LROBRUYA

4WD Smart Robot Car V2.0 Kit

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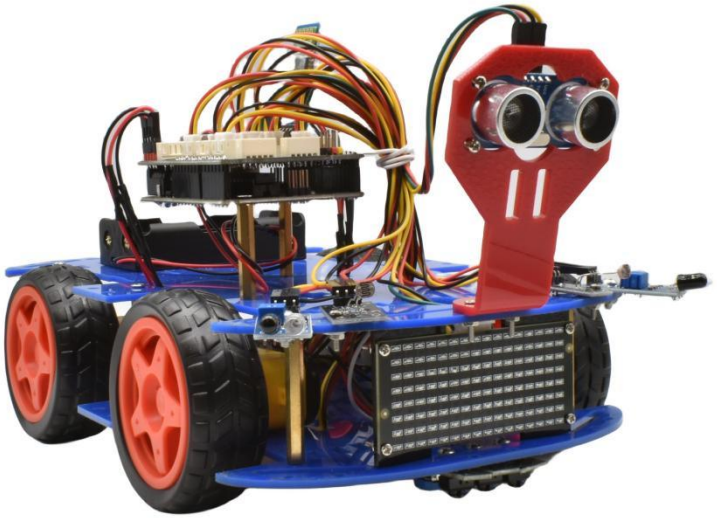

Content

Preface

Company Profile

Founded in 2014, Shenzhen Lonten Technology Co., Ltd. focuses on the design, research production of Electronics Module for robotics related products. Consisting of professional researchers and skilled engineers, our R&D team constantly strives for creative function and excellent user experience. The company's R&D investments on arduino kits raspberry pi kits, as well as 3D printer and robots that back up STEAM education.

Customer Service

Our self-owned factory is certificated with BSCI and SO, covering an area of 5,000 square meters, and achieving an annual production capacity of over 10,000 units. Our products are all certified to CE, FCC, and ROHS standards, have exported to more than 100 countries including, but not limited to France, the United States of America, Australia, Russia, the United Kingdom, Germany, Singapore, Egypt, and India, bringing technological innovation to all walks of life.

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How to Install Arduino IDE

Introduction

The Arduino Integrated Development Environment (IDE) is the software side of the Arduino platform.

In this Project, you will learn how to setup your computer to use Arduino and how to set about the Projects that follow.

The Arduino software that you will use to program your Arduino is available for Windows, Mac and Linux. The installation process is different for all three platforms and unfortunately there is a certain amount of manual work to install the software.

STEP 1: Go to https://www.arduino.cc/en/software.

The version available at this website is usually the latest version, and the actual version may be newer than the version in the picture.

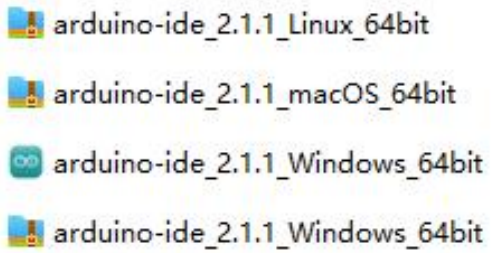
STEP2：Download the development software that is compatible with the operating.

system of your computer. Take Windows as an example here.

Click Windows Win 10 and newer,64 bits.

Click JUST DOWNLOAD.

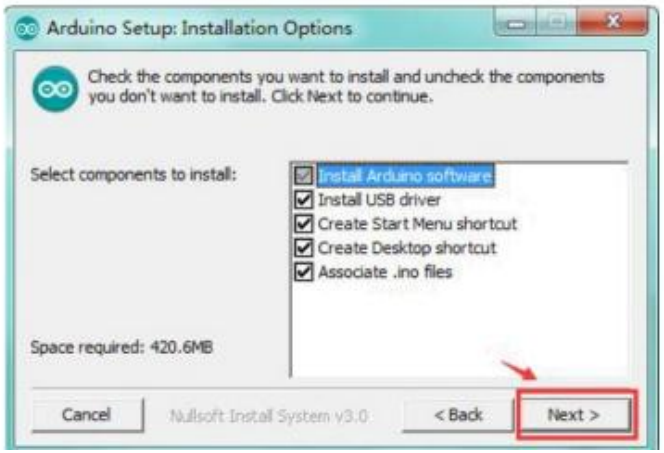
Also version 2.1.1 is available in the material we provided, and the versions of our materials are the latest versions when this course was made.



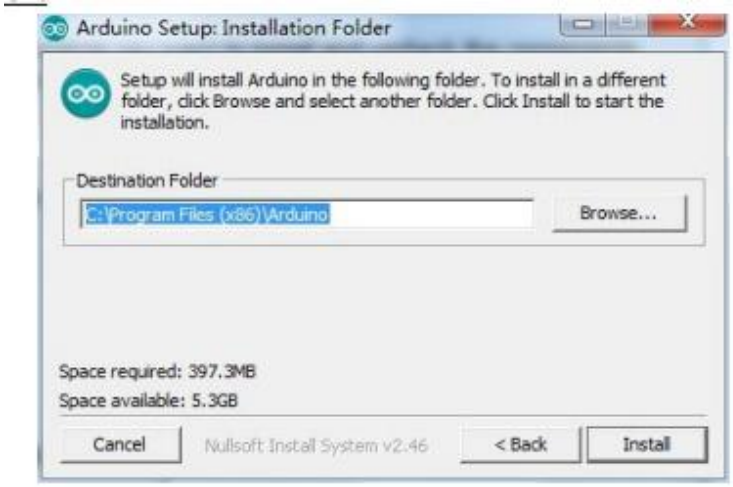
Installing Arduino (Windows)

Install Arduino with the exe. Installation package.

Click I Agree to see the following interface.

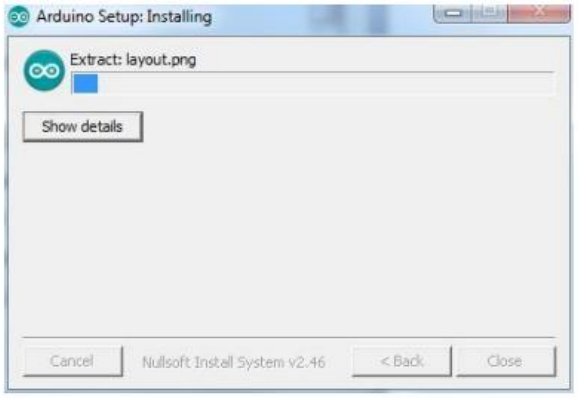

Arduino Setup: Installation Options
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.
Select components to install:
Install Arduino software
Install USB driver
Create Start Menu shortcut
Create Desktop shortcut
Associate .ino files
Space required: 420.6MB
Cancel
Nullsoft Install System v3.0
< Back
Next >

Click Next

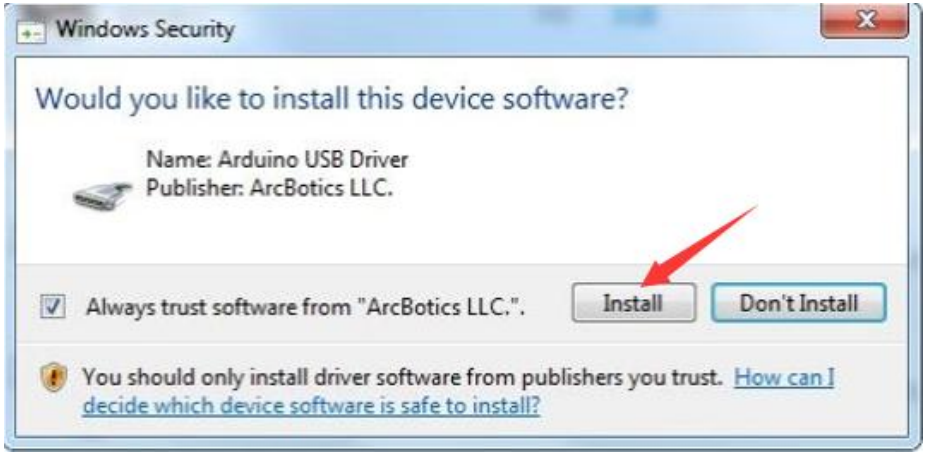

Arduino Setup: Installation Folder
Setup will install Arduino in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.
Destination Folder
C:\Program Files (x86)\Arduino
Browse...
Space required: 397.3MB
Space available: 5.3GB
Cancel
Nullsoft Install System v2.46
< Back
Install

You can press Browse… to choose an installation path or directly type in the directory you want.

Click Install to initiate installation

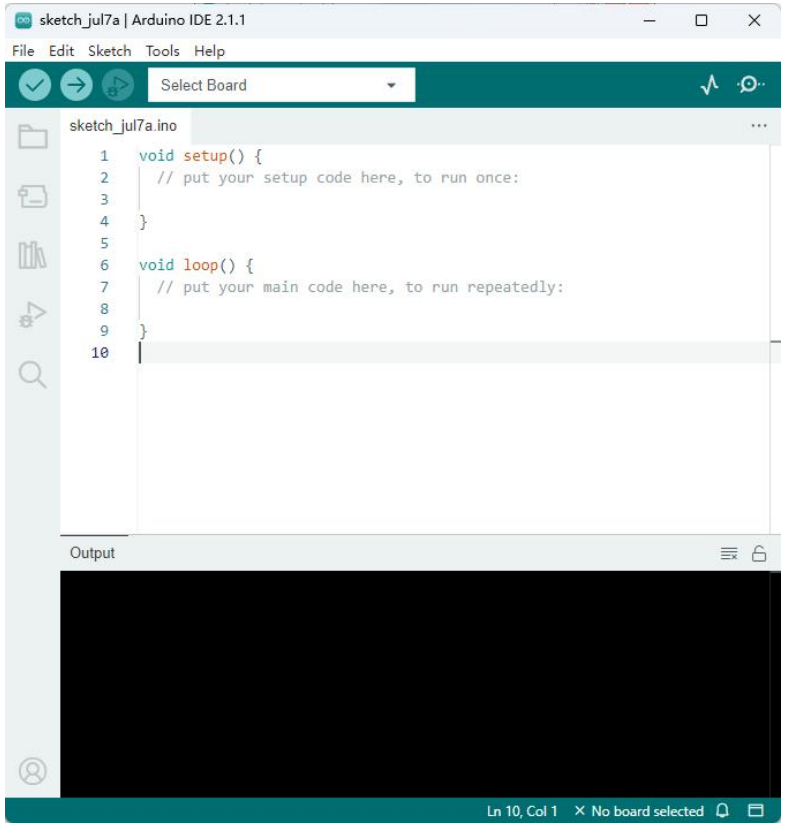


Finally, the following interface appears, click Install to finish the installation.



Next, the following icon appears on the desktop

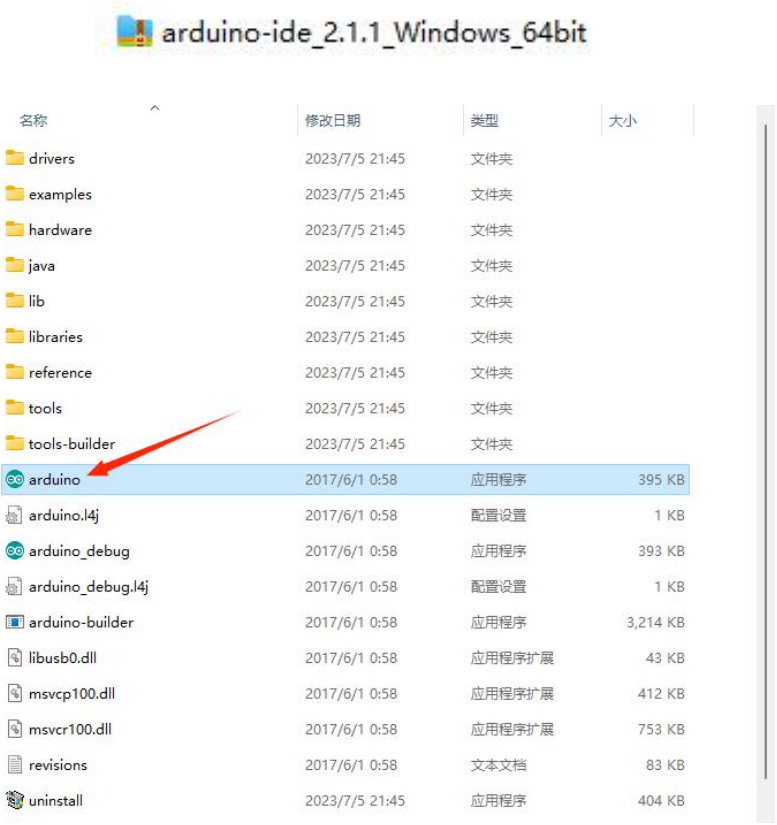
Double-click to enter the desired development environment

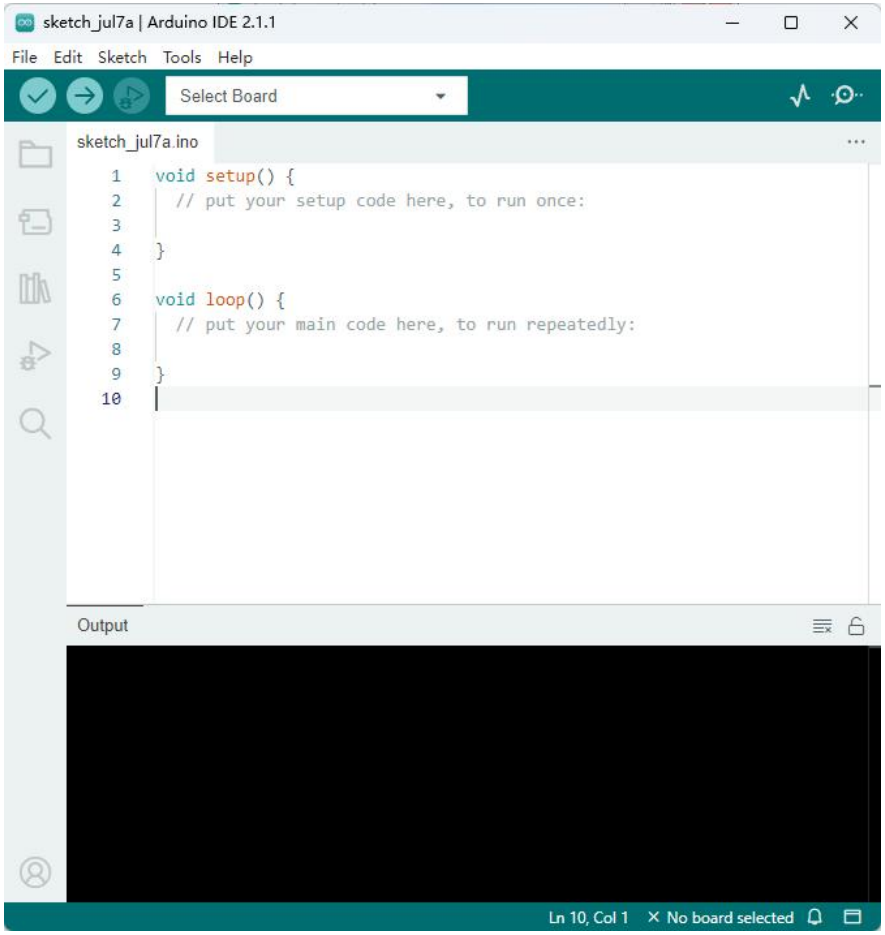


You may directly choose the installation package for installation and skip the contents below and jump to the next section.

But if you want to learn some methods other than the installation package, please continue to read the section.

Unzip the zip file downloaded, Double-click to open the program and enter the desired development environment.


arduino-ide_2.1.1_Windows_64bit
名称
修改日期
类型
大小
drivers 2023/7/5 21:45 文件夹
examples 2023/7/5 21:45 文件夹
hardware 2023/7/5 21:45 文件夹
java 2023/7/5 21:45 文件夹
lib 2023/7/5 21:45 文件夹
libraries 2023/7/5 21:45 文件夹
reference 2023/7/5 21:45 文件夹
tools 2023/7/5 21:45 文件夹
tools-builder 2023/7/5 21:45 文件夹
arduino 2017/6/1 0:58 应用程序 395 KB
arduino.l4j 2017/6/1 0:58 配置设置 1 KB
arduino_debug 2017/6/1 0:58 应用程序 393 KB
arduino_debug.l4j 2017/6/1 0:58 配置设置 1 KB
arduino-builder 2017/6/1 0:58 应用程序 3,214 KB
libusb0.dll 2017/6/1 0:58 应用程序扩展 43 KB
msvcp100.dll 2017/6/1 0:58 应用程序扩展 412 KB
msvcr100.dll 2017/6/1 0:58 应用程序扩展 753 KB
revisions 2017/6/1 0:58 文本文档 83 KB
uninstall 2023/7/5 21:45 应用程序 404 KB


sketch_jul7a | Arduino IDE 2.1.1
File Edit Sketch Tools Help
Select Board
sketch_jul7a.ino
1 void setup() {
2 // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7 // put your main code here, to run repeatedly:
8
9 }
10
Output
Ln 10, Col 1
No board selected

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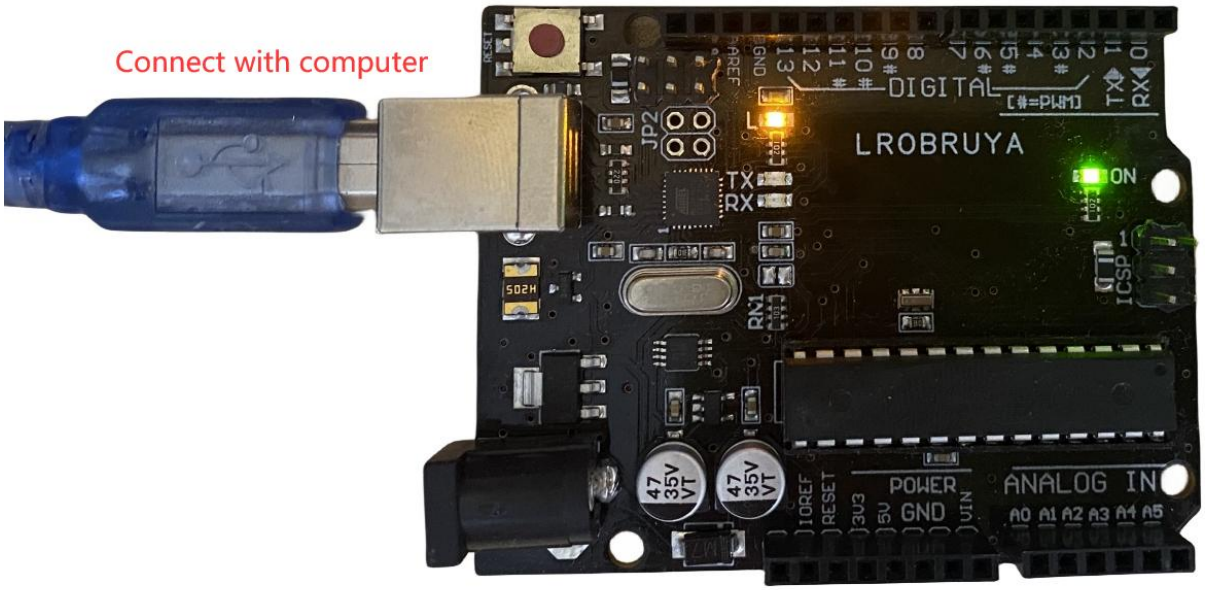
How to Install Arduino Driver

For Windows

Arduino UNO R3 board



Serial communication interface: D0 is RX, D1 is TX

PWM interface (pulse width modulation): D3 D5 D6 D9 D10 D11

External interrupt interface: D2 (interrupt 0) and D3 (interrupt 1)

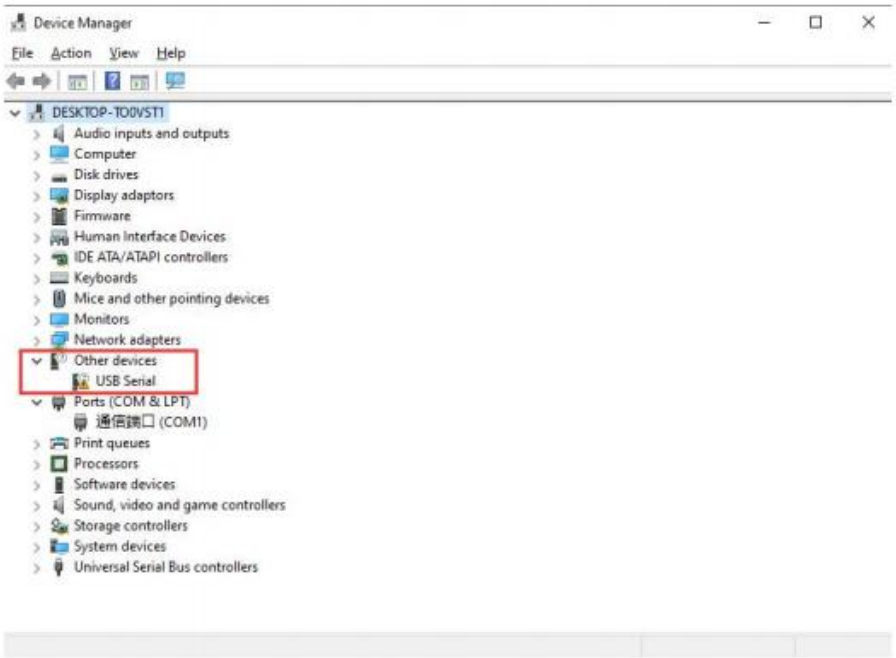
SPI communication interface: D10 is SS, D11 is MOSI, D12 is MISO, D13 is SCK

