Colour Sensor

BY USING IR SENSOR

IEEE BUB SB

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AGENDA

- Defining Color Sensors

- Introduction to Infrared (IR) Sensors

- Utilizing IR Sensors in Color Detection Systems

- Advantages and Disadvantages of IR Sensors

AGENDA

- Components are involved.

- Tinkercad module.

- Arduino's code

COLOUR SENSOR

A colour sensor is a type of "photoelectric sensor" which emits light from a transmitter, and then detects the light reflected back from the detection object with a receiver.

A colour sensor can detect the received light intensity for red, blue and green respectively, making it possible to determine the colour of the target object.

·Color sensors detect RGB values by receiving ambient light using a photodiode.
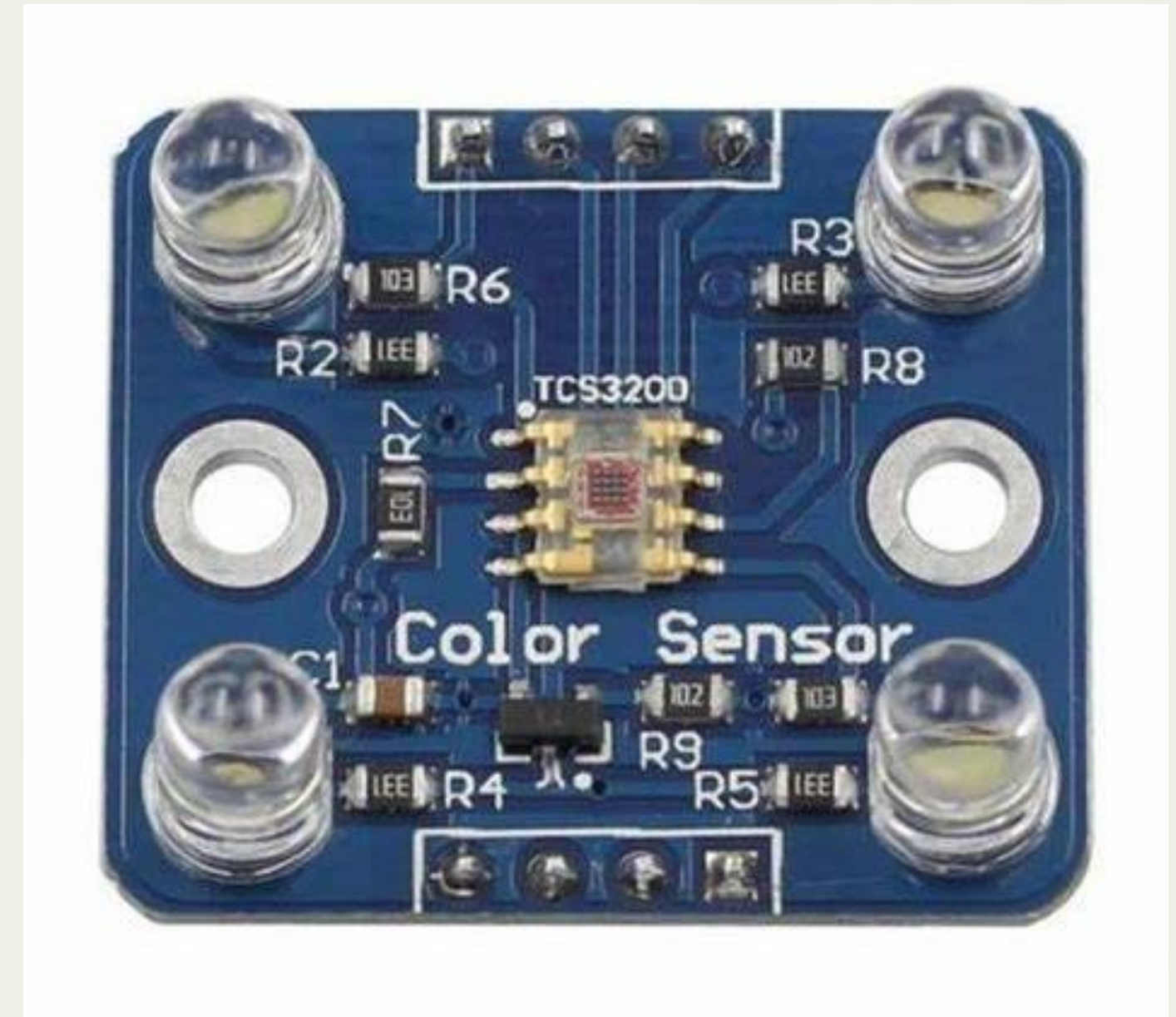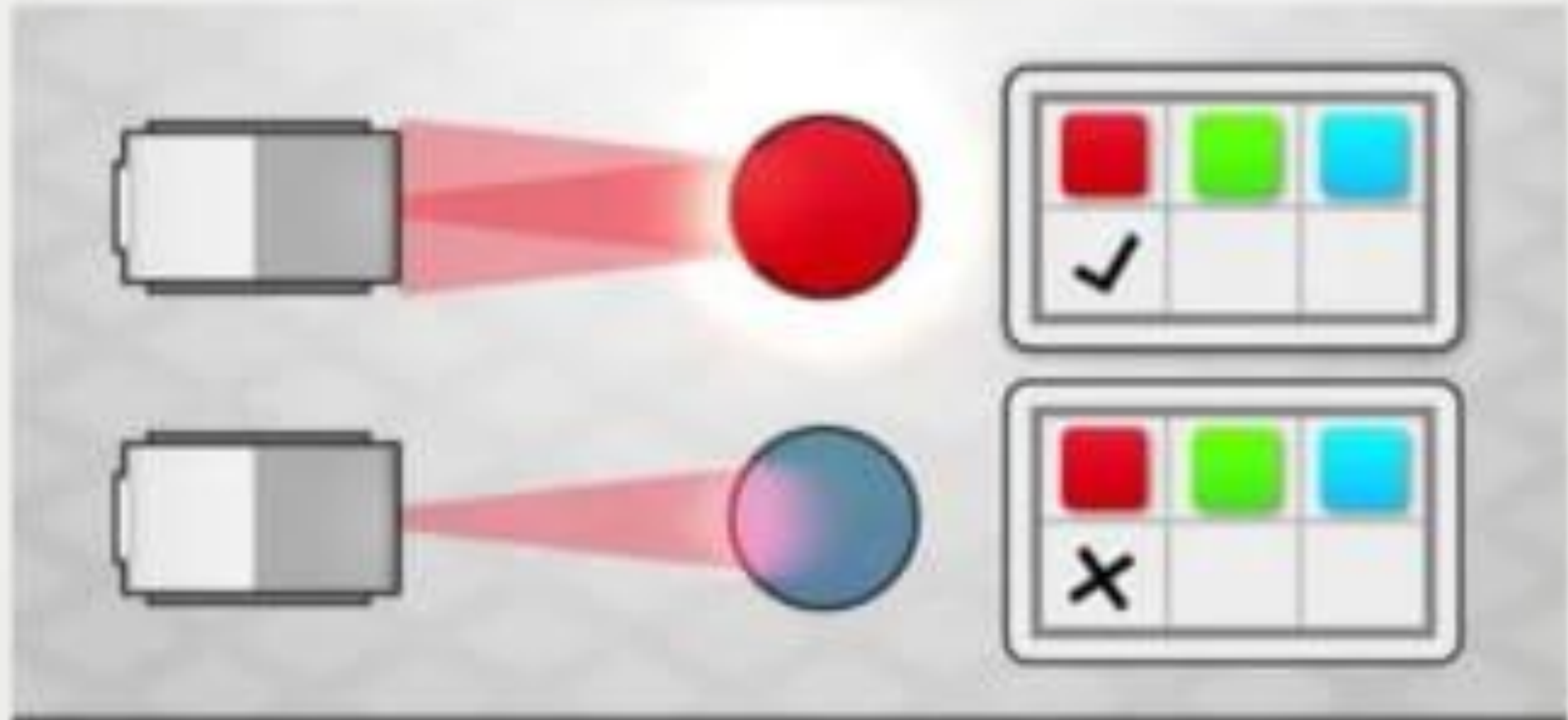
COLOUR SENSOR

The sensor identifies the color of the material typically in the RGB scale, categorizing it as red, blue, or green. Moreover, these sensors are furnished with filters to eliminate unwanted infrared (IR) and ultraviolet (UV) light.

