LROBRUYA

DIY 4WD Smart Robot Car Kit

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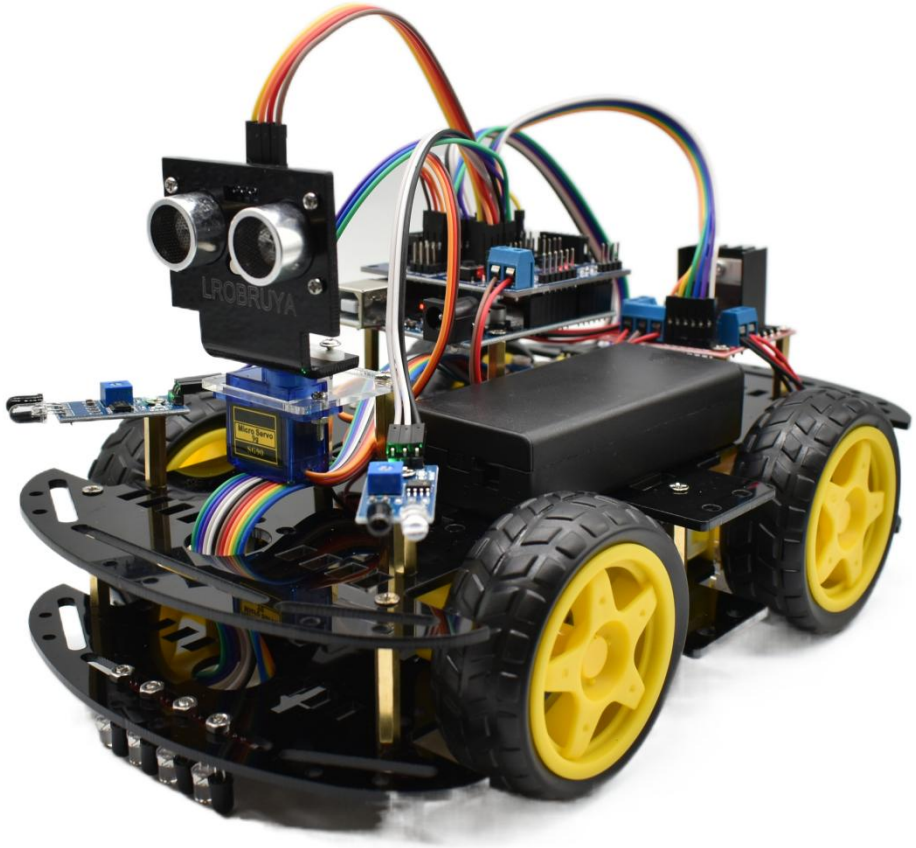

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Content

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.

By the way, We also look forward to hearing from you and any of your critical comment or suggestions. Pls email us by lonten3@qq.com or info@lontentech.com， if you have any questions or suggestions. As a continuous and fast growing company. We keep striving our best to offer you excellent products and quality service.

Our Store

store: https://www.lontentech.com/

Brand: LONTEN

Product Catalog

https://www.lontentech.com/collections/steam-robot

Tutorial

This tutorial include codes,libraries and lessons. It is designed for beginners. It will teach every users how to assembly the robot kit and use UNO controller board, sensors,servo.

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.

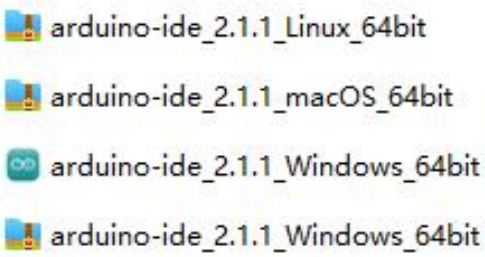
STEP2：Download the development software that is compatible with the operating.

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

Click Windows Win 10 and newer,64 bits.

Click JUST DOWNLOAD.

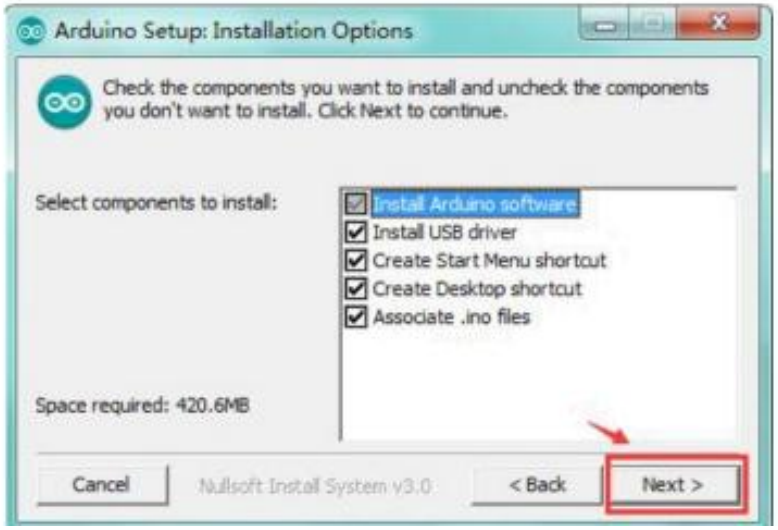
Also version 2.1.1 is available in the material we provided, and the versions of our materials are the latest versions when this course was made.



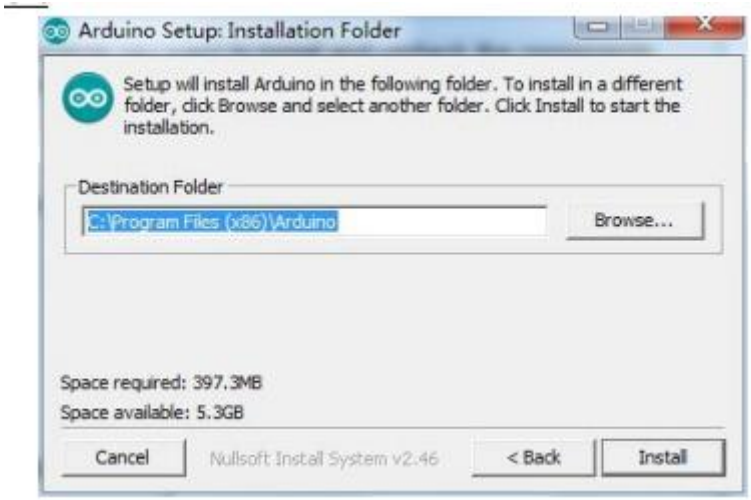
Installing Arduino (Windows)

Install Arduino with the exe. Installation package.

Click I Agree to see the following interface.

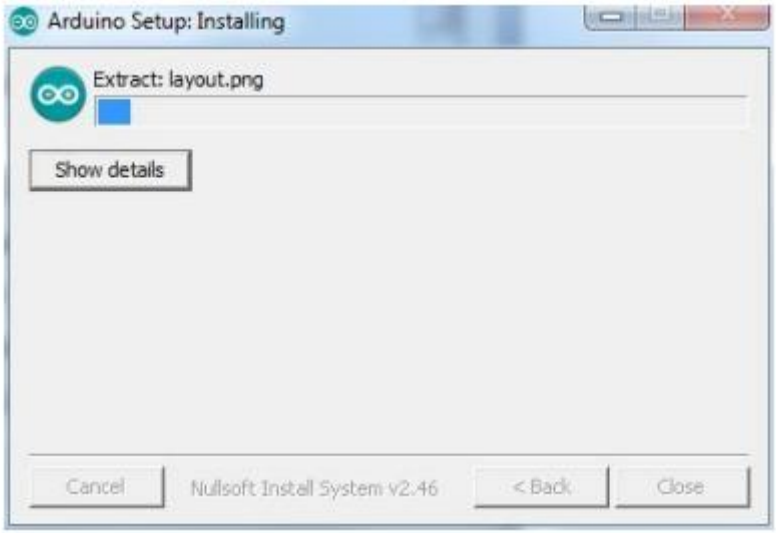

Arduino Setup: Installation Options
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.
Select components to install:
Install Arduino software
Install USB driver
Create Start Menu shortcut
Create Desktop shortcut
Associate .ino files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

Click Next



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

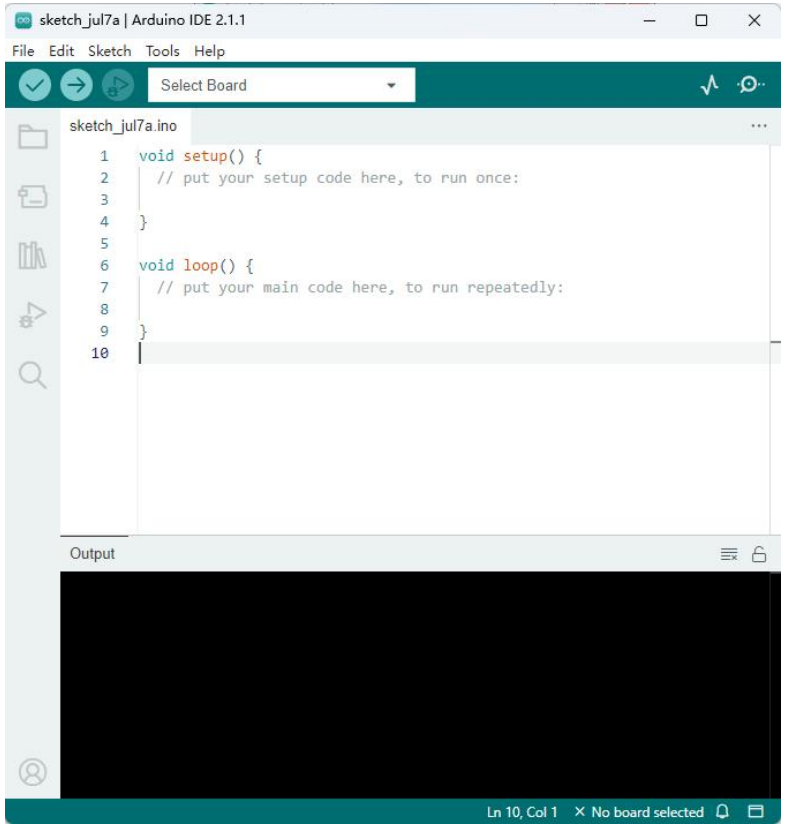
Click Install to initiate installation



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

Next, the following icon appears on the desktop

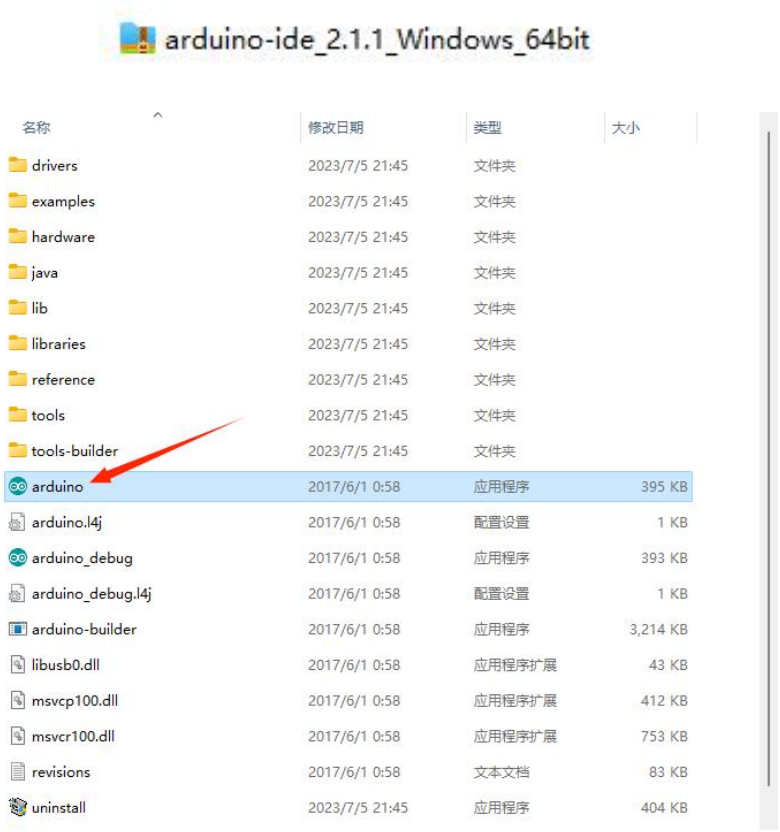
Double-click to enter the desired development environment



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.



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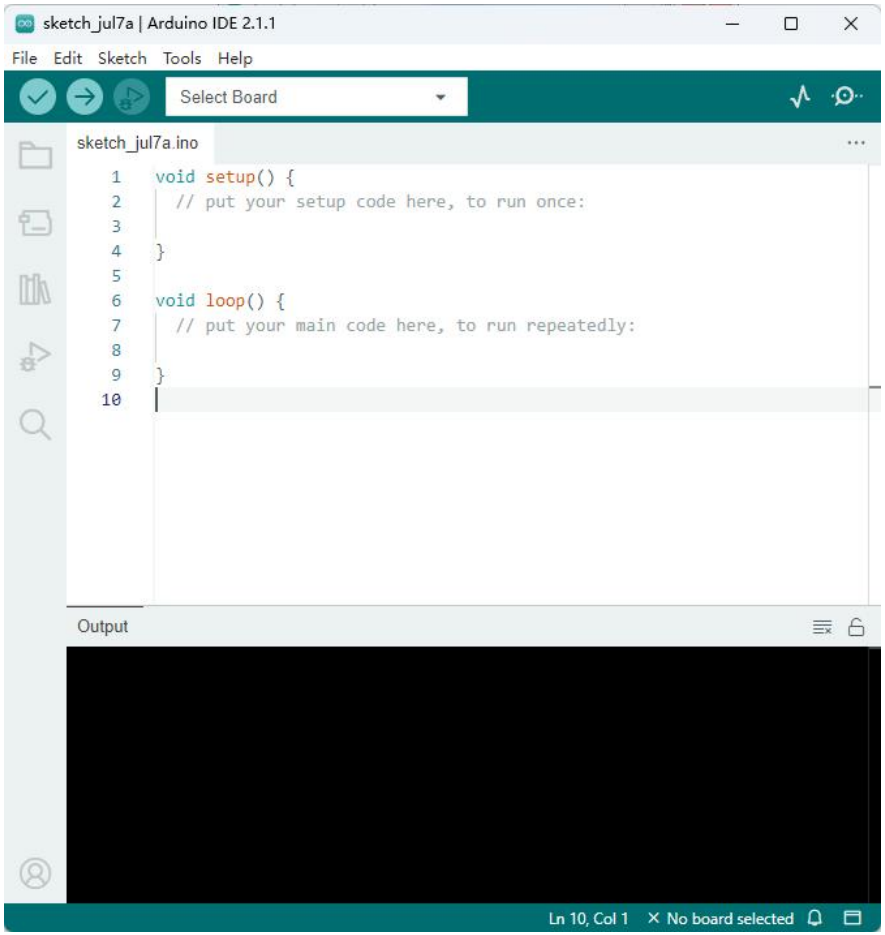
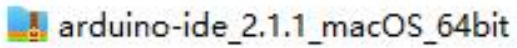

sketch_jul7a | Arduino IDE 2.1.1
File Edit Sketch Tools Help
Select Board
sketch_jul7a.ino
1 void setup() {
2 // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7 // put your main code here, to run repeatedly:
8
9 }
10
Output
Ln 10, Col 1
No board selected

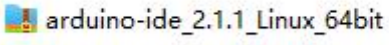
Installing Arduino (Mac OS X)

Download and Unzip the zip file, double click the Arduino.app to enter Arduino IDE; the system will ask you to install Java runtime library if you don't have it in your computer. Once the installation is complete you can run the Arduino IDE.



Installing Arduino (Linux)

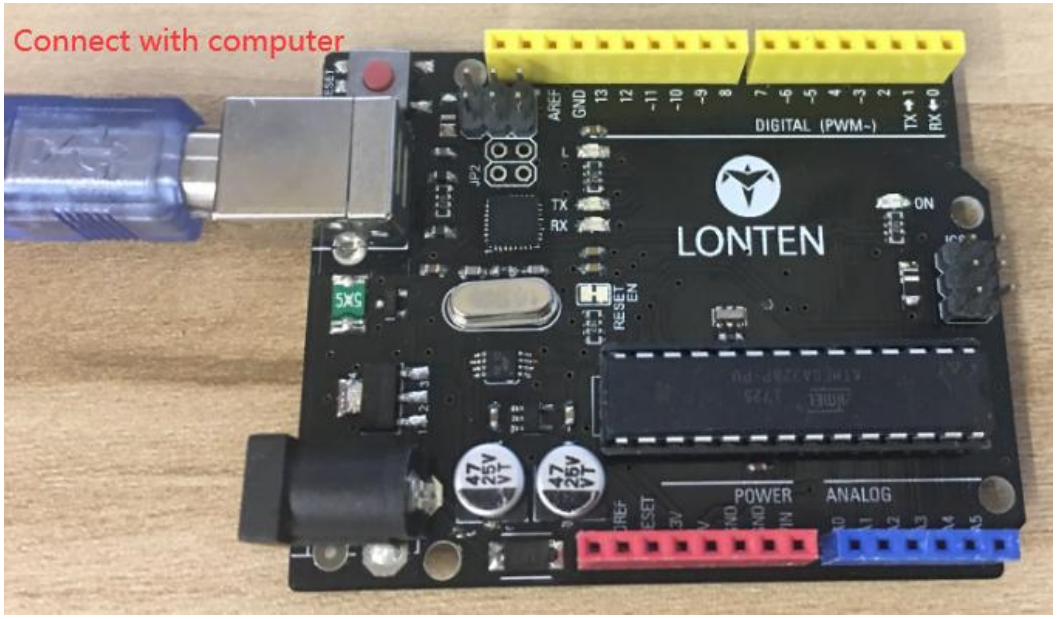
You will have to use the make install command. If you are using the Ubuntu system, it is recommended to install Arduino IDE from the software center of Ubuntu.



