Arduino, bread board, jumper wires, resistor, ultrasonic sensor.

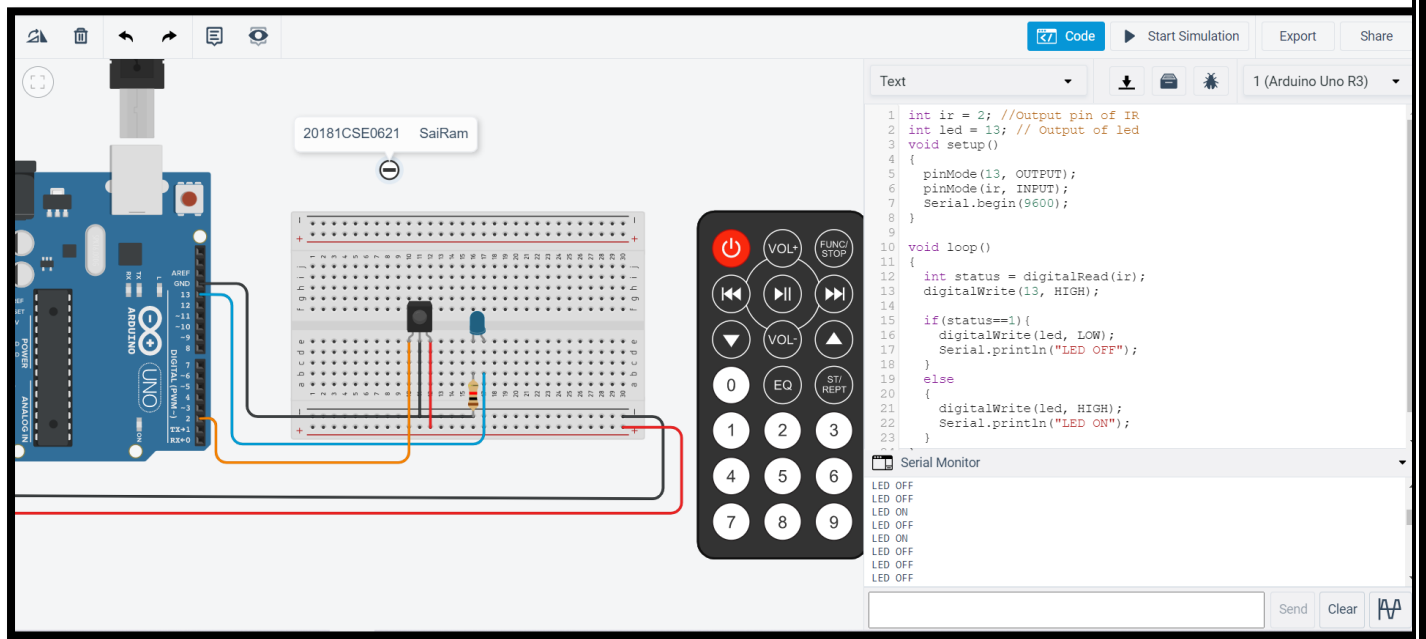
**Initial Circuit Design :**



**Sketch [Code] :**

```
int ir = 2; //Output pin of IR
int led = 13; // Output of led
void setup()
{
  pinMode(13, OUTPUT);
  pinMode(ir, INPUT);
  Serial.begin(9600);
}
void loop()
{
  int status = digitalRead(ir);
  digitalWrite(13, HIGH);
  if(status==1){
    digitalWrite(led, LOW);
    Serial.println("LED OFF");
  }
  else
  {
    digitalWrite(led, HIGH);
    Serial.println("LED ON");
  }
}
```

