PRESIDENCY UNIVERSITY

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Internet Of Things

Lab Record

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ROLL NO: 20181CSE0621
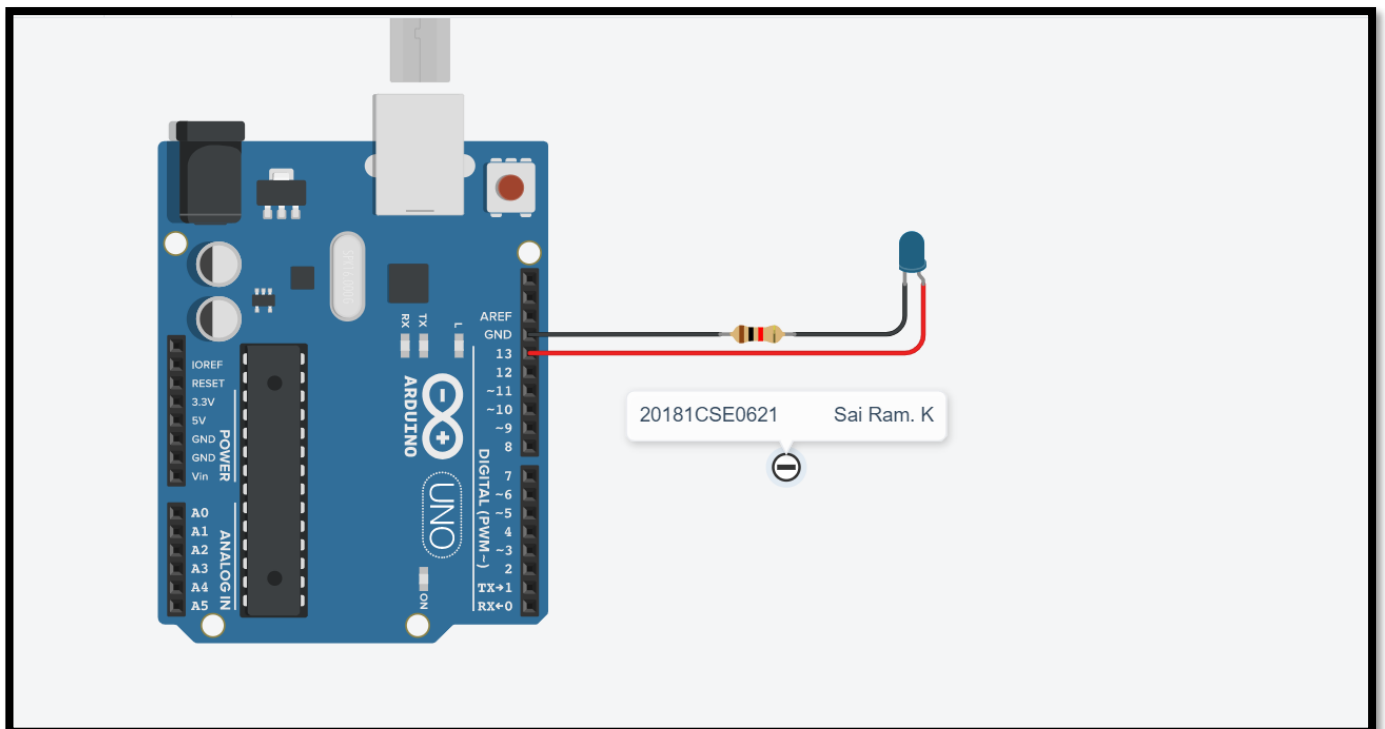
SEC: 6-CSE-10

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

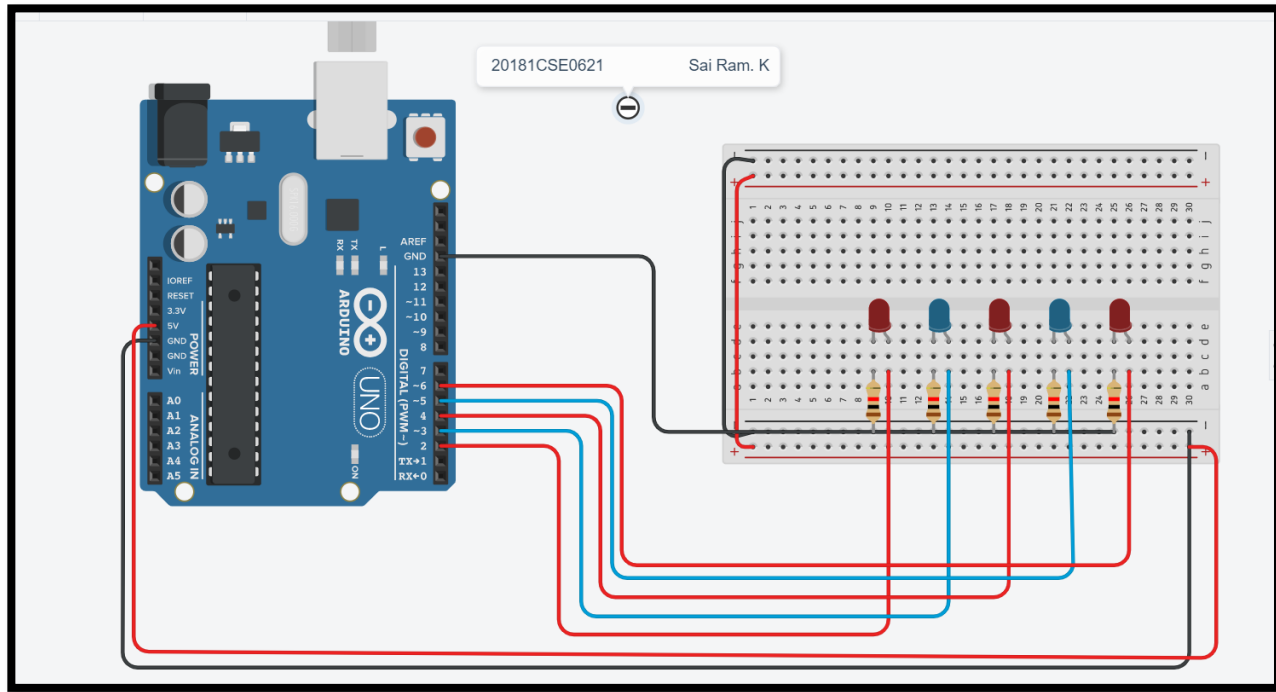## Initial Circuit Design:

Arduino Sketch:

```
void setup()

{

  pinMode(13, OUTPUT);

}

void loop()

{

  digitalWrite(13, HIGH);

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

  digitalWrite(13, LOW);
```