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)

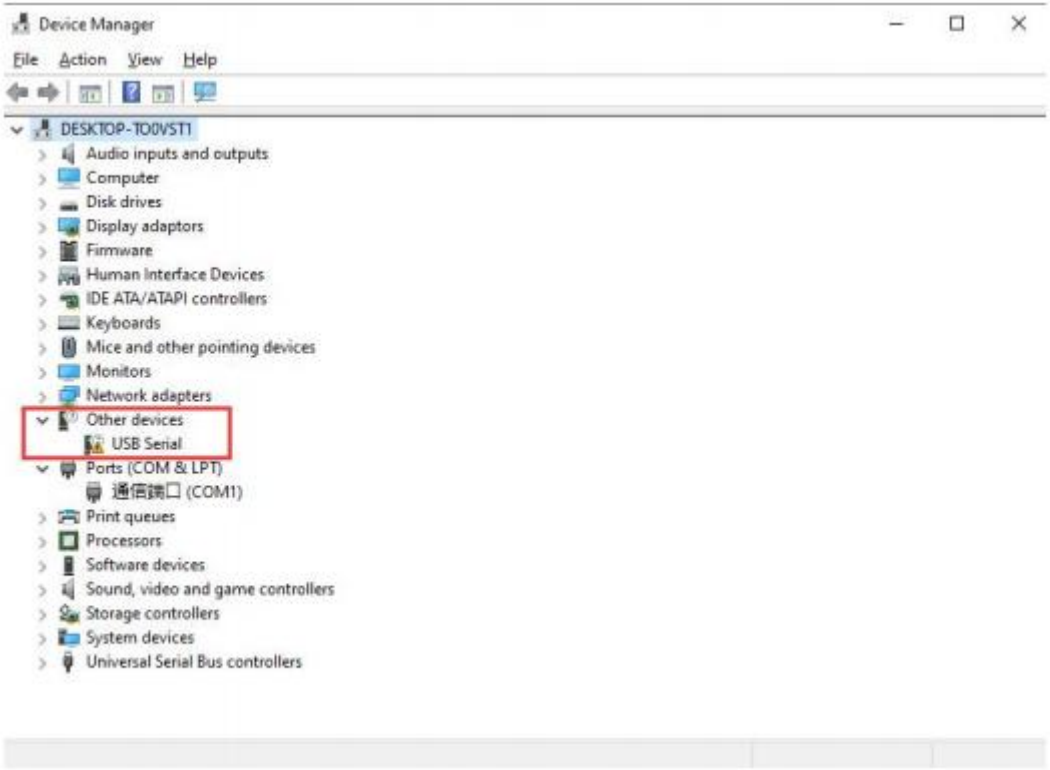
SPI communication interface: D10 is SS, D11 is MOSI, D12 is MISO, D13 is SCK

IIC communication port: A4 is SDA, A5 is SCL

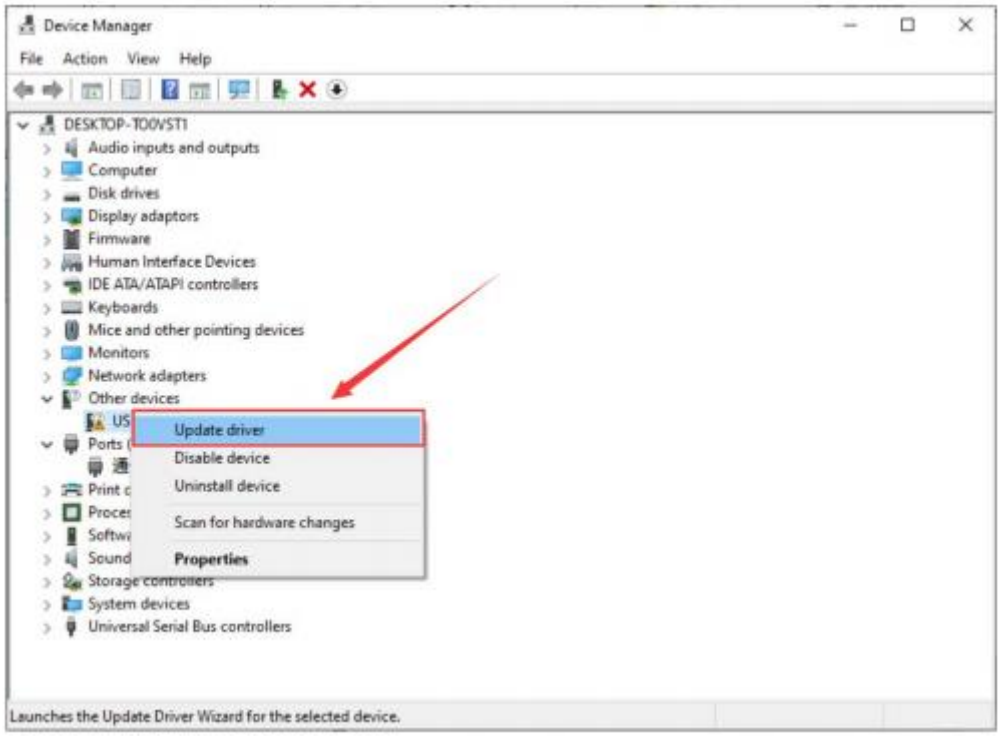
In different systems, the driver installation is similar. Here we start to install the driver on the Win10 system. You can find the “USB_Drive_CH341_3_1” folder in the information we provide, this is the driver file we want to install.

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

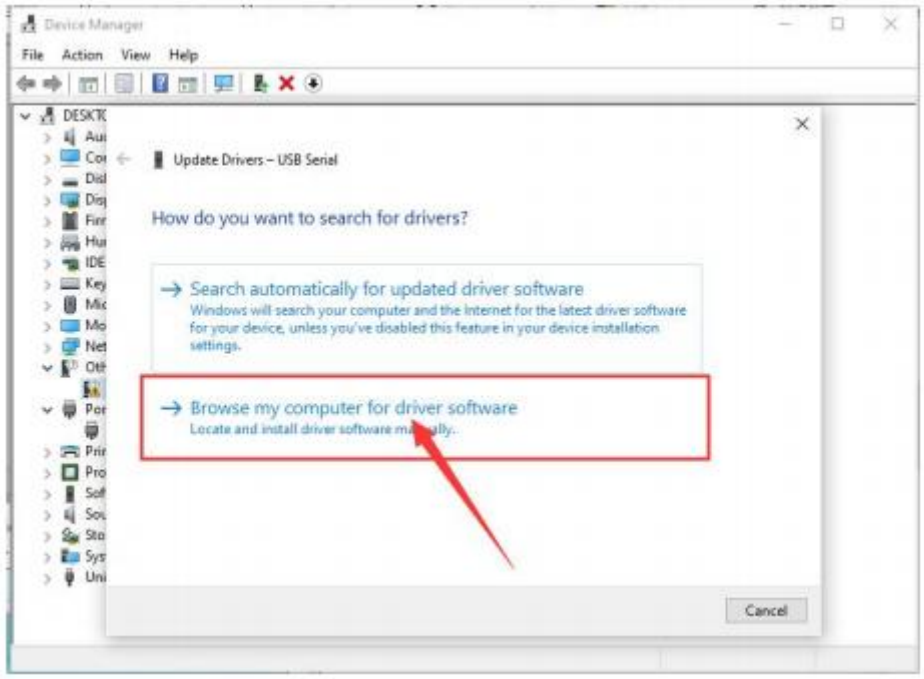
When you connect the Arduino UNOR3 Board to your computer at the first time, right click your “My Computer”—>for “Properties”—>click the “Device manager”, under Other devices, you should see the “USB-Serial” or “Unknown device ”.Or you can search for "devi" in your computer, or you can open the device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



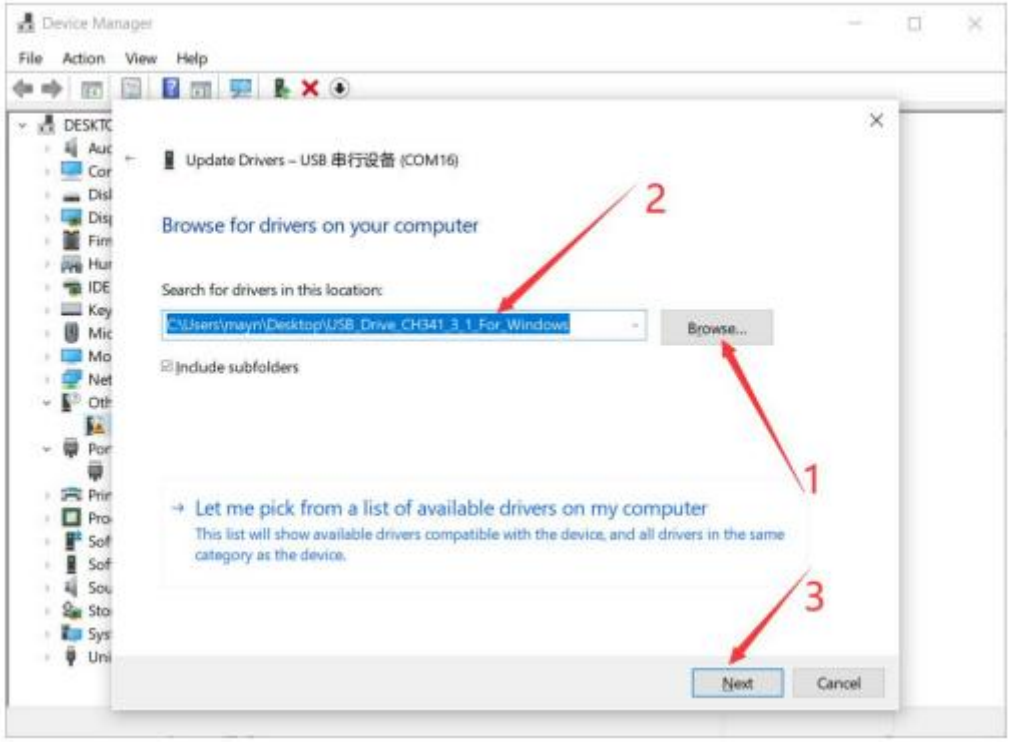
Then right-click on the device and select the top menu option (Update Driver Software...) shown as the figure below.



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”.

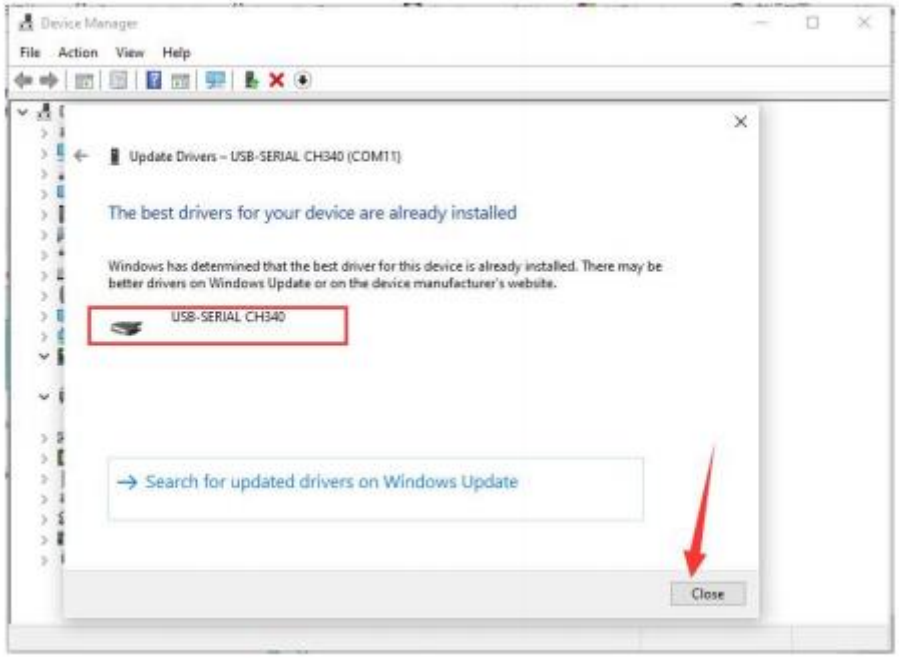


After that, select the browse option and navigate to the drive folder "USB_Drive_CH341_3_1", which can be found in the information we provide.(Note that the file path selects the location of the. For example, I store this driver file on the computer desktop, so the file path I choose is C:\Users\mayn\Desktop\USB_Drive_CH341_3_1_For_Windows)

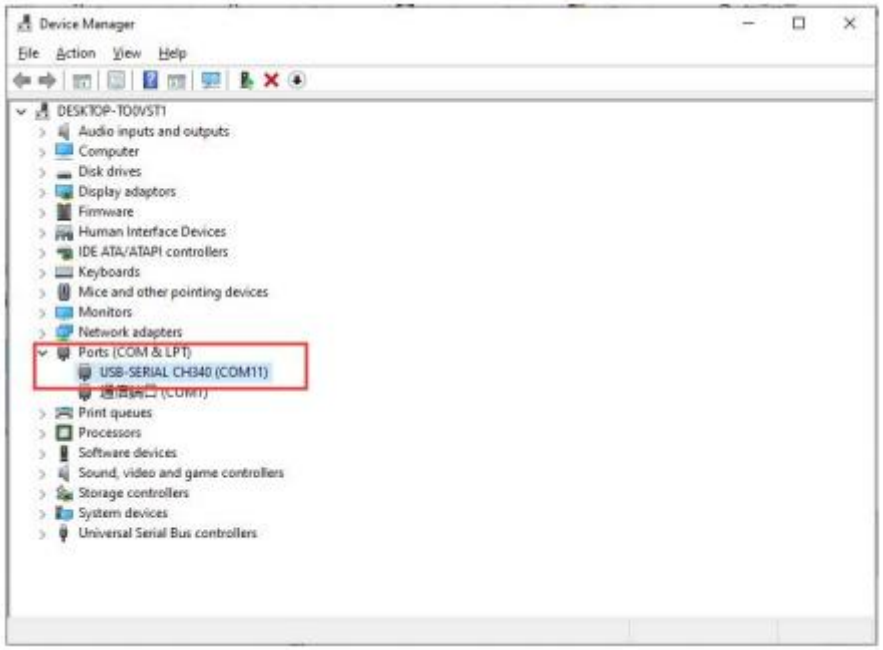


Once the software has been installed, you will get a confirmation message.

Installation completed, click “Close”.



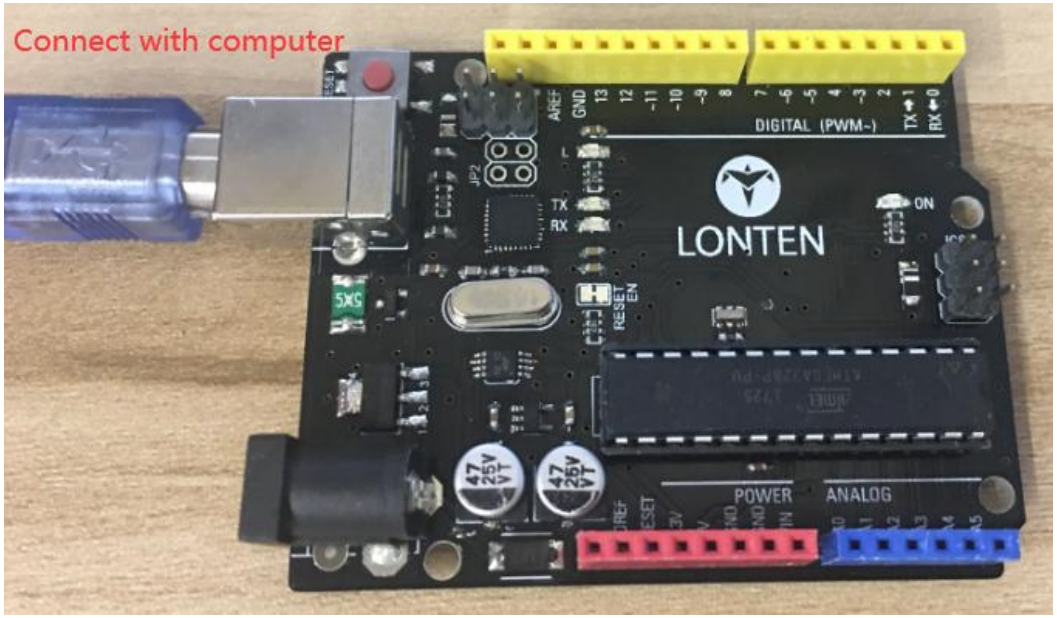
Up to now, the driver is installed well. Then you can right click “My Computer”—>for “Properties”—>click the “Device manager”, you should see the device as the figure shown below. Or you can search for "devi" in your computer, or you can open the device manager of your computer.



