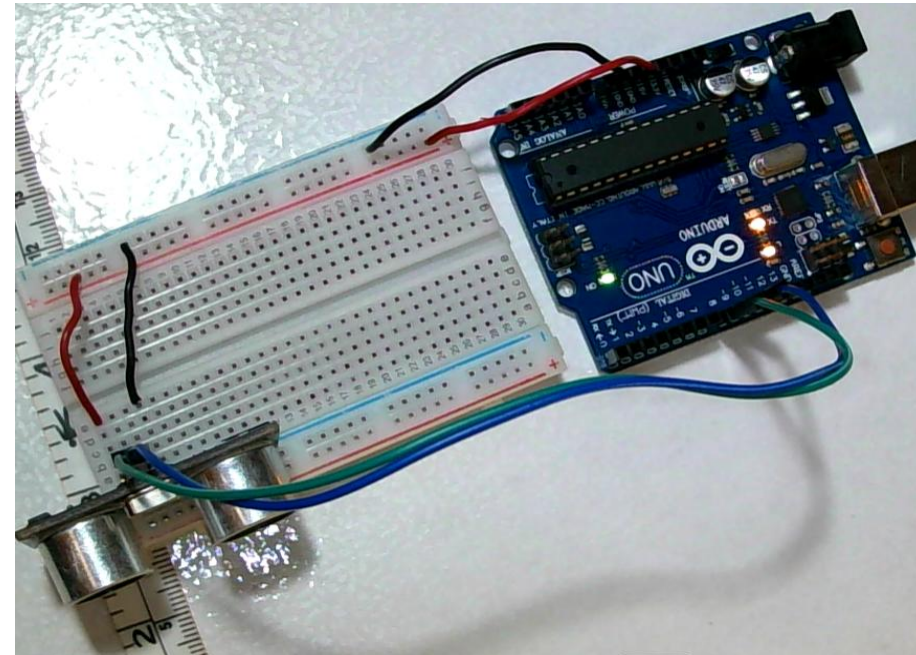
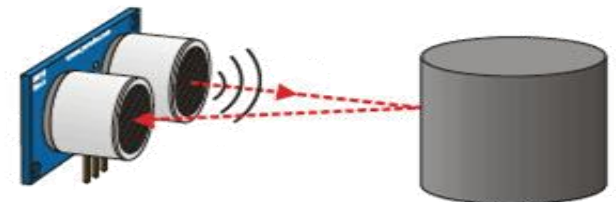


Medir distancia con sensor ultrasónico HC-SR04 y Arduino Uno

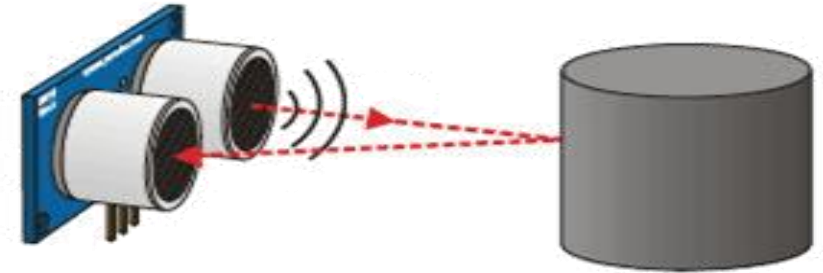


Sensor ultrasónico

- Es un dispositivo para medir distancias.
- Su funcionamiento se base en el envío de un pulso de alta frecuencia, no audible por el ser humano. Este pulso rebota en los objetos cercanos y es reflejado hacia el sensor, que dispone de un micrófono adecuado para esa frecuencia.
- Midiendo el tiempo entre pulsos, conociendo la velocidad del sonido, podemos estimar la distancia del objeto contra cuya superficie impacto el impulso de ultrasonidos
- El rango de medición del sensor HC-SR04 es de 2cm a 400 cm, con una resolución de 0.3cm



Data Sheet



Tech Support: services@elecfreaks.com

Ultrasonic Ranging Module HC - SR04

Product features:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

- (1) Using IO trigger for at least 10us high level signal.
- (2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
- (3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time × velocity of sound (340M/S)) / 2.

