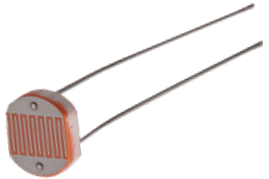
SENSORS

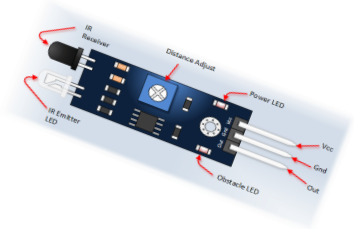
Electro

2022/2023

What You Will Learn

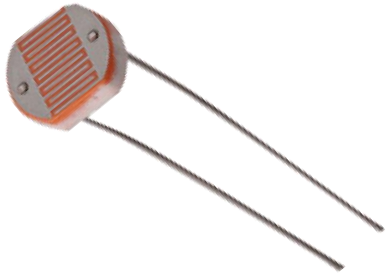


- **Light Dependent Resistor (LDR)**
- **Distance Measurement Sensor (ULTRASONIC)**
- **Humidity / Temperature Sensor (DHT)**
- **Infra-Red Sensor (IR)**

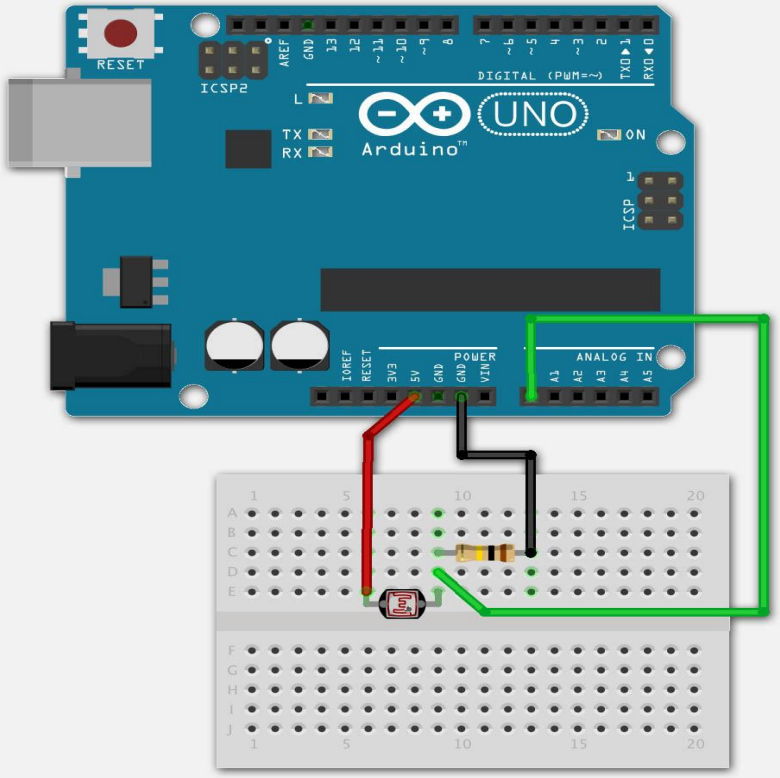


LDR (Photoresistor)

A **photoresistor** (or **light-dependent resistor**, **LDR**, or **photo-conductive cell**) is a light-controlled variable resistor.
The resistance of a photoresistor decreases with increasing incident light intensity