IIC communication port: A4 is SDA, A5 is SCL

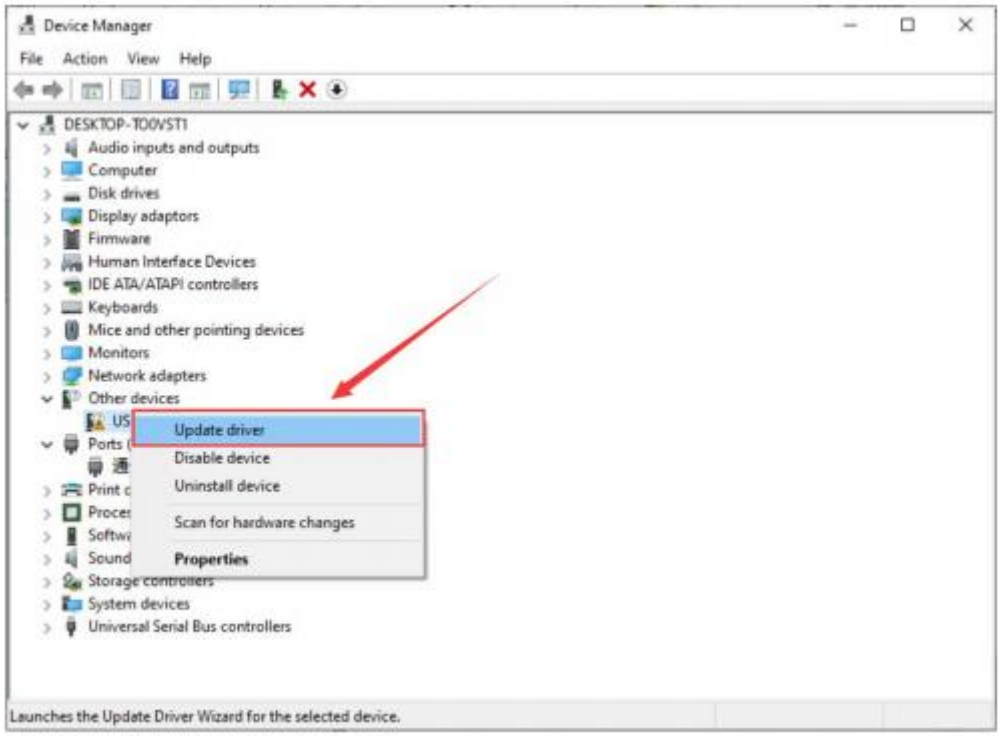
In different systems, the driver installation is similar. Here we start to install the driver on the Win10 system. You can find the “USB_Drive_CH341_3_1” folder in the information we provide, this is the driver file we want to install.

Plug one end of your USB cable into the Arduino UNO R3 Board and the other into a USB socket on your computer.

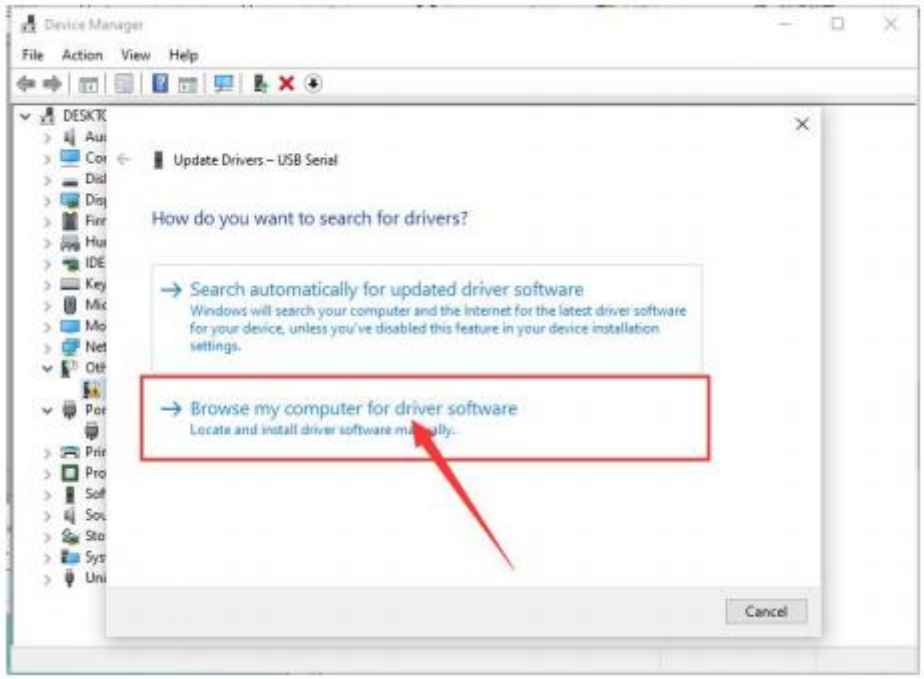
When you connect the Arduino UNOR3 Board to your computer at the first time, right click your “My Computer”—>for “Properties”—>click the “Device manager”, under Other devices, you should see the “USB-Serial” or “Unknown device ”.Or you can search for "devi" in your computer, or you can open the device manager of your computer.



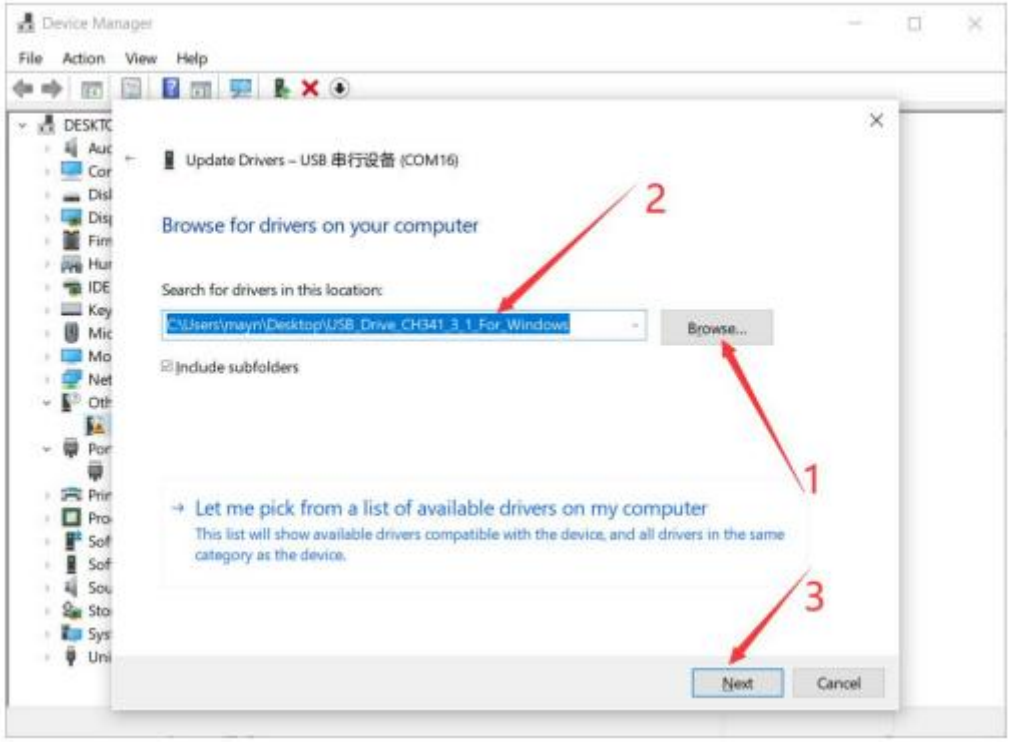
Then right-click on the device and select the top menu option (Update Driver Software...) shown as the figure below.



Then it will be prompted to either “Search Automatically for updated driver software” or “Browse my computer for driver software”. Shown as below. In this page, select “Browse my computer for driver software”.

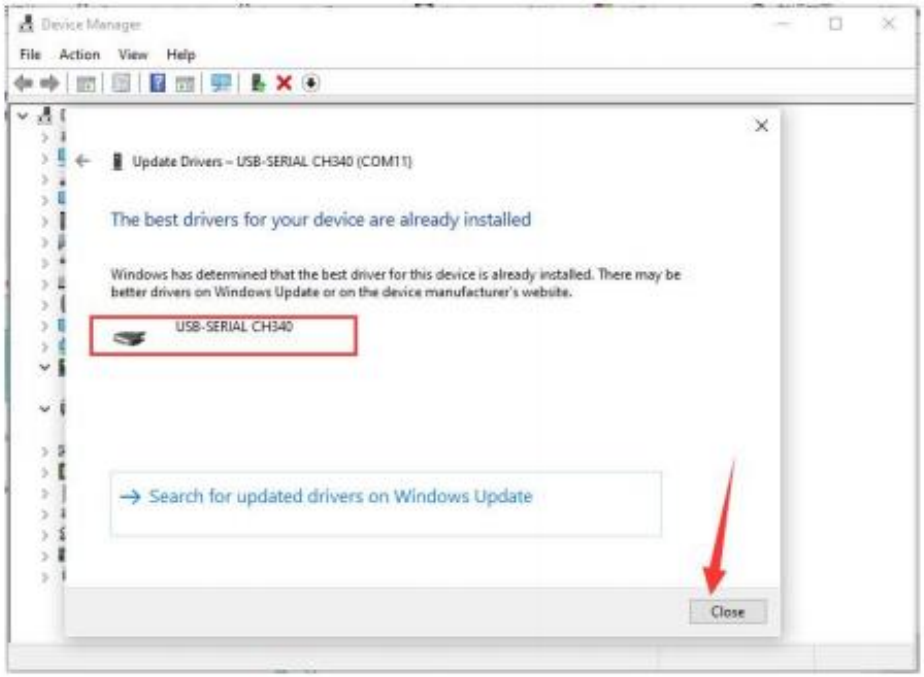


After that, select the browse option and navigate to the drive folder "USB_Drive_CH341_3_1", which can be found in the information we provide.(Note that the file path selects the location of the. For example, I store this driver file on the computer desktop, so the file path I choose is C:\Users\mayn\Desktop\USB_Drive_CH341_3_1_For_Windows)

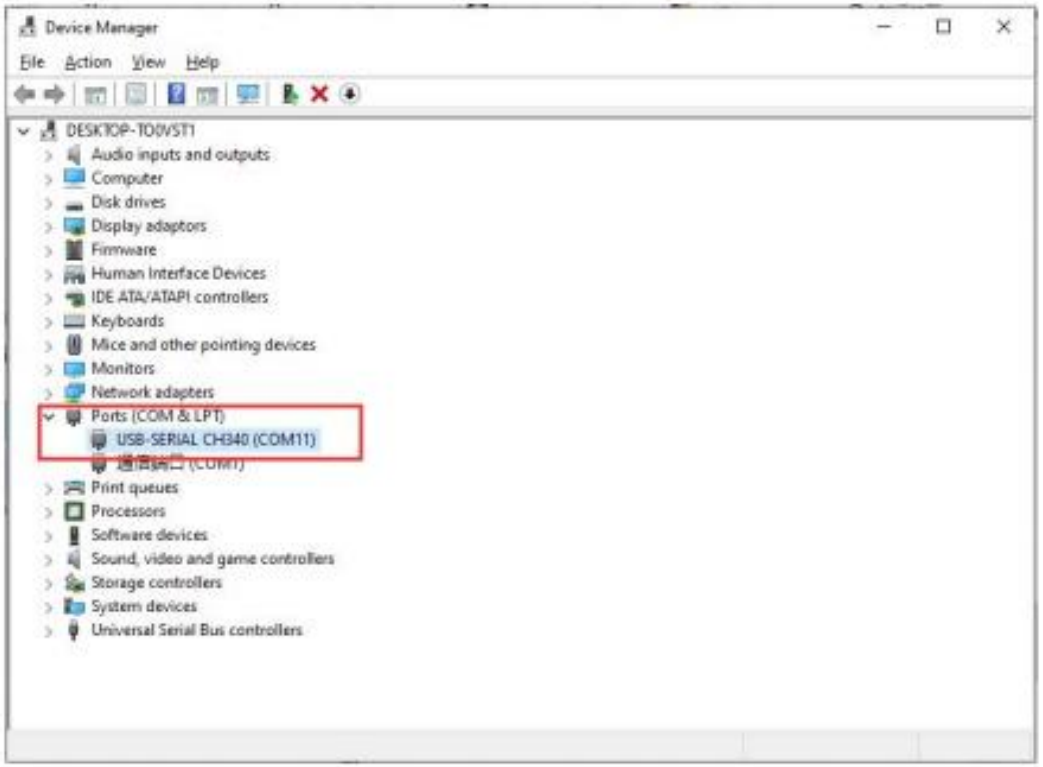


Once the software has been installed, you will get a confirmation message.

Installation completed, click “Close”.



Up to now, the driver is installed well. Then you can right click “My Computer”—>for “Properties”—>click the “Device manager”, you should see the device as the figure shown below. Or you can search for "devi" in your computer, or you can open the device manager of your computer.


Device Manager
File Action View Help
DESKTOP-TO0VST1
Audio inputs and outputs
Computer
Disk drives
Display adaptors
Firmware
Human Interface Devices
IDE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
USB-SERIAL CH340 (COM11)
Print queues
Processors
Software devices
Sound, video and game controllers
Storage controllers
System devices
Universal Serial Bus controllers

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How to Add Arduino Libraries

Installing Additional Arduino Libraries

Once you are comfortable with the Arduino software and using the built-in functions, you may want to extend the ability of your Arduino with additional libraries.

What are Libraries?

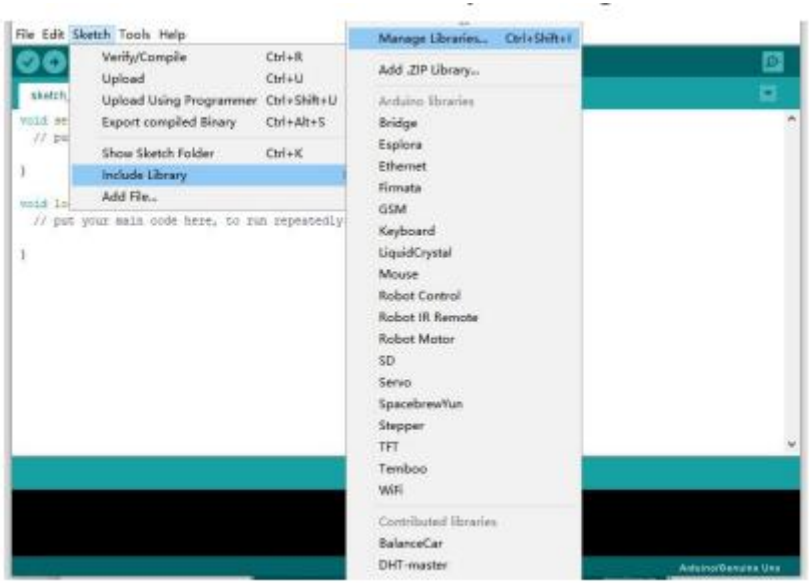
Libraries are a collection of code that makes it easy for you to connect to a sensor, display, module, etc. For example, the built-in Liquid Crystal library makes it easy to talk to character LCD displays. There are hundreds of additional libraries available on the Internet for download.

The built-in libraries and some of these additional libraries are listed in the reference. To use the additional libraries, you will need to install them.

How to Install a Library

Using the Library Manager

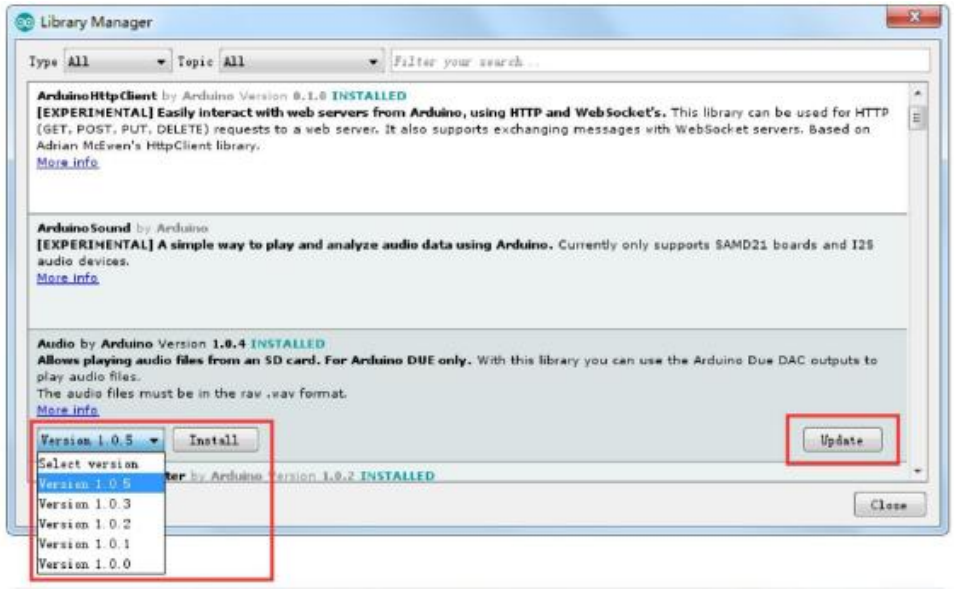
To install a new library into your Arduino IDE you can use the Library Manager (available from IDE version 1.8.0). Open the IDE and click to the "Sketch" menu and then Include Library > Manage Libraries.

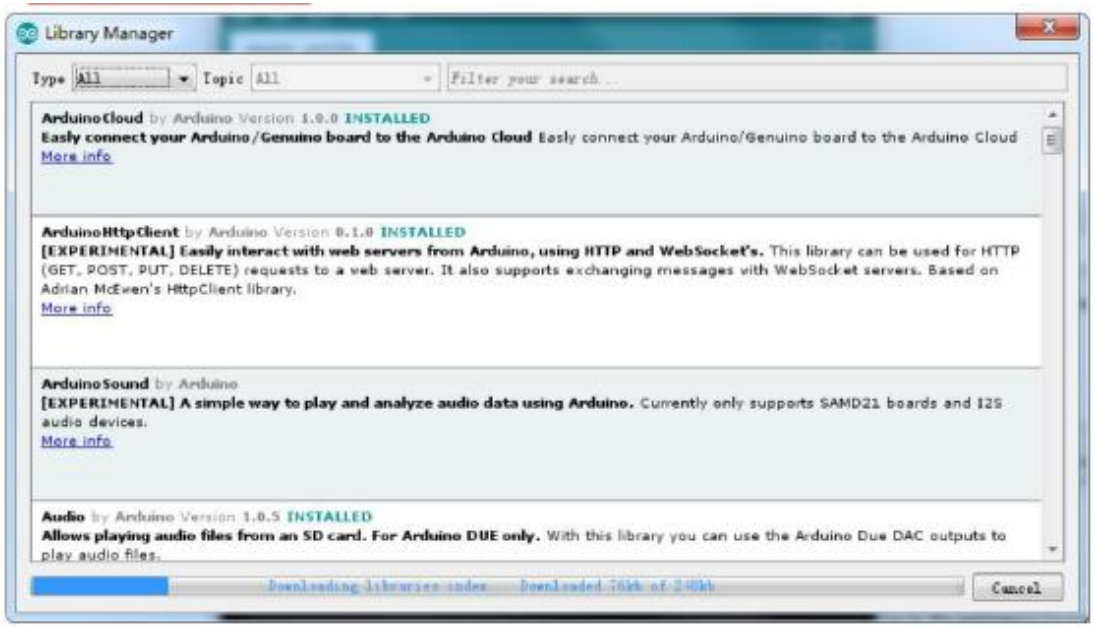


Then the library manager will open and you will find a list of libraries that are already installed or ready for installation. In this example we will install the Bridge library. Scroll the list to find it, then select the version of the library you want to install. Sometimes only one version of the library is available. If the version selection menu does not appear, don't

worry: it is normal.

There are times you have to be patient with it, just as shown in the figure. Please refresh it and wait.