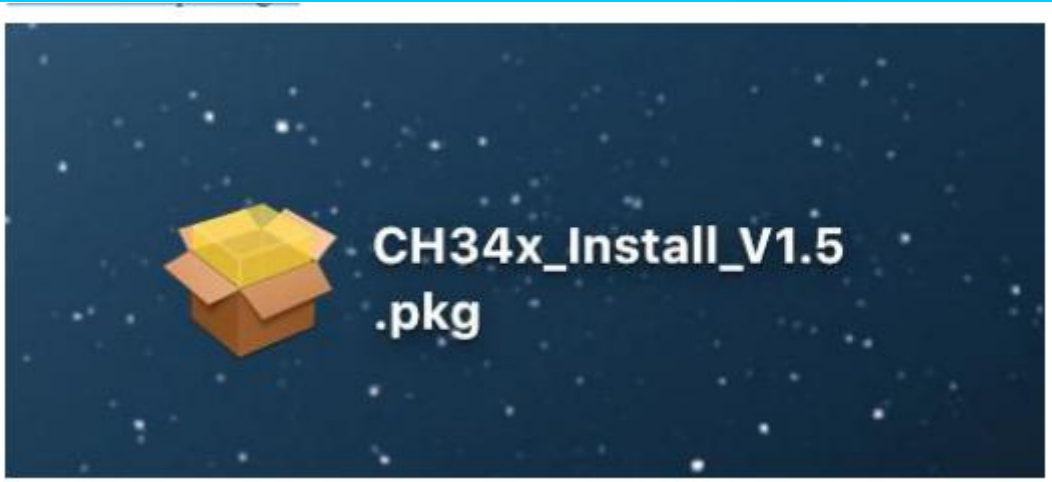
For MAC System

Arduino UNO R3 board

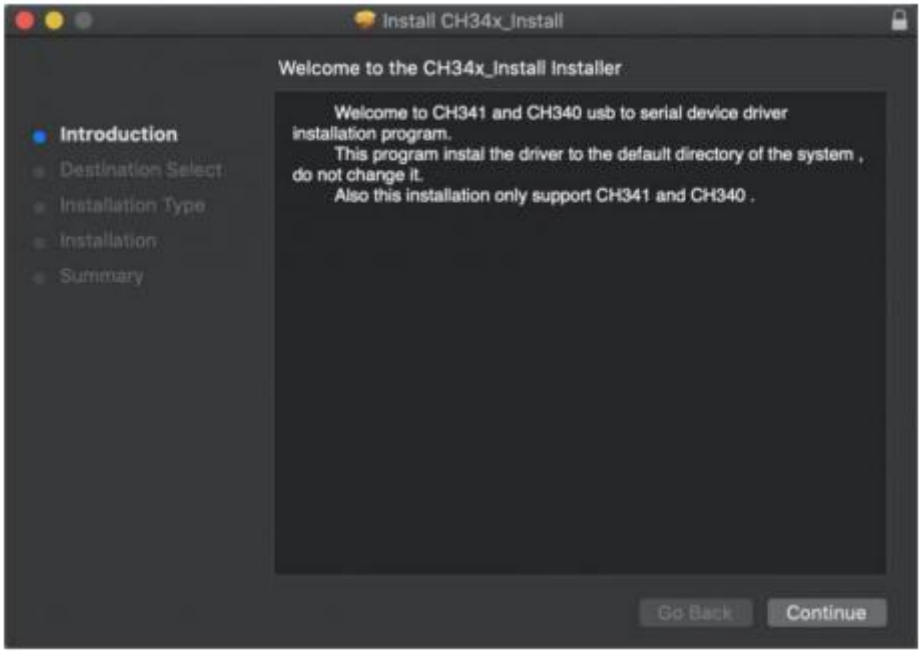
Plug one end of your USB cable into the Arduino UNO R3 Board and the other into a USB socket on your computer.



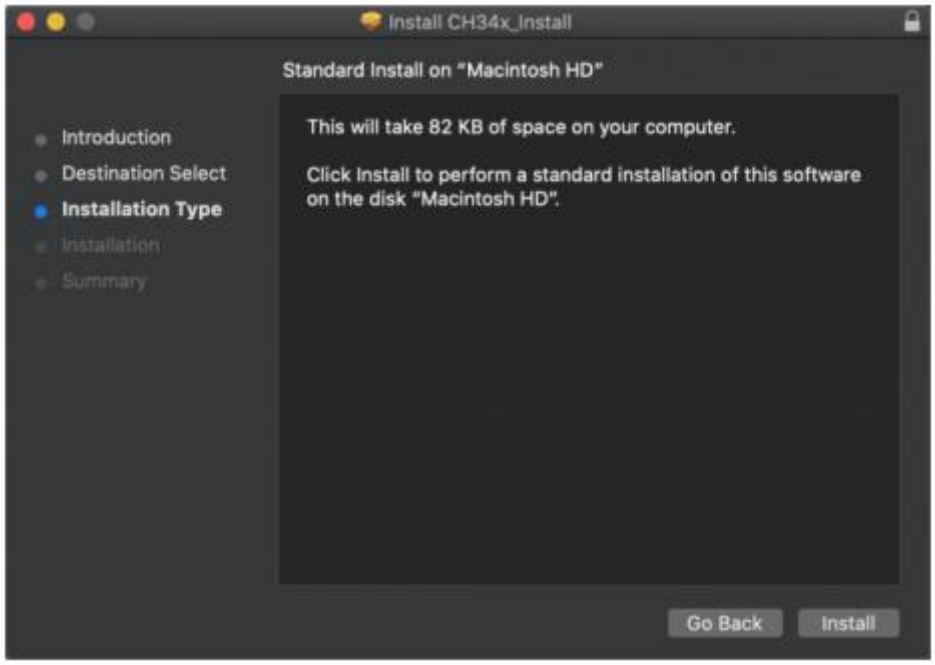
The driver file of the R3 of the MAC system is provided in the tutorial data package.



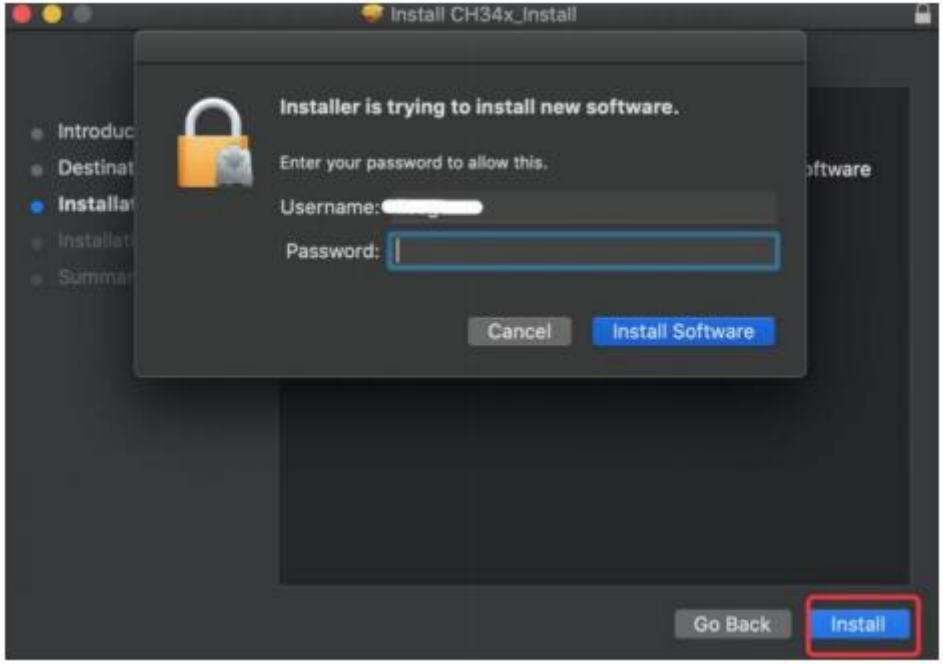
Double-click installation package and tap Continue



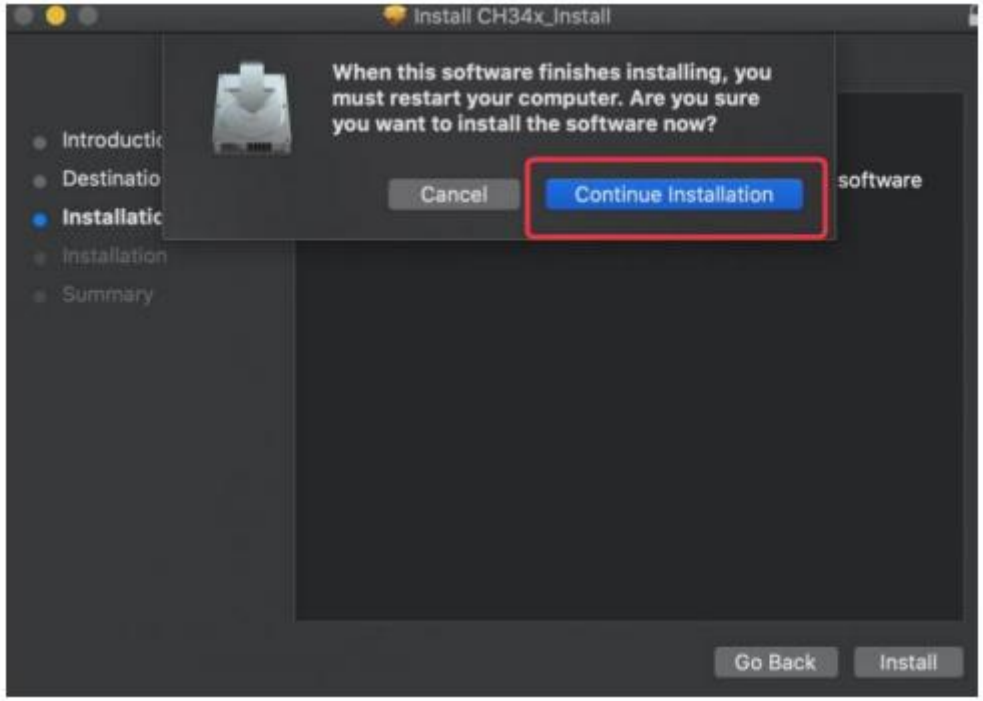
Click Install



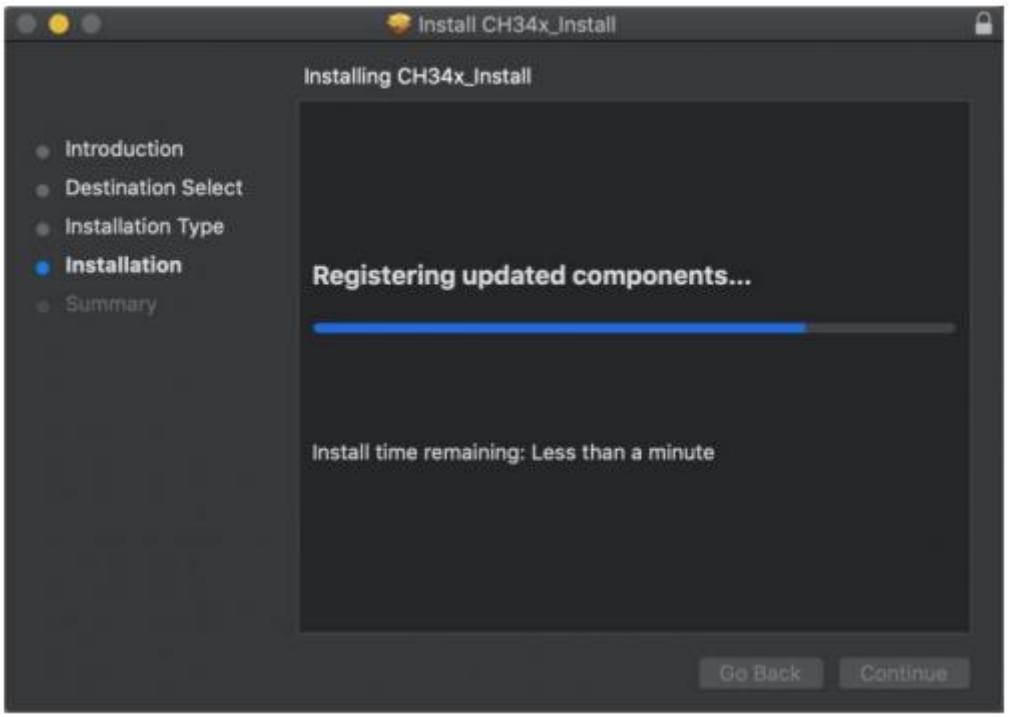
Input your user password and click Install Software



Tap Continue Installation



Wait to install



Click Restart after the installation is finished

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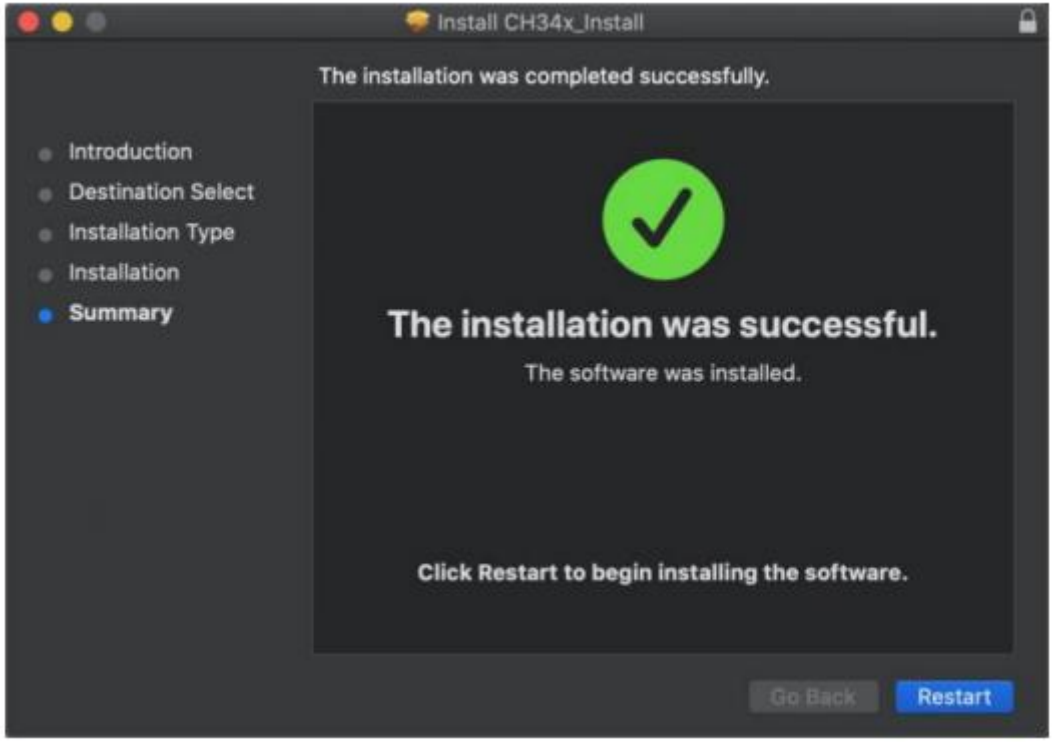

Install CH34x_Install
The installation was completed successfully.
Introduction
Destination Select
Installation Type
Installation
Summary
The installation was successful.
The software was installed.
Click Restart to begin installing the software.
Go Back
Restart

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?

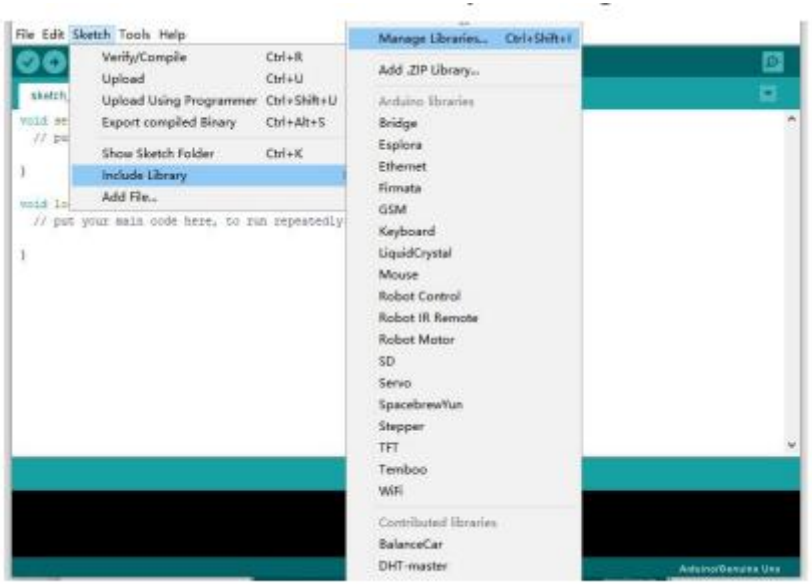
Libraries are a collection of code that makes it easy for you to connect to a sensor, display, module, etc. For example, the built-in Liquid Crystal library makes it easy to talk to character LCD displays. There are hundreds of additional libraries available on the Internet for download.

