LAB-04

CSE2020

INTRODUCTION TO CPS LAB

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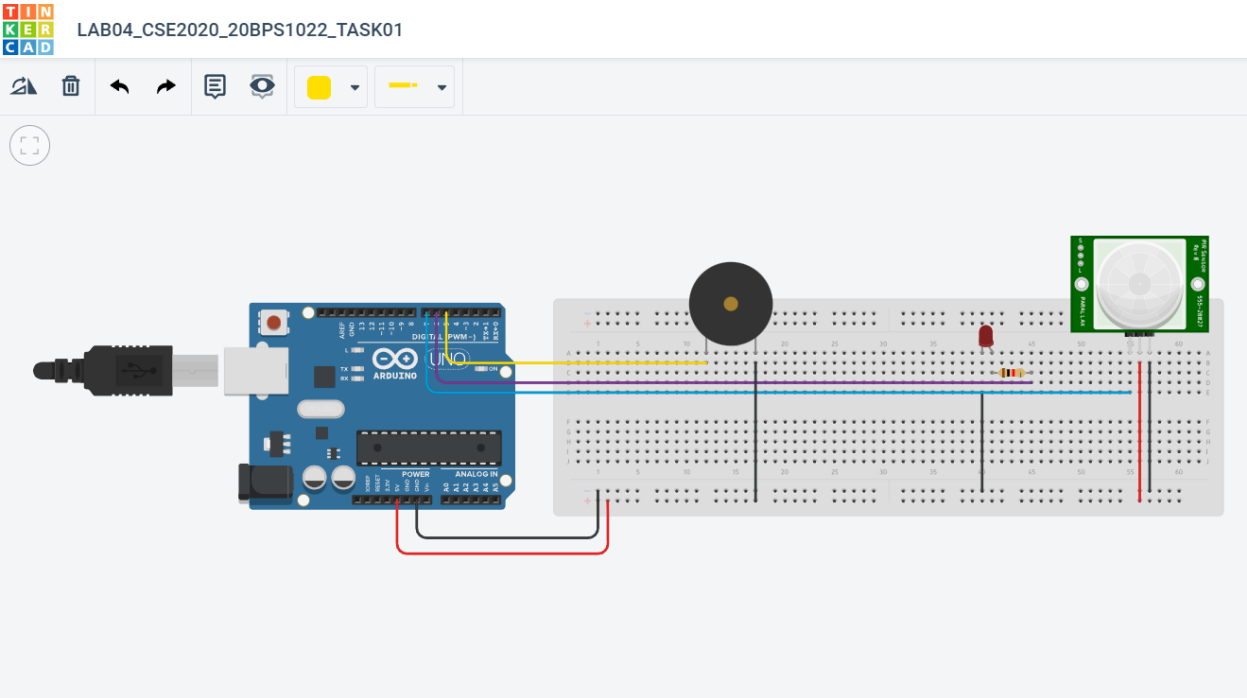
Date: January 31, 2022

Task 1: **Connect Arduino with PIR, Piezo Electric and an LED. When there is change in angle, the sensor and LED turn ON.**

Circuit:

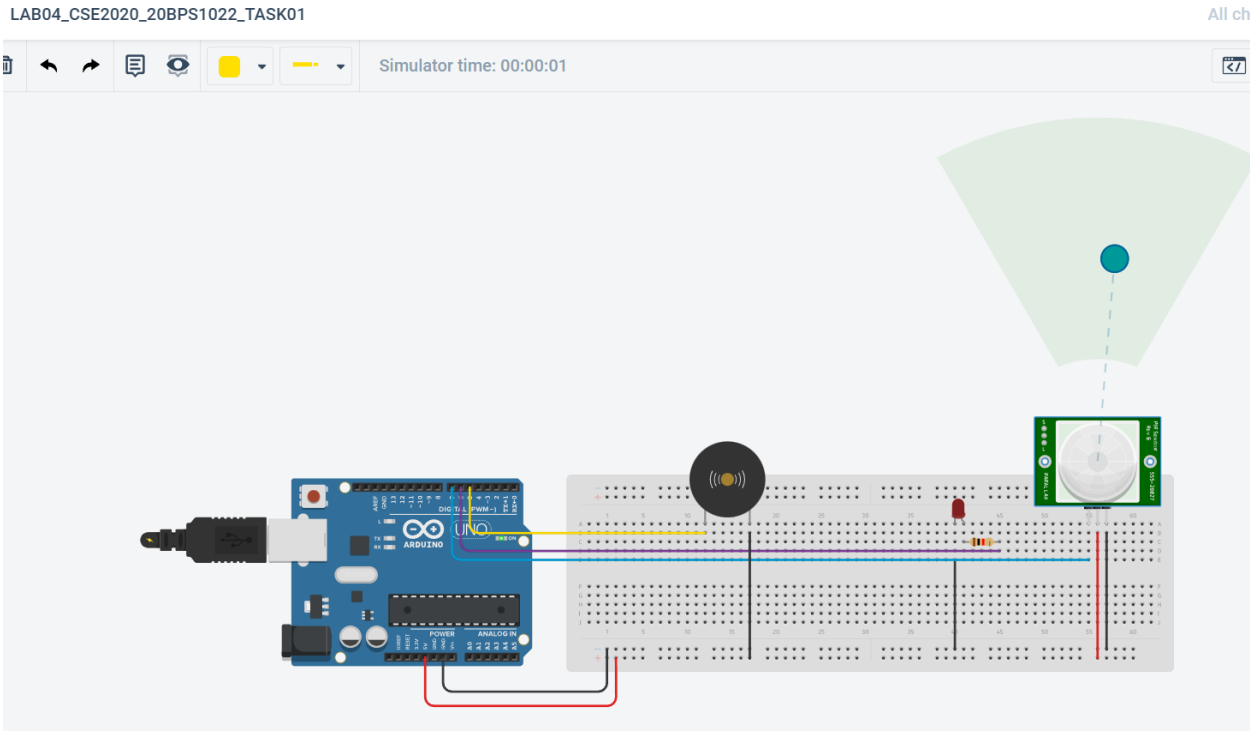


Code:

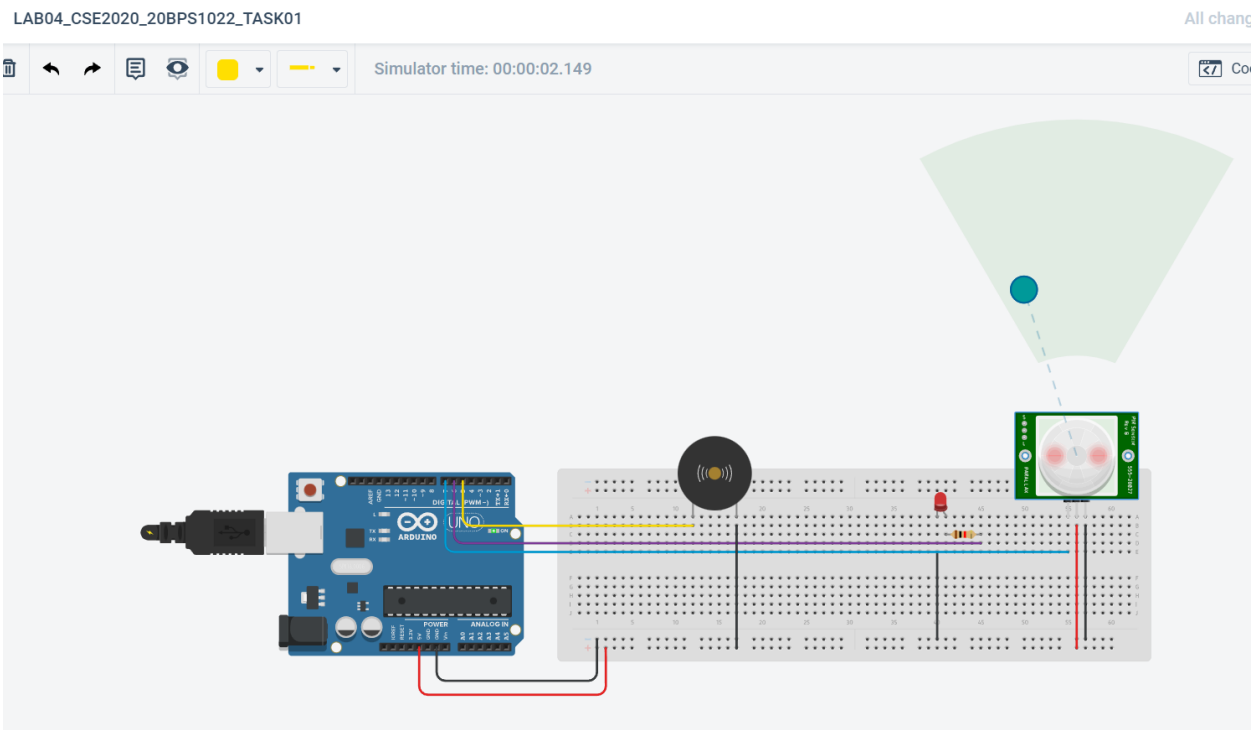
```
const int buzzerPin=5;
const int ledPin=6;
const int motionPin=7;
boolean buzzer_mode=false;
int ledState= LOW;
long previousMillis=0;
long interval=100;
void setup(){
  pinMode(ledPin, OUTPUT);
  pinMode(buzzerPin, OUTPUT);
  pinMode(motionPin, INPUT);
  delay(1000);
}
void loop()
{
  if(digitalRead(motionPin)){
    buzzer_mode=true;
  }
  if(buzzer_mode){
    unsigned long currentMillis=millis();
    if(currentMillis-previousMillis>interval){
      previousMillis=currentMillis;
      if(ledState==LOW)
        ledState=HIGH;
      else
        ledState=LOW;
```

```
digitalWrite(ledPin,ledState);
    }
    tone(buzzerPin,1000);
  }
if(buzzer_mode==false)
{
  noTone(buzzerPin);
  digitalWrite(ledPin, LOW);
}
  else{
    buzzer_mode=false;
  }
}
```

Output:



Object at some angle

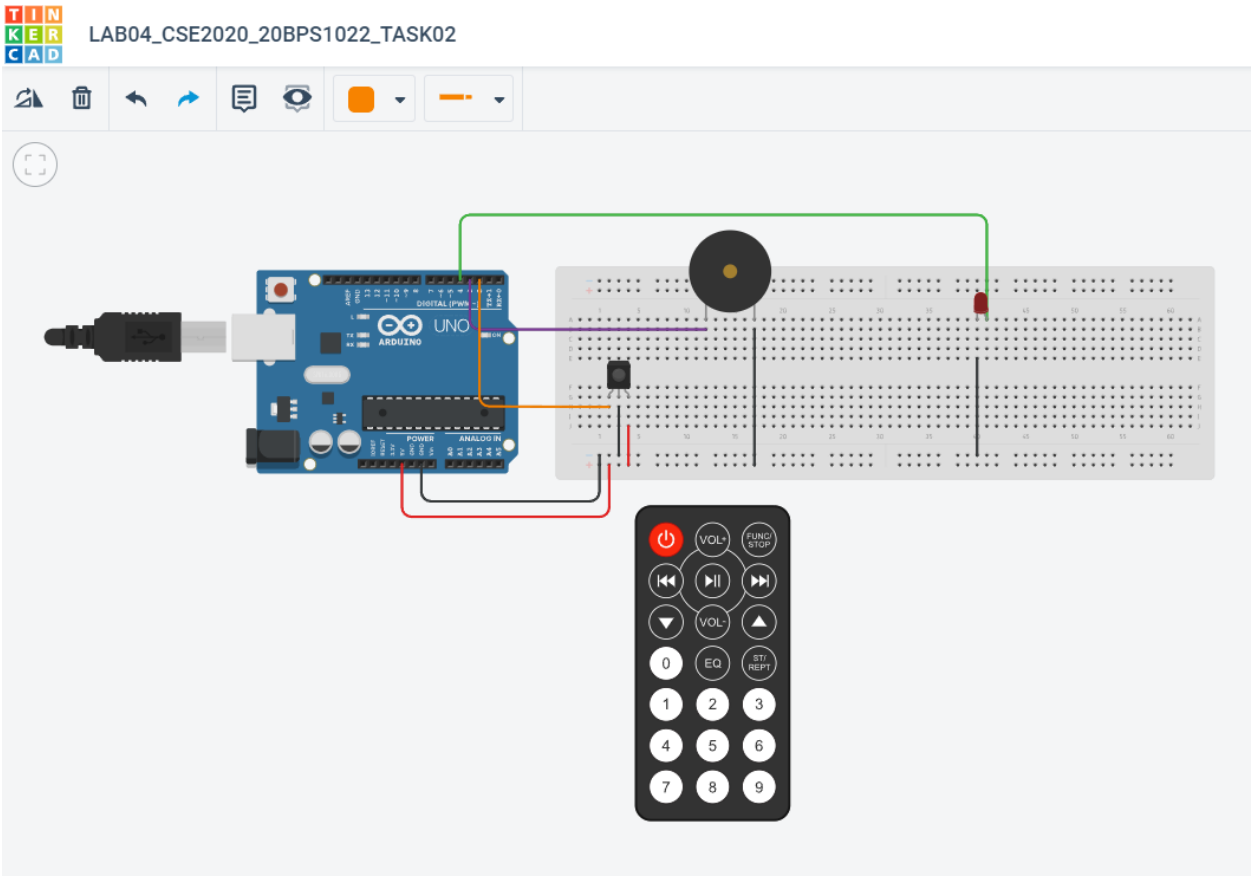


Angle changed; motion detected. LED glows

Link: https://www.tinkercad.com/things/eHr56u2C1v7-lab04cse202020bps1022task01/editel?sharecode=LC81AxSxLVpaa3iIPYP-hs-RXQZV0Om5yQtQv6xebow

Task 2: **Connect Arduino with IR Sensor and using a remote control it and show hexadecimal readings in the serial monitor, piezo.**

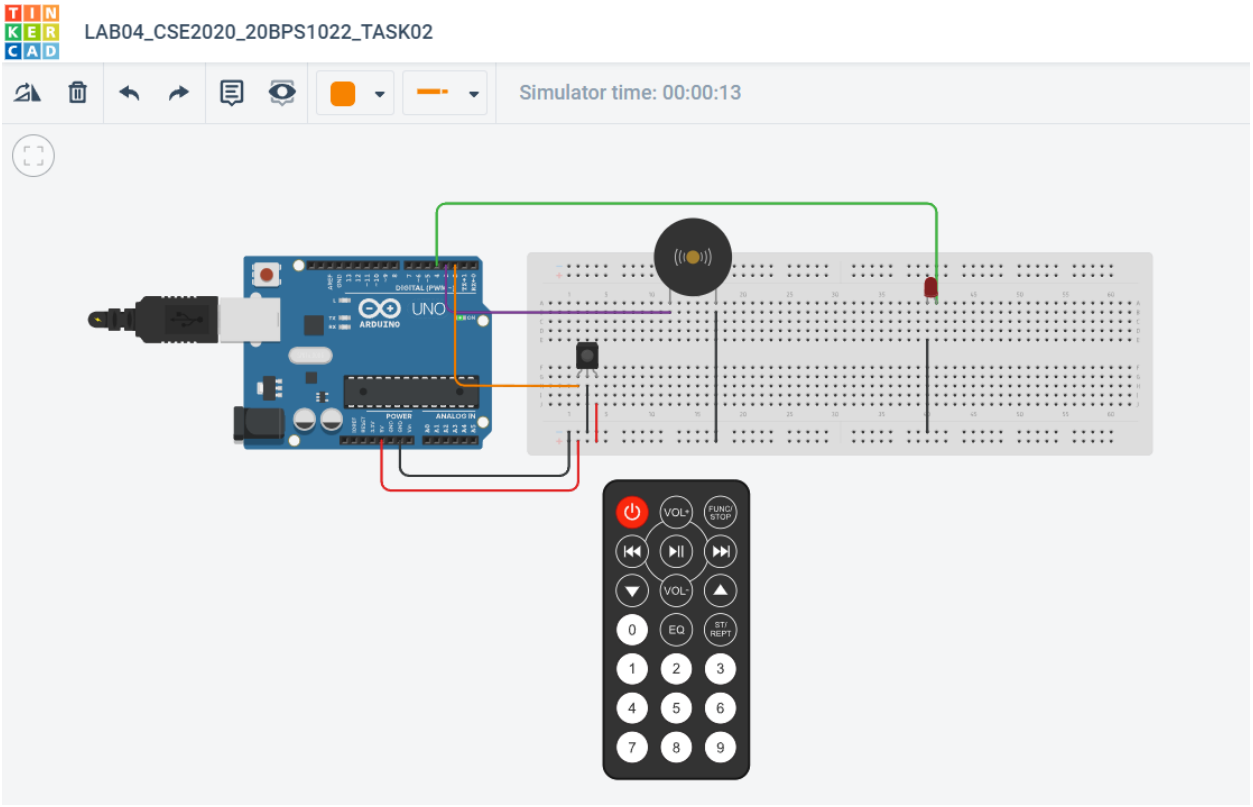
Circuit:

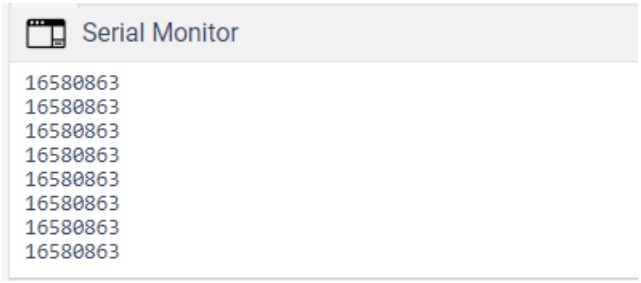


Code:

```
#include<IRremote.h>
int RECV_PIN=2;
IRrecv irrecv(RECV_PIN);
decode_results results;
int piezo=3;
int led=4;
void setup()
{
        Serial.begin(9600);
        irrecv.enableIRIn();
        pinMode(piezo,OUTPUT);
  pinMode(led,OUTPUT);
}
void loop(){

  if (irrecv.decode(&results)){

    long int decCode = results.value;
    Serial.println(results.value);
    digitalWrite(piezo,HIGH);
    digitalWrite(led,HIGH);
        delay(500);
    irrecv.resume();
        }
        digitalWrite(piezo,LOW);
        digitalWrite(led,LOW);
}
```

Output:



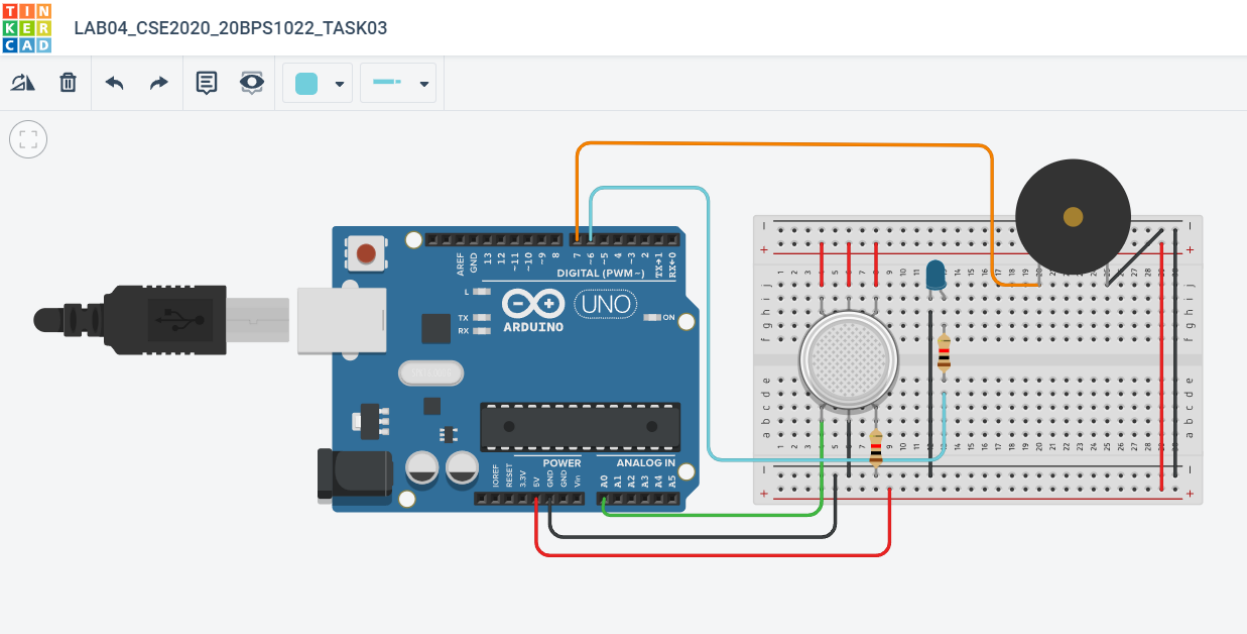


Link:

https://www.tinkercad.com/things/d73O6aq62n5-lab04cse202020bps1022task02/editel?sharecode=bcV9ghZhB56uBA1vG9YccHxovw0E0iAd3ei3ZGT9SxM

Task 3:

Circuit:

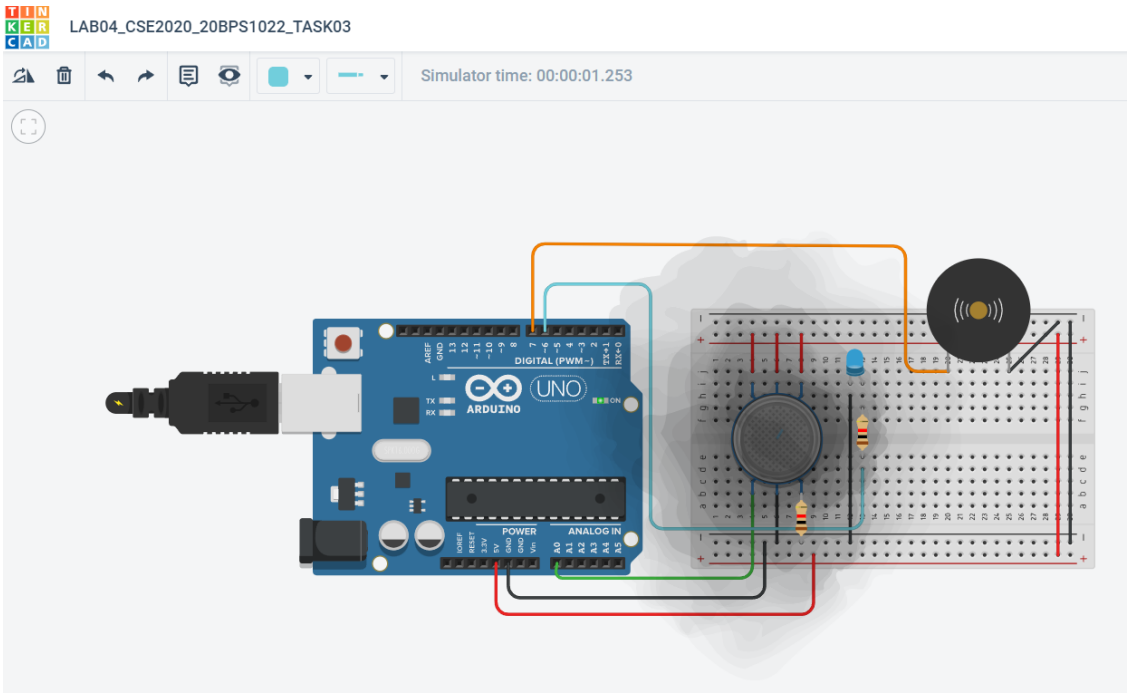


Code:

```
int led=6;
int buzzer=7;
int sensor=A0;
int sensorValue=0;
void setup()
{
 pinMode(led, OUTPUT);
 pinMode(buzzer, OUTPUT);
 pinMode(sensor, INPUT);
 Serial.begin(9600);
}
void loop()
```

```
{
 int sensorValue=analogRead(sensor);
 Serial.println(sensorValue);
 if(sensorValue>300){
 digitalWrite(led, HIGH);
 digitalWrite(buzzer, HIGH);
 }
 else{
 digitalWrite(led, LOW);
 digitalWrite(buzzer, LOW);
 }
}
```

Output:



Link: https://www.tinkercad.com/things/5KpXDA0URaO-lab04cse202020bps1022task03/editel?sharecode=BTnOX16Tuip-PJA3En2sZJMIEgcA6wJvMF5WpMkMqvg