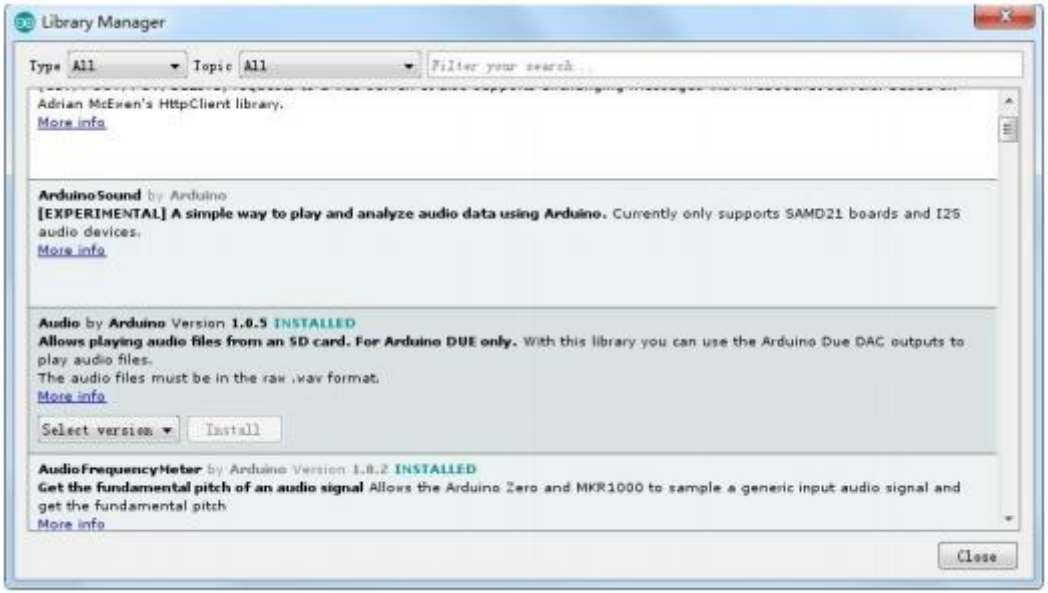




Finally click on install and wait for the IDE to install the new library.

Downloading may take time depending on your connection speed. Once it has finished, an Installed tag should appear next to the Bridge library.

You can close the library manager.

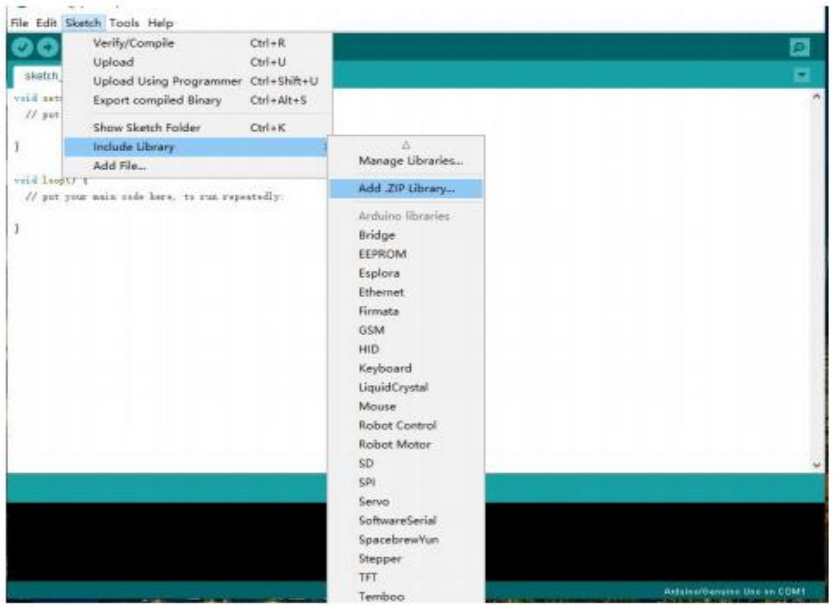


You can now find the new library available in the Include Library menu. If you want to add your own library open a new issue on Github.

Importing a .zip Library

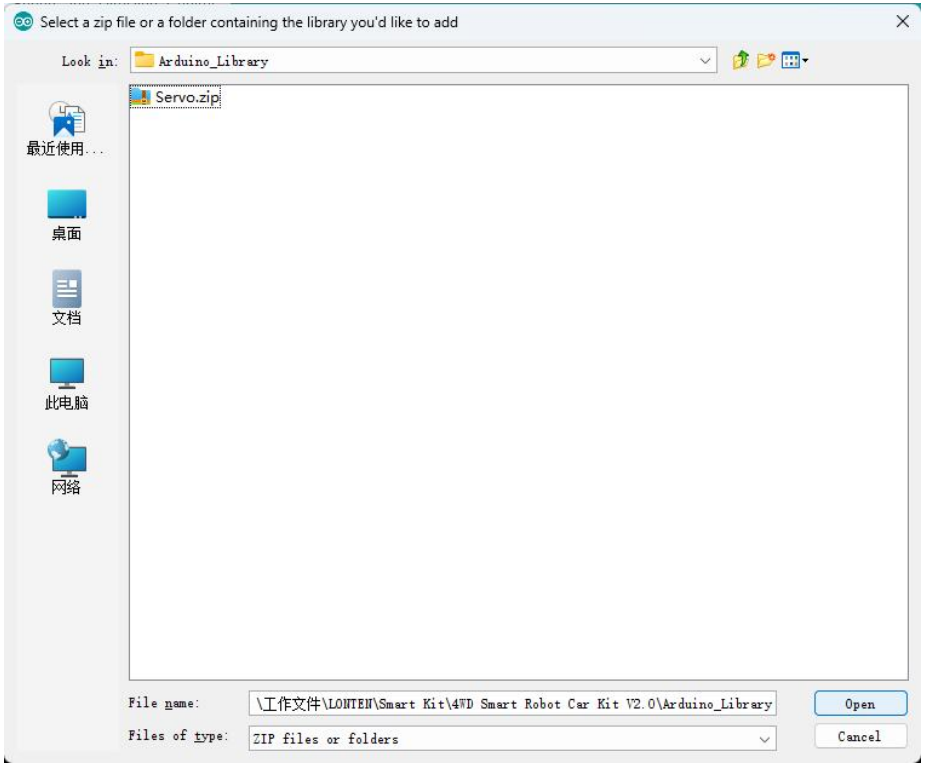
Libraries are often distributed as a ZIP file or folder. The name of the folder is the name of the library. Inside the folder will be a .cpp file, a .h file and often a keywords.txt file, examples folder, and other files required by the library. Starting with

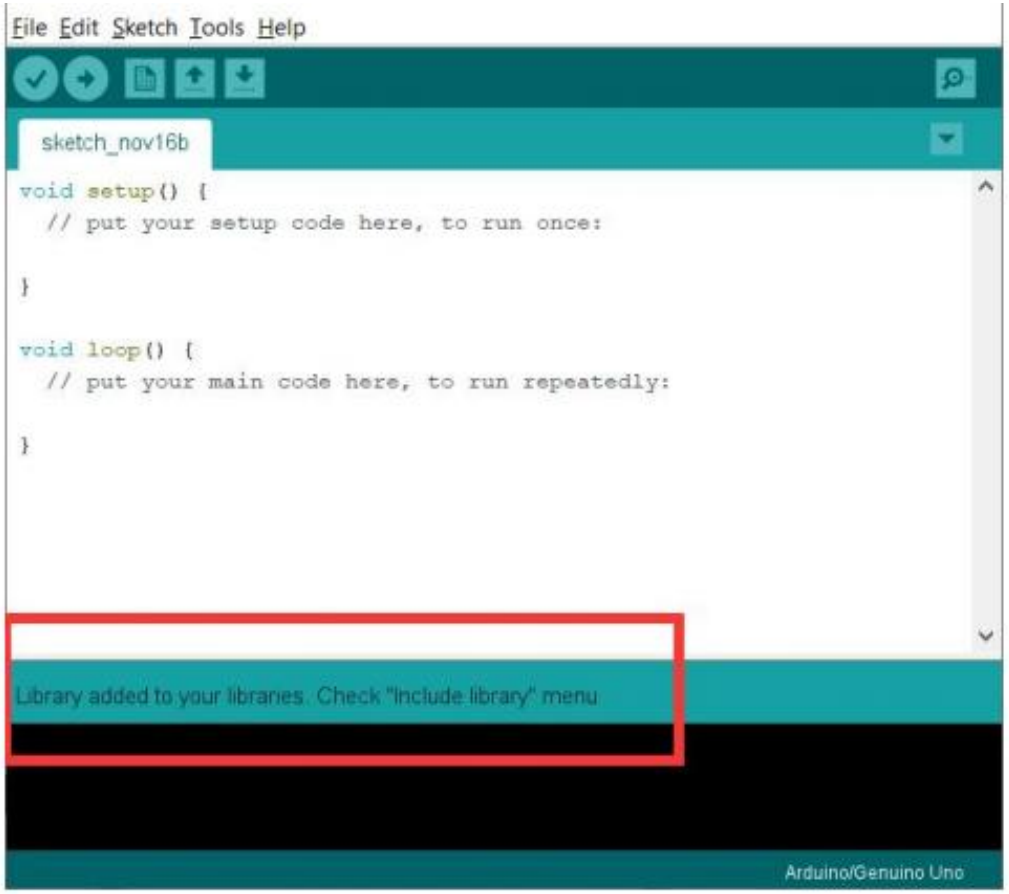
version 1.0.5, you can install 3rd party libraries in the IDE. Do not unzip the downloaded library, leave it as is. In the Arduino IDE, navigate to Sketch > Include Library. At the top of the drop down list, select the option to "Add .ZIP Library".



You will be prompted to select the library you would like to add.

Navigate to the .zip file's location and open it.


Select a zip file or a folder containing the library you'd like to add
Look in:
Arduino_Library
Servo.zip
最近使用...
桌面
文档
此电脑
网络
File name:
\工作文件\LOWTEN\Smart Kit\4WD Smart Robot Car Kit V2.0\Arduino_Library
Files of type:
ZIP files or folders
Open
Cancel


File Edit Sketch Tools Help
sketch_nov16b
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}
Library added to your libraries. Check "Include library" menu
Arduino/Genuino Uno

Return to the Sketch > Import Library menu. You should now see the library at the bottom of the drop-down menu. It is ready to be used in your sketch. The zip file will have been expanded in the libraries folder in your Arduino sketches directory. NB: the Library will be available to use in sketches, but examples for the library will not be exposed in the File > Examples until after the IDE has restarted.

Blink Test

Overview

In this Project, you will learn how to program your UNO R3 controller board to blink the Arduino's built-in LED, and how to download programs by basic steps.

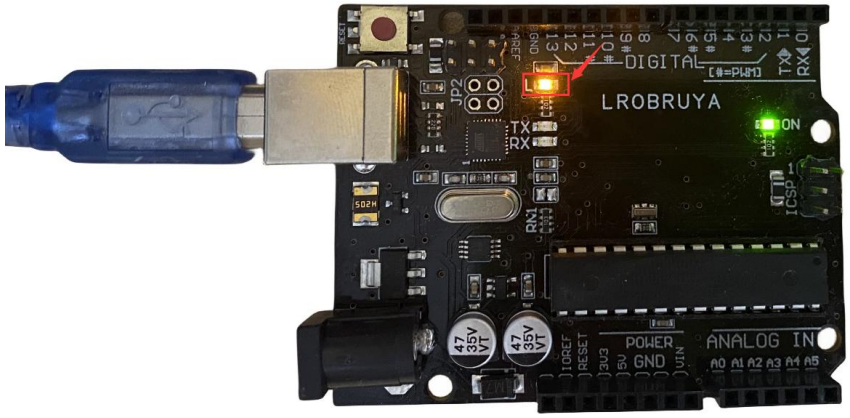
Component Required:

LROBRUYA Uno R3 Board* 1

Principle

The UNO R3 board has rows of connectors along both sides that are used to connect to several electronic devices and plug-in 'shields' that extends its capability.

It also has a single LED that you can control from your sketches. This LED is built onto the UNO R3 board and is often referred to as the 'L' LED as this is how it is labeled on the board.

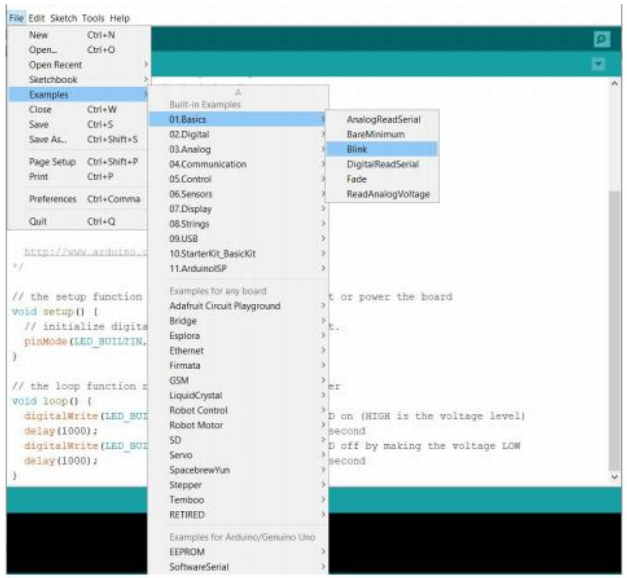


In this Project, we will reprogram the UNO board with our own Blink sketch and then change the rate at which it blinks.

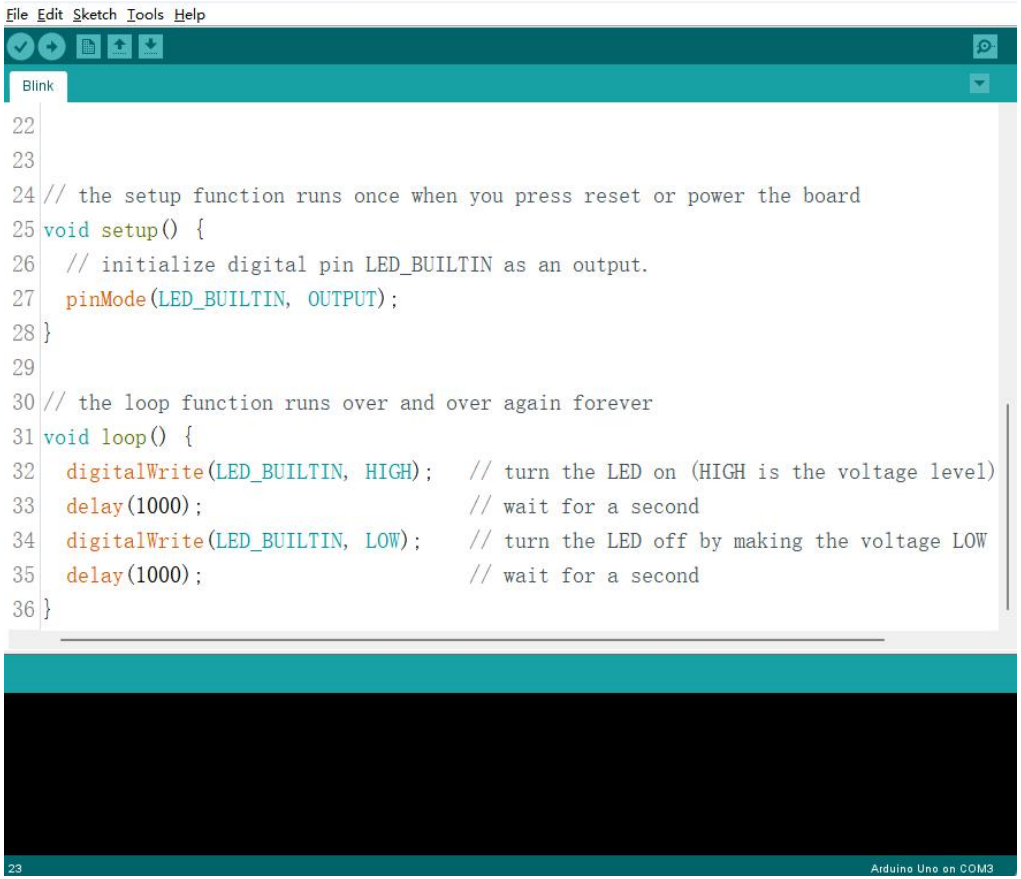
In the previous chapter-How to install Arduino IDE, you set up your Arduino IDE and made sure that you could find the right serial port for it to connect to your UNO board. The time has now come to put that connection to the test and program your UNO board.

The Arduino IDE includes a large collection of example sketches that you can load up and use. This includes an example sketch for making the 'L' LED blink.

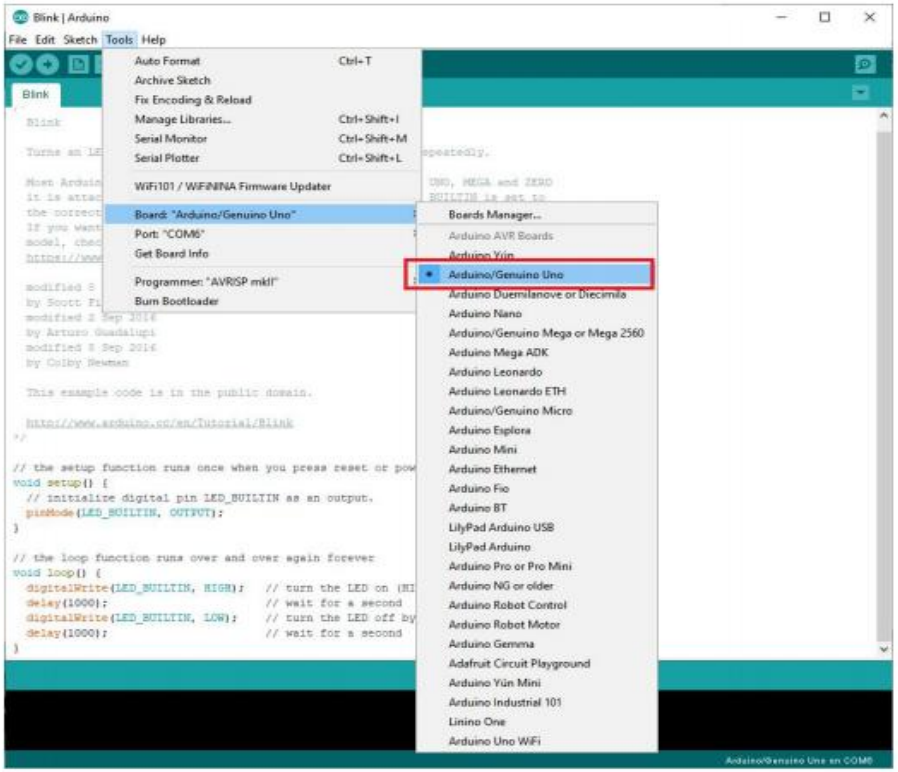
Load the 'Blink' sketch that you will find in the IDE's menu system under File > Examples > 01.Basics>Blink

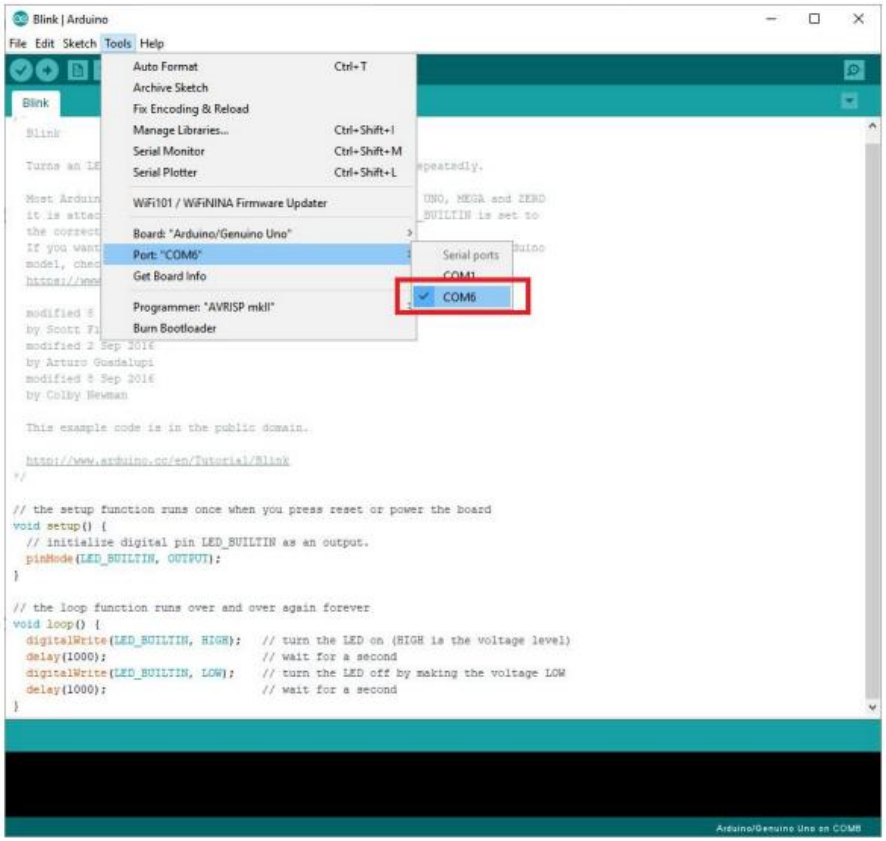


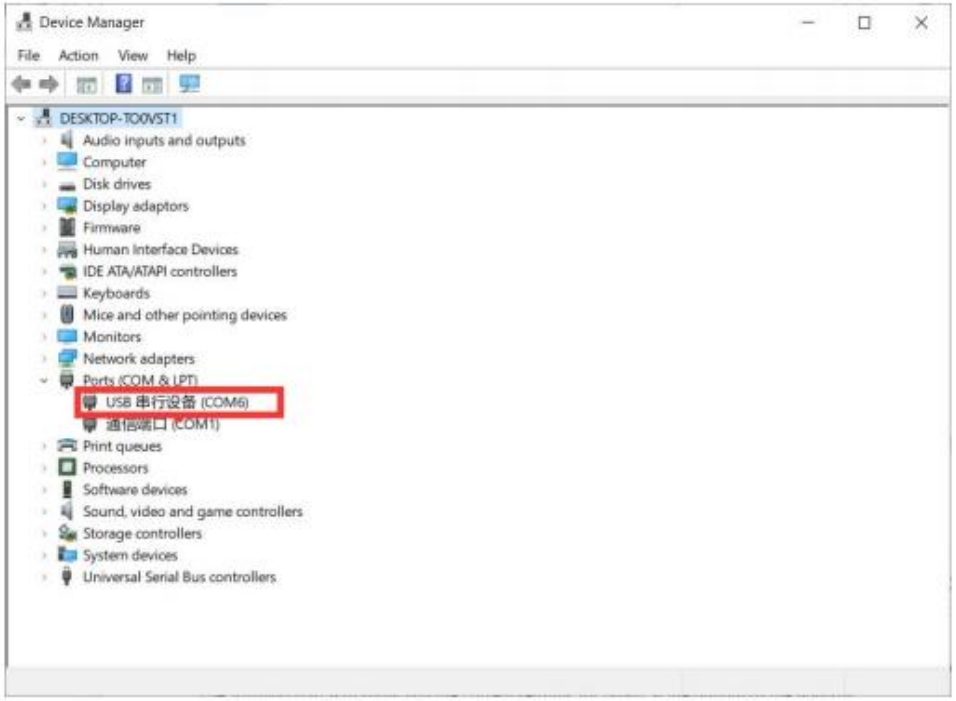
When the sketch window opens, enlarge it so that you can see the entire sketch in the window.