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

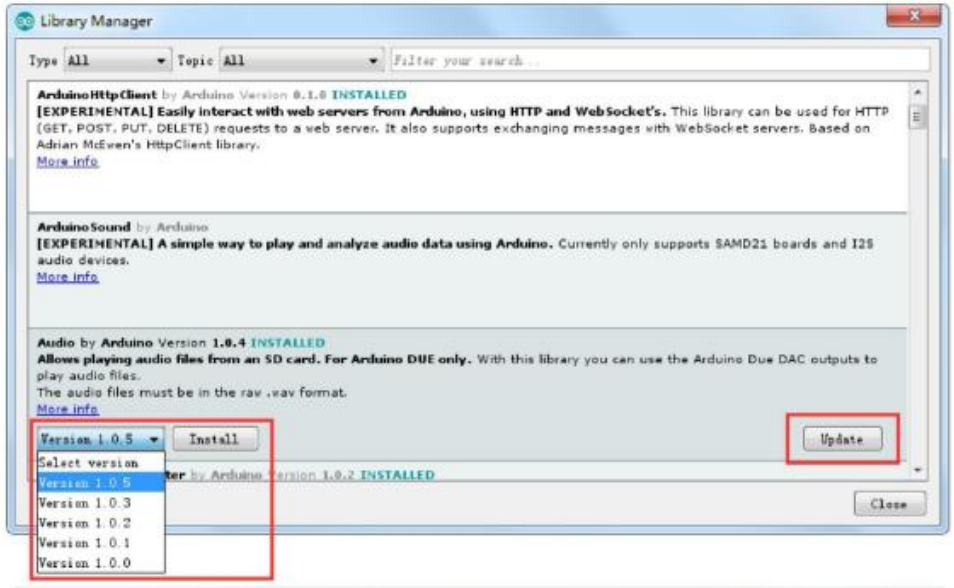
Using the Library Manager

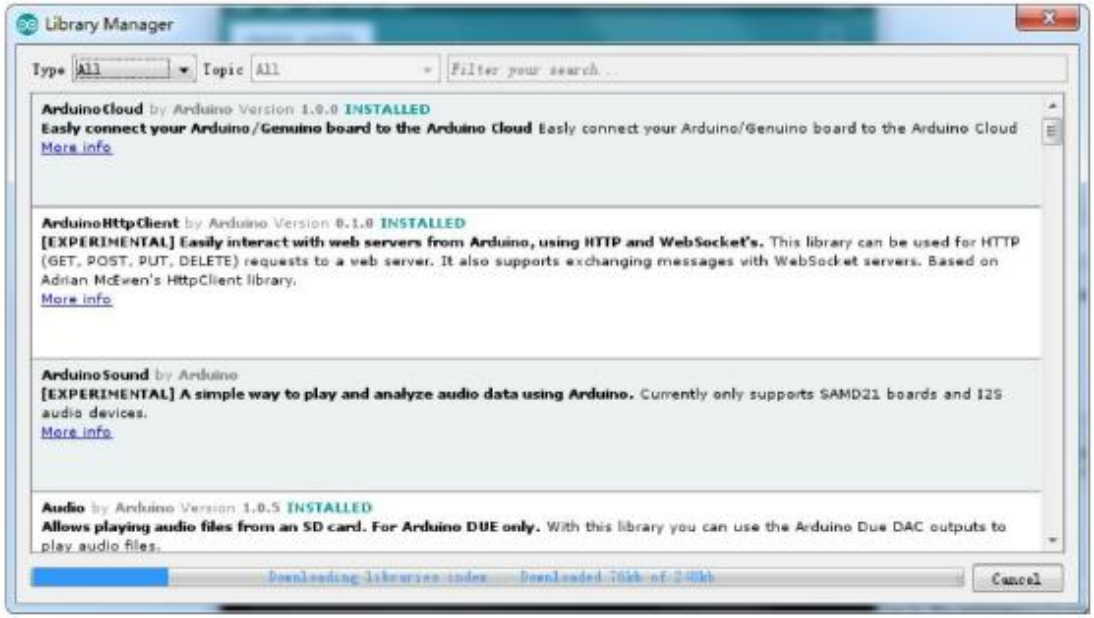
To install a new library into your Arduino IDE you can use the Library Manager (available from IDE version 1.8.0). Open the IDE and click to the "Sketch" menu and then Include Library > Manage Libraries.



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.

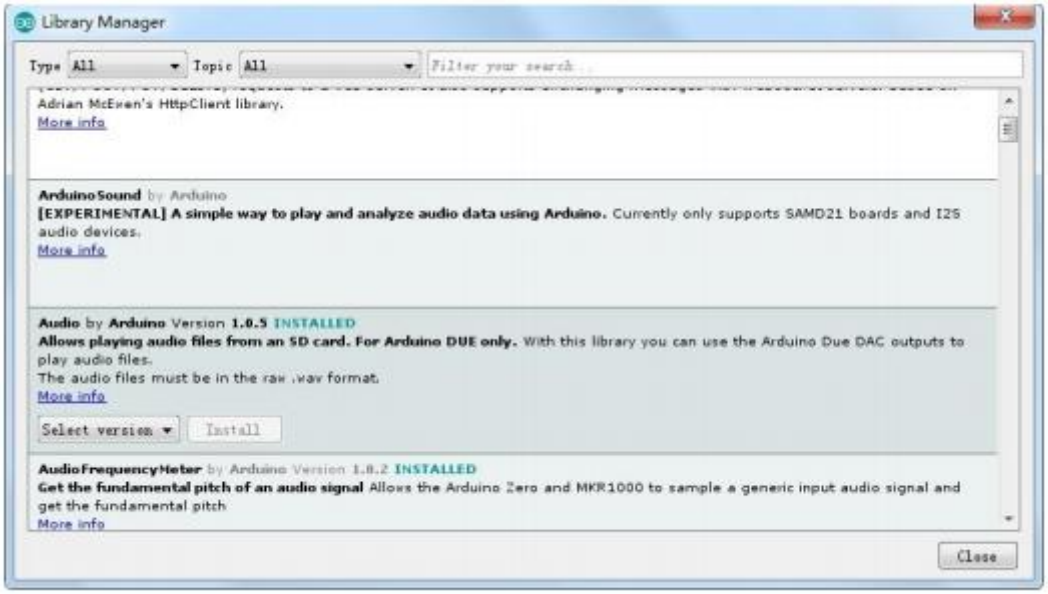




Finally click on install and wait for the IDE to install the new library.

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

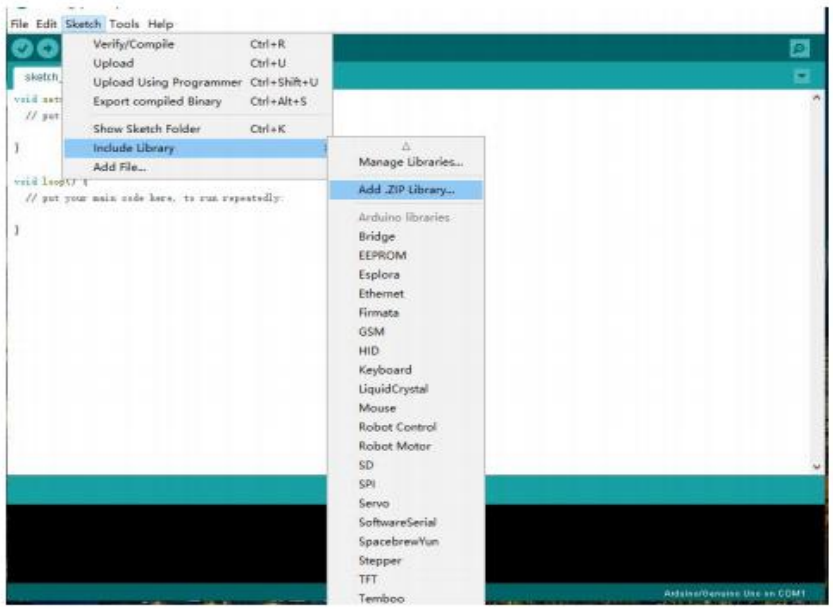
You can close the library manager.



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.

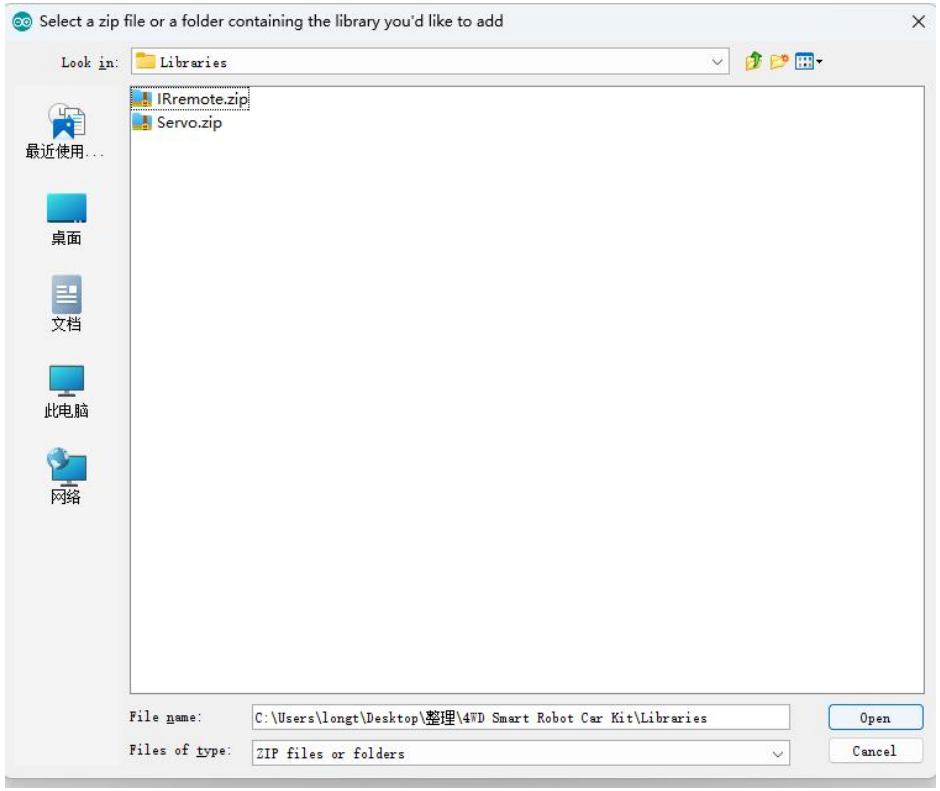
Importing a .zip Library

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.



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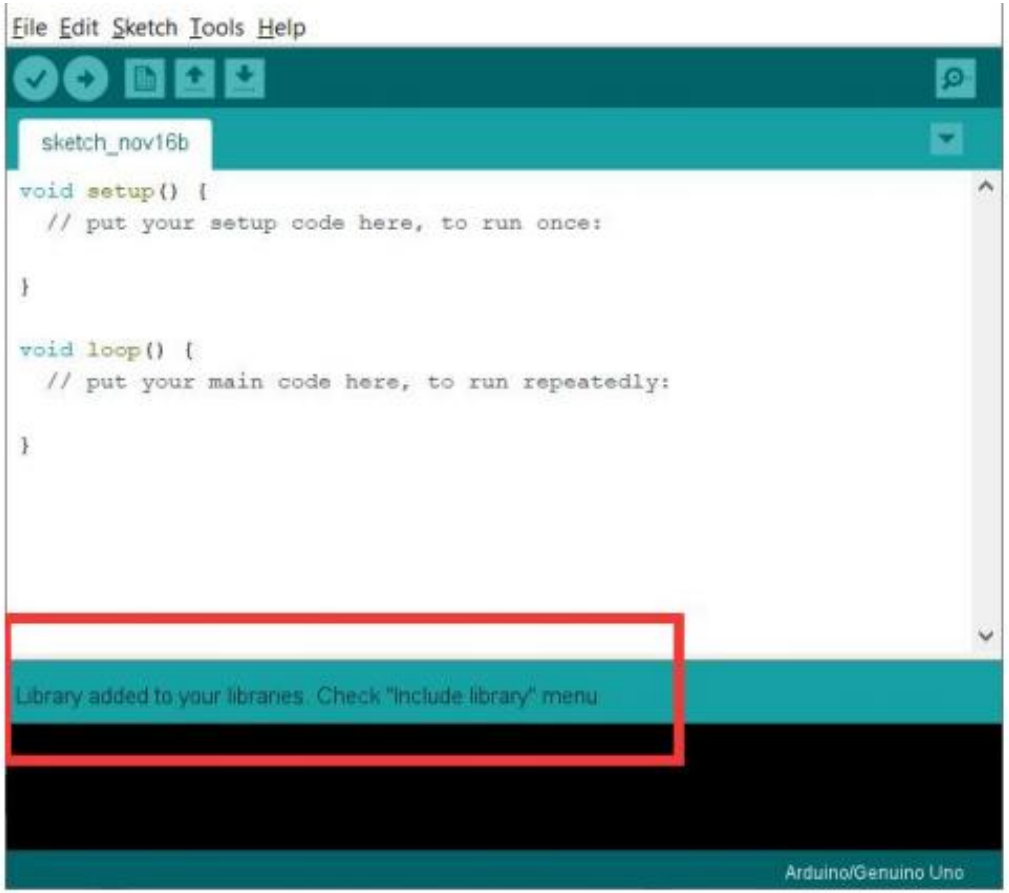

File Edit Sketch Tools Help
sketch_nov16b
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}
Library added to your libraries. Check "Include library" menu
Arduino/Genuino Uno

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.

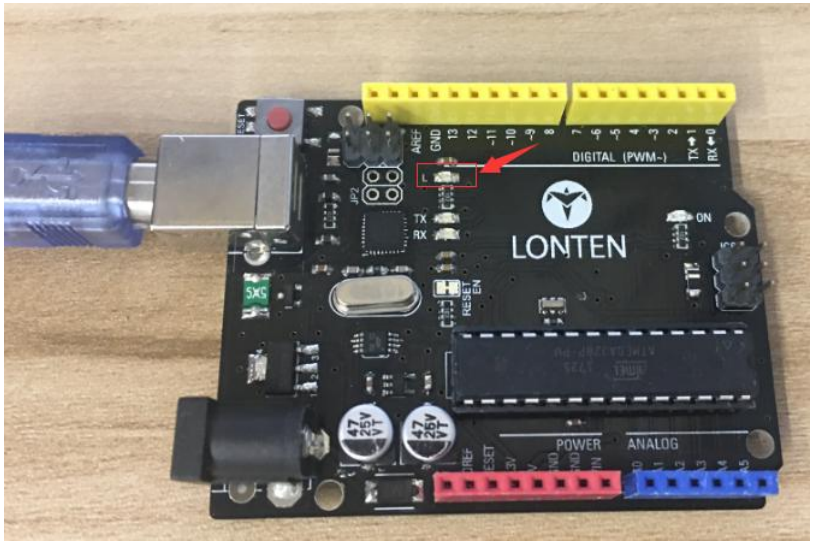
Component Required:

LONTEN 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.

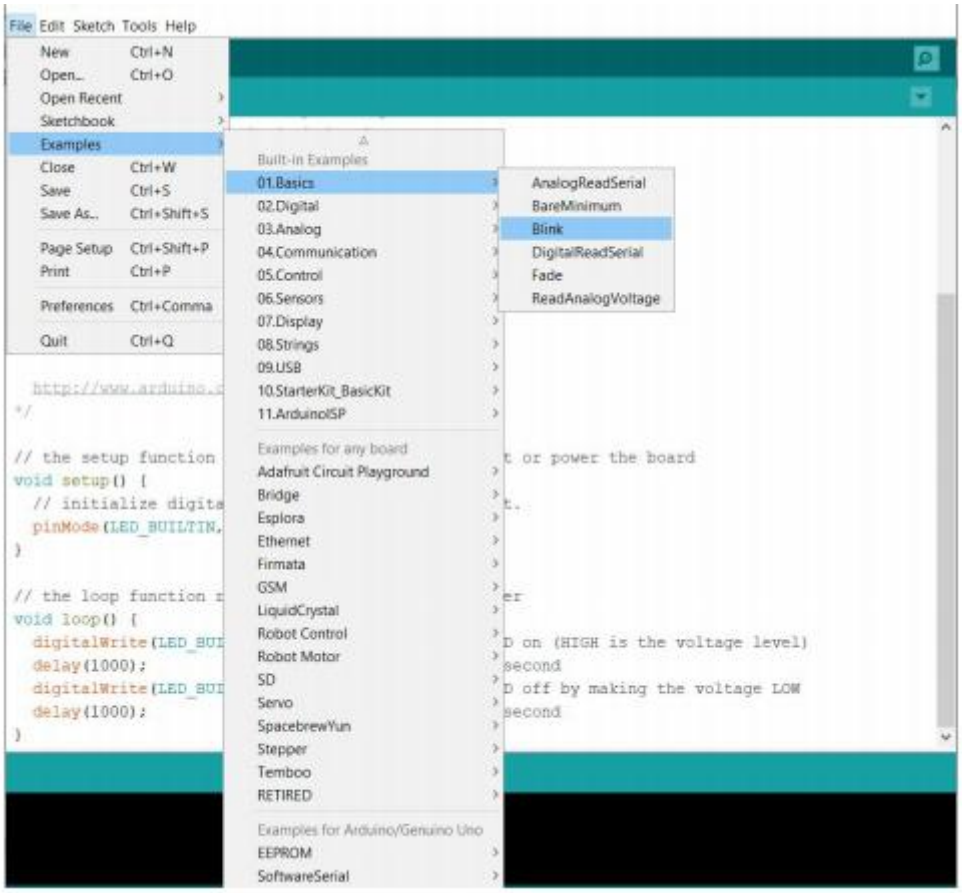


In this Project, we will reprogram the UNO board with our own Blink sketch and then change the rate at which it blinks.

