

LROBROYA

2WD Robot Car Kit

[illegible]



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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.



How to Install Arduino IDE

Introduction

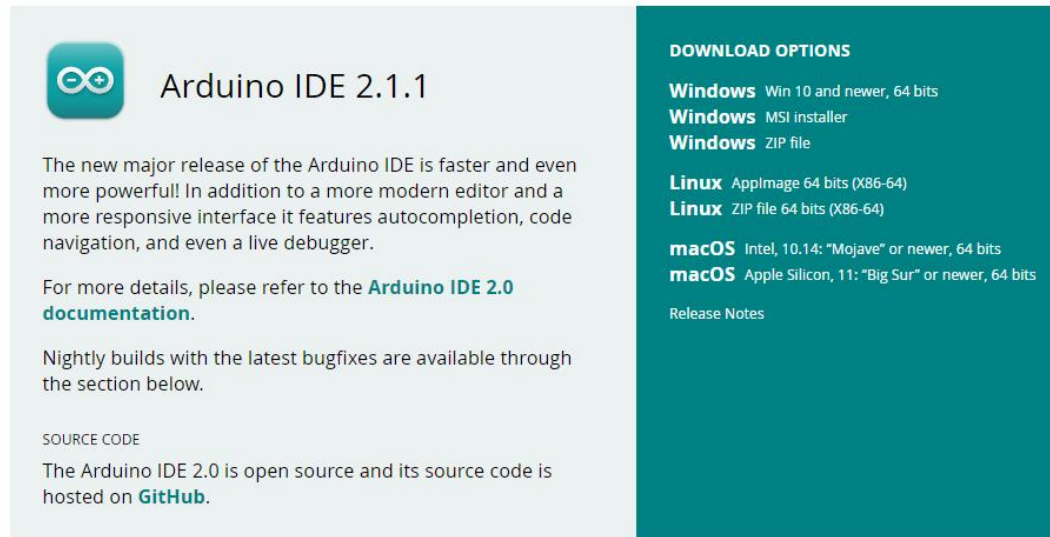
The Arduino Integrated Development Environment (IDE) is the software side of the Arduino platform.


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>.

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 **Arduino IDE 2.1.1**

The new major release of the Arduino IDE is faster and even more powerful! In addition to a more modern editor and a more responsive interface it features autocompletion, code navigation, and even a live debugger.

For more details, please refer to the [Arduino IDE 2.0 documentation](#).

Nightly builds with the latest bugfixes are available through the section below.

SOURCE CODE

The Arduino IDE 2.0 is open source and its source code is hosted on [GitHub](#).

DOWNLOAD OPTIONS

Windows Win 10 and newer, 64 bits
Windows MSI installer
Windows ZIP file

Linux AppImage 64 bits (X86-64)
Linux ZIP file 64 bits (X86-64)

macOS Intel, 10.14: "Mojave" or newer, 64 bits
macOS Apple Silicon, 11: "Big Sur" or newer, 64 bits

[Release Notes](#)

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.

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DOWNLOAD OPTIONS

Windows Win 10 and newer, 64 bits 

Windows MSI installer

Windows ZIP file

Linux Appliance 64 bits (X86-64)

Linux ZIP file 64 bits (X86-64)

macOS Intel, 10.14: "Mojave" or newer, 64 bits

macOS Apple Silicon, 11: "Big Sur" or newer, 64 bits

[Release Notes](#)

Click Windows Win 10 and newer, 64 bits.


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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.

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 arduino-ide_2.1.1_Linux_64bit

 arduino-ide_2.1.1_macOS_64bit

 arduino-ide_2.1.1_Windows_64bit

 arduino-ide_2.1.1_Windows_64bit

Installing Arduino (Windows)

Install Arduino with the exe. Installation package.

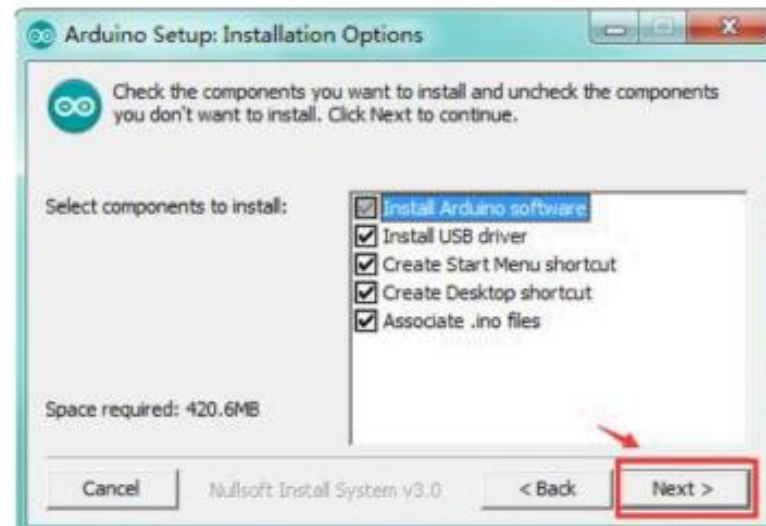
 arduino-ide_2.1.1_Windows_64bit

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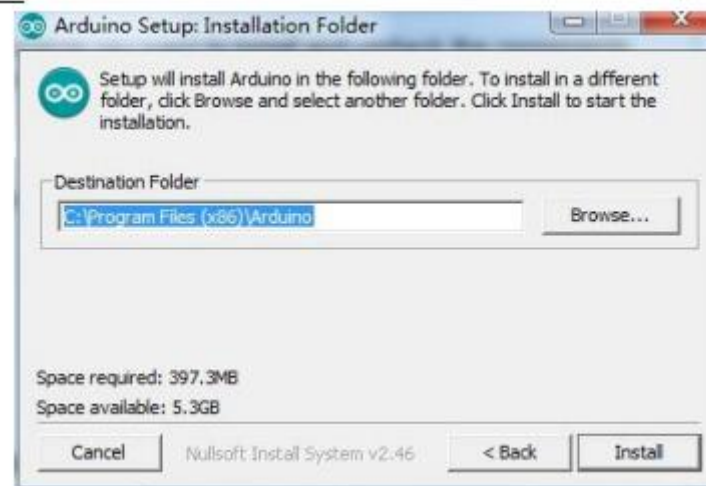
Click I Agree to see the following interface.

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Click Next

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

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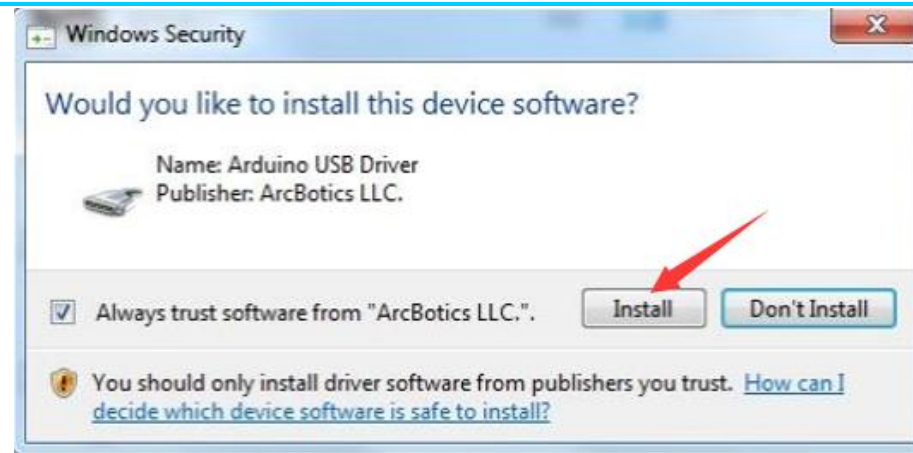
Click Install to initiate installation

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

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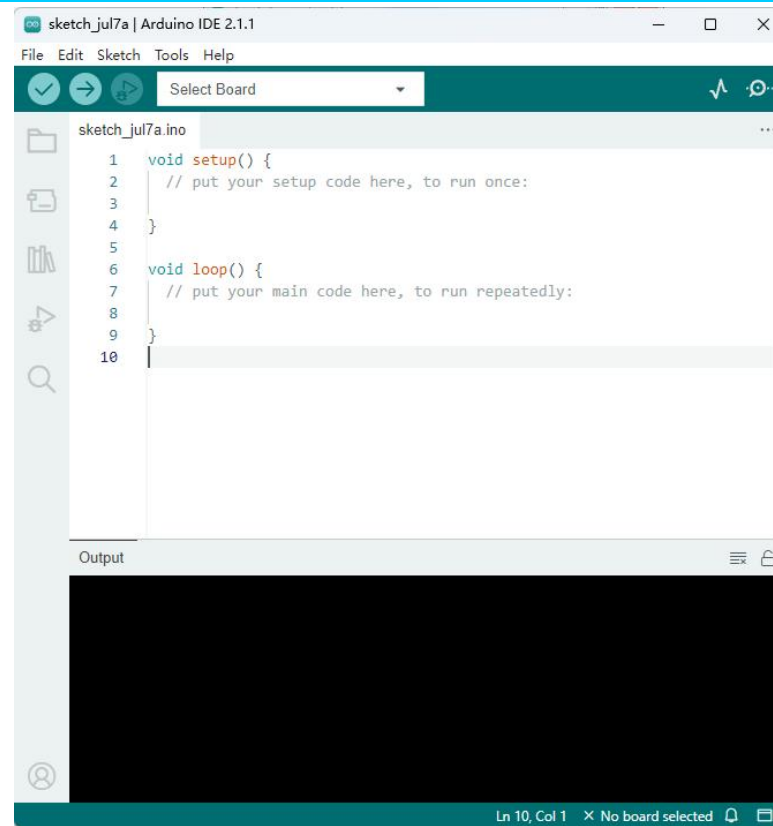


Next, the following icon appears on the desktop



Double-click to enter the desired development environment

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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.

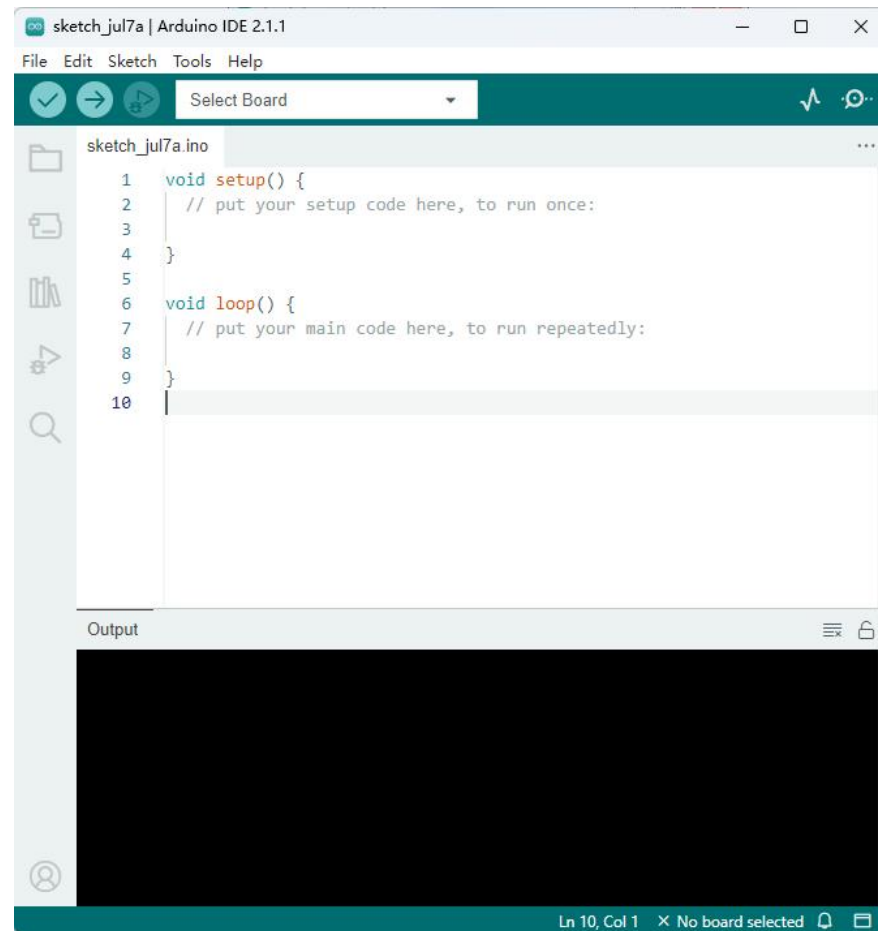
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Unzip the zip file downloaded, Double-click to open the program and enter the desired development environment.

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

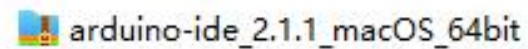
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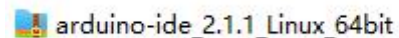
Installing Arduino (Mac OS X)

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.