Attach your Arduino board to your computer with the USB cable and check that the 'Board Type' and 'Serial Port' are set correctly.



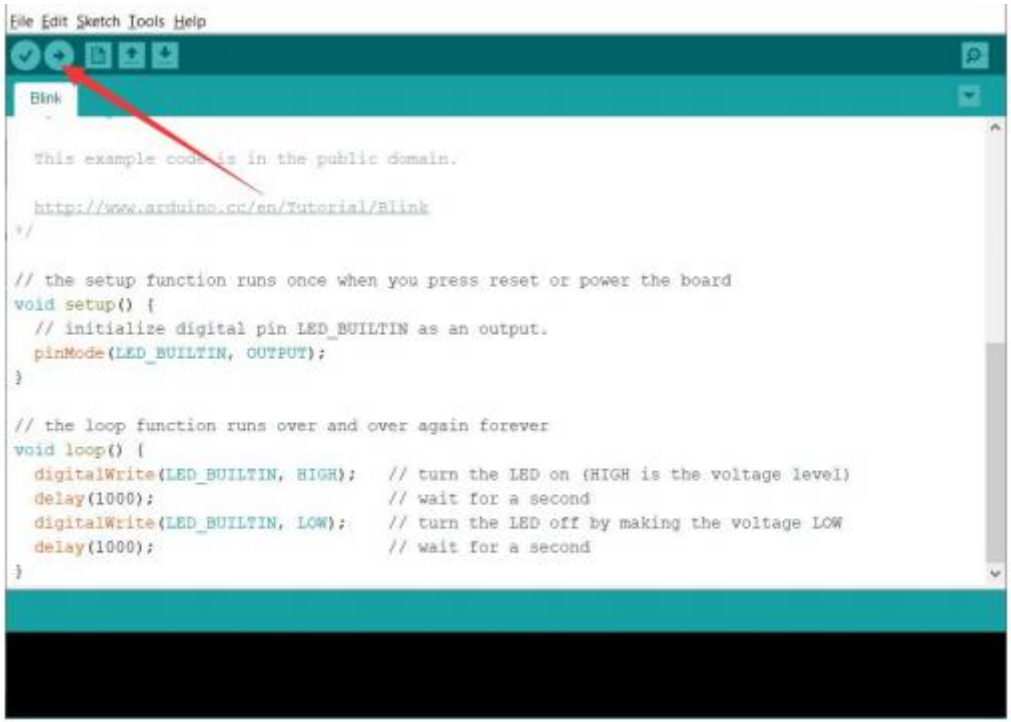

Blink | Arduino
File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Manage Libraries... Ctrl+Shift+I
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
WiFi101 / WiFiNINA Firmware Updater
Board: "Arduino/Genuino Uno"
Port: "COM6"
Get Board Info
Programmer: "AVRISP mkII"
Burn Bootloader
Serial ports
COM1
COM6
Blink
Blink
Turns an LED
Most Arduin
it is attac
the correct
If you want
model, chec
https://www
modified 8
by Scott Fi
modified 2 Sep 2016
by Arturo Guadalupi
modified 8 Sep 2016
by Colby Newman
This example code is in the public domain.
http://www.arduino.cc/en/Tutorial/Blink
*/
// the setup function runs once when you press reset or power the board
void setup() {
// initialize digital pin LED_BUILTIN as an output.
pinMode(LED_BUILTIN, OUTPUT);
}
// the loop function runs over and over again forever
void loop() {
digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
delay(1000); // wait for a second
digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
delay(1000); // wait for a second
}
repeatedly.
UNO, MEGA and ZERO
_BUILTIN is set to
uino
Arduino/Genuino Uno on COM6



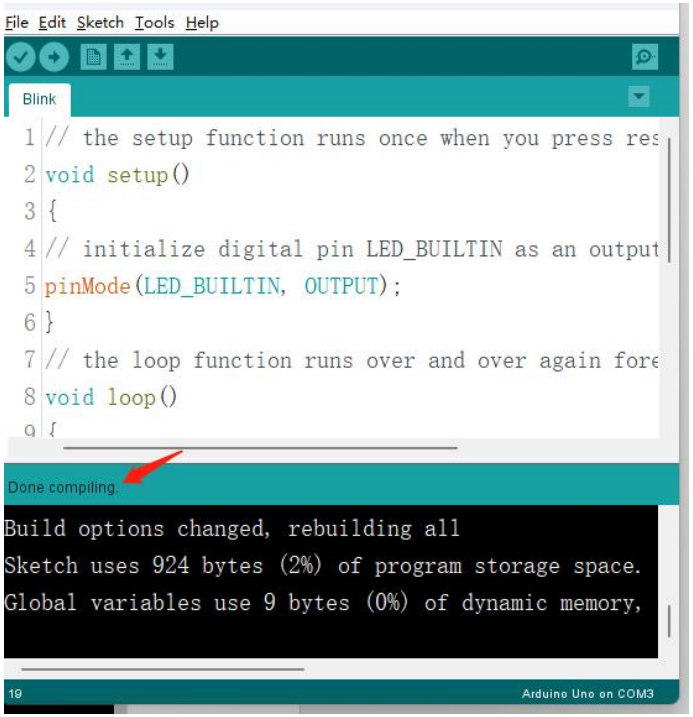
Note: The Board Type and Serial Port here are not necessarily the same as shown in picture. If you are using UNO, then you will have to choose Arduino UNO as the Board Type, other choices can be made in the same manner. And the Serial Port displayed for everyone is different, despite COM 6 chosen here, it could be COM3 or COM4 on your computer. A right COM port is supposed to be COMX (arduino XXX), which is by the certification criteria.

The Arduino IDE will show you the current settings for board at the bottom of the window.

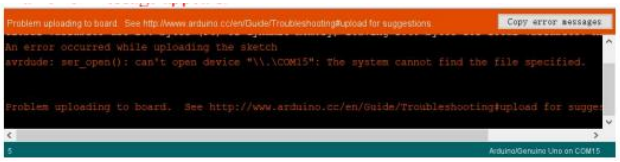
Click on the 'Upload' button. The second button from the left on the toolbar.



When the status bar prompts "Done uploading", it means the code upload is successful



If an error message appears.

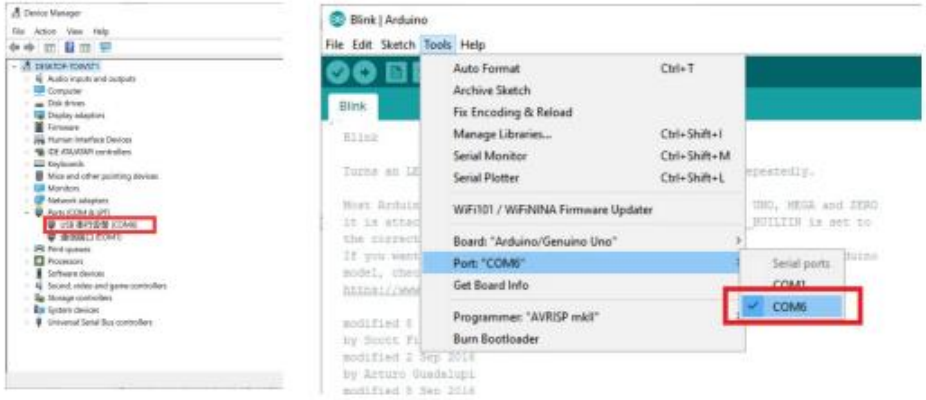


There can be several reasons:

1. The arduino uno driver software is not installed successfully, please refer to the course for the installation steps: How to Install Arduino Driver.

2. The communication serial port selection of arduino uno is wrong;

you can check the communication port COMx of your arduino uno in the computer in the device manager.

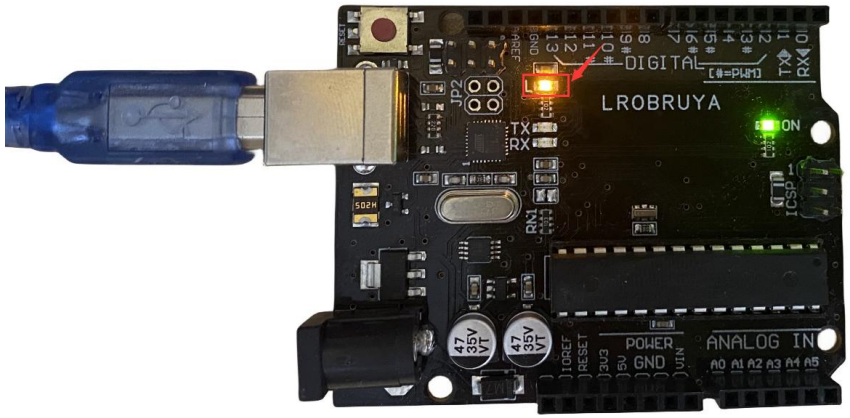


3. If your Arduino uno is connected to a Bluetooth module, it will occupy the communication serial port. You need to remove the Bluetooth module connection before uploading the code.

4. The USB data cable is not firmly connected. Check if there are any of the above problems. After correcting, follow the previous steps to re-operate.

Test Code

```
void setup() // the setup function runs once when you press reset or power the board
{
    pinMode(LED_BUILTIN, OUTPUT); // initialize digital pin LED_BUILTIN as an output.
}
void loop() // the loop function runs over and over again forever
{
    digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
    delay(1000); // wait for a second
    digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
    delay(1000); // wait for a second }
```



After the code is successfully uploaded, the "L" character LED will flash once per second. So far, you have completed the testing process of your first program.

LROBRUYA

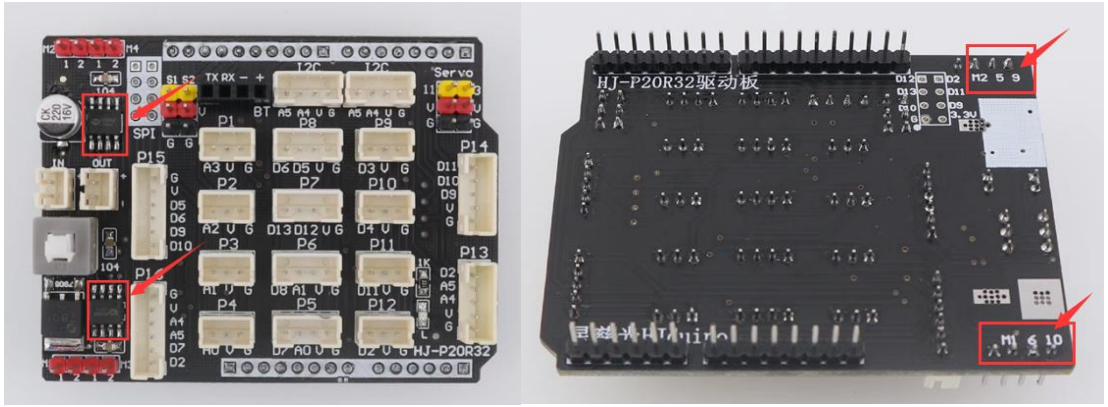
Lesson 1 Motor Speed and Direction Control

About this lesson:

In this lesson, you will learn how to use a Motor Driver module control the direction and speed control of the robot car.

Component Introduction

This drive board consists of two motor drive boards. Therefore, there are four motors in this board, and the left and right motors are connected in parallel.

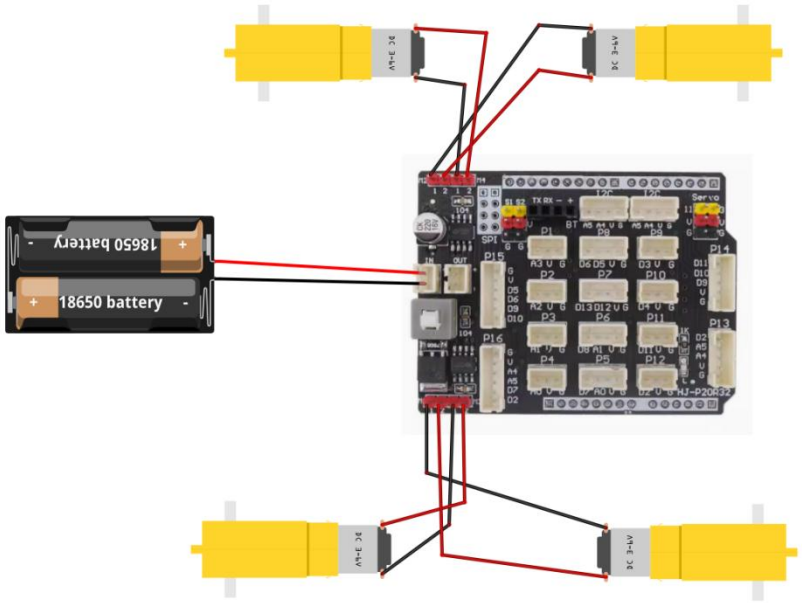


Flip the driver board over and you can see that the drive pins of M1 motor are 6 and 10, and the drive pins of M2 motor are 5 and 9.

As long as the corresponding pins are set to 0 or 1, the car can stop or move, because these four pins can be adjusted by PWM, so we can set a value between 0 and 255 in the code to control the car speed.

4WD Robot	D6	D10	D5	D9
Forward	LOW	HIGH	LOW	HIGH
Backward	HIGH	LOW	HIGH	LOW
Turn to left	LOW	HIGH	HIGH	LOW
Turn to right	HIGH	LOW	LOW	HIGH
Stop	LOW	LOW	LOW	LOW

Wiring diagram



Attention

If the car is moving in the opposite direction, please carefully check whether the motor line is connected incorrectly.

Result

In experimental test 1, we will write code to control the robot car to move forward, backward, turn to left, turn to right, stop.

Lesson 2 Line Tracking Smart Car

About this lesson:

In this lesson, we will complete the test of two experimental codes. In experimental test 1, we learned how to use the infrared line-following sensor, and observed the results returned by the sensor to distinguish black and white objects. In the experimental test 2, we learned to combine the infrared line-following sensor with the motor to control the robot car to complete the line-following function.

Component Introduction

The tracking sensor is actually an infrared sensor. The component used here is the TCRT5000 infrared tube. Its working principle is to use the different reflectivity of infrared light to the color, then convert the strength of the reflected signal into

a current signal. During the process of detection, black is active at HIGH level, but white is active at LOW level. The detection height is 0-3 cm. By rotating the adjustable potentiometer on the sensor, it can adjust the detection sensitivity of the sensor.

Specification:

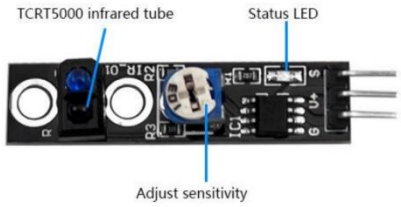
Operating Voltage: 3.3-5V (DC)

Interface: G(GND) V+(VCC) S(Signal)

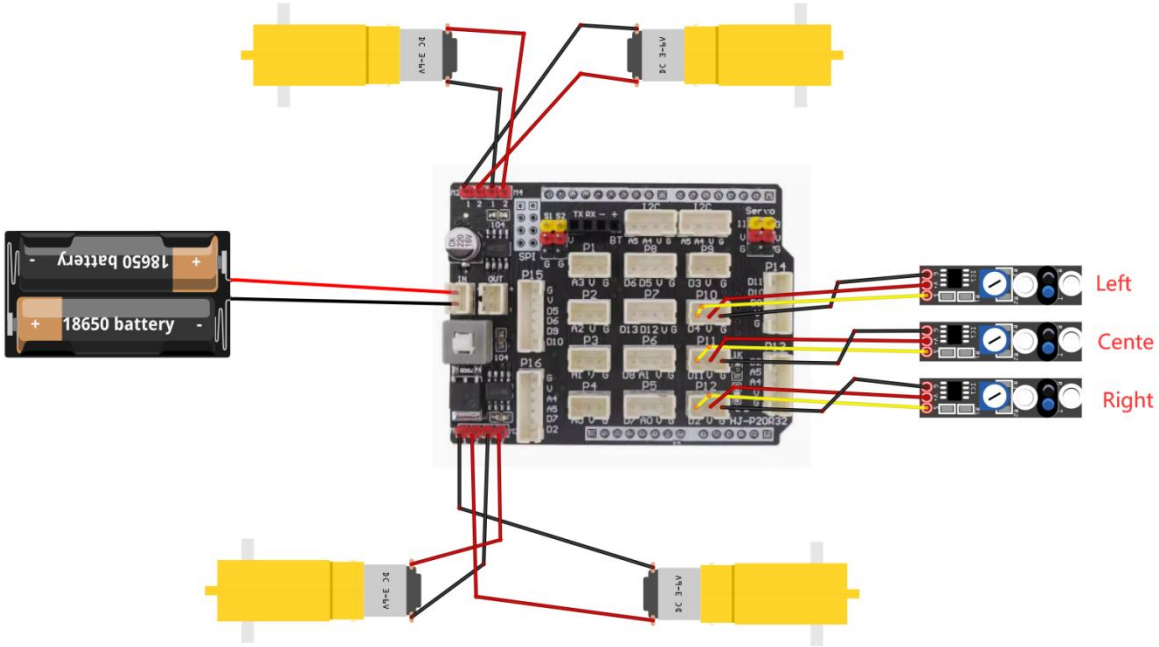
Output Signal: Digital signal

Detection Height: 0-3 cm

Special note: before testing, turn the potentiometer on the sensor to adjust the detection sensitivity. When adjust the LED at the threshold between ON and OFF, the sensitivity is the best.