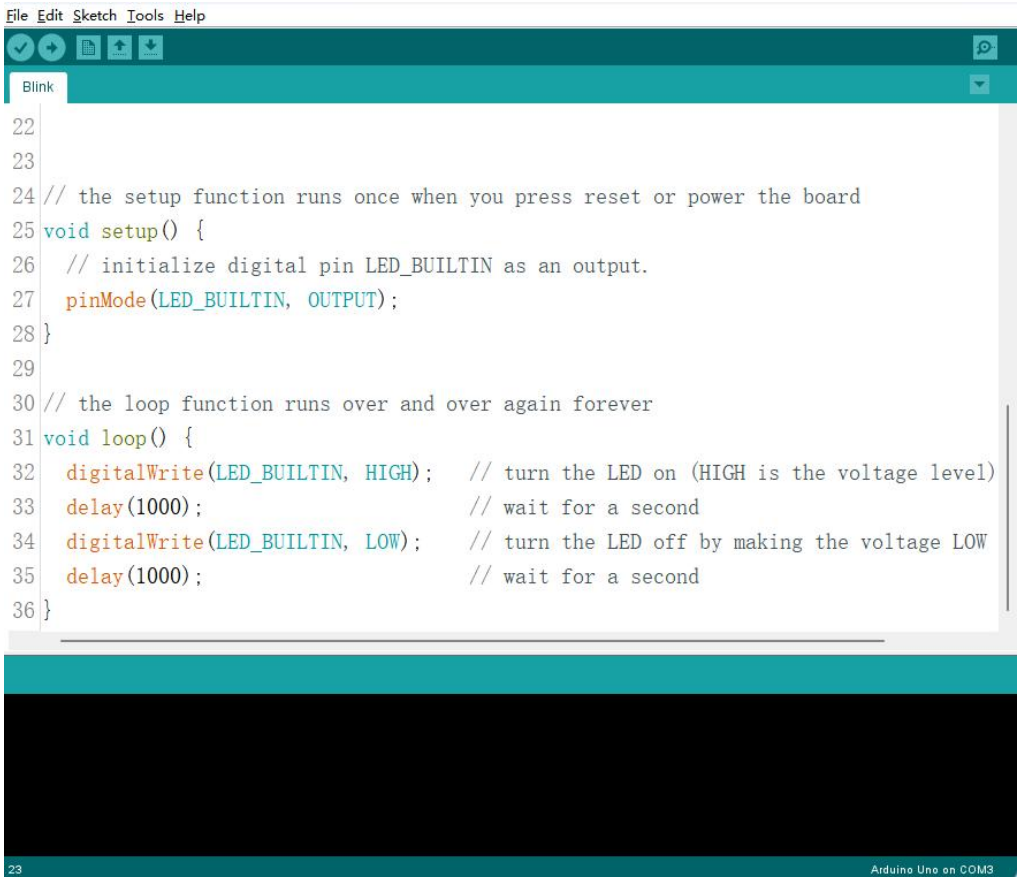
In the previous chapter-How to install Arduino IDE, you set up your Arduino IDE and made sure that you could find the right serial port for it to connect to your UNO board. The time has now come to put that connection to the test and program your UNO board.

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.

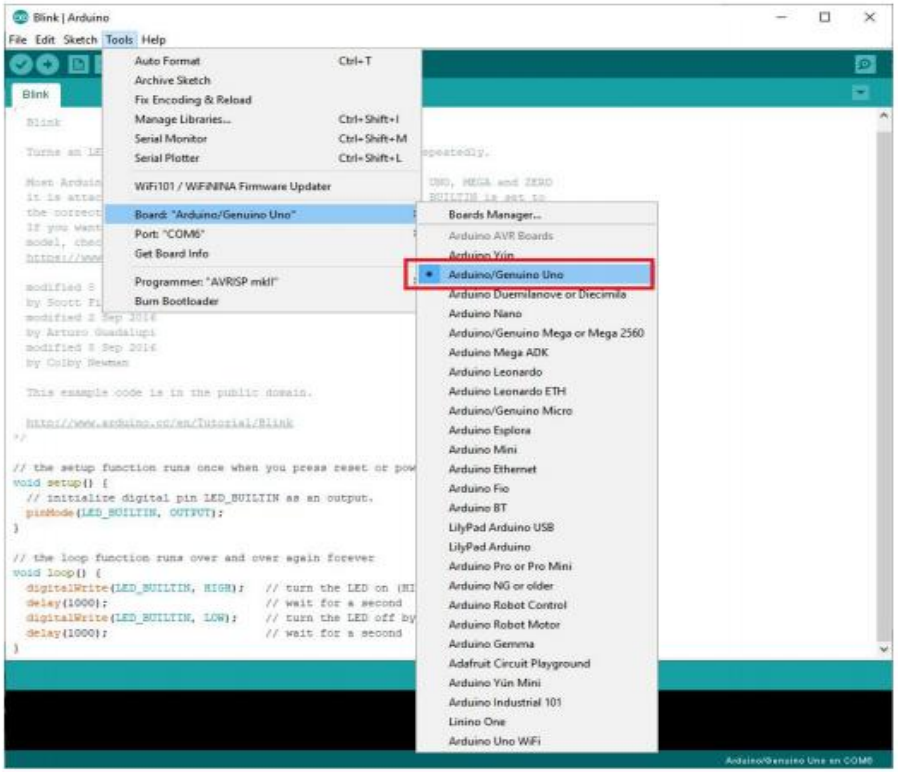
Load the 'Blink' sketch that you will find in the IDE's menu system under File > Examples > 01.Basics>Blink



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


File Edit Sketch Tools Help
Blink
22
23
24 // the setup function runs once when you press reset or power the board
25 void setup() {
26 // initialize digital pin LED_BUILTIN as an output.
27 pinMode(LED_BUILTIN, OUTPUT);
28 }
29
30 // the loop function runs over and over again forever
31 void loop() {
32 digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
33 delay(1000); // wait for a second
34 digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
35 delay(1000); // wait for a second
36 }
23
Arduino Uno on COM3

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



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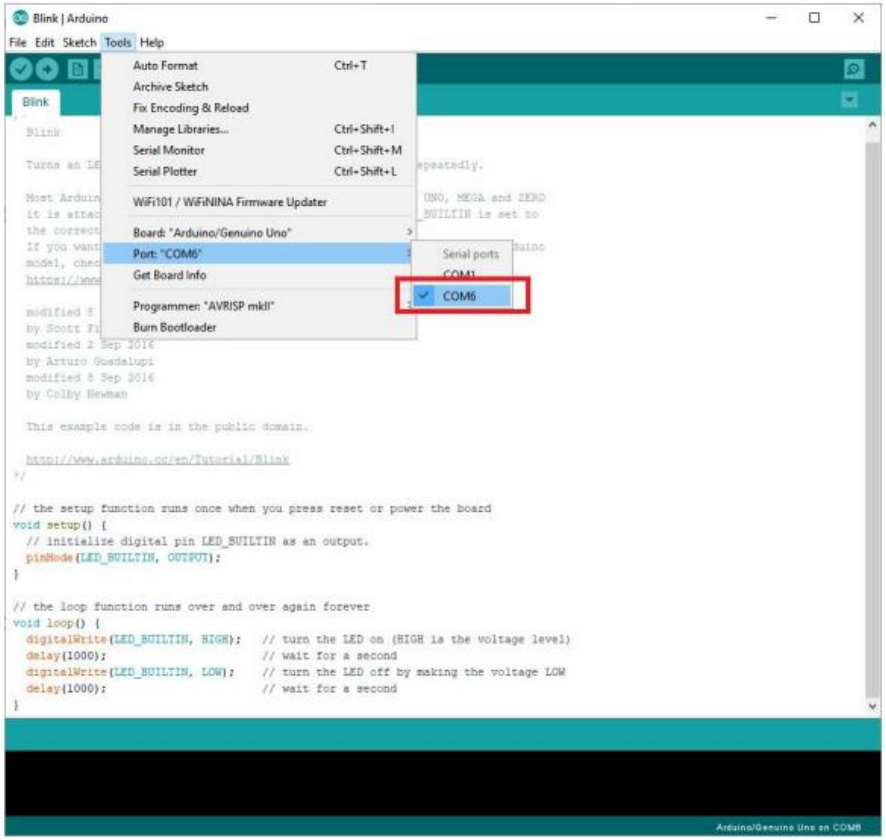
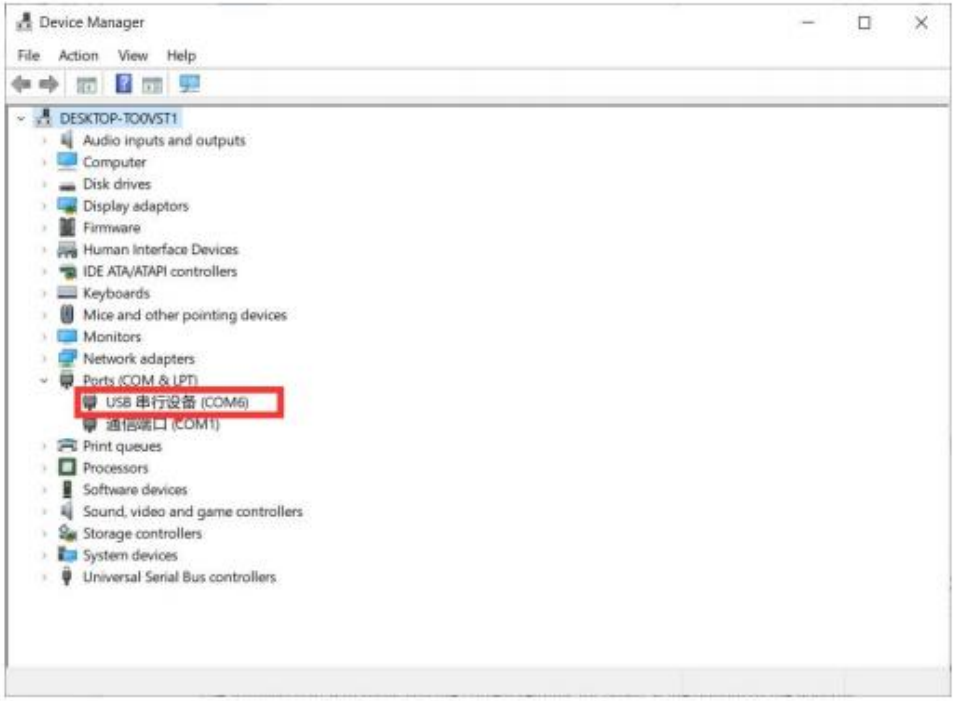

Blink | Arduino
File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Manage Libraries... Ctrl+Shift+I
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
WiFi101 / WiFiNINA Firmware Updater
Board: "Arduino/Genuino Uno"
Port: "COM6"
Get Board Info
Programmer: "AVRISP mkII"
Burn Bootloader
Serial ports
COM1
COM6
Blink
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
}
Arduino/Genuino Uno on COM6

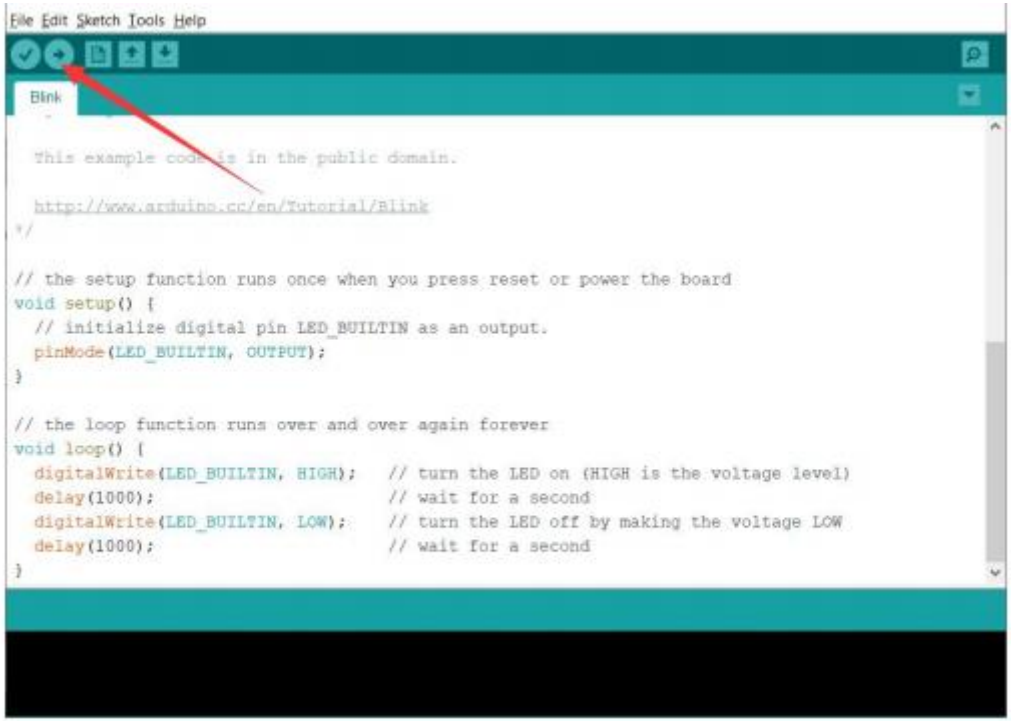


Note: The Board Type and Serial Port here are not necessarily the same as shown in picture. If you are using UNO, then you will have to choose Arduino UNO as the Board Type, other choices can be made in the same manner. And

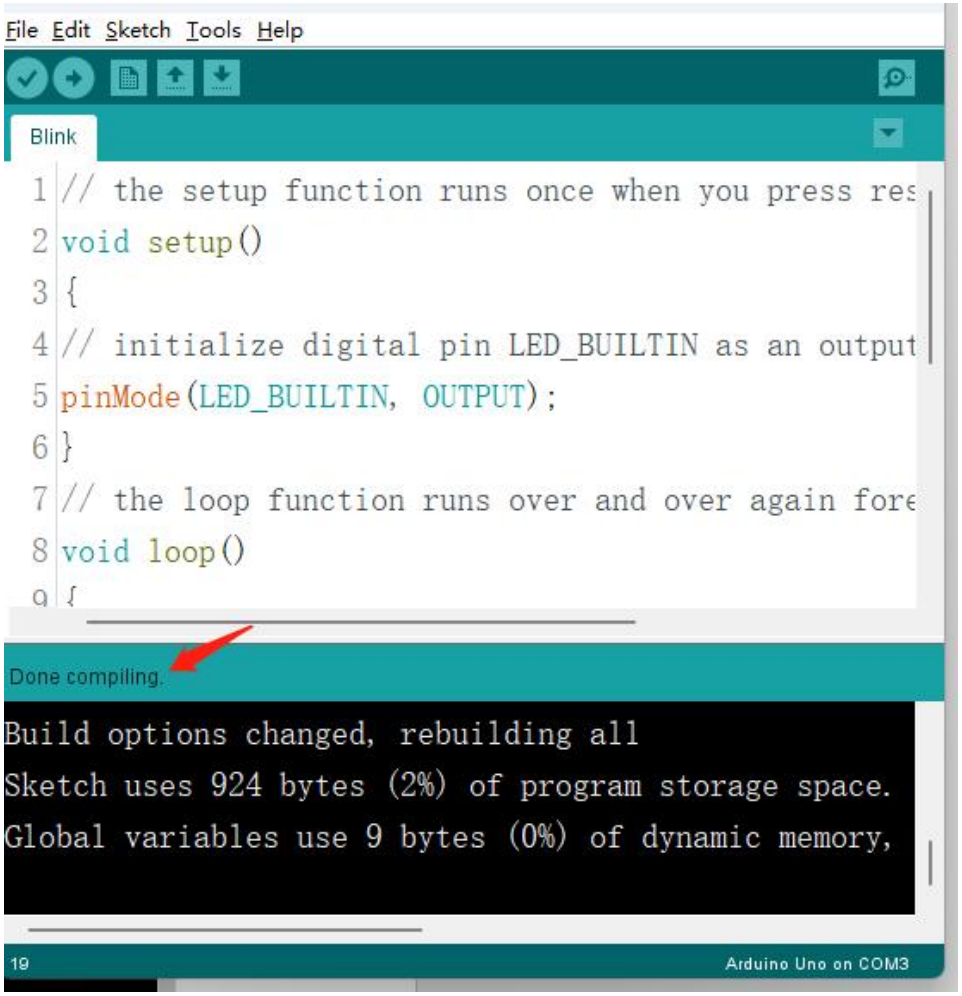
the Serial Port displayed for everyone is different, despite COM 6 chosen here, it could be COM3 or COM4 on your computer. A right COM port is supposed to be COMX (arduino XXX), which is by the certification criteria.

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

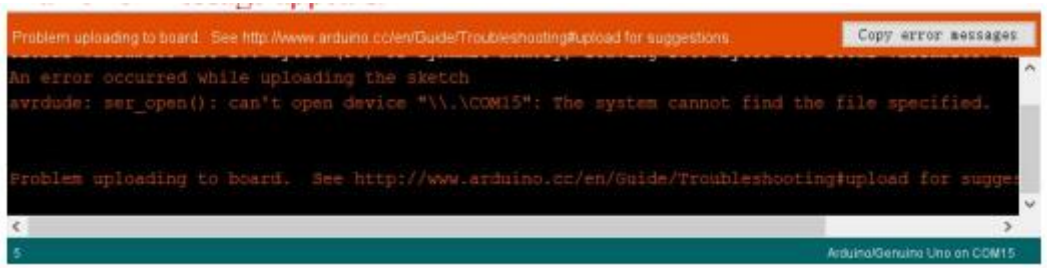
Click on the 'Upload' button. The second button from the left on the toolbar.



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


File Edit Sketch Tools Help
Blink
1 // the setup function runs once when you press res
2 void setup()
3 {
4 // initialize digital pin LED_BUILTIN as an output
5 pinMode(LED_BUILTIN, OUTPUT);
6 }
7 // the loop function runs over and over again fore
8 void loop()
Done compiling.
Build options changed, rebuilding all
Sketch uses 924 bytes (2%) of program storage space.
Global variables use 9 bytes (0%) of dynamic memory,
19
Arduino Uno on COM3

If an error message appears.

