

Radar-cat



Simulation Radar Ultrasonic Learning Kit

V1.0.23.12.22

Packing list

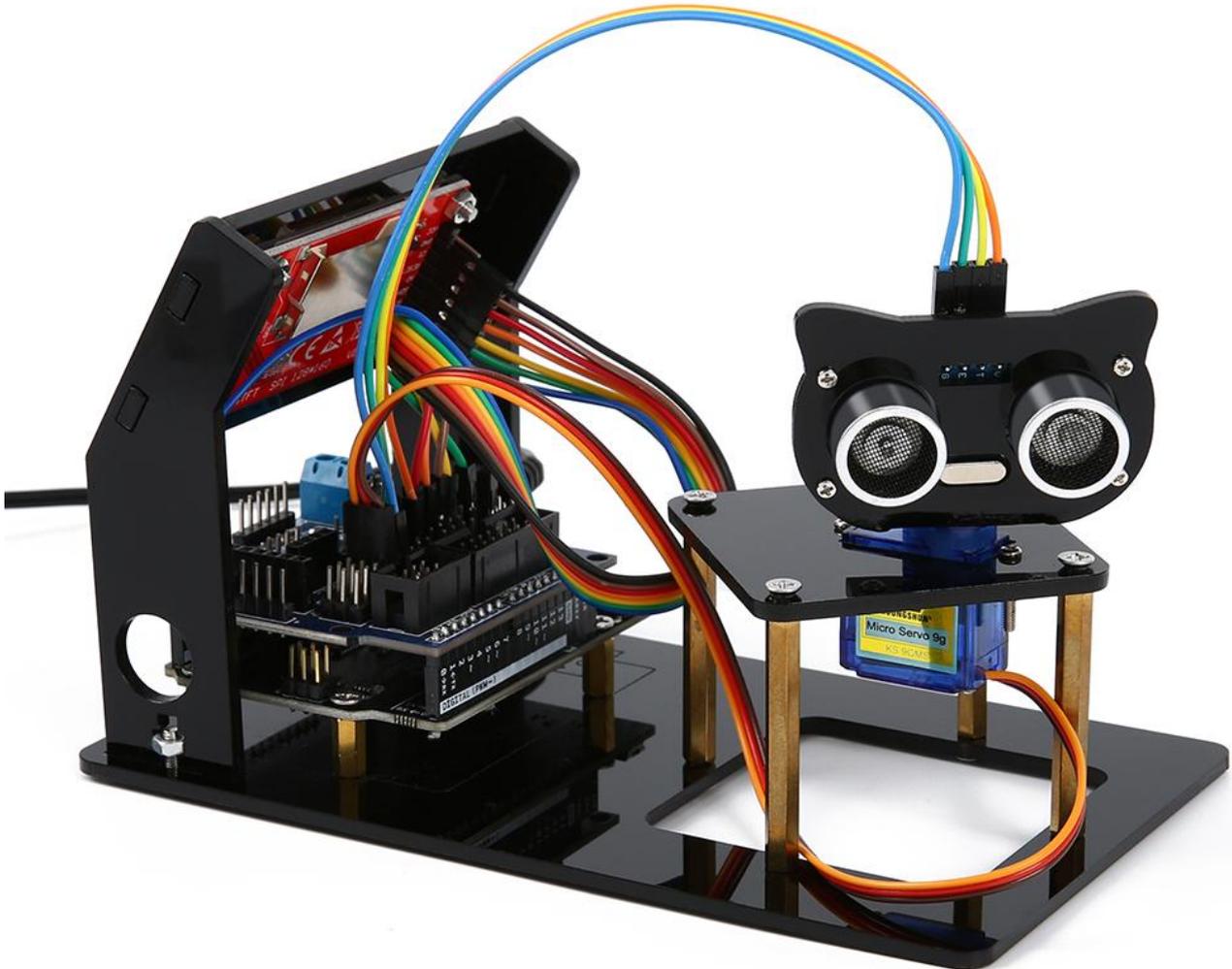


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Part 0 Preparation

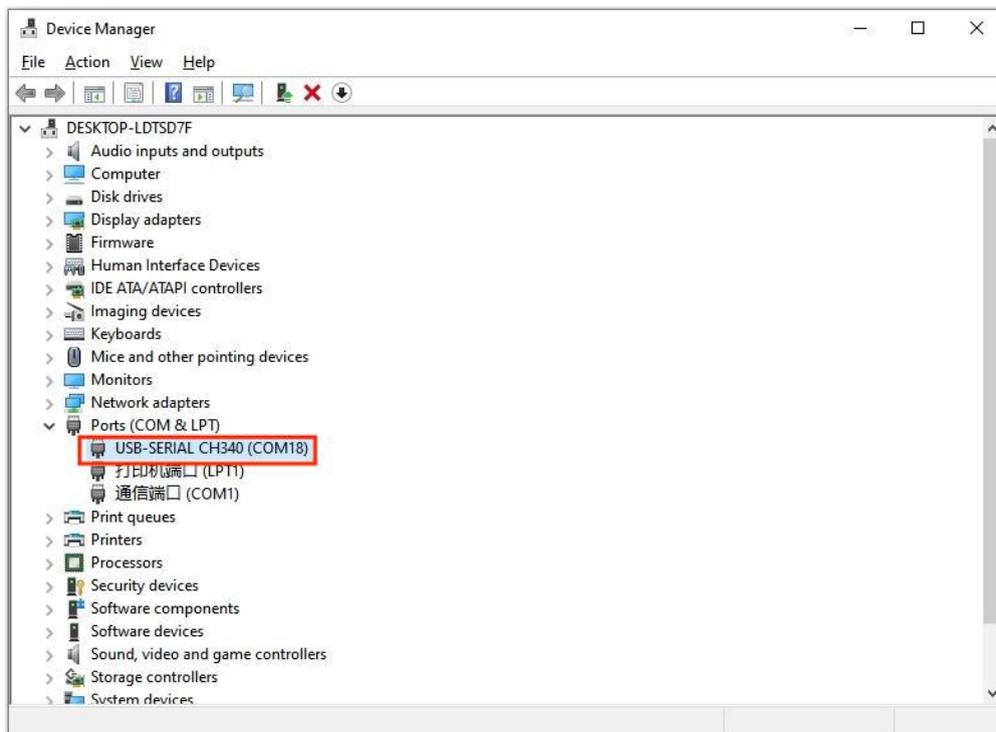
Before proceeding with this tutorial, make sure