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

}
```

Output Screenshots:

i)To blink two LED's alternatively
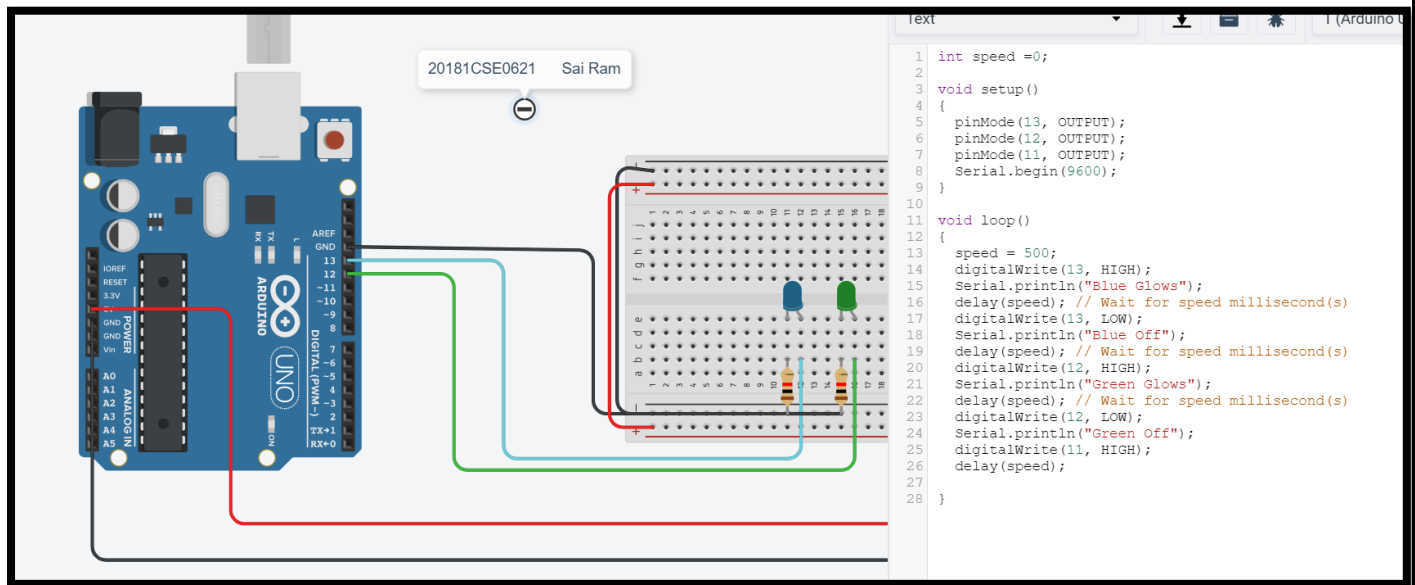
Aim: Blink LED's Alternately

Components: Arduino UNO

            LED

            Resistor

            Tinker cad Simulator
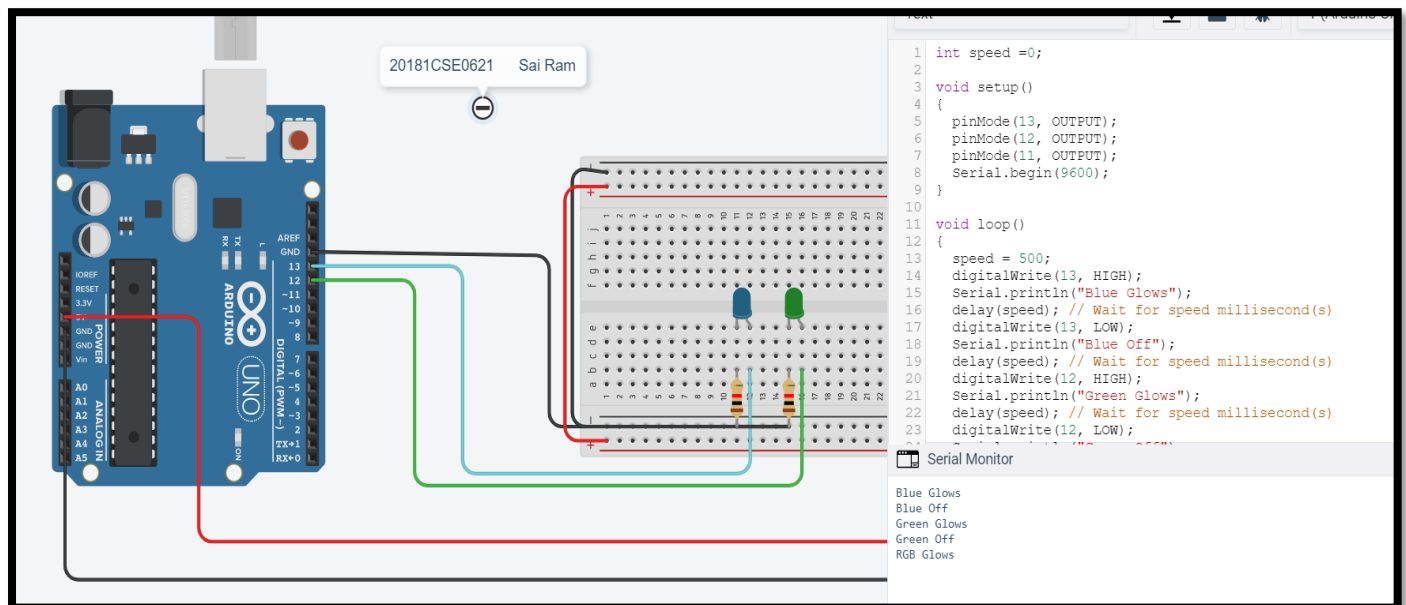
            Bread board

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:

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ii) To blink ODD and EVEN LED's

Aim: Blink led's ODD AND EVEN

Components: Arduino UNO

           LED
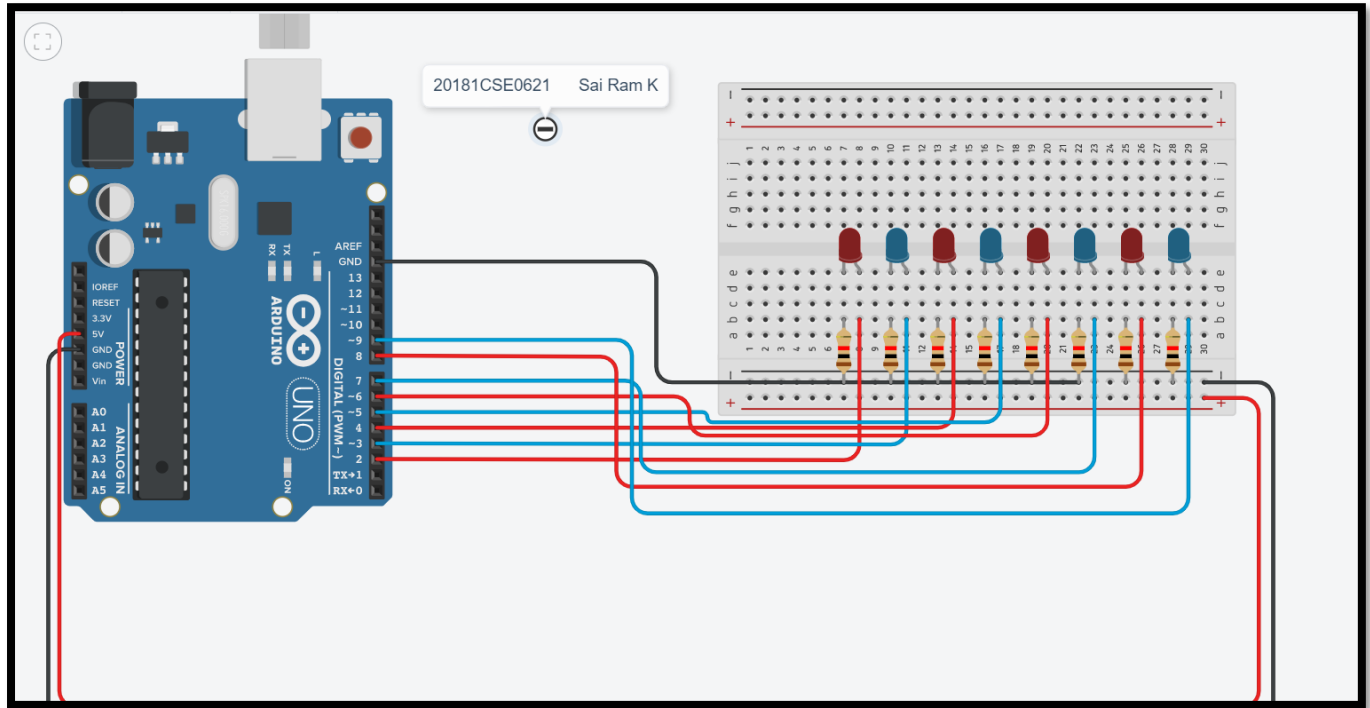
           Resistor

           Tinker cad Simulator

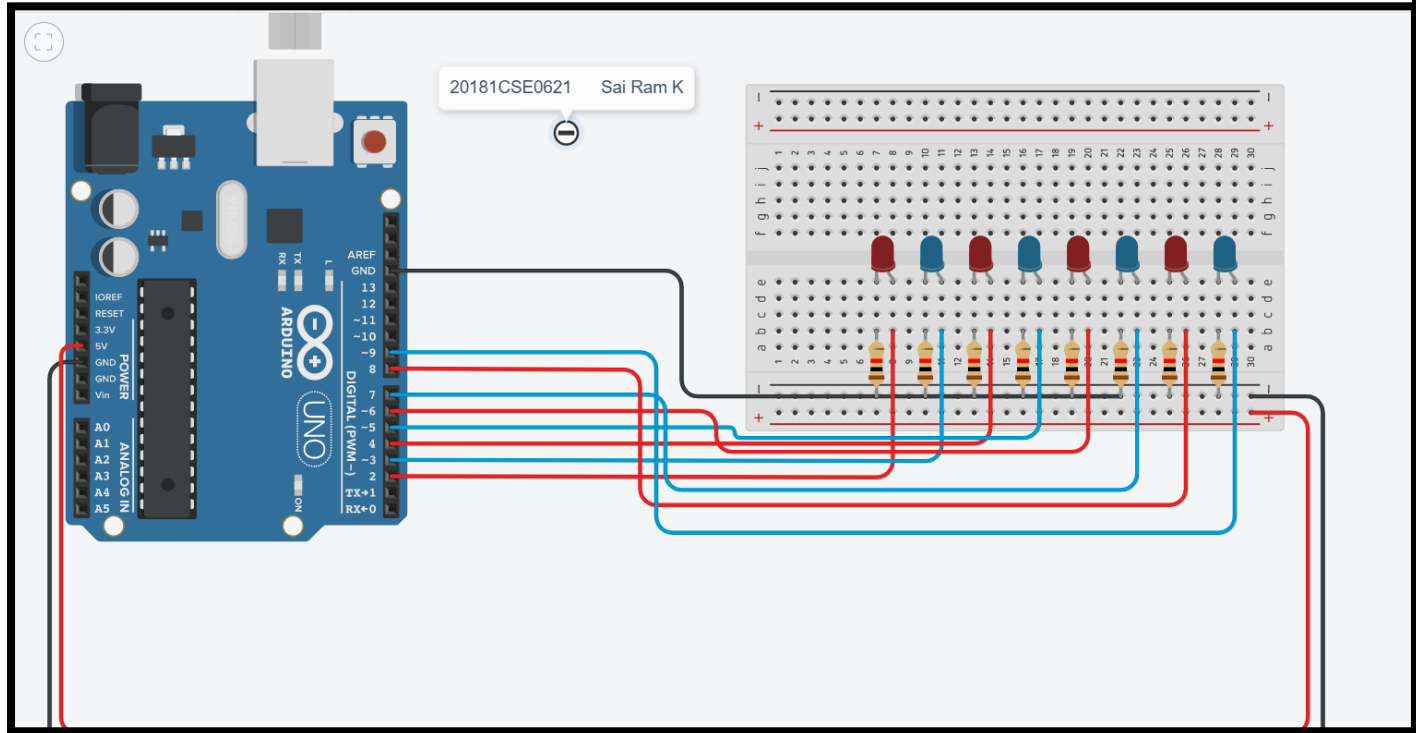   Bread board

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);
```