Wire connecting direct as following:

- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

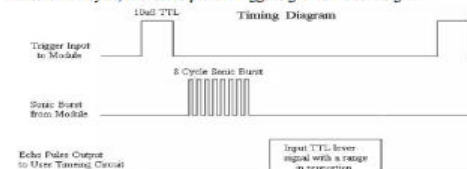
Electric Parameter

Working Voltage	DC 5V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm



Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion. You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: $\mu\text{S} / 58 = \text{centimeters}$ or $\mu\text{S} / 148 = \text{inch}$; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



Sensor ultrasónico HC-SR04

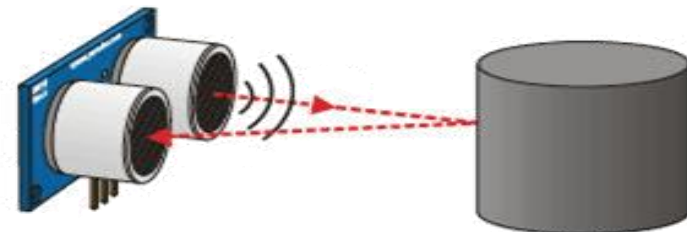
- Mide el tiempo, en microsegundos
- Velocidad Sonido = 343 M/S

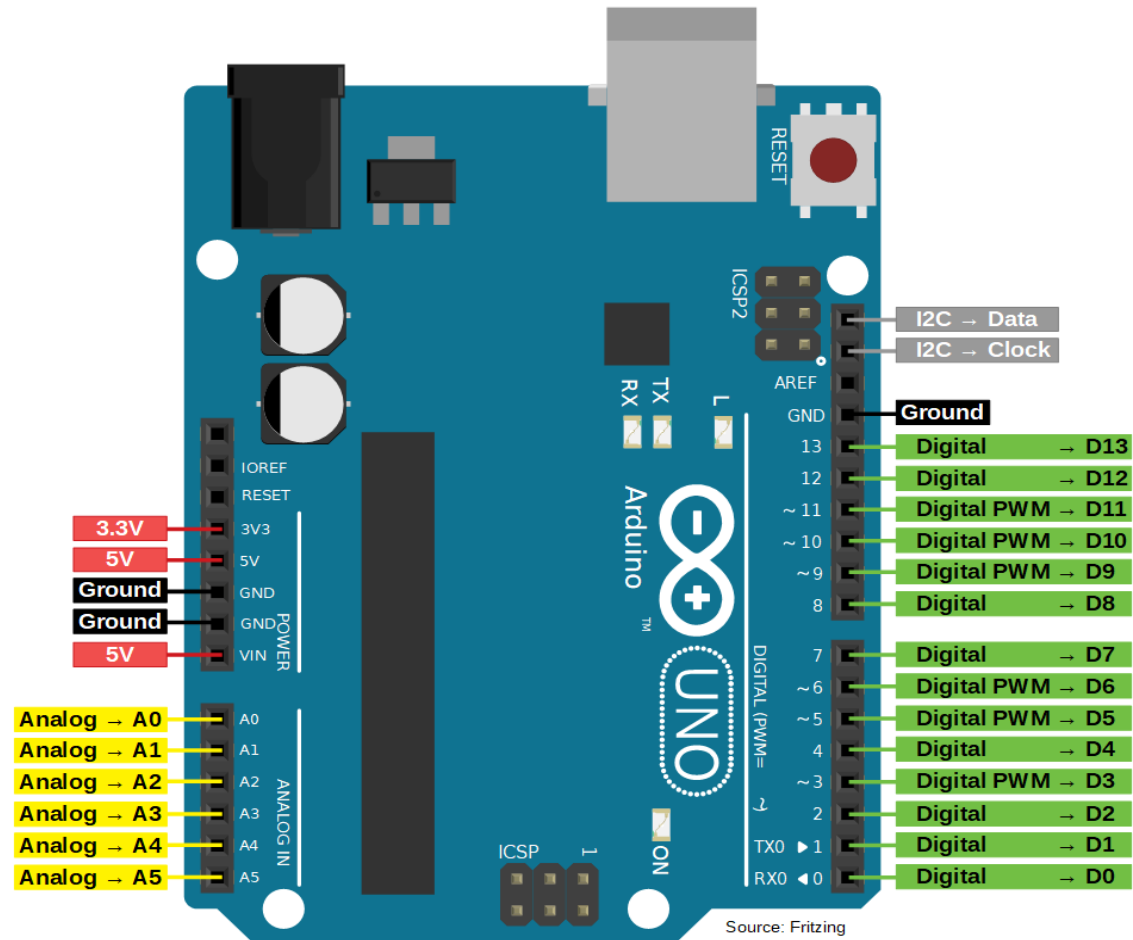
$$343 \frac{m}{s} * 100 \frac{cm}{m} * \frac{1}{1,000,000} \frac{s}{\mu s} = \frac{1}{29.15} \frac{cm}{\mu s}$$

