Adafruit HCSR04 Library Documentation

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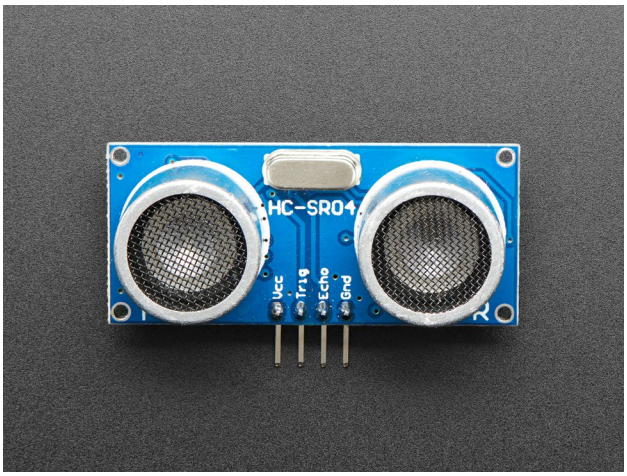
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The HC-SR04 is an inexpensive solution for measuring distances using microcontrollers. This library provides a simple driver for controlling these sensors from CircuitPython.

CHAPTER 1

Dependencies

This driver depends on:

- Adafruit CircuitPython

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the Adafruit library and driver bundle.

CHAPTER 2

Installing from PyPI

On supported GNU/Linux systems like the Raspberry Pi, you can install the driver locally from PyPI. To install for current user:

```
pip3 install adafruit-circuitpython-hcsr04
```

To install system-wide (this may be required in some cases):

```
sudo pip3 install adafruit-circuitpython-hcsr04
```

To install in a virtual environment in your current project:

```
mkdir project-name && cd project-name
python3 -m venv .env
source .env/bin/activate
pip3 install adafruit-circuitpython-hcsr04
```

CHAPTER 3

Usage Example

Warning: The HC-SR04 uses 5V logic, so you will have to use a level shifter between it and your CircuitPython board (which uses 3.3V logic).

Note: If you want to use an HC-SR04 with MicroPython, I recommend checking out this library.

You'll need to dedicate two pins to communicating with the HC-SR04. The sensor communicates in a very rudimentary manner, so it doesn't matter which pins you choose, as long as they're digital IO pins (pins that start with "D" are digital).

There are two ways of instantiating a *HCSR04* object: with or without using a context manager.

Note: It is technically possible to communicate with the HC-SR04 using only one wire since the trigger and echo signals aren't ever active at the same time. Once I have a chance to determine a safe way to do this, I plan to add this as a feature to the library.

See Also:

Adafruit's guide on Lifetime and ContextManagers Gives more info on using context managers with CircuitPython drivers.

board A list of pins available on your device. To view this list, first get a REPL (the guide linked was written for the pyboard, but it still works), then input the following:

```
import board
dir(board)
```

3.1 Without a Context Manager

In the example below, we create the *HCSR04* object directly, get the distance every 2 seconds.

```
import time
import board
import adafruit_hcsr04

sonar = adafruit_hcsr04.HCSR04(trigger_pin=board.D5, echo_pin=board.D6)

while True:
    try:
        print((sonar.distance,))
    except RuntimeError:
        print("Retrying!")
    time.sleep(2)
```

3.2 With a Context Manager

In the example below, we use a context manager (the with statement) to create the *HCSR04* instance, again get the distance every 2 seconds, but then the context manager handles de-initializing the device for us.

```
import board
from adafruit_hcsr04 import HCSR04
with HCSR04(trigger_pin=board.D5, echo_pin=board.D6) as sonar:
    try:
        while True:
            print(sonar.distance)
            sleep(2)
    except KeyboardInterrupt:
        pass
```

CHAPTER 4

Contributing

Contributions are welcome! Please read our Code of Conduct before contributing to help this project stay welcoming.

CHAPTER 5

Documentation

For information on building library documentation, please check out this guide.

CHAPTER 6

Table of Contents

6.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/hcsr04_simpletest.py

```
# SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
# SPDX-License-Identifier: MIT

import time
import board
import adafruit_hcsr04

sonar = adafruit_hcsr04.HCSR04(trigger_pin=board.D5, echo_pin=board.D6)

while True:
    try:
        print((sonar.distance,))
    except RuntimeError:
        print("Retrying!")
    time.sleep(0.1)
```

6.2 adafruit_hcsr04

A CircuitPython library for the HC-SR04 ultrasonic range sensor.

The HC-SR04 functions by sending an ultrasonic signal, which is reflected by many materials, and then sensing when the signal returns to the sensor. Knowing that sound travels through dry air at 343.2 meters per second (at 20 °C), it's pretty straightforward to calculate how far away the object is by timing how long the signal took to go round-trip and do some simple arithmetic, which is handled for you by this library.

Warning: The HC-SR04 uses 5V logic, so you will have to use a level shifter or simple voltage divider between it and your CircuitPython board (which uses 3.3V logic)

- Authors:
  - Mike Mabey
  - Jerry Needell - modified to add timeout while waiting for echo (2/26/2018)
  - ladyada - compatible with *distance* property standard, renaming, Pi compat

class adafruit_hcsr04.**HCSR04**(*trigger_pin*, *echo_pin*, *, *timeout=0.1*)

Control a HC-SR04 ultrasonic range sensor.

Example use:

```
import time
import board

import adafruit_hcsr04

sonar = adafruit_hcsr04.HCSR04(trigger_pin=board.D2, echo_pin=board.D3)


while True:
    try:
        print((sonar.distance,))
    except RuntimeError:
        print("Retrying!")
        pass
    time.sleep(0.1)
```

Parameters

- **trigger_pin** – The pin on the microcontroller that's connected to the Trig pin on the HC-SR04.
- **echo_pin** (*microcontroller.Pin*) – The pin on the microcontroller that's connected to the Echo pin on the HC-SR04.
- **timeout** (*float*) – Max seconds to wait for a response from the sensor before assuming it isn't going to answer. Should *not* be set to less than 0.05 seconds!

deinit()

De-initialize the trigger and echo pins.

distance

Return the distance measured by the sensor in cm.

This is the function that will be called most often in user code. The distance is calculated by timing a pulse from the sensor, indicating how long between when the sensor sent out an ultrasonic signal and when it bounced back and was received again.

If no signal is received, we'll throw a RuntimeError exception. This means either the sensor was moving too fast to be pointing in the right direction to pick up the ultrasonic signal when it bounced back (less likely), or the object off of which the signal bounced is too far away for the sensor to handle. In my experience, the sensor can detect objects over 460 cm away.

Returns Distance in centimeters.

Return type float

CHAPTER 7

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