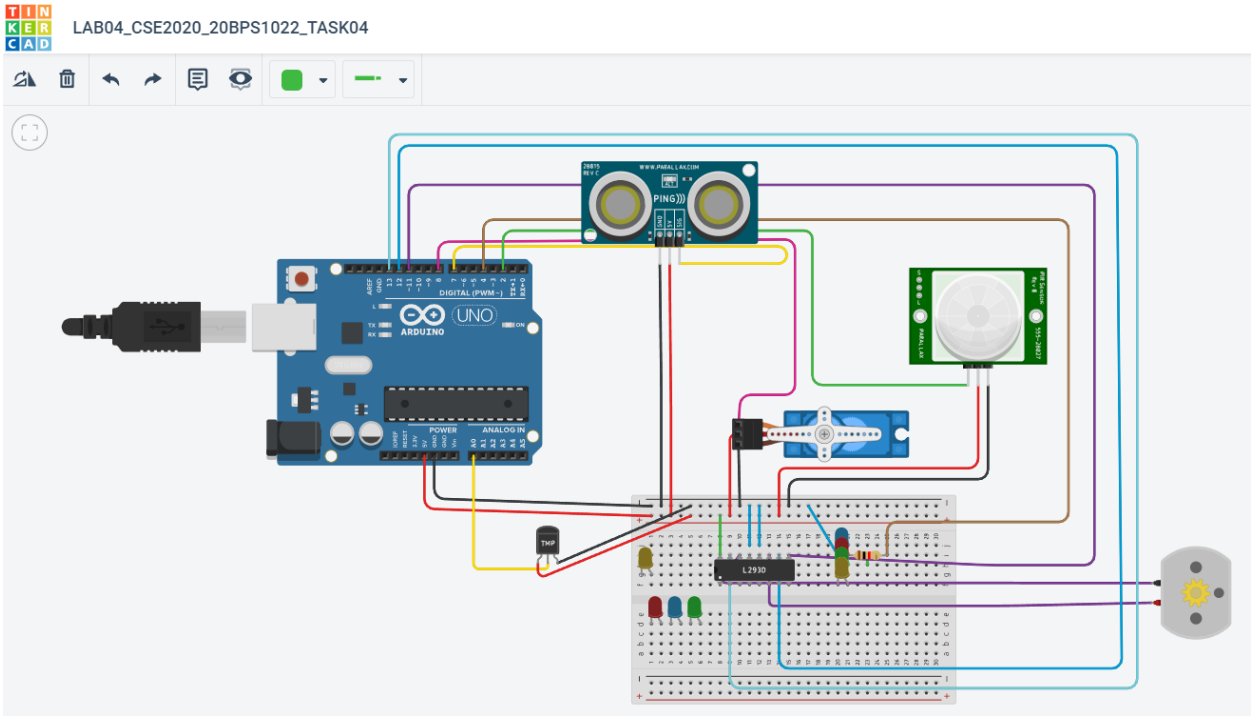
Task 4:

Implement a home automation project in tinker cad.

The following actions are being performed:

i. Control fan
ii. Home door locking system
iii. If there is any movement in the room, the light (LED) will immediately turn on.

Circuit:



Code:

```
#include<Servo.h>

const int pingPin = 7;

int servoPin = 8;

Servo servo1;

void setup() {

  // initialize serial communication:

  Serial.begin(9600);

  servo1.attach(servoPin);
```

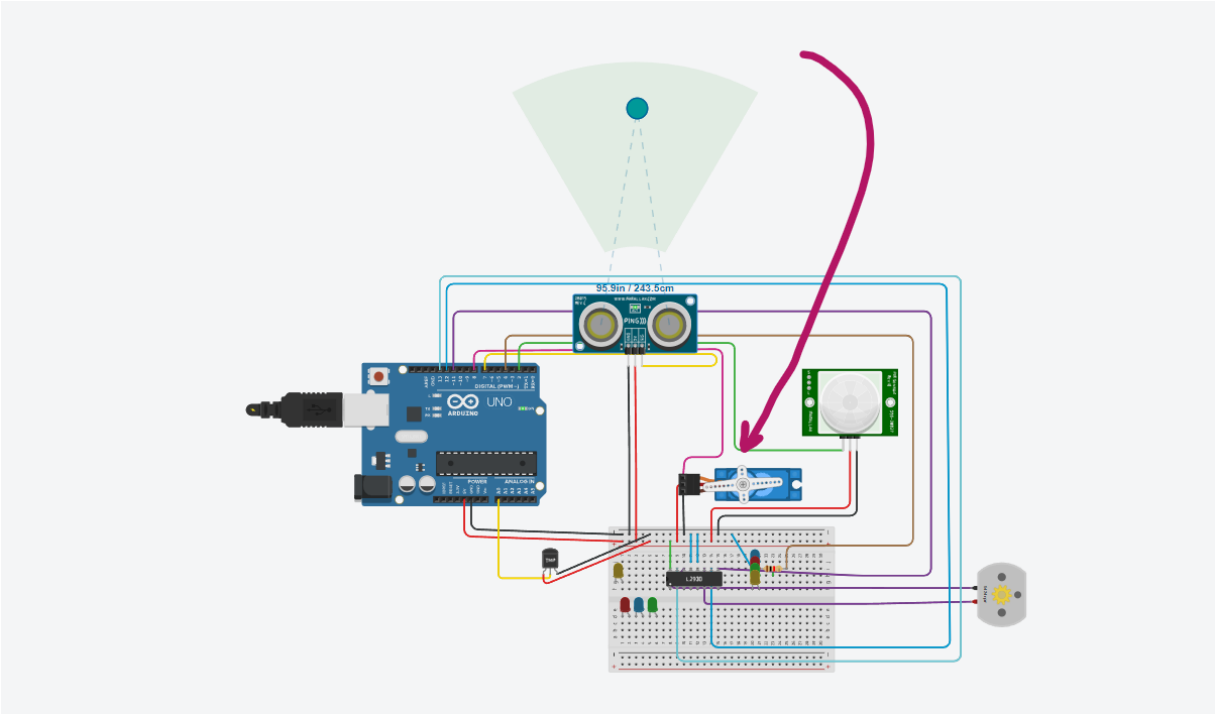
```
  pinMode(2,INPUT);
  pinMode(4,OUTPUT);
  pinMode(11,OUTPUT);
  pinMode(12,OUTPUT);
  pinMode(13,OUTPUT);
  pinMode(A0,INPUT);
  digitalWrite(2,LOW);
  digitalWrite(11,HIGH);
}
void loop() {
  long duration, inches, cm;
  pinMode(pingPin, OUTPUT);
  digitalWrite(pingPin, LOW);
  delayMicroseconds(2);
  digitalWrite(pingPin, HIGH);
  delayMicroseconds(5);
  digitalWrite(pingPin, LOW);
  // The same pin is used to read the signal from the PING))): a HIGH pulse
  // whose duration is the time (in microseconds) from the sending of the ping
  // to the reception of its echo off of an object.
  pinMode(pingPin, INPUT);
  duration = pulseIn(pingPin, HIGH);
  // convert the time into a distance
  inches = microsecondsToInches(duration);
  cm = microsecondsToCentimeters(duration);
  //Serial.print(inches);
  //Serial.print("in, ");
```

```
//Serial.print(cm);
//Serial.print("cm");
//Serial.println();
//delay(100);
servo1.write(0);
if(cm < 40)
{
  servo1.write(90);
  delay(2000);
}
else
{
  servo1.write(0);
}
// PIR with LED starts
int pir = digitalRead(2);
if(pir == HIGH)
{
  digitalWrite(4,HIGH);
  delay(1000);
}
else if(pir == LOW)
{
  digitalWrite(4,LOW);
}
//temp with fan
float value=analogRead(A0);
```