6

 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:
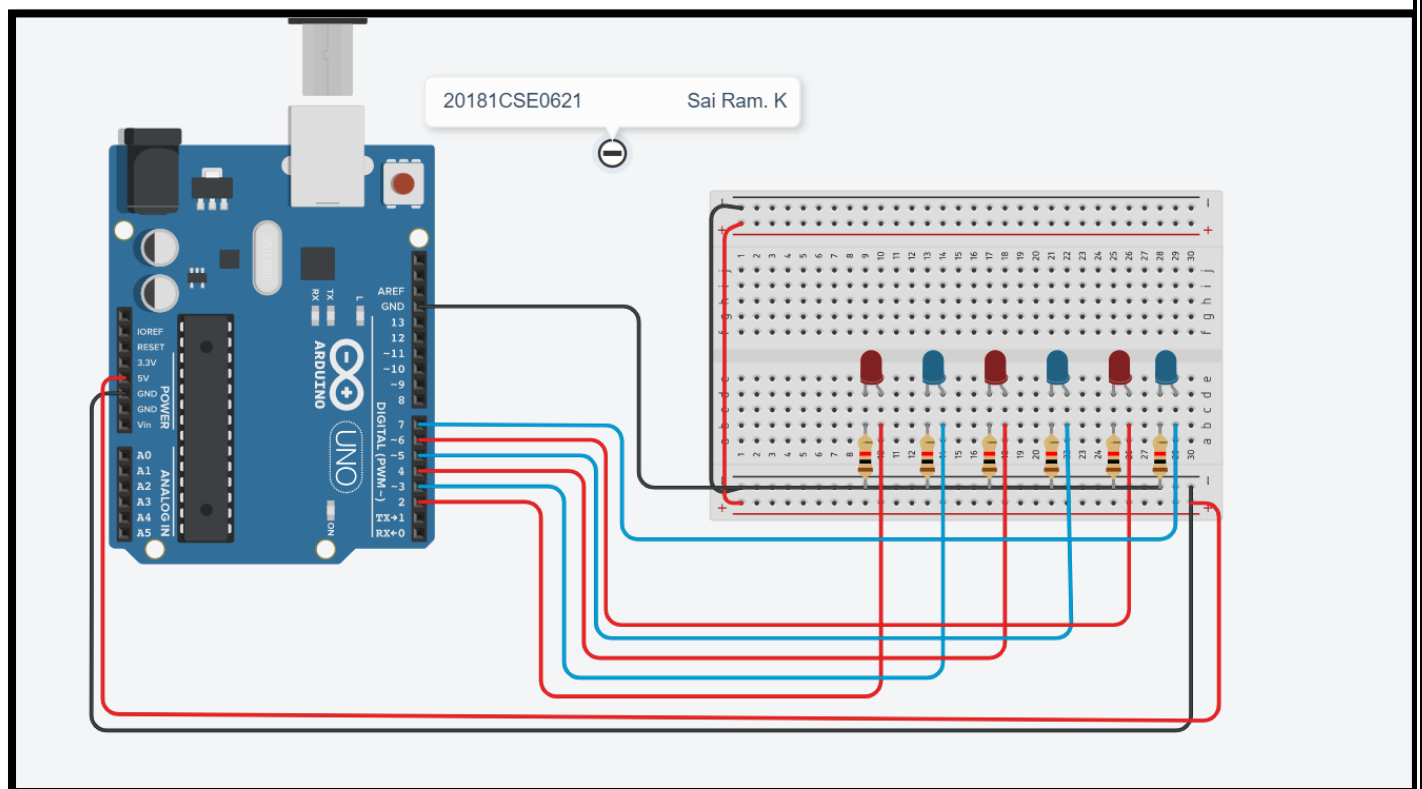
Experiment – 2

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.
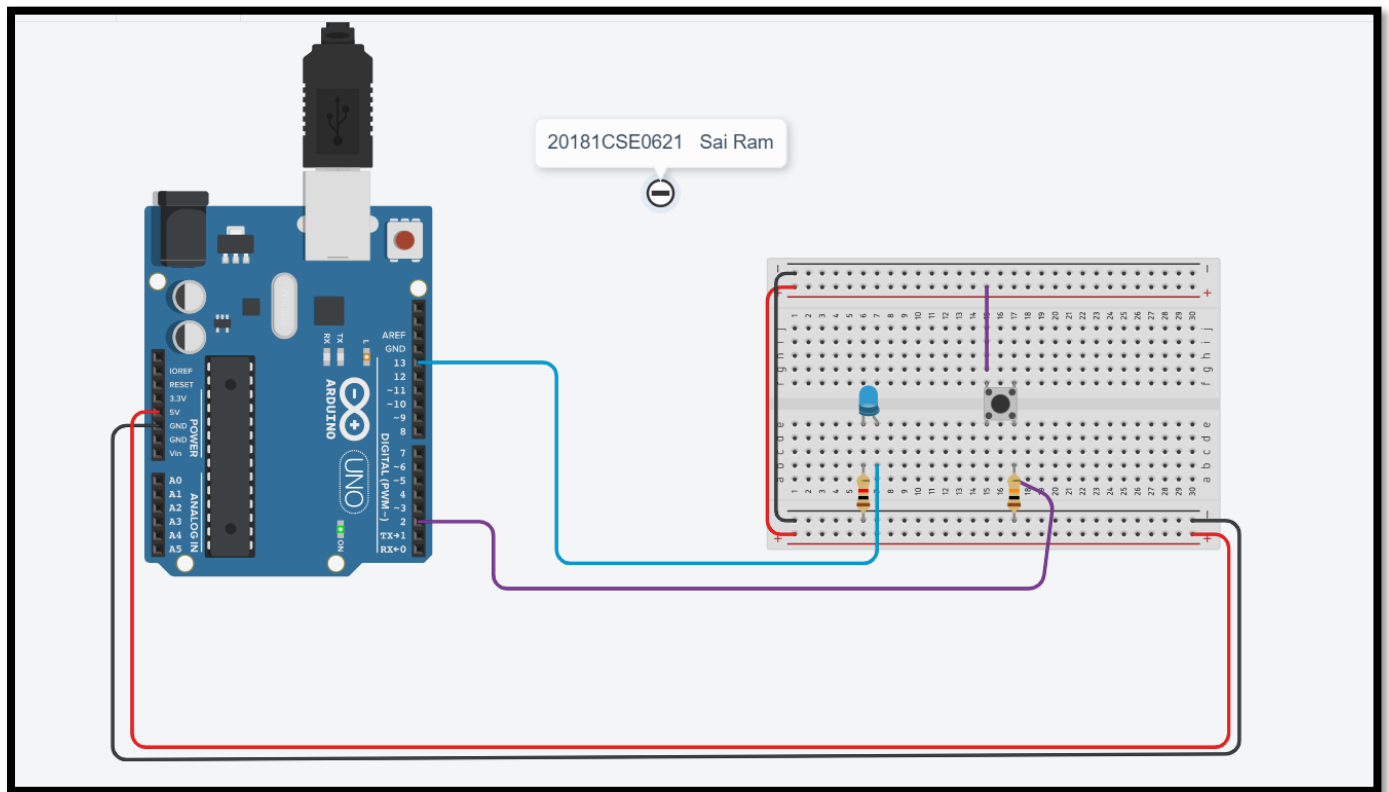
Sketch [Code] :