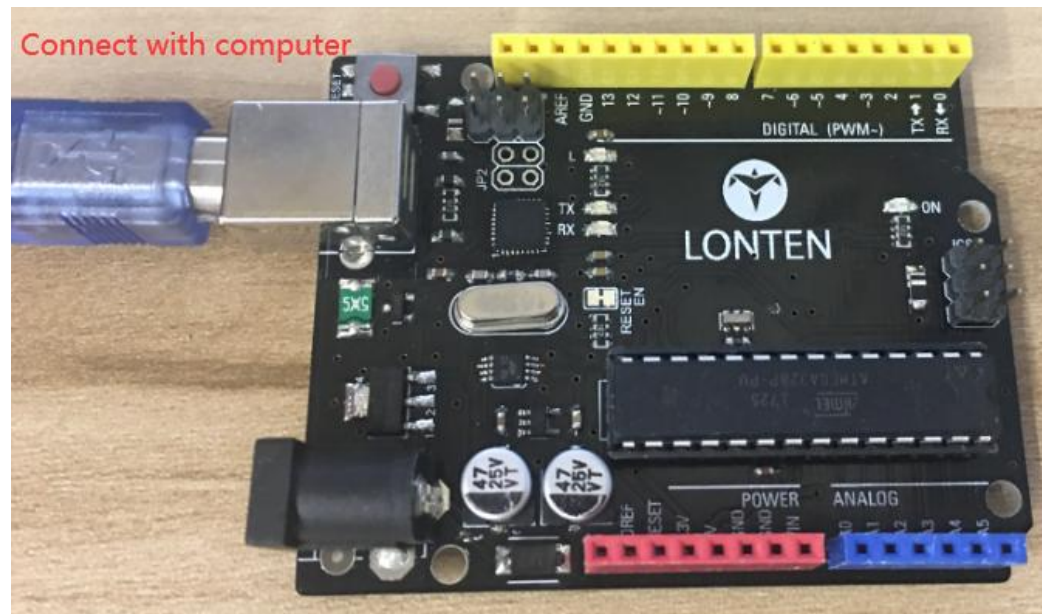


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How to Install Arduino Driver

For Windows

Arduino UNO R3 board





Serial communication interface: D0 is RX, D1 is TX

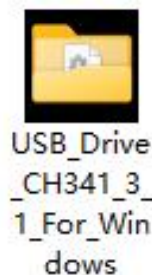
PWM interface (pulse width modulation): D3 D5 D6 D9 D10 D11

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.

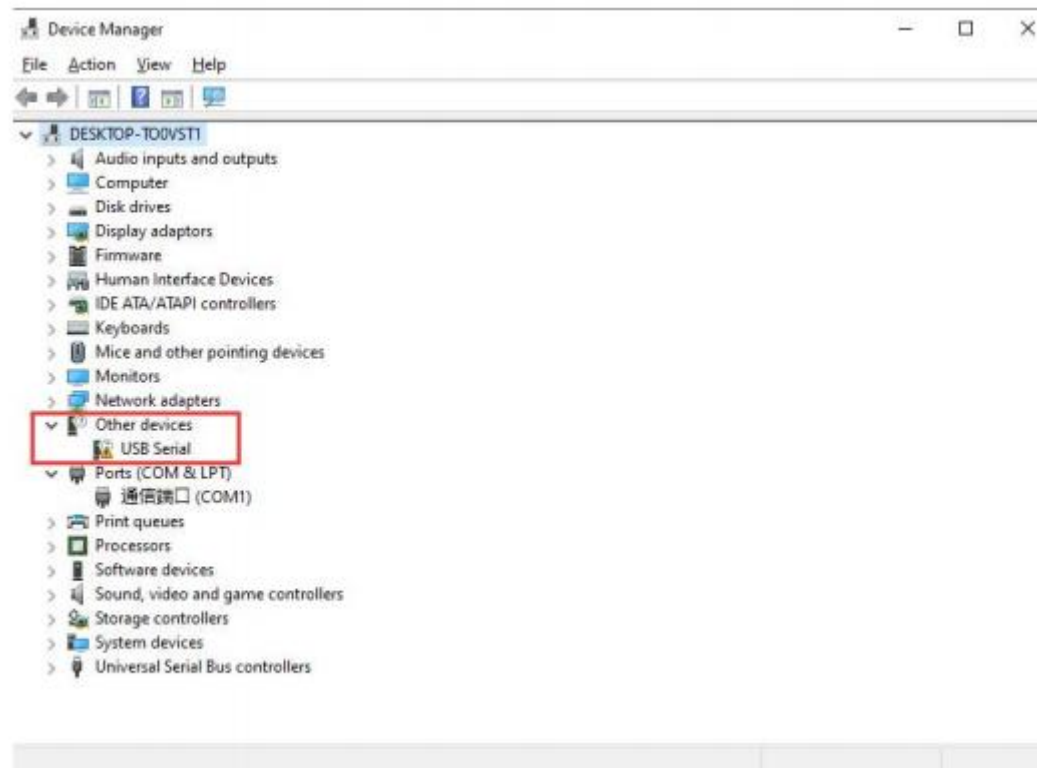


Plug one end of your USB cable into the Arduino UNO R3 Board and the other into a USB socket on your computer.



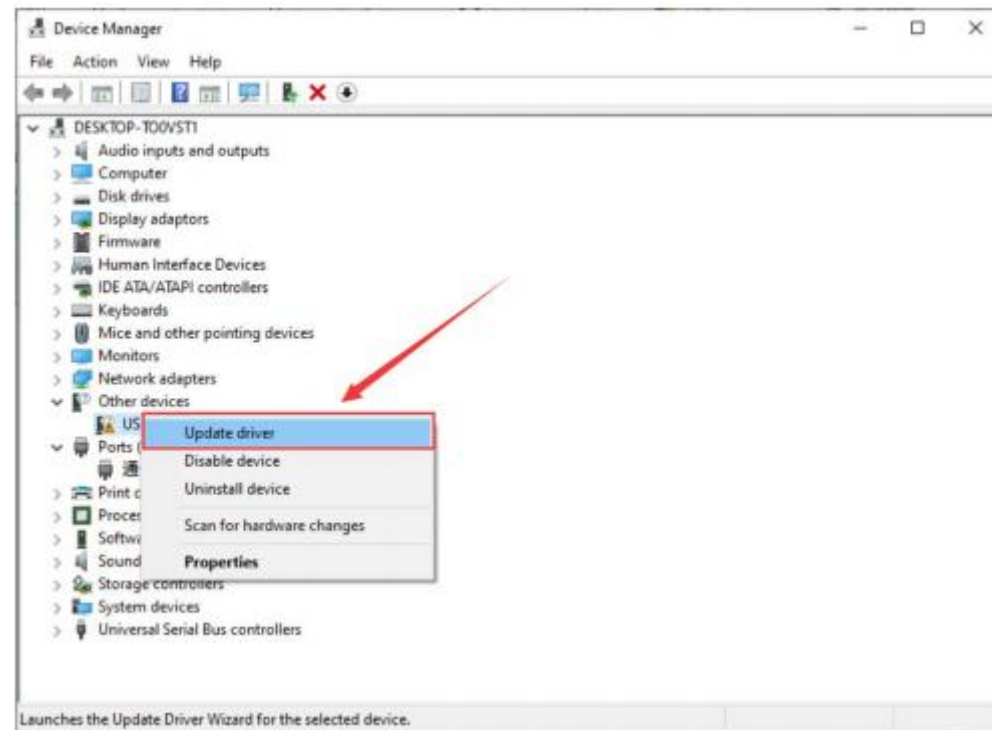
When you connect the Arduino UNOR3 Board to your computer at the first time, right click your “My Computer”—>for “Properties”—>click the “Device manager”, under Other devices, you should see the “USB-Serial” or “Unknown device ”.Or you can search for "devi" in your computer, or you can open the device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

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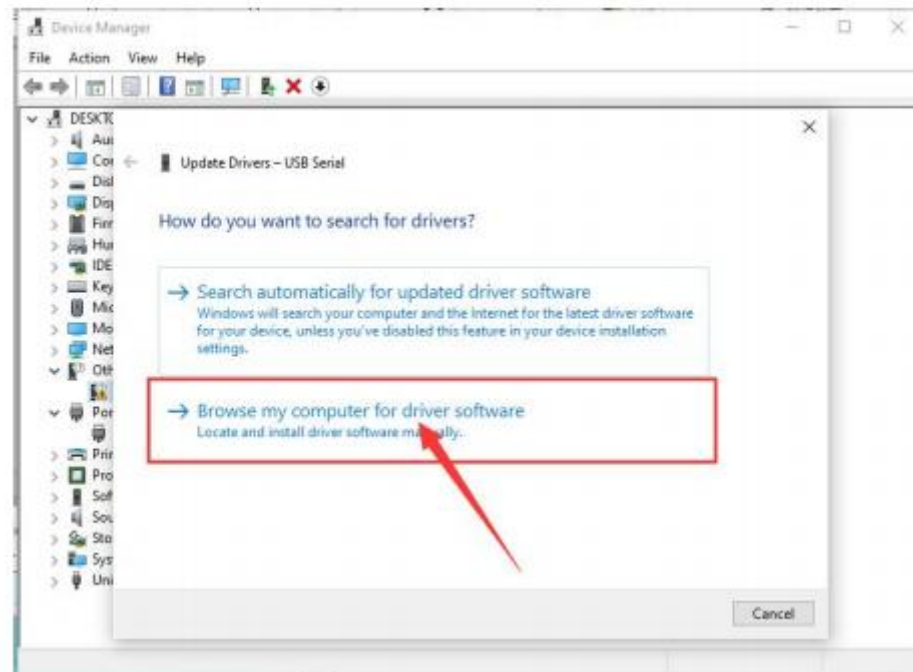
Then right-click on the device and select the top menu option (Update Driver Software...) shown as the figure below.

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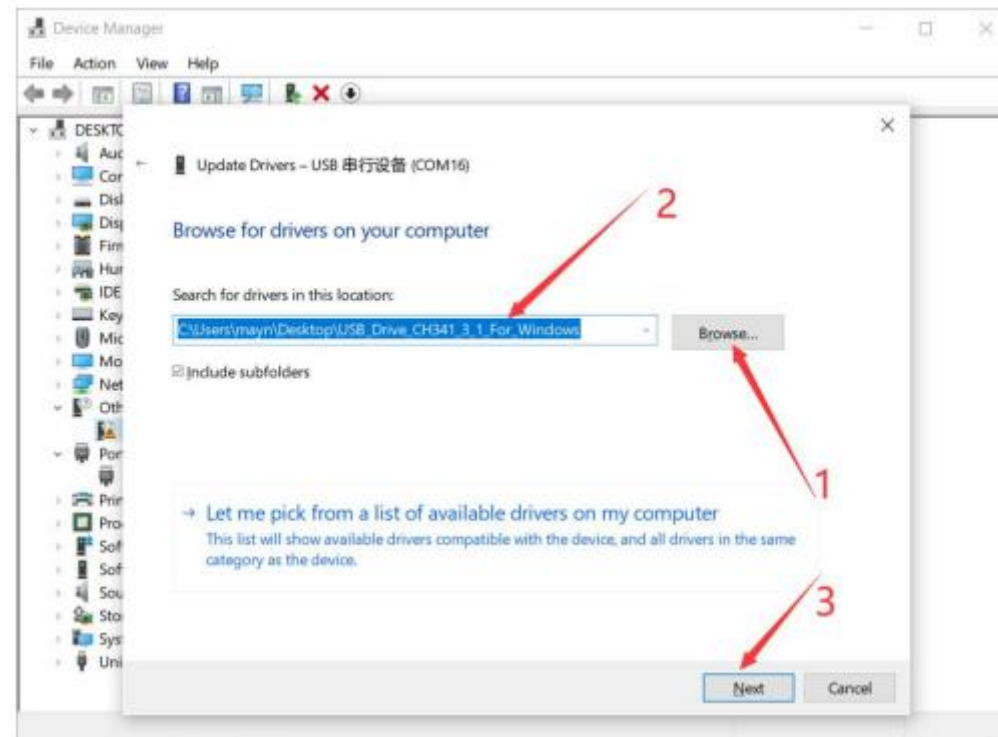
Then it will be prompted to either “Search Automatically for updated driver software” or “Browse my computer for driver software”. Shown as below. In this page, select “Browse my computer for driver software”.