Applied to measure and detect surface colors, these sensors find extensive utility across industrial, medical, and security systems.

COLOR SENSOR MECHANISM:

WORKING PRINCIPLE OF A COLOUR SENSOR:

Colour sensors contain a white light emitter to illuminate the surface. Three filters with wavelength sensitivities at 580nm, 540nm, 450nm to measure the wavelengths of red, green and blue colors respectively.

Based on the activation of these filters, the color of the material is categorized. A light to voltage converter is also present in the sensor. The sensor responds to color by generating a voltage proportional to the detected color.

INTROTO IR SENSOR

In daily life and various industries, Infrared (IR) technology serves diverse functions. For instance, televisions incorporate IR sensors to interpret signals sent from remote controls. The primary advantages of IR sensors include their minimal power consumption, uncomplicated design, and user-friendly attributes. Importantly, IR signals are imperceptible to the naked eye.
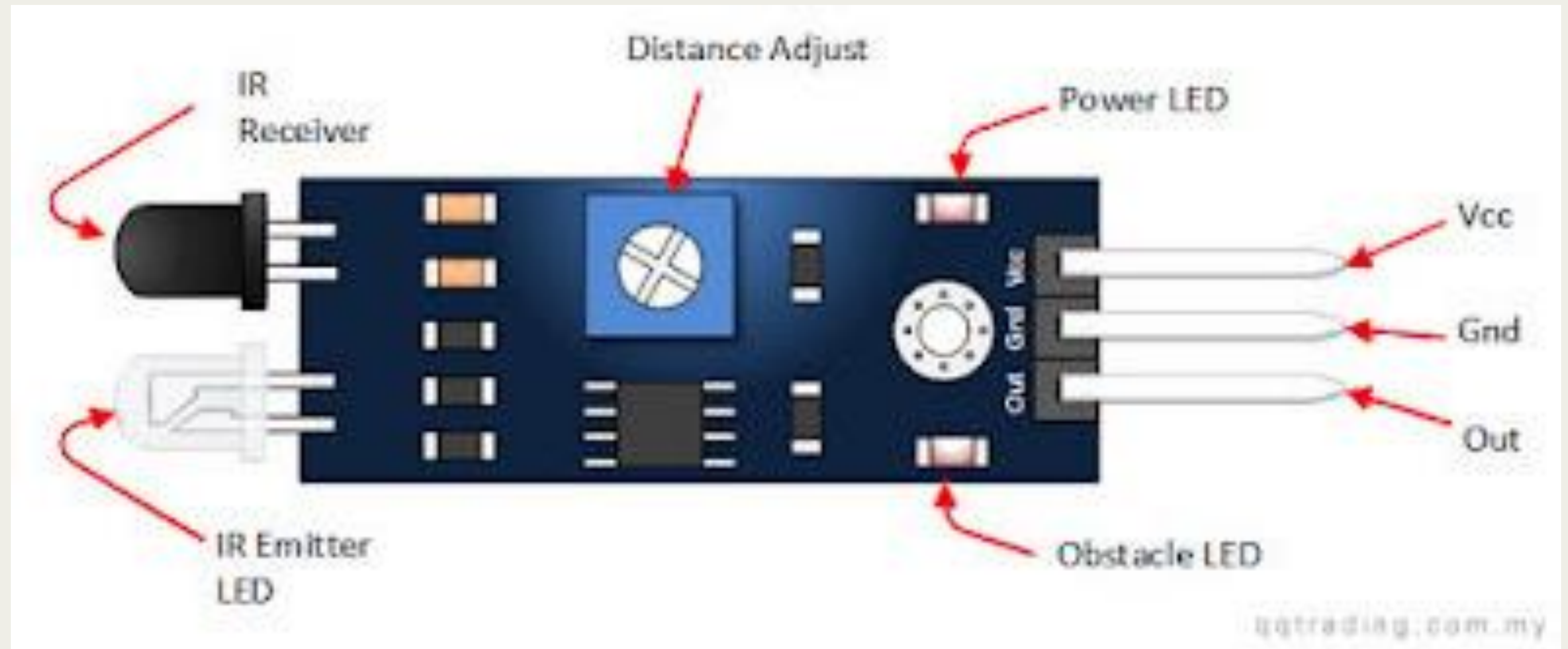
IR SENSOR