Circuit Building

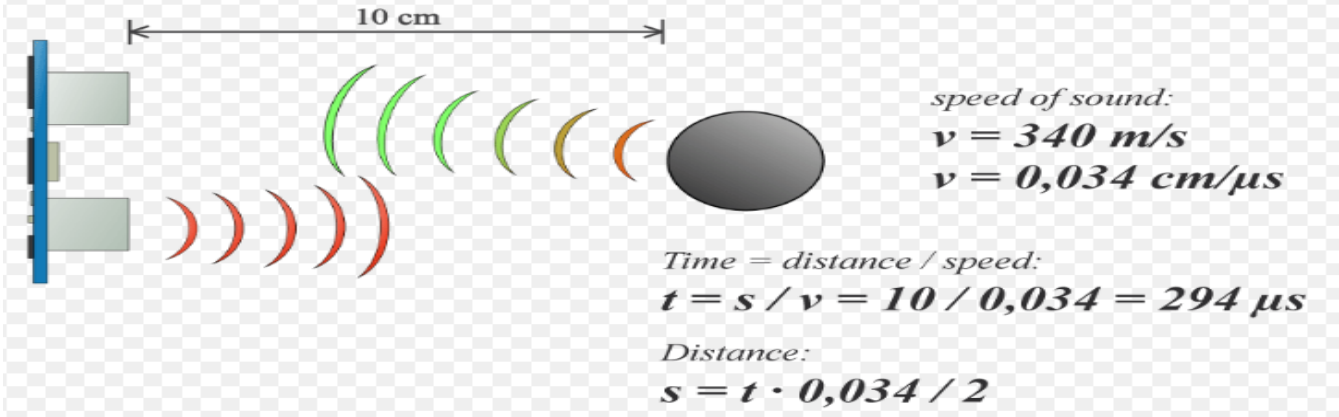


Let’s Code!

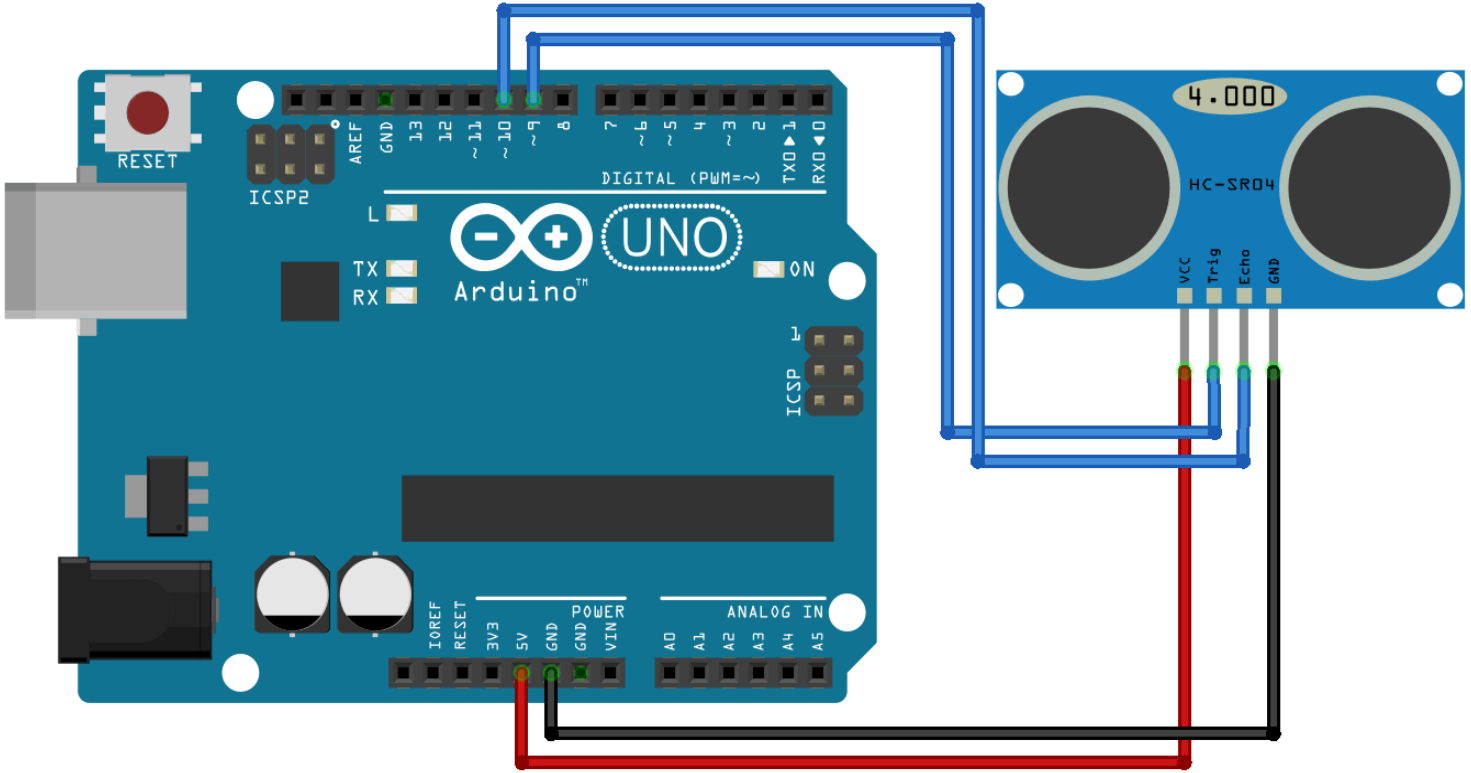
```
void setup() {
  pinMode(A0, INPUT);       // set the pin A0 as INPUT
  Serial.begin(9600);       // set the serial baud rate 9600
}

void loop() {
  int value = analogRead(A0);  // put the value of the pin A0 in the "val" variable
  Serial.println(val);     // printing the value stored in the "val" variable
  delay(100);       // wait for 100 milisecond
}
```