you have finished putting the model together in “1_Assembly_Guide”.



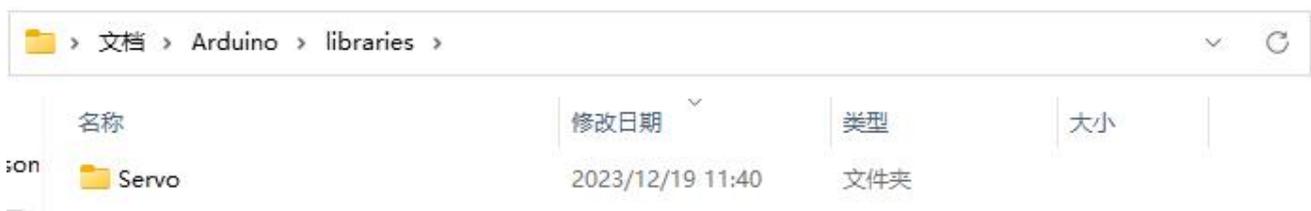
Please also complete the ARDUINO software download:



CH340 driver installation:



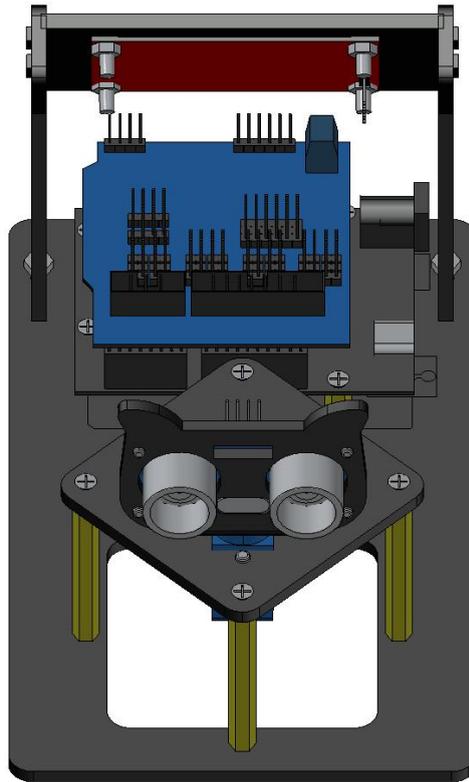
and library addition in “2_Programming_Preparation”.



