

No Blind Ultrasonic User Guide

Part 1 Ultrasonic Introduction

1. 1 Ultrasonic Definition

The human ear can hear sound frequency around 20HZ ~ 20KHZ, and ultrasonic is the sound wave beyond the human ability of 20KHZ .

1.2 Ultrasonic distance measurement principle

Ultrasonic transmitter emitted an ultrasonic wave in one direction, and started timing when it launched. Ultrasonic spread in the air, and would return immediately when it encountered obstacles on the way. At last, the ultrasonic receiver would stop timing when it received the reflected wave. As Ultrasonic spread velocity is 340m / s in the air, based on the timer record t , we can calculate the distance (s) between the obstacle and transmitter, namely: $s = 340t / 2$, which is so- called time difference distance measurement principle

The principle of ultrasonic distance measurement used the already-known air spreading velocity, measuring the time from launch to reflection when it encountered obstacle, and then calculate the distance between the transmitter and the obstacle according to the time and the velocity. Thus, the principle of ultrasonic distance measurement is the same with radar.

Distance Measurement formula is expressed as: $L = C \times T$

In the formula, L is the measured distance, and C is the ultrasonic spreading velocity in air, also, T represents time (T is half the time value from transmitting to receiving).

1.3 Ultrasonic Application

Ultrasonic Application Technology is the thing which developed in recent decades. With the ultrasonic advance, and the electronic technology development, especially as high-power semiconductor device technology matures, the application of ultrasonic has become increasingly widespread:

- Ultrasonic measurement of distance, depth and thickness;
- Ultrasonic testing;
- Ultrasound imaging;
- Ultrasonic machining, such as polishing, drilling;
- Ultrasonic cleaning;
- Ultrasonic welding;

Part 2 No Blind Ultrasonic Introduction

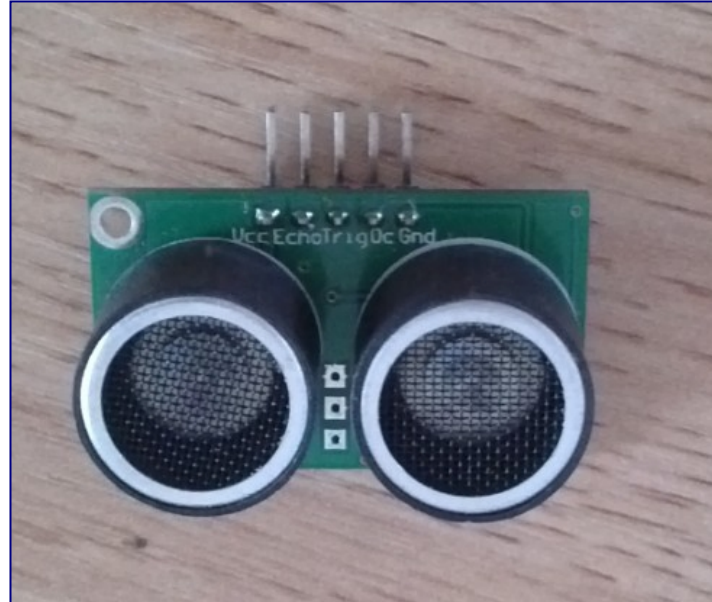
2.1 Product Features

- Stable performance
- Accurate distance measurement
- High-density
- No blind

Application Areas:

- Robotics barrier
- Object distance measurement
- Level detection
- Public security
- Parking detection

2.2 Product Image



2.3、 Module Pin Definition

Type	Pin symbol	Pin function description
SDM-IO module	VCC	5V power supply
	Trig	Trigger pin
	Echo	Receive pin
	GND	Power ground

2.4、 Electrical parameters

Electrical Parameters	SDM-IO No Blind Ultrasonic Module
Operating Voltage	DC-5V
Operating Current	8mA
Operating Frequency	40KHZ
Farthest Range	2m
Nearest Range	0cm
Measuring Angle	15 Degree
Input Trigger Signal	10us 0 Signal
Output Echo Signal	Output TTL level signal, proportional with range
Dimensions	35*20*15mm

2.5、 Module Operating Principle and Features

Operating Principle:

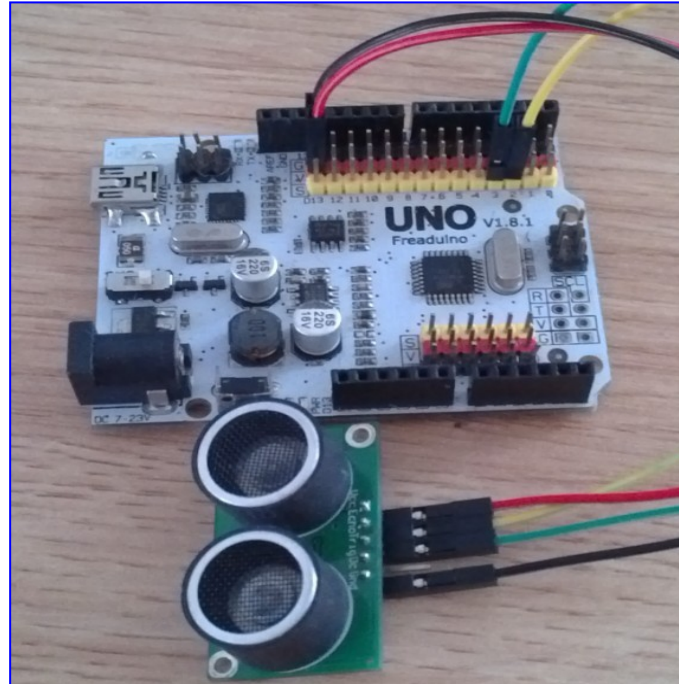
1. Using IO trigger to measure distance, giving TRIG at least 10us signal.
2. The module automatically sends eight 40KHZ square wave, and automatically detects whether a signal returns.
3. If the signal returns, ECHO would outputs a 0 signal after test. The duration from TRIG = 1 to ECHO = 0 is the time of ultrasonic wave from the transmitter to return.
4. When TRIG from 0 -> 1, the MPU starts 18ms timer to control this measurement timeout. When more than 18ms, ECHO still does not appear 250us 0 signal, which means that there are no obstructions.

Main features:

1. Ultra-miniature, only the equivalent of two transmitter and receiver head of the area, unable to be smaller.
2. No blind spots (within 15mm a triangle measurement results will be between 8-20mm).
3. Fast response, and 18ms measurement period enable it not easy to lose high-speed targets.
4. Reflective head is close to receiving head, and they form basically linear relationship with the measured objectives.
5. The module has LED indicators to facilitate the observation and testing.

Part3 Use Freaduino UNO to test SDM-IO

3.1、 Freaduino UNO and SDM-IO Connection



Connection Description: D2<----->Echo D3<----->Trig(User can self-define the connection pin)

3.2、 NoBlind_ultrasonic library function description

.2.13、 unsigned int ping()

Function name: ping

Parameters: None

Return Value: the time of ultrasonic from the transmitter to the receiver

3.2.2、 unsigned int ping_in()

Function name: ping_in

Parameters: None

Return Value: the measured distance (in inches)

3.2.3、 unsigned int ping_cm()

Function name: ping_cm

Parameters: None

Return value: measured distance (in centimeters)

3.2.4、 boolean ping_trigger()

Function name: ping_trigger

Parameters: None

Return value: true ----- module triggers success
false ----- module triggers failure

3.2.5、 void ping_timer(void (*userFunc)(void))

Function name: ping_timer

Parameters: userFunc: function for Timer from timing to performing

Return Value: None

3.2.6、 boolean check_timer()

Function name: check_timer

Parameters: None

Return value: true ----- detected ultrasonic

False ---- not detected ultrasonic

3.3、 NoBlind_ultrasonic Library Use

Step1: Unpack the compressed bag of NoBlind_ultrasonic to get the file of NoBlind_ultrasonic

Step2: Add the file of NoBlind_ultrasonic in the file of Arduino-1.0.X / libraries.

Step3: If you can see the Example of NoBlind_ultrasonic in Arduino IDE, the adding of NoBlind_ultrasonic library has been successful.

3.4、 Test the Module with the Examples of Library File

1. Open Arduino IDE 1.0.X, and choose the corresponding board and serial port.
2. Click file/ examples/ NoBlind_ultrasonic until the code pop up.
3. Compiling sketch until Done uploading appears, which represents the uploading has been successful.
4. Open serial monitor and set the corresponding BaudRate.
5. If you see similar information in serial monitor as below, you succeeded.

