PRESIDENCY UNIVERSITY

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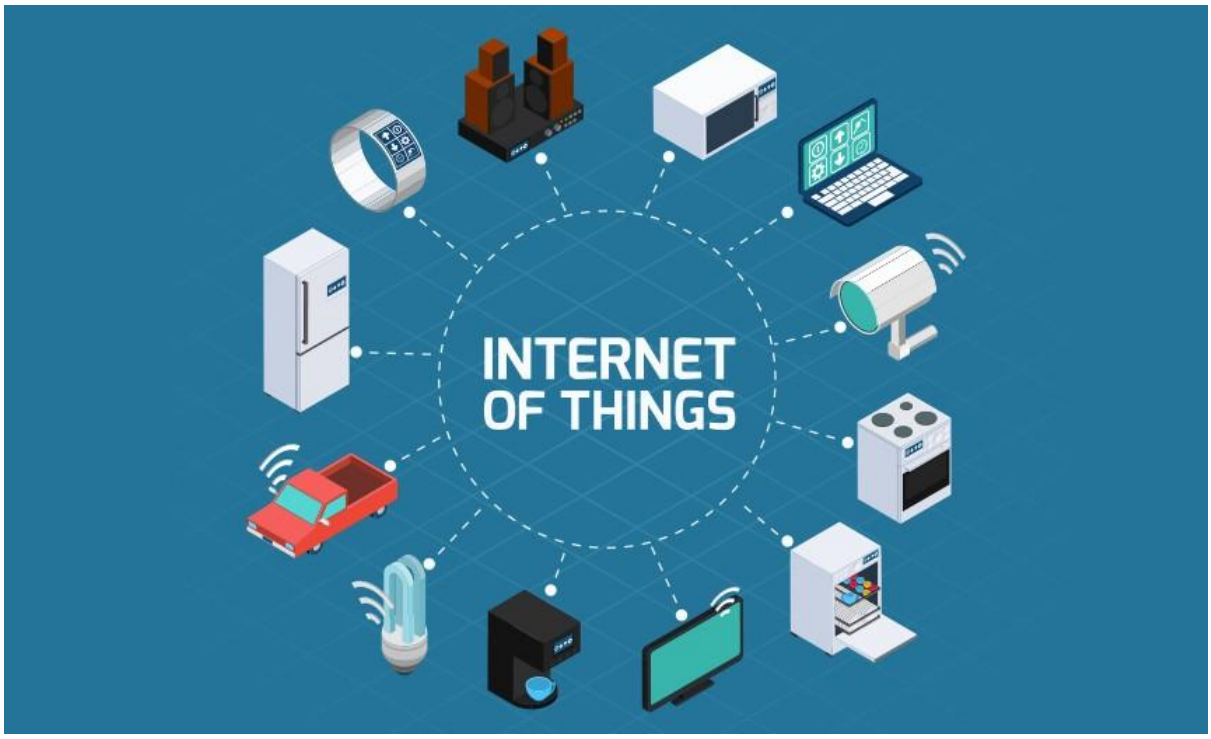
IOT LAB Programs



Name:

Id Number:

Section: 5BCA

Course code and title: CSA 3005 -Internet Of Things

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ID Number: 5BCA **NAME**

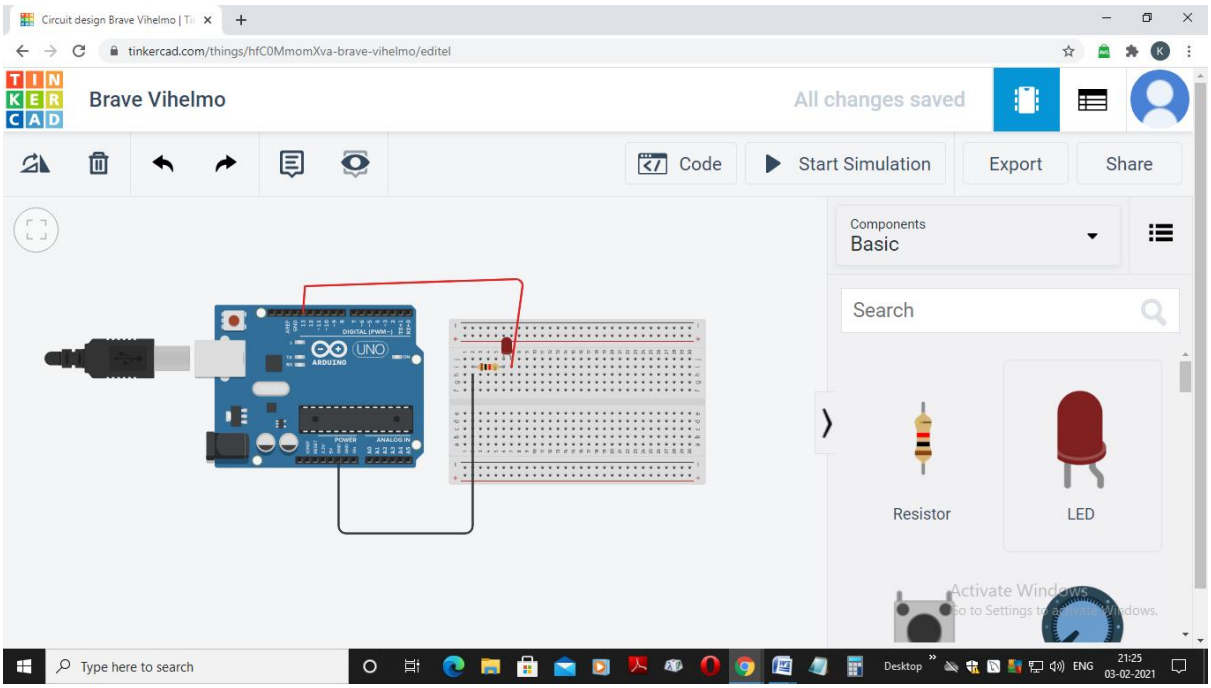
Experiment no:1 **DATE:**

Aim of the experiment: To blink an LED on Arduino Uno and to verify the result on Arduino IDE.

Components required: To blink an LED on Arduino Uno the following components are required.

- Arduino Uno R3
- 1 Led
- 1k Ω Resistor
- Small Breadboard
- Jumper Wires

Initial circuit design:

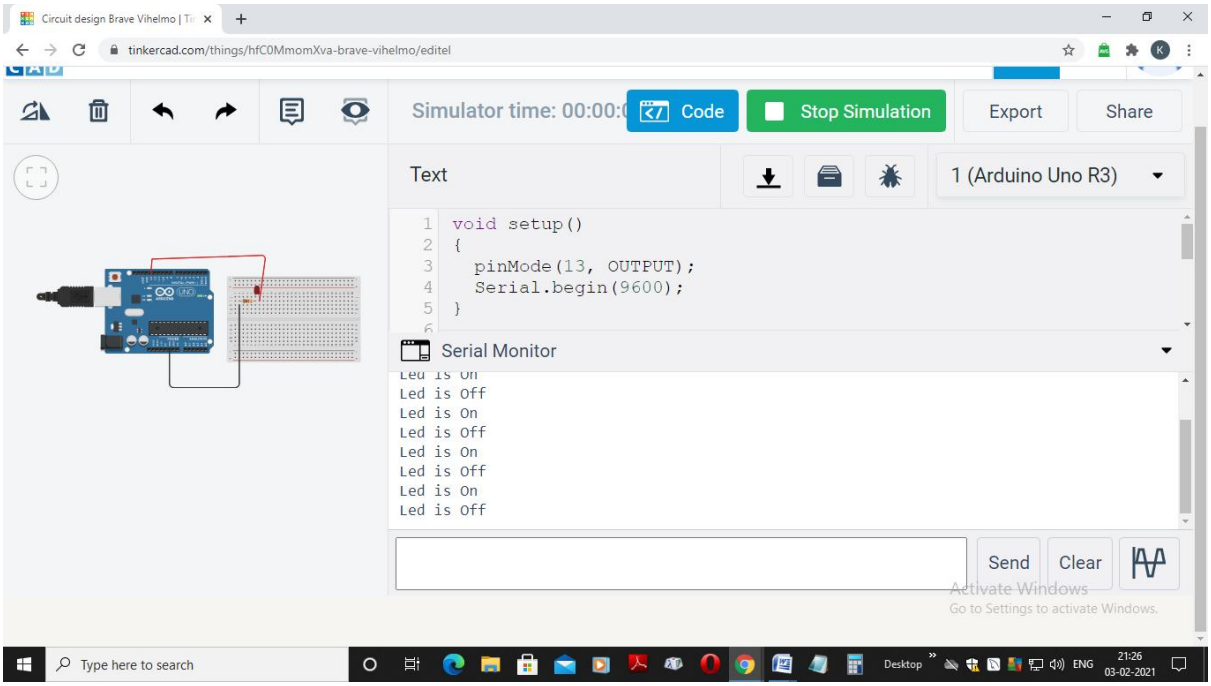


Arduino sketch:

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

```
}


void loop()
{
  digitalWrite(13, HIGH);
  Serial.println("Led is On");
  delay(1000); // Wait for 1000 millisecond(s)
  digitalWrite(13, LOW);
  Serial.println("Led is Off");
  delay(1000); // Wait for 1000 millisecond(s)
}
```

Output Screenshot:



Outcome: Led was blinked successfully for every one second

ID Number: 5BCA **NAME**

1(i) **DATE:**

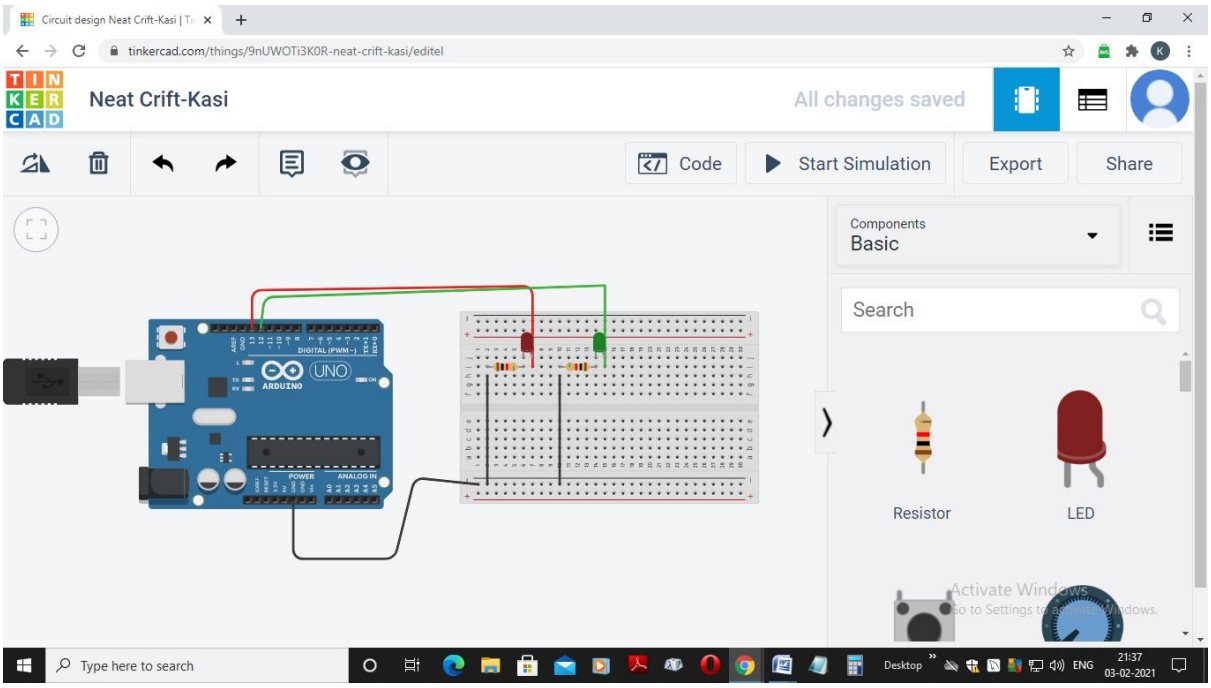
Additional programs:

Aim of the experiment: To blink two LED's on Arduino Uno and to verify the result on Arduino IDE.

Components required: To blink an LED on Arduino Uno the following components are required.

- Arduino Uno R3
- 2 Led
- 2 1k Ω Resistor
- Small Breadboard
- Jumper Wires

Initial circuit design:

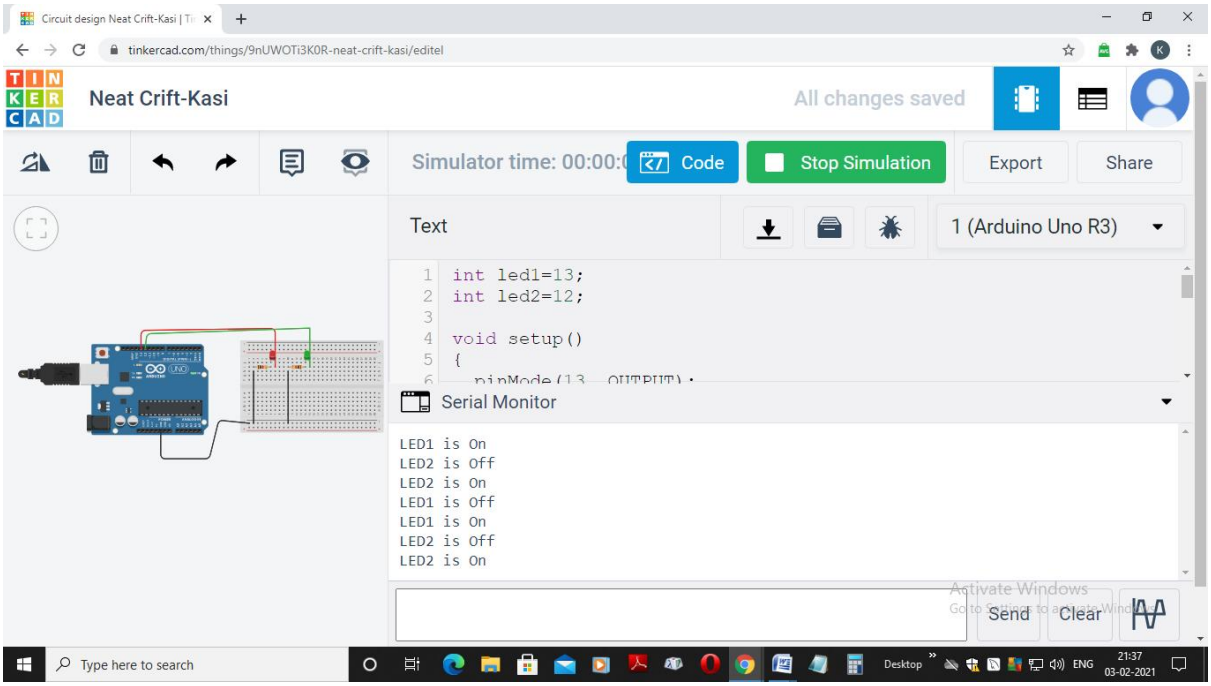


Arduino sketch:

```
int led1=13;

int led2=12;

void setup()

{

  pinMode(13, OUTPUT);
```

```
  Serial.begin(9600);
}
void loop()
{
  digitalWrite(led1, HIGH);
  Serial.println("LED1 is On");
  delay(1000); // Wait for 1000 millisecond(s)
  digitalWrite(led2, LOW);
  Serial.println("LED2 is Off");
  digitalWrite(led2, HIGH);
  Serial.println("LED2 is On");
  delay(1000);
  digitalWrite(led1, LOW);
  Serial.println("LED1 is Off");
  delay(1000); // Wait for 1000 millisecond(s)
}
```

Output Screenshot:



Outcome: Two LED's were successfully blinked alternatively for every one second.

ID Number: 5BCA **NAME**

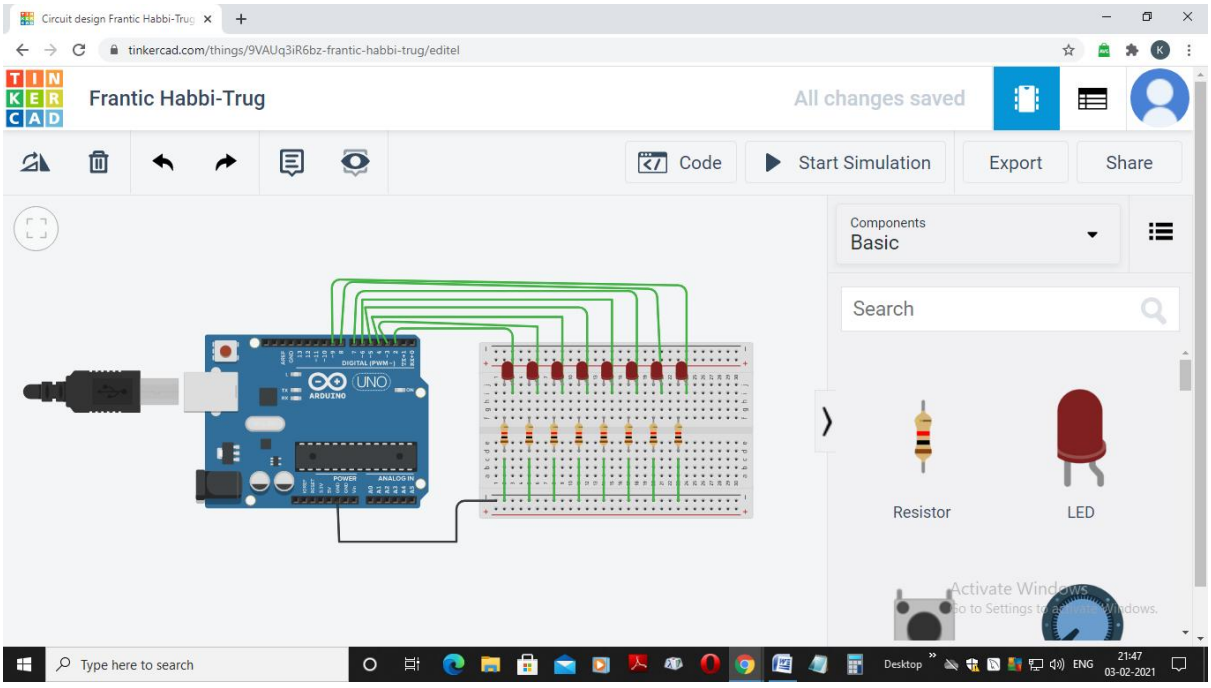
1(ii) **DATE:**

Aim of the experiment: To blink odd and even LED's on Arduino Uno and to verify the result on Arduino IDE.

Components required: To blink odd and even LED's on Arduino Uno the following components are required.

- Arduino Uno R3
- 8 Led
- 8 1k Ω Resistor
- Small Breadboard
- Jumper Wires

Initial circuit design:



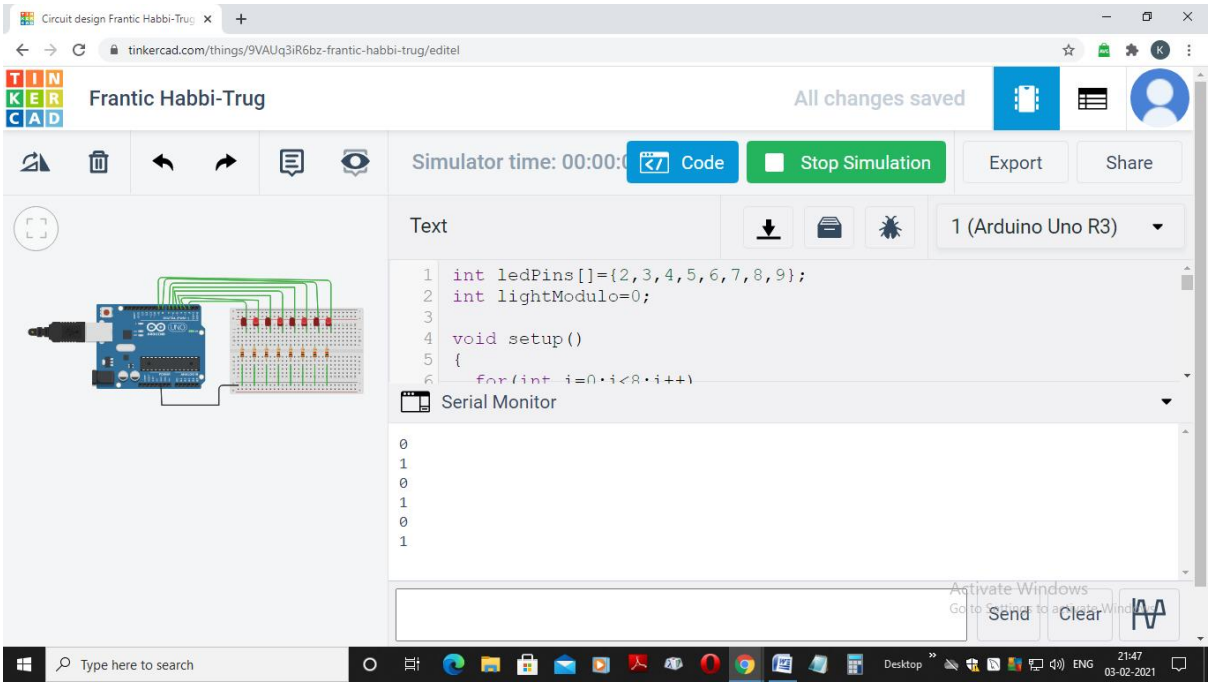
Arduino sketch:

```
int del=1000; // variable define the delay

void setup()

{

 // make pins 2, 3, 4 and up to 8 as digital output pins
```

```
 // for loop to initialize all pins
 for(int i=2; i<=8; i++)
  {
    pinMode(i,OUTPUT); // declare pins as a output
  }


}

void loop()
{
  //  for loop makes an even number of digital output pins digital high
  for(int i=2; i<=8; i++)
  {
          if(i%2==0)
          {
          digitalWrite(i,HIGH);   delay(del);
          digitalWrite(i,LOW);   delay(del);
           }
  }/* end of for loop */

// for loop makes an odd number of digital output pins digital high
for(int i=2; i<=8; i++)
        {
          if(i%2==1)
```

```
        {
          digitalWrite(i,HIGH);  delay(del);
          digitalWrite(i,LOW);  delay(del);
        }
 }/* end of for loop */
}/* end of main loop */
```

Output Screenshot:



Outcome: Odd and even LED's were blinked successfully for every one second

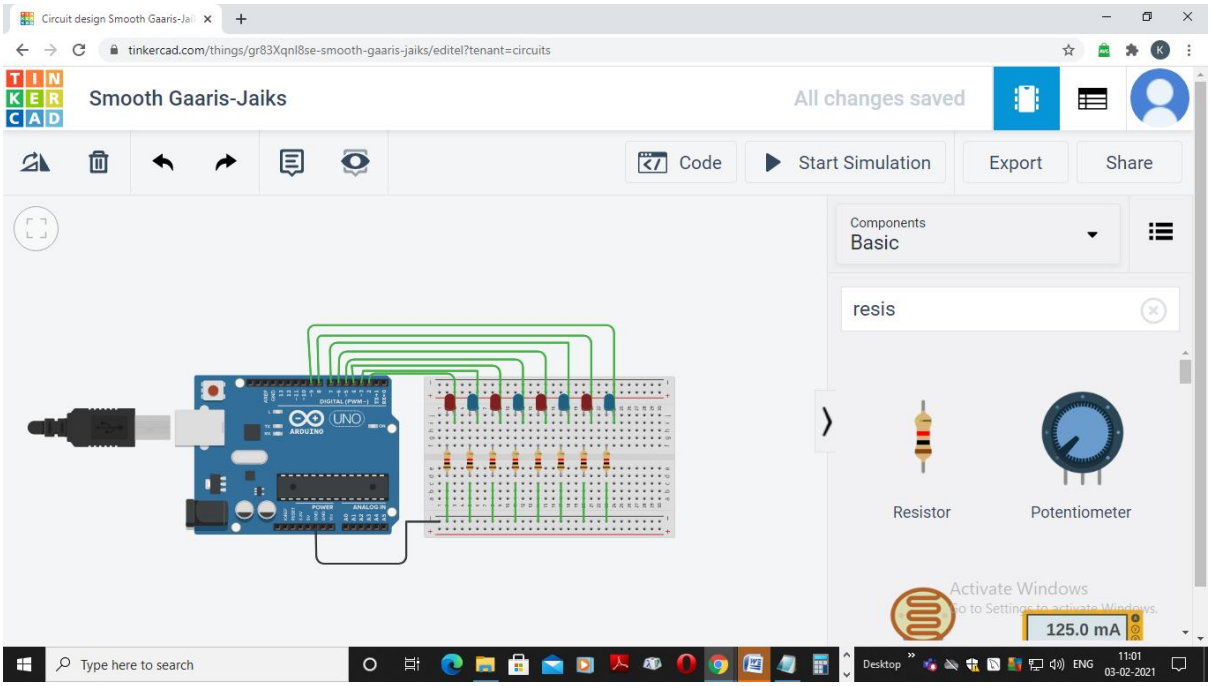
1(iii) **DATE:**

Aim of the experiment: To scroll LED's on Arduino Uno and to verify the result on Arduino IDE.

Components required: To scroll LED's on Arduino Uno the following components are required.

- Arduino Uno R3
- 8 Led
- 8 1k Ω Resistor
- Small Breadboard
- Jumper Wires

Initial circuit design:



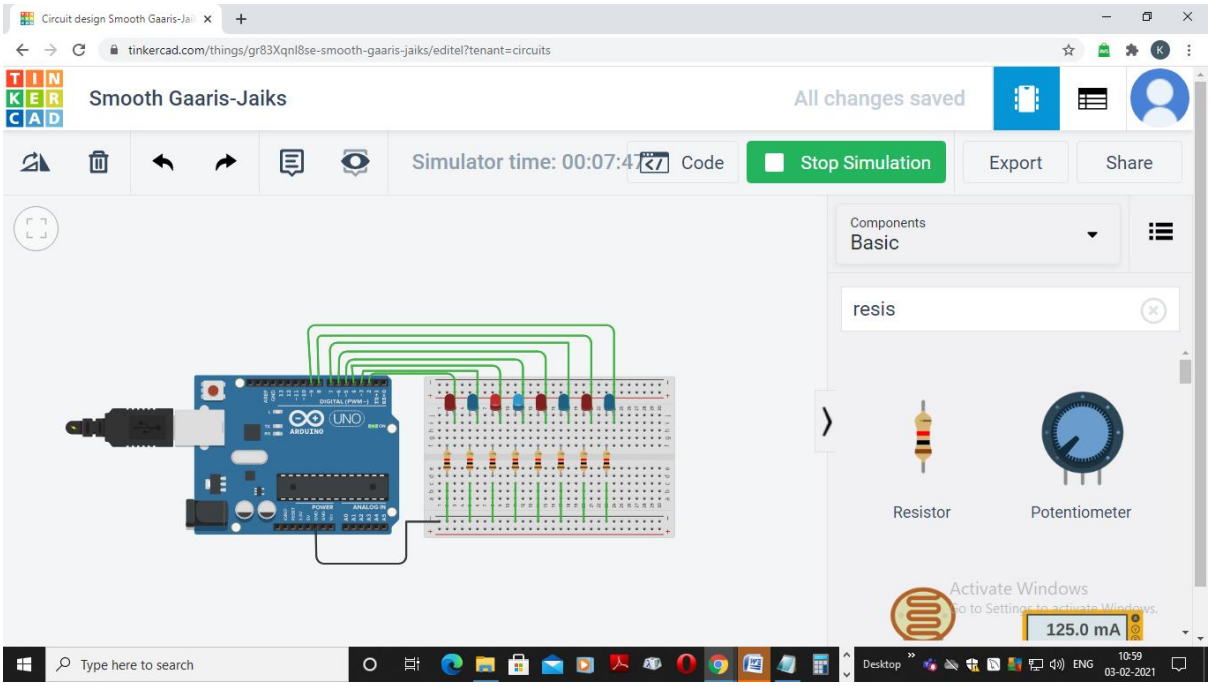
Arduino sketch:

```
int ledPins[]={2,3,4,5,6,7,8,9};

void setup()

{

  for(int i=0;i<8;i++)

 {

  pinMode(ledPins[i], OUTPUT);
```

```
  }
  Serial.begin(9600);
}

void loop()
{
   for(int i=0;i<8;i++)
         {
            digitalWrite(ledPins[i],HIGH);     delay(1000);
            digitalWrite(ledPins[i],LOW);
   }
  for(int i=7;i>=0;i--)
         {
           digitalWrite(ledPins[i],HIGH);     delay(1000);
          digitalWrite(ledPins[i],LOW);
   }
}
```

Output Screenshot:

ID Number: 5BCA **NAME**



Outcome: Led was scrolled successfully for every one second

ID Number: 5BCA **NAME**

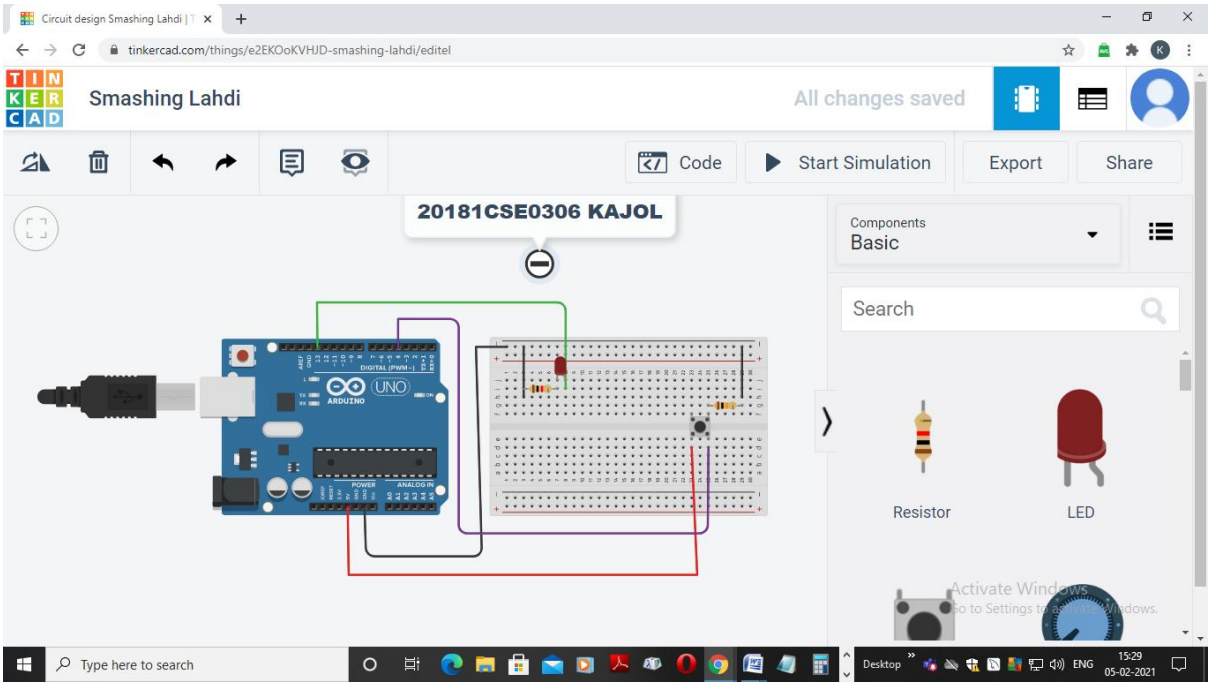
Experiment no:2 **DATE:**

Aim of the experiment: Interfacing of Arduino Uno with LED and switch and to control LED using switch.