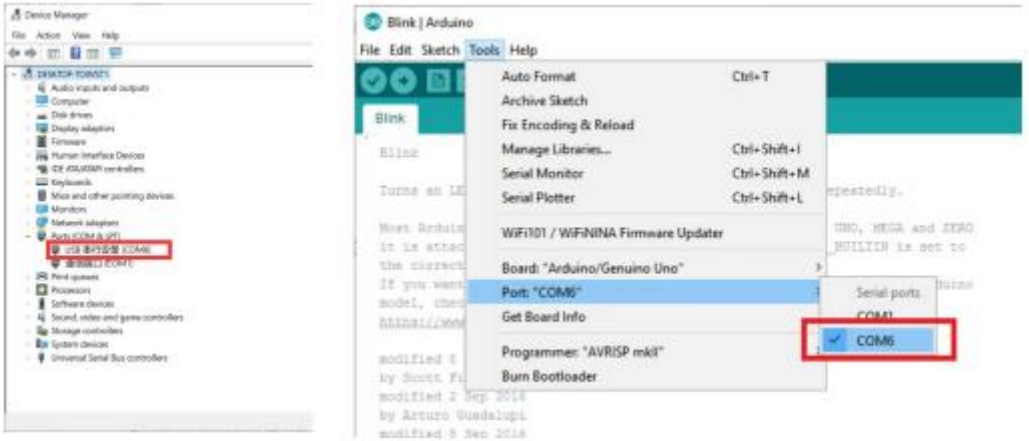


There can be several reasons:

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.

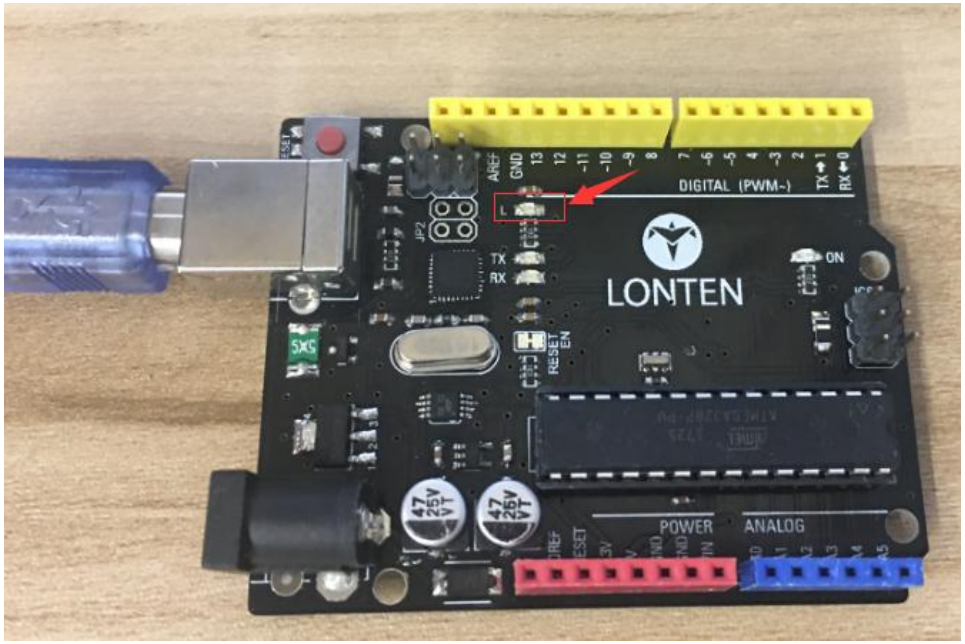


3. If your Arduino uno is connected to a Bluetooth module, it will occupy the communication serial port. You need to remove the Bluetooth module connection before uploading the code.

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

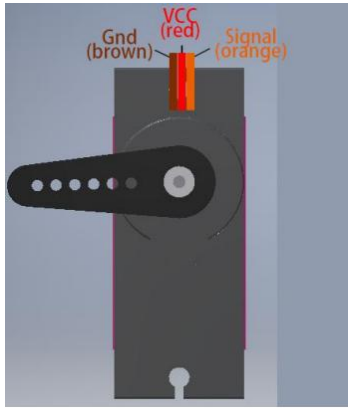
Lesson 1 Servo

About this lesson:

In this lesson, you will learn how to control a servo motor using Arduino UNO development board.

The servo motor has three leads. The color of the leads varies between servo motors, but the red lead is always 5V and GND will either be brown.The red one is the power wire and should be connected to the 5v port and this is usually orange.

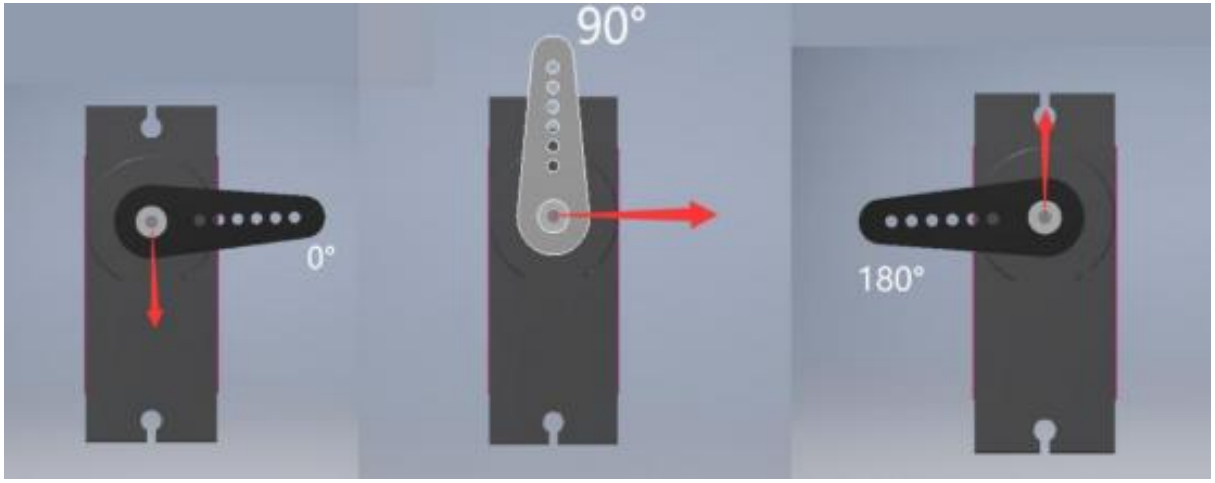
This control lead is connected to digital pin 13.



Introduction

Servo motors are great devices that can turn to a specified position.

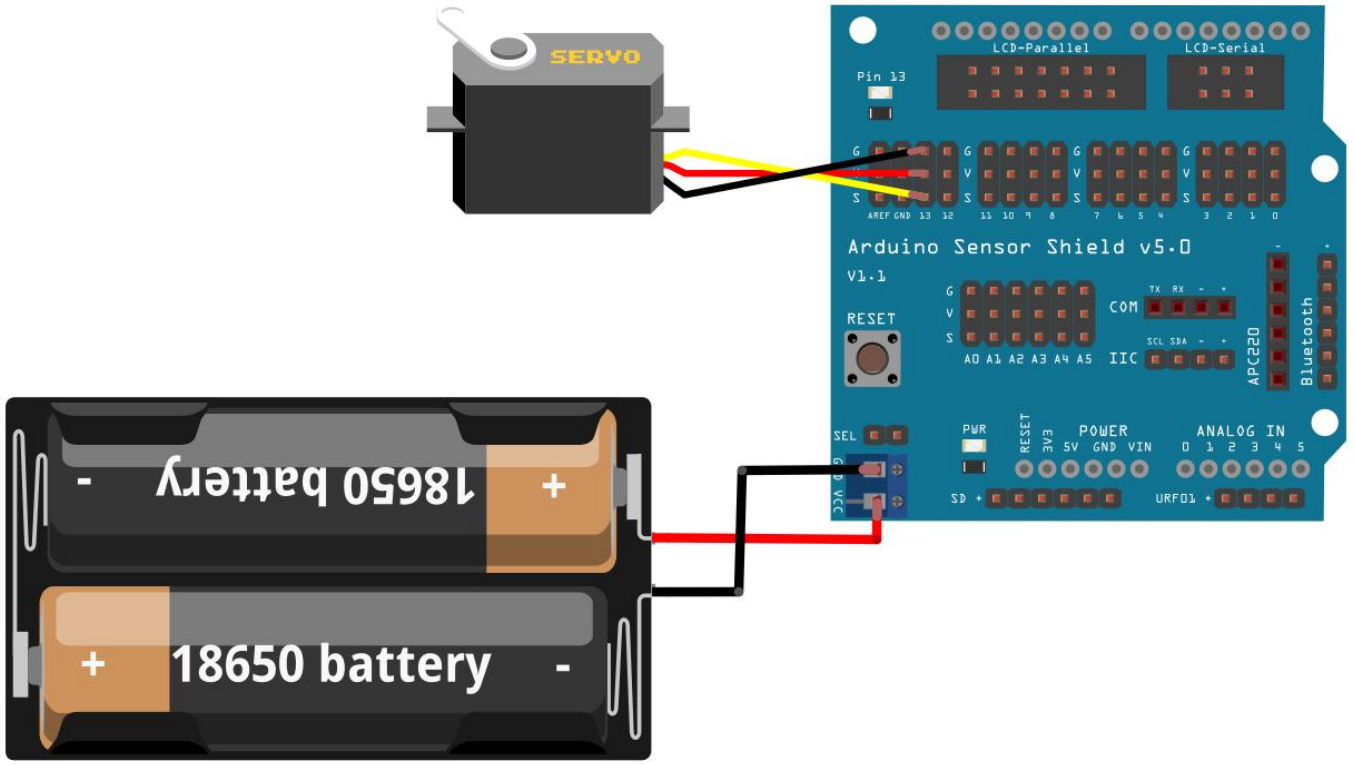
Usually, they have a servo arm that can turn 180 degrees. Using the Arduino, we can tell a servo to go to a specified position and it will go there. As simple as that!



Servo motors were first used in the Remote Control (RC) world, usually to control the steering of RC cars or the flaps on a RC plane. With time, they found their uses in robotics, automation, and of course, the Arduino world.

There are two ways to control a servomotor with Arduino. One is to use a common digital sensor port of Arduino to produce square wave with different duty cycle to simulate PWM signal and use that signal to control the positioning of the motor. Another way is to directly use the Servo function of the Arduino to control the motor. In this way, the program will be easier. The Arduino drive capacity is limited. So if you need to control more than one motor, you will need external power.

Connection diagram



Attention

After connecting,please open the the program and load up the code - Lesson_1_Servo onto your Arduino board. Before you can run this, make sure that you have installed the < Servo> library or re-install it, if necessary. Otherwise, your code won't work.

Result

After uploading the code, the servo motor rotates from 0 degrees to 180 degrees, 1 degree at a time. Then rotate from 180 degrees to 0 degrees, one degree at a time.

Lesson 2 Ultrasonic Sensor Module

About this lesson:

Ultrasonic sensor is great for all kind of projects that need distance measurements, avoiding obstacles as examples.

It works like a bat's eye. Determine the distance of obstacles in front after receiving and receiving high-frequency sound waves.

As the following picture shown, it is our ultrasonic module. It has two something like eyes. One is transmitting end, the other is receiving end.

Introduction:

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.

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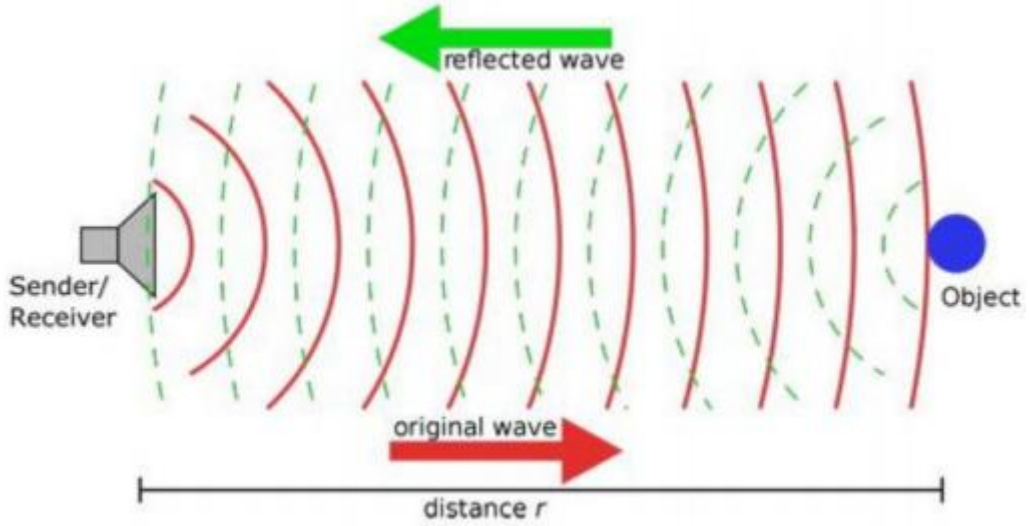
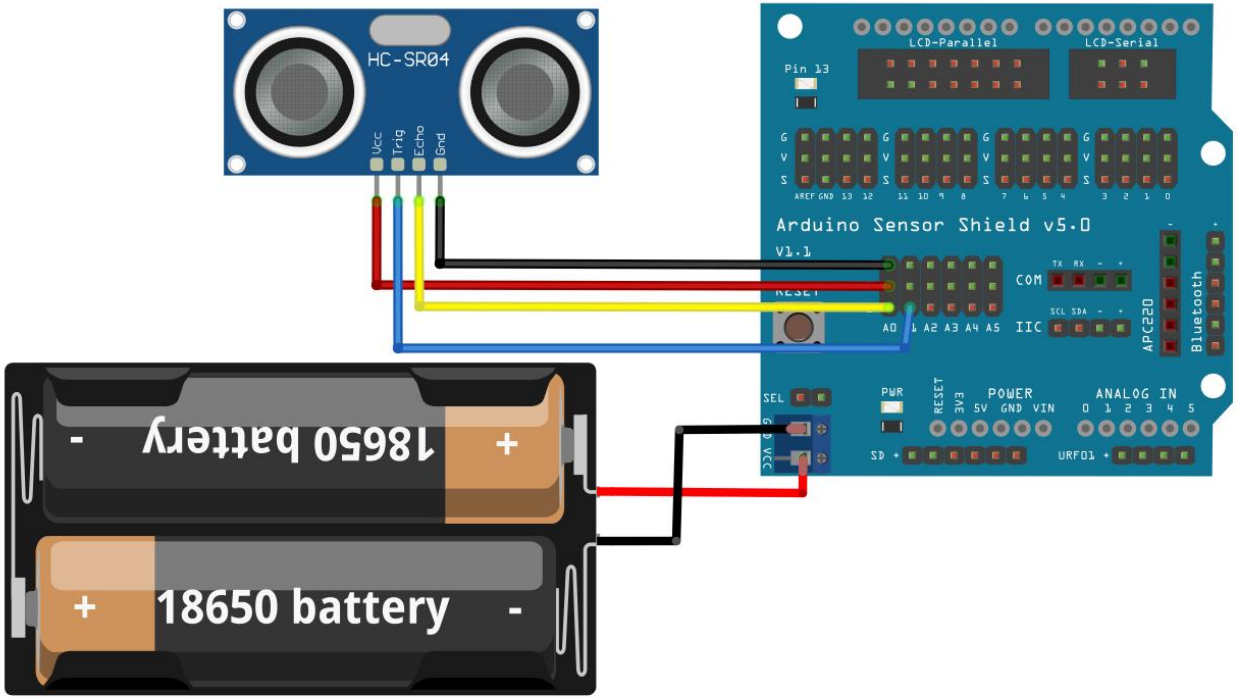

reflected wave
Sender/
Receiver
Object
original wave
distance r

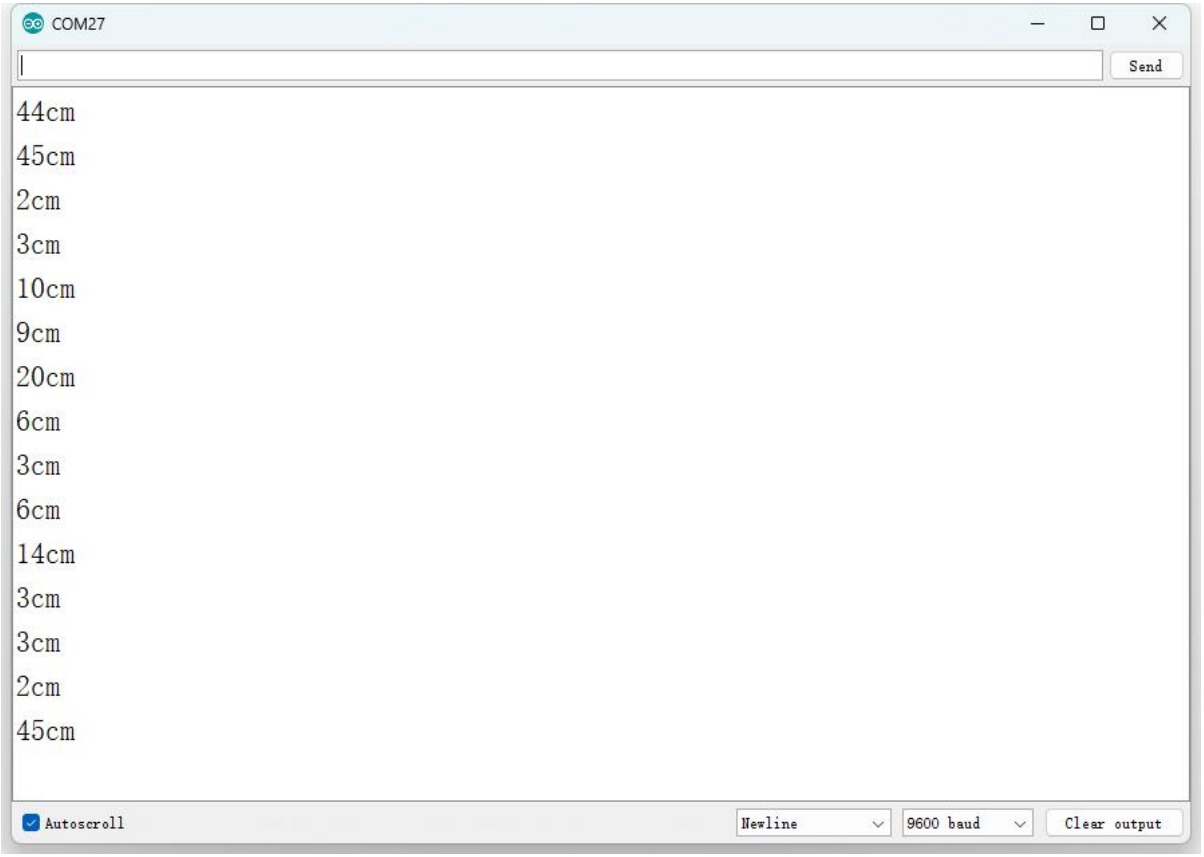
Wiring diagram



Result

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:



Lesson 3 Infrared Obstacle Avoidance Module

About this lesson:

In this lesson, 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.

