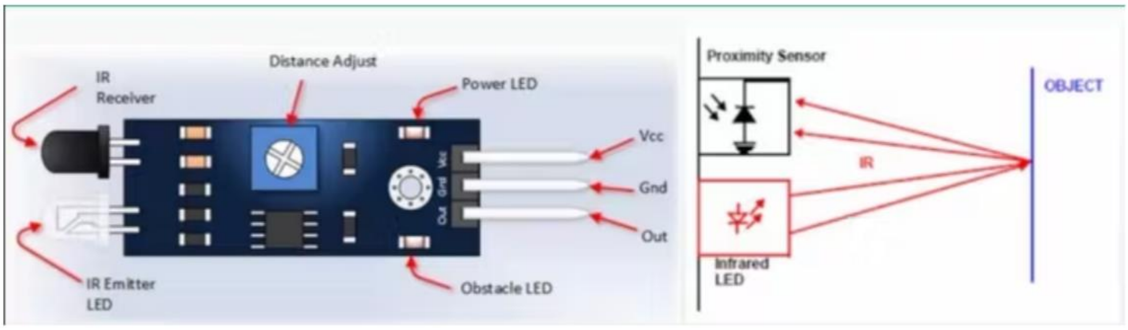
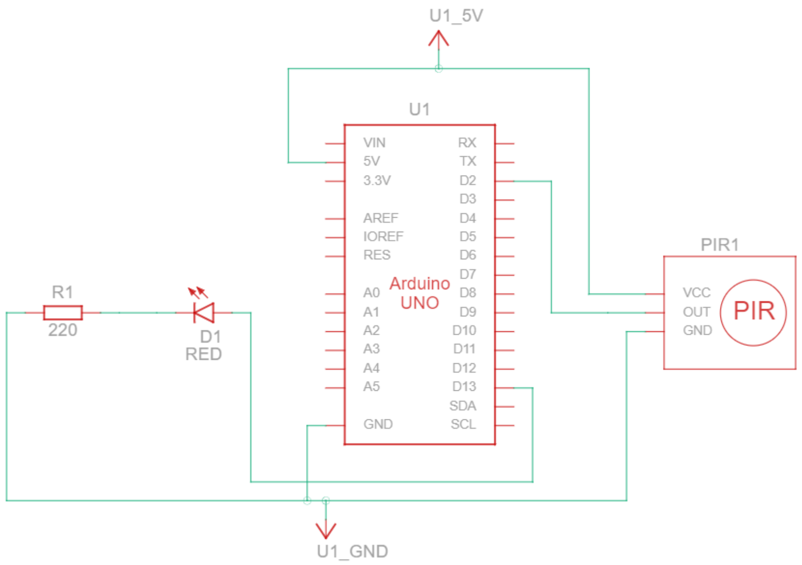
B) INFRARED SENSOR:

THEORY:

A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. IR sensors are commonly used in security alarms and automatic lighting applications.



CIRCUIT DIAGRAM:

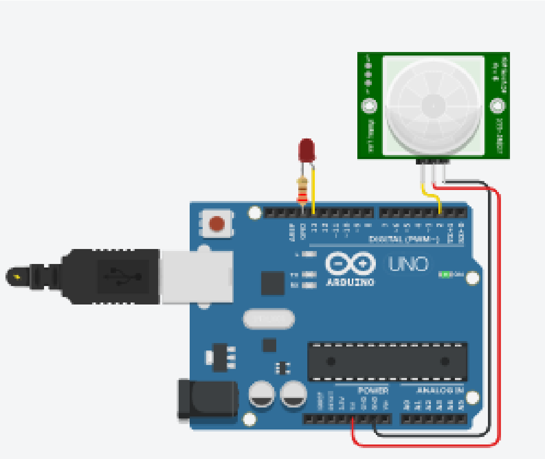


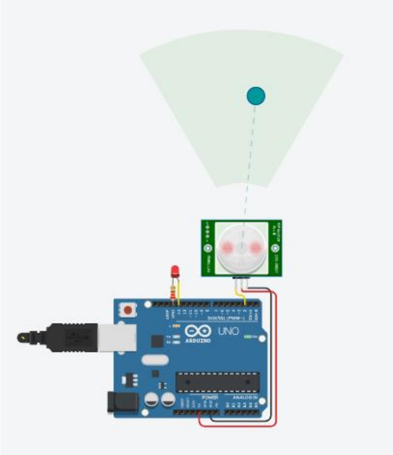
SOURCE CODE:

```
int buttonState = 0;

void setup()

{

  pinMode(2, INPUT);

  pinMode(LED_BUILTIN, OUTPUT);

}

void loop()
```

```
{
  // read the state of the pushbutton
  buttonState = digitalRead(2);
  // check if pushbutton is pressed. if it is, the
  // button state is HIGH
  if (buttonState == HIGH) {
    digitalWrite(LED_BUILTIN, HIGH);
  } else {
    digitalWrite(LED_BUILTIN, LOW);
  }
  delay(10); // Delay a little bit to improve simulation performance
}
```

