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SEN0311

A02YYUW Ultrasonic distance sensor, 3.3...5V DC, UART, 0.03...4.5m, IP67

Hestore no.: 100.433.43



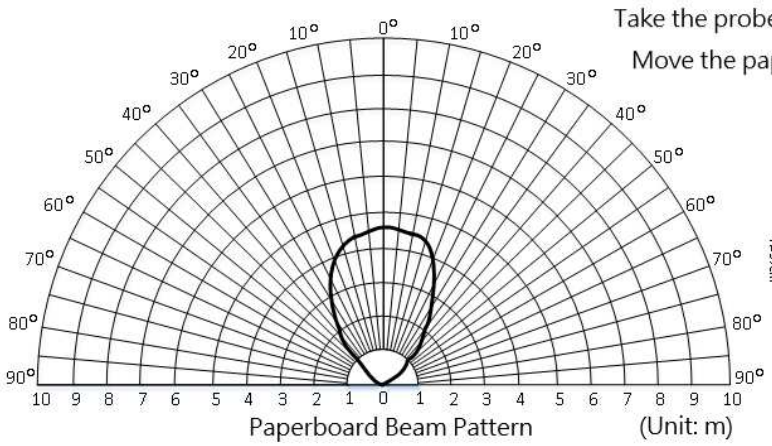
Ultrasonic distance sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse.

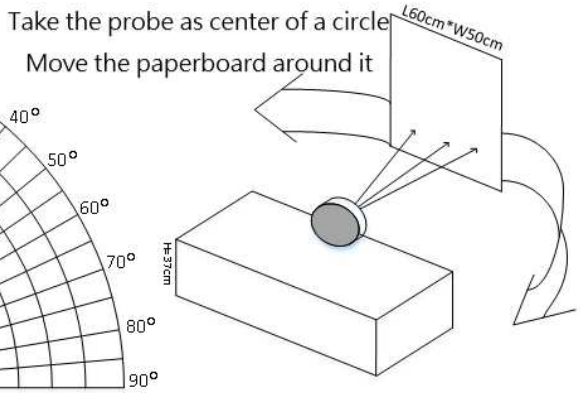
A02YYUW is an waterproof ultrasoinic sensor module with 4.5m effective ranging distance. It supports 3.3~5V wide voltage range and is compatible with 3.3V or 5V device like Arduino, Raspberry Pi, etc. The average current of A02YYUW is only 8mA so it can be powered by most controllers' IO port. The ultrasonic sensor adopts closed separated probe, waterproof and dustproof, which could be well suitable for harsh and moist measuring environment. All the signal processing units are integrated inside the module, so users can directly obtain the distance value through Asynchronous Serial Interface. With 9600bit/s band rate, the sensor can easily communicate with upper-host or other MCU, which greatly shortens the developing cycle for users.

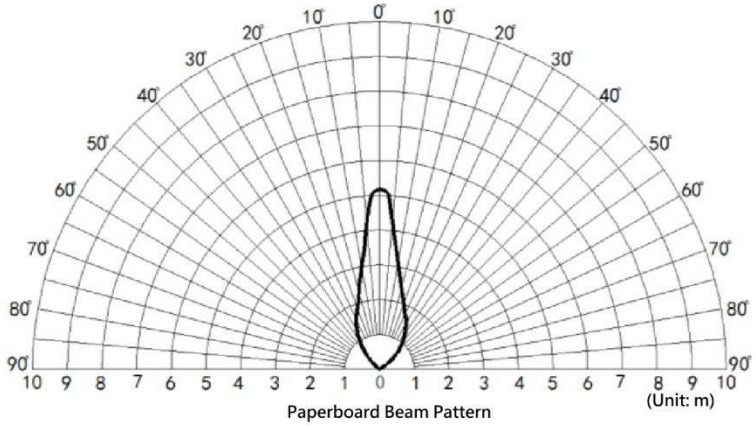
Use the sensor with Arduino controller to build up your projects, such as backing car annunciator, obstacle avoidance robot, object approaching detection etc.

