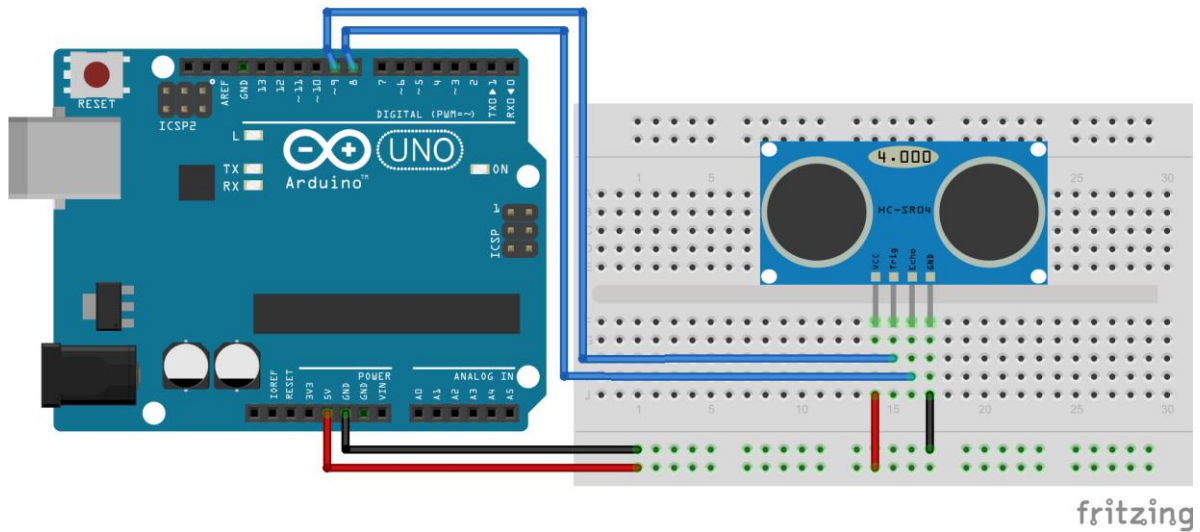


FOR HC SR04 Ultrasonic Sensor Set up ONLY (FOR EXAM READ BOTH (TWO SONARs SET UP))



USE DIRECT WIRING. SEE THE WIRING, DO NOT USE BREADBOARD anymore.

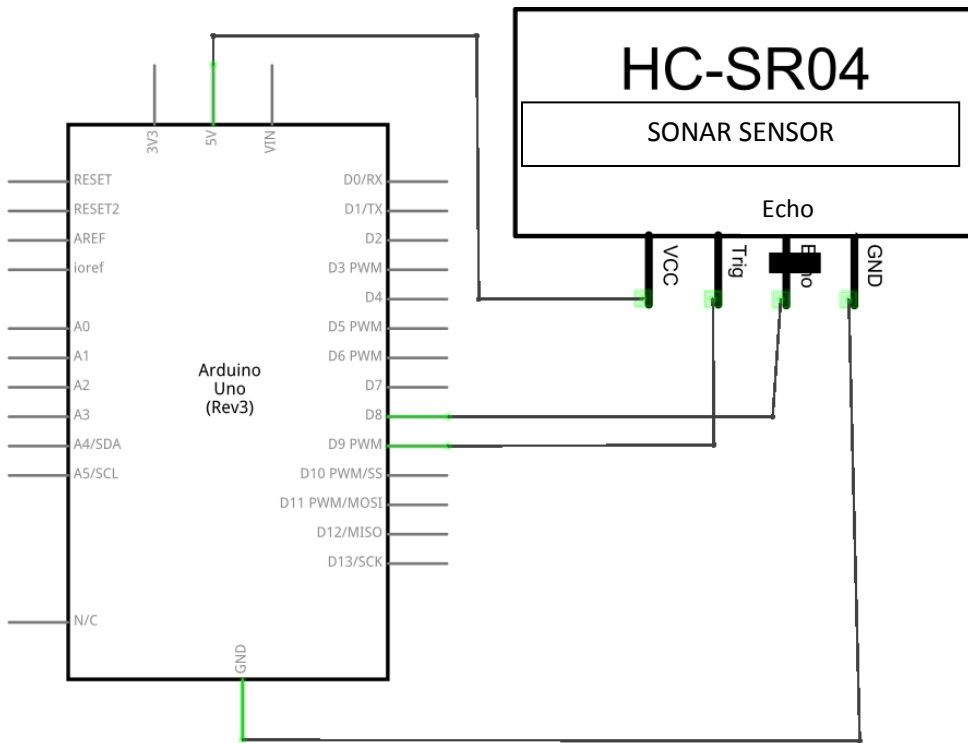
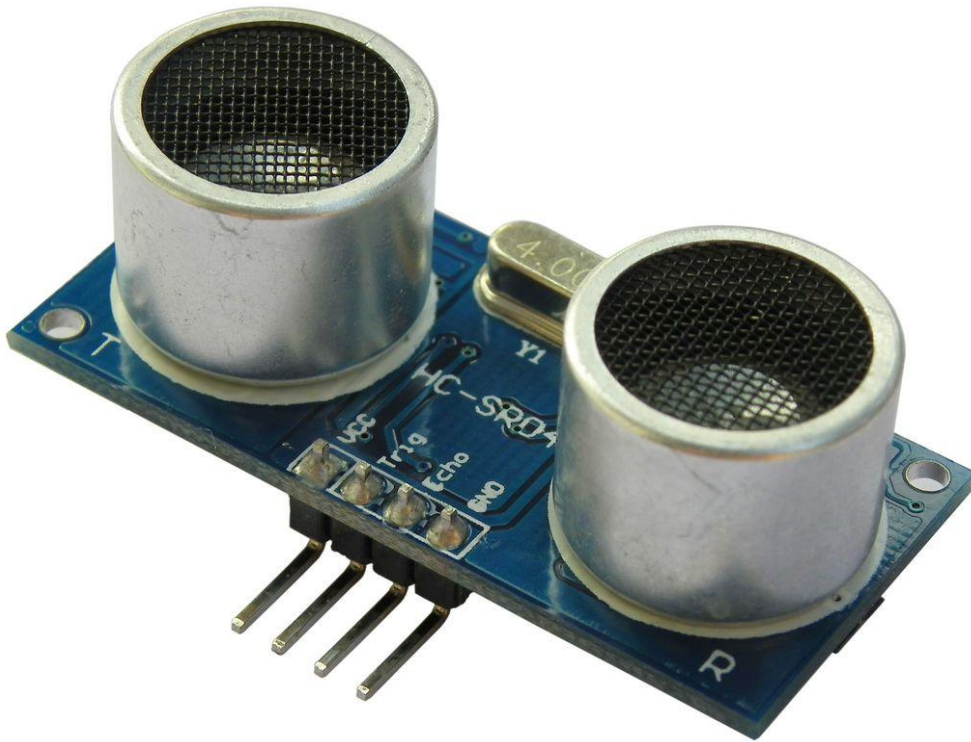
The HC-SR04 Ultrasonic Module has four pins: VCC, Trig, Echo and GND. Direct wiring.