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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`)

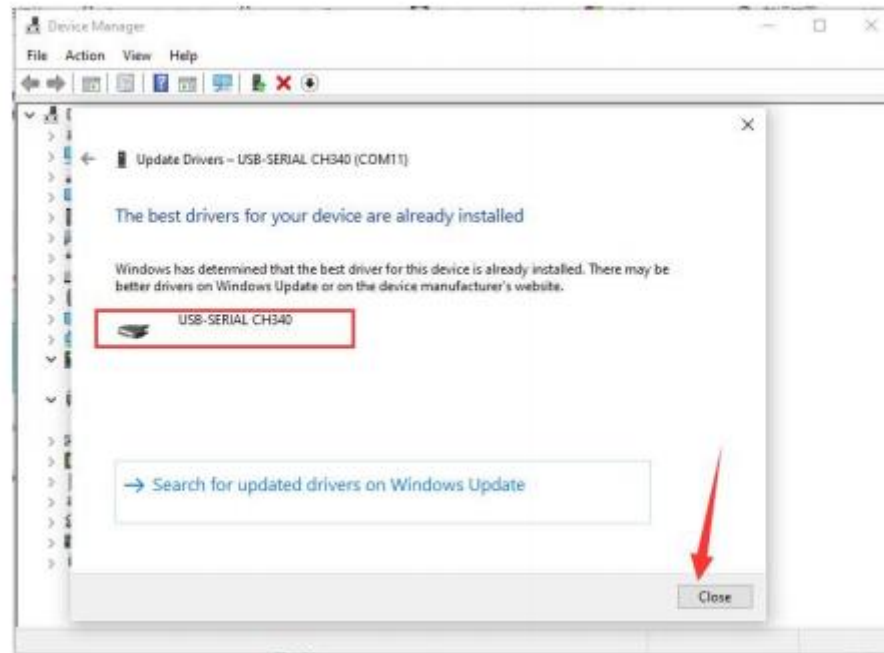
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Once the software has been installed, you will get a confirmation message.

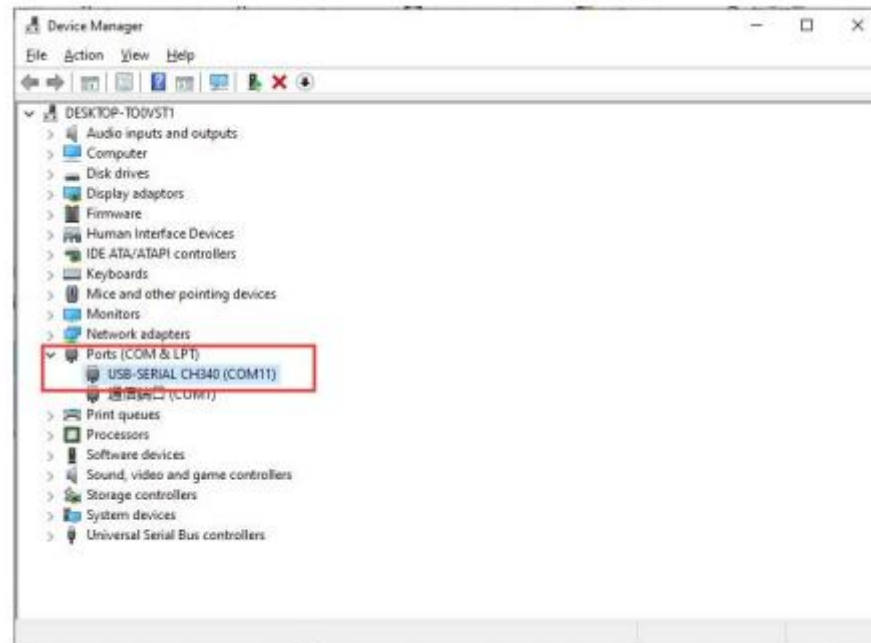
Installation completed, click “Close”.

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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.

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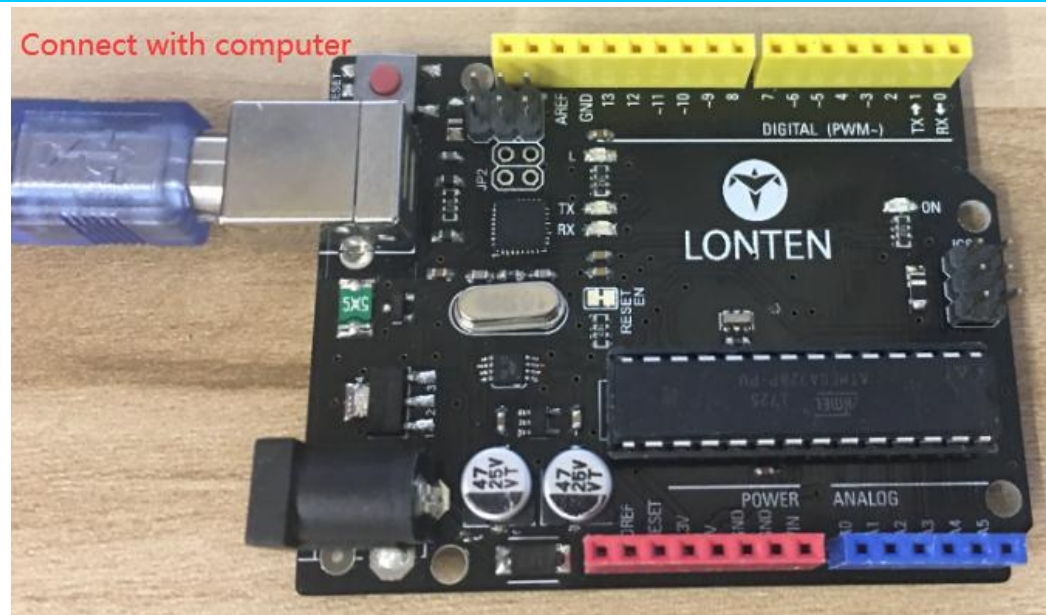


For MAC System

Arduino UNO R3 board

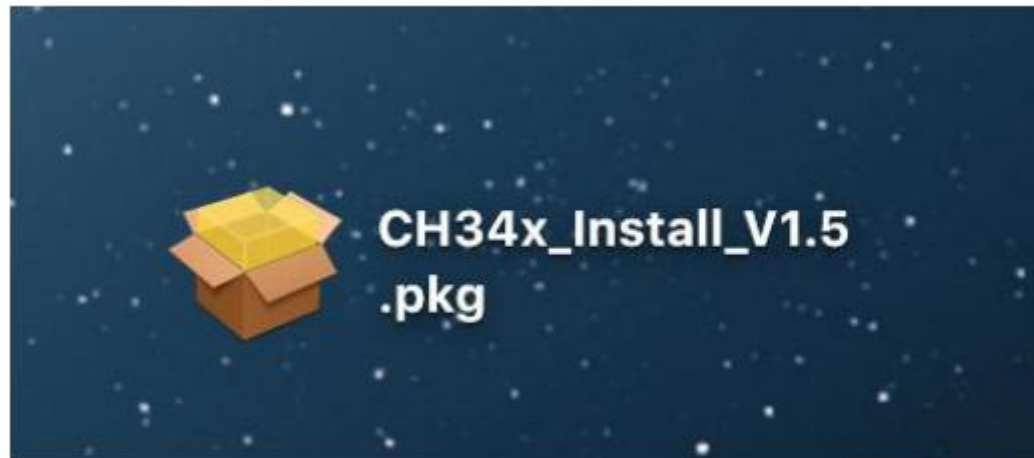
Plug one end of your USB cable into the Arduino UNO R3 Board and the other into a USB socket on your computer.

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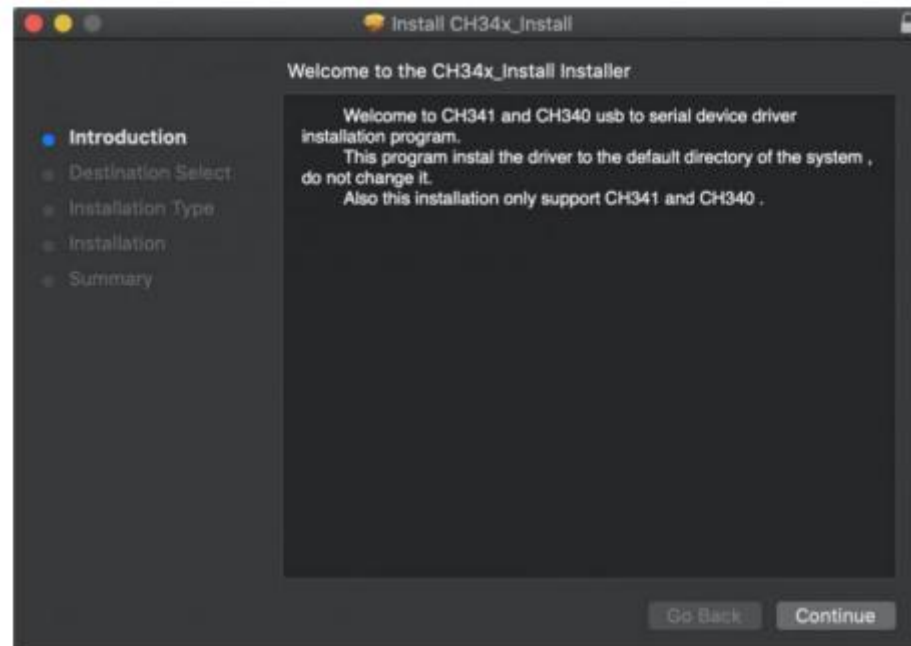
The driver file of the R3 of the MAC system is provided in the tutorial data package.

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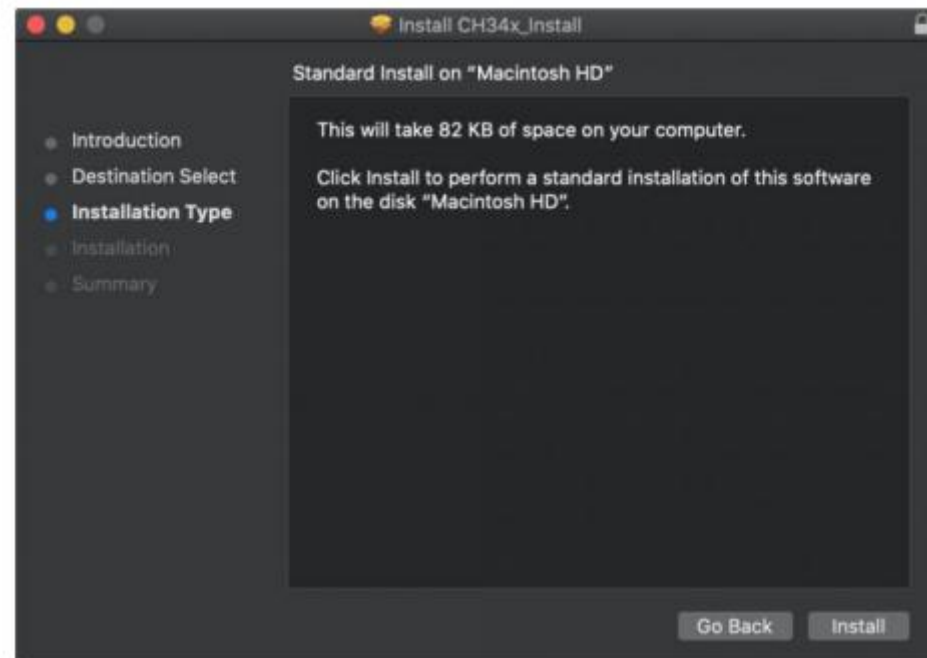
Double-click installation package and tap Continue

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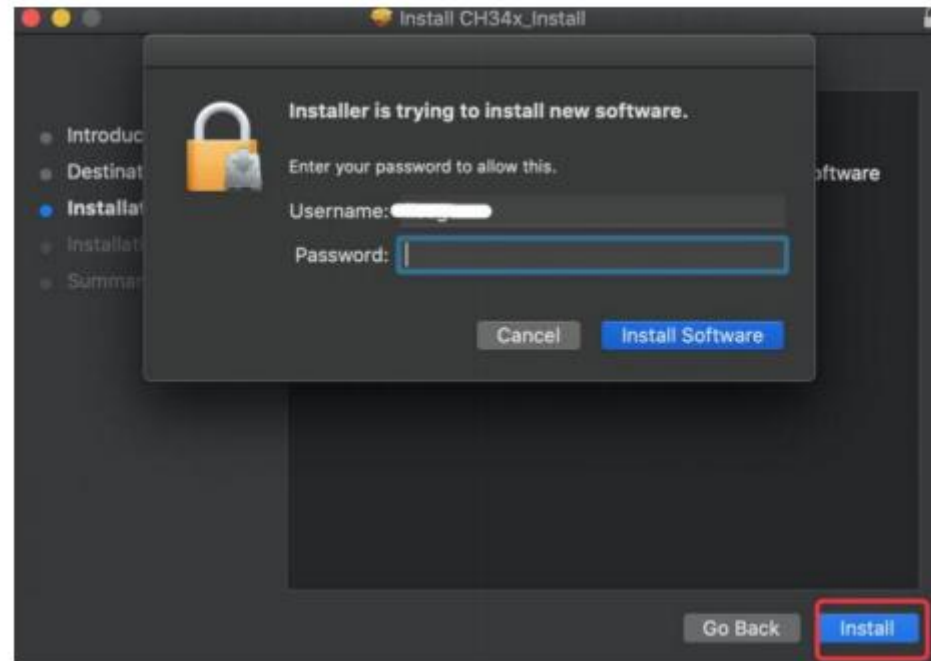
Click Install