Components required: To interface an Arduino Uno with LED and switch the following components are required.

- Arduino Uno R3
- Led
- 1k Ω and 10k Ω Resistor
- Small Breadboard
- Jumper Wires
- Push button

Initial circuit design:

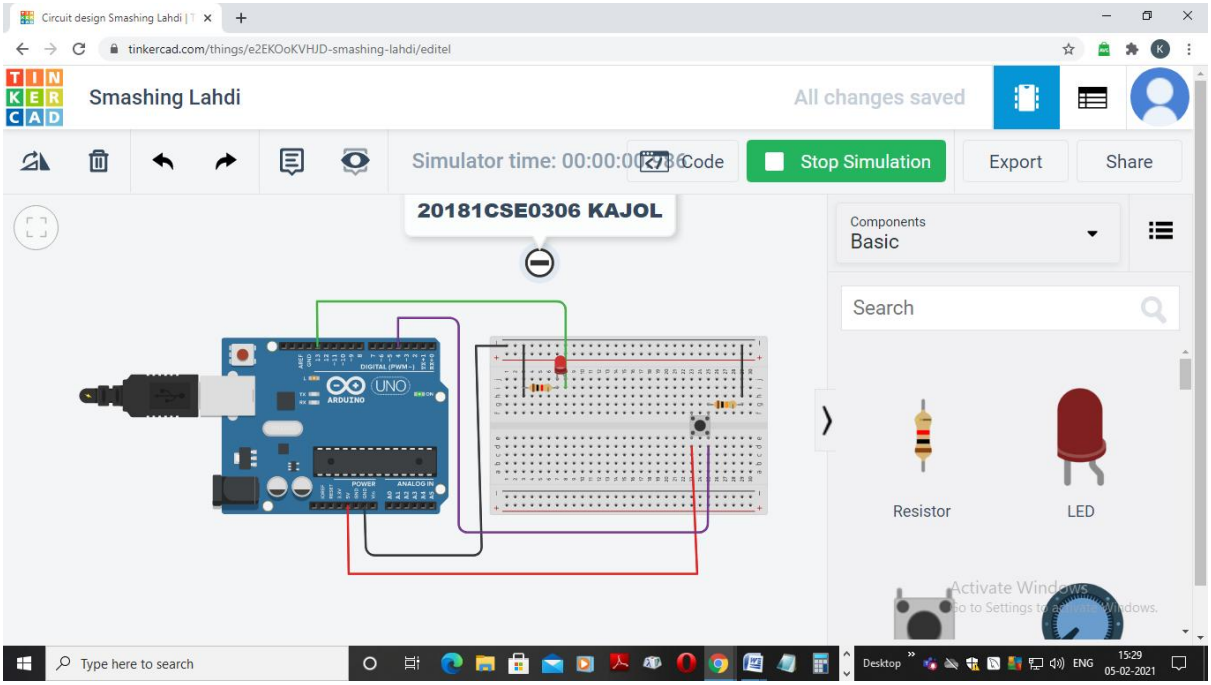


Arduino sketch:

```
void setup()

{
```

```
  pinMode(13, OUTPUT);
  pinMode(12, INPUT);
  Serial.begin(9600);
}

void loop()
{
  if(digitalRead(12)==1)
  {
  digitalWrite(13, HIGH);
  Serial.println("LED IS ON.....");
  delay(1000); // Wait for 1000 millisecond(s)
  }
  digitalWrite(13, LOW);
  Serial.println("LED IS OFF.....");
  delay(1000); // Wait for 1000 millisecond(s)
}
```

Output Screenshot:



Outcome: Arduino Uno was successfully interfaced with LED and switch and the LED was controlled using switch.

ID Number: 5BCA **NAME**

2(i) **DATE:**

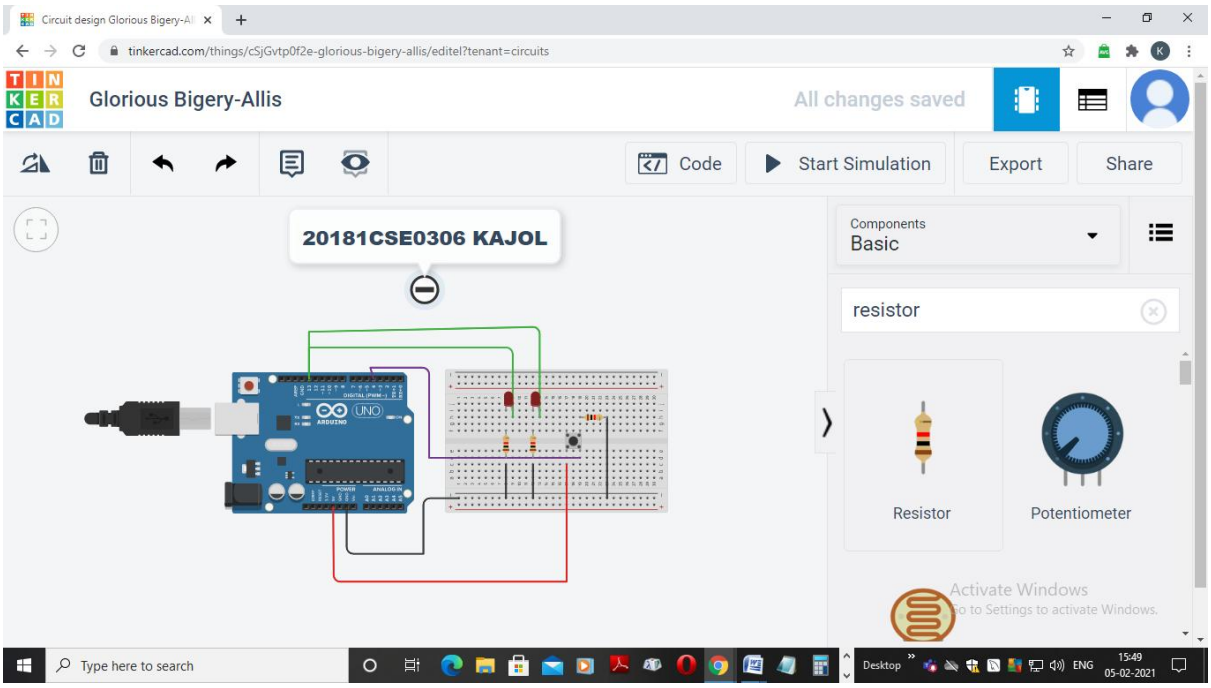
Additional programs:

Aim of the experiment: To control multiple LED's using single switch.

Components required: To control multiple LED's using single switch the following components are required.

- Arduino Uno R3
- Led
- 1k Ω and 10k Ω Resistor
- Small Breadboard
- Jumper Wires
- Push button

Initial circuit design:



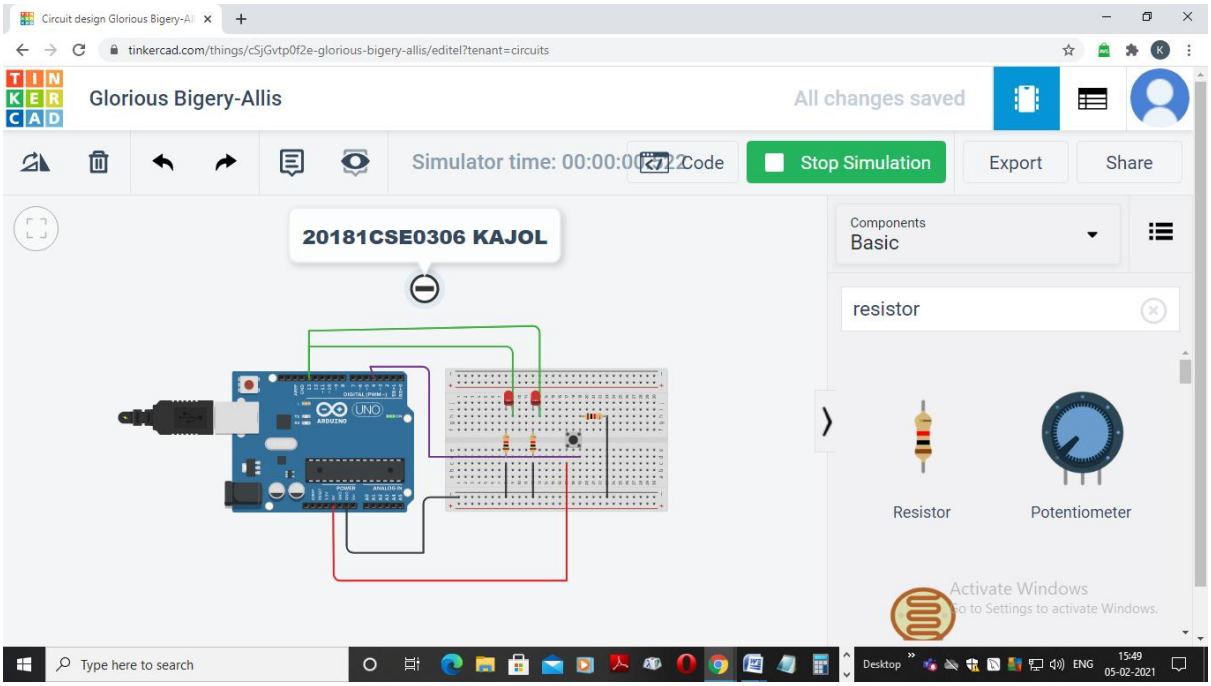
Arduino sketch:

```
int button_pin=4;

void setup()
```