An infrared sensor circuit is a fundamental and commonly utilized sensor module in electronic devices. Operating similar to human visual senses, it is designed to detect obstacles, making it a prevalent application in real-world scenarios.

IR SENSOR :

These types of radiations are invisible to our eyes, which can be detected by an infrared sensor. The emitter is simply an IR LED ([Light Emitting Diode](#)) and the detector is simply an IR photodiode that is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.
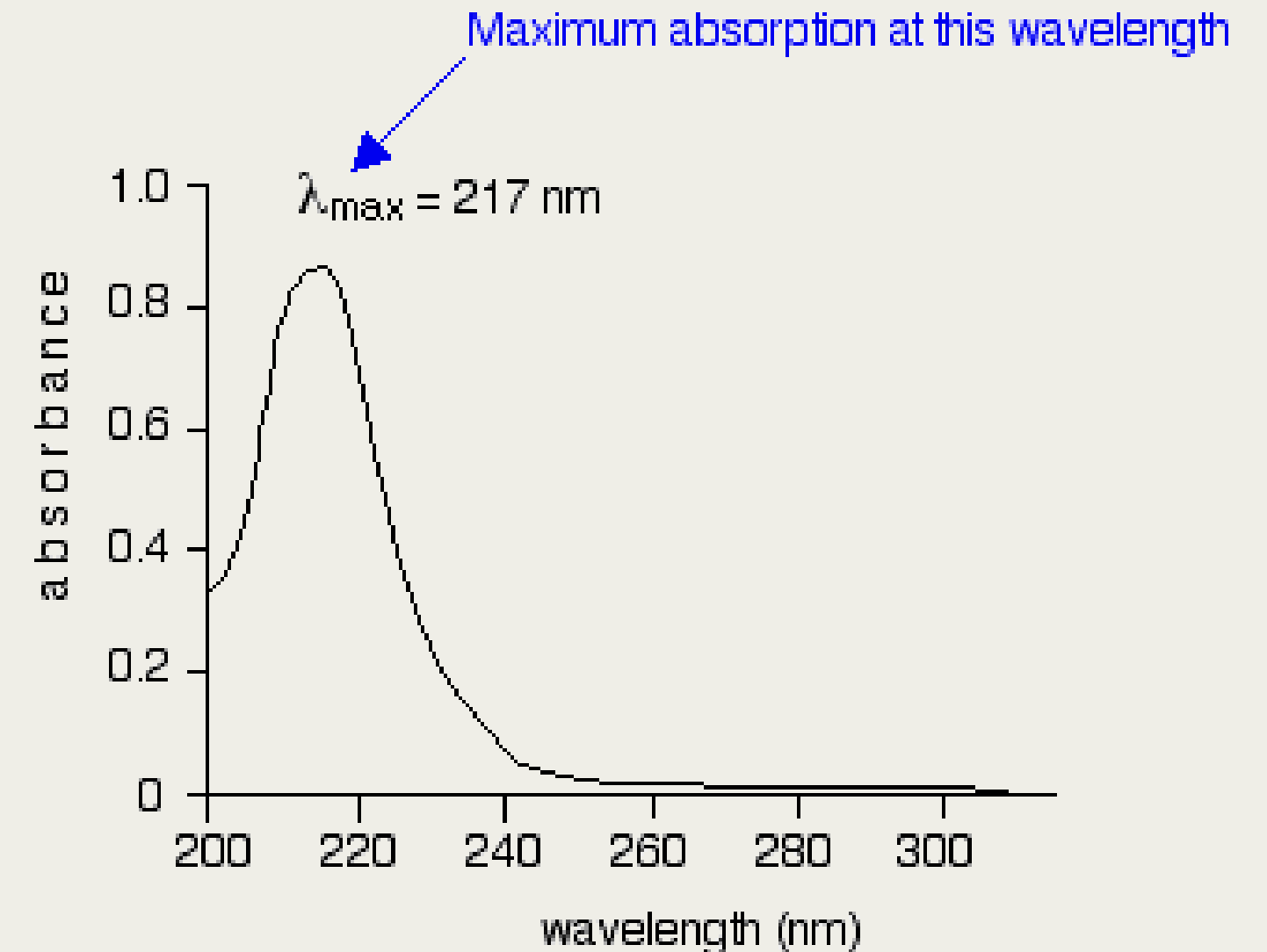
IR SENSOR :