OUTPUT:





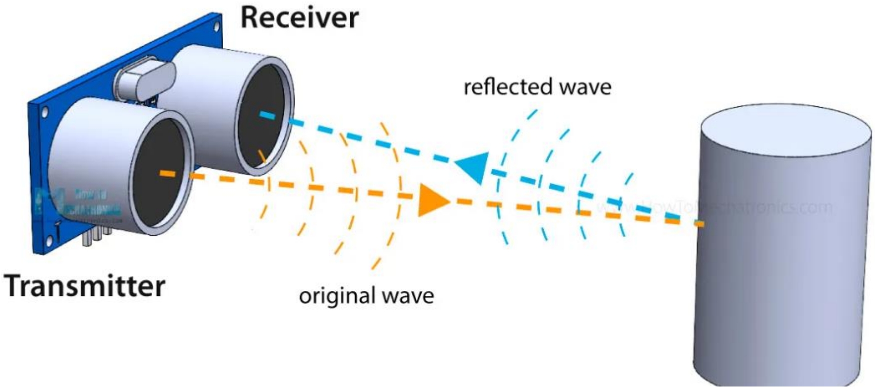
CONCLUSION:

From this practical, I have learned and implemented the infrared sensor with Arduino in tinkercad.

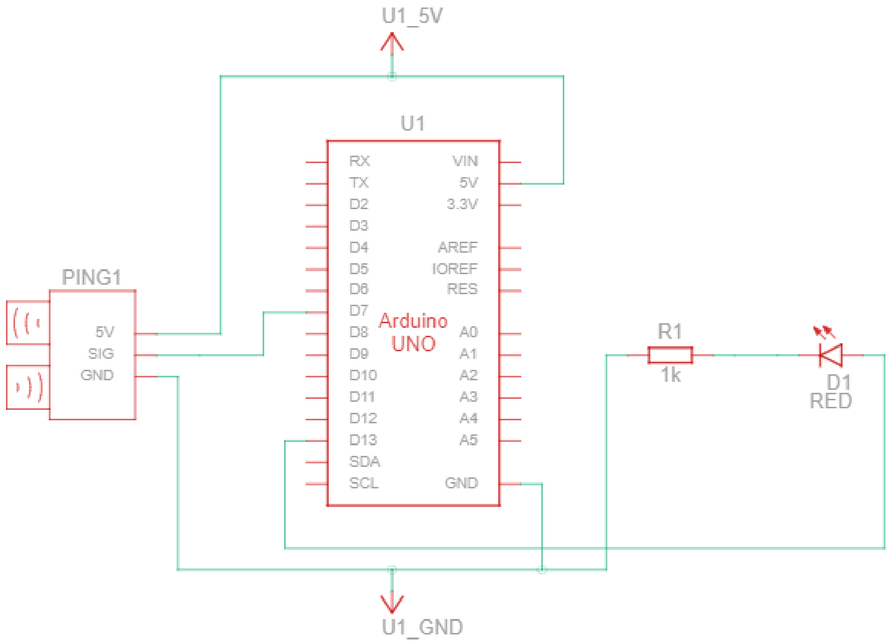
C) ULTRASONIC SENSOR:

THEORY:

Ultrasonic Distance Sensor:
An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.
High-frequency sound waves reflect from boundaries to produce distinct echo patterns.



CIRCUIT DIAGRAM:

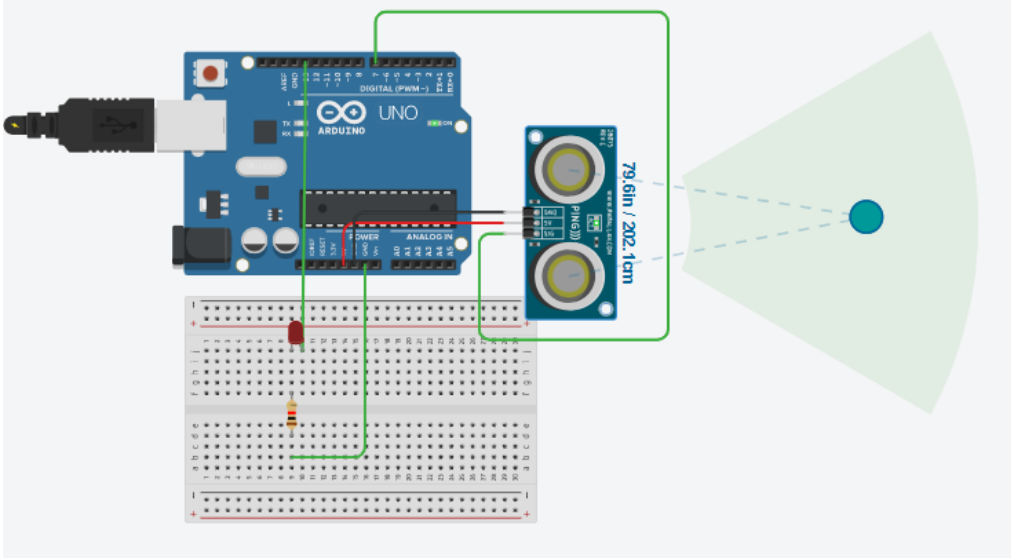


SOURCE CODE:

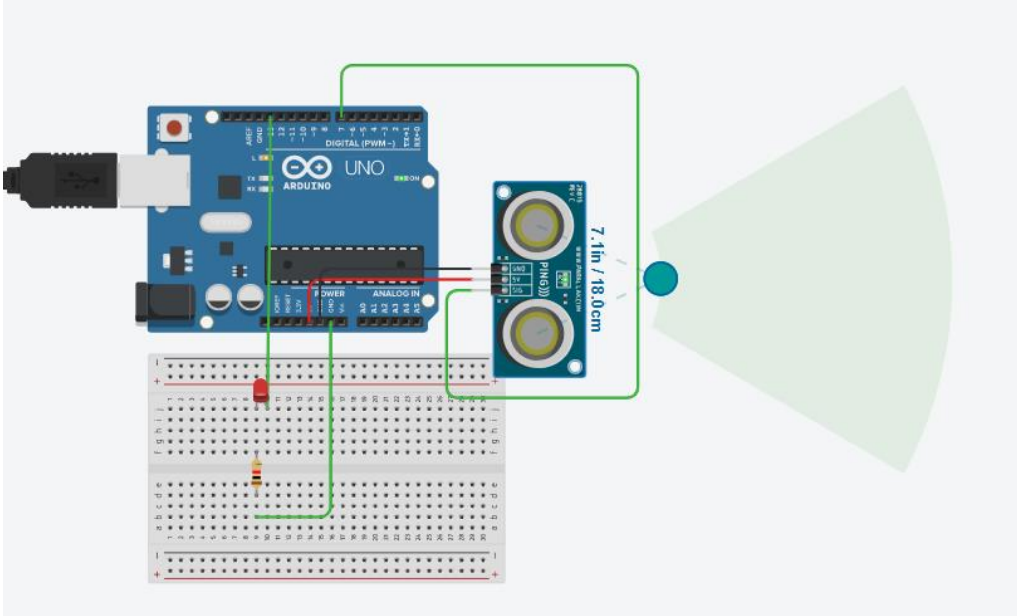
```
const int pingPin = 7;
const int ledPin = 13;

void setup() {
  // initialize serial communication:
  Serial.begin(9600);
  pinMode(ledPin, OUTPUT);
}
```

```
void loop() {
  // establish variables for duration of the ping,
  // and the distance result in inches and centimeters:
  long duration, cm;

  // The PING))) is triggered by a HIGH pulse of 2 or more microseconds.
  // Give a short LOW pulse beforehand to ensure a clean HIGH pulse:
  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
  cm = microsecondsToCentimeters(duration);

  // Print the distance
  Serial.print("Distance: ");
  Serial.print(cm);
  Serial.print("cm");
  Serial.println();

  // Turn on the LED if the object is too close:
  if(cm < 100) {
    digitalWrite(ledPin, HIGH);
  }
  else {
    digitalWrite(ledPin, LOW);
  }
  delay(100);
}


long microsecondsToCentimeters(long microseconds) {
  // The speed of sound is 340 m/s or 29 microseconds per centimeter.
  // The ping travels out and back, so to find the distance of the
  // object we take half of the distance travelled.
  return microseconds / 29 / 2;
}
```

OUTPUT:



LED will glow if distance is less than 100 cm:



CONCLUSION:

From this practical, I have learned and implemented the ultrasonic sensor with Arduino in tinkercad.