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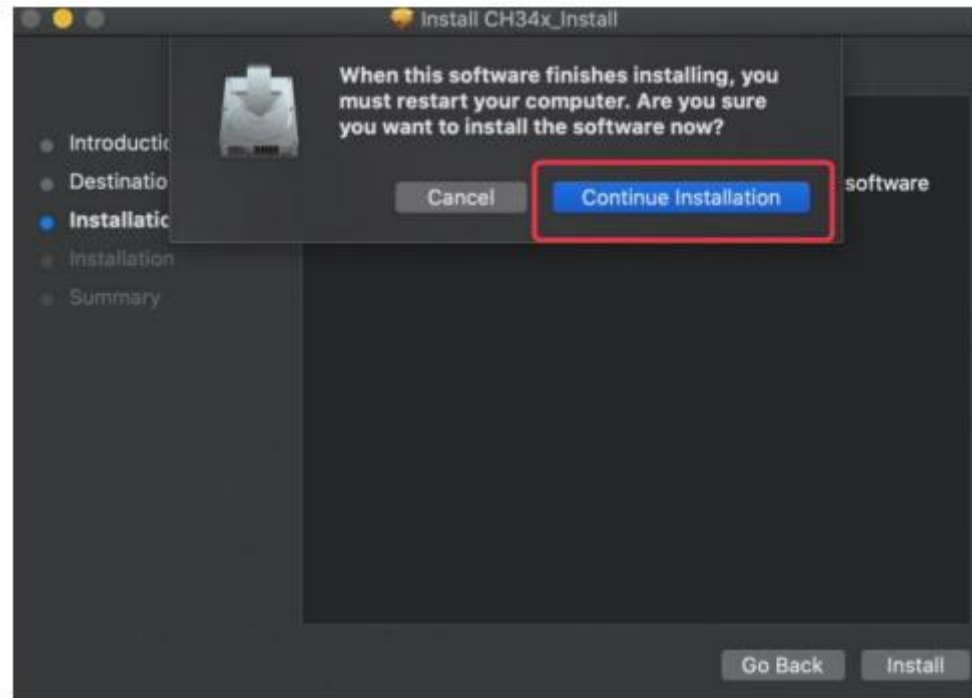
Input your user password and click Install Software

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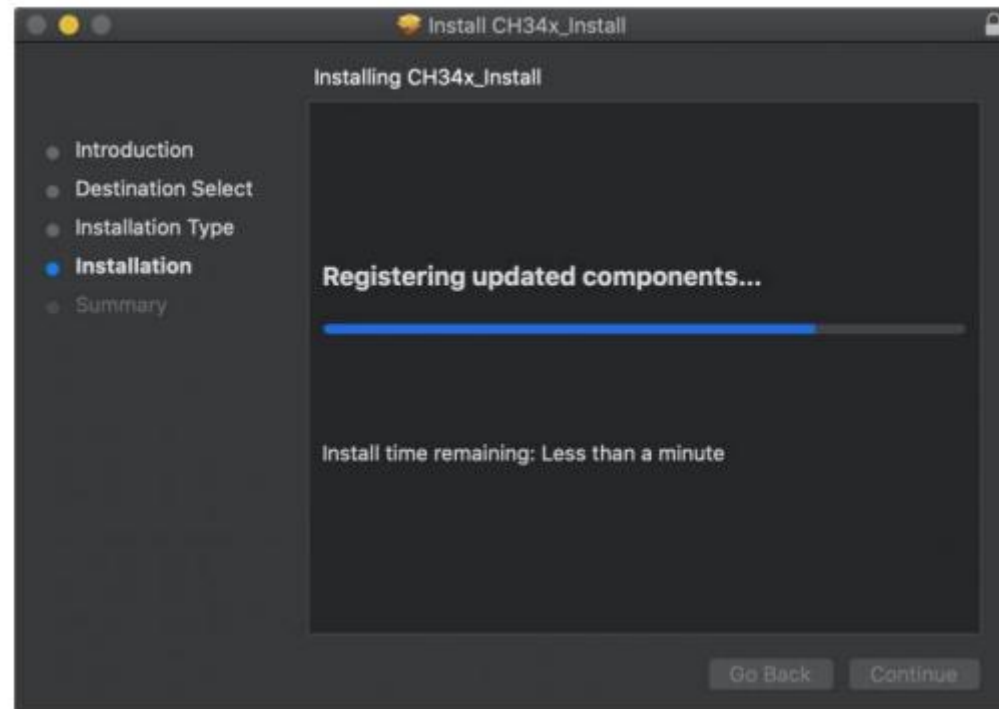
Tap Continue Installation

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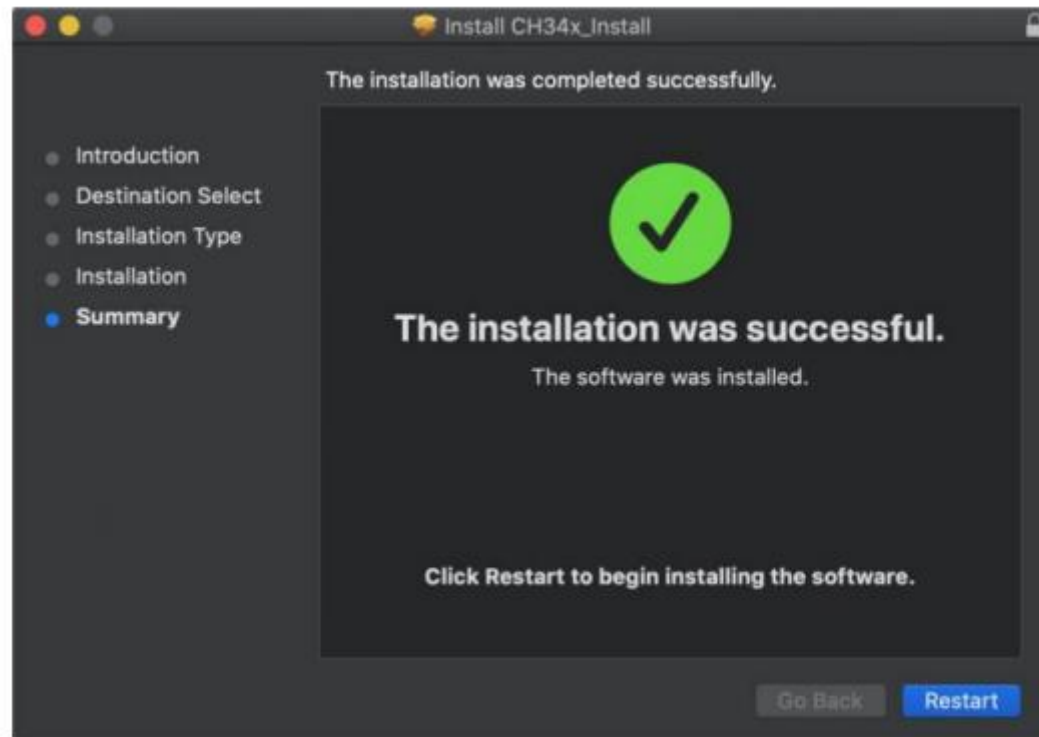
Wait to install

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Click Restart after the installation is finished

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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.

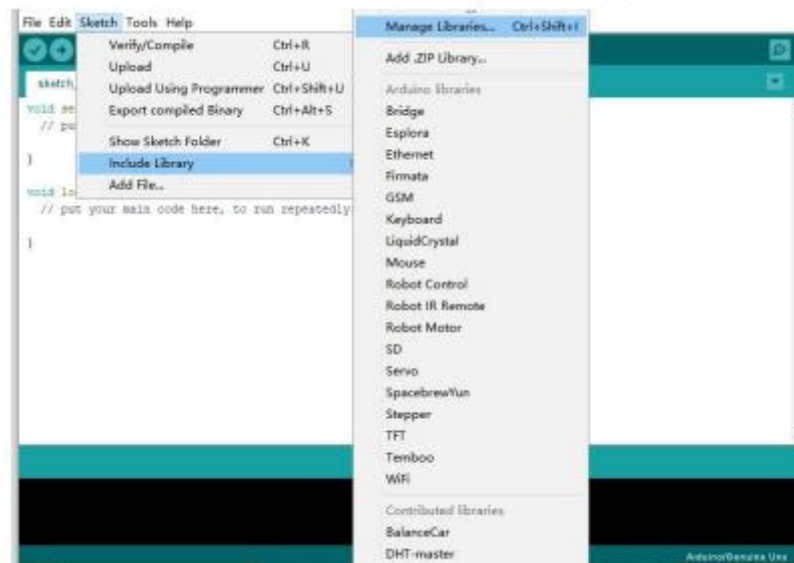
The built-in libraries and some of these additional libraries are listed in the reference. To use the additional libraries, you will need to install them.

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How to Install a Library

Using the Library Manager

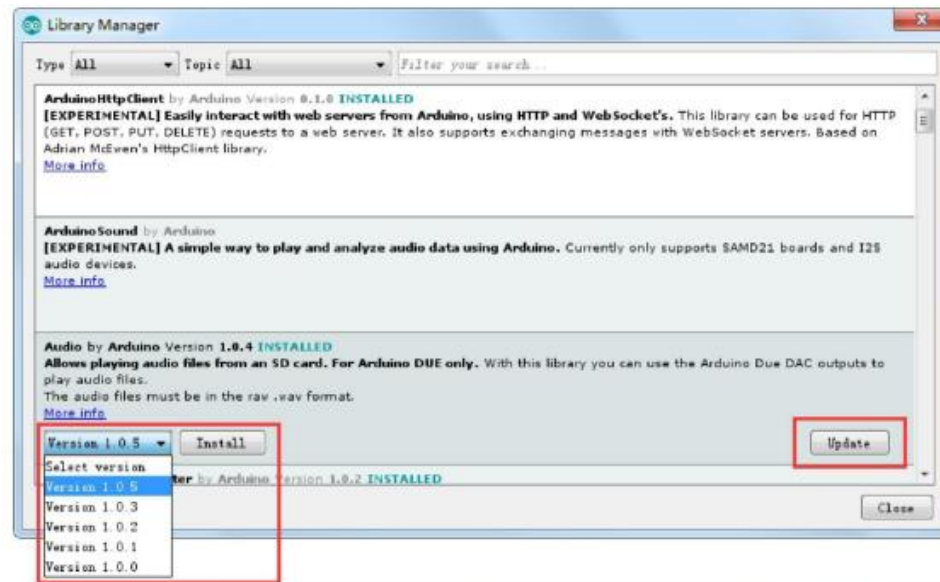
To install a new library into your Arduino IDE you can use the Library Manager (available from IDE version 1.8.0). Open the IDE and click to the "Sketch" menu and then Include Library > Manage Libraries.



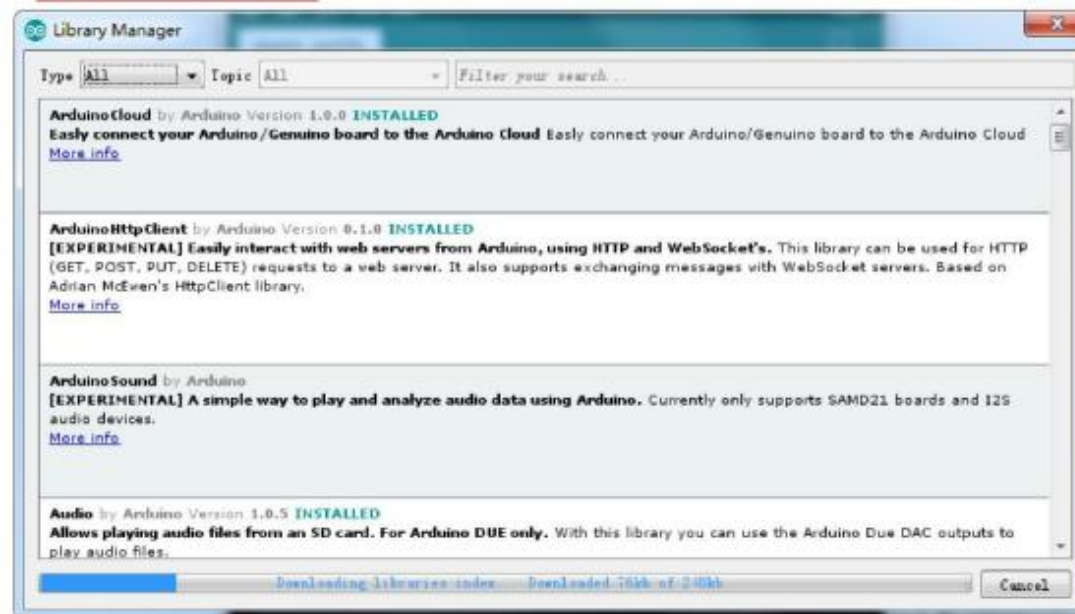
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Then the library manager will open and you will find a list of libraries that are already installed or ready for installation. In this example we will install the Bridge library. Scroll the list to find it, then select the version of the library you 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.