HOW DOES AN IR SENSOR DETECT COLOR?

- An IR sensor is a device that can emit or detect infrared radiation, which is invisible to the human eye.
- An IR sensor consists of an IR-LED (transmitter) and a photo diode (receiver), which measure the voltage change due to the reflected light.

Maximum absorption at this wavelength

$\lambda_{max} = 217$ nm

absorbance

1.0
0.8
0.6
0.4
0.2
0

200 220 240 260 280 300

wavelength (nm)

HOW DOES AN IR SENSOR DETECT COLOR?

- by measuring the amount of reflection from different colored surfaces, which have different levels of absorption and reflection of infrared light.
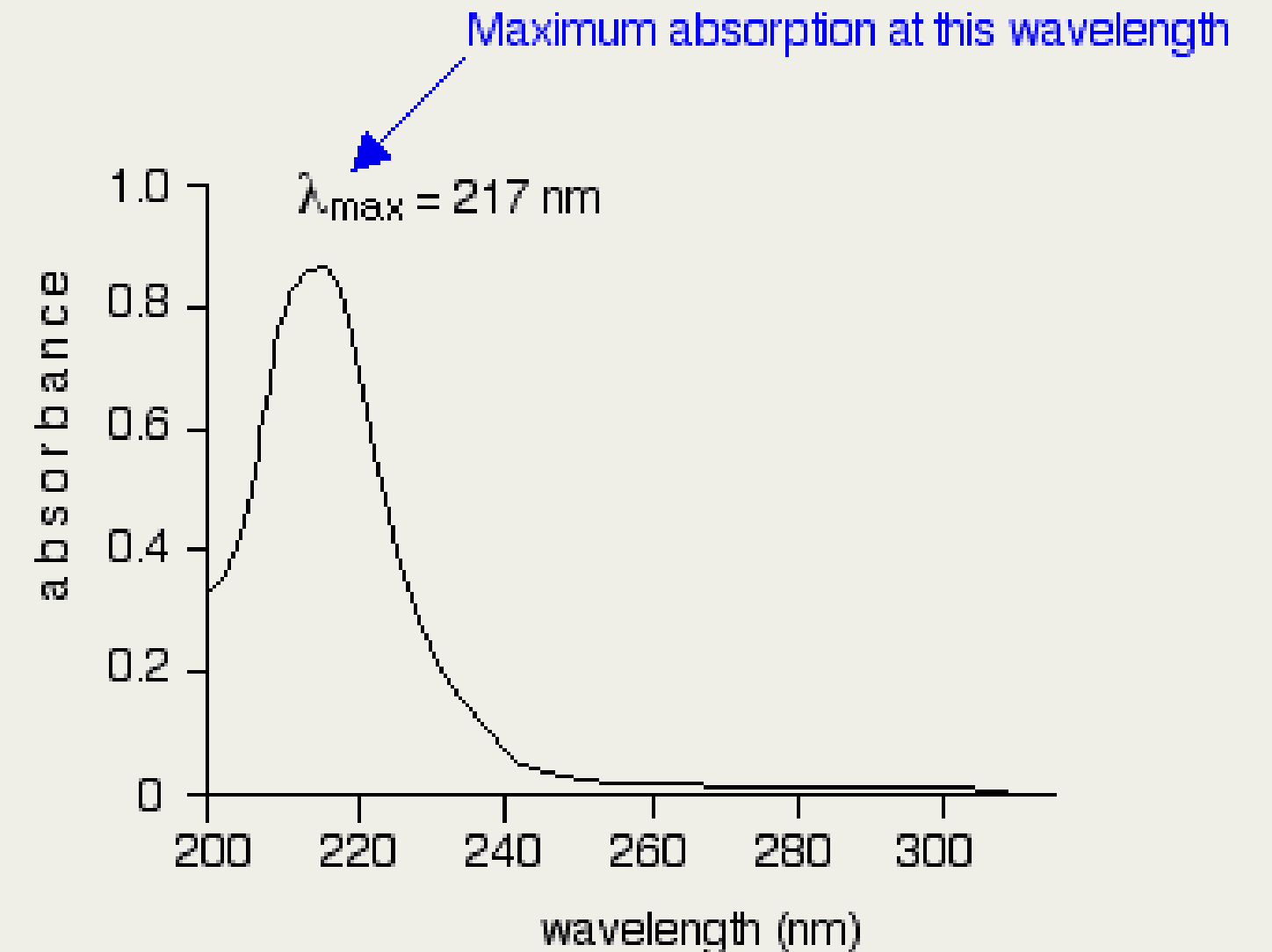
ADVANTAGE