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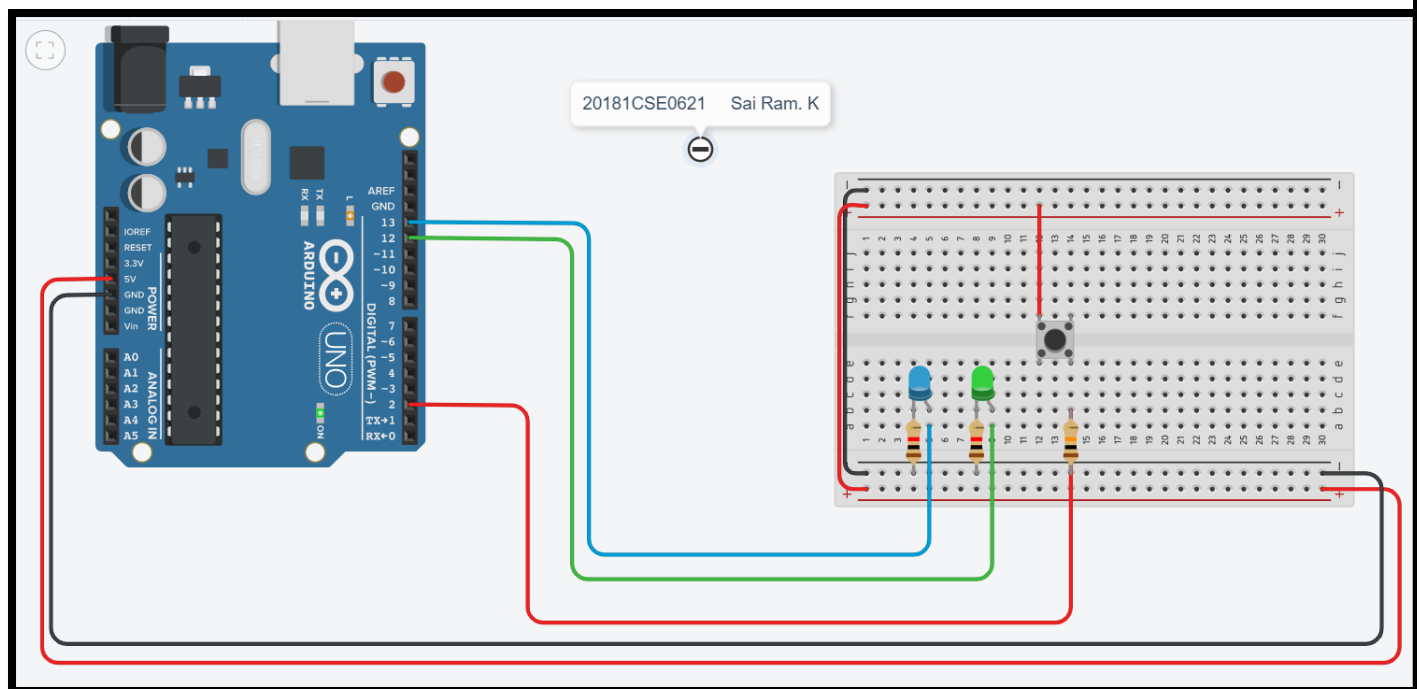
      digitalWrite(12,HIGH);