Ultarsonic

An **ultrasonic sensor** is an instrument that measures the distance to an object using **ultrasonic** sound waves.
An **ultrasonic sensor** uses a **transducer** to send and receive **ultrasonic** pulses that relay back information about an object's proximity.



Circuit Building



Let’s Code!

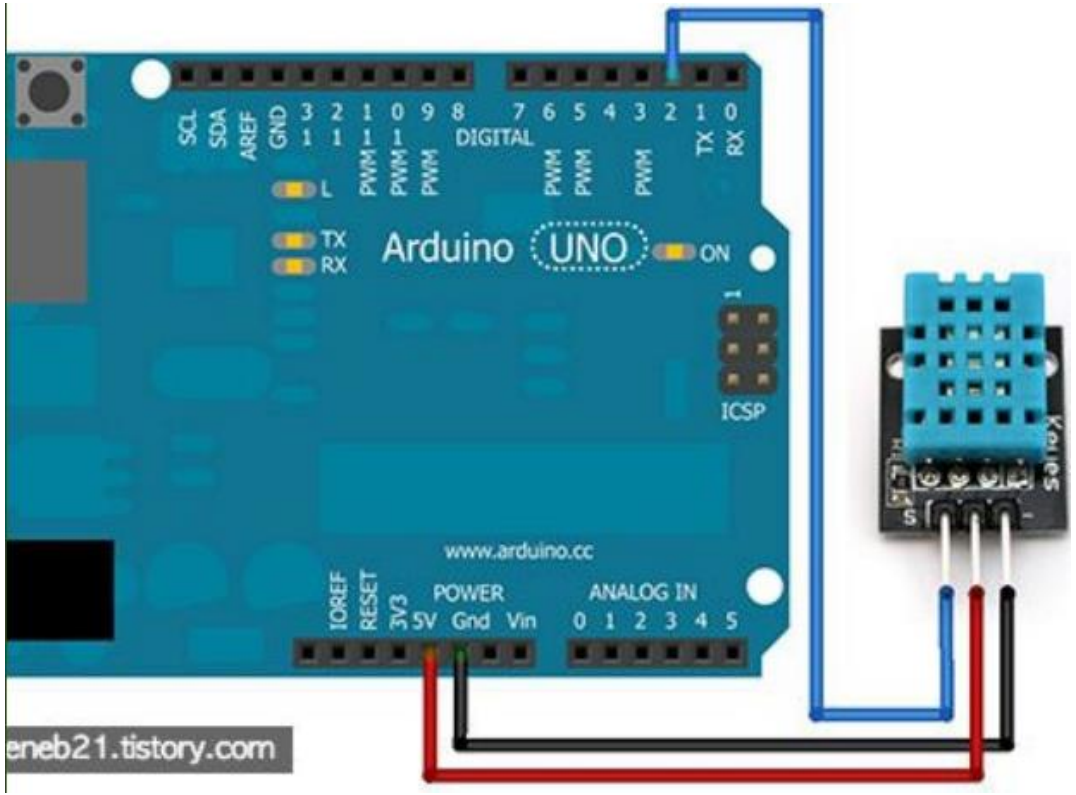
```
int trigPin = 9;    //trig connector is connected to pin 9
int echoPin = 10;   //echo connector is coonected to pin 10
long duration;
int distance;
void setup() {
  Serial.begin(9600);         //initialize the Serial at the baud rate of 9600
  pinMode(trigPin, OUTPUT);   //set the trig pin as output
  pinMode(echoPin, INPUT);    //set the echo pin as input
}
void loop() {
  digitalWrite(trigPin, LOW);       //initialize the trig pin to low
  delayMicroseconds(2);             //wait 2 uSeconds
  digitalWrite(trigPin, HIGH);      //give a small pulse to the trig pin
  delayMicroseconds(10);            //wait 10 uSeconds
  digitalWrite(trigPin, LOW);       //turn off the trig pin
  duration = pulseIn(echoPin, HIGH);    //start counting until the echo pin reseive a signal and store the duration in the variable
  distance = duration * 0.034 / 2;      //multiply the duration by the speed of the ultrasound and devide it by 2
  Serial.print("Distance: ");           //print the distance in Serial Monitor
  Serial.println(distance);
}
```