- It uses less power
- The detection of motion is possible in the presence or absence of light approximately with equal reliability.
- They do not need contact with the object for detection
- There is no data leakage because of the ray direction
- These sensors are not affected by oxidation & corrosion
- Noise immunity is very strong

DISADVANTAGES

- Line of sight is required
- Range is limited
- These can be affected by fog, rain, dust, etc
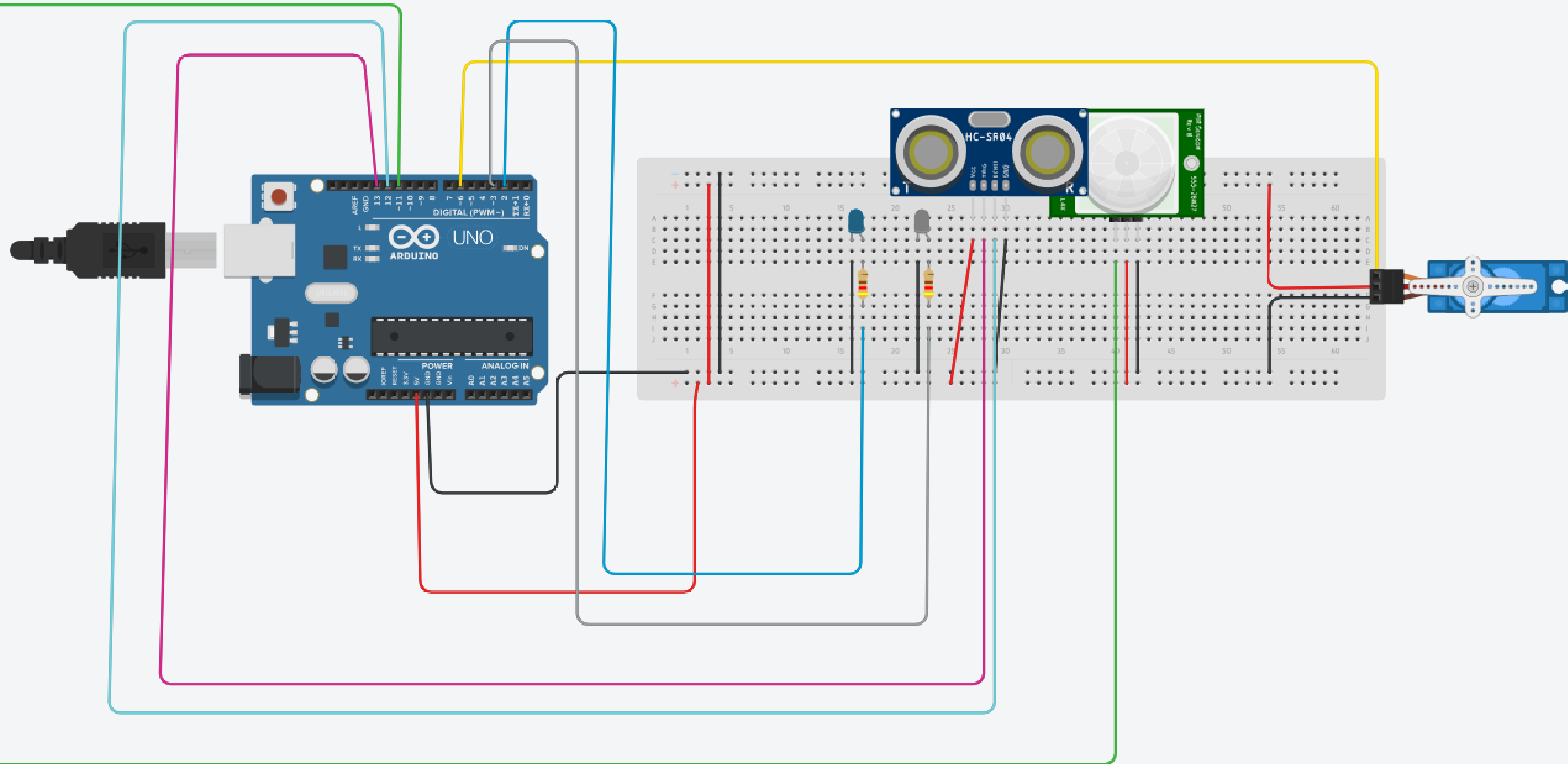- Less data transmission rate