Wiring diagram



Let's program

Test 1--Line Tracking Sensor

The main purpose of the test experiment is to read the return signal of the line tracking sensor and print it to the serial port monitor.When detects white paper, sensor’s signal pin outputs LOW (display 0),and status LED is on;When detects black,

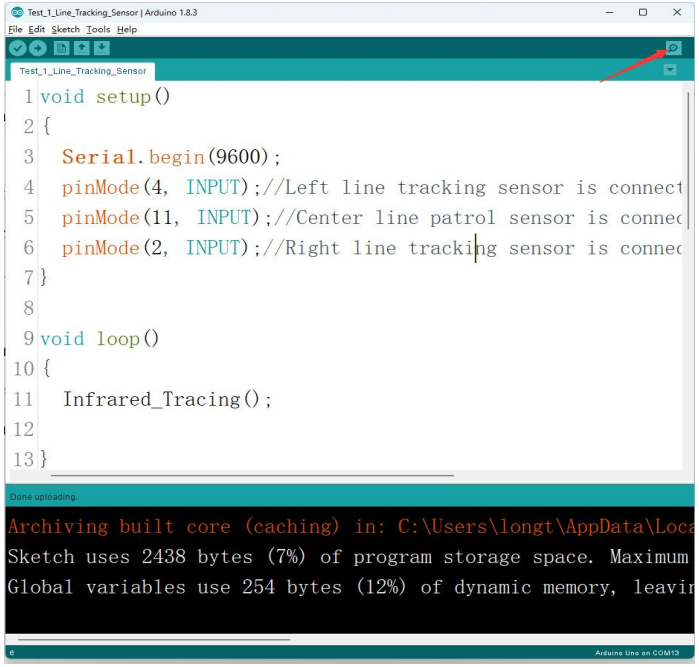
sensor’s signal pin outputs HIGH (display 1),and status LED is off.

Result

if you want to refer to the program we provide.open the reference code for this lesson

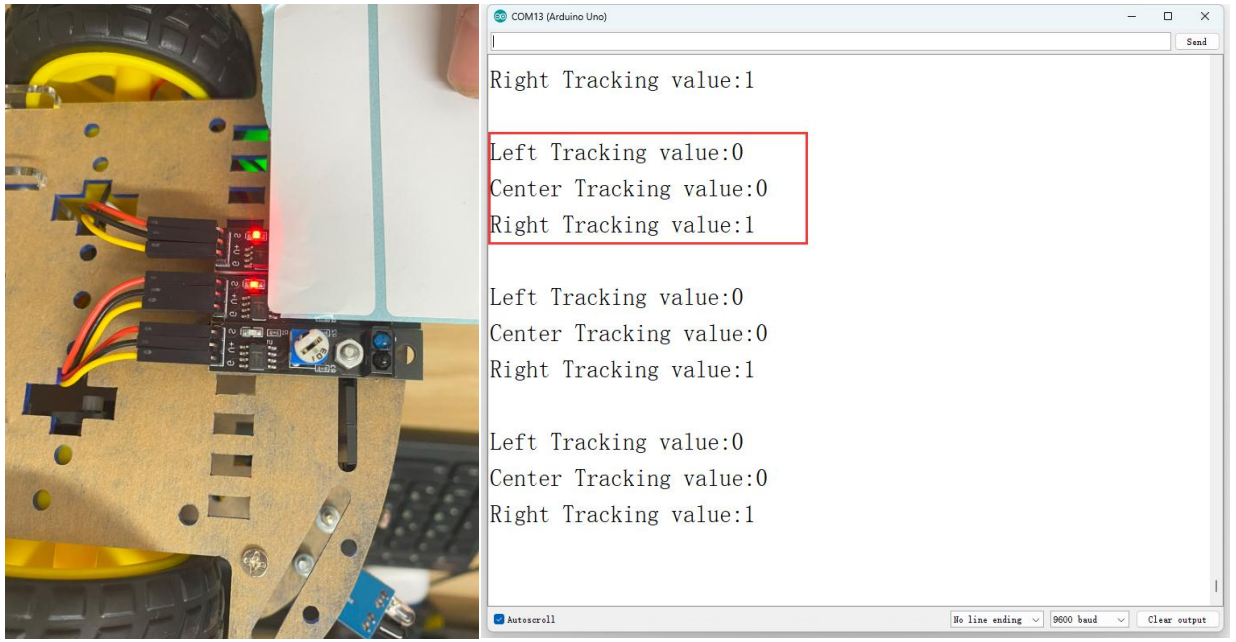
"Test_1_Line_Tracking_Sensor.ino" in the reference materials we provided.

After uploading the code, click the button in the upper right corner to open the serial monitor to view the measured distance.



Then you can see the data as blow:

When detects white paper, sensor's signal pin outputs LOW (display 0),and status LED is on;When detects black, sensor's signal pin outputs HIGH (display 1),and status LED is off.



Important note: Before you upload the program, you need to close the serial monitor, otherwise the serial monitor will occupy the communication interface of the uploaded program.

Test 2--Line Tracking Smart Car

In the experimental test 2, we learned to combine the infrared line-following sensor with the motor to control the robot car to complete the line-following function.

Step 1: Prepare a black track on white ground. (the width of the black track is more than 15mm and less than 20mm).

Please note, the bend angle of the track can't be larger than 90 degree. If the angle is too large, the car will move out of the track.

Step 2: Adjust the sensitivity of tracking sensor modules.

Turn on and hold the car to adjust the potentiometer on the tracking sensor with Phillips screwdriver until you get the best sensitivity status: the signal indicate LED light will turn on when sensor is above white ground, and the signal LED will turn off when the sensor is above black track.

Signal Indicate LED ON: White Ground

Signal Indicate LED OFF: Black Track

Step 3: Turn on the car and put the car over the black track, then the car will move along the black track.

If the car can't move, please check the following:

If adjusted well the sensibility of the tracking sensor.

Car tracking flow chart

The car entered the tracking mode, namely began constantly scanning and detector connected to the I/O port of the SCM, once detected a signal of a I/O port, enter judgment processing procedures, to determine which one of 3 detectors detect the black line.

Result

Turn the POWER switch ON.The robot car will move forward along the black track.

Lesson 3 Ultrasonic Infrared Obstacle Avoidance Robot Car

About this lesson:

In this lesson, we will complete the test of 3 experimental codes. In experimental test 1, we separately learn how to use infrared obstacle avoidance sensors to detect obstacles, and observe the results returned by the sensors to determine whether obstacles are detected. In the second experimental test 2, we will learn to use the ultrasonic module to measure distance. In the experimental test 3, the infrared obstacle avoidance sensor, the ultrasonic module and the servo motor were assembled on the robot car at the same time, and the data of these sensors were used at the same time to assist the robot car to complete the obstacle avoidance function more accurately.

What is infrared obstacle avoidance sensor

The infrared obstacle detector sensor has a pair of infrared transmitting and receiving tubes.The transmitter emits an infrared rays of a certain frequency. When the detection direction encounters an obstacle (reflecting surface), the infrared rays are reflected back, and receiving tube will receive it.At this time, the indicator (green LED) lights up. After processed

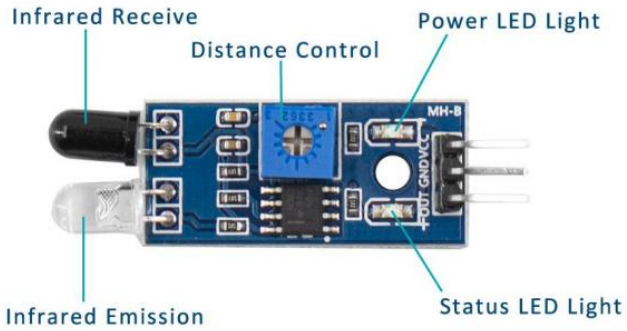
by the circuit, the signal output terminal will output Digital signal.You can rotate the potentiometer on the shield to adjust the detection distance. It is better to adjust the potentiometer to make the green LED in a state between on and off. The detection distance is the best,almost 10cm.

How to use the infrared obstacle avoidance sensor

we read the signal level of obstacle detector sensor to judge whether detect obstacles or not.

When detects an obstacle, sensor’ s signal pin outputs LOW (display 0); otherwise, output HIGH (display 1).

Show the result on the serial monitor, and control the external LED module turn ON/OFF.



What is an ultrasonic sensor

Ultrasonic sensor module HC-SR04 provides 2cm-400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit.

The basic principle of work:

(1) Using IO trigger for at least 10us high level signal

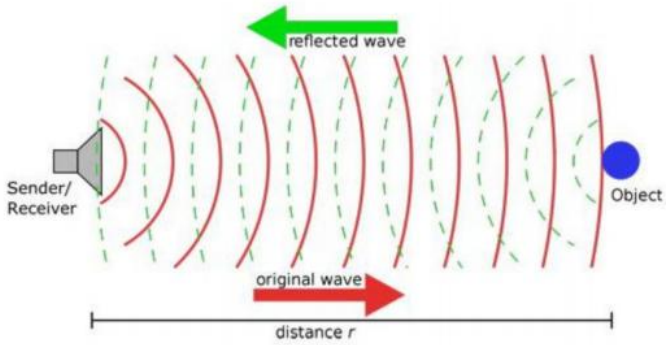
(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic tore turning.

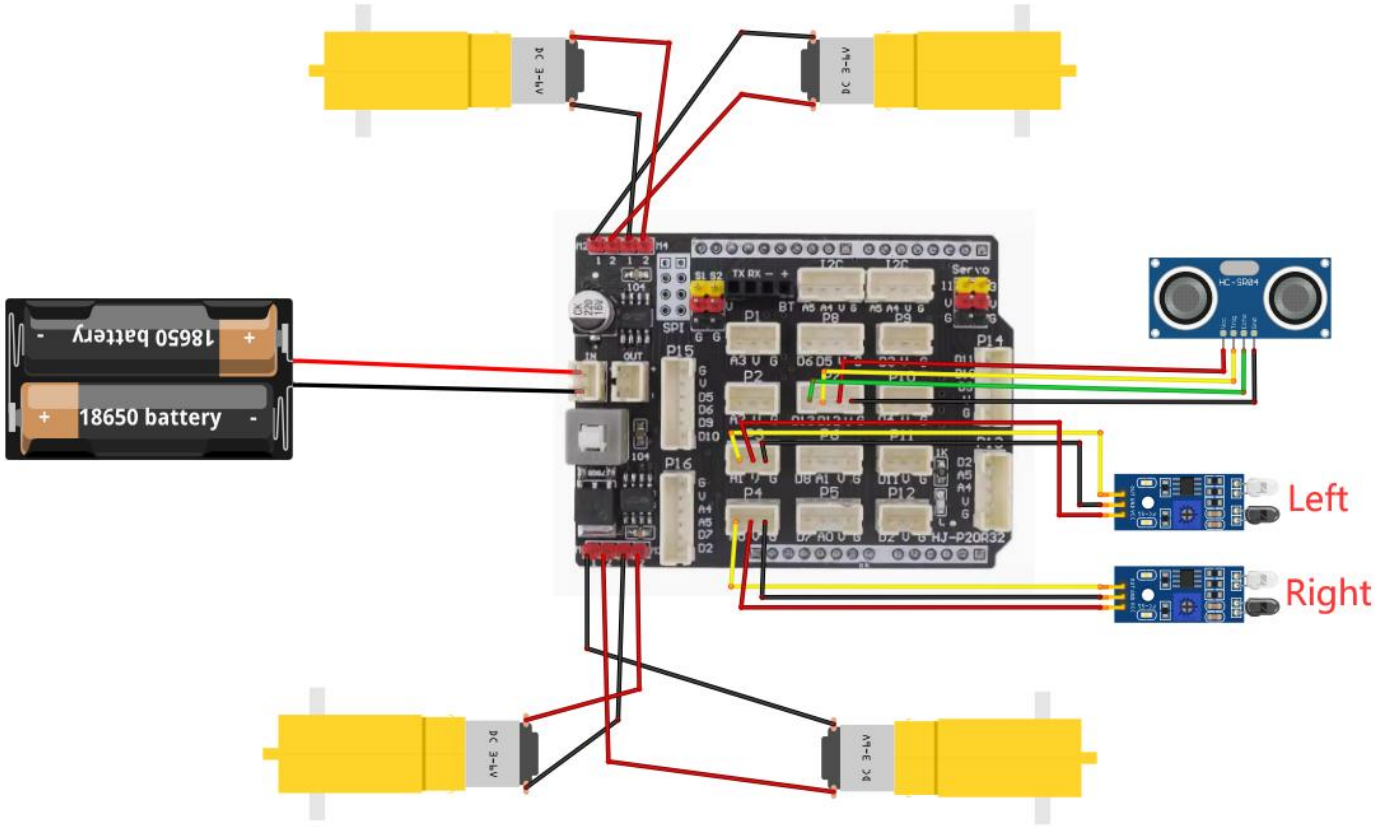
Test distance = (high level time × velocity of sound (340m/s) /2

The Timing diagram is shown below. 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 burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object

that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: us / 58 = centimeters or us / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



Wiring diagram



Let's program

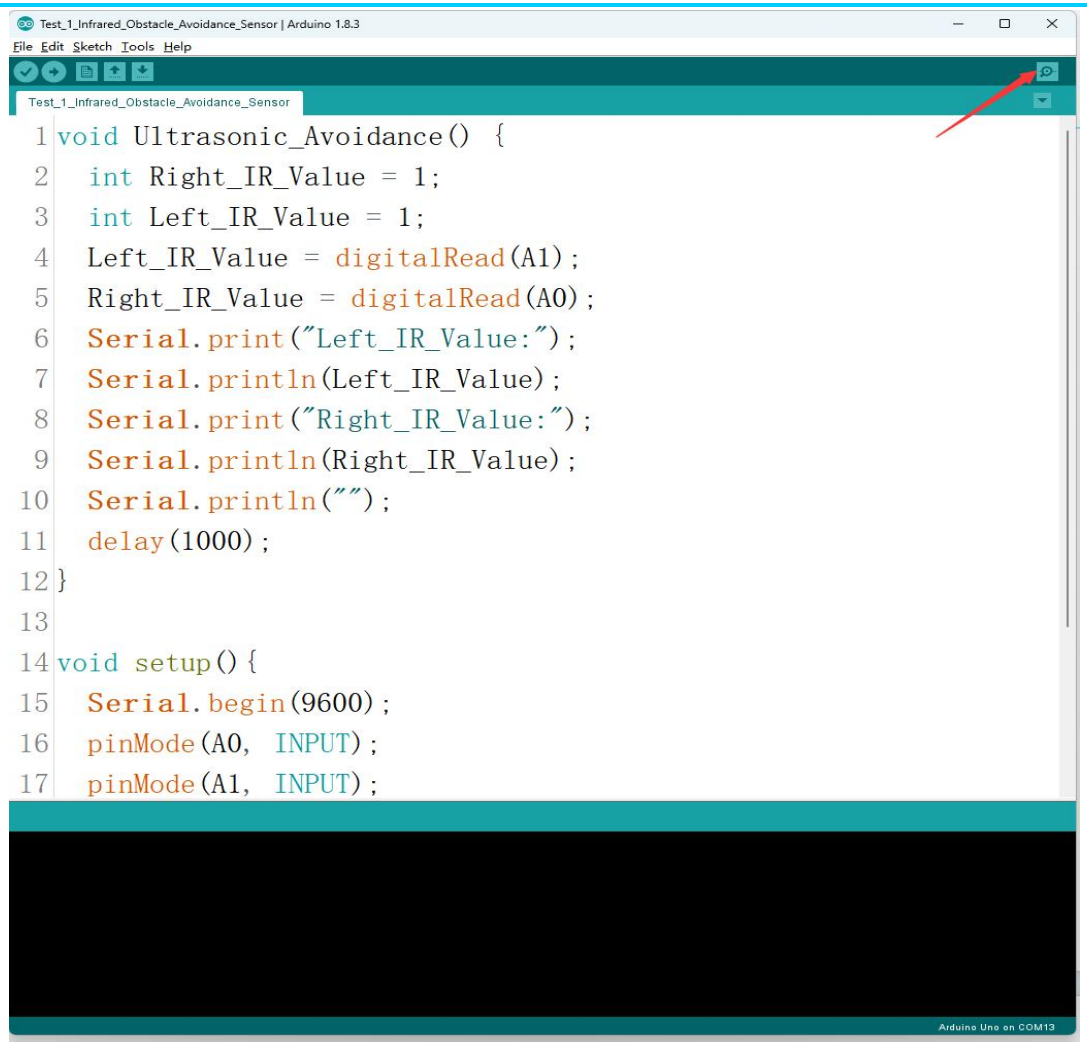
Test 1--infrared obstacle avoidance sensor

The main purpose of the test experiment is to read the return signal of the infrared obstacle avoidance sensor and print it to the serial port monitor.When detects an obstacle, sensor’s signal pin outputs LOW (display 0); otherwise, output HIGH (display 1).

Result

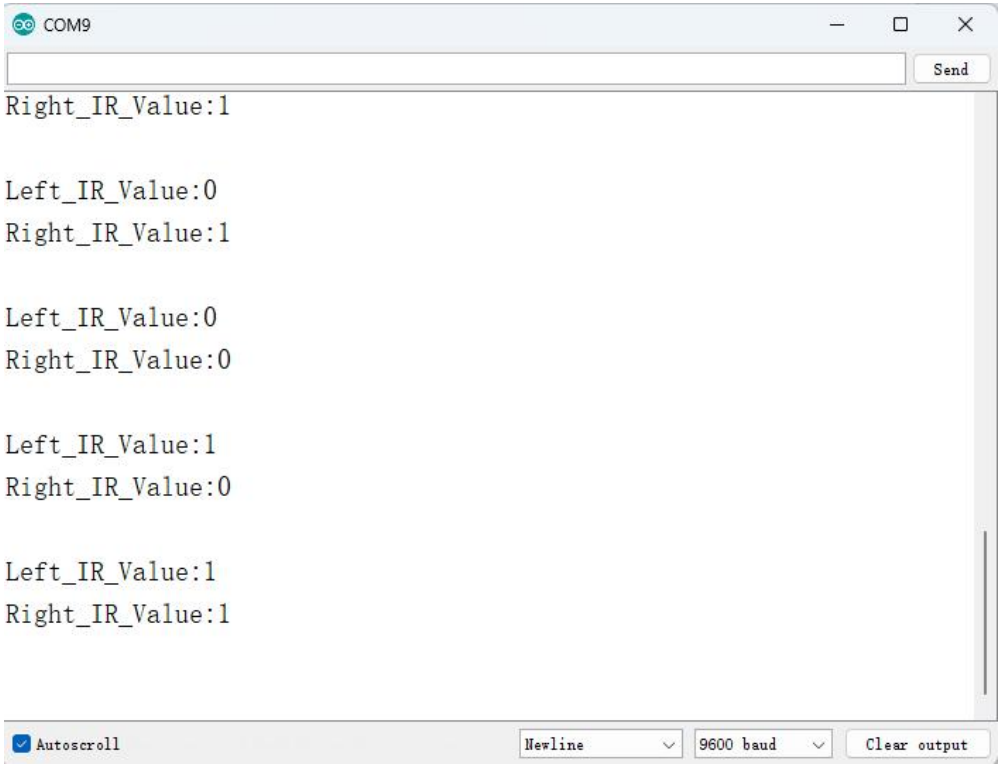
If you want to refer to the program we provide.open the reference code for this lesson "**Test_1_Infrared_Obstacle_Avoidance_Sensor.ino**" in the reference materials we provided.

After uploading the code, click the button in the upper right corner to open the serial monitor to view the measured distance.


Test_1_Infrared_Obstacle_Avoidance_Sensor | Arduino 1.8.3
File Edit Sketch Tools Help
Test_1_Infrared_Obstacle_Avoidance_Sensor
1 void Ultrasonic_Avoidance() {
2 int Right_IR_Value = 1;
3 int Left_IR_Value = 1;
4 Left_IR_Value = digitalRead(A1);
5 Right_IR_Value = digitalRead(A0);
6 Serial.print("Left_IR_Value:");
7 Serial.println(Left_IR_Value);
8 Serial.print("Right_IR_Value:");
9 Serial.println(Right_IR_Value);
10 Serial.println("");
11 delay(1000);
12 }
13
14 void setup(){
15 Serial.begin(9600);
16 pinMode(A0, INPUT);
17 pinMode(A1, INPUT);
Arduino Uno on COM13

Then you can see the data as blow:

When there is an obstacle in the front, IR_value=0, and the indicator light on the sensor lights up.