DHT

The **DHT11** is a basic, ultra low-cost digital temperature and humidity sensor.

It has a circuitry inside it that converts the physical changes into digital signals (no analog input pins needed). It is fairly simple to use, but requires careful timing to grab data.

Circuit Building



Let's Code!

```
#include <DHT.h>              //include the DHT library
#define DHTPIN 2              //DHT's signal pin is connected to pin 2
#define DHTTYPE DHT11         //DHT type used is DHT11, you can use DHT22
DHT dht(DHTPIN, DHTTYPE);     //define the DHT variable with the name 'dht'

void setup() {
  Serial.begin(9600);                  //initialize the Serial at the baud rate of 9600
  Serial.println(F("DHTxx test!"));
  dht.begin();           //initialize the DHT sensor
  delay(1500);           //wait a second and half
}

void loop() {
  float h = dht.readHumidity();         // read the temerature value
  float t = dht.readTemperature();      // read the humidity value
  if (isnan(h) || isnan(t) || isnan(f)) {                    //isnan means "is not a number"
    Serial.println(F("Failed to read from DHT sensor!"));  // print it if the dht sensor was disconnected
    return;
  }
  Serial.print("Temperature= ");              // printing the temperature
  Serial.println(t);
  Serial.print("Humidity= ");                // printing the humudity
  Serial.print(h);
}
```

Infra-Red Sensor

The basic concept of IR(infrared) obstacle detection is to transmit the IR signal(radiation) in a direction and a signal is received at the IR receiver when the IR radiation bounces back from a surface of the object.