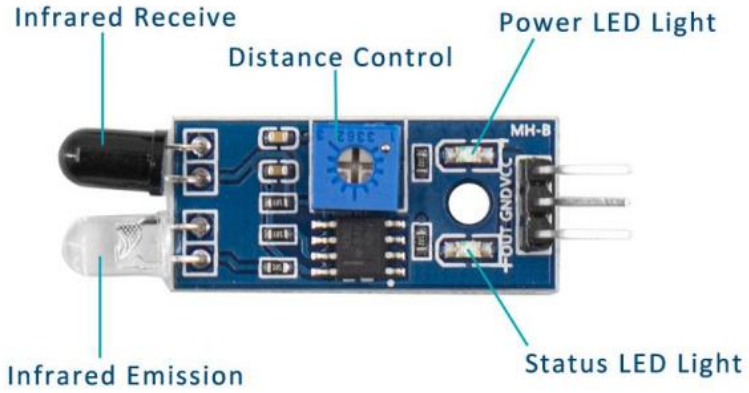
Component Introduction

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.

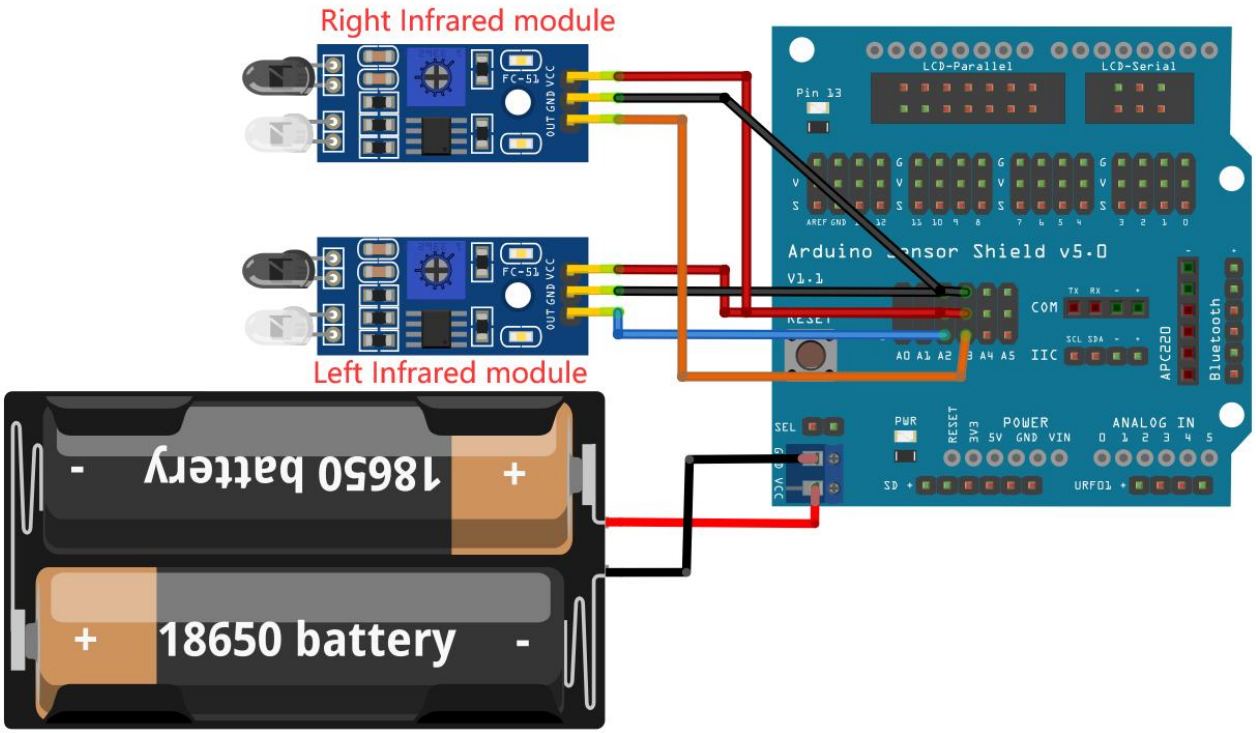
we read the signal level of obstacle detector sensor to judge whether detect obstacles or not.

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.

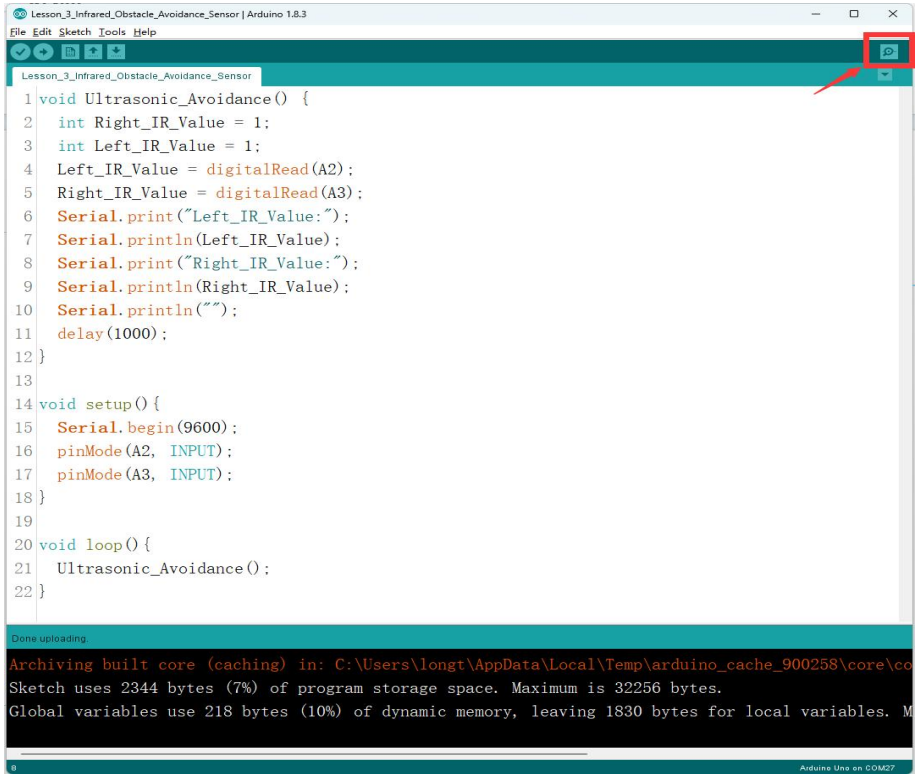


Wiring diagram

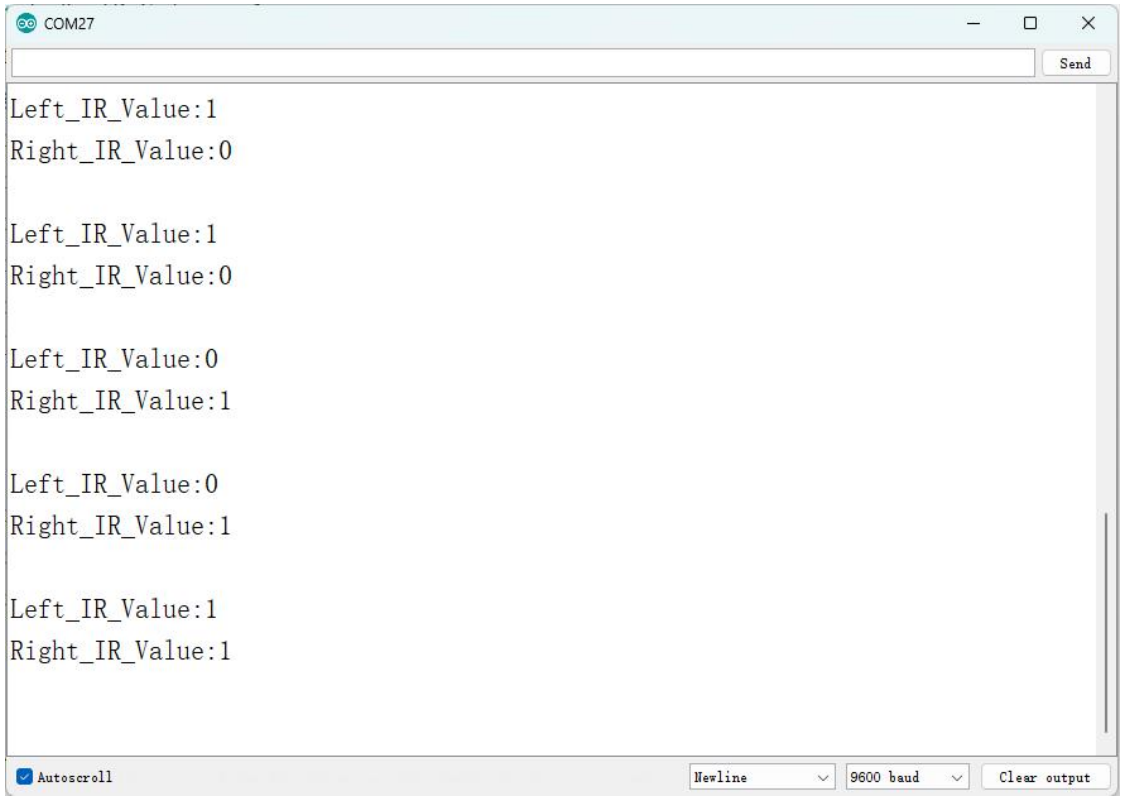


Result

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



Then you can see the data as blow:



Lesson 4 L298N Motor Driver

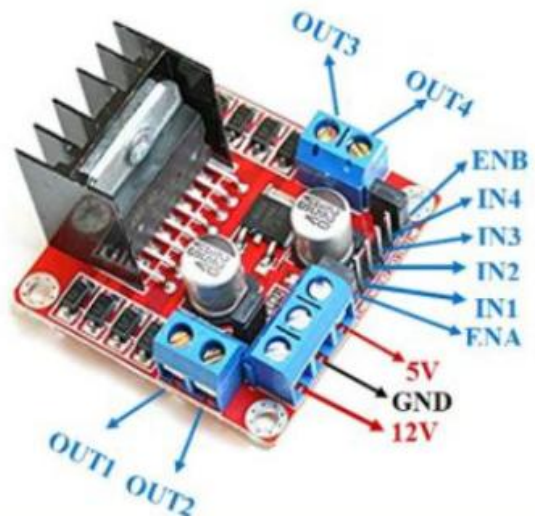
About this lesson:

In this lesson, you will learn how to use a L298N Motor Driver module.

Component Introduction

This L298N Motor Driver Module is a high power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. L298N Module can control up to 4 DC motors, or 2 DC motors with directional and speed control.

LROBRUYA



Using L298N made by ST Company as the control chip, the module has characteristics of strong driving ability, low calorific value and strong anti-interference ability.

This module can use built-in 78M05 for electric work via a driving power supply part. But to avoid the damage of the voltage stabilizing chip, please use an external 5V logic supply when using more than 12V driving voltage.

Using large capacity filter capacitor, this module can follow current to protect diodes, and improve reliability.

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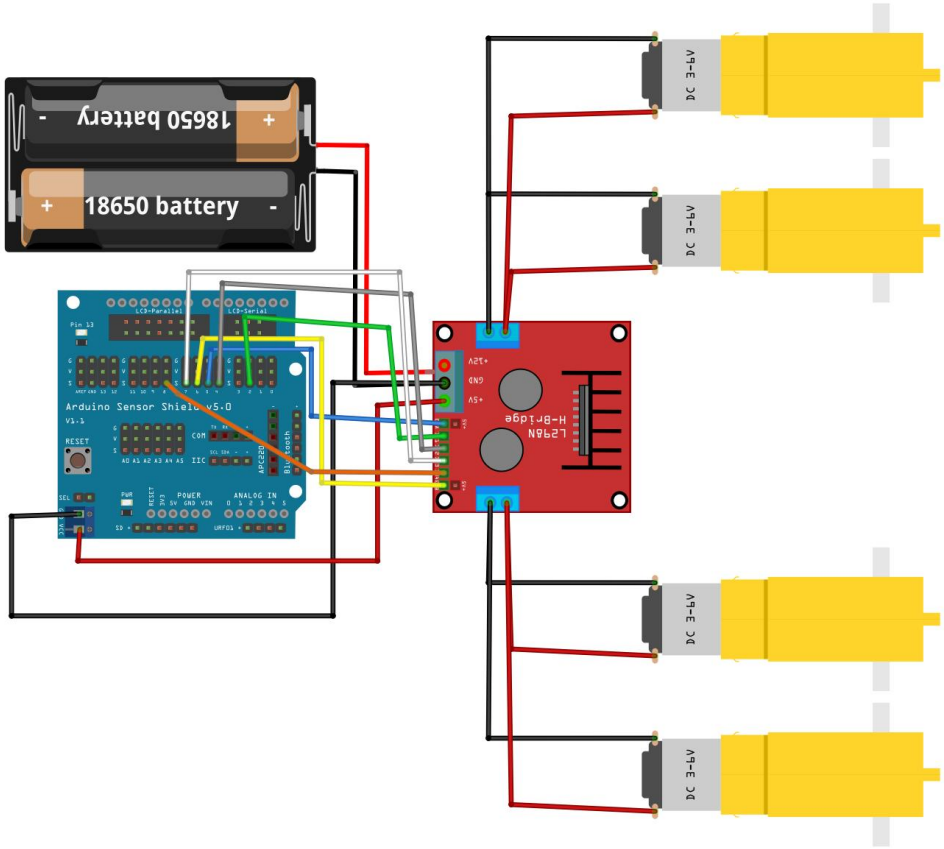
Wiring diagram



Attention

When connecting, the jumper caps of ENA and ENB must be removed.

After wiring, please open the program in the code folder- Lesson_4_L298N_Motor_Driver and click UPLOAD to upload the program.

Result

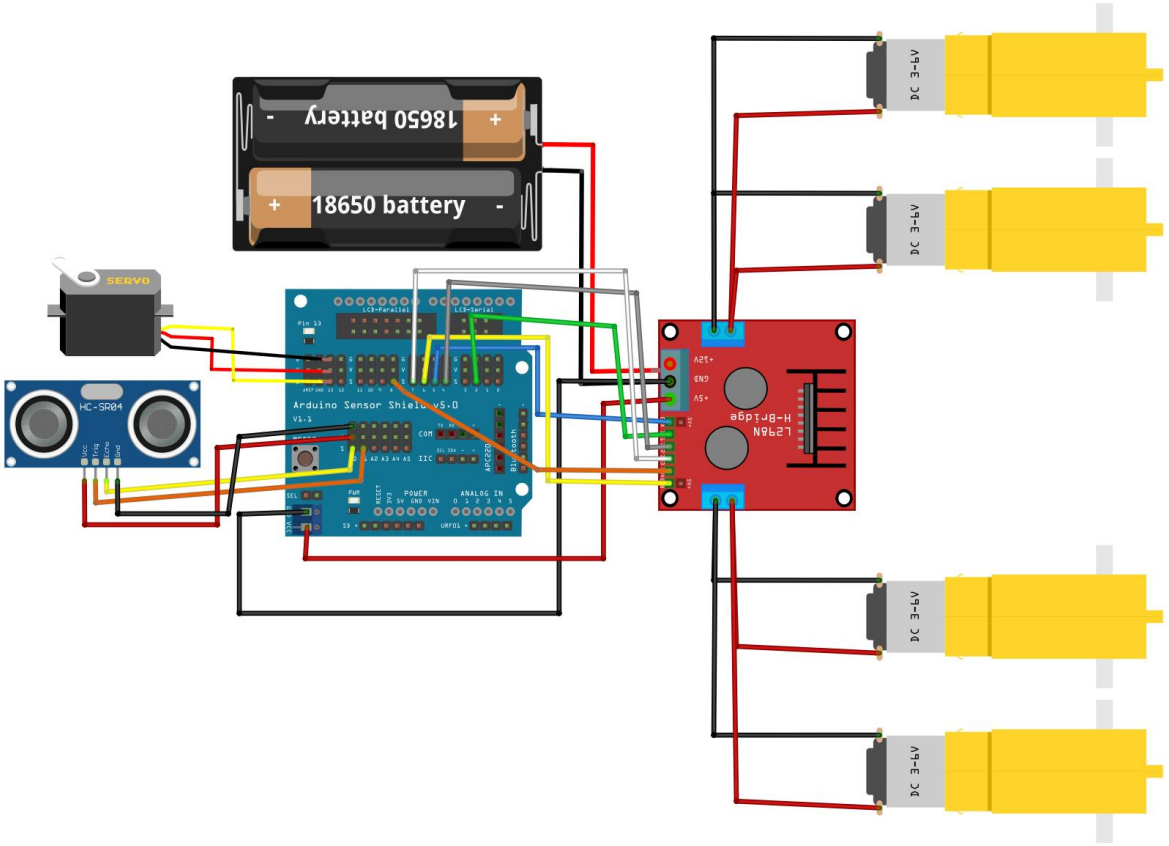
After connection and power-on, two motors rotate clockwise for 2 second at a speed of 200 (PWM value is 200) and then stop for 2 second; two motors rotate anticlockwise for 2 second at a speed of 200 (PWM value is 200) and then stop for 2second; circulating like this.