If any step has not been completed, refer to "1_Assembly_Guide or 2_Programming_Preparation".

Part 1 Simulation Radar Code

We set that when the servo motor is turned to 90 degrees, the object is in a centered state, as shown in the figure.



But in fact, when installing the servo motor, the program Angle and the actual Angle are often inconsistent.

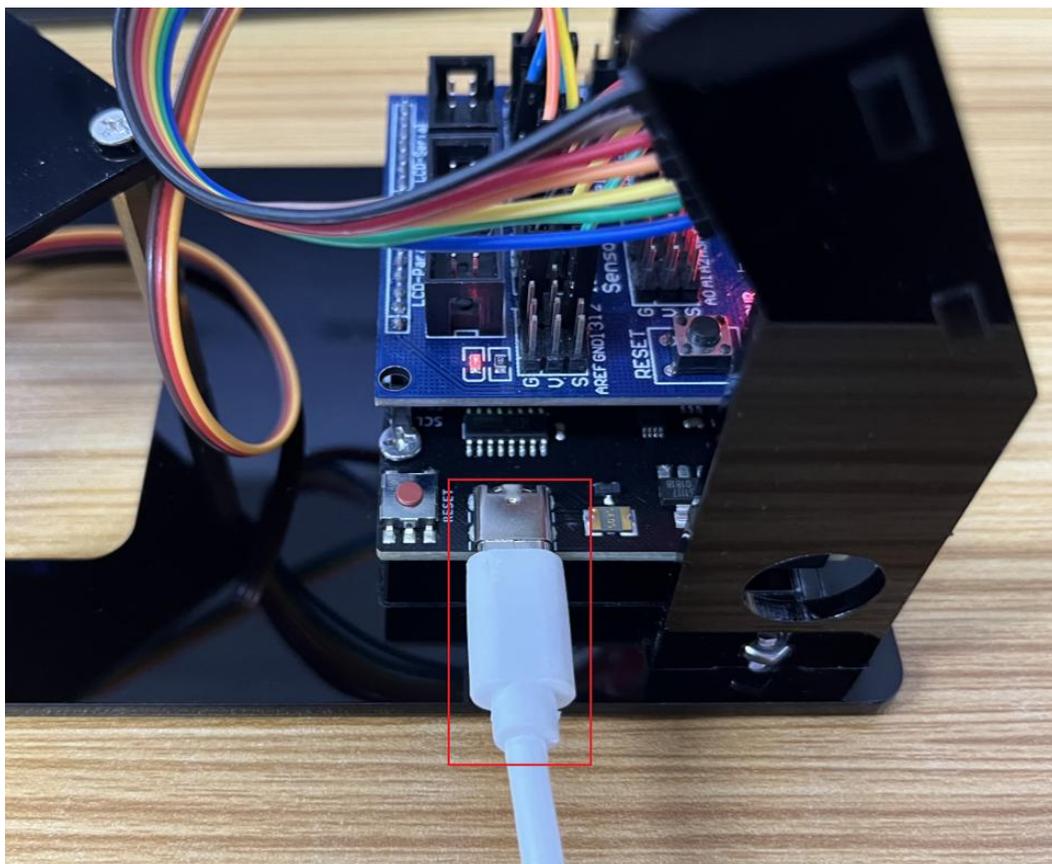
So we can use the program to see if the Angle of the servo motor is the same as the Angle we installed:

①Go to the following path and open the program

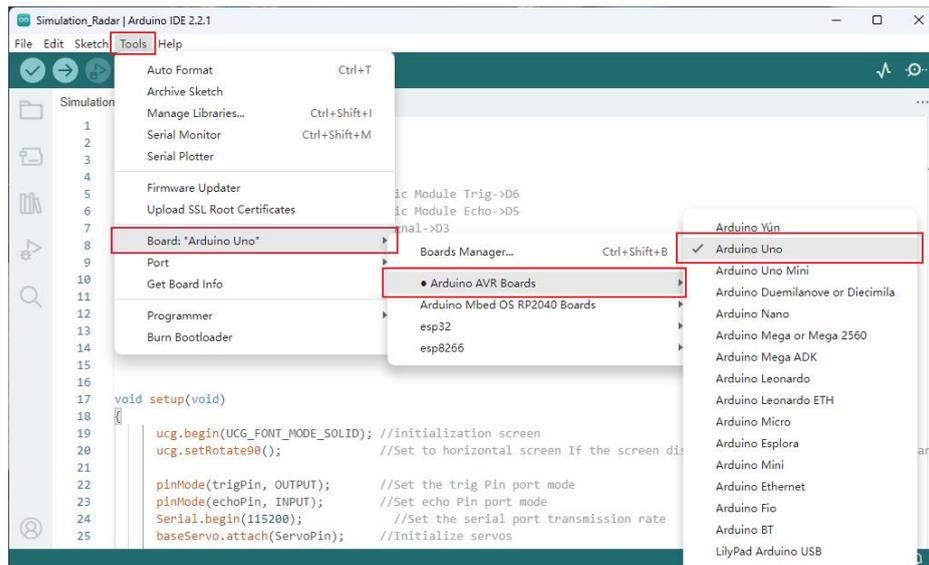


```
Simulation_Radar | Arduino IDE 2.2.1
File Edit Sketch Tools Help
Select Board
Simulation_Radar.ino
1  /*Simulation radar kit*/
2  #include <Servo.h>
3  #include <SPI.h>
4  #include "Ucglib.h"
5  #define trigPin 6 //Ultrasonic Module Trig->D6
6  #define echoPin 5 //Ultrasonic Module Echo->D5
7  #define ServoPin 3 //Servo Signal->D3
8  int Ymax = 128; //vertical pixels of the screen
9  int Xmax = 160; //horizontal pixels of the screen
10 int Xcent = Xmax / 2; //Horizontal screen center position
11 int base = 118; //baseline position
12 int scanline = 105; //Radar scan line length
13 Servo baseServo;
14 Ucglib_ST7735_18x128x160_HWSPI ucg(/*cd=*/ 9, /*cs=*/ 10, /*reset=*/ 8);
15
16
17 void setup(void)
18 {
19     ucg.begin(UCG_FONT_MODE_SOLID); //initialization screen
20     ucg.setRotate90(); //Set to horizontal screen If the screen
21
22     pinMode(trigPin, OUTPUT); //Set the trig Pin port mode
23     pinMode(echoPin, INPUT); //Set echo Pin port mode
```