      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 {
```
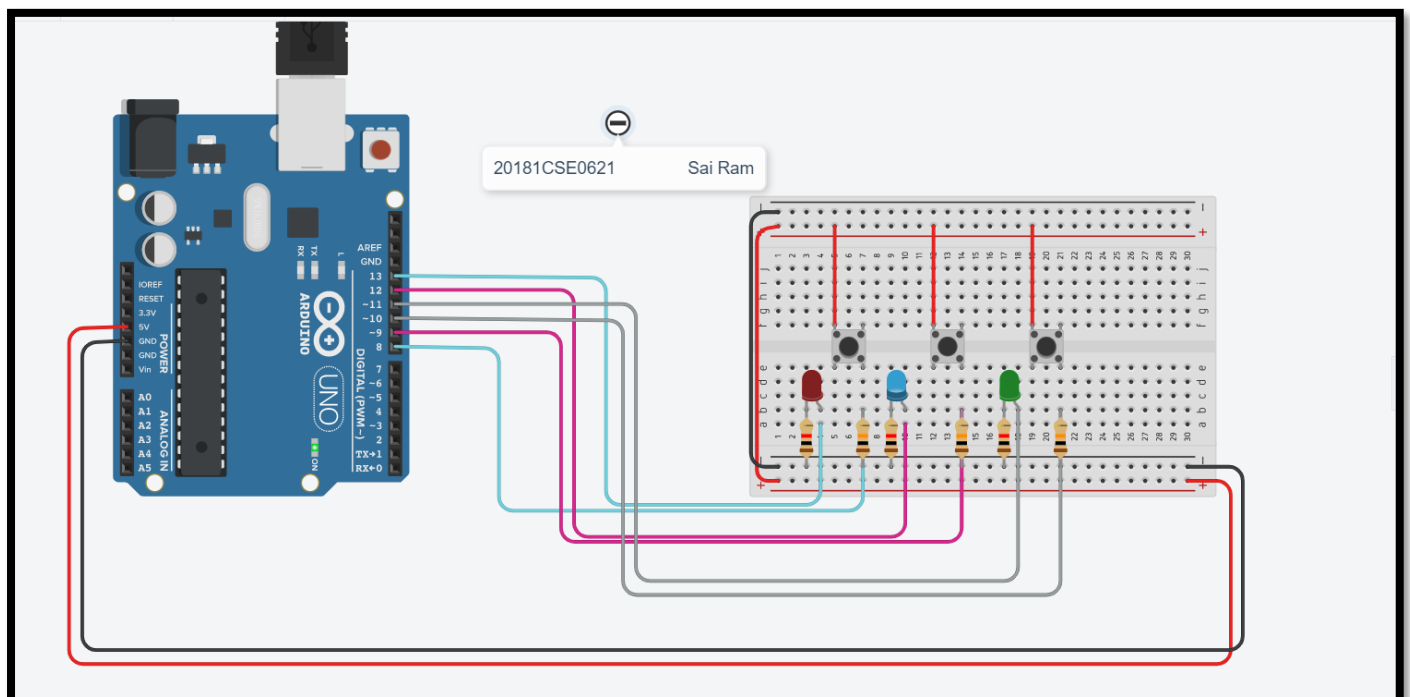
13

 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.
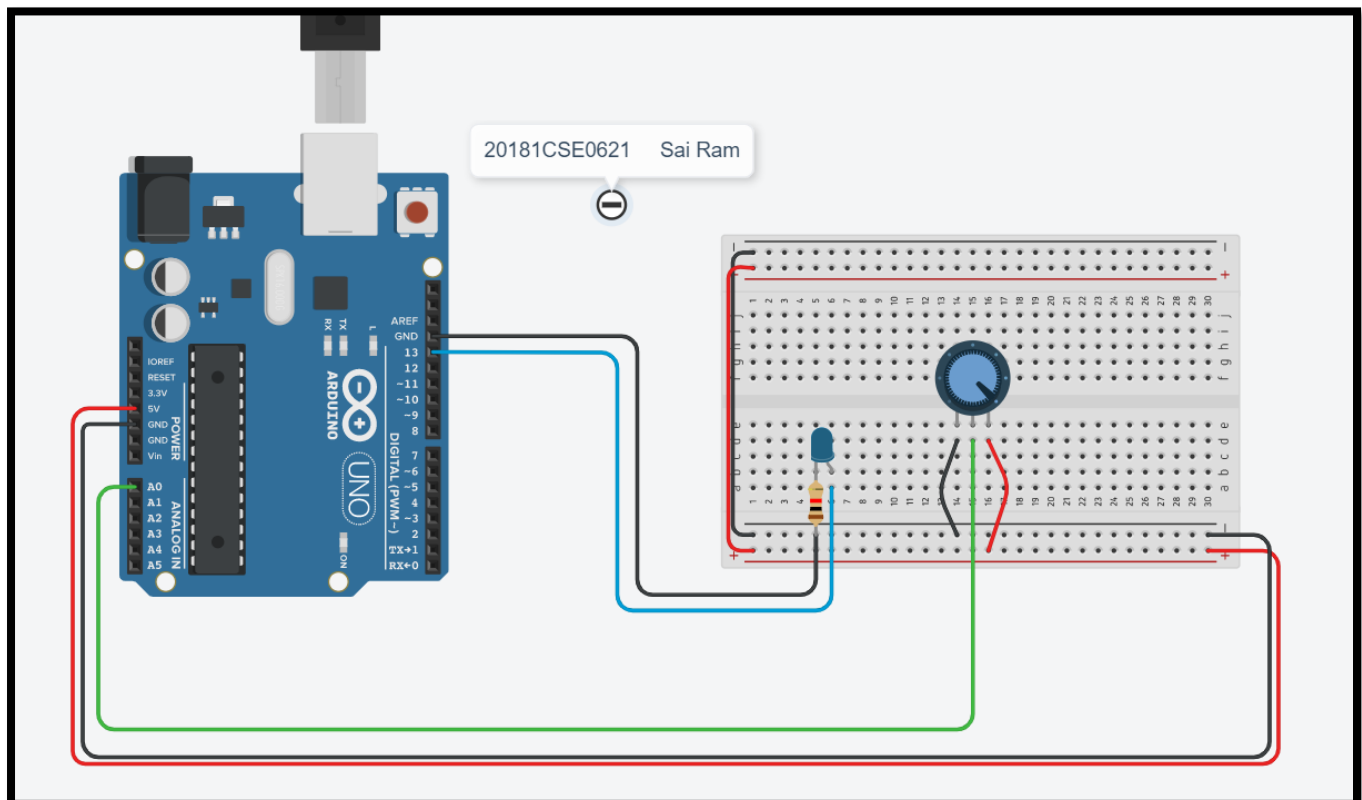Additional Programs:
  i)Adjust the brightness of LED without potentiometer.

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);

}
```
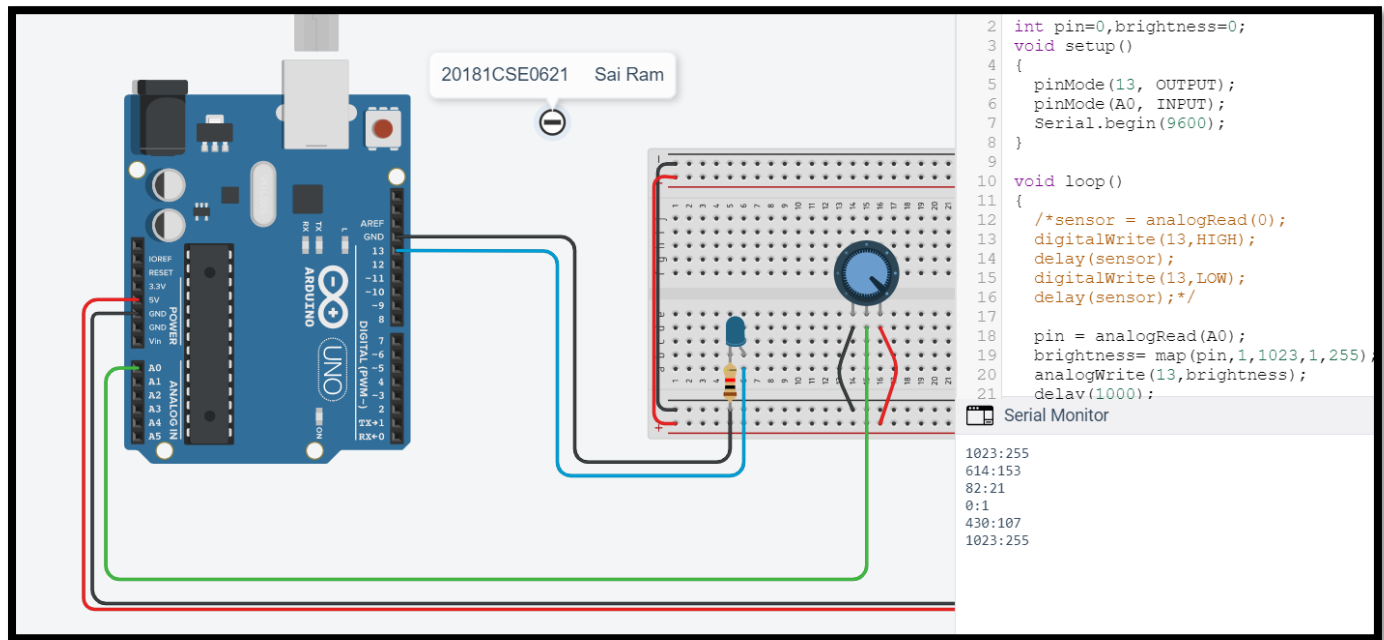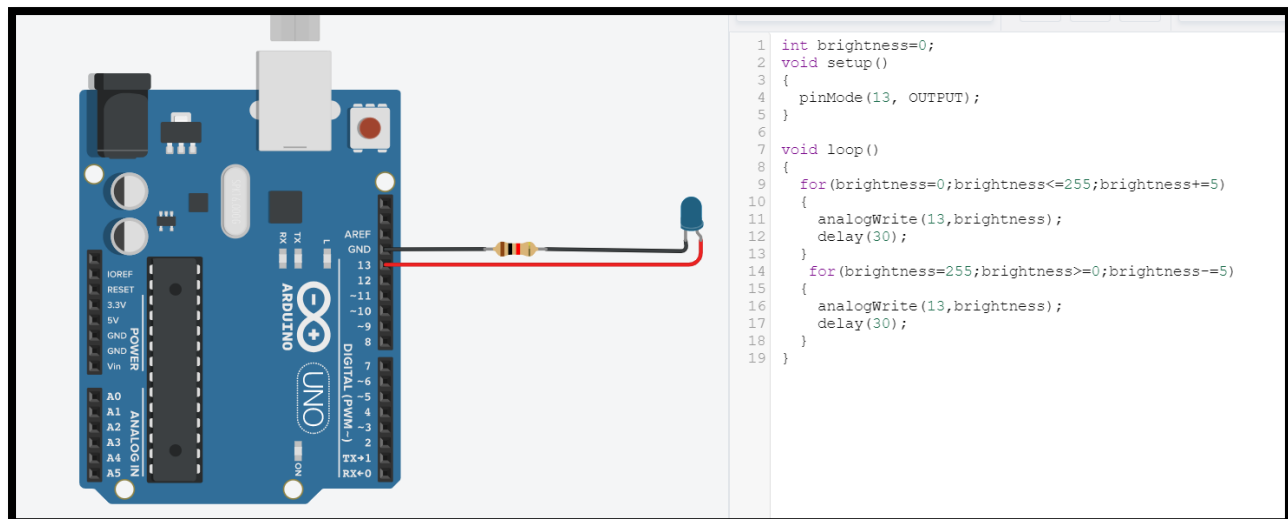
Output Screenshots :

```
2   int pin=0,brightness=0;
3   void setup()
4   {
5     pinMode(13, OUTPUT);
6     pinMode(A0, INPUT);
7     Serial.begin(9600);
8   }
9
10  void loop()
11  {
12    /*sensor = analogRead(0);
13    digitalWrite(13,HIGH);
14    delay(sensor);
15    digitalWrite(13,LOW);
16    delay(sensor);*/
17
18    pin = analogRead(A0);
19    brightness= map(pin,1,1023,1,255);
20    analogWrite(13,brightness);
21    delay(1000);
```