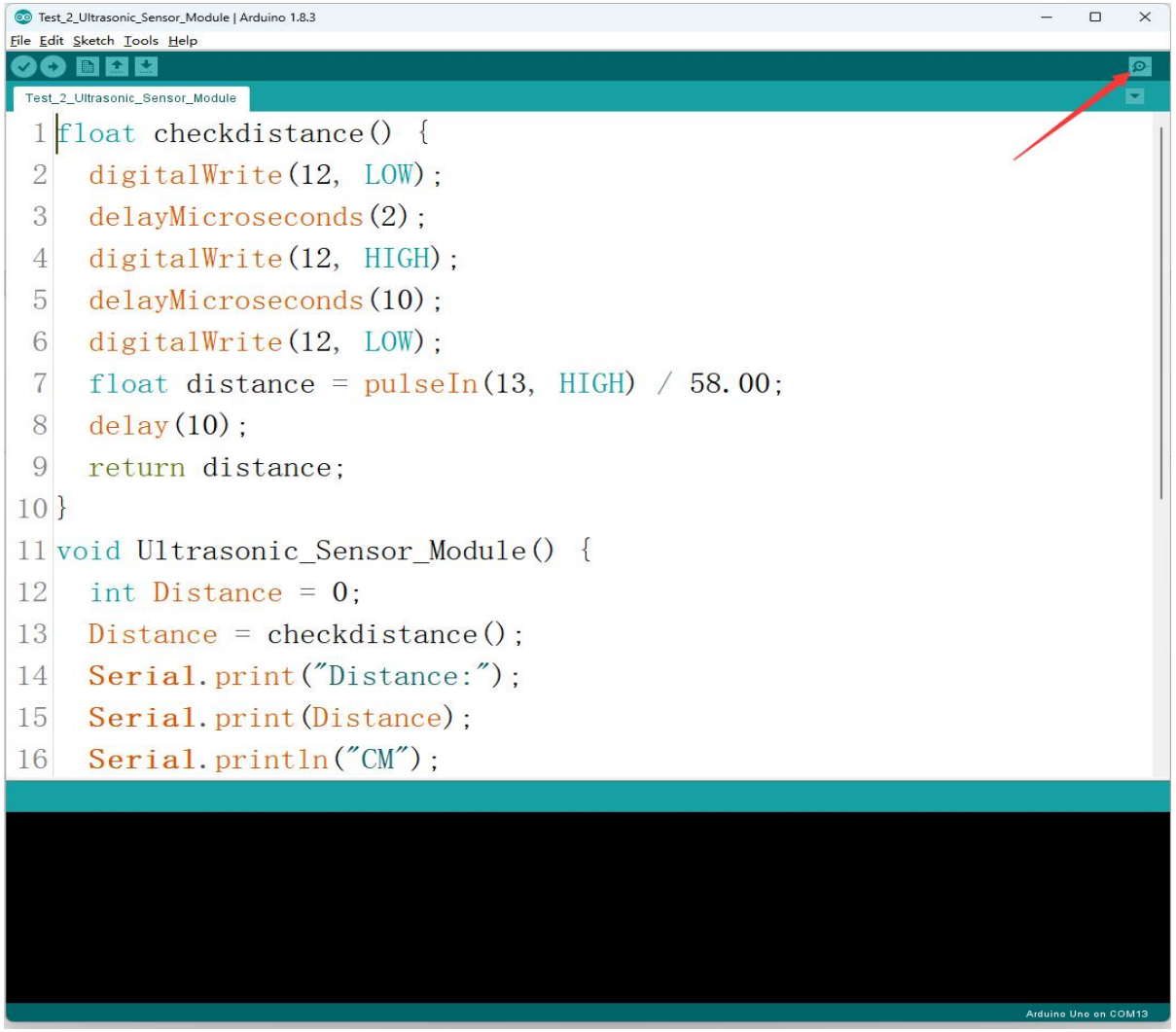
Test 2--Ultrasonic Sensor Module

In Experimental Test 2, we will learn how to control the ultrasonic sensor, and display the distance measured by the ultrasonic sensor on the serial monitor.

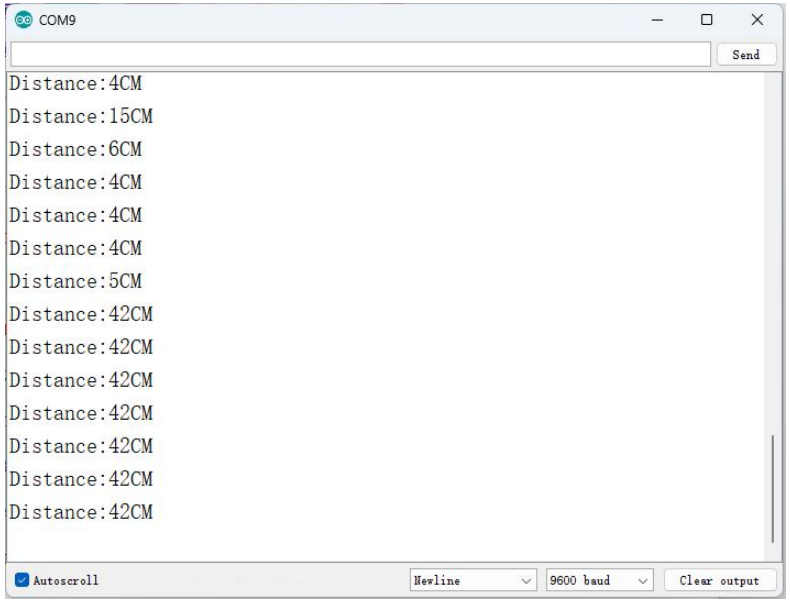
Result

If you want to refer to the program we provide.open Arduino IDE software and open the reference code for this lesson "**Test_2_Ultrasonic_Sensor_Module.ino**" in the reference materials we provided.

After uploading the code, click the button in the upper right corner to open the serial monitor to view the measured distance.


Test_2_Ultrasonic_Sensor_Module | Arduino 1.8.3
File Edit Sketch Tools Help
Test_2_Ultrasonic_Sensor_Module
1 float checkdistance() {
2 digitalWrite(12, LOW);
3 delayMicroseconds(2);
4 digitalWrite(12, HIGH);
5 delayMicroseconds(10);
6 digitalWrite(12, LOW);
7 float distance = pulseIn(13, HIGH) / 58.00;
8 delay(10);
9 return distance;
10 }
11 void Ultrasonic_Sensor_Module() {
12 int Distance = 0;
13 Distance = checkdistance();
14 Serial.print("Distance:");
15 Serial.print(Distance);
16 Serial.println("CM");
Arduino Uno on COM13

Then you can see the data as blow:



Test 3--Ultrasonic_Infrared_Obstacle_Avoidance_Robot_Car

In the experimental test 3, the infrared obstacle avoidance sensor, the ultrasonic module were assembled on the robot car at the same time, and the data of these sensors were used at the same time to assist the robot car to complete the obstacle avoidance function more accurately.

Result

If you want to refer to the program we provide.open the reference code for this lesson

"**Test_3_Ultrasonic_Infrared_Obstacle_Avoidance_Robot_Car.ino**" in the reference materials we provided.

Note: It is recommended that the height of the obstacle is greater than 15cm.which means that the height of the obstacle is greater than the height of the ultrasonic sensor.

What will you see

Upload the code to UNO R3 control board, and turn the POWER switch ON.

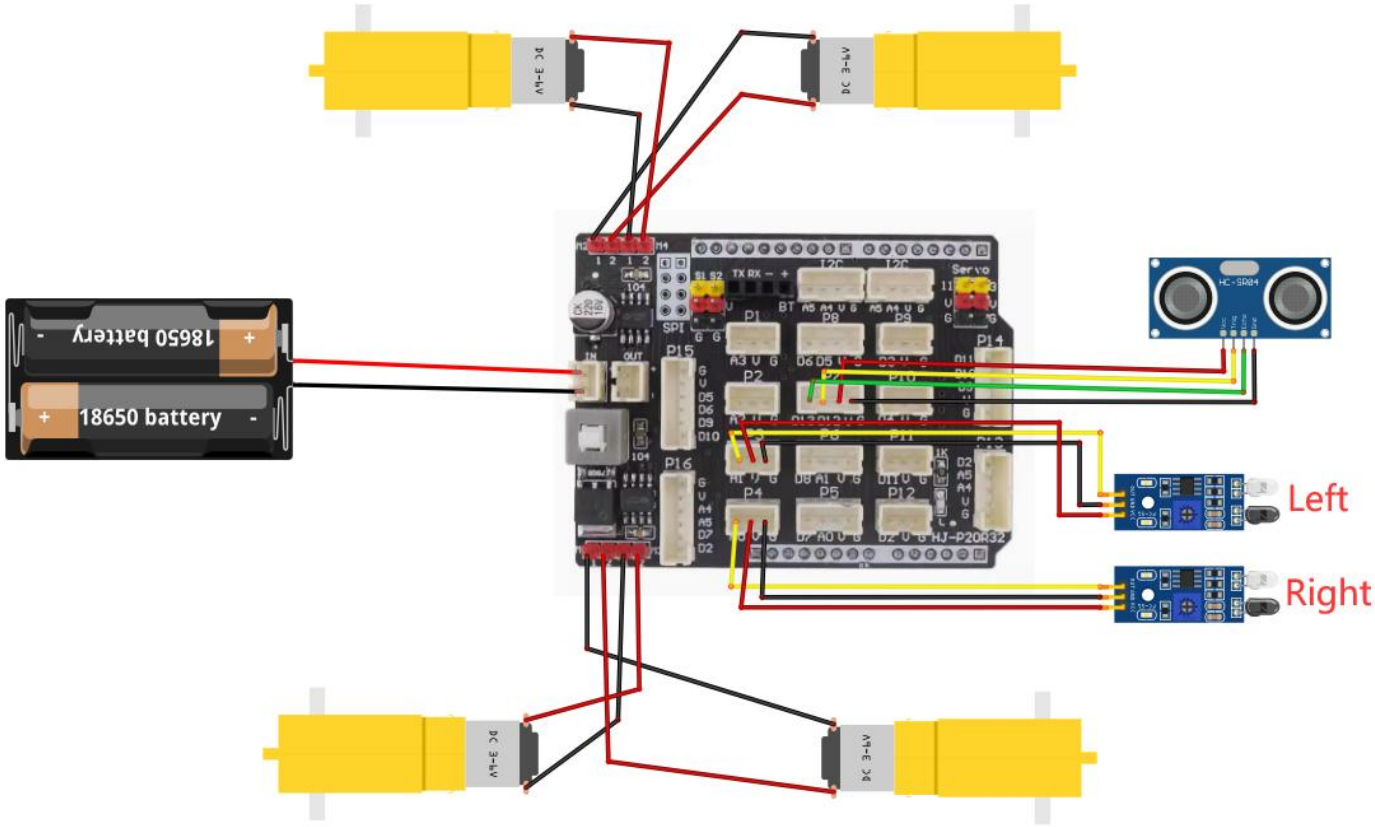
Because of receiving the detection signals of ultrasonic and infrared obstacle avoidance modules at the same time, the robot car can complete the obstacle avoidance function more accurately. When obstacles are on the left and right sides of the robot car, they can be discovered by the infrared obstacle avoidance module in time and turn to avoid. When the obstacle is directly in front, the ultrasonic will be able to measure the distance between the robot car and the obstacle.

Lesson 4 Ultrasonic Follow Robot Car

About this lesson:

In the last course, We learned how to use the ultrasonic module and infrared obstacle avoidance module. Similarly, combining these two modules can control the robot car to complete the following function. When the guiding object is on the left and right sides of the robot car, the infrared obstacle avoidance module can detect and judge the direction of the guiding object, and control the robot car to turn to the guide object. When the guided object is directly in front of the robot car, the ultrasonic sensor can detect the distance between the robot car and the guide object.When the distance is greater than 10mm, control the robot car to approach the guide;When the distance is less than 5mm, control the robot car to stop and keep the current distance.

Wiring diagram



Let's program

Test 1--Ultrasonic Follow Robot Car

When the guiding object is on the left and right sides of the robot car, the infrared obstacle avoidance module can detect and judge the direction of the guiding object, and control the robot car to turn to the guide object.

When the guided object is directly in front of the robot car, the ultrasonic sensor can detect the distance between the robot car and the guide object.When the distance is greater than 10mm, control the robot car to approach the guide;

When the distance is less than 5mm, control the robot car to stop and keep the current distance.

Result

If you want to refer to the program we provide.open the reference code for this lesson

"**Test_1_Ultrasonic_Follow_Robot_Car.ino**" in the reference materials we provided.

What will you see

Upload the code to UNO R3 control board,and turn the POWER switch ON.

Note: It is recommended to use a rectangular object box to guide the robot car. Length>10cm.Width>15cm.

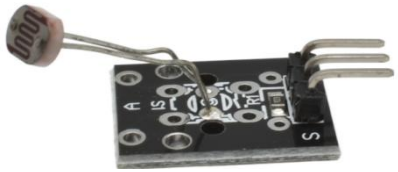
The robot car detects the distance of the object in front through the ultrasonic sensor. When the front object moves, the robot car will follow the movement, keeping the distance between the car and the object in front between 1cm~5cm.

Lesson 5 Light Seeking Robot Car

About this lesson:

In this lesson, we mainly study two experimental tests.In the first test experiment, we learn the photoelectric sensor and use it to obtain the light intensity in the environment; in the second test experiment, the photoelectric sensor and motor control need to be combined, so that when the car senses strong light, Will move in the direction of the light.

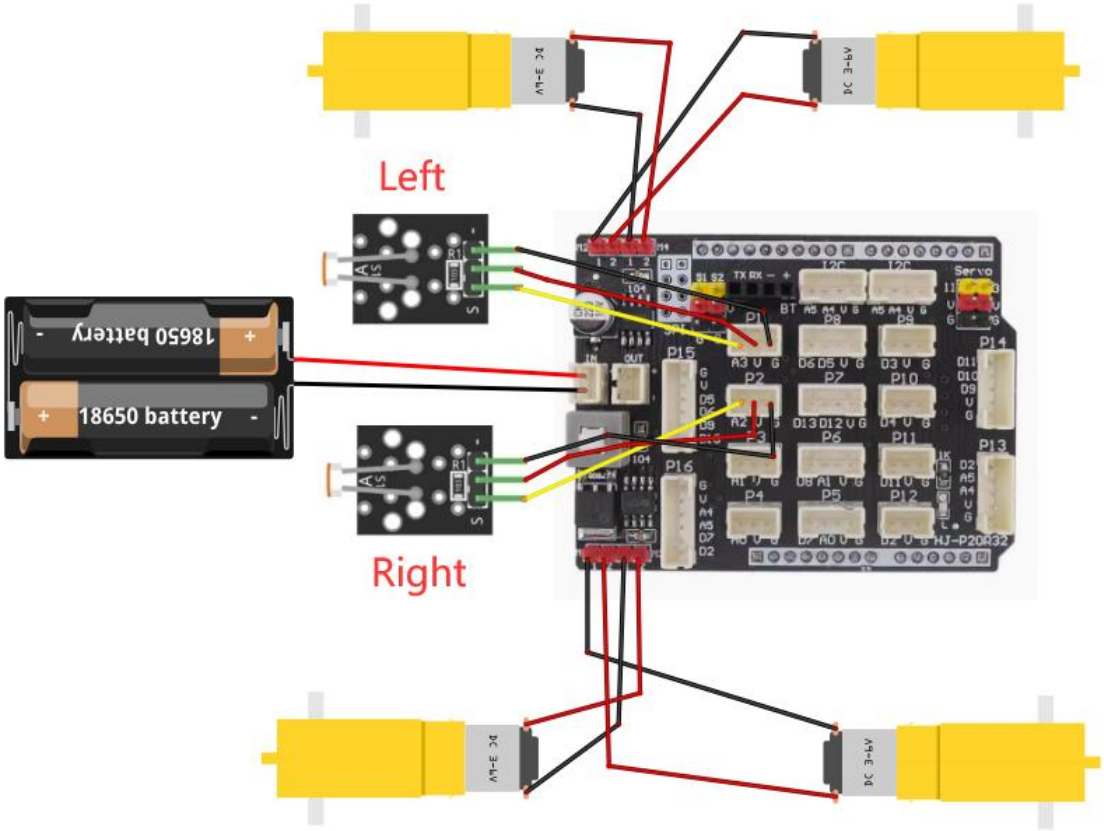
What is photoelectric sensor



The photoelectric sensor (photoresistor) is a resistor semiconductor made by the photoelectric effect. It is very sensitive to

ambient light, so its resistance value changes with different light intensities. We use its functions to design circuits and generate photoresistor sensor modules. The signal end of the module is connected to the microcontroller. When the light intensity increases, the resistance decreases, and the voltage of the signal output port of the module decreases, that is, the voltage detected by the analog port of the microcontroller will decrease. Otherwise, when the light intensity decreases, the resistance increases, and the voltage of the signal output port of the module increases, that is, the voltage detected by the analog port of the microcontroller will increase. Therefore, we can use the photoresistor sensor module to read the corresponding analog value and sense the light intensity in the environment. It is usually used in light measurement, control and conversion, and light control circuits.

Wiring diagram



Let's program

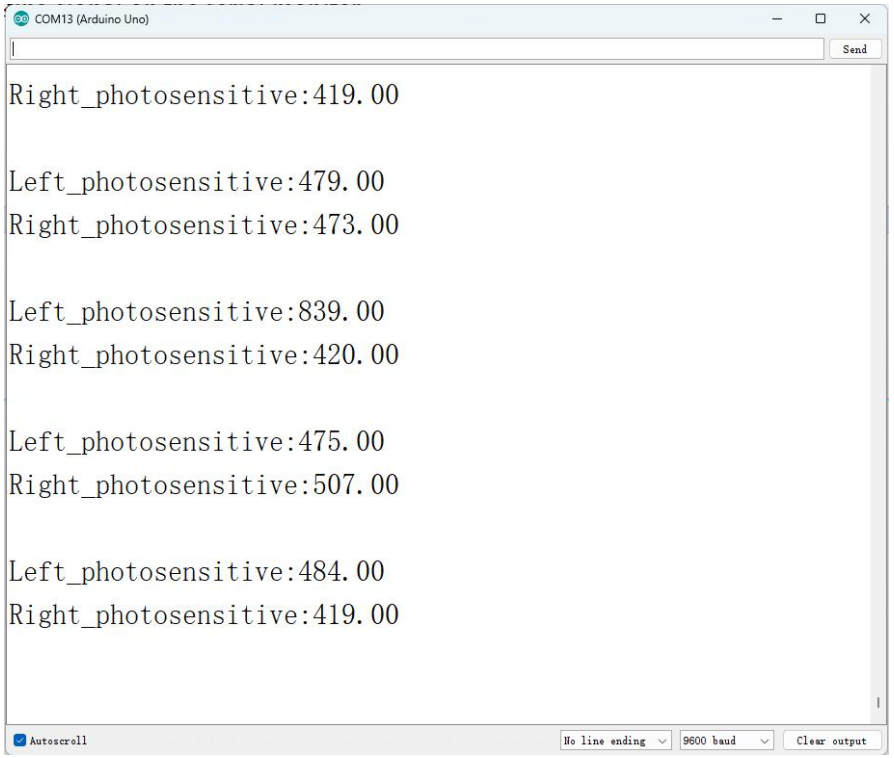
Test 1--Light Seeking Signal

On the module , When the photoresistor is illuminated by strong light , Its resistance value drops rapidly , the current passed increases, the resistance of the photoresistor rises rapidly in a dark environment, the current passed through is reduced, The main control board determines whether there is a light source.

Result

If you want to refer to the program we provide.Open the reference code for this lesson "**Test_1_Light_Seeking_Signal.ino**" in the reference files we provided in tutorial.

After uploading the program, Use a cover to block the light near the photoresistor, and then observe that the output value of the light-seeking signal on the serial monitor is relatively large, and then remove the obstruction. It is found that the output value of the light-seeking signal on the serial monitor becomes smaller. You can also use the flashlight of the mobile phone to illuminate the photoresistor to observe the change of the output value of the light-seeking signal on the serial monitor.



Test 2--Light Seeking Robot Car

The photoelectric sensor and the motor control need to be combined, so that when the car senses strong light, it will move in the direction of the light.

Result

If you want to refer to the program we provide.Open the reference code for this lesson

"Test_2_Light_Seeking_Robot_Car.ino" in the reference files we provided in tutorial.

What will you see

Upload the code to UNO R3 control board,and turn the POWER switch ON.

Test in a dark environment and turn off the lights in the room.

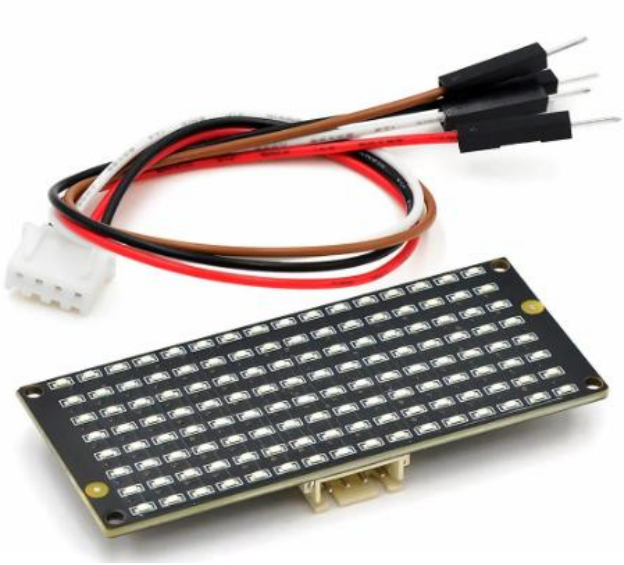
The light of the flashlight faces the photoelectric sensor on the right, and the robot car turns right. The light of the flashlight faces the photoelectric sensor on the left, and the robot car turns left.The light is detected on both sides, and the car is moving forward.