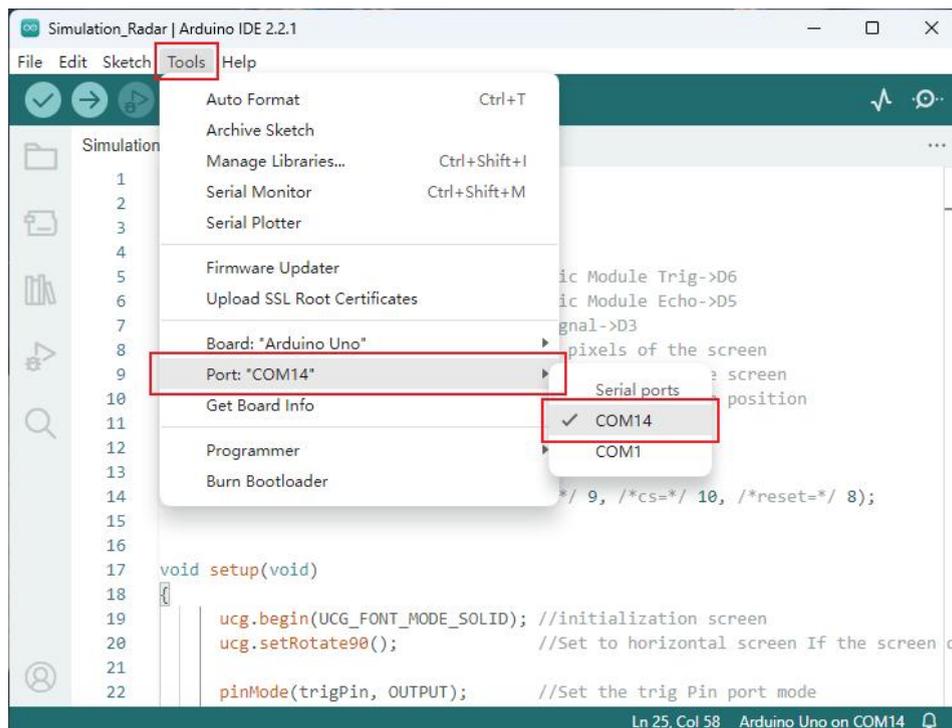
② Connect the Arduino board to your computer with a TYPE-C cable



③ Select your Board in Tools > Board >>>> Arduino UNO

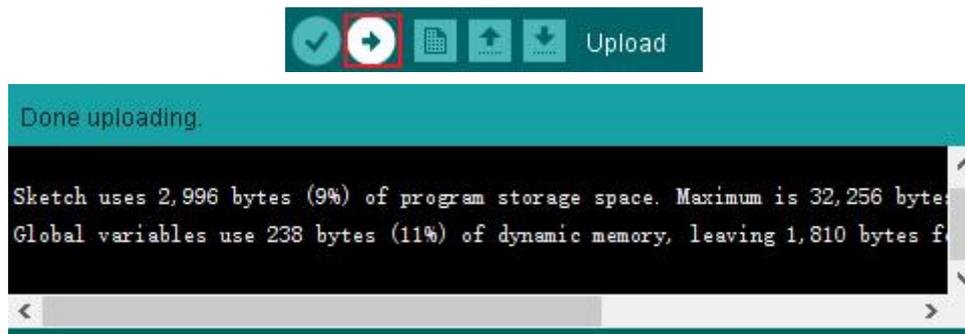


④ Select the Port. (The COM port number of each computer may be different, and the port number that appears is your port number) (If you do not see COM ports other than COM1 in Arduino IDE, you need to refer to the installation of CH340 driver in "2_Programming_Preparation" and install it)