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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.

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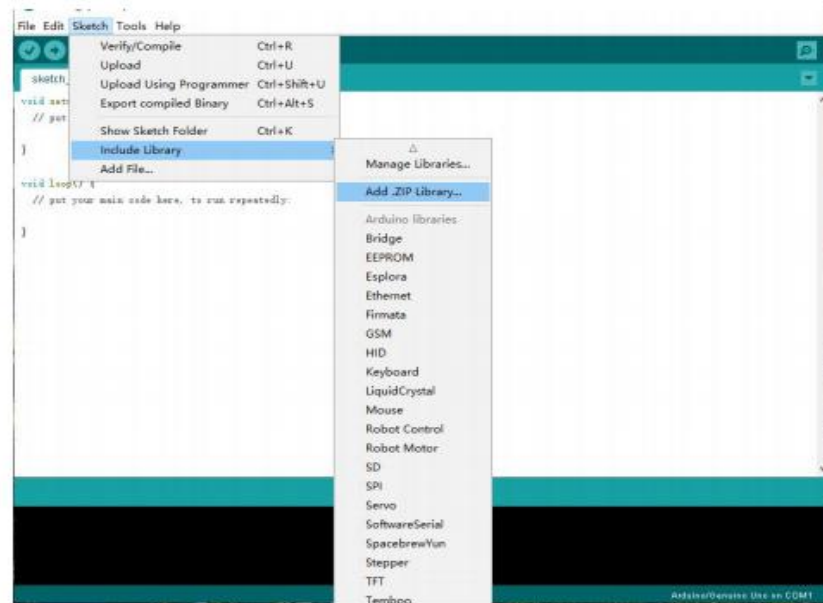


You can now find the new library available in the Include Library menu. If you want to add your own library open a new issue on [Github](#).

Importing a .zip Library

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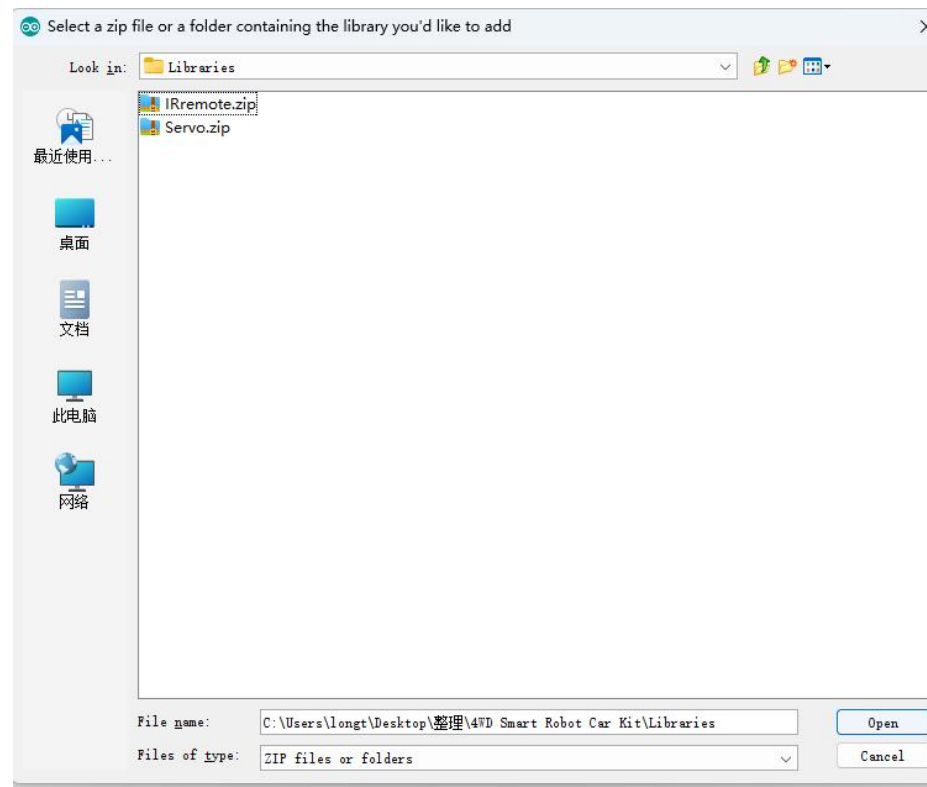
Libraries are often distributed as a ZIP file or folder. The name of the folder is the name of the library. Inside the folder will be a .cpp file, a .h file and often a keywords.txt file, examples folder, and other files required by the library. Starting with version 1.0.5, you can install 3rd party 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".



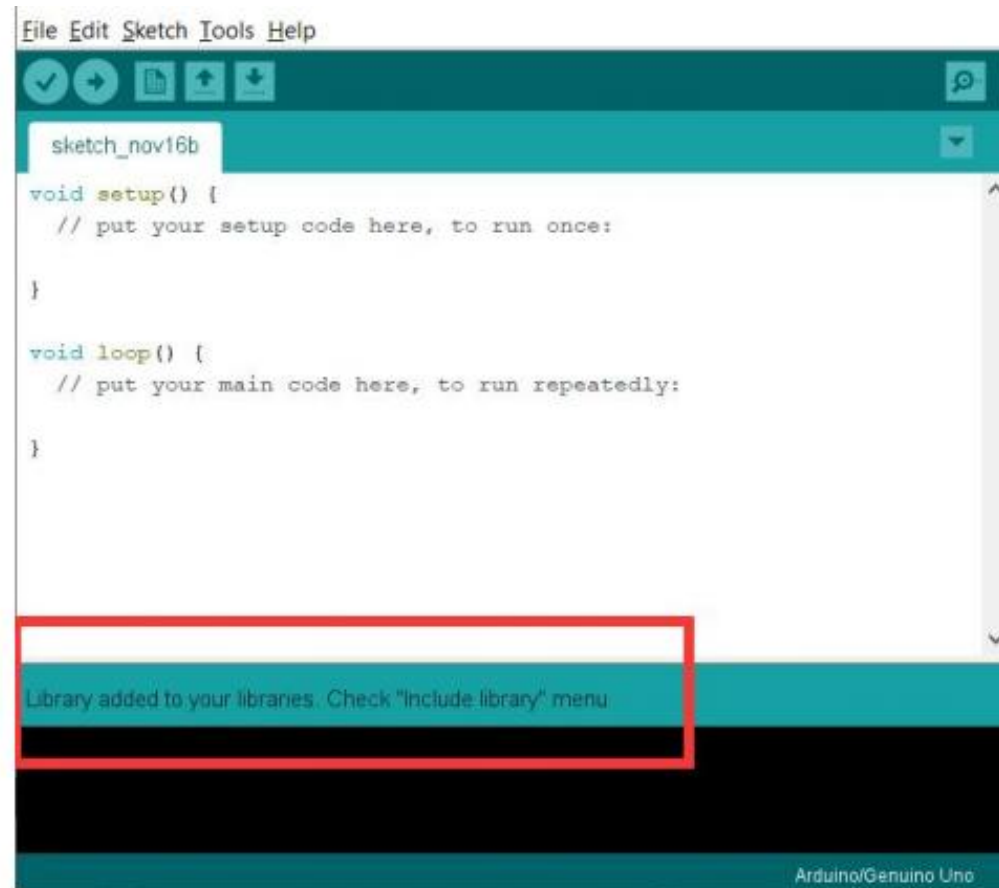
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You will be prompted to select the library you would like to add.

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



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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:

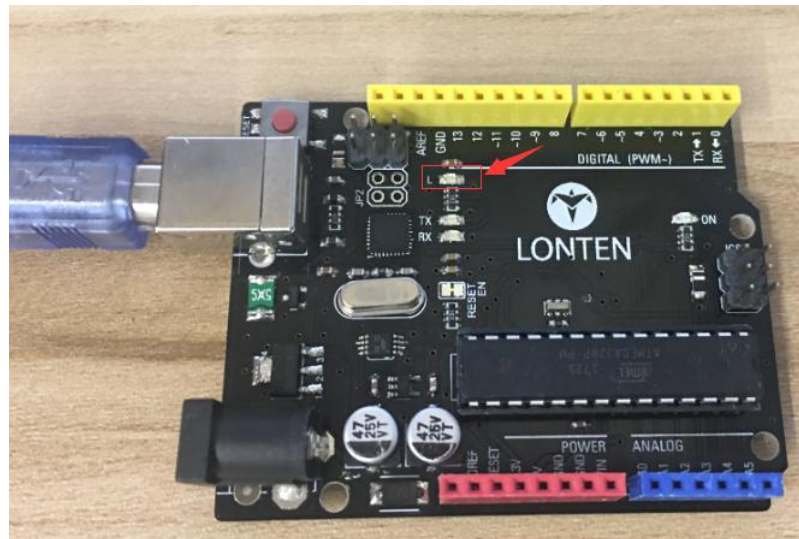
LONTEN Uno R3 Board* 1

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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.





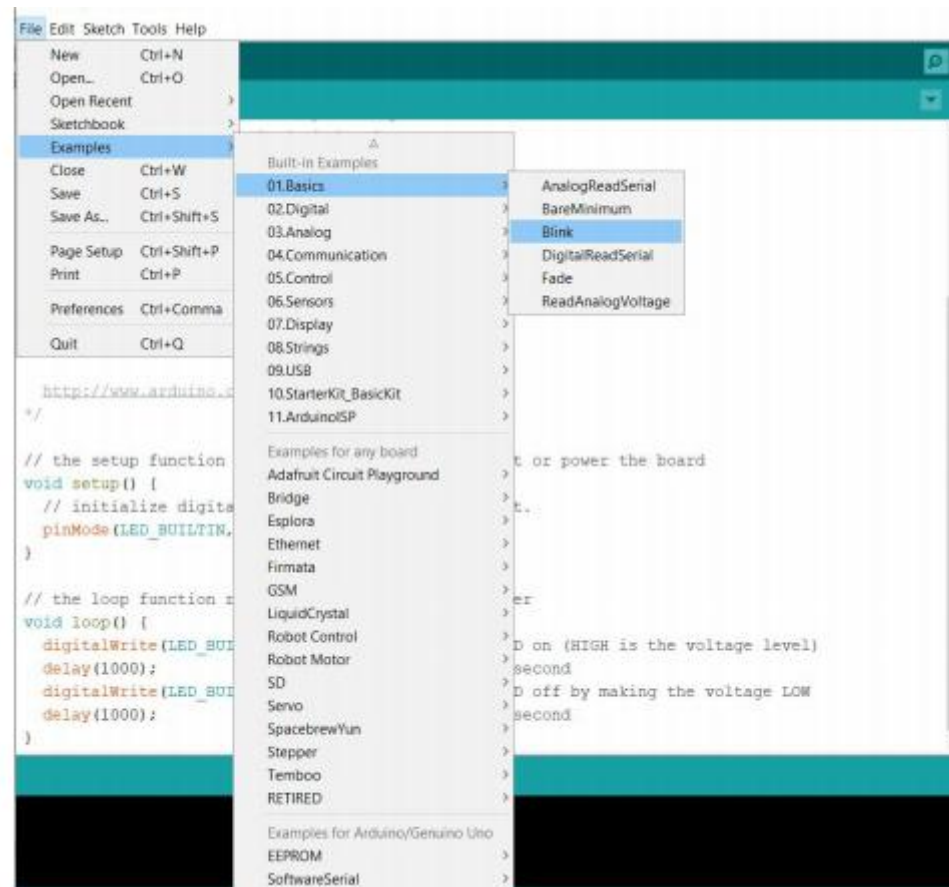
In this Project, we will reprogram the UNO board with our own Blink sketch and then change the rate at which it blinks.