$$Distancia (cm) = \frac{Tiempo (\mu s)}{29.15 * 2}$$

$$Distancia (cm) = \frac{Tiempo (\mu s)}{58.3}$$

Tiempo	
1	= 1,000,000
Segundo	Microsegundo

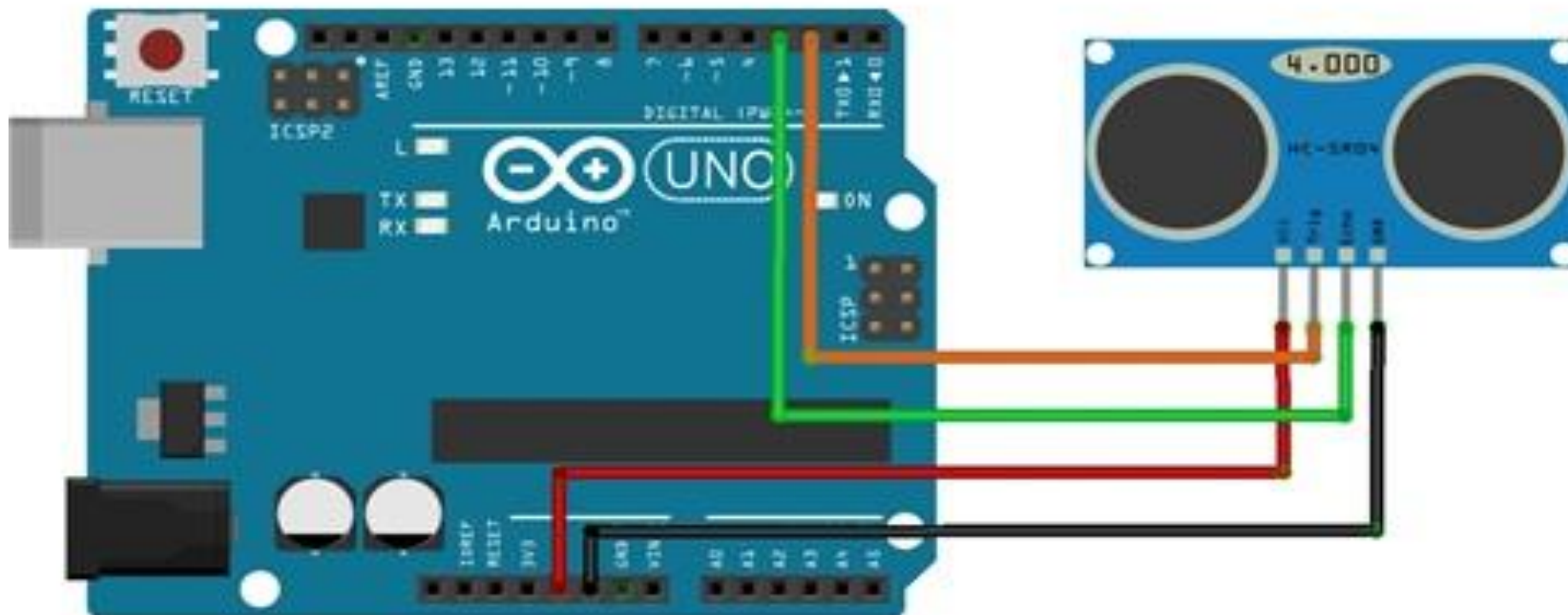




Circuito

Trig -> 2

Echo -> 3



Código

```
#define PIN_TRIG 2
#define PIN_ECHO 3

float tiempo;
float distancia;

void setup() {
    Serial.begin(9600);
    pinMode(PIN_TRIG, OUTPUT);
    pinMode(PIN_ECHO, INPUT);
}

void loop() {

    digitalWrite(PIN_TRIG, LOW); //para generar un pulso limpio ponemos a LOW 4us
    delayMicroseconds(4);

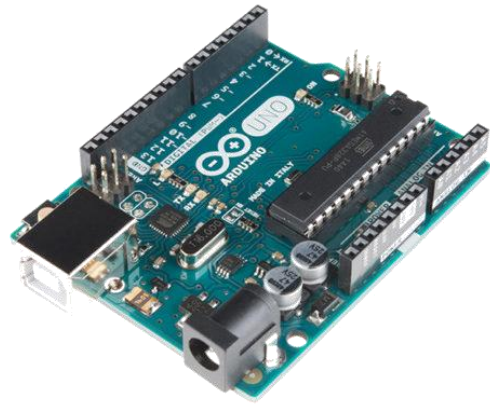
    digitalWrite(PIN_TRIG, HIGH); //generamos Trigger (disparo) de 10us
    delayMicroseconds(10);
    digitalWrite(PIN_TRIG, LOW);

    tiempo = pulseIn(PIN_ECHO, HIGH);
    distancia = tiempo/58.3;

    Serial.println(distancia);

    delay(1000);
}
```





Medir distancia con sensor ultrasónico HC-SR04 y Arduino Uno