Serial Monitor

```
1023:255
614:153
82:21
0:1
430:107
1023:255
```

B. Adjusting the brightness without Potentiometer : -

Aim : Intensity of Led without using Potentiometer ..

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

Initial Circuit Design :


```
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  }
```

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);

 }

}
```
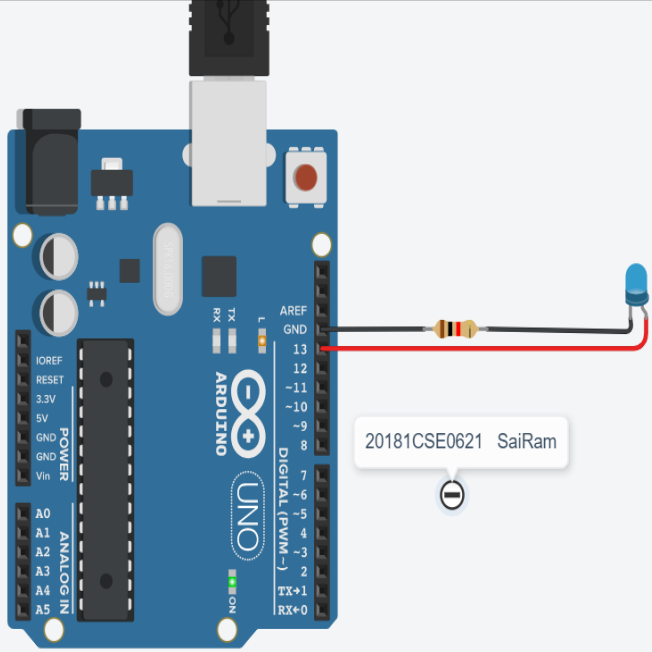
Output Screenshots :

```
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 }
```
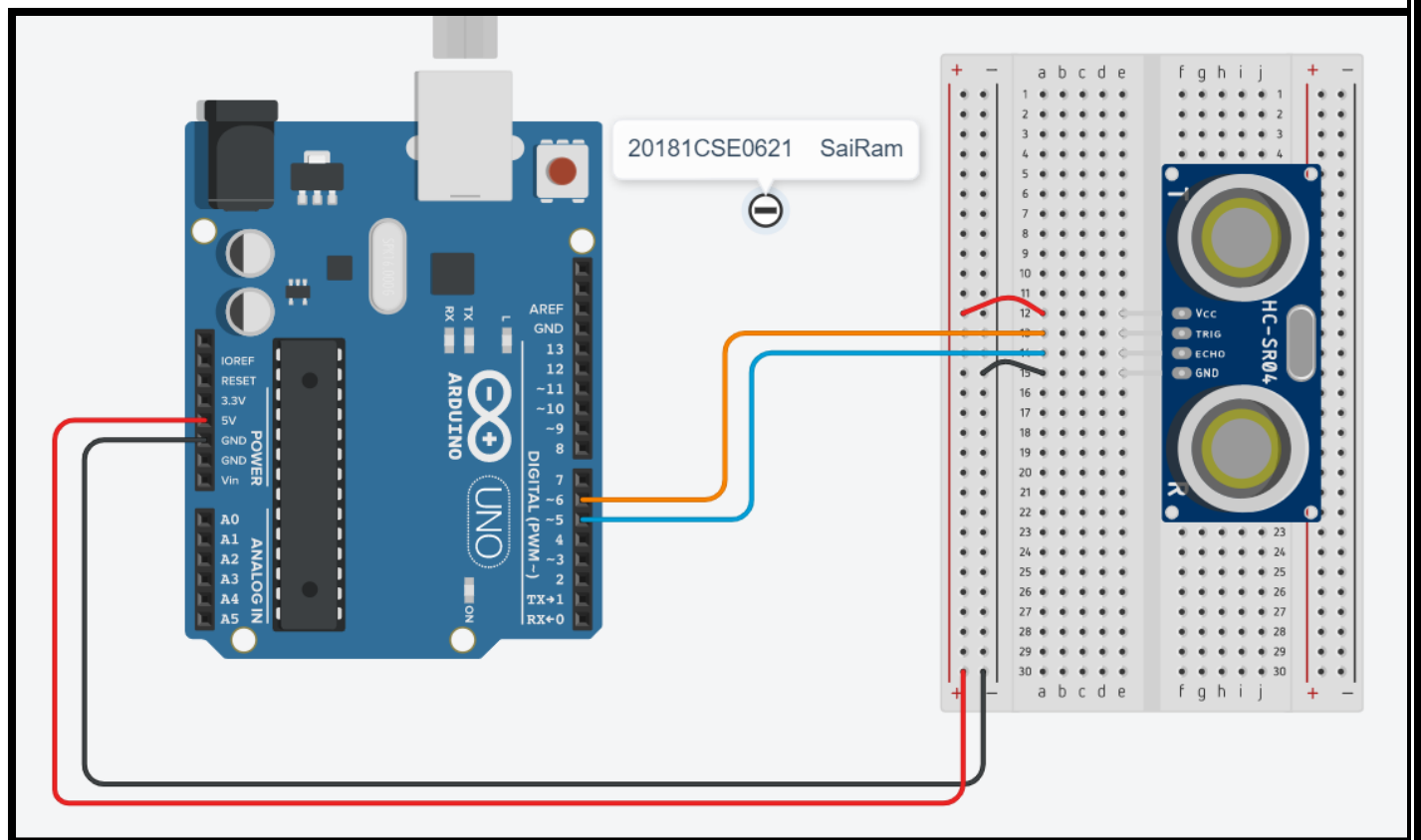
Experiment – 4
Ultrasonic Sensor

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 connecttion

const int echo = 5; // echo pin connection

long duration;

int distance;

void setup()

{
```