Lesson 5 Ultrasound Obstacle Avoidance Car

About this lesson:

This lesson ,regarding Arduino as main control, detect front obstacle by ultrasonic sensor and platform motor, and send the feedback to Arduino. Arduino will analyses the feedback signal and then control the driver motor to adjust the car diversion. Finally the car is able to avoid obstacle automatically and keep going.

Wiring diagram



Attention

After connecting,please open the the program and load up the code - Lesson_5_Ultrasound_Obstacle_Avoidance_Car onto your Arduino board. Before you can run this, make sure that you have installed the < Servo> library or re-install it, if necessary. Otherwise, your code won't work.

Result

1.Ultrasonic detecting distance: one port emits high level more than 10 us. Once it outputting level, open potentiometer to time. When the port becomes low level, read out current value. Use the time of detecting distance to calculate distance.

2.Use ultrasonic to detect the distance between obstacle and car, so that control the motion of the car according to the data.

3.When there is no obstacle in front of the robot car, the car keeps walking straight. When the distance of the obstacle in front of the robot car is less than 20cm, the robot car stops, then detects whether there is an obstacle in the left front and right front, and then turns in the opposite direction.

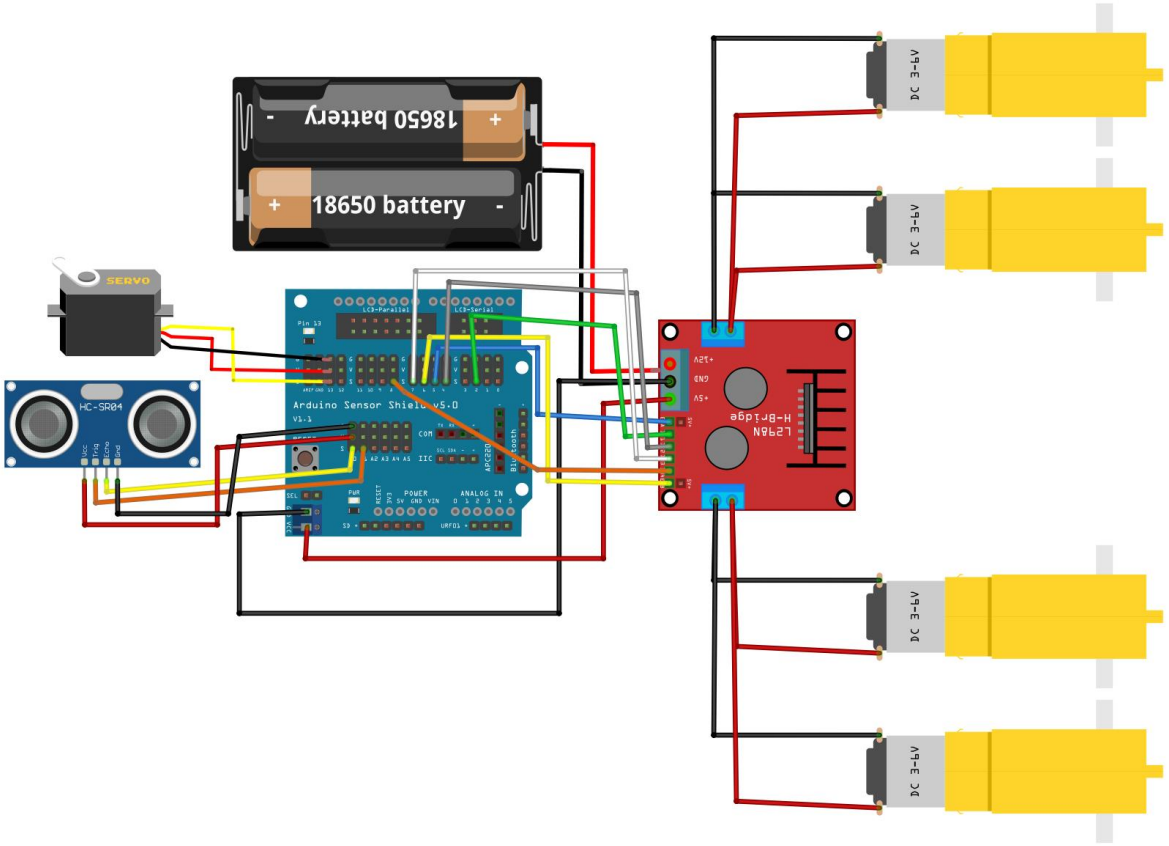
LROBRUYA

Lesson 6 Follow Car

About this lesson:

In this lesson, we learn the use of ultrasonic sensors and then use ultrasonic sensors to detect distances to achieve robots to follow his master.

Wiring diagram



Attention

After connecting,please open the the program and load up the code - Lesson_6_Follow_Car onto your Arduino board.

Before you can run this, make sure that you have installed the < Servo> library or re-install it, if necessary. Otherwise, your code won't work.

Result

After downloading the program and observing the distance information printed by the serial port window, unplug the USB data cable and turn on the power switch of the robot.you can move your hand close to the front of the ultrasonic sensor. When the robot is less than 10 cm away from your hand, he will stop.Move your hand straight forward.When the robot is more than 20cm away from your hand, the robot will approach your hand.

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Lesson 7 Line-Tracking sensor

About this lesson:

In this lesson, you will learn how to use a Tracking Sensor.we will use an obstacle avoidance sensor module and an LED attached to pin of the Arduino Uno board to build a simple circuit to make a tracking light.

Component Introduction

This Line Tracking Sensor can detect white lines in black and black lines in white. The single line-tracking signal provides a stable output signal TTL for a more accurate and more stable line. Multi-channel option can be easily achieved by installing required line-tracking robot sensors.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:

Power Supply: +5V Operating Current: <10mA

Operating Temperature Range: 0°C ~ + 50 °C

Output Interface: 3-wire interface (1 - signal, 2 - power, 3 - power supply negative) Output Level: TTL level

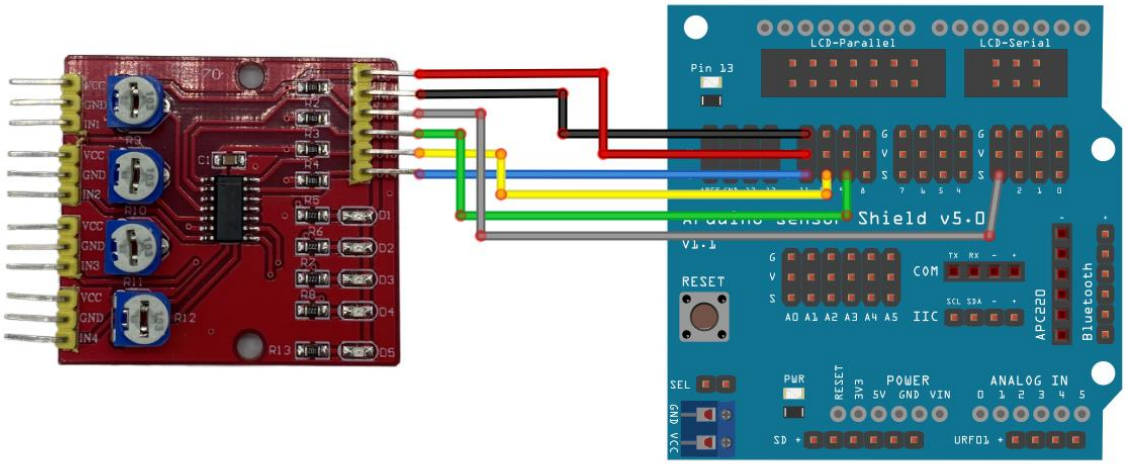
How to use the Line-Tracking sensor

we read the signal level of Line-Tracking sensor to judge whether detect black or not.

When detects black, sensor’s signal pin outputs HIGH (display 1).The red indicator light will turn off ; otherwise, output LOW (display 0),the red indicator light will turn on.

Show the result on the serial monitor.

Wiring diagram

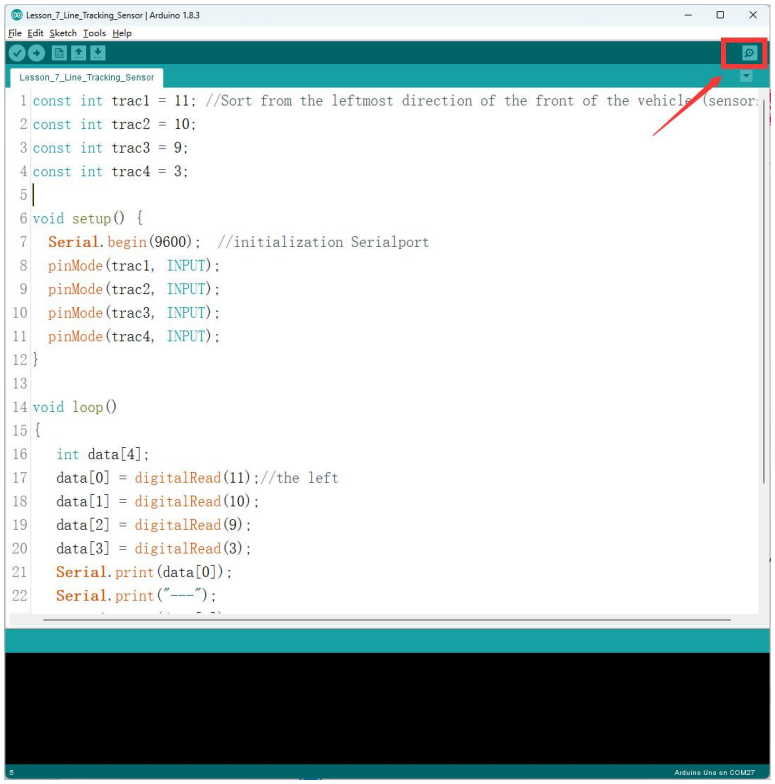


Attention

The Line Tracking sensor adjusts the detection sensitivity of the sensor according to the actual situation by rotating the adjustable potentiometer on the sensor.

Result

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



When the line patrol sensor detects black, the serial monitor will receive "1", and the digital port will receive a high level, otherwise the serial monitor will receive "0", and the digital port will receive a low level. If the four sensors on the left and right and middle detect black at the same time, the serial monitor receives four "1"s. If the left sensor detects black and the other three sensors detect non-black, the signals received by the serial monitor are "1---0---0---0".

Lesson 8 Line-Tracking Car

About this lesson:

In this lesson,we will learn a simple and automatic line tracking system of a car.

Step 1: Prepare a black track on white ground. (the width of the black track is more than 20mm and less than 30mm). 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:

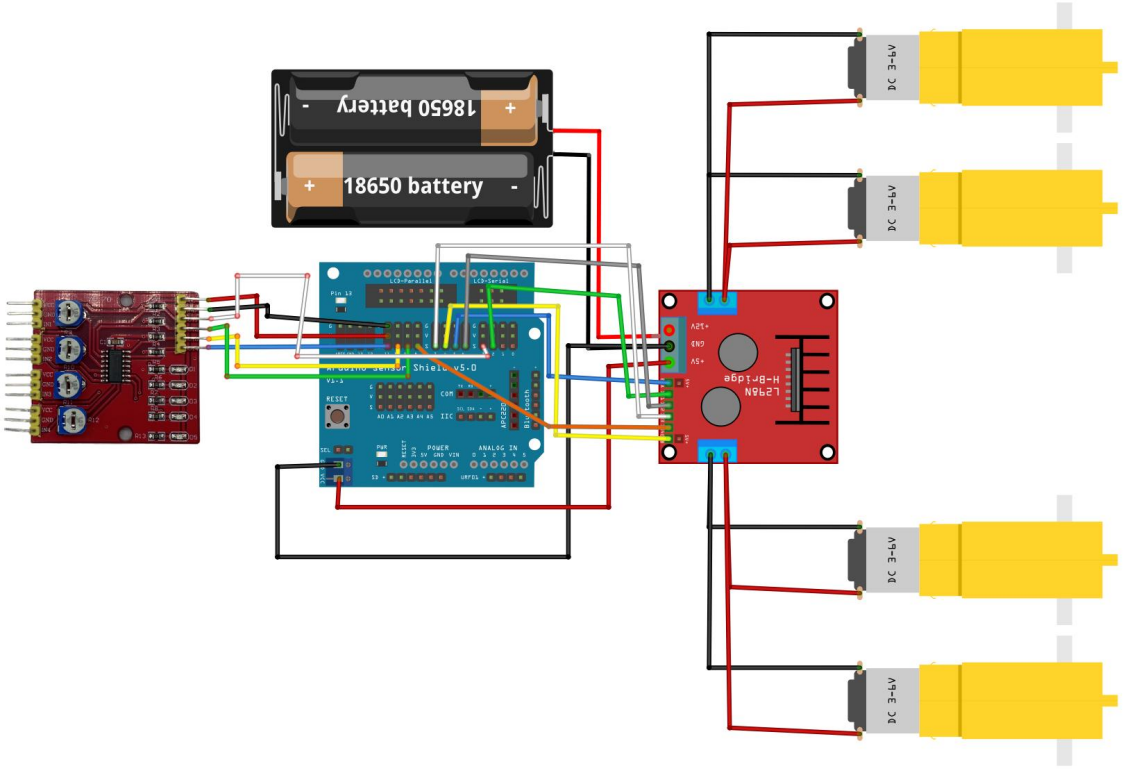
If adjusted well the sensibility of the tracking sensor

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.

Wiring diagram



Result

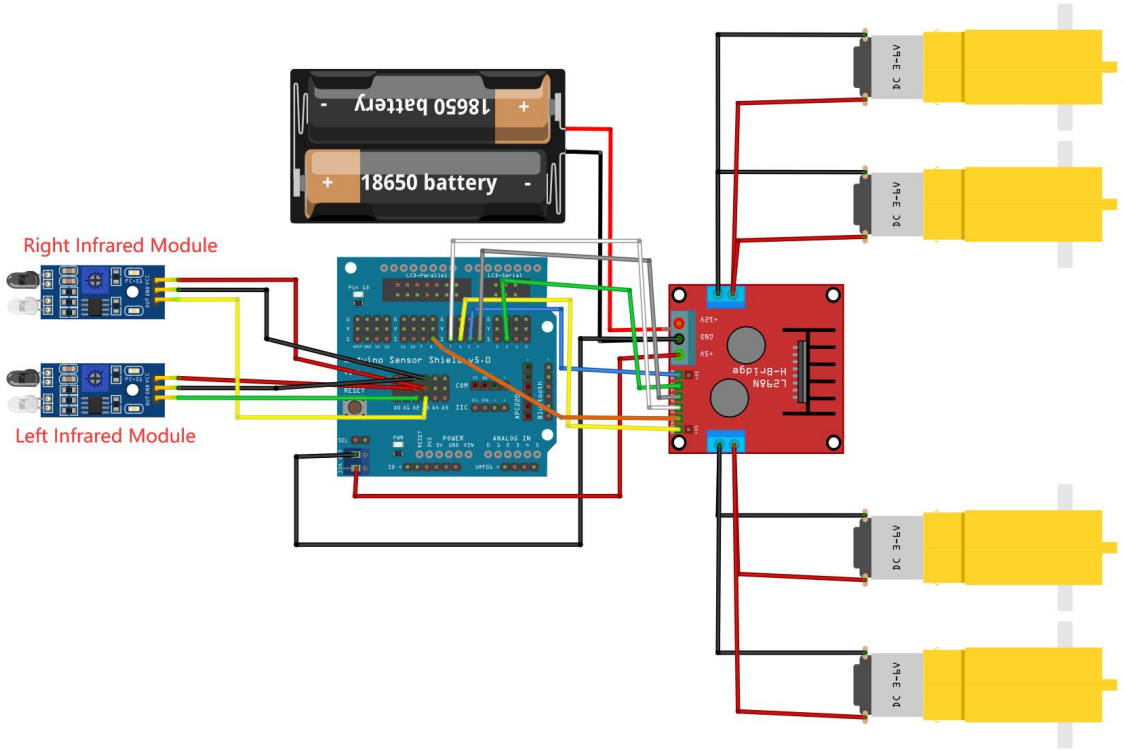
Turn the POWER switch ON.The robot car will move forward along the black track.

Lesson 9 Infrared Obstacle Avoidance Robot Car

About this lesson:

we learned to combine the infrared obstacle avoidance sensor with the motor to control the car to complete the obstacle avoidance function.

Wiring diagram



Result

Upload the test code to UNO R3 control board, turn the POWER switch ON. If there is an obstacle in front of the left of the car, the car will retreat and turn right, If there is an obstacle in the front right of the car, the car will retreat and turn left, If there are obstacles in the front left and front right, the car moves backwards and then randomly chooses to turn right or left.If there are no obstacles ahead, the car goes straight.

Note: According to the physical laws: Black objects have a strong ability to absorb light. The infrared obstacle avoidance function relies on transmitting and receiving infrared rays to detect obstacles in front. When all obstacles in front of the car are black objects, the sensitivity of the sensor detection will decrease.