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

void loop()
{
  Serial.println("Controlling LED through push button");
  int button;
  button=digitalRead(button_pin);

  if(button==HIGH)
  {
    digitalWrite(13,HIGH);
    Serial.println("LED1 is ON");
    digitalWrite(13,HIGH);
    Serial.println("LED2 is ON");

  }
  else
  {
    digitalWrite(13,LOW);
    Serial.println("LED2 is OFF");
```

```
    digitalWrite(13,LOW);
    Serial.println("LED2 is OFF");


  }
}
```

Output Screenshot:



Outcome: Multiple LED's were controlled successfully using single switch .

ID Number: 5BCA **NAME**

2(ii) **DATE:**

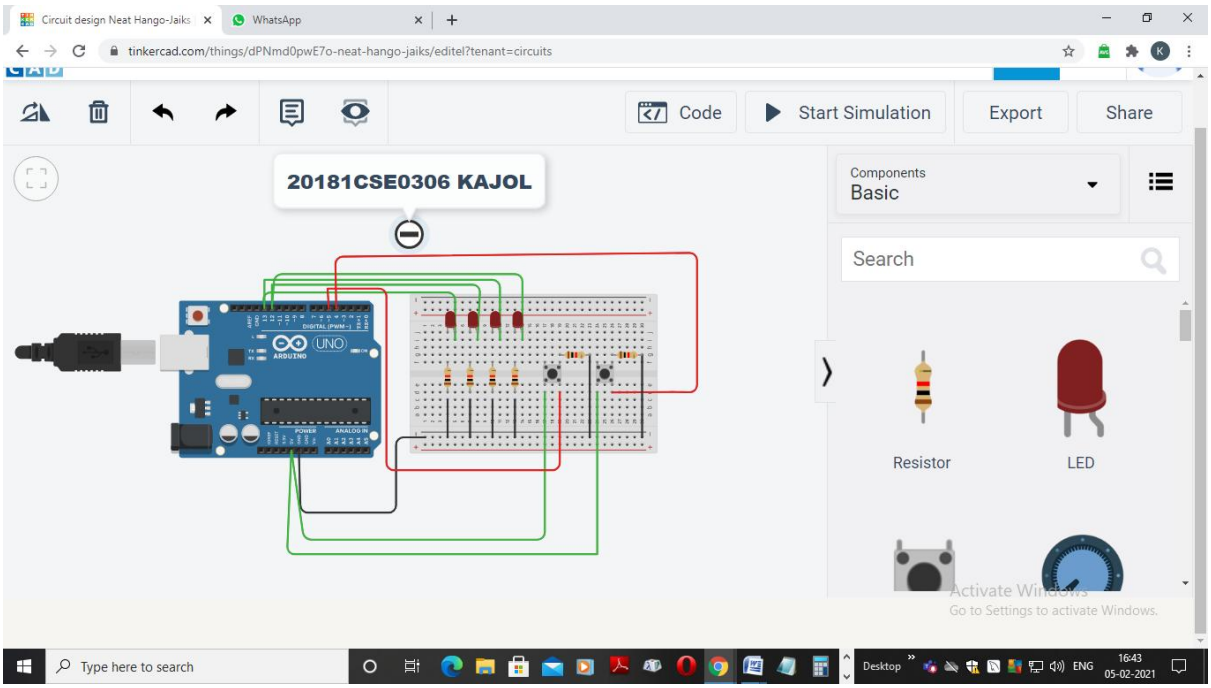
Additional program:

Aim of the experiment: To control multiple LED's using multiple switch.

Components required: To control multiple LED's using single switch the following components are required.

- Arduino Uno R3
- Led
- 1k Ω and 10k Ω Resistor
- Small Breadboard
- Jumper Wires
- Push button

Initial circuit design:



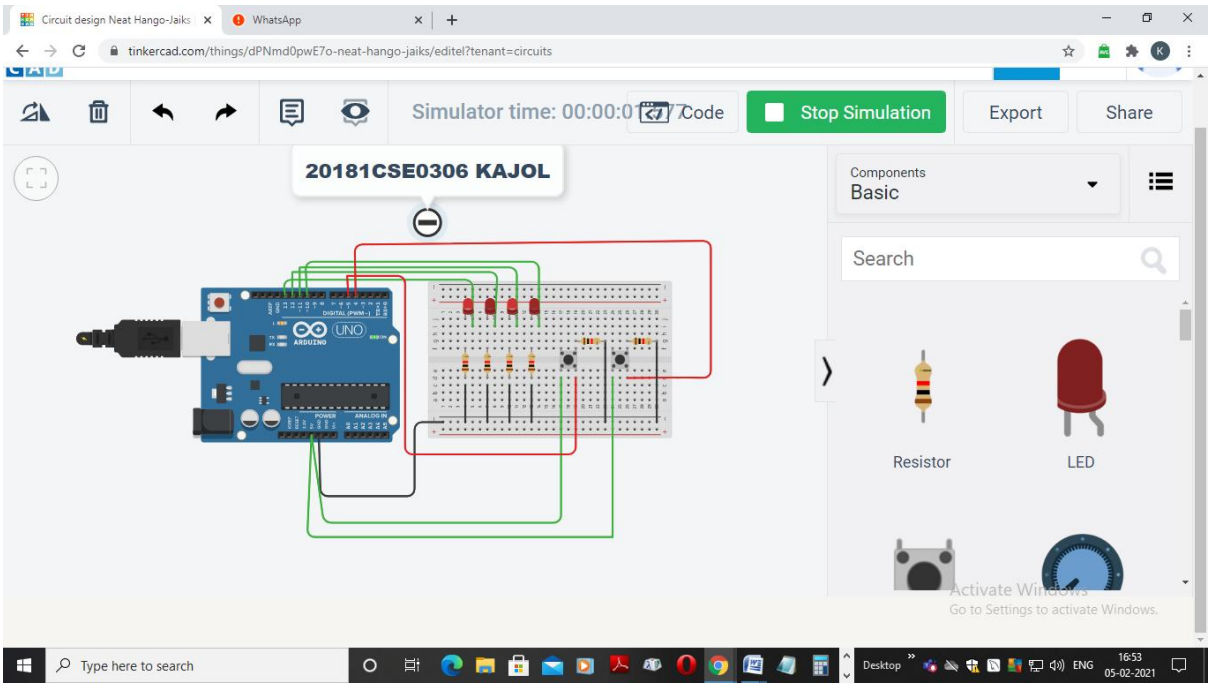
Arduino sketch:

```
int button_pin1=4;
```

```
int button_pin2=5;
void setup()
{
  pinMode(13, OUTPUT);
  pinMode(button_pin1,INPUT);
  pinMode(button_pin2,INPUT);
  pinMode(12,OUTPUT);
  Serial.begin(9600);
}

void loop()
{
  int button1,button2;
  button1=digitalRead(button_pin1);
  button2=digitalRead(button_pin2);
  if (button1==HIGH)
  {
    digitalWrite(13, HIGH);
  }
  else
  {
    digitalWrite(13,LOW);
  }
  if (button2==HIGH)
```