## Output Screenshots :





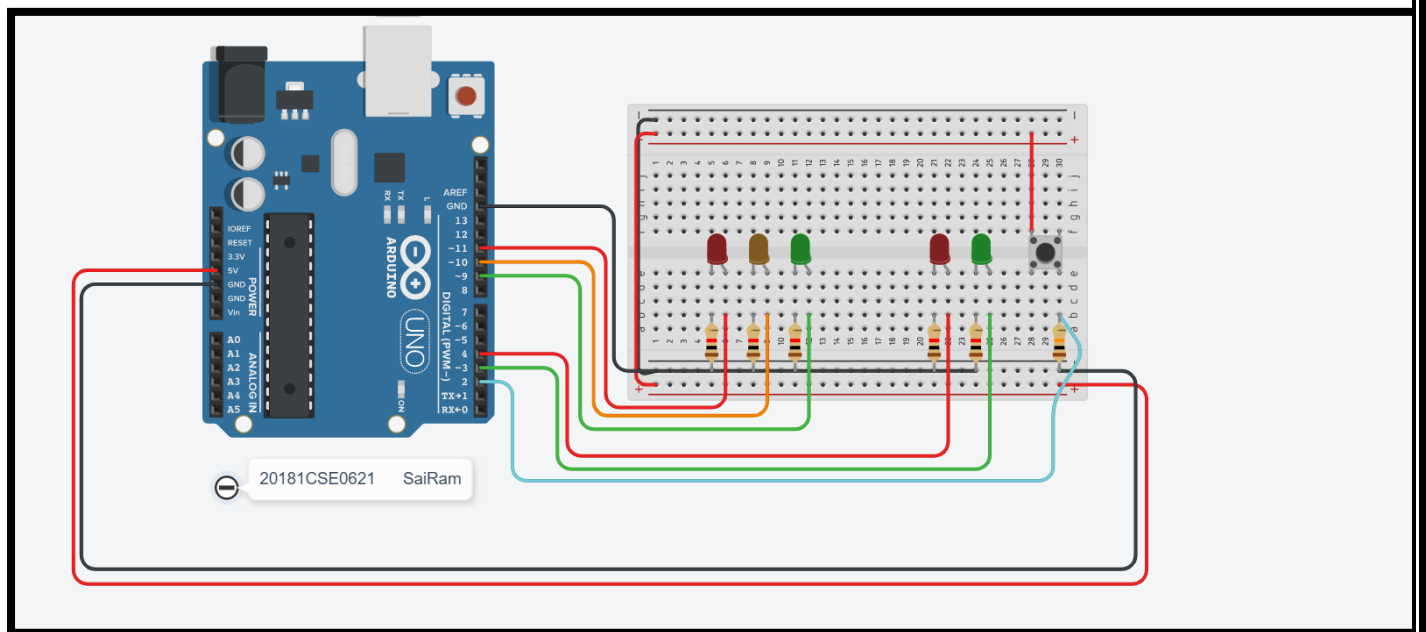
## Experiment – 5

### Traffic Control System

**Aim :** To control traffic lights on pedestrian and vehicle side.

**Components :** Arduino, bread board, jumper wires, resistor.

### Initial Circuit Design :



**Sketch [Code] :**

```
int carRed=11;

int carYellow=10;

int carGreen=9;

int pedRed=4;

int pedGreen=3;

int push=2;

int crossTime = 5000;

unsigned long changeTime;

void setup()

{
```

```
pinMode(carRed, OUTPUT);

pinMode(carYellow, OUTPUT);

pinMode(carGreen, OUTPUT);

pinMode(pedRed, OUTPUT);

pinMode(pedGreen, OUTPUT);


pinMode(push, INPUT);

digitalWrite(carGreen,HIGH);

digitalWrite(pedRed,HIGH);

}


void loop()

{

int state = digitalRead(push);