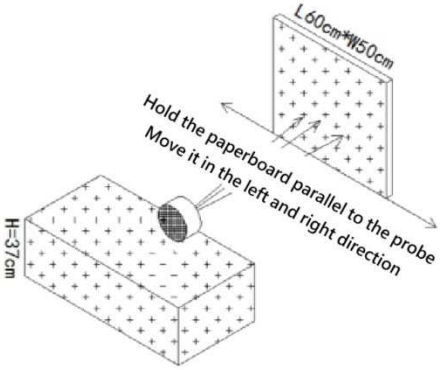
Specification

- Operating Voltage: 3.3~5V
- standby Current: ≤5mA
- Average Current: ≤8mA
- Blind Zone Distance: 3cm
- Ranging Distance for Flat Object: 3-450cm
- Output: UART
- Response Time: 100ms
- Probe Center Frequency: 40K±1.0K
- Operating Temperature: -15~60℃
- Storage Temperature: -25~80℃
- Sensing Angle: 100°
- Protection Rate: IP67





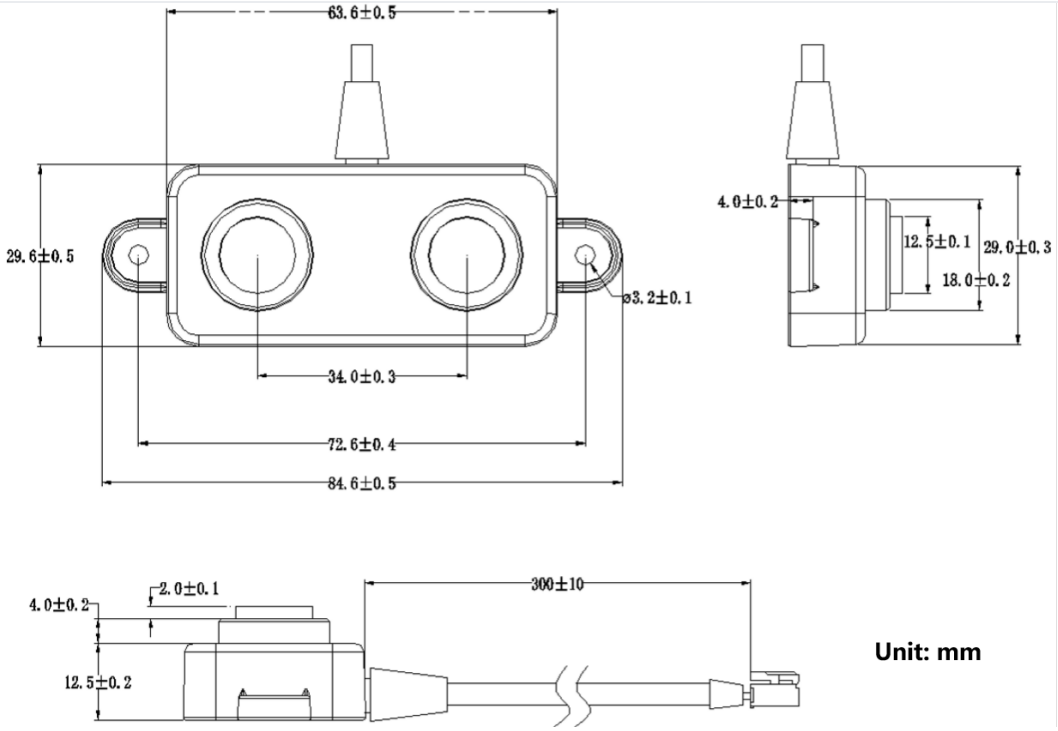




Features

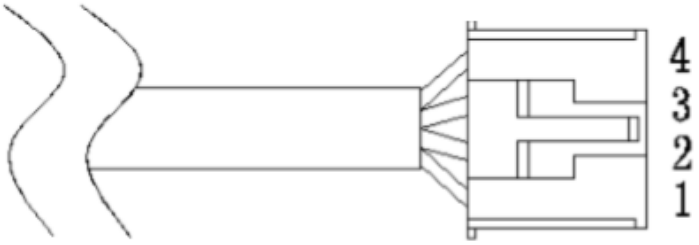
- Smaller Blind Zone
- Strong Resistance
- Stable Output
- Low Power
- Fast Response
- High Antistatic Performance
- Wide Operating Temperature
- High Accuracy

Installation Dimension



Pinout

Label	Name	Description
1	VCC	Power Input
2	GND	Ground
3	RX	Processed Value/Real-time Value Output Selection
4	TX	UART Output



UART Output

Output Communication

When "RX" floats or input High level, the module outputs processed value, the data is more steady, response time: 100-300ms; when input Low level, the module outputs real-time value, response time: 100ms.