20

```
 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("");

}
```
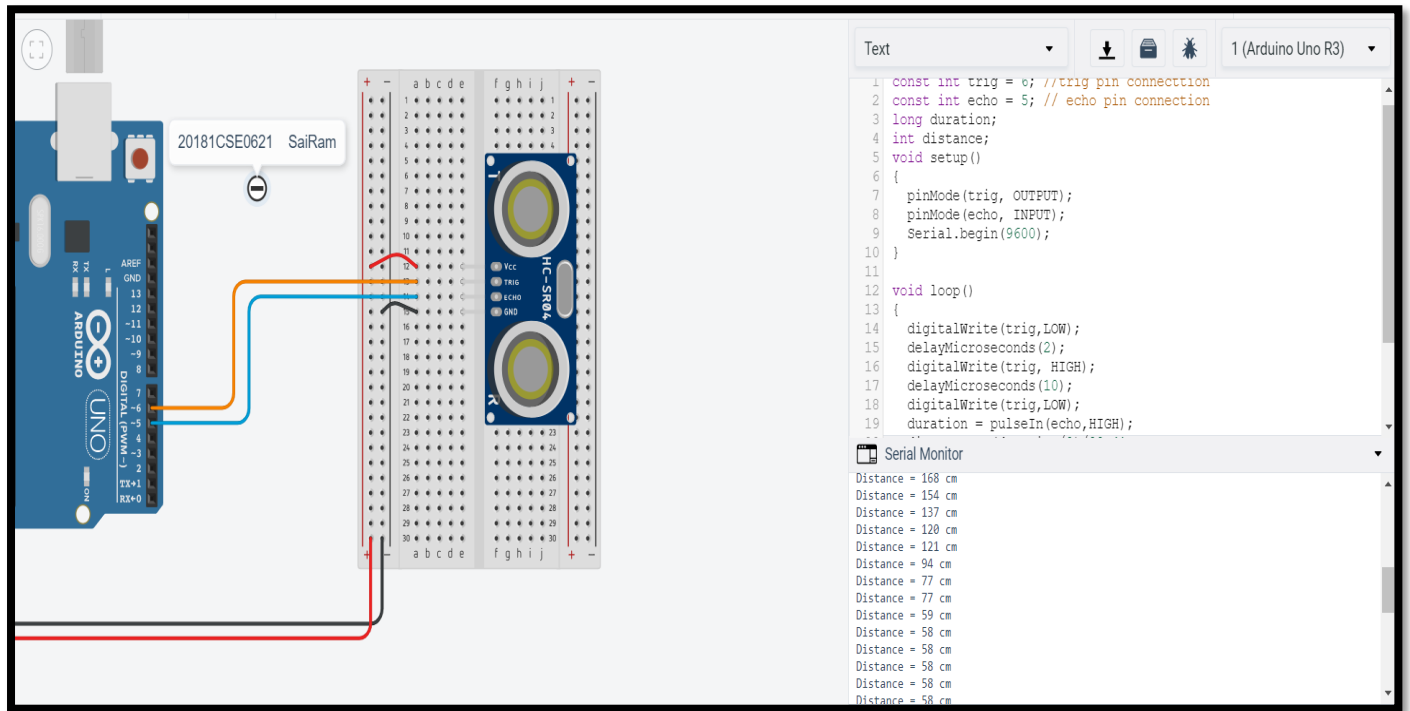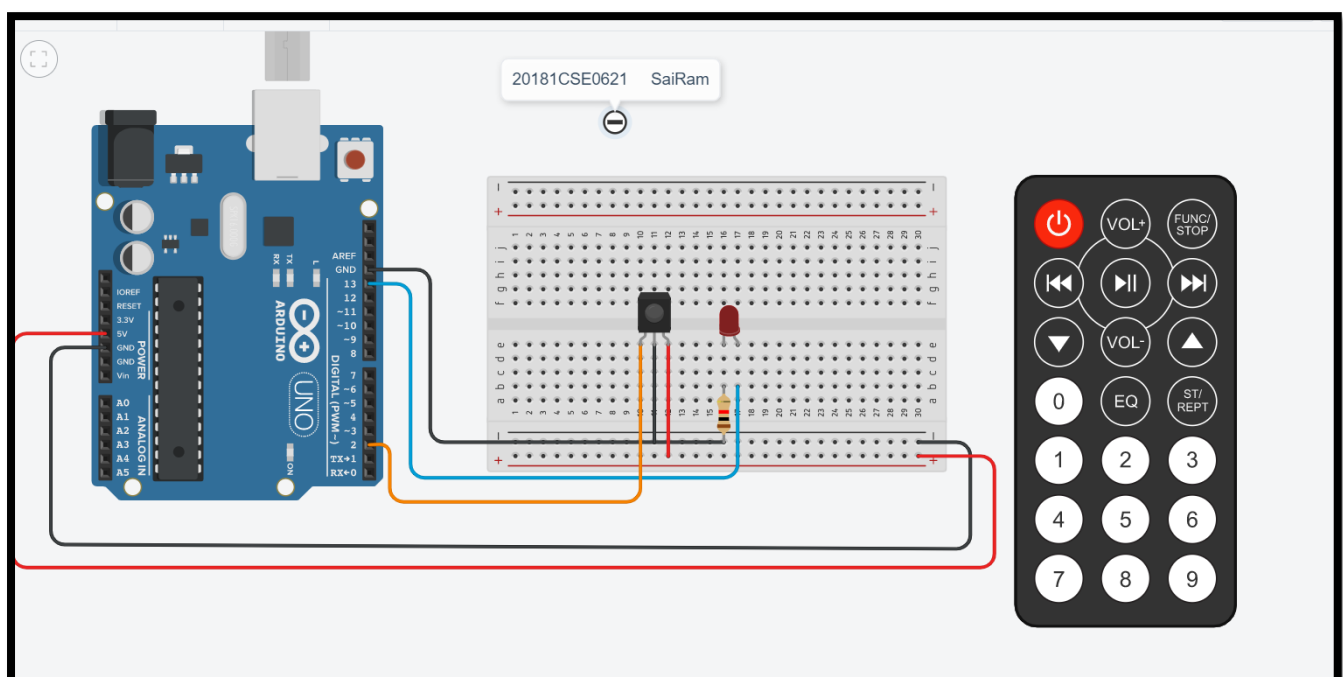
Output Screenshots :

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");

 }

}
```

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Output Screenshots :


```
1  int ir = 2; //Output pin of IR
2  int led = 13; // Output of led
3  void setup()
4  {
5    pinMode(13, OUTPUT);
6    pinMode(ir, INPUT);
7    Serial.begin(9600);
8  }
9
10 void loop()
11 {
12   int status = digitalRead(ir);
13   digitalWrite(13, HIGH);
14
15   if(status==1){
16     digitalWrite(led, LOW);
17     Serial.println("LED OFF");
18   }
19   else
20   {
21     digitalWrite(led, HIGH);
22     Serial.println("LED ON");
23   }
```

Serial Monitor

```
LED OFF
LED OFF
LED ON
LED OFF
LED ON
LED OFF
LED OFF
LED OFF
```