

# 27.Sound\_Sensor

## Introduction

Sound sensor is a component that receives sound waves and converts them into electrical signal. It detects the sound intensity in ambient environment like a microphone.

## Hardware Required

- ✓ 1 \* Raspberry Pi
- ✓ 1 \* Breadboard
- ✓ 1 \* PCF8591
- ✓ 1 \* Network cable (or USB wireless network adapter)
- ✓ 1 \* Sound sensor module
- ✓ 1 \* 3-Pin anti-reverse cable
- ✓ Several Jumper wires (M to F)

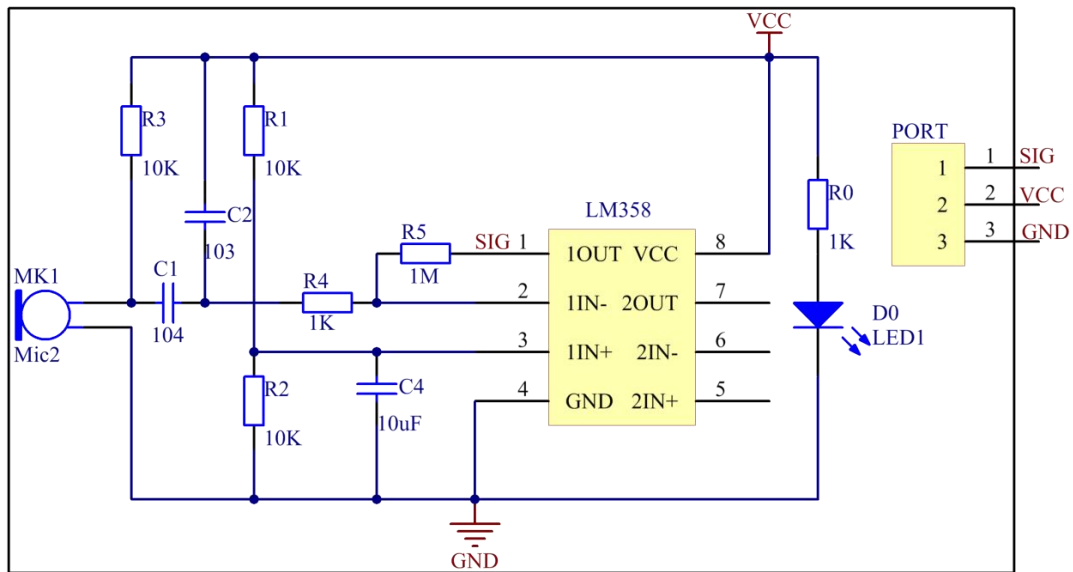
## Principle

The microphone on the sensor module can convert audio signals into electrical signals (analog quantity), then convert analog quantity into digital quantity by PCF8591 and transfer them to MCU.

LM358 is a dual-channel operational amplifier. It contains two independent, high gain, and internally compensated amplifiers, but we will only use one of them in this experiment.

The microphone transforms sound signals into electrical signals and then sends out the signals to pin 2 of LM358 and outputs them to pin 1 (that's, pin SIG of the module) via the external circuit. Then use PCF8591 to read analog values.

PCF8591 is an 8-bit resolution, 4-channel A/D, 1-channel D/A conversion chip. We connect the output terminal (SIG) to AIN0 of PCF8591 so as to detect the strength of voice signal in a real-time manner.