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

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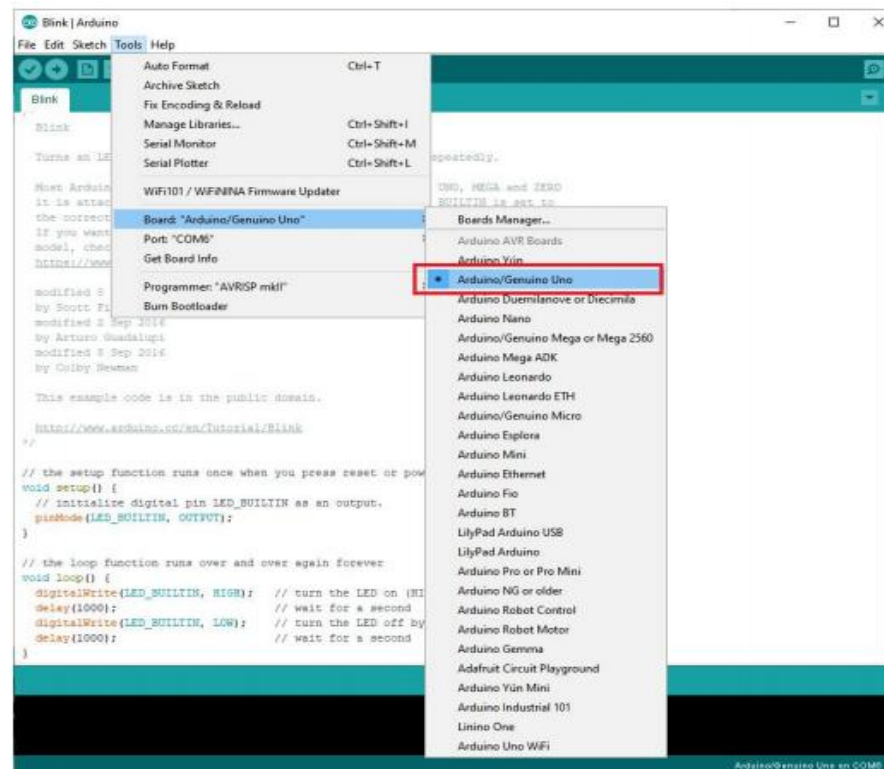
When the sketch window opens, enlarge it so that you can see the entire sketch in the window.

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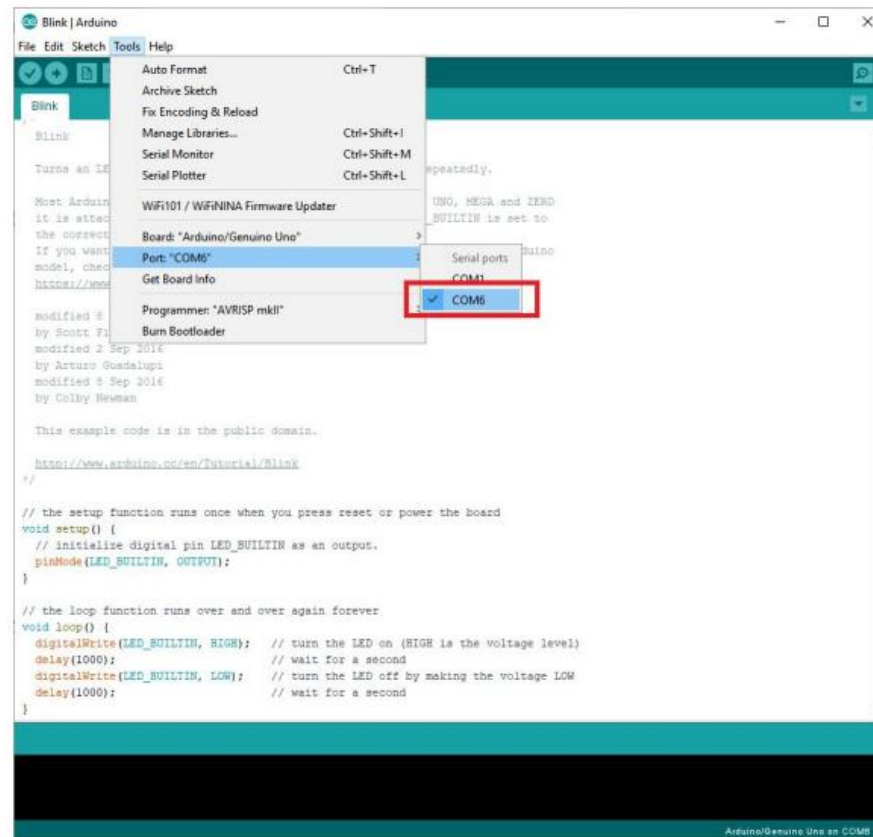
```
File Edit Sketch Tools Help
[Icons] [Serial Monitor Icon]
Blink [Close Icon]
22
23
24 // the setup function runs once when you press reset or power the board
25 void setup() {
26   // initialize digital pin LED_BUILTIN as an output.
27   pinMode(LED_BUILTIN, OUTPUT);
28 }
29
30 // the loop function 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 }
[Serial Monitor Area]
23 Arduino Uno on COM3
```

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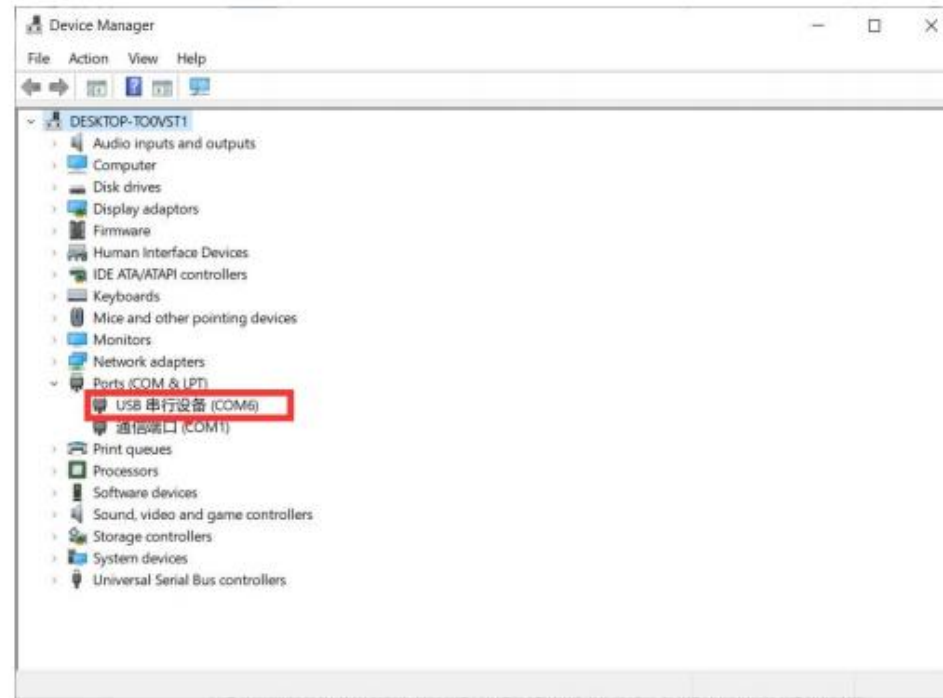
Attach your Arduino board to your computer with the USB cable and check that the 'Board Type' and 'Serial Port' are set correctly.



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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



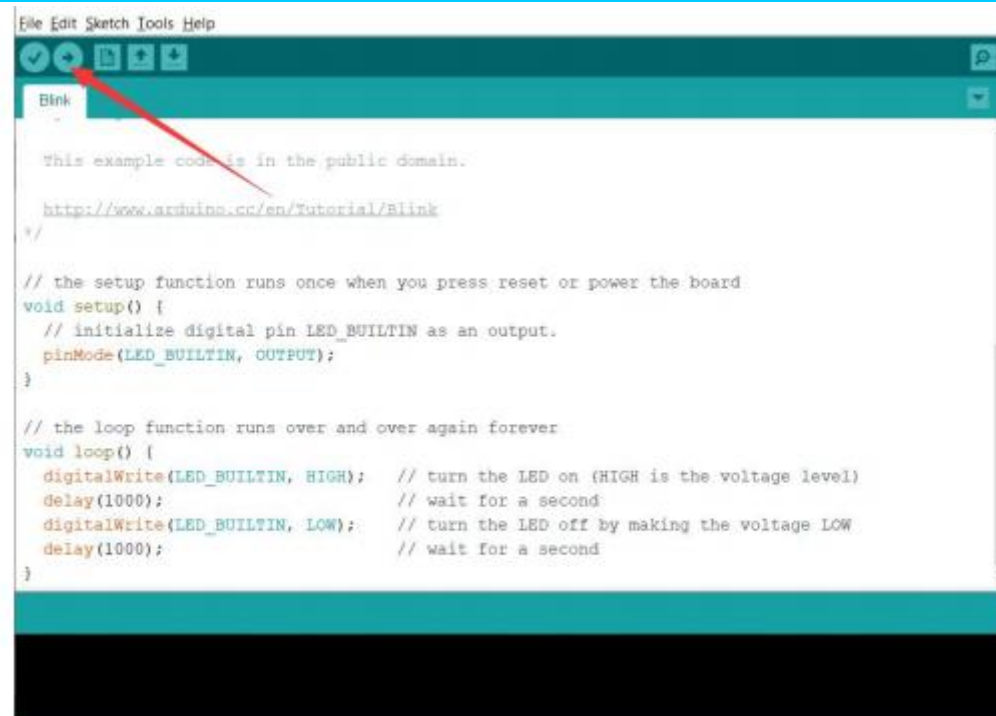
the Serial Port displayed for everyone is different, despite COM 6 chosen here, it could be COM3 or COM4 on your computer. A right COM port is supposed to be COMX (arduino XXX), which is by the certification criteria.

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.

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```
File Edit Sketch Tools Help

Blink

This example code is in the public domain.

http://www.arduino.cc/en/Tutorial/Blink

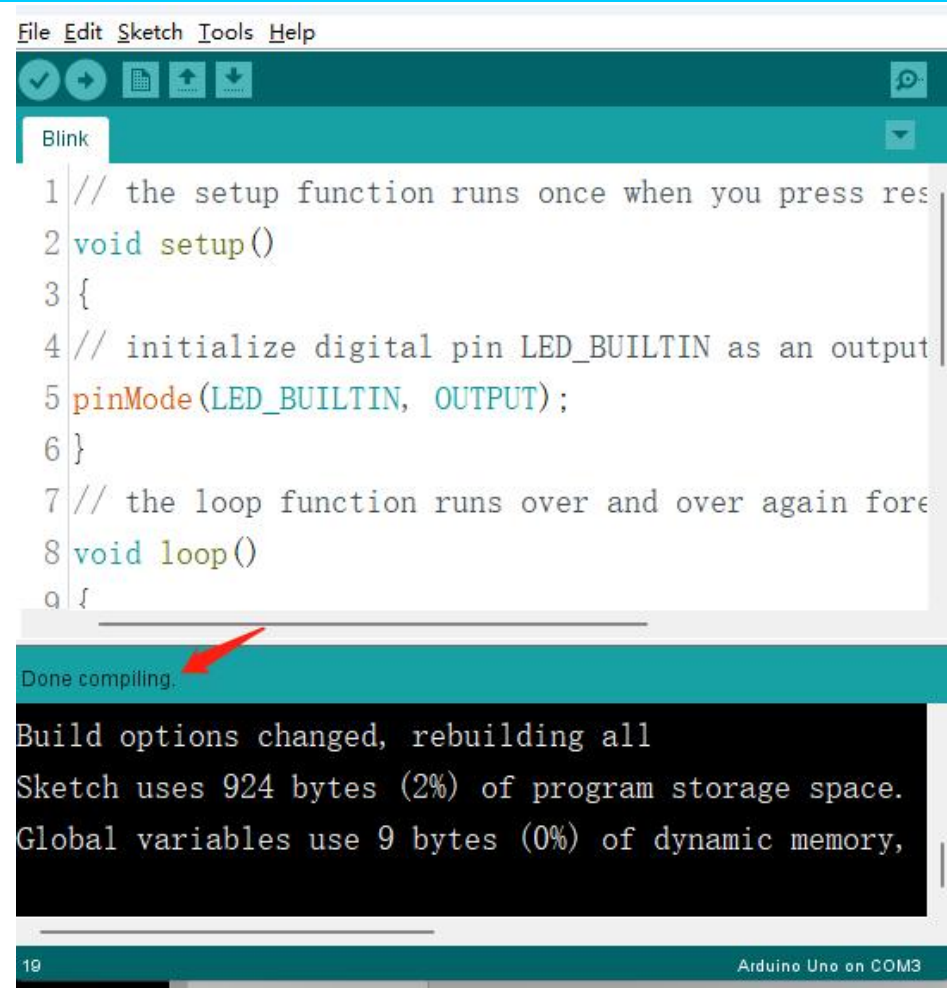
*/

// 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
}
```

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

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The screenshot shows the Arduino IDE interface. The menu bar includes File, Edit, Sketch, Tools, and Help. Below the menu bar is a toolbar with icons for saving, undo, redo, and uploading. The sketch name 'Blink' is displayed in the top left corner. The code editor contains the following code:

```
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()
9 {
```

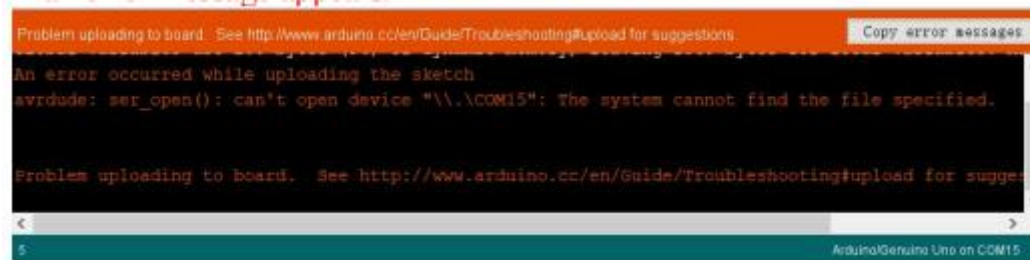
Below the code editor, a status bar indicates 'Done compiling.' with a red arrow pointing to it. Below the status bar, a black box displays the following text:

```
Build options changed, rebuilding all
Sketch uses 924 bytes (2%) of program storage space.
Global variables use 9 bytes (0%) of dynamic memory,
```

The bottom status bar shows '19' on the left and 'Arduino Uno on COM3' on the right.

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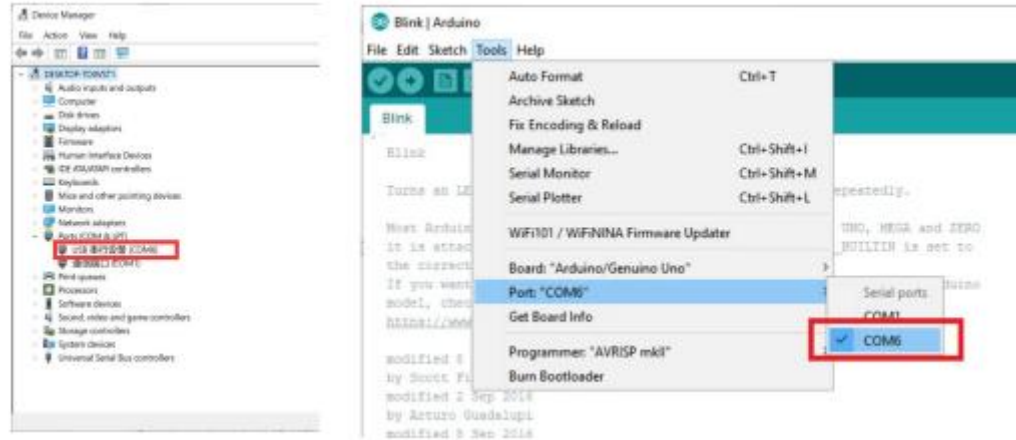
If an error message appears.



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.

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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.

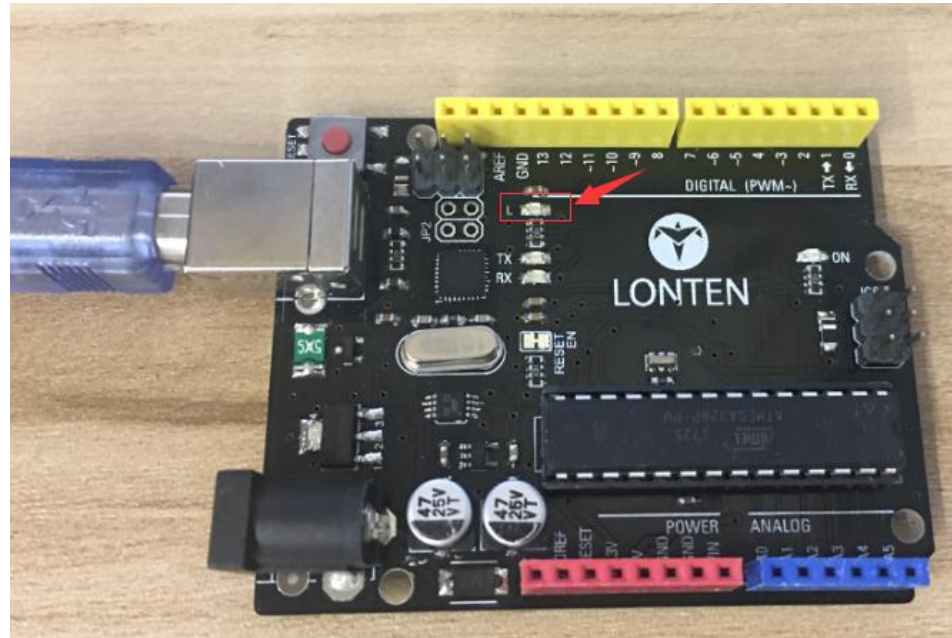


Test Code