if(state==HIGH && (millis() - changeTime) > 5000)

{

    changeLights();

}

}

void changeLights()

{

digitalWrite(carGreen, LOW);

digitalWrite(carYellow, HIGH);

delay(2000);

digitalWrite(carYellow, LOW);

digitalWrite(carRed, HIGH);
```

```
delay(1000);

digitalWrite(pedRed, LOW);

digitalWrite(pedGreen, HIGH);


delay(crossTime);

for(int i=0;i<10;++i)
{
    digitalWrite(pedGreen,HIGH);

    delay(1000);

    digitalWrite(pedGreen, LOW);

    delay(250);

}

digitalWrite(pedRed,HIGH);

delay(500);

digitalWrite(carYellow, HIGH);

digitalWrite(carRed, 0);

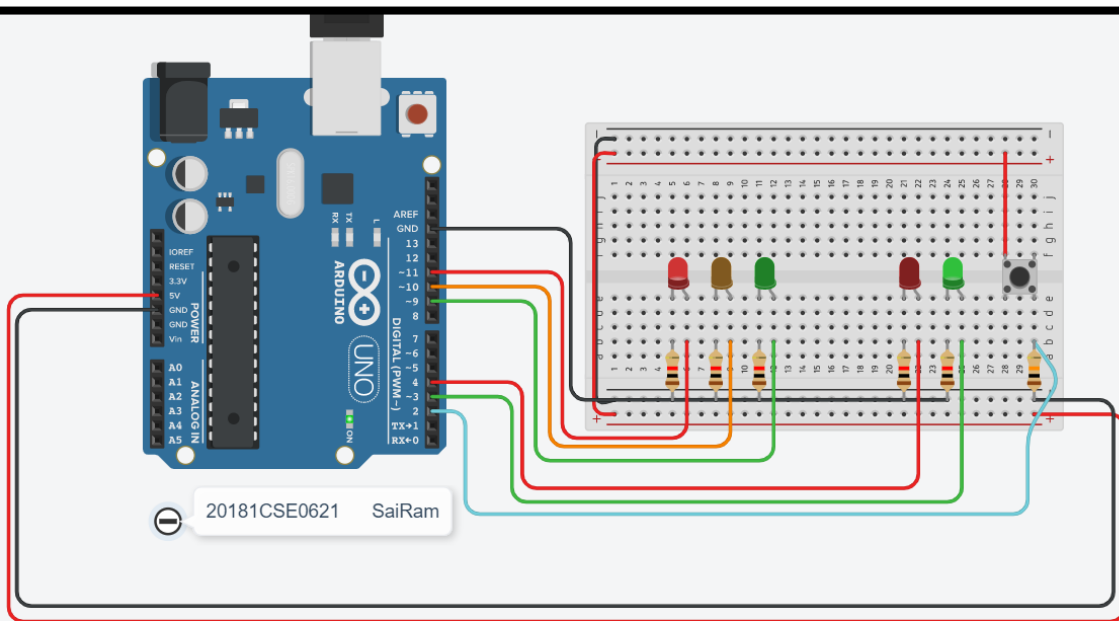
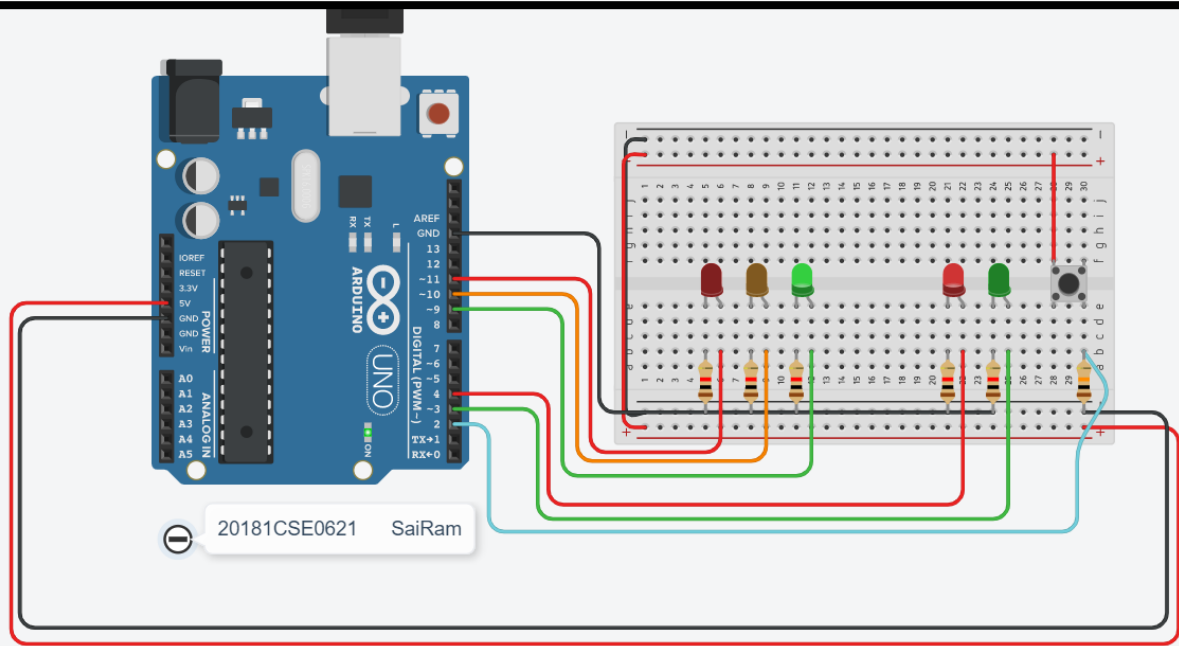
delay(1000);

digitalWrite(carGreen, HIGH);

digitalWrite(carYellow, LOW);

}
```