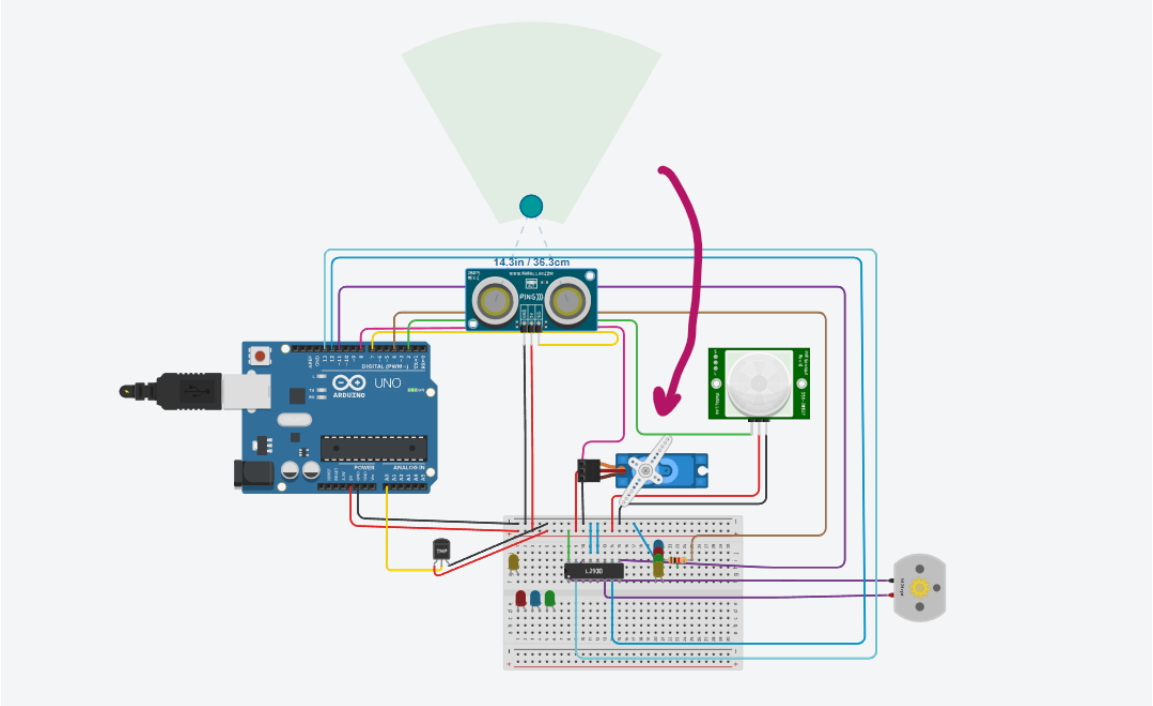
```
  float temperature=value*0.48;
  Serial.println("temperature");
  Serial.println(temperature);

  if(temperature > 20)
  {
    digitalWrite(12,HIGH);
    digitalWrite(13,LOW);
  }
  else
  {
    digitalWrite(12,LOW);
    digitalWrite(13,LOW);
  }
}
long microsecondsToInches(long microseconds) {
  return microseconds / 74 / 2;
}
long microsecondsToCentimeters(long microseconds) {
  return microseconds / 29 / 2;
}
```

Output:

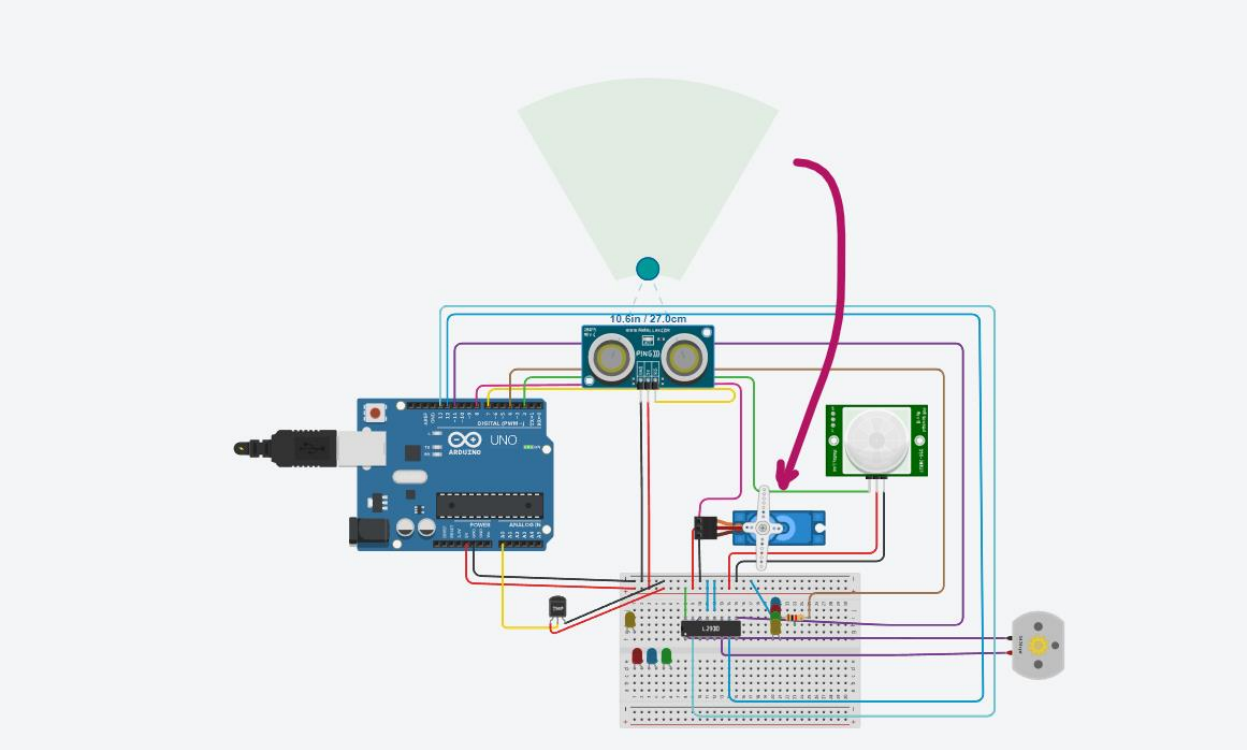
Opening/Closing Door:



Door is closed

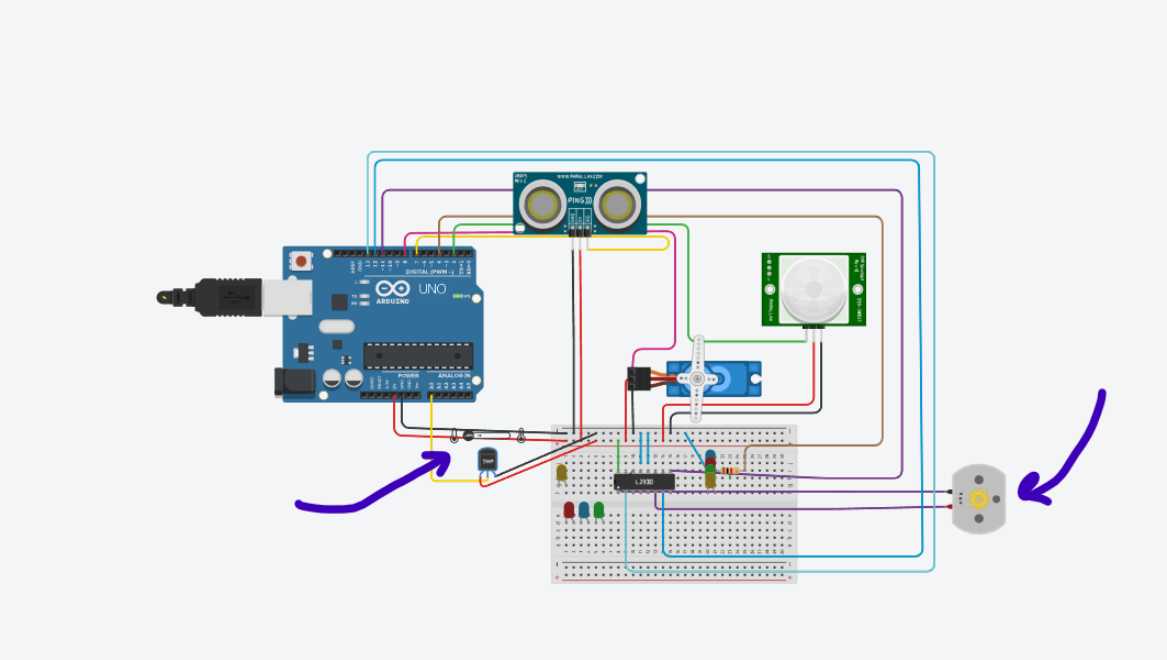


Door is opening

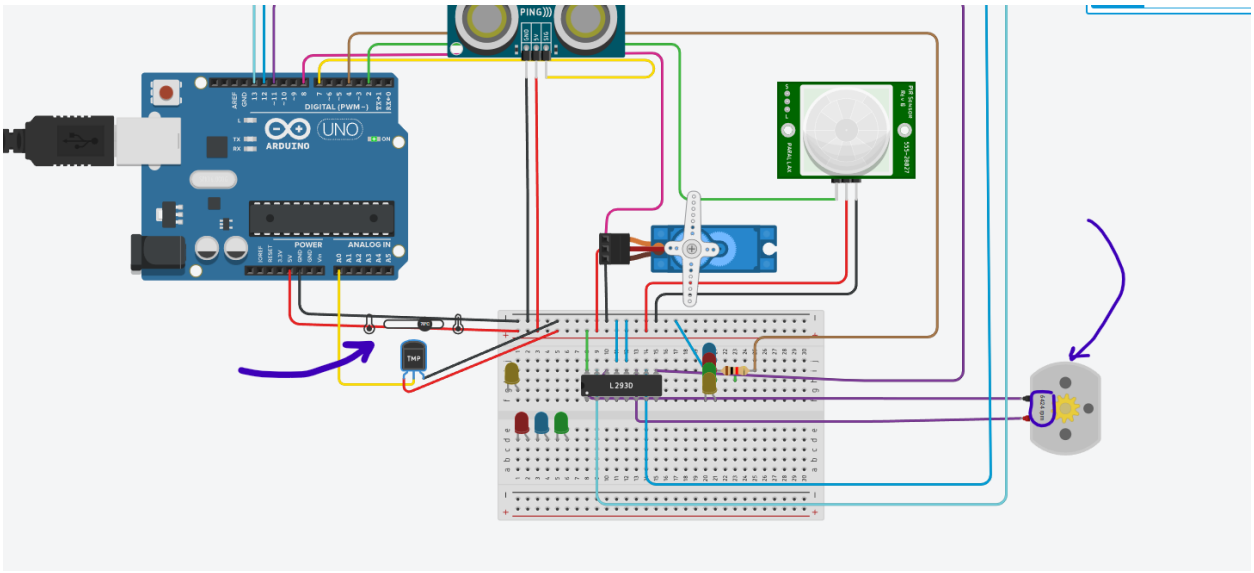


Door is open

Turning FAN ON/OFF:

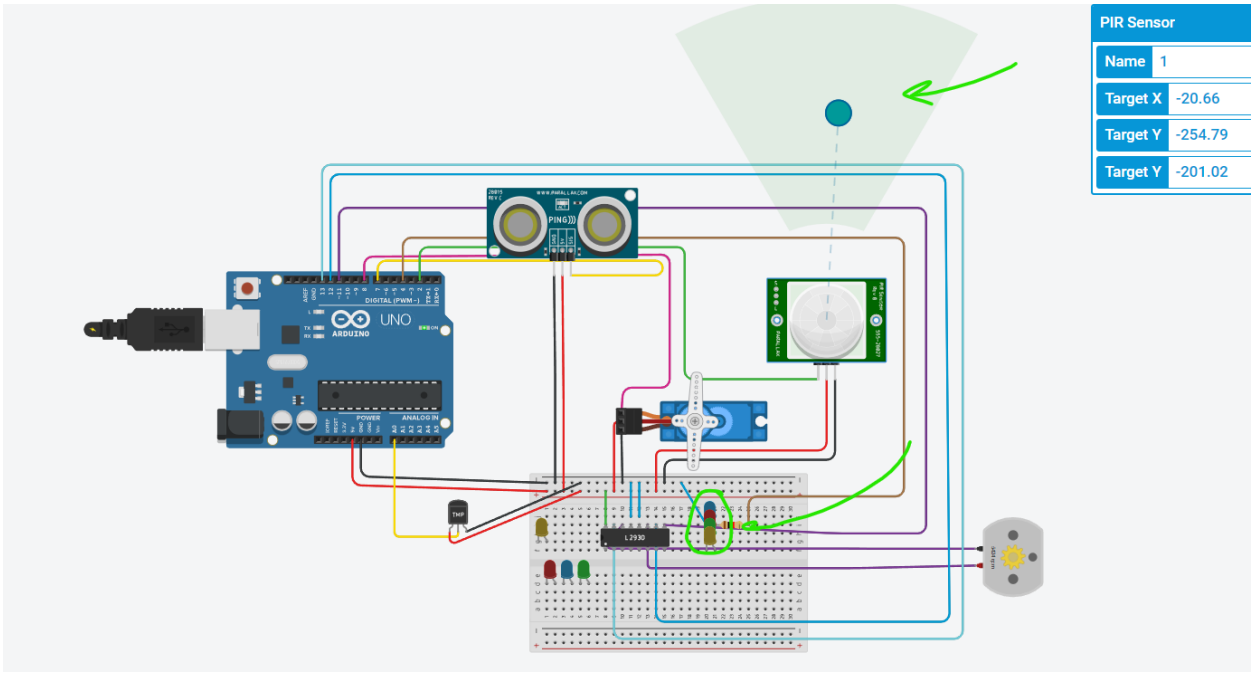


Low temperature so Fan OFF

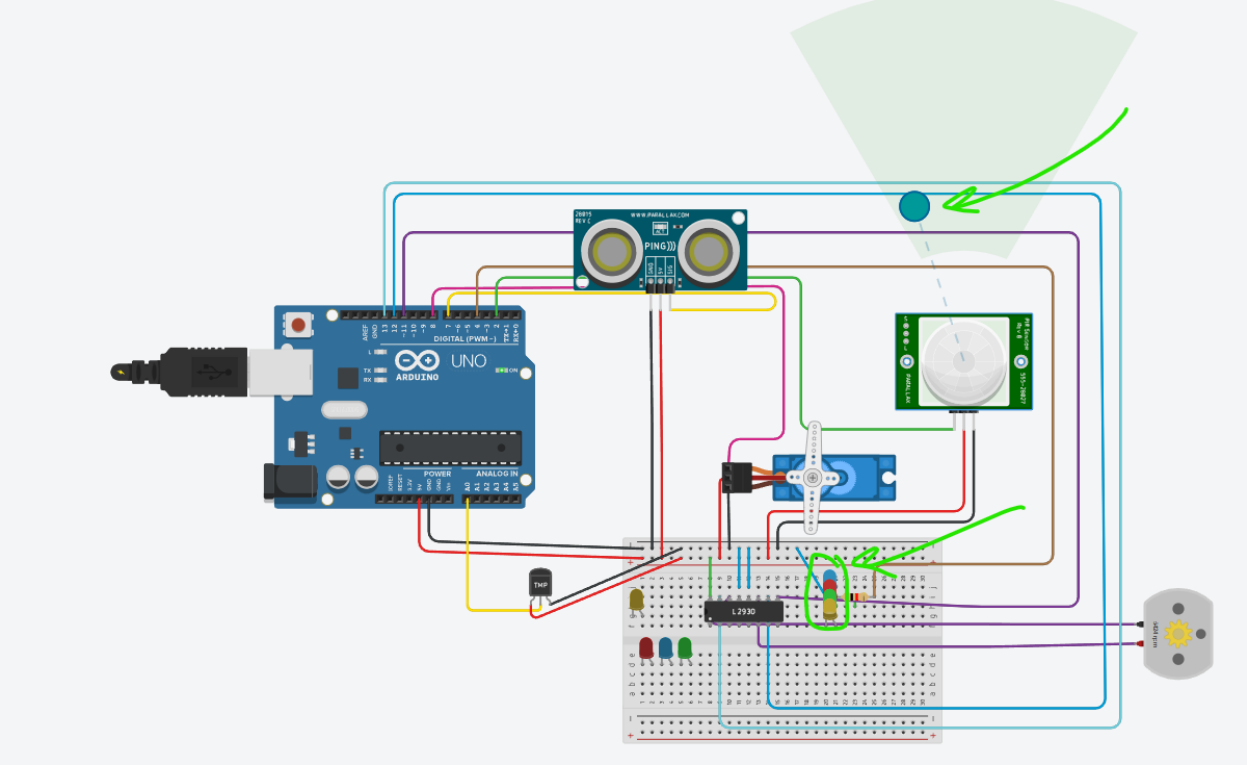


Temperature rose FAN turned ON

Automatic Lights:



No motion in room, so lights OFF



Motion in room, lights turned ON

Link:

https://www.tinkercad.com/things/hkK8ynEAE4J-lab04cse202020bps1022task04/editel?sharecode=vAndfCBFow5lOQeFygbYHtRNKCAvJ8LoBVN0bA_npR0

Result:

All the circuits were successfully built as required.