Lesson 6 Facial Expression LED Board

About this lesson:

In this lesson, we mainly study two experimental tests.In the first test experiment, We learn to draw a smiley face on the LED board; in the second test experiment, We learn to display the state of the car driving on the LED board.

What is expression board



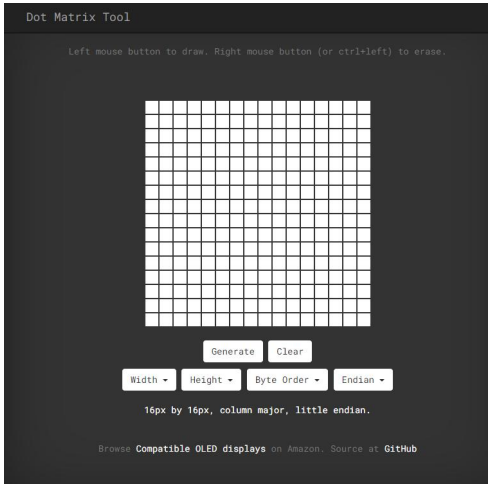
How fun it is if a expression board is added to the robot. And the 8*16 LED board can do the trick. With the help of it, you could design facial expressions, images, patterns and other displays by yourselves. The 8*16 LED board comes with 128 LEDs. The data of the microprocessor (Arduino) communicates with the AiP1640 through a two-wire bus interface. Therefore, it can control the on and off of 128 LEDs on the module, so as to make the dot matrix on the module to display the pattern you need. A HX-2.54 4Pin cable is provided for your convenience of wiring.

Instructions for the use of modulus tool

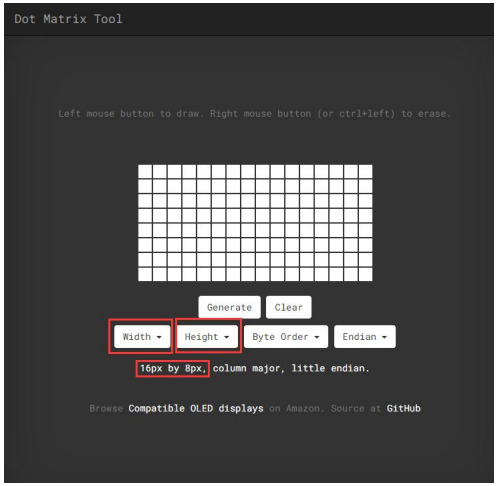
The dot matrix tool uses the online version, and the link is :

http://dotmatrixtool.com/#

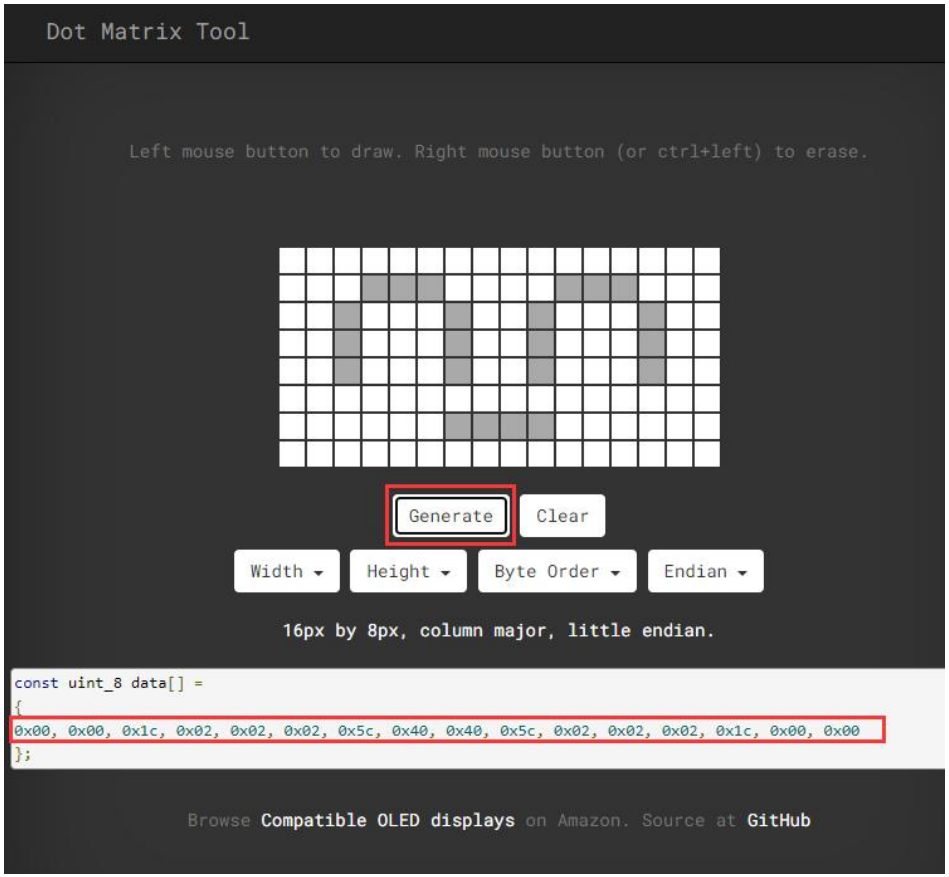
①Enter the link and the page appears as shown below



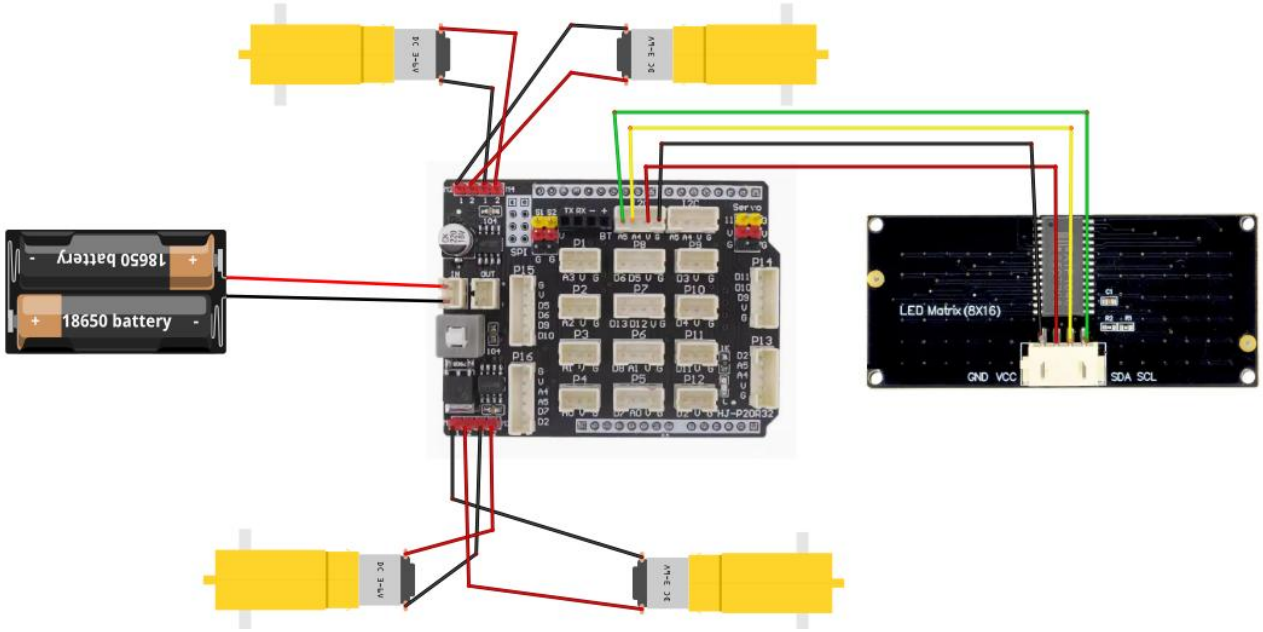
②The dot matrix is 8*16, so adjust the height to 8 and width to 16, as shown in the figure below



③Generate hexadecimal data from the pattern As shown in the figure below, press the left mouse button to select, right click to cancel; draw the pattern you want, click Generate, and the hexadecimal data we need will be generated.



Wiring diagram



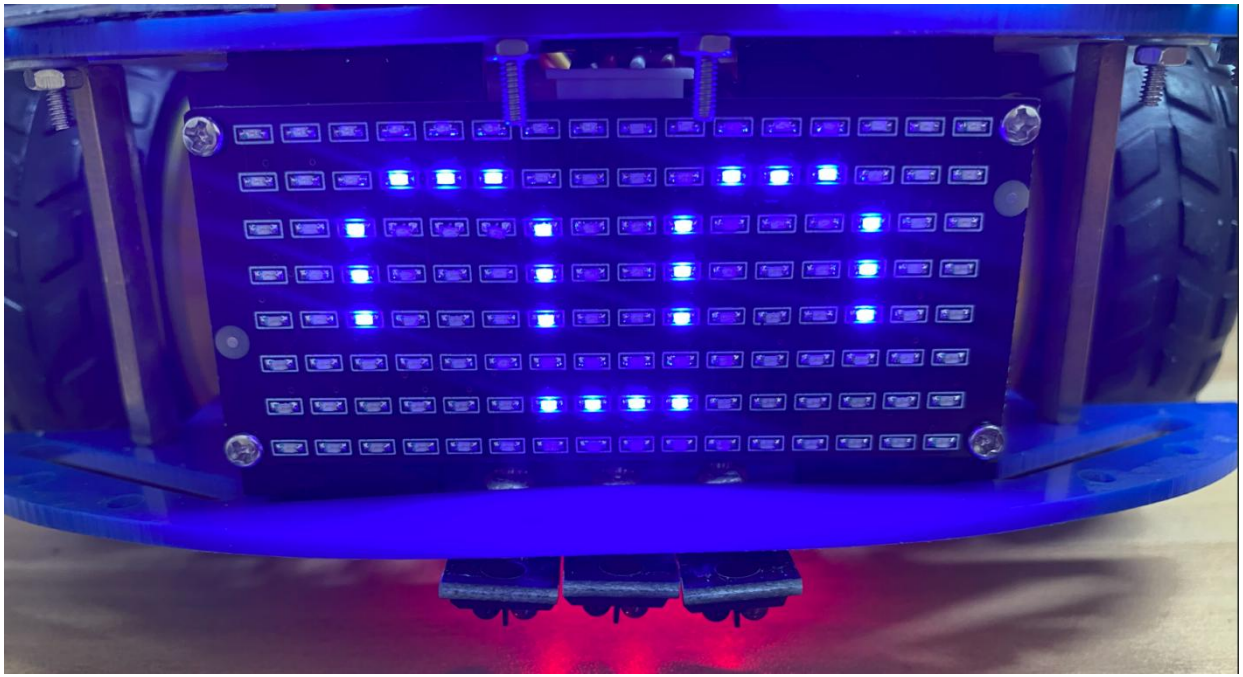
Let's program

Test 1--show the smile face

On the module , The board will show the smile face.

Result

After successfully uploading the code to the board, connect the wirings according to the wiring diagram, then turn on the power, a smile-shaped pattern will be displayed on the LED board.



Test 2-- Matrix face

We use the modulus tool we just learned, http://dotmatrixtool.com/#, to make the dot matrix display the start pattern, going forward, going back, going left, going right, and stop and then clear the pattern. The time interval is 2000 ms.

Code obtained from the module tool：

Code for the pattern start:

0x01,0x02,0x04,0x08,0x10,0x20,0x40,0x80,0x80,0x40,0x20,0x10,0x08,0x04,0x02,0x01

Code for the pattern going forward:

0x00,0x00,0x00,0x00,0x00,0x24,0x12,0x09,0x12,0x24,0x00,0x00,0x00,0x00,0x00,0x00

Code for the pattern stepping back:

0x00,0x00,0x00,0x00,0x00,0x24,0x48,0x90,0x48,0x24,0x00,0x00,0x00,0x00,0x00,0x00

Code for the pattern turning left：

0x00,0x00,0x00,0x00,0x00,0x00,0x44,0x28,0x10,0x44,0x28,0x10,0x44,0x28,0x10,0x00

Code for the pattern turning right：

0x00,0x10,0x28,0x44,0x10,0x28,0x44,0x10,0x28,0x44,0x00,0x00,0x00,0x00,0x00,0x00

Code for the pattern stop：

0x2E,0x2A,0x3A,0x00,0x02,0x3E,0x02,0x00,0x3E,0x22,0x3E,0x00,0x3E,0x0A,0x0E,0x00

Code to clear screen：

0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00

Result

If you want to refer to the program we provide.Open the reference code for this lesson **"Test_2_Matrix_face.ino"** in the reference files we provided in tutorial.

What will you see

Upload the code to UNO R3 control board,and turn the POWER switch ON.

After uploading test code, the facial expression board shows these patterns orderly and repeats this sequence.

Lesson 7 Bluetooth Multifunctional Robot Car

About this lesson:

In this lesson, we mainly study two experimental tests.In the first test experiment, We learn how to use the Bluetooth Module; in the second test experiment, We will integrate all of its functions via a Bluetooth.

Introduction:

The HC-06 is a Serial port Bluetooth module which having fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

We use the serial port communication function of the Bluetooth module, use the app to control the Bluetooth connection of the mobile phone and the HC-06 Bluetooth module, and then the mobile phone app sends data, and the HC-06 Bluetooth module transmits the received data to the arduino uno through the serial port. The default communication baud rate of the HC-06 Bluetooth module is 9600.

The HC-06 Bluetooth module to UNO R3:

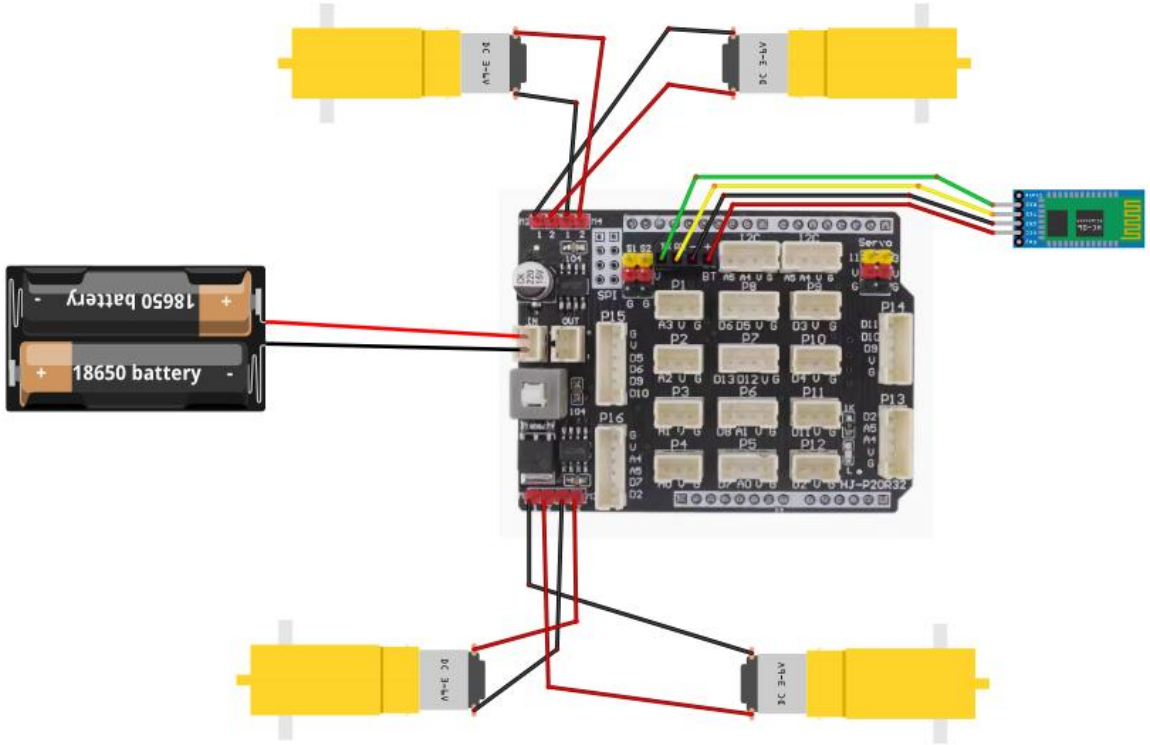
VCC>>>> +

GND>>>> -

TXD>>>>RX

RXD>>>>TX

Wiring diagram

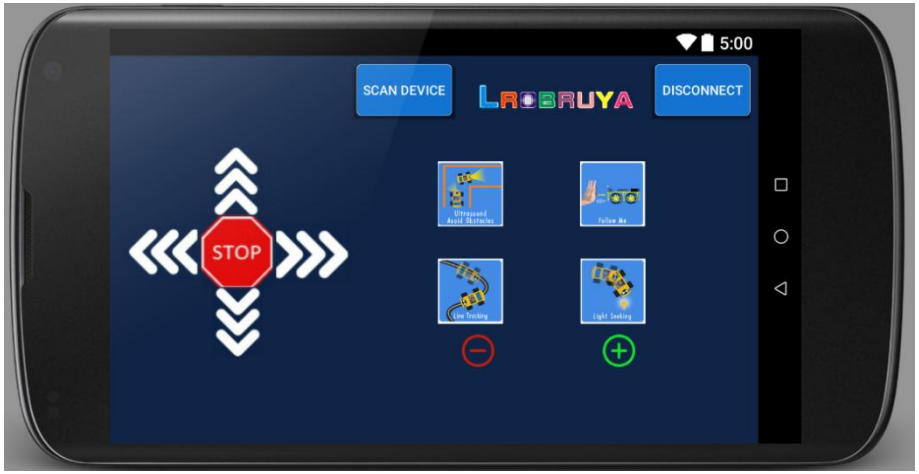


Attention

The bluetooth module should be pulled out before you upload the program every time,or it will be failed to upload the program.When uploading the code, CANNOT connect the Bluetooth module first; otherwise uploading fails! You are supposed to upload the code to control board, then connect the Bluetooth module.

Instructions for the use of app

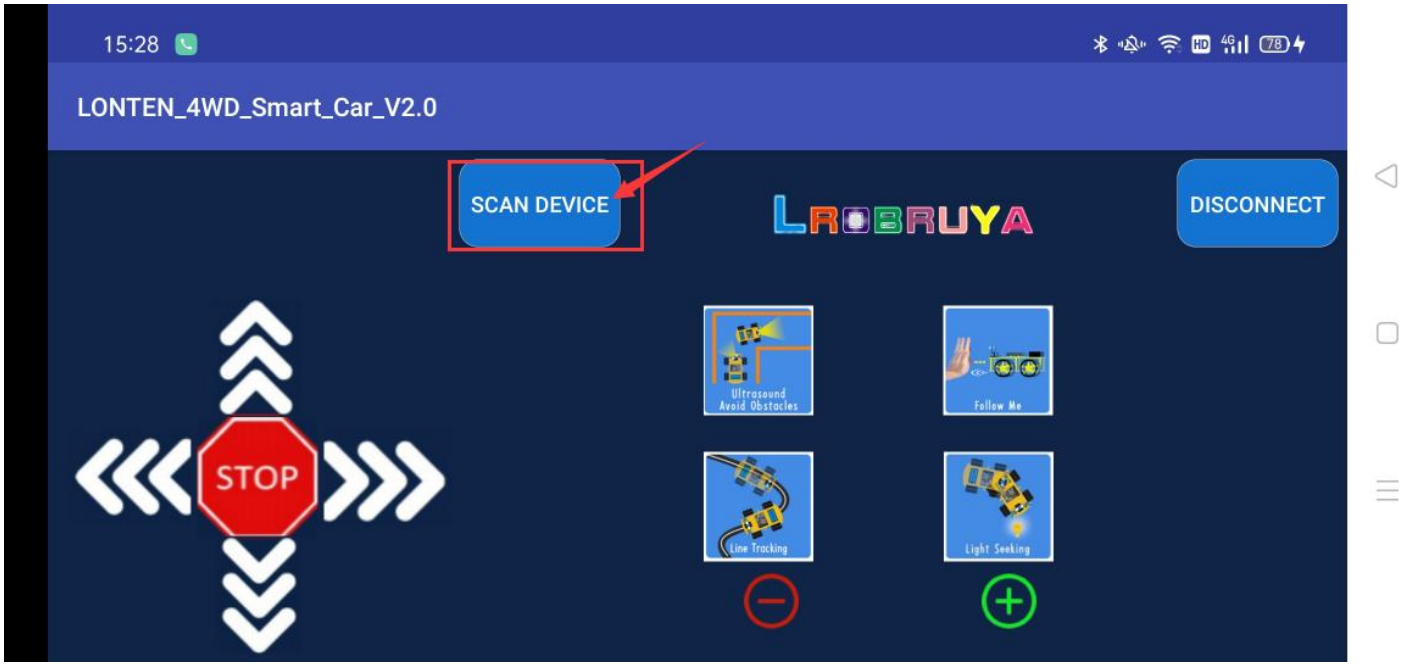
Firstly, download the "**LONTEN_4WD_Smart_Car_V2.0.apk**" file from the folder to your mobile phone and install it into an application software.