### **Output Screenshots :**

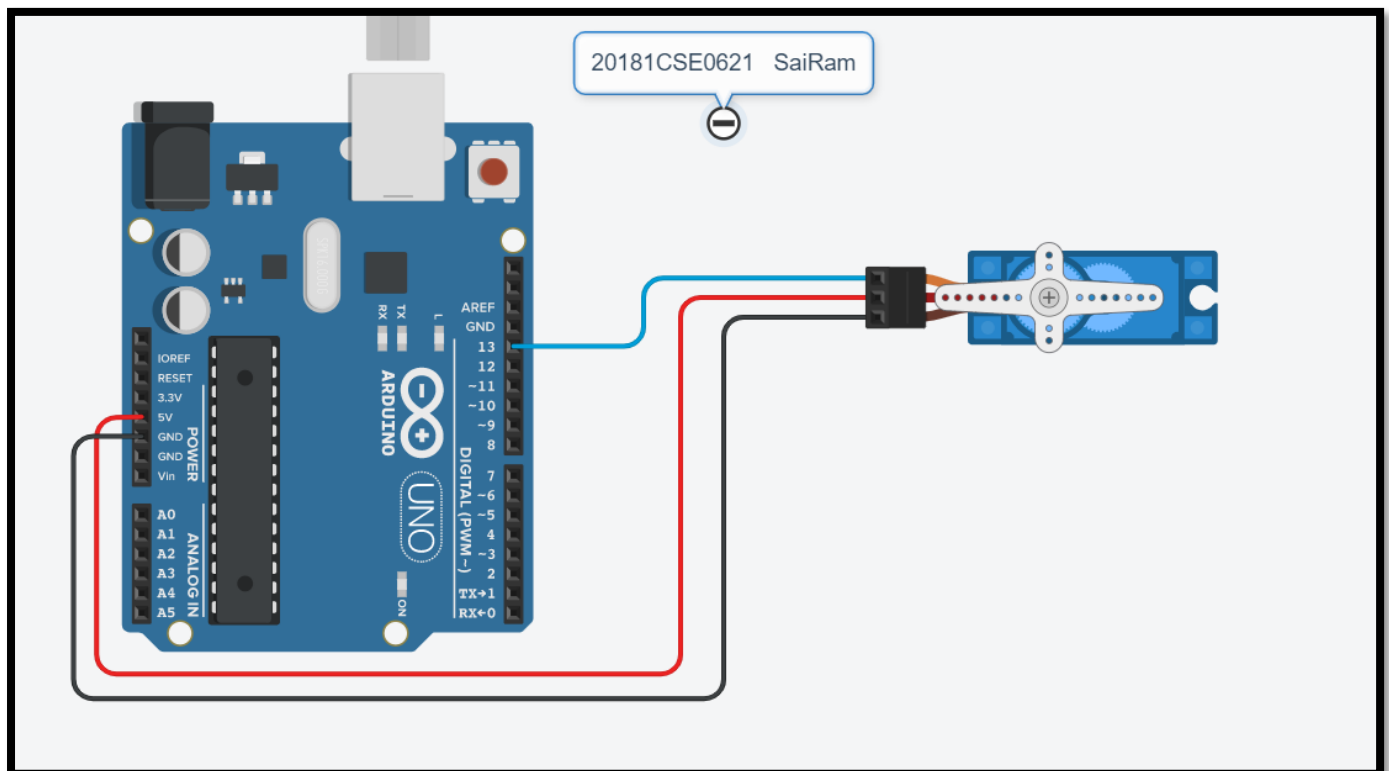


## Experiment – 6 Servo Motor

**Aim :** To rotate the servo motor.

**Components :** Arduino, bread board, jumper wires, micro-servo.

### **Initial Circuit Design :**



### **Sketch [Code] :**

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

```
Servo servo; //object to access funcs in servo library
```

```
int pos=0;
```

```
void setup()
```

```
{
```

```
servo.attach(13);
```

```
}
```

```
void loop()

{

for(pos=0;pos<=180;pos++)

{

servo.write(pos);

delay(20);

}

for(pos=180;pos>=0;pos--)

{

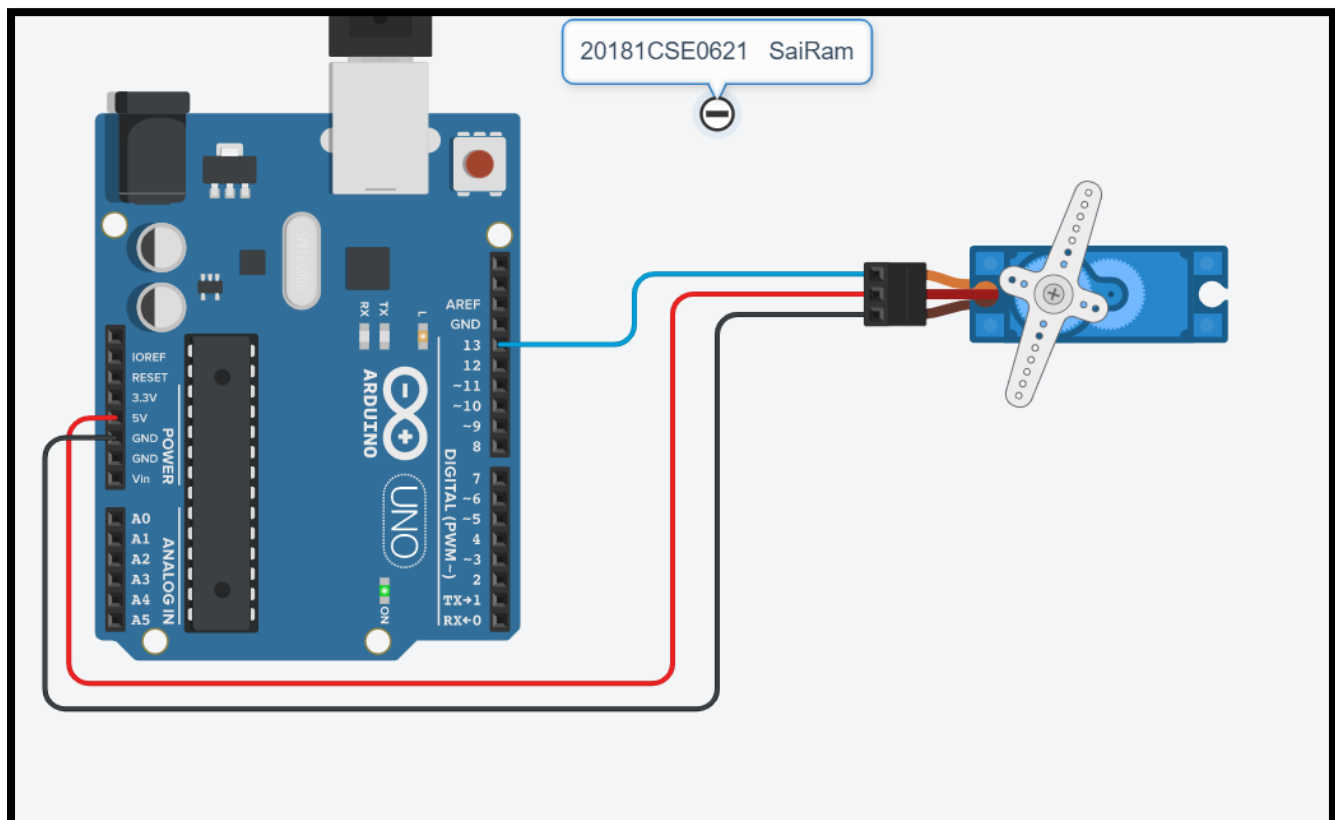
servo.write(pos) ;

delay(20);

}

}
```

