MODEL: JSN-SR04M-2 / 200427

ULTRASONIC RANGING AMPLIFIER

Introduction:

How do you deal with the problem that traditional non-waterproof ultrasonic distance sensor can not be used outside for a long time in rainy day. Now, don't worry, this weather - proof ultrasonic sensor with separate probe can help you with this problem. With fully enclosed waterproof design, the module is suitable for outdoor applications in rainy days, such as car reverse ranging, security alarms, industrial inspection, etc.

Application: high precision long-distance ranging, obstacle avoidance, automatic control, object approach, existence detection, artificial intelligence, scientific research and experiment, traffic, security and industrial control

NOTE:

The module is not suggested to connect directly to electric, if connected electric, the GND terminal should be connected the module first, otherwise, it will affect the normal work of the module.
When tested objects, the range of area is not less than 0.5 square meters and the plane requests as smooth as possible, otherwise, it will affect the results of measuring

Specification:

Operating voltage	3.0 ~ 5.5VDC
Working Current	less than 8mA
Frequency	40kH
Max Range	600mm
Tolerance Range	200mm
Long Range Accuracy	±10mm
Resolution	1mm
Measuring Angel	75°
Input Trigger Signal	1, TTL pulse grater than 10uS 2, Serial port send instruction: 0X55
Output Echo Signal	Outout pulse width signal ot TTL
Connection Mode	Positive triger (control) RX Echo (output) TX GND
Board Size	42x29x12mm
Operating Temperature	-20°C ~ +70°C

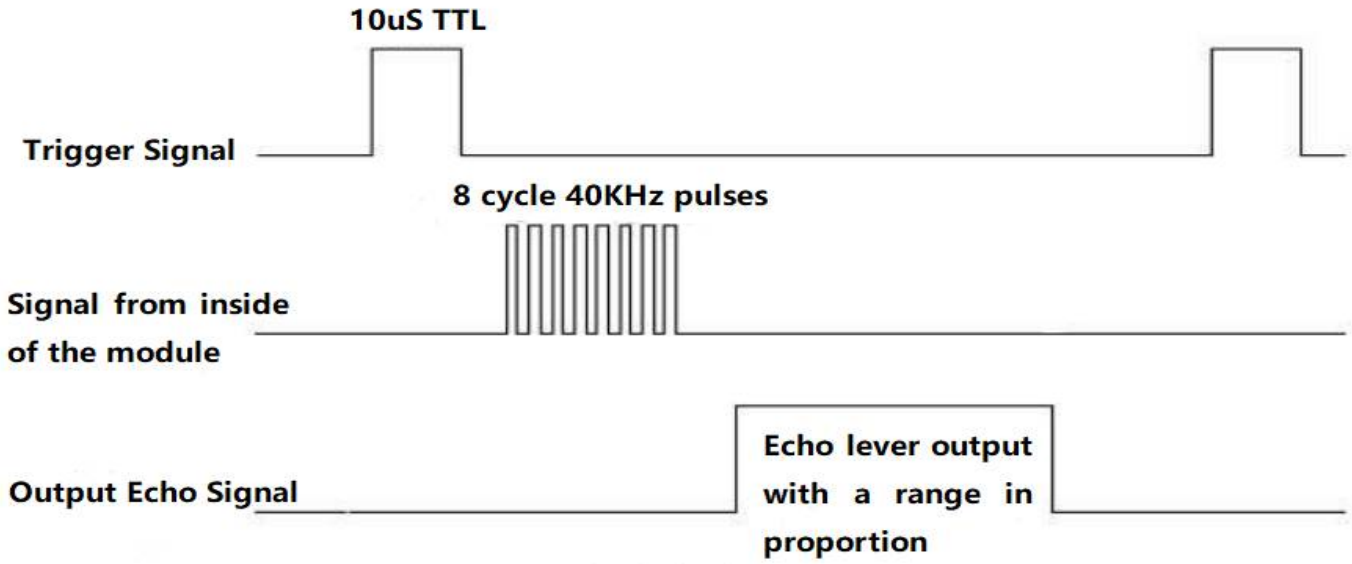
Pin Specifications:

VCC: Positive supply
Trig/RX: Input high level more that 10uS, to trigger the module ranging / UART receiver
Ehco/TX: End of ranging , outputs a high level signal width = sum of ultrasonic rounding trip time / UART TX
GND: Ground

Fundamental Principles:

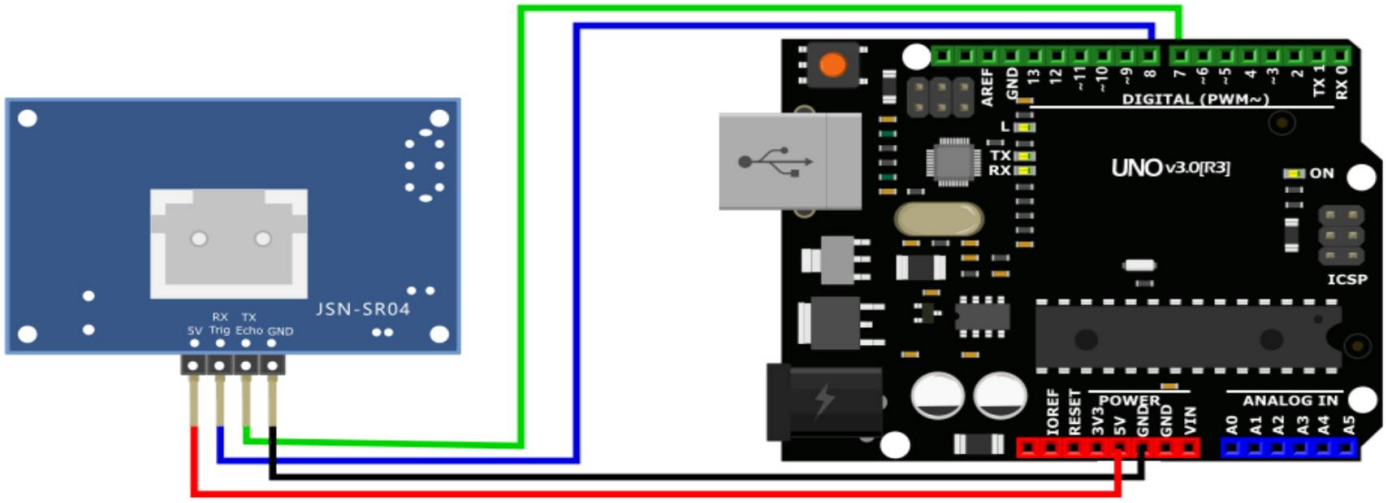
1. Adopt IO port TRIG to trigger ranging. Present a high level signal of at least 10us.
2. The module automatically sends eight 40khz square waves and automatically detects whether a signal returns;
3. When a signal returns, a high level is output through the IO port ECH0. The duration of the high level is the time from the transmission of the ultrasonic wave to the return. Test distance in normal temperature= (high level time * speed of sound (348M/S))/2.
4. After the module is triggered for ranging, if the echo cannot be received (Reason: The ultrasonic wave exceeds the measured range or the probe doesn't directly points at the measured object), the ECHO port will automatically become low after 40MS, marking the end of the measurement, regardless of success.
5. The LED does not light up until there is a triggering signal to the TRIG pin. The frequency of light flashing is synchronized with the trigger cycle, indicating that the module receives the correct command and enters the working state at this time.

Ultrasonic Timing diagram:



The Timing diagram below shows that you only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle level at 40 kHz and raise its echo. Once an echo signal is detected, an echo signal is output. The pulse width of the echo signal is directly proportional to the measured distance. You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: uS / 57.5 = centimeters or uS / 148 =inch; or: the range = high level time * velocity (348M/S) / 2; we suggest to use over 50ms measurement cycle, in order to prevent effect caused by trigger signal to the echo signal.

Connection Diagram:



Arduino Sketch:

```
/* ***************************************************
* @brief Water-proof Ultrasonic Sensor (ULS)

 * @copyright   [DFRobot](http://www.dfrobot.com), 2016
 * @copyright   GNU Lesser General Public License

* @author [huyujie](yujie.hu@dfrobot.com)
* @version  V1.0
* @date  2020-12-7

* GNU Lesser General Public License.
* All above must be included in any redistribution
* ****************************************************/

#include <SoftwareSerial.h>
unsigned char buffer_RTT[4] = {0};// Used to store data read from the serial port
int Distance = 0;//Used to store the read distance value
unsigned char CS;//Save checksum
SoftwareSerial mySerial(7, 8); // RX, TX
void setup() {
  Serial.begin(115200);
  mySerial.begin(9600);
}
void loop() {
  if(mySerial.available() > 0){
    delay(4);
    if(mySerial.read() == 0xff){    //Judge packet header
      buffer_RTT[0] = 0xff;
      for (int i=1; i<4; i++){
        buffer_RTT[i] = mySerial.read();    //Read data
      }
      CS = buffer_RTT[0] + buffer_RTT[1]+ buffer_RTT[2];  //Compute checksum
      if(buffer_RTT[3] == CS) {
        Distance = (buffer_RTT[1] << 8) + buffer_RTT[2];//Calculate distance
        Serial.print("Distance:");
        Serial.print(Distance);
        Serial.println("mm");
      }
    }
  }
}
```