```
 {
   digitalWrite(12,HIGH);
 }
 else
 {
   digitalWrite(12,LOW);
 }
}
```

Output Screenshot:



Outcome: Multiple LED's were controlled successfully using multiple switch.

ID Number: 5BCA **NAME**

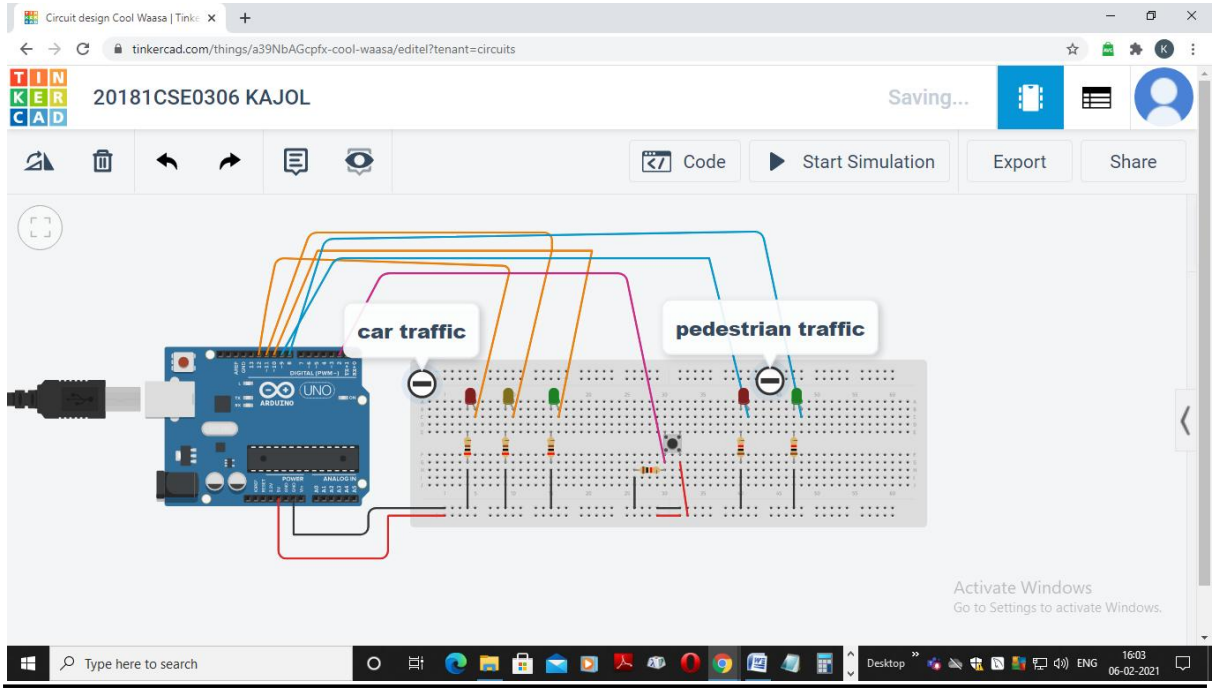
Additional program **DATE:**

Aim of the experiment: Arduino program to implement traffic control system.

Components required: to implement traffic control system the following components are required.

- Arduino Uno R3 board
- Power cable(1)
- Breadboard(1)
- Led (5)
  - 2 Red LED's
  - 1 Yellow LED
  - 2 Green LED's
- 200 Ω Resistor (6)
- Jumper Wires
- Tactile Switch (Push button)

Initial circuit design:



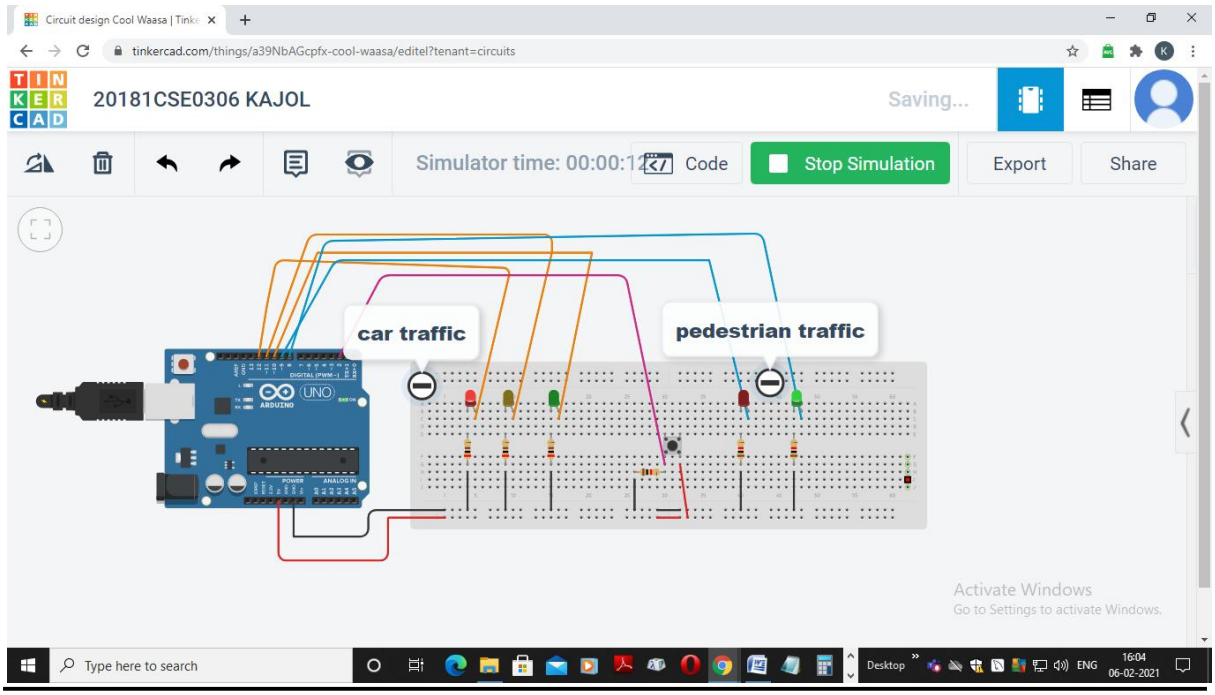
Arduino sketch:

```
int carRed =12;
int carYellow =11;
int carGreen =10;
int pedRed =9;
int pedGreen =8;
int button=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(button, INPUT);

  digitalWrite(carGreen, HIGH);
  digitalWrite(pedRed, HIGH);
}
```

```
void loop()
{
 int state=digitalRead(button);
 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 x=0;x<10;x++)
 {
   digitalWrite(pedGreen, HIGH);
   delay(250);
```

```
    digitalWrite(pedGreen, LOW);
    delay(250);
  }
  digitalWrite(pedRed, HIGH);
  delay(500);
  digitalWrite(carYellow, HIGH);
  digitalWrite(carRed, LOW);
  delay(1000);
  digitalWrite(carGreen,HIGH);
  digitalWrite(carYellow, LOW);

  changeTime=millis();
}
```

Output Screenshot:



ID Number: 5BCA **NAME**

Outcome: Traffic control system was implemented successfully using Arduino Uno.

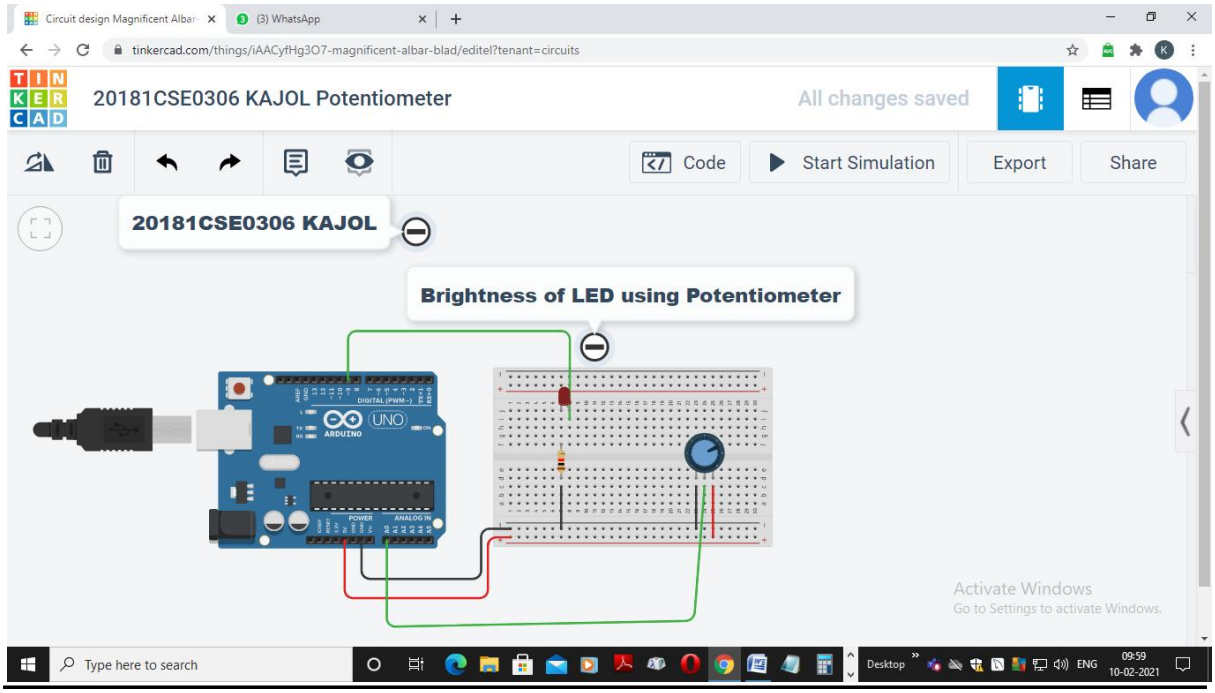
Experiment no:3 **DATE:**

Aim of the experiment: To adjust the brightness **(Fading) of an** LED using Potentiometer.

Components required:

- Arduino Uno
- Led
- Potentiometer(knob)
- Resistor
- Tinkercad simulator

Initial circuit design:



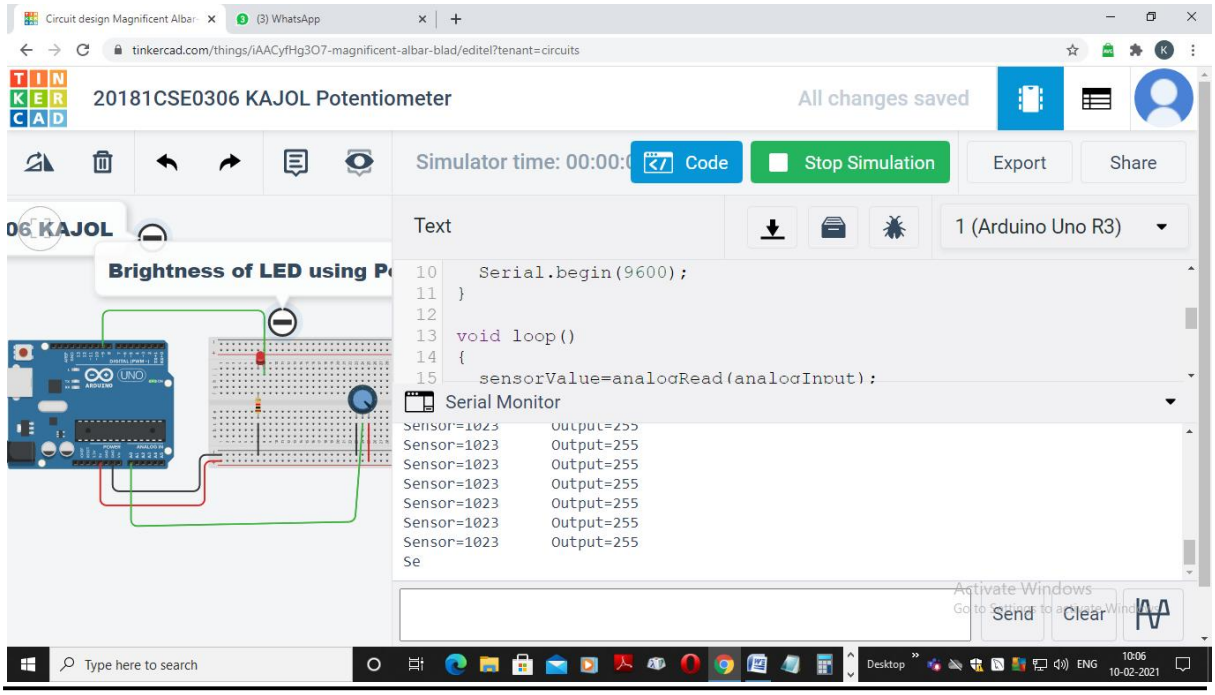
Arduino sketch:

```
const int analogInput=A0;

const int analogOutput=9;
```

```
int sensorValue=0; //wiper-read voltage from potentiometer
int outputValue=0;//value output to the PWM(analog output)


void setup()
{
  Serial.begin(9600);
}

void loop()
{
  sensorValue=analogRead(analogInput);

  outputValue=map(sensorValue,0,1023,0,255);

  analogWrite(analogOutput,outputValue);

  Serial.print("Sensor=");
  Serial.print(sensorValue);
  Serial.print("\t Output=");
  Serial.println(outputValue);
```

```
}
```

Output Screenshot:



Outcome: The brightness of an LED was adjusted successfully using Potentiometer.

ID Number: 5BCA **NAME**

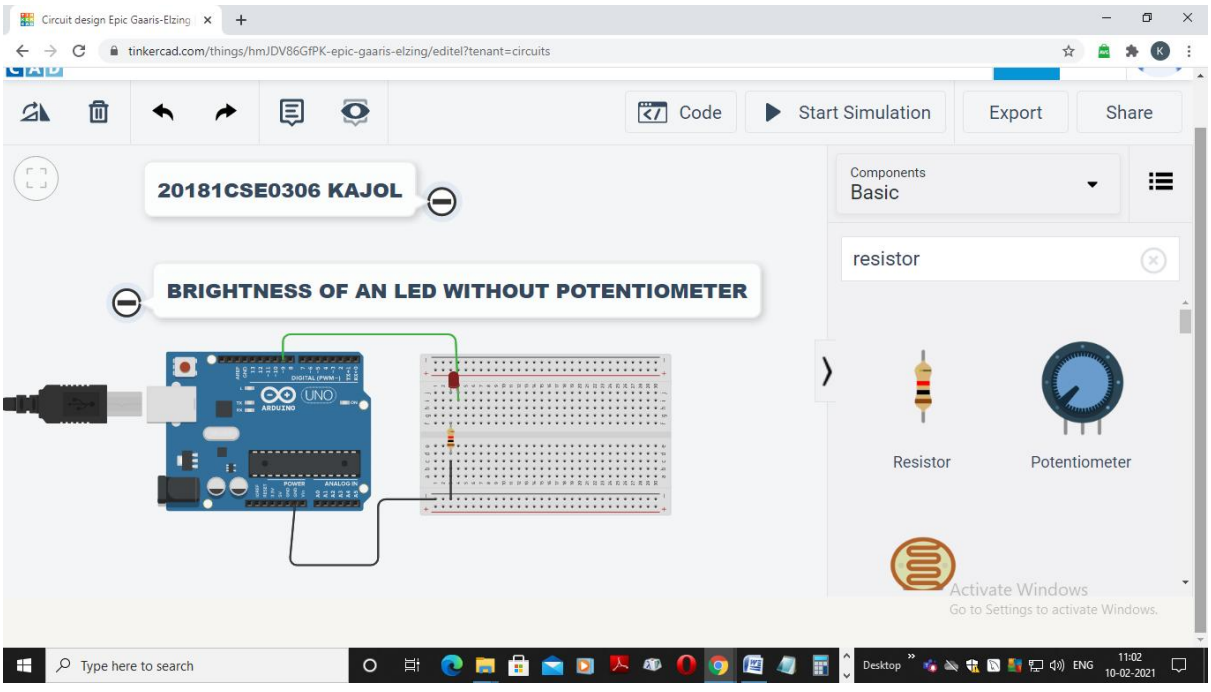
Additional program: **DATE:**

Aim of the experiment: To adjust the brightness **(Fading) of an** LED without using Potentiometer.

Components required:

- Arduino Uno
- Led
- Resistor
- Tinkercad simulator

Initial circuit design:



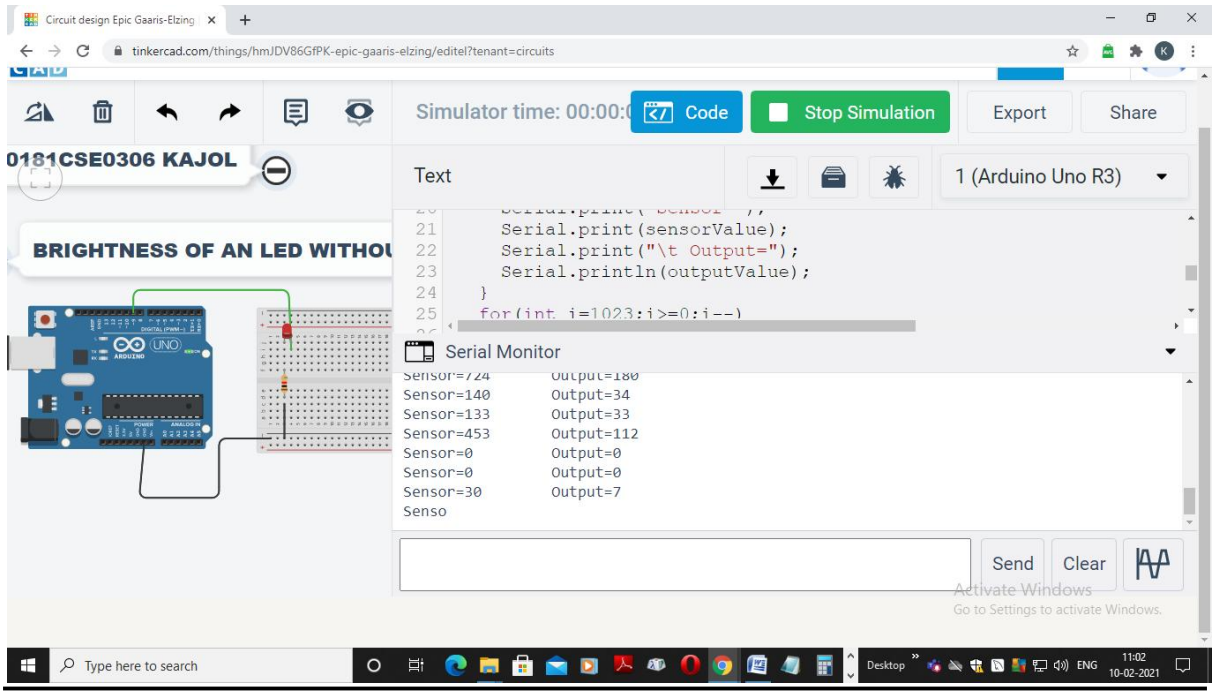
Arduino sketch:

```
const int analogOutput=9;

int sensorValue=0;

int outputValue=0;
```

```
void setup()
{
  Serial.begin(9600);
}

void loop()
{
  for(int i=0;i<=1023;i++)
  {
    sensorValue=analogRead(i);
    outputValue=map(sensorValue,0,1023,0,255);

//map is a function which accepts 5 arguments map(input sensor
value ,volt_value range and analog  value range;

    analogWrite(analogOutput,outputValue);

    Serial.print("Sensor=");
    Serial.print(sensorValue);
    Serial.print("\t Output=");
    Serial.println(outputValue);
  }
  for(int i=1023;i>=0;i--)
  {
    sensorValue=analogRead(i);
```

```
    outputValue=map(sensorValue,0,1023,0,255);
    analogWrite(analogOutput,outputValue);
    Serial.print("Sensor=");
    Serial.print(sensorValue);
    Serial.print("\t Output=");
    Serial.println(outputValue);
  }
}
```

Output Screenshot:



Outcome: The brightness of an LED was adjusted successfully without using potentiometer

ID Number: 5BCA **NAME**

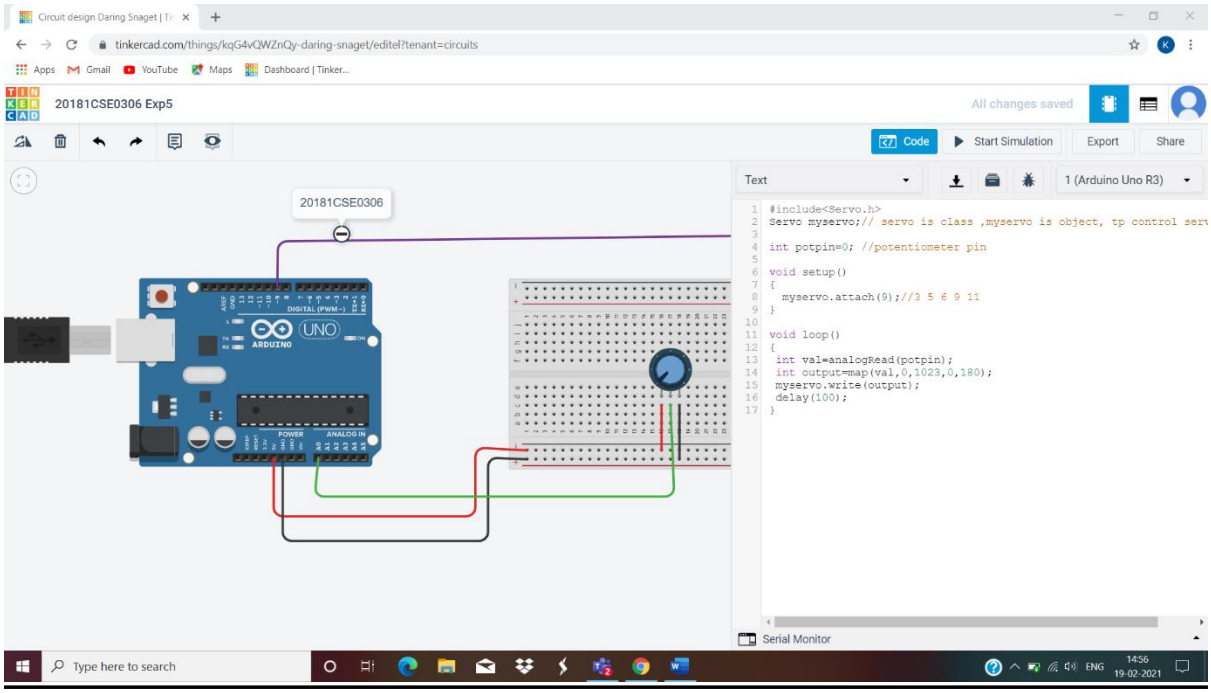
Experiment no:4 **DATE:**

Aim of the experiment: Arduino program to demonstrate control of servo motor using potentiometer**.**

Components required:

- Arduino Uno board
- Jumper wires
- Power cable
- Servo Motor
- Potentiometer(knob)

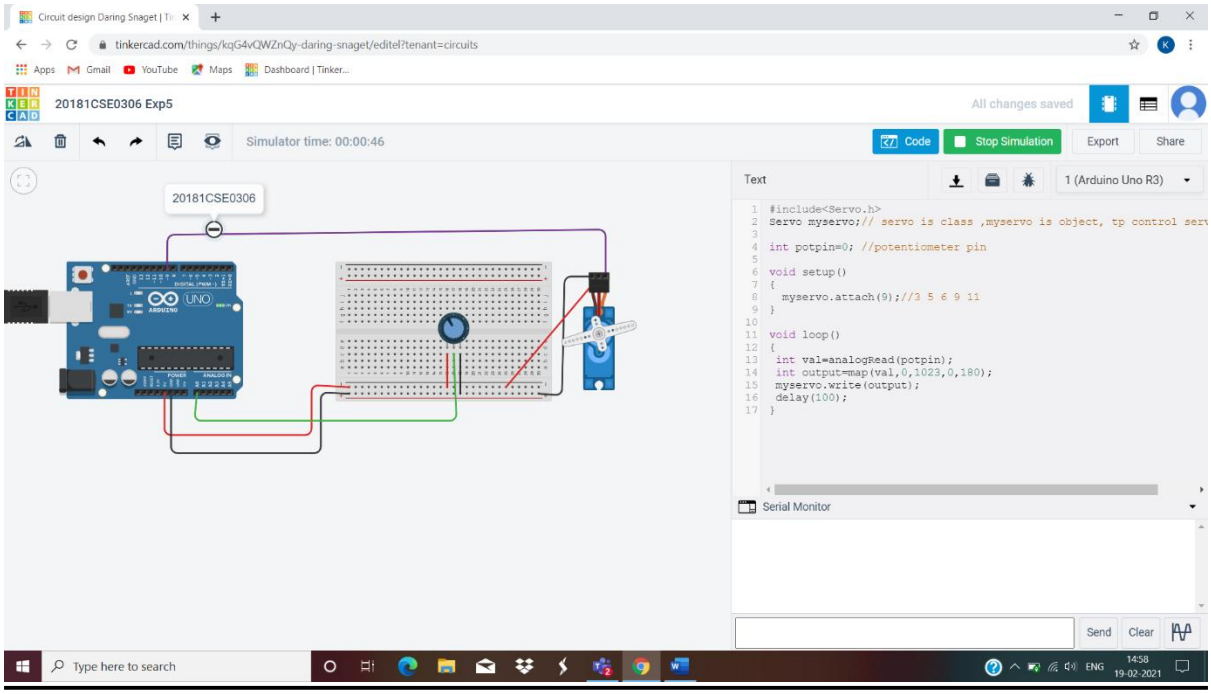
Initial circuit design:



Arduino sketch:

```
#include<Servo.h>
Servo myservo;// servo is class ,myservo is object, tp control servometer

int potpin=0; //potentiometer pin

void setup()
{
  myservo.attach(9);//3 5 6 9 11
}

void loop()
{
 int val=analogRead(potpin);
 int output=map(val,0,1023,0,180);
 myservo.write(output);
 delay(100);
}
```

Output Screenshot:



Outcome: Control of servo motor using potentiometer was demonstrated successfully.

ID Number: 5BCA **NAME**

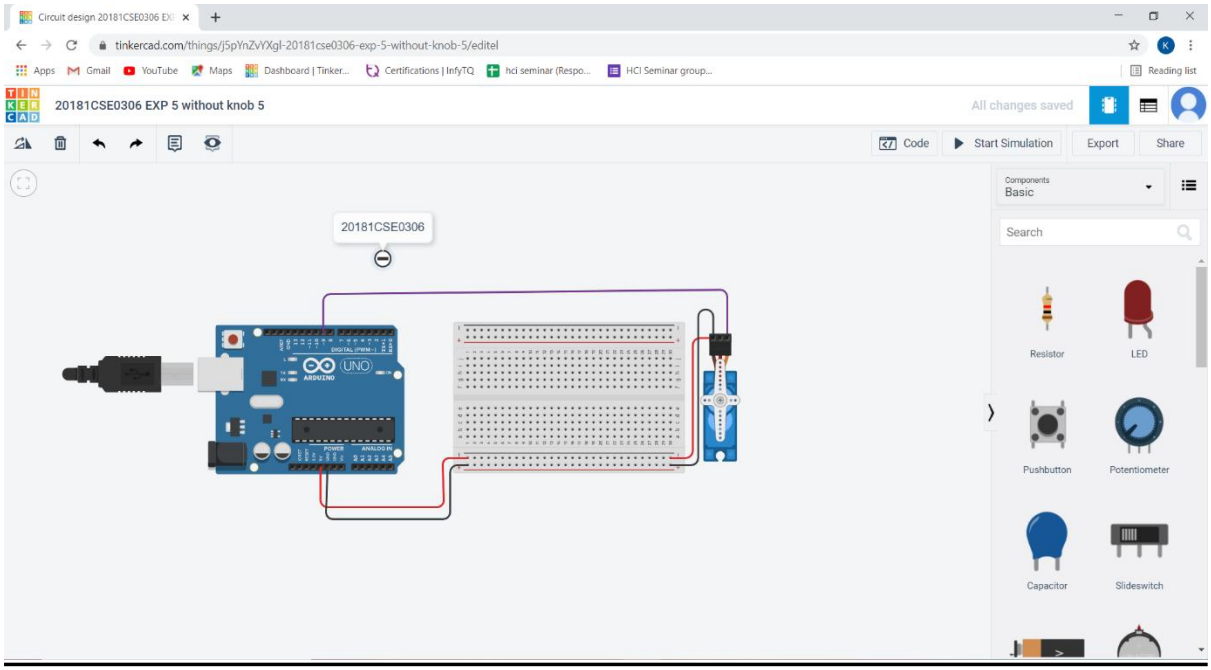
Additional Program **DATE:**

Aim of the experiment: Arduino program to demonstrate control of servo motor **without using potentiometer.**

Components required:

- Arduino Uno board
- Jumper wires
- Power cable
- Servo Motor

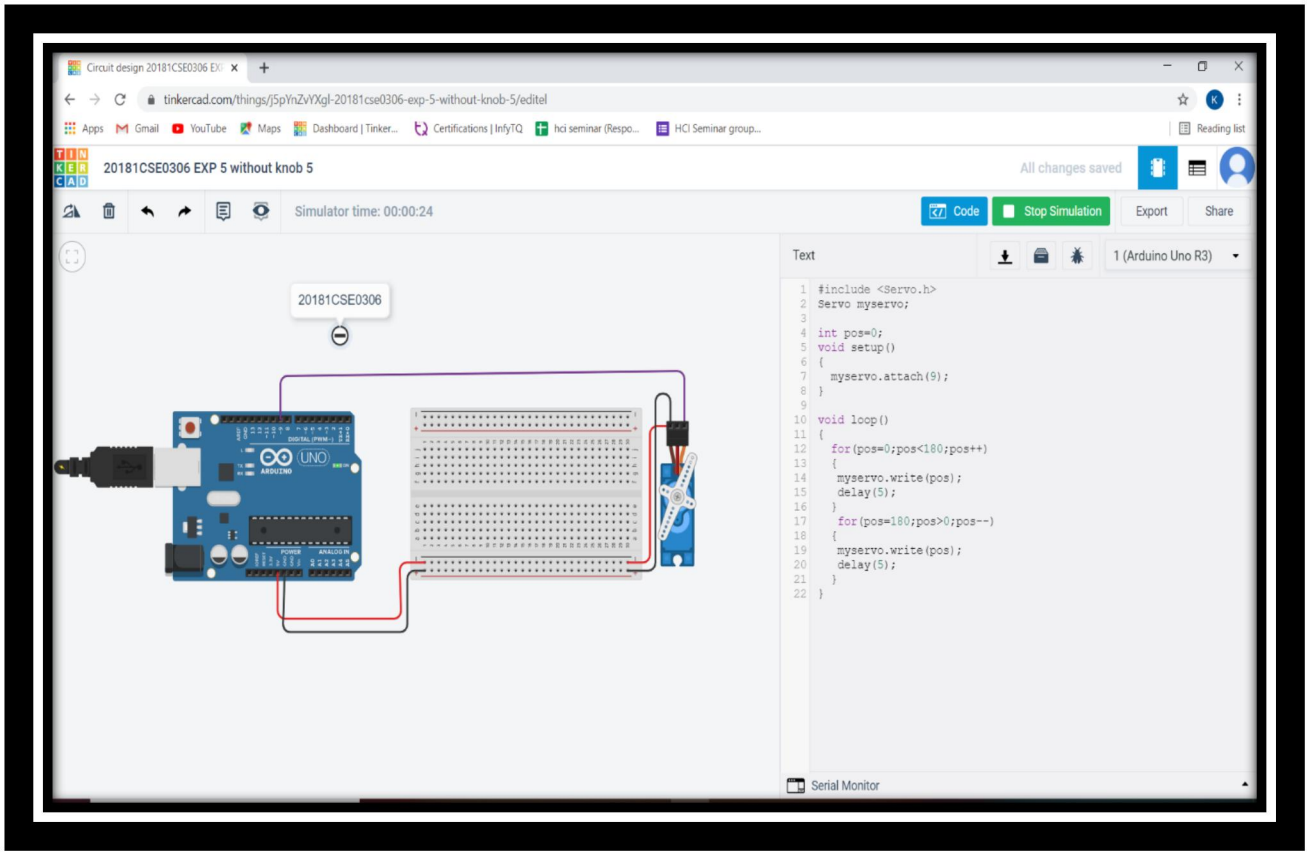
Initial circuit design:



Arduino sketch:

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

int pos=0;
void setup()
{
  myservo.attach(9);
}

void loop()
{
  for(pos=0;pos<180;pos++)
  {
   myservo.write(pos);
   delay(5);
  }
   for(pos=180;pos>0;pos--)
  {
   myservo.write(pos);
   delay(5);
  }
}
```

Output Screenshot:



Outcome: Control of servo motor without using potentiometer was demonstrated successfully.

Implementation of IR and PIR sensor using Arduino and Tinkercad