### Output Screenshots :

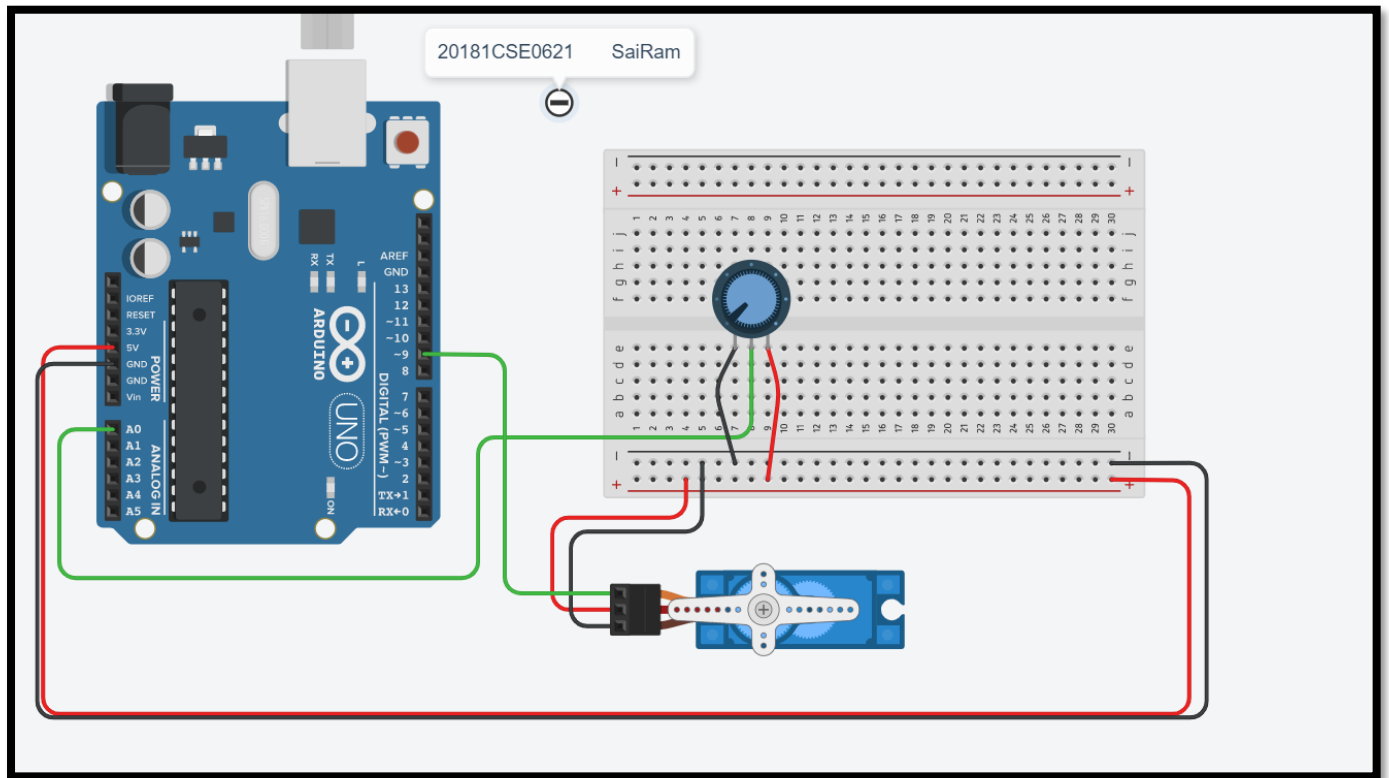


## B. Servo with Potentiometer

**Aim :** To rotate the servo motor using **Potentiometer**.

**Components :** Arduino, bread board, jumper wires, micro-servo.

### **Initial Circuit Design :**



### **Sketch [Code] :**

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

```
Servo myservo; // create servo object to control a servo
```

```
int potpin = 0; // analog pin used to connect the potentiometer
```

```
int val; // variable to read the value from the analog pin