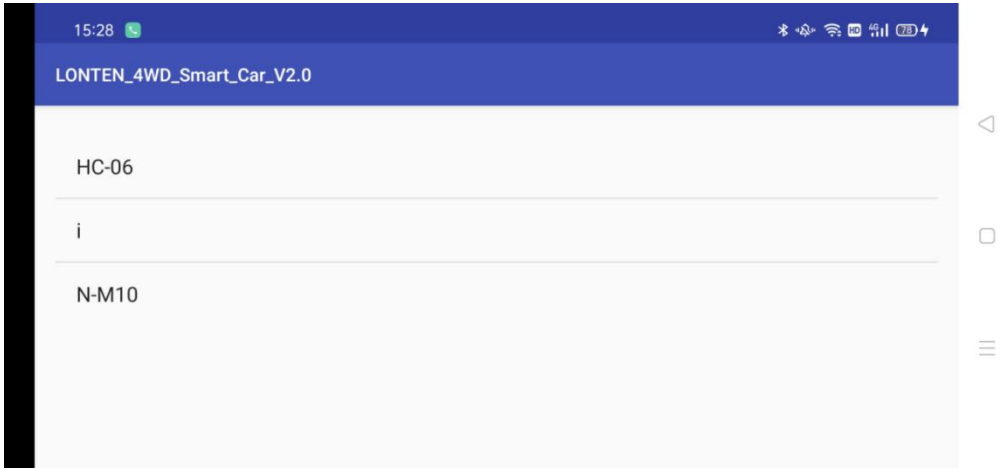
Then make sure the Bluetooth module is connected. Pair your phone with HC-06. for doing this go to Settings->Bluetooth->Scan device->select HC-06 and pair it. Pass code to pair is '1234'.

Open Bluetooth Terminal software, go to options and select 'connect a device - secure' option. It it ask for pass code enter 1234.If your phone is connected to the Bluetooth module, you will see a usable device called HC-06 on the PAIRED DEVICES(As shown below).If the HC-06 does not appear on the PAIRED DEVICES, reoperate the above steps.

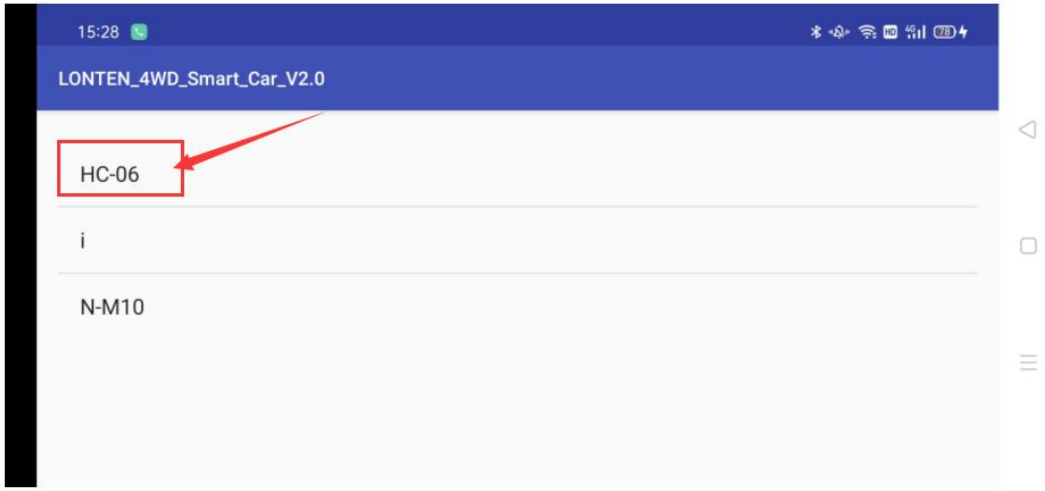
After the above steps are complete, we open the **LONTEN_4WD_Smart_Car_V2.0 app**.



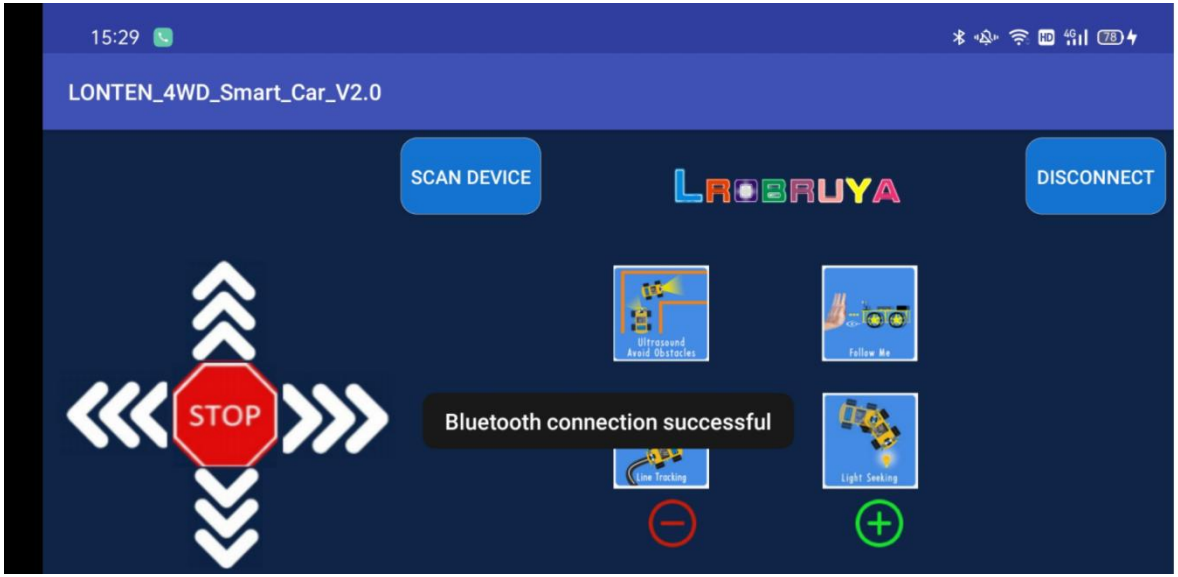
Click the Connect Bluetooth icon button”SCAN DEVICE” . the HC-06 will appear in our scan results.Select HC-06.



After selecting the HC-06 device, click button will to connect .



After click on the button .wait 2 seconds,If the connection is successful, "Bluetooth connection successful" will be displayed.



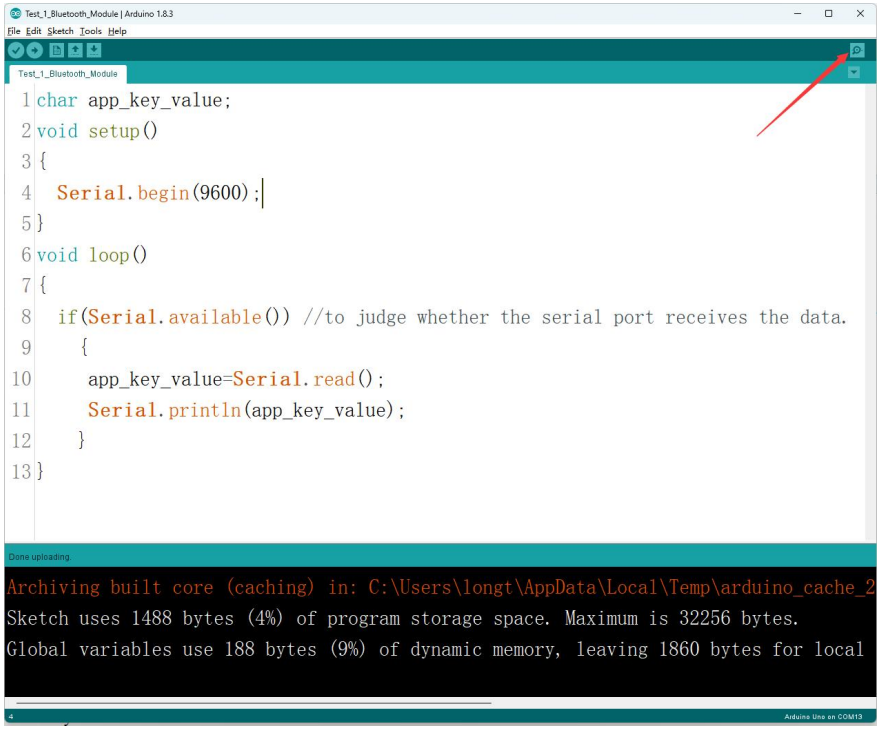
(Note: When the Bluetooth module is not successfully connected, the red LED light will continue to flash. When the connection is successful, the red LED light will be remain on.)

If there is a warning in the interface, it means that Bluetooth is not turned on normally or the selected device is wrong.

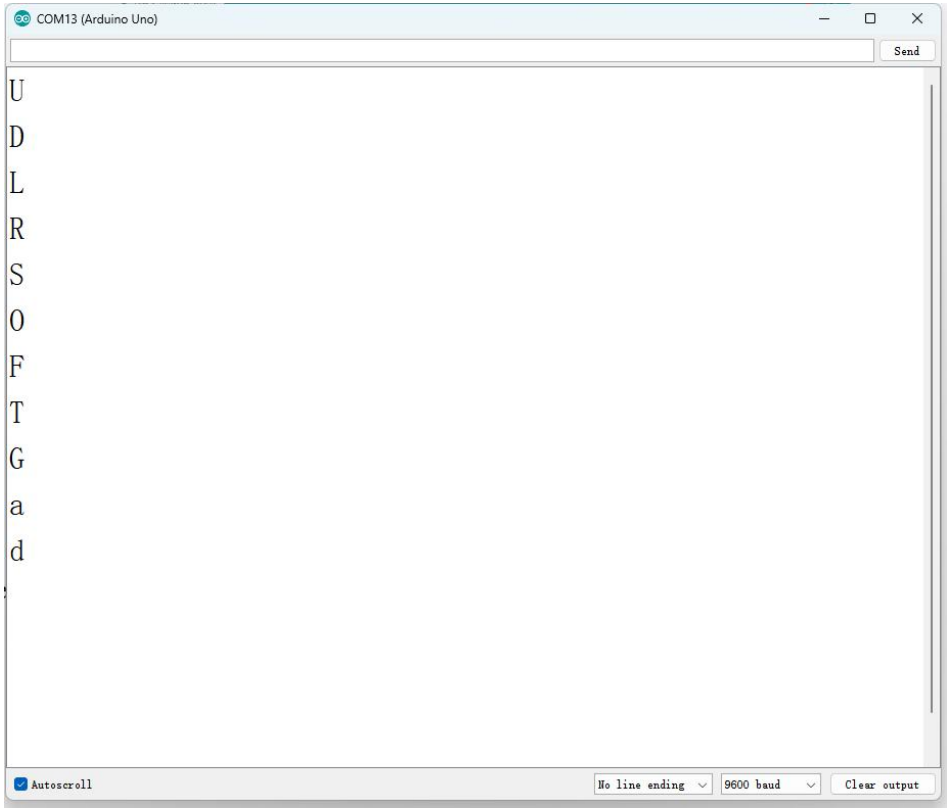
Let's program

Test 1--Bluetooth Module

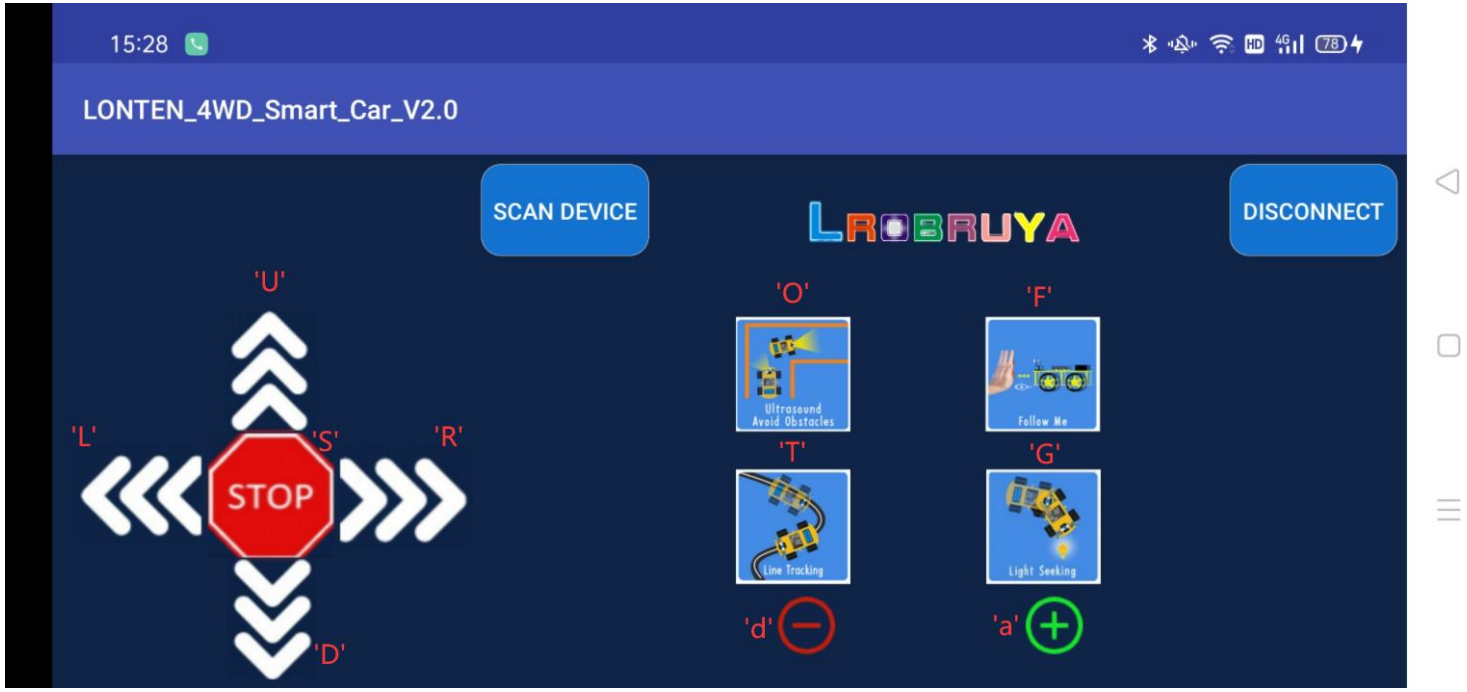
Follow the steps above to reconnect. After uploading the code, click the button in the upper right corner to open the serial monitor to view the measured distance.



Then you can see the data as blow:

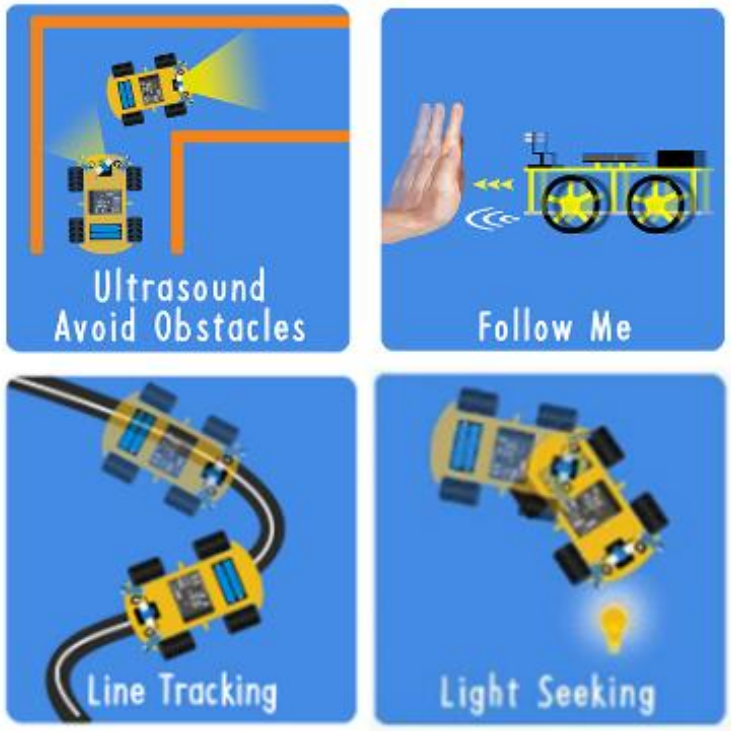


For example,If the Line Tracking mode button is pressed,the mobile phone Bluetooth sends the character "T" to the Robot car Bluetooth module.Set the baud rate of the communication between the Bluetooth module and the mobile phone's Bluetooth to 9600.



Test 2--Bluetooth Multifunctional Robot Car

In previous projects, the car only performs a single function. However, in this lesson, we will integrate all of its functions via a Bluetooth.



Attention

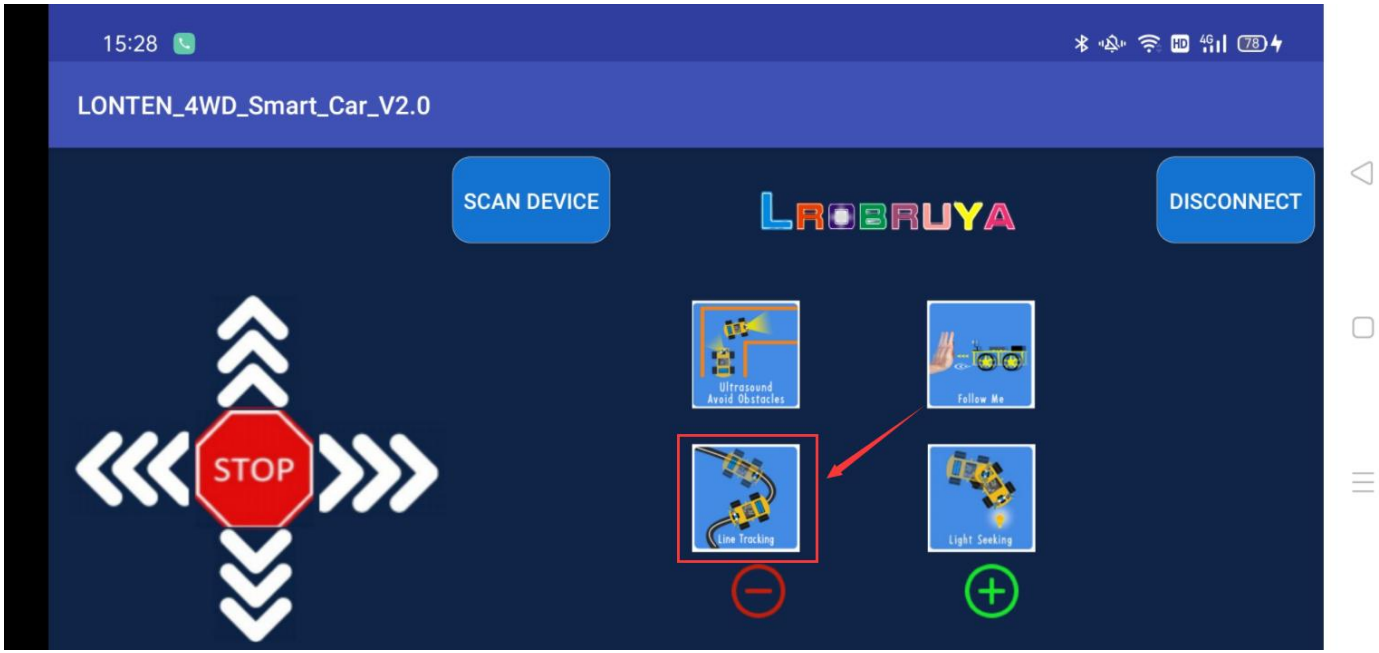
The bluetooth module should be pulled out before you upload the program every time,or it will be failed to upload the program.When uploading the code, CANNOT connect the Bluetooth module first; otherwise uploading fails! You are supposed to upload the code to control board, then connect the Bluetooth module.

How to use the app to control the robot car

After completing the program upload, plug in the Bluetooth module again, and then open the app software to complete the connection of the Bluetooth device.

The interface after the app software and Bluetooth module are successfully connected is as follows.

For example, if you want to control the car to enter the Line tracking mode, you click the line patrol function button.After the robot car receives the signal, it will enter the line patrol state. At this time, you need to provide a black track for the robot car.



Note: If you want to switch to other modes, you need to click the “STOP” button, and then click the function button you want to switch. It means that you need to be in status: stop to switch to other modes.

The speed of the car is adjusted by clicking the add or subtract button. The degree of speed increase or decrease is determined by the time between clicking the button once and the user clicking the “STOP” button again. The length of time determines how much the speed of the car is increased or decreased.