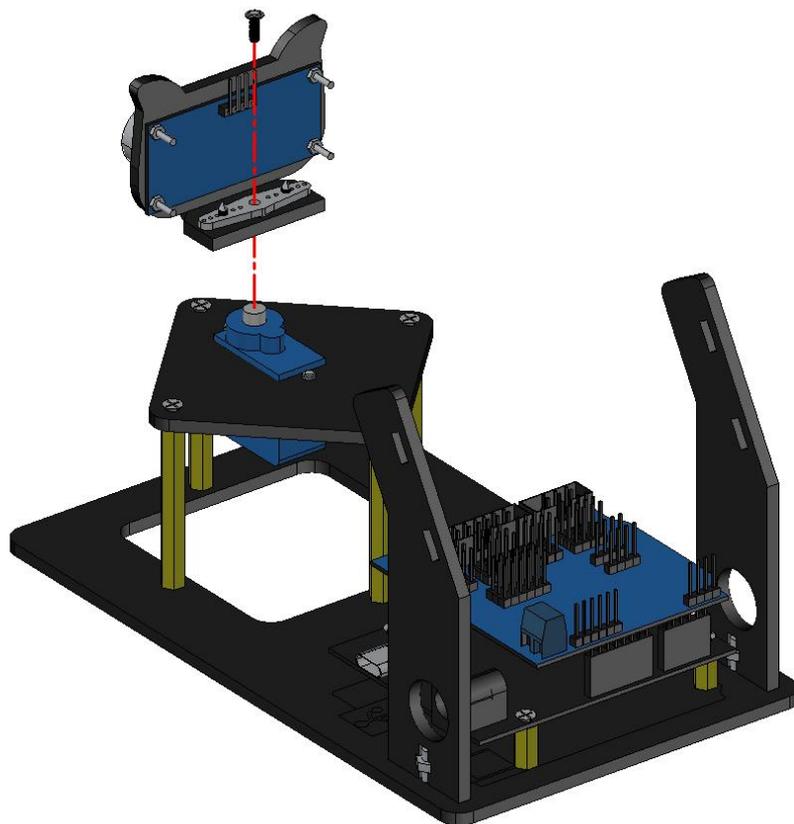
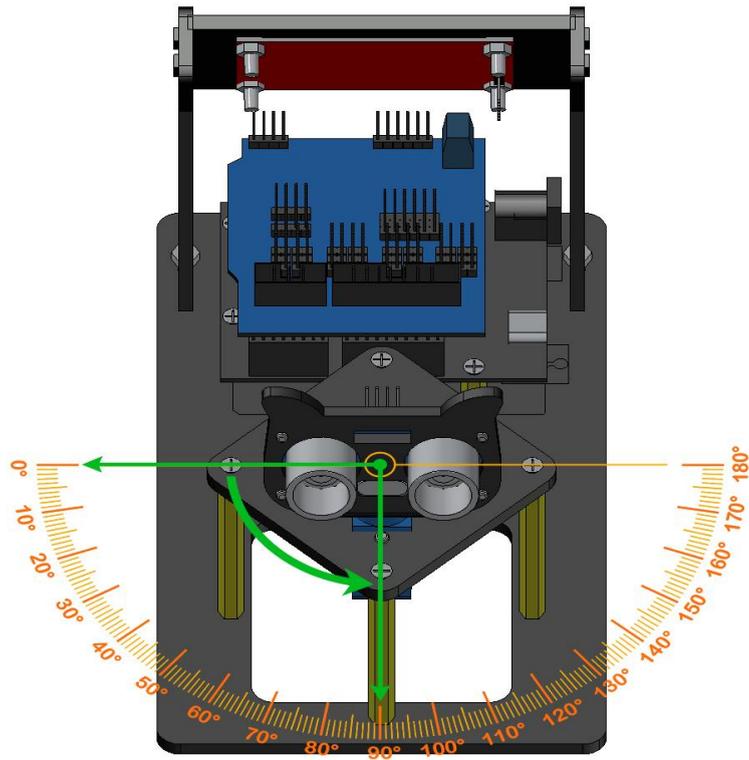
⑤Upload the program to the UNO controller board.



The picture above shows that it is uploaded successfully.