```

```
void setup() {
```

```
    myservo.attach(9); // attaches the servo on pin 9 to the servo object
```

```
}
```

```
void loop() {
```

```
val = analogRead(potpin);    // reads the value of the potentiometer (value between 0 and 1023)

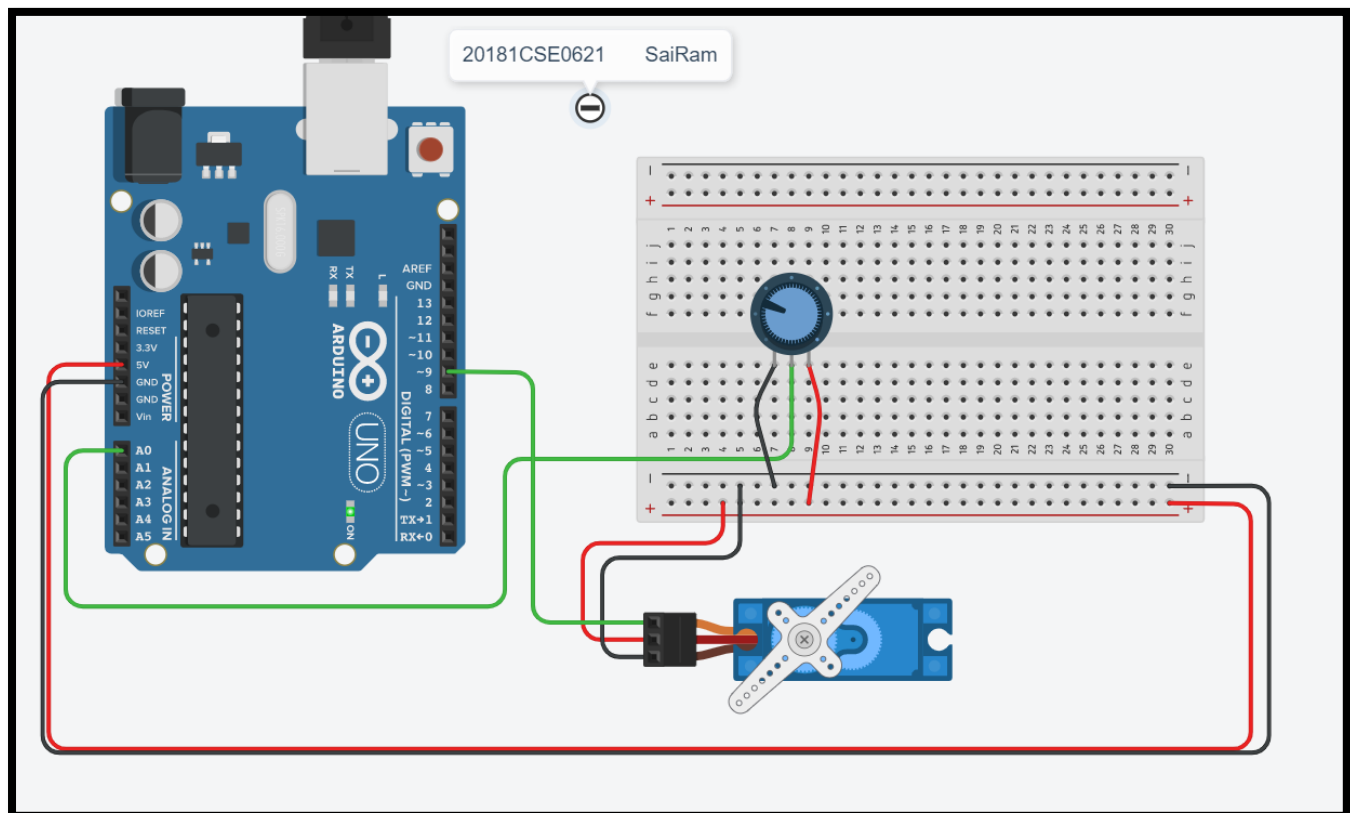
val = map(val, 0, 1023, 0, 180); // scale it to use it with the servo (value between 0 and 180)

myservo.write(val);          // sets the servo position according to the scaled value

delay(15);                   // waits for the servo to get there

}
```