UART	data bit	stop bit	parity	band rate
TTL level	8	1	none	9600bps

UART Output Form

Frame Data	Description	Byte
Header	0xFF	1 byte
DATA_H	Distance Data High 8-bits	1 byte
DATA_L	Distance Data Low 8-bits	1 byte
SUM	Checksum	1 byte

UART Output

Header	DATA_H	DATA_L	SUM
0xFF	0x07	0xA1	0xA7

Note: checksum only reserves the low 8-bits of the accumulated value.

```
SUM=(Header+Data_H+Data_L)&0x00FF
=(0XFF + 0X07 + 0XA1)&0x00FF
=0XA7;
```

Distance= Data_H*256+ Data_L=0X07A1;

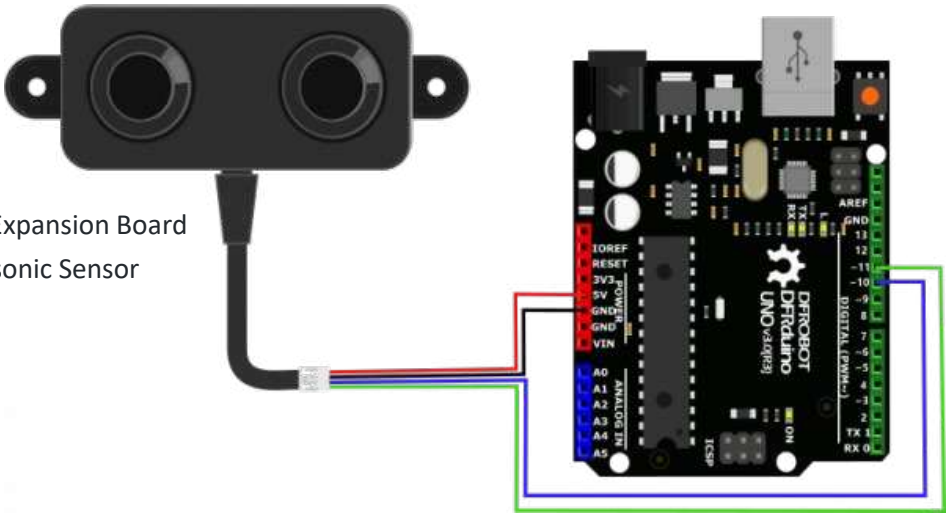
Equal to 1953 when converted into decimal;

Represent the current measured distance is 1953mm.

Arduino Platform

Preparation

- Hardware
  - Arduino UNO
  - UNO IO Sensor Expansion Board
  - A02YYUW Ultrasonic Sensor
  - 4P Connector
- Software
  - Arduino IDE