Features:

There is an obstacle, the green indicator light on the circuit board

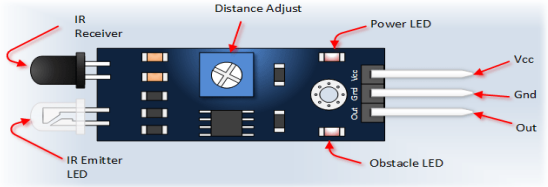
Digital output signal

Detection distance: 2 ~ 30cm

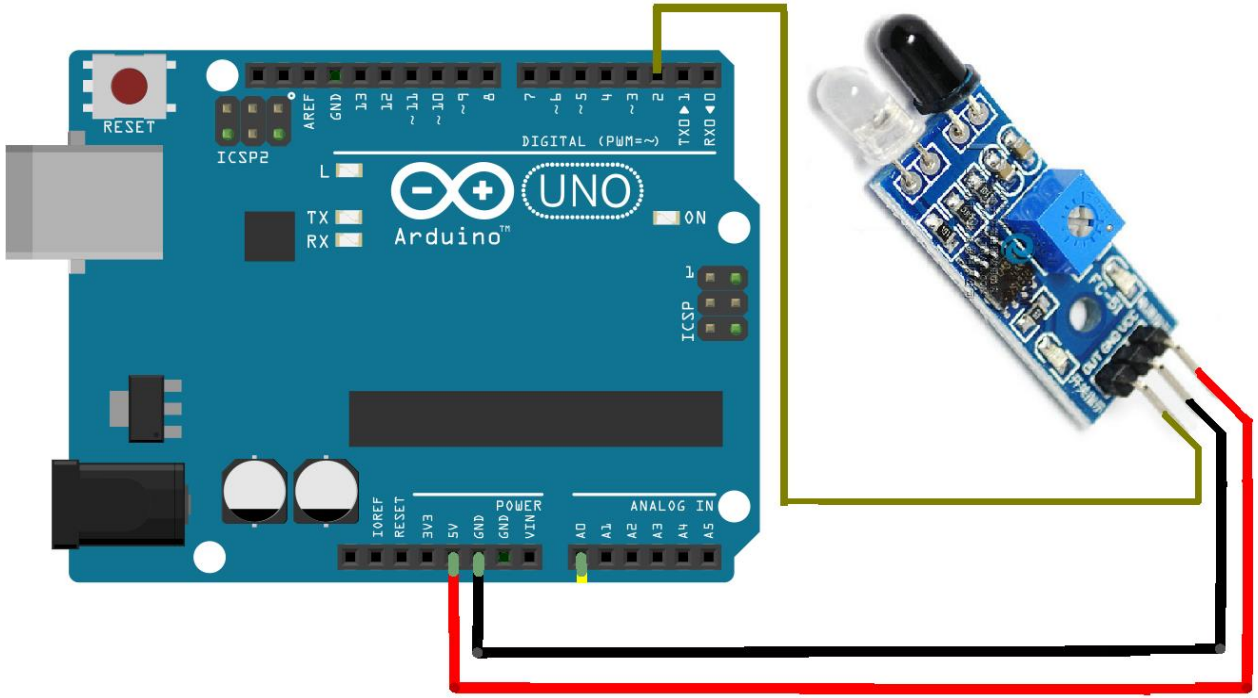
Adjustable detection distance range via potentiometer:

Clockwise: Increase detection distance

Counter-clockwise: Reduce detection distance



Circuit Building



Let’s Code!

```
void setup() {
  pinMode(2, INPUT);     //set the pin 2 as input
  Serial.begin(9600);    //initialize the Serial Monitor with the baud rate of 9600
}

void loop() {
  bool value = digitalRead(2);           //read the state of the pin 2 and store it in the variable

  if ( value == 1){                      //check if the state of the pin 2 is high
    Serial.println("Hand Detected!");     //if true, print "Hand Detected" in serial
  }

  else if (value == 0){                  //check if the state of the pin 2 is low
    Serial.println("No Hand Detected!"); //if true, print "No Hand Detected" in serial
  }

  delay(100);   //wait for 100 miliseconds
}
```

That’s it!

@electro.sc

https://github.com/electro-sc/Arduino-Bootcamp-2023

Thanks!