Ultrasonic ranging

Overview

This lesson will teach you how to use HC-SR04 module to test distance. It is generally used in the robot.

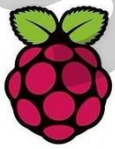
Specification

Please view “HCSR04.pdf”
Path: \Public_materials\Datasheet\ HCSR04.pdf

Pin definition

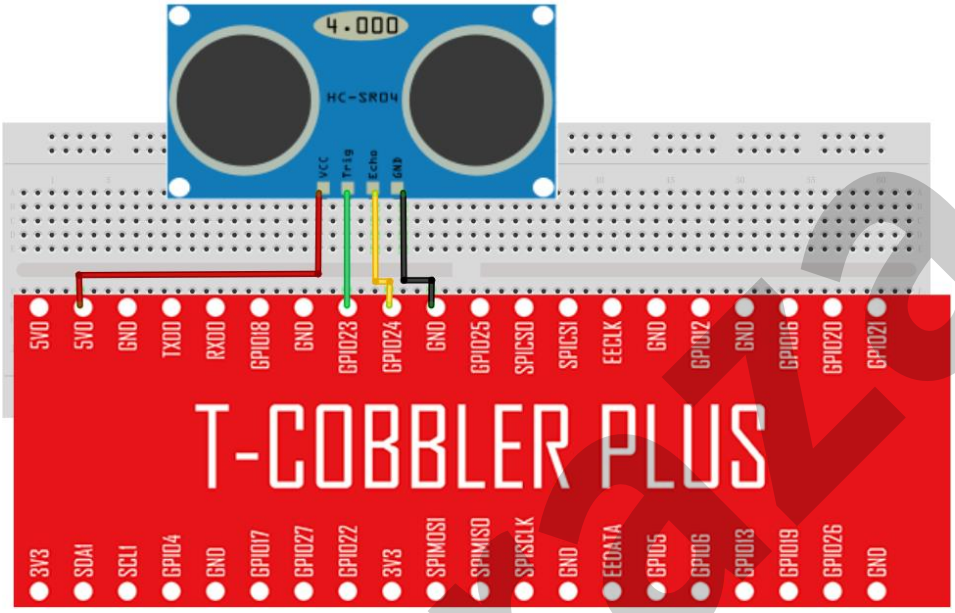
HC SR04		RPI
Vcc	->	5V0
Trig	->	GPIO23
Echo	->	GPIO24
Gnd	->	GND

Hardware required

Material diagram	Material name	Number
	HCSR04	1
	Raspberry Pi Board	1
	T-Cobbler Plus	1
	40P GPIO Cable	1
	Breadboard	1

	Jumper wires	Several

Connection diagram



Connection

HC SR04		RPI
Vcc	->	5V0
Trig	->	GPIO23
Echo	->	GPIO24
Gnd	->	GND

Sample code

Note: sample code under the **Sample code** folder

```
#include <wiringPi.h>
#include <stdio.h>
#include <sys/time.h>

#define Trig    4
#define Echo    5

void ultraInit(void)
{
    pinMode(Echo, INPUT);
    pinMode(Trig, OUTPUT);
}
```

```
float disMeasure(void)
{
    struct timeval tv1;
    struct timeval tv2;
    long start, stop;
        float dis;

    digitalWrite(Trig, LOW);
    delayMicroseconds(2);

    digitalWrite(Trig, HIGH);
    delayMicroseconds(10);
    digitalWrite(Trig, LOW);
    while(!(digitalRead(Echo) == 1));
    gettimeofday(&tv1, NULL);

    while(!(digitalRead(Echo) == 0));
    gettimeofday(&tv2, NULL);

    start = tv1.tv_sec * 1000000 + tv1.tv_usec;
    stop  = tv2.tv_sec * 1000000 + tv2.tv_usec;

    dis = (float)(stop - start) / 1000000 * 34000 / 2;

    return dis;
}

int main(void)
{
    float dis;

    if(wiringPiSetup() == -1){ //when initialize wiring failed,print messageto screen
        printf("setup wiringPi failed !");
        return 1;
    }

    ultraInit();
     printf( "Welcome to Smraza\n");
     printf( "Raspberry HC sr04 test program\n" );
     printf( "Press Ctrl+C to exit\n" );
    while(1){
        dis = disMeasure();
        printf("distance = %0.2f cm\n",dis);
        delay(1000);
```

```
    }

    return 0;
}
```

Compiling: gcc -Wall -o HCsr04 HCsr04.c -lwiringPi

Run: sudo ./HCsr04

Tips: Press “Ctrl+C” to exit

Application effect

When you are running program, you will see the parameters returned by the ultrasonic module.