Sample Code

```
/*
  *@File  : DFRobot_Distance_A02.ino
  *@Brief : This example use A02YYUW ultrasonic sensor to measure distance
  *         With initialization completed, We can get distance value
  *@Copyright [DFRobot](https://www.dfrobot.com),2016
  *           GUN Lesser General Pulic License
  *@version V1.0
  *@data  2019-8-28
*/

#include <SoftwareSerial.h>

SoftwareSerial mySerial(11,10); // RX, TX
unsigned char data[4]={};
float distance;

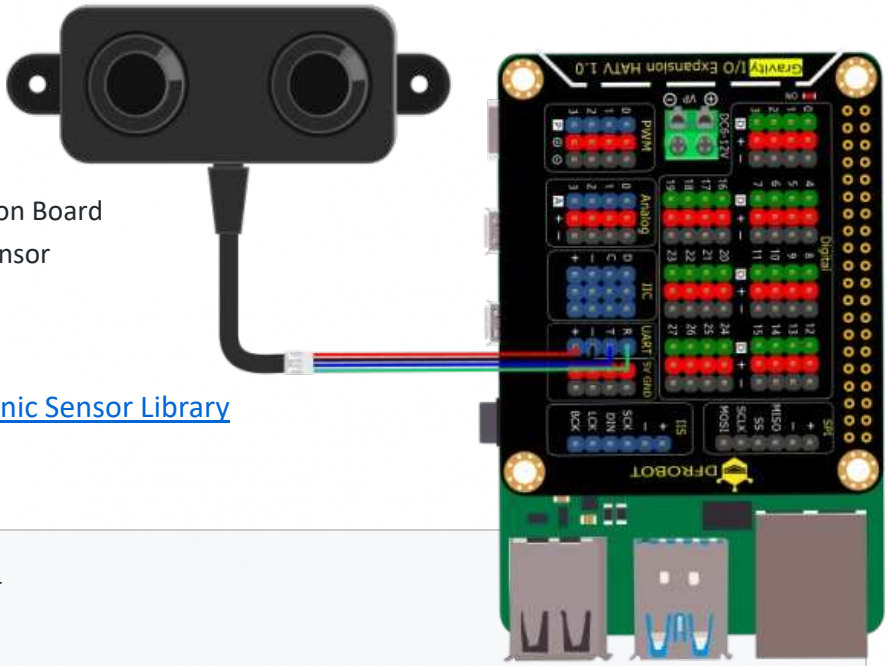
void setup()
{
 Serial.begin(57600);
 mySerial.begin(9600);
}

void loop()
{
    do{
     for(int i=0;i<4;i++)
     {
       data[i]=mySerial.read();
     }
  }while(mySerial.read()==0xff);

  mySerial.flush();

  if(data[0]==0xff)
    {
      int sum;
      sum=(data[0]+data[1]+data[2])&0x00FF;
      if(sum==data[3])
      {
        distance=(data[1]<<8)+data[2];
        if(distance>30)
          {
           Serial.print("distance=");
           Serial.print(distance/10);
           Serial.println("cm");
          }else
             {
               Serial.println("Below the lower limit");
             }
      }else Serial.println("ERROR");
     }
     delay(100);
}
```

Raspberry Pi Platform



Preparation

- Raspberry Pi 4B
- Raspberry Pi IO Expansion Board
- A02YYUW Ultrasonic Sensor
- 4P Connector
- **Sample Code**

- Download the Ultrasonic Sensor Library

```
# -*- coding:utf-8 -*-

'''
  # demo_get_distance.py
  #
  # Connect board with raspberryPi.
  # Run this demo.
  #
  # Connect A02 to UART
  # get the distance value
  #
  # Copyright   [DFRobot](https://www.dfrobot.com), 2016
  # Copyright   GNU Lesser General Public License
  #
  # version  V1.0
  # date  2019-8-31
'''

import time

from DFRobot_RaspberryPi_A02YYUW import DFRobot_A02_Distance as Board

board = Board()

def print_distance(dis):
  if board.last_operate_status == board.STA_OK:
    print("Distance %d mm" %dis)
  elif board.last_operate_status == board.STA_ERR_CHECKSUM:
    print("ERROR")
  elif board.last_operate_status == board.STA_ERR_SERIAL:
    print("Serial open failed!")
  elif board.last_operate_status == board.STA_ERR_CHECK_OUT_LIMIT:
    print("Above the upper limit: %d" %dis)
  elif board.last_operate_status == board.STA_ERR_CHECK_LOW_LIMIT:
    print("Below the lower limit: %d" %dis)
  elif board.last_operate_status == board.STA_ERR_DATA:
    print("No data!")

if __name__ == "__main__":
  dis_min = 0   #Minimum ranging threshold: 0mm
  dis_max = 4500 #Highest ranging threshold: 4500mm
  board.set_dis_range(dis_min, dis_max)
  while True:
    distance = board.getDistance()
    print_distance(distance)
    time.sleep(0.3) #Delay time < 0.6s
```