- Jumpers
- LEDs
- Ultrasonic Sensors
- Resistors
- Servo Motor
- Arduino Uno
- IR Sensor

Servo Motor Mechanism

• Servo motor is an electrical device which can be used to rotate objects (like robotic arm) precisely.

• Servo motor consists of DC motor with error sensing negative feedback mechanism. This allows precise control over angular velocity and position of motor. In some cases, AC motors are used.

• It is a closed loop system where it uses negative feedback to control motion and final position of the shaft.

• It is not used for continuous rotation like conventional AC/DC motors.

• It has rotation angle that varies from 0° to 180°.

TINKER CAD MODEL :

CODE:

```cpp
#include <Servo.h>

#define irpin 11
#define ledWhite 3
#define ledBlack 2
#define servo_pin 6
#define echo 12
#define trig 13

Servo servo_motor;


void setup(){

  pinMode(ledWhite,OUTPUT);
  pinMode(irpin,INPUT);
  pinMode(ledBlack,OUTPUT);

  pinMode(trig,OUTPUT);   //transmit infra_red
  pinMode(echo,INPUT);   // receive infra_red to calculate distance

  servo_motor.attach(servo_pin);

  //Serial.begin(9600);


}
```

CODE:

```
26
27  }
28
29  void loop(){
30
31      int ir_read=digitalRead(irpin);
32
33    ultrasonic(ir_read);
34
35  }
36
37
```

CODE:

```
void ultrasonic(int ir_read){

  digitalWrite(trig,HIGH);
  delayMicroseconds(10);

  digitalWrite(trig,LOW);

  int duration=pulseIn(echo,HIGH);

  int distance=duration*0.0343/2;

    //Serial.println(distance);

  if(distance<=20){
    servo(ir_read);
  }

  else{

   // initial angle = 90
  servo_motor.write(90);
  delay(100);
  }


}
```

CODE:

```
//ir_Sensor reading

int ir_sensor(int ir_read){

  int flag=0;

  if(ir_read==HIGH){

    digitalWrite(ledWhite,HIGH);
    digitalWrite(ledBlack,LOW);
    flag=1;
  }
  else{

    digitalWrite(ledBlack,HIGH);
    digitalWrite(ledWhite,LOW);
    flag=0;
  }

  return flag;

}
```

CODE:

```
//the direction of the Servo depend on color object

void servo(int ir_read){

    //if ir_sensor detect black object
    //left
  if( ir_sensor(ir_read)==0){
    servo_motor.write(180);
    delay(500);

  }

    // if ir_sensor detect white object
    // right
  else if( ir_sensor(ir_read)==1){
    servo_motor.write(0);
    delay(500);



  }

}
```

Thank you!

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