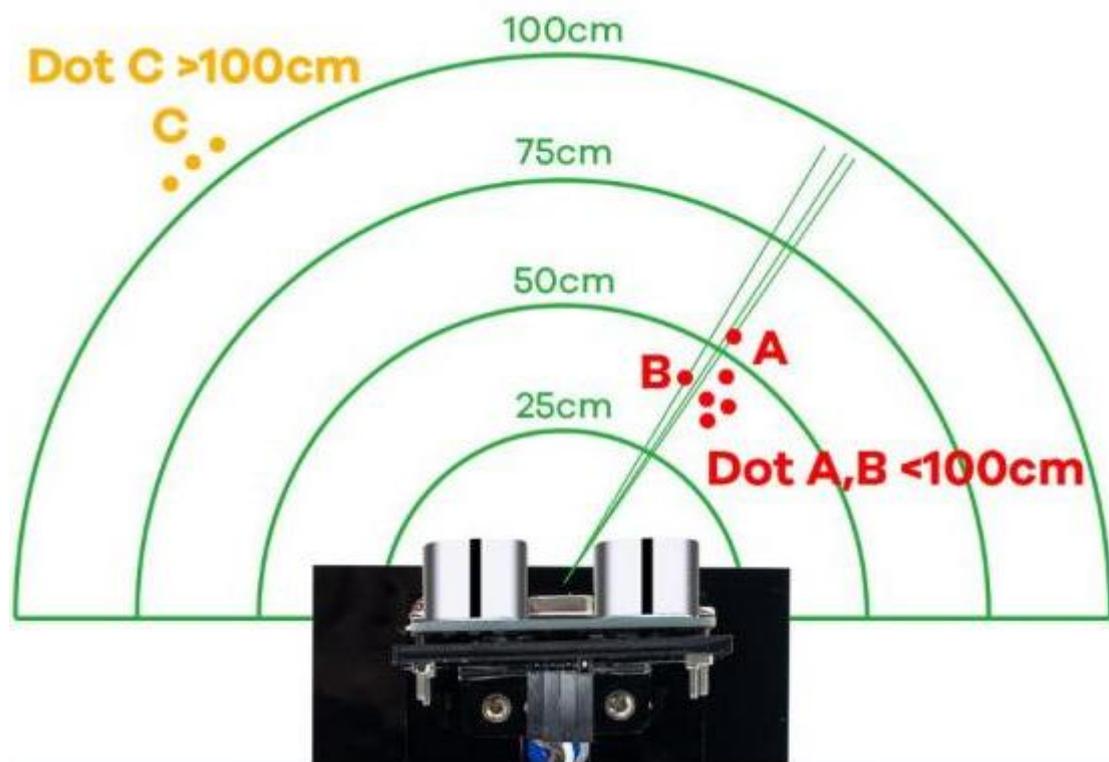
⑥After uploading the code successfully. The servos will turn to the initial angle of 90 for one second and then goes back and forth. Please disconnect the data line within this second. You can see the following state. If it is too late to disconnect, press the RESET button and then disconnect.

If the Angle of the servo motor is not consistent with the picture after uploading the program, please unscrew the fixing screw of the steering rocker arm and the servo motor, and separate the steering rocker arm from the servo motor. Rotate it to match the image before covering it. Then screw on the set screws of the steering rocker arm and the servo motor.



After we have corrected the servo motor angle and re-energized it, we can see the ultrasound scan start and display the results on the screen.

By utilizing the 180-degree scanning range of the servo motor, combined with the distance measurement capability of the ultrasonic sensor, Arduino can detect targets and represent them on the screen with different colored dots. Targets detected within a 1-meter range will be represented by red dots, while targets beyond 1 meter will be represented by yellow dots. The TFT screen provides intuitive visual feedback, allowing users to understand the distance information of the targets.



The Arduino simulation radar provides the following functionalities:

① **Distance Measurement:** By using the ultrasonic sensor to measure the distance between objects and the sensor, it enables distance measurement and obstacle detection.

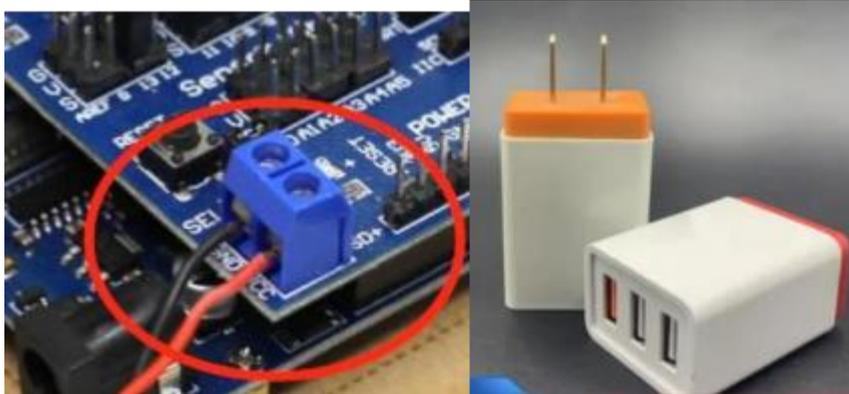
②**Direction Sensing:** By controlling the direction of the sensor through the servo motor, it allows obtaining the approximate directional position of objects in space.

③**Real-time Monitoring:** By continuously rotating the sensor and acquiring distance data, it enables real-time monitoring of the position and distance changes of objects.

