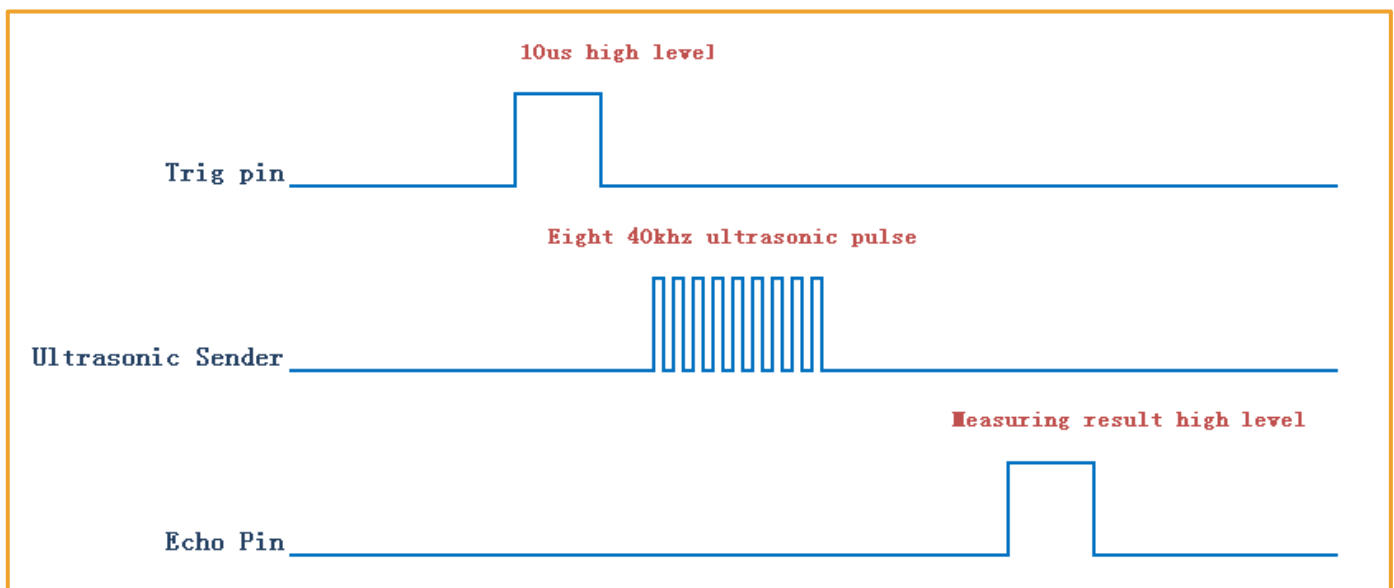


## Ultrasonic ranging principle

Ultrasonic transmitter launches ultrasonic to a certain direction and we start timing at the same time. When the ultrasonic in the air runs into obstacles, it will return immediately, ultrasonic receiver receives the reflected wave, then we stop timing. Sound waves in the air are at the rate of 340 m/s, according to the recorded time  $t$ , the distance  $s$  between launch spot and the obstacles can be calculated, that is:  $s = 340m / s * t / 2$ . So we can get the distance.

Ultrasonic ranging module has four pins, they are Vcc, Trig, Echo, GND, among the Trig is distance measuring trigger pin, as long as the Trig pin are at least 10 $\mu$ s high level, ultrasonic sending module will automatically send eight 40KHZ ultrasonic pulse, and automatically detect whether there is a returned signal. This step will be done automatically by the inside module. If there is any returned signal, the Echo pin will output high level, the duration of the high level is the time of ultrasonic wave from launch to return. At this point, we can use pulseIn () function to obtain the result of distance measuring, and calculate the actual distance.



