hcsr04sensor - Python Module

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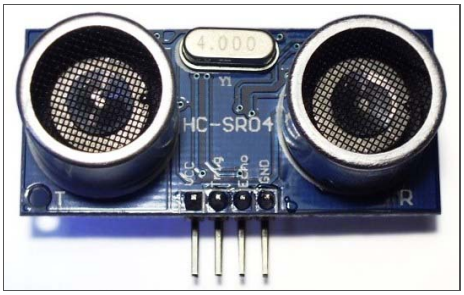


Installing hcsr04sensor

```
sudo apt install python3-pip python3-rpi.gpio
sudo pip3 install hcsr04sensor
```

Contributing

The python hcsr04sensor module source code is available on Github.

Discord

The Raspi-Sump Discord group has a new channel called #hcsr04sensor. This is one place you can ask questions specifically about the module. While Raspi-Sump uses this module it can also be used for other applications. This is the place to discuss non Raspi-Sump issues related to hcsr04sensor.

If you are interested contact me for an invite link. You need to have a Discord account to join.

Description

Use Python to calculate distance, depth and volume measurements with an HCSR04 Ultrasonic Sound Sensor and a Raspberry Pi. The module also works with a waterproof JSN-SR04T sensor.

The module does the following;

- Returns an error corrected distance by using the median reading of a sorted sample. NOTE - The default sample size is 11 readings.

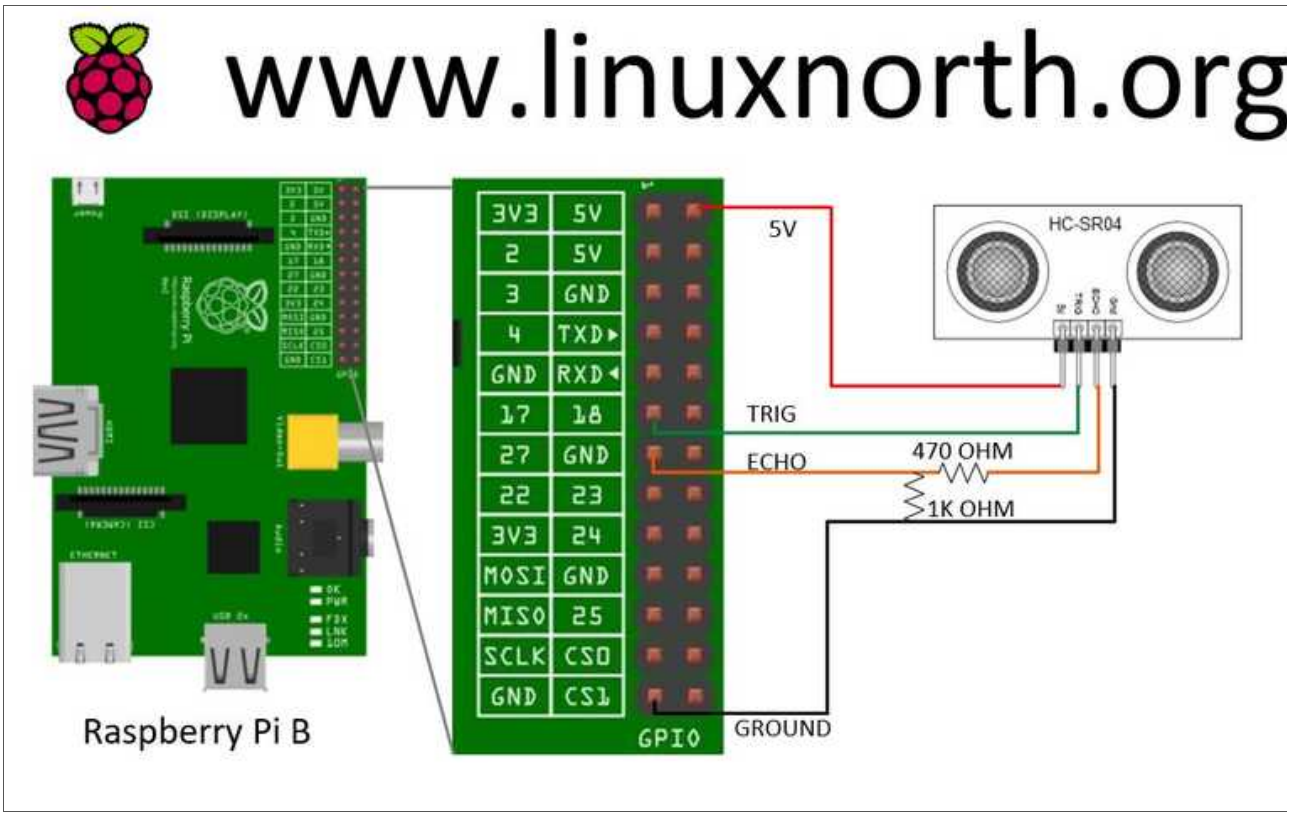
  This module supports BCM and BOARD pin values but uses BCM by default. See the Raspberry Pi pin layout documentation for your model.

- Adjusts the reading based on temperature by adjusting the speed of sound.
- Allows measuring distance or depth in metric and imperial units.
- Allows measuring volume in (litres/gallons) of various shaped containers (cuboid, cylinders, elliptical cylinders).
- Raises an exception if a faulty cable or sensor prevents an echo pulse from being received.
- See pydoc for methods available
- Recipes are provided for all methods
- Free to use under the MIT License

Connecting the Sensor

The HCSR04 sensor has four pins.

- 5V VCC which connects to a 5V pin on the Raspberry Pi
- Trig Pin which connects to a valid GPIO pin. Diagram uses GPIO pin 17.
- Echo Pin which connects to a valid GPIO pin. Diagram uses GPIO pin 27.
- Ground which connects to any valid ground pin on the Raspberry Pi



GPIO pins are rated for 3.3V so you must insert a voltage divider as the power pin on the PI is 5V. In the above diagram a 470 Ohm resistor is soldered on the echo wire. A 1000 Ohm resistor is soldered between the echo and ground wires. This reduces voltage to GPIO pin 27 to 3.4V which is within a tolerable level. Failure to do this can

damage your board.

Voltage divider calculator courtesy ohmslawcalculator.com.
Soldering tutorial (youtube) courtesy Xrobots James Bruton.

Testing Your HCSR04 Sensor

Installation of the module also installs the hcsr04.py utility to /usr/local/bin. This utility allows you to take a quick measurement for testing your sensor.

Usage

```
pi@raspberry:~ $ hcsr04.py -h
usage: hcsr04.py [-h] -t TRIG -e ECHO [-sp SPEED] [-ss SAMPLES]

Script tests the HCSR04 sensor under different configurations

optional arguments:
  -h, --help            show this help message and exit
  -t TRIG, --trig TRIG  Trig Pin (Required - must be an integer)
  -e ECHO, --echo ECHO  Echo Pin (Required - must be an integer)
  -sp SPEED, --speed SPEED
                        Time between individual reading samples (Optional -
                        must be a float, default is 0.1 seconds)
  -ss SAMPLES, --samples SAMPLES
                        Reading Sample Size (Optional - must be an integer,
                        default is 11)
```

Sample Output

```
pi@raspberry:~ $ hcsr04.py -t 17 -e 27
trig pin = gpio 17
echo pin = gpio 27
speed = 0.1
samples = 11

The imperial distance is 12.3 inches.
The metric distance is 31.2 centimetres.
```

More Info

Get it on Github

Various recipes for measuring distance or liquid depth.

HC-SR04 Specification Manual
JSN-SR04T Specification Manual

Last Updated: October 28, 2022