Part 2 Frequently Asked Questions

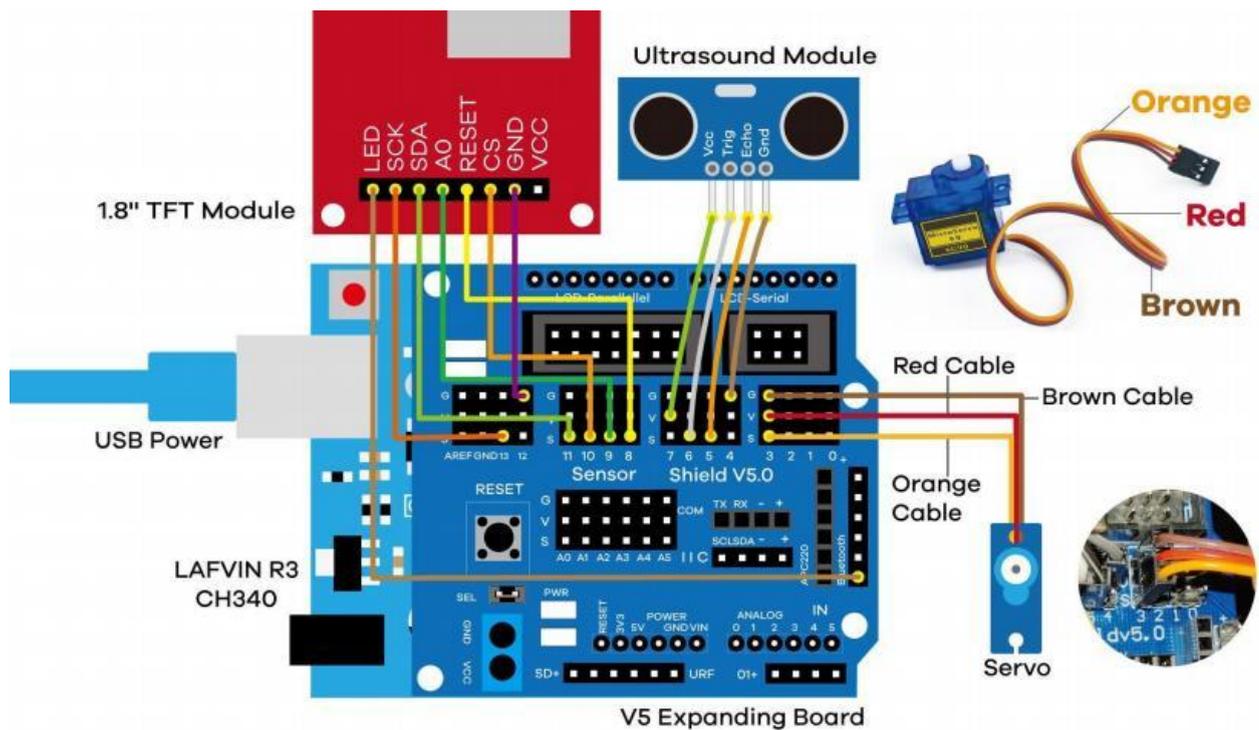
Q: The screen flickers, and the display turns into a white screen after running for a while

A: Because the power consumption of the screen is slightly larger, the power supply of UNO may be insufficient. This problem can be solved by increasing the external power supply. You can use the external power supply of the shield, or other 5V 1A adapter or mobile power supply.



Q: The screen is white when booting, or the screen is always black

A: Obviously the wiring is wrong, please check the wiring diagram carefully and reconnect. Or maybe the dupont wire connection is loose



Q: The accuracy of ranging is not high

A: Part of the reason is also due to insufficient power supply. In addition, the surface and orientation of different materials are different, and the reflection of ultrasonic waves is also different, which will cause a large error in distance measurement. For example, a cylindrical object will become wider, and a messy desktop will cause a large jump in the measured distance.

Q: The scanning speed of the ultrasonic module is slow

A: If it is very slow, and the measured distance is all 0, it is generally because the ultrasonic module line is not connected properly, the echo cannot be detected, and it has been in a waiting state.

Q: How to view the distance value output by the ultrasonic sensor

A: After uploading the code, Click the icon in the upper right corner of the Arduino IDE and set the baud rate to 115200, the angle and distance will be printed on the serial monitor.