## Output Screenshots :





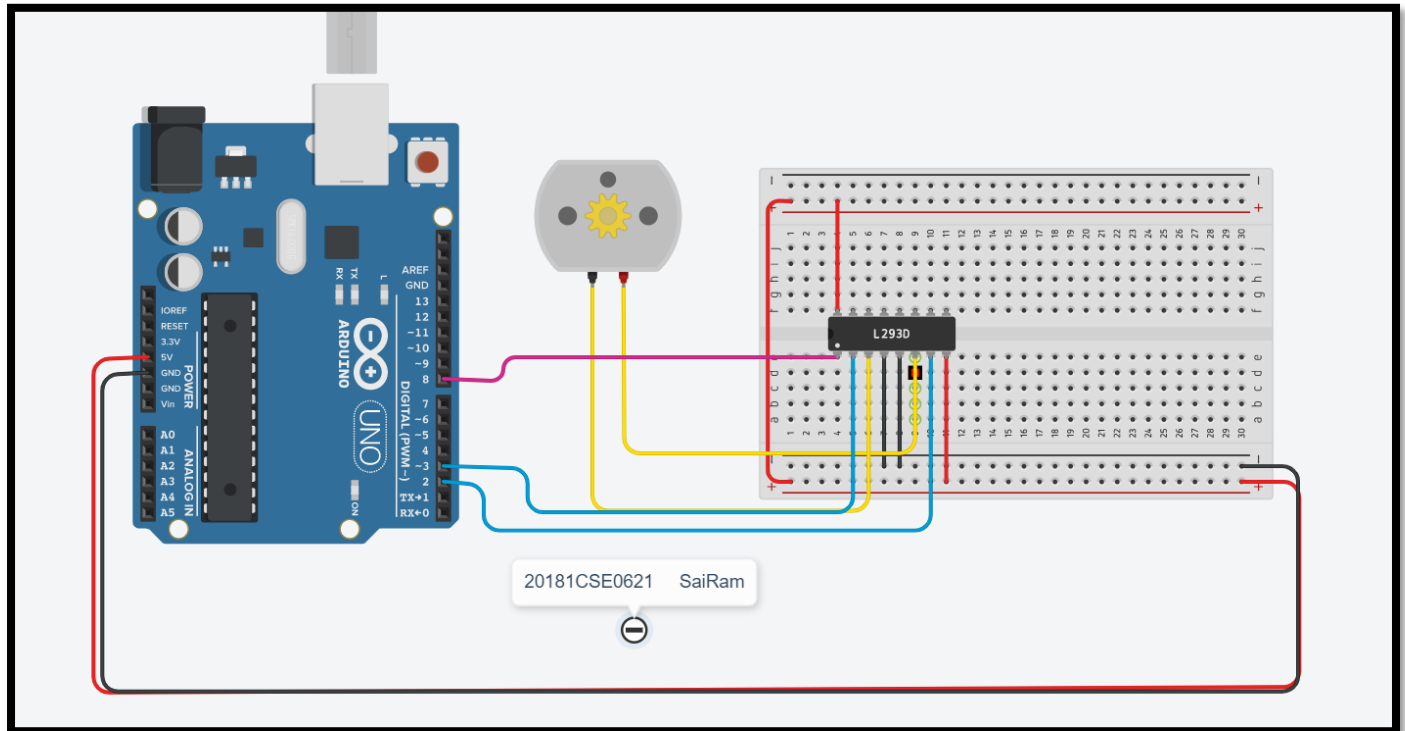
## Experiment – 7

### D.C Motor

**Aim :** To Interface a D.C motor with arduino

**Components :** Arduino, bread board, jumper wires, IC L293D.

### **Initial Circuit Design :**



### **Sketch [Code] :**

```
int enable_inp1 = 8, inp2 = 2;  
  
int inp3 = 3;  
  
void setup()  
{  
  pinMode(13, OUTPUT);  
  pinMode(enable_inp1, OUTPUT);  
  pinMode(inp2, OUTPUT);  
  pinMode(inp3, OUTPUT);  
  
  Serial.begin(9600);
```

```

digitalWrite(enable_in1, HIGH);

}

void loop()
{
    digitalWrite(inp2, HIGH);

    digitalWrite(inp3, LOW);

    Serial.println("Rotating Clockwise...");

    delay(2000);

    digitalWrite(inp2, LOW);

    digitalWrite(inp3, HIGH);

    Serial.println("Rotating Anti-Clockwise...");

    delay(2000);

    digitalWrite(inp2, HIGH);

    digitalWrite(inp3, LOW);

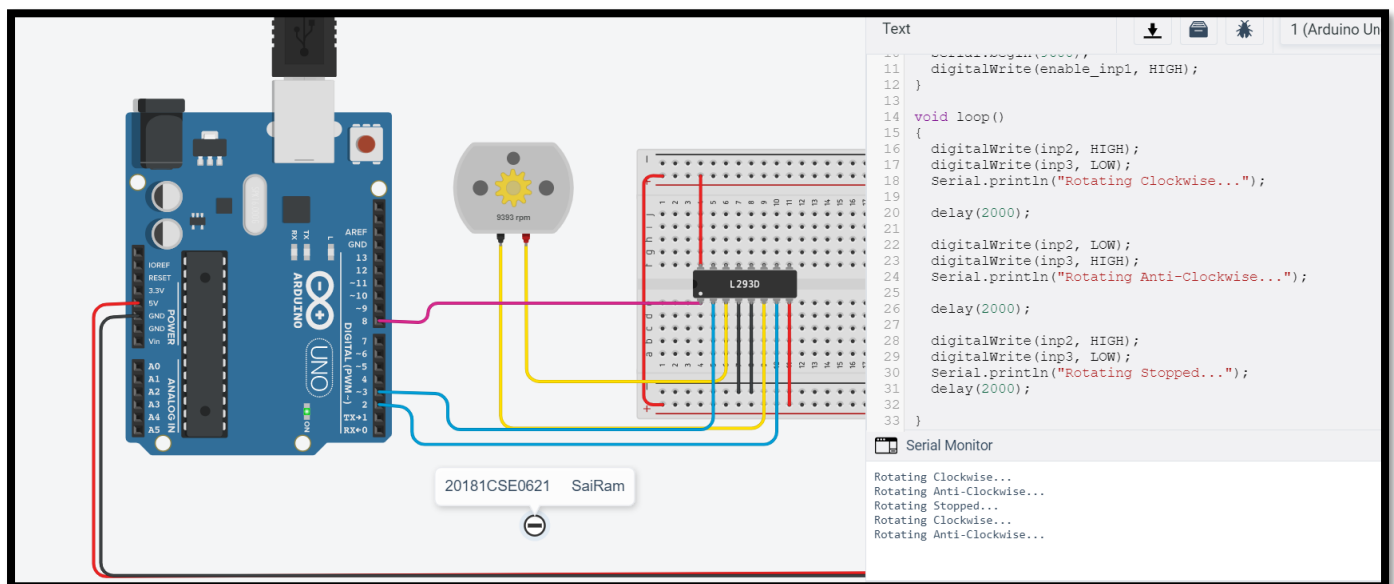
    Serial.println("Rotating Stopped...");

    delay(2000);

}