## Experiment Purpose

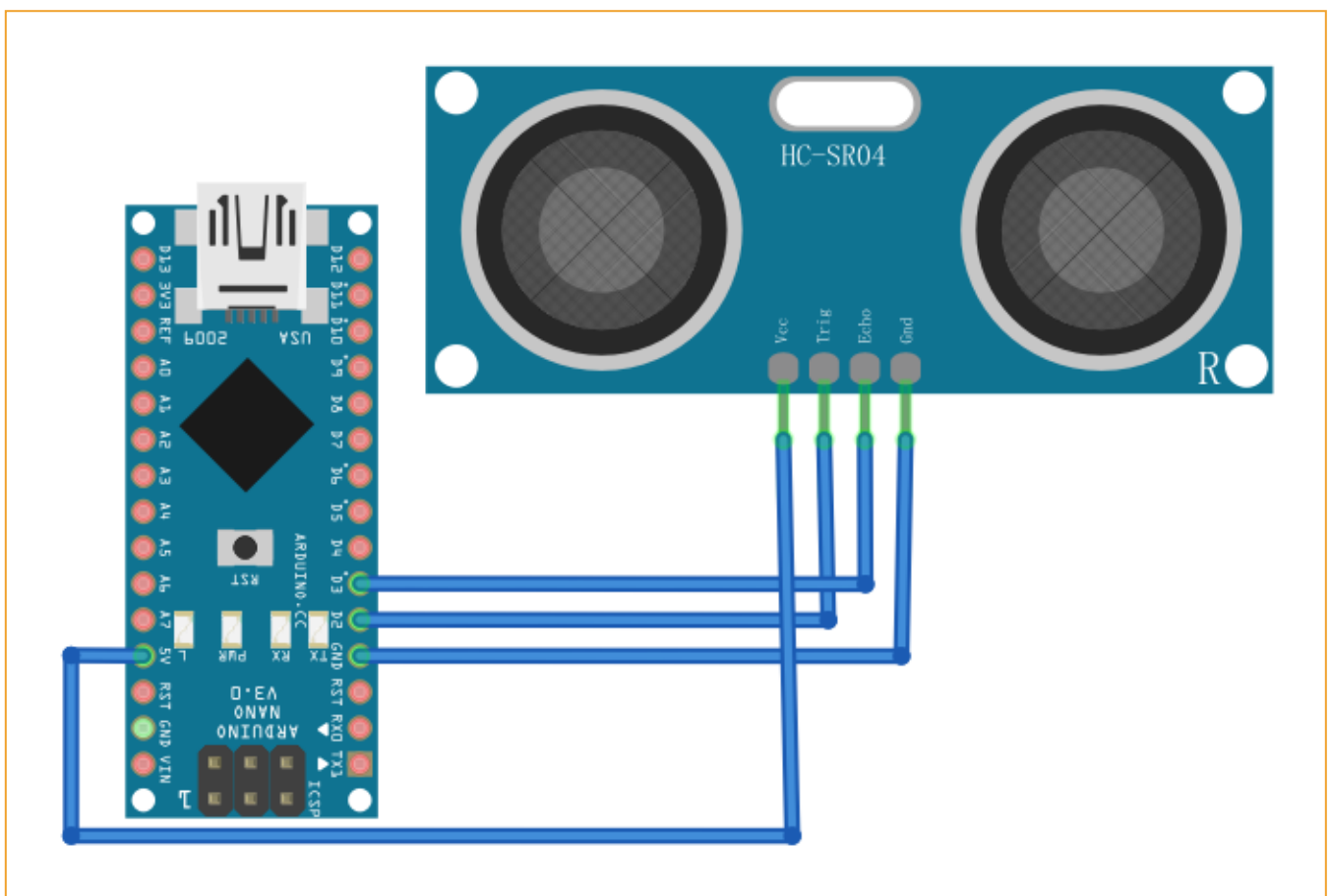
The purpose is to measure the distance of the obstacle from the ultrasonic ranging module by the ultrasonic distance measuring module.

## Component List

- ◆ Arduino Nano mainboard
- ◆ Breadboard
- ◆ USB cable
- ◆ Ultrasonic module\* 1
- ◆ Several jumper wires

## Wiring of Circuit

Arduino Nano	Ultrasonic
VCC	1Vcc)
2	2 (Trig)
3	3(Echo)
GND	4 (Gnd)



## Code

```
const int TrigPin = 2;
const int EchoPin = 3;
float distance;
void setup()
{
  Serial.begin(115200);
  pinMode(TrigPin, OUTPUT);
  pinMode(EchoPin, INPUT);
  Serial.println("Ultrasonic sensor:");
}
void loop()
{
  digitalWrite(TrigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(TrigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(TrigPin, LOW);
  distance = pulseIn(EchoPin, HIGH) / 58.00;
  Serial.print("distance is :");
  Serial.print(distance);
  Serial.print("cm");
  Serial.println();
  delay(1000);
}
```

## Experiment Result