Connect the **VCC** to 5V board pin,

Trig to the digital pin 9 and

Echo to the digital pin 8 of the board,

finally connect the **GND** pin to GND board pin.



fritzing

Explanation

In the first part of sketch we declare the variables used and define which pins are used to connect to the Ultrasonic Module.

In the setup function first we initialize the Serial communication with the command `Serial.begin(9600)`, after we define the trig as output and the echo as input through the function `pinMode`, finally we set the trig at LOW level with the command `digitalWrite`.

In the loop block we set the trig to HIGH and after 10 microsecond we set it again to the LOW level.

We read the time between transmitting and receiving signal with the function `pulseIn(Echo,HIGH)` and we place it in the duration variable.

After we check this value, if it is greater or equal than 38000 microsecond on Serial monitor we view this phrase:out range; else we see the measure of distance expressed in centimeter and meter.

We calculate the distance dividing duration by 58.

Calculation of the distance:

$\text{distance} = \text{speed of sound} * \text{duration}$

the speed of sound is 343,4 m/s or 0,0343 cm/microsecond to the Temperature of 20°C.

$\text{distance} = 0,0343 * \text{duration}$

we divide for 2 because the duration is the time spent from ultrasonic signal to sending and returning:

$\text{distance} = 0,0343 * \text{duration}/2$

but:

$0,0343/2 = 0,01715 = 1/58,31$

then:

$\text{distance} = \text{duration}/58,31$

approximate:

$\text{distance} = \text{duration}/58$

ULTRA SONIC CODE (Copy without ERROR!)

```
// Ultrasonic Sensor Example
```

```
int trig=9;
```

```
int echo=8;
```

```
int duration;
```

```
float distance;
```

```
float meter;
```

```
void setup()
{
  Serial.begin(9600);
  pinMode(trig, OUTPUT);
  digitalWrite(trig, LOW);
  delayMicroseconds(2);
  pinMode(echo, INPUT);
  delay(6000);
  Serial.println("Distance:");
}
void loop()
{
  digitalWrite(trig, HIGH);
  delayMicroseconds(10);
  digitalWrite(trig, LOW);

  duration = pulseIn(echo, HIGH);

  if(duration >= 38000){
    Serial.print("Out range");
  }

  else{
    distance = duration/58;
    Serial.print(distance);
    Serial.print("cm");
    meter = distance/100;
```

```
Serial.print("\t");  
Serial.print(meter);  
Serial.println("m");  
}  
delay(1000);  
}
```