```

## Output Screenshots

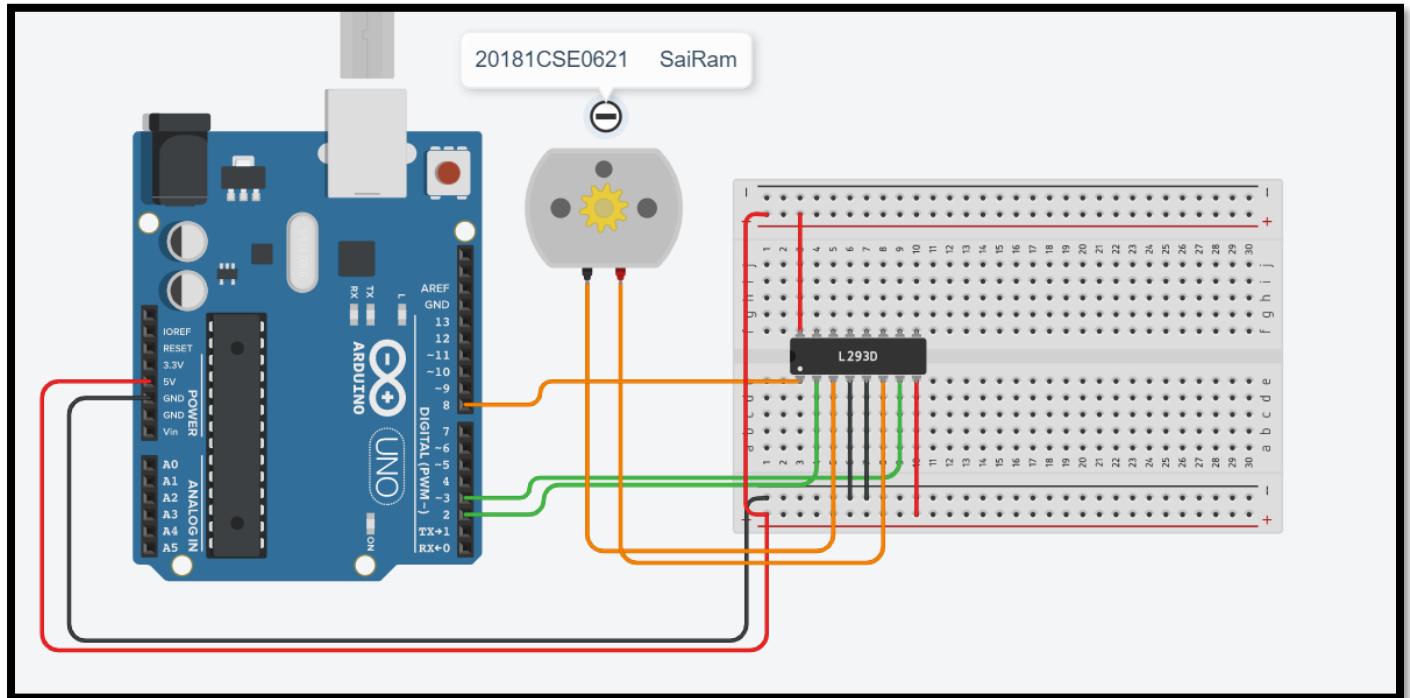


## Experiment – 7B D.C Motor

**Aim :** To Interface a D.C motor with arduino

**Components :** Arduino, bread board, jumper wires, IC L293D.

### **Initial Circuit Design :**



### **Sketch [Code] :**

```
int enable=8,inp1=2,inp2=3;

int x=0,pwm=0;

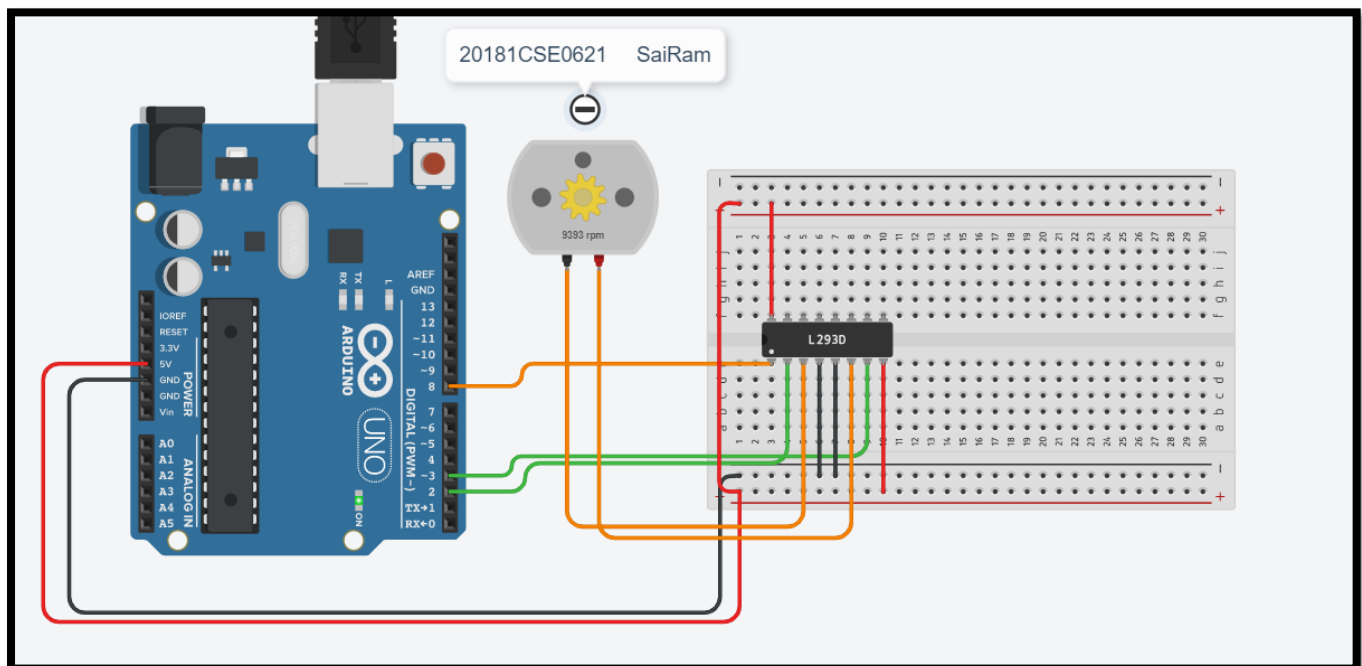
void setup()
{
  digitalWrite(enable,HIGH);

  pinMode(enable,OUTPUT); //3-enable,9-inp1,11,inp2
  pinMode(inp1,OUTPUT);
  pinMode(inp2,OUTPUT);

  Serial.begin(9600);
```

```
}  
  
void loop()  
{  
    digitalWrite(inp1,HIGH);  
    digitalWrite(inp2,LOW);  
    delay(2000);  
    x=5;  
    digitalWrite(inp2,HIGH);  
    digitalWrite(inp1,LOW);  
    delay(2000);  
    pwm = map(x,0,5,0,255);  
    analogWrite(3,pwm);  
}
```

## Output Screenshots



## **Alternate code for speed using input from serial monitor**

```
int enable=8,inp1=2,inp2=3;

int x=0,pwm=0;

void setup()
{
    digitalWrite(enable,HIGH);

    pinMode(enable,OUTPUT); //3-enable,9-inp1,11,inp2

    pinMode(inp1,OUTPUT);

    pinMode(inp2,OUTPUT);

    Serial.begin(9600);
}

void loop()
{
    if(Serial.available())
    {
        int speed = Serial.parseInt();

        Serial.print(speed);

        analogWrite(enable, speed);

        digitalWrite(inp1,HIGH);

        digitalWrite(inp2,LOW);

    }
}
```