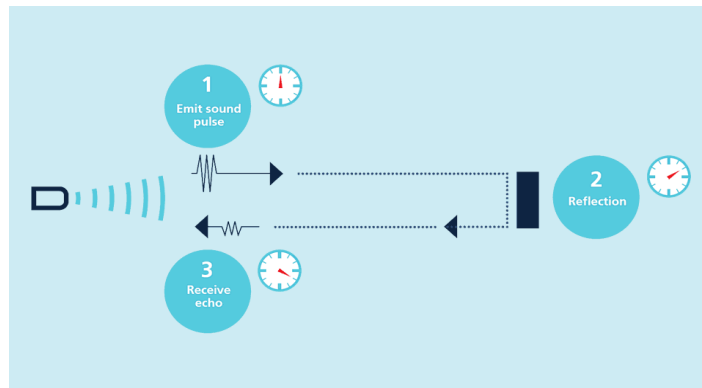


Lesson 11 Ultrasonic sensor

Introduction

In this Raspberry Pi distance sensor tutorial, we will be utilizing the HC-SR04 Ultrasonic Sensor with our Raspberry Pi. This guide will go through showing you how to wire up the sensor with the Raspberry Pi as well as exploring how we can utilize the sensor also to read distance.



We will be showing you how to wire the [HC-SR04 sensor](#) up to the Raspberry Pi, including how to wire a voltage divider as the circuit requires one to drop the 5v output from the sensor to 3.3v for the Raspberry Pi.

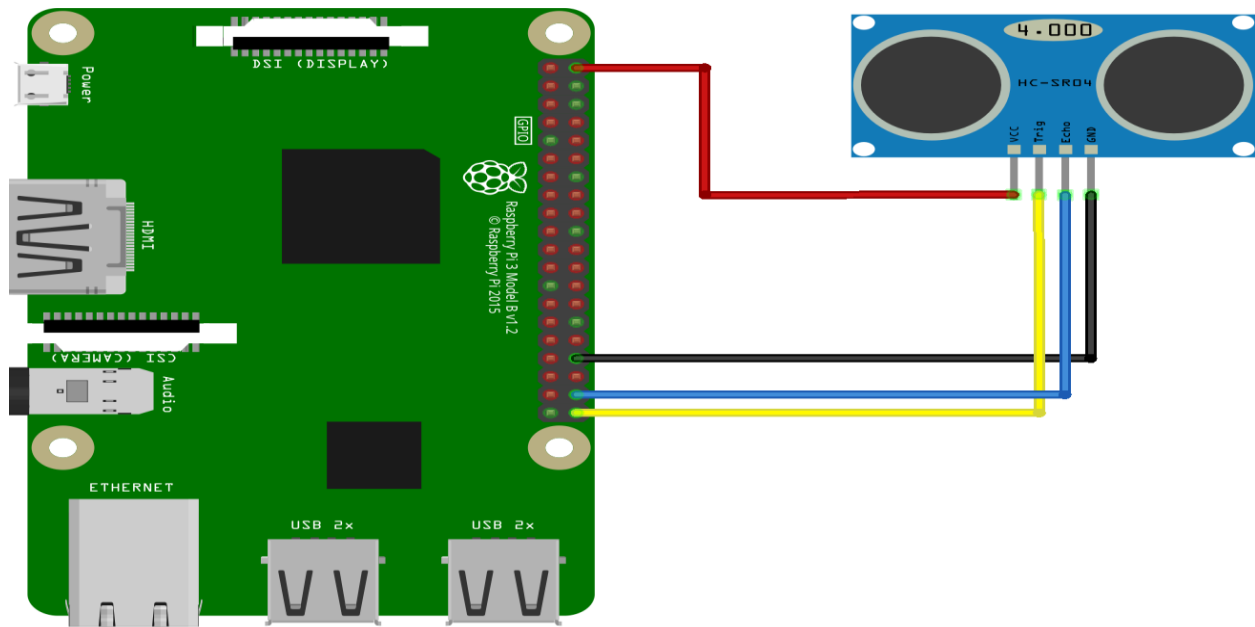
Principle

Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo.

Hardware Required

- [Raspberry Pi](#)
- [Power Supply](#)
- [HC-SR04 Ultrasonic Sensor](#)
- [Breadboard](#)
- [Connecting Wire](#)

Hardware Setup



Python Code

```
#!/usr/bin/python

import RPi.GPIO as GPIO

import time

try:

    GPIO.setmode(GPIO.BOARD)

    PIN_TRIGGER = 40

    PIN_ECHO = 38

    GPIO.setup(PIN_TRIGGER, GPIO.OUT)

    GPIO.setup(PIN_ECHO, GPIO.IN)

    GPIO.output(PIN_TRIGGER, GPIO.LOW)

    print "Waiting for sensor to settle"

    time.sleep(2)
```

```
print "Calculating distance"

GPIO.output(PIN_TRIGGER, GPIO.HIGH)

time.sleep(0.00001)

GPIO.output(PIN_TRIGGER, GPIO.LOW)

while GPIO.input(PIN_ECHO)==0:

    pulse_start_time = time.time()

while GPIO.input(PIN_ECHO)==1:

    pulse_end_time = time.time()

pulse_duration = pulse_end_time - pulse_start_time

distance = round(pulse_duration * 17150, 2)

print "Distance:", distance,"cm"

finally:

    GPIO.cleanup()
```

Output

If everything is working correctly, you should get something like what is shown below in your terminal. Of course, the distance will be different to what we got.

```
Waiting for sensor to settle
Calculating distance
Distance: 29.69 cm
```

Hopefully, by now you will have successfully set up your Raspberry Pi distance sensor and also written a python script that interacts with the sensor and successfully calculates the distance.

Application

- **Object detection**
- **Measuring the distance**
- **Dynamic body detection**
- **The human body and object detection by distance detection, dynamic body detection**