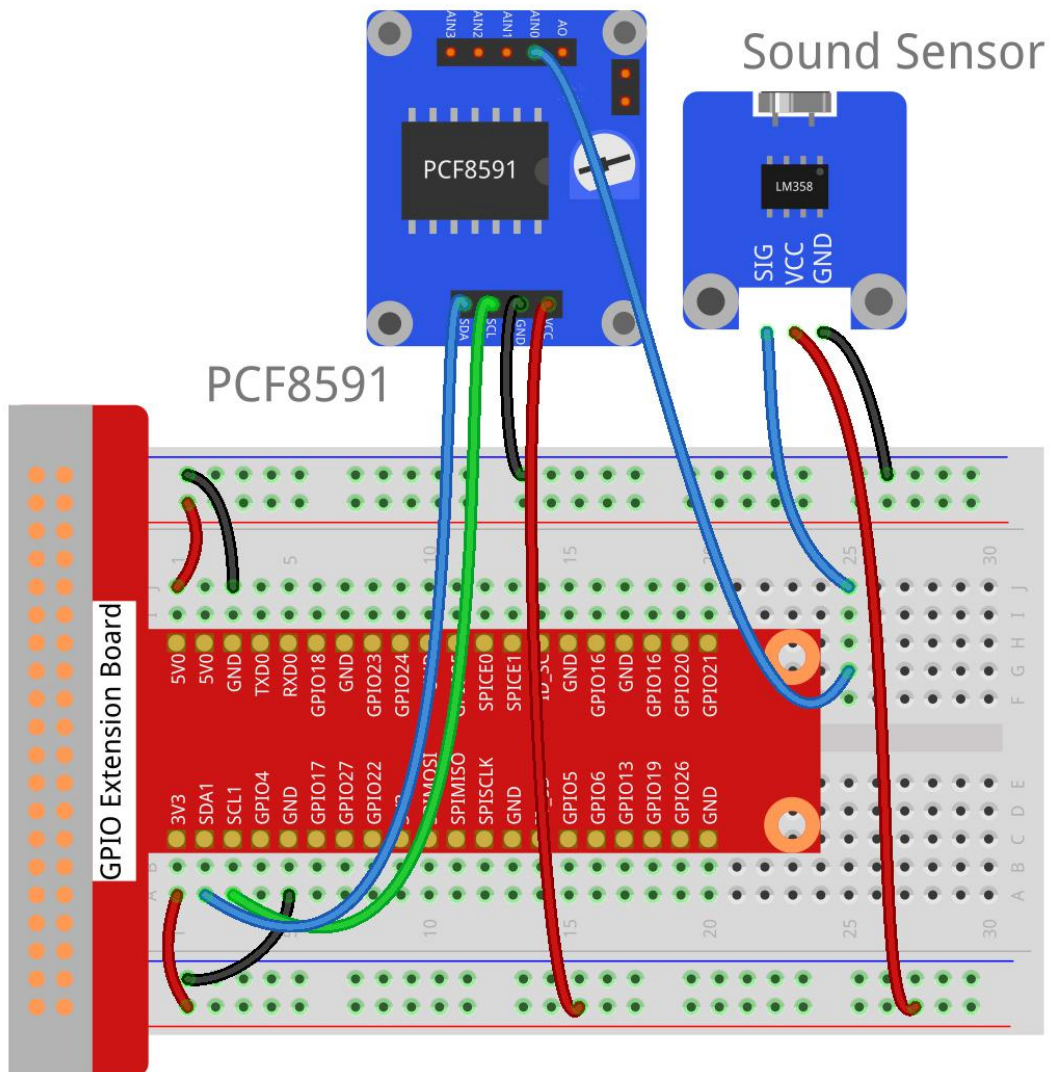


## Schematic Diagram

Raspberry Pi	PCF8591 Module	Sound Sensor Module
SDA	SDA	
SCL	SCL	
3V3	VCC	VCC
GND	GND	GND
*	AIN0	SIG

## Experimental Procedures

### Step 1: Build the circuit



**For C language users:**

## Step 2: Change directory

```
cd /home/pi/REXQualis_Raspberry_Pi_Complete_Starter_Kit/C/27.Sound_Sensor
```

## Step 3: Compile the code

```
gcc 27.Sound_Sensor.c -o Sound_Sensor.out -lwiringPi
```

## Step 4: Run the executable file output in the previous step.

```
sudo ./Sound_Sensor.out
```

Now, say something or blow to the microphone, and you can see "Voice In!! \*\*\*\*" printed on the screen.

## Code

```
#include <stdio.h>
```

```

#include <wiringPi.h>

#include <pcf8591.h>

#define PCF      120

int main (void)
{
    int value;

    int count = 0;

    wiringPiSetup ();      // Setup pcf8591 on base pin 120, and address 0x48
    pcf8591Setup (PCF, 0x48);

    while(1) // loop forever
    {
        value = analogRead  (PCF + 0);

        //printf("%d\n", value);

        if (value <50){
            count++;

            printf("Voice In!!  %d\n", count);
        }
    }

    return 0;
}

```

## For Python users:

### Step 2: Change directory

```
cd /home/pi/REXQualis_Raspberry_Pi_Complete_Starter_Kit/Python
```

### Step 3: Run

```
sudo python3 27.Sound_Sensor.py
```

### Code

```

#!/usr/bin/env python3

import PCF8591 as ADC

```

```
import RPi.GPIO as GPIO

import time

GPIO.setmode(GPIO.BCM)

def setup():
    ADC.setup(0x48)

def loop():
    count = 0

    while True:

        voiceValue = ADC.read(0)

        if voiceValue:

            print ("Value:", voiceValue)

            if voiceValue < 50:

                print ("Voice detected! ", count)

                count += 1

                time.sleep(0.2)

if __name__ == '__main__':
    try:
        setup()

        loop()

    except KeyboardInterrupt:

        pass
```

## Phenomenon Picture