```
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
}
```

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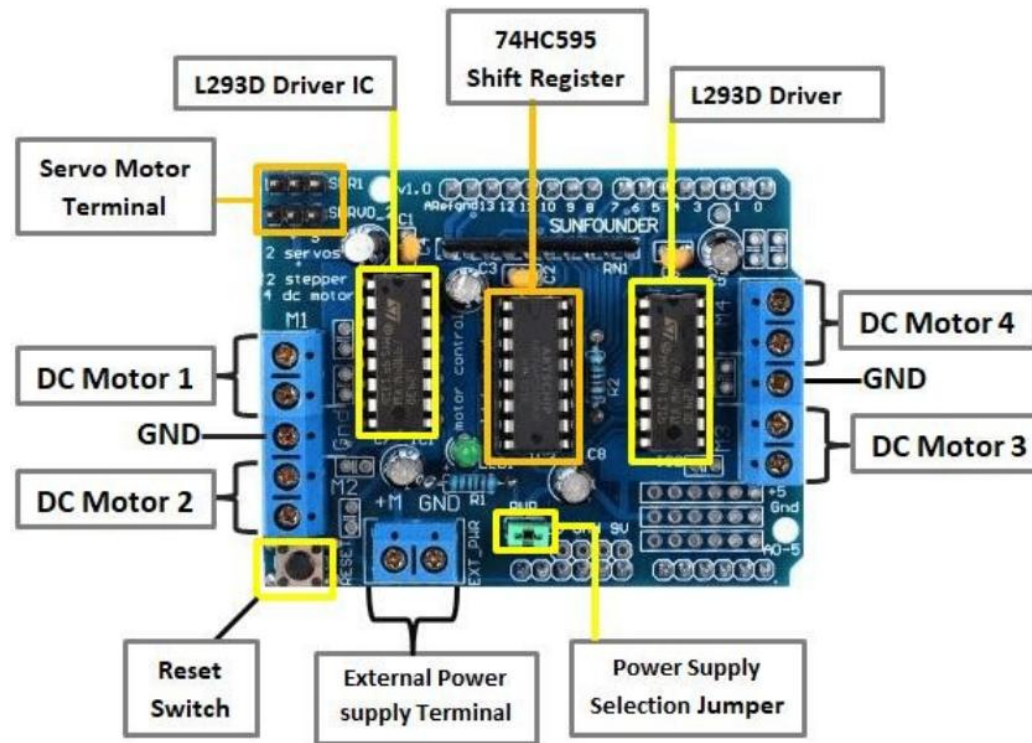


After the code is successfully uploaded, the "L" character LED will flash once per second. So far, you have completed the testing process of your first program.

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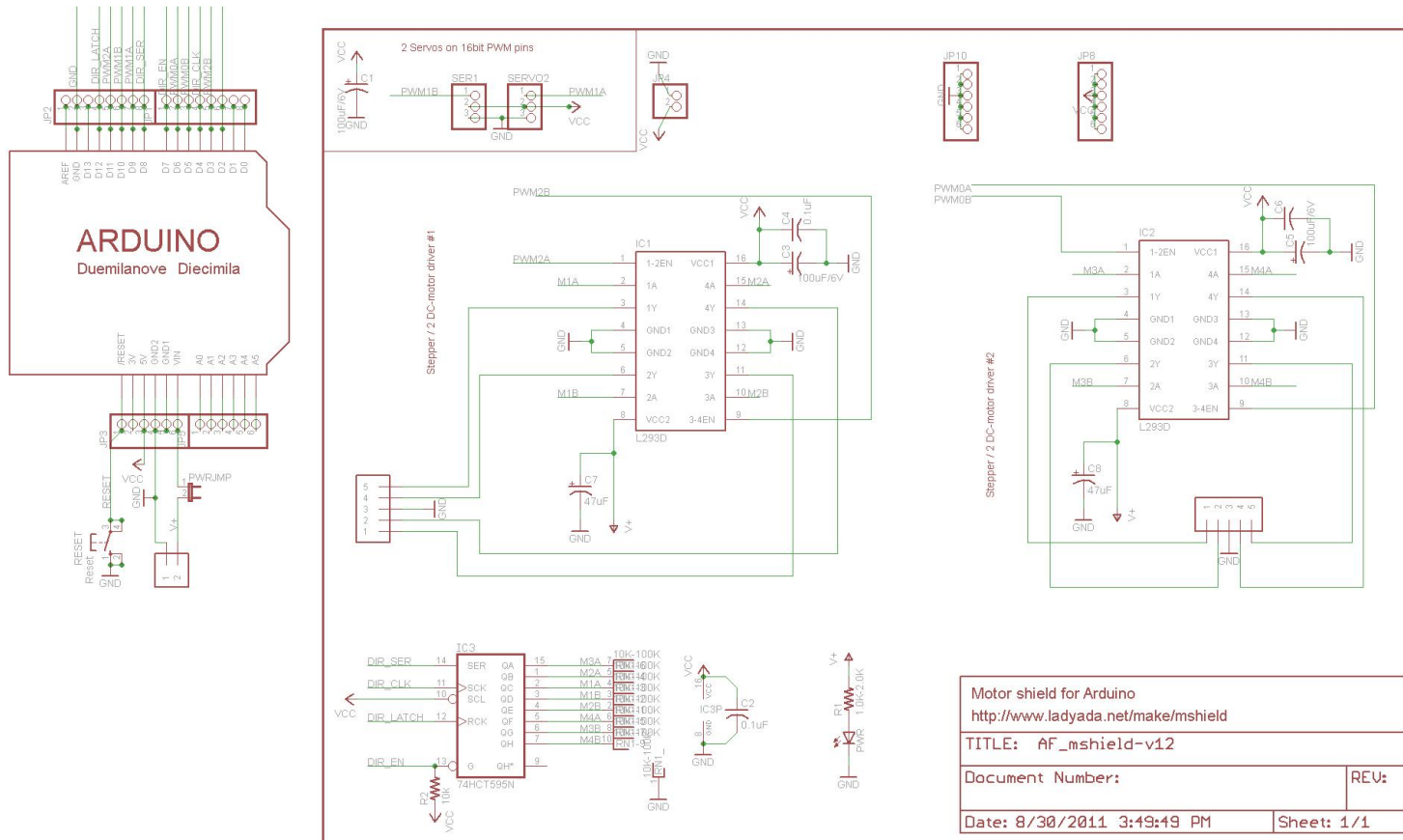
Introduction L293D

L293D Pinout



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L293D Motor Control Shield Schematic diagram



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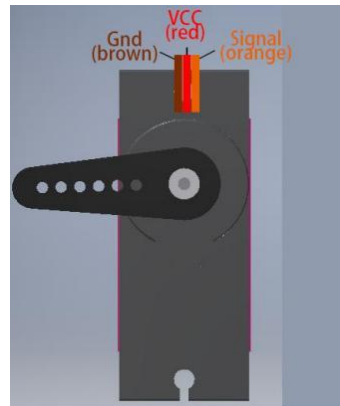
Lesson 1 Servo

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 10.

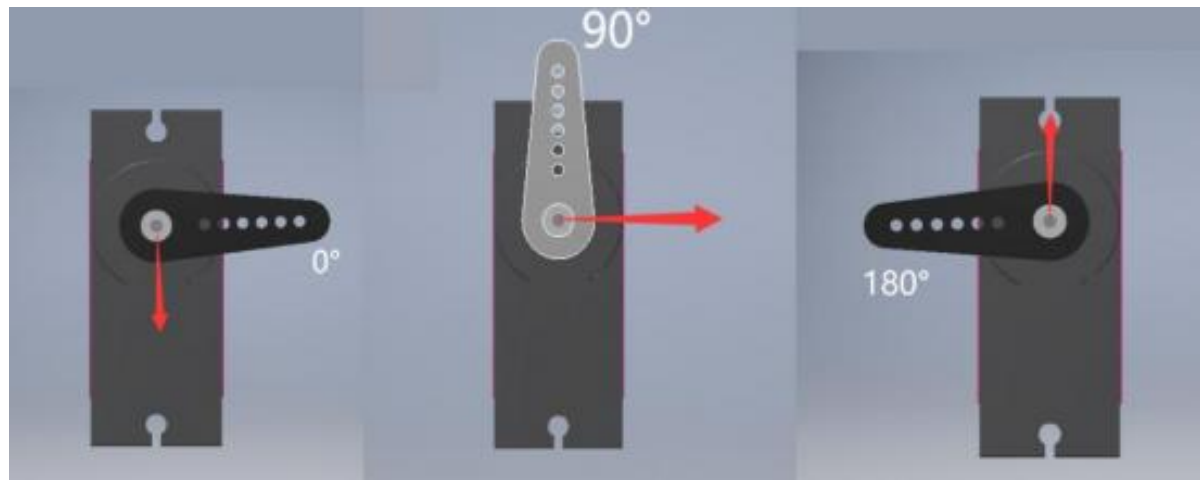


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Introduction

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!



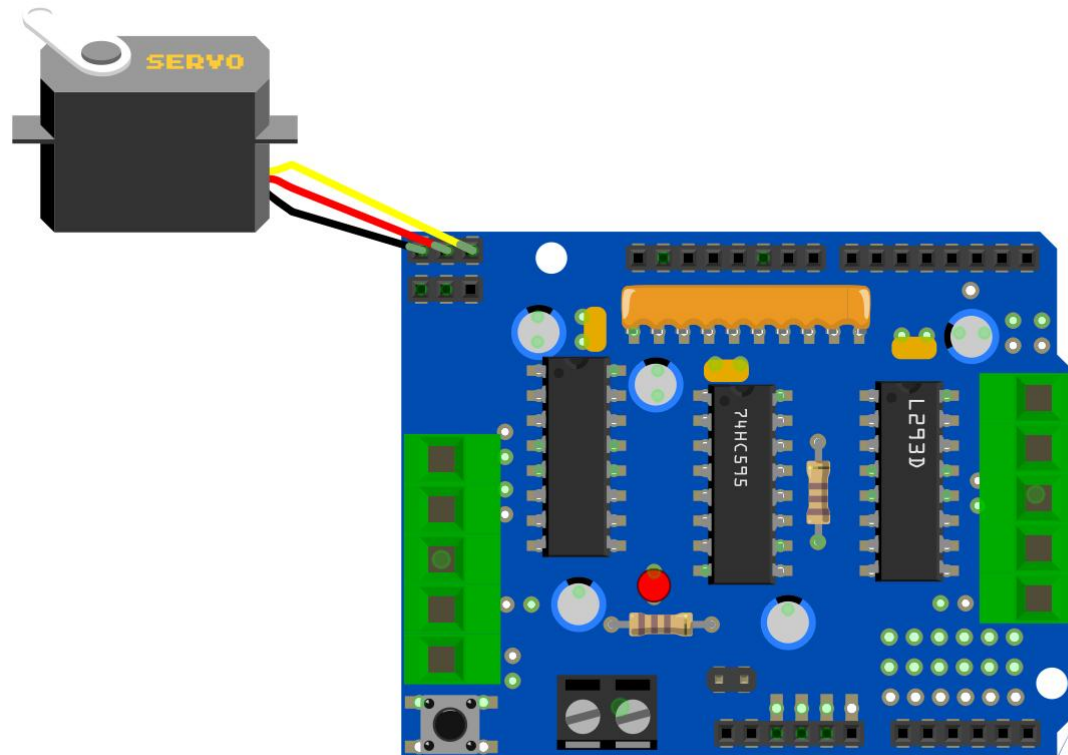
Servo motors were first used in the Remote Control (RC) world, usually to control the steering of RC cars or the flaps on a RC plane. With time, they found their uses in robotics, automation, and of course, the Arduino world.



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.

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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

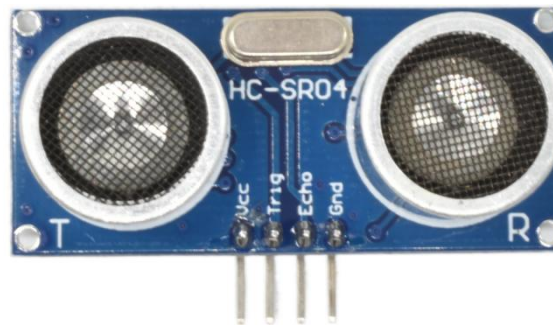
About this lesson:

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

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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

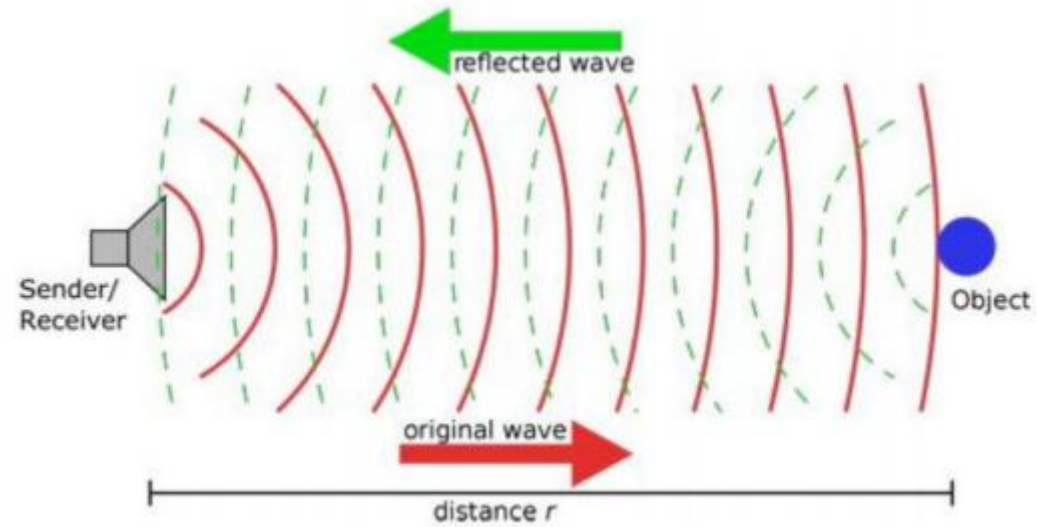
(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

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

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

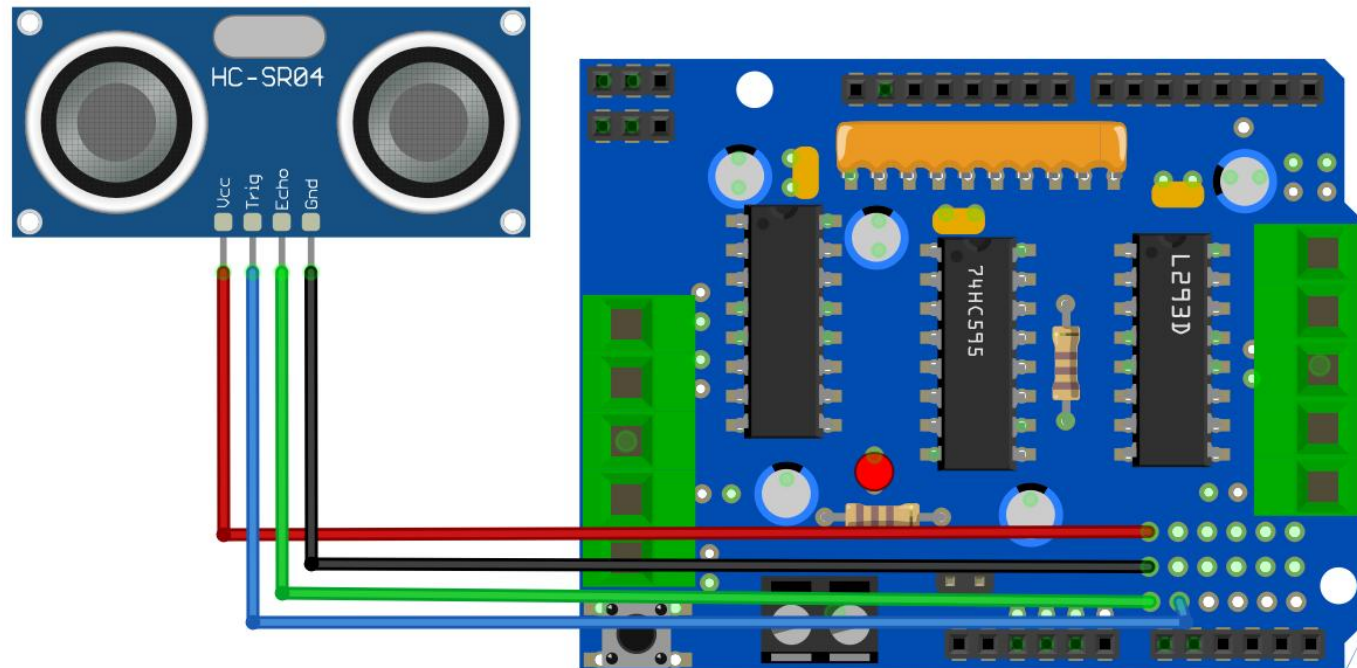
The Timing diagram is shown below. You only need to supply a short 10us pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: $\text{us} / 58 = \text{centimeters}$ or $\text{us} / 148 = \text{inch}$; 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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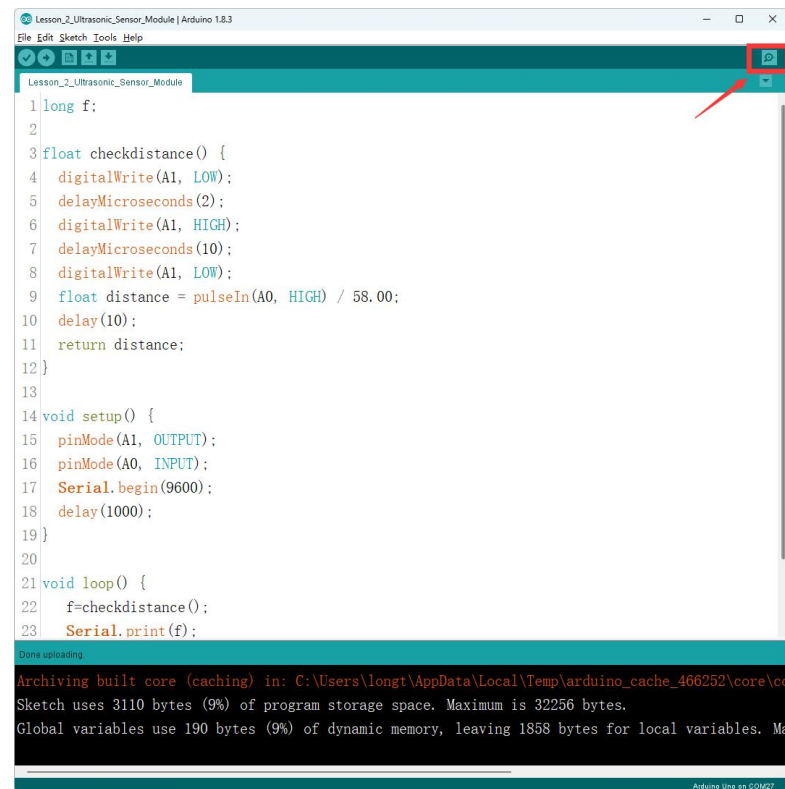
Wiring diagram



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Result

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



The screenshot shows the Arduino IDE interface. The main window displays a C++ code for an ultrasonic sensor module. The code includes a `checkdistance()` function that sends a square wave to the sensor and reads the distance using `pulseIn()`. The `setup()` function initializes the pins and the serial port. The `loop()` function calls `checkdistance()` and prints the result. A red box highlights the serial monitor icon in the top right corner, with a red arrow pointing to it. Below the code editor, a status bar shows the upload progress and memory usage.

```
1 long f;
2
3 float checkdistance() {
4   digitalWrite(A1, LOW);
5   delayMicroseconds(2);
6   digitalWrite(A1, HIGH);
7   delayMicroseconds(10);
8   digitalWrite(A1, LOW);
9   float distance = pulseIn(A0, HIGH) / 58.00;
10  delay(10);
11  return distance;
12 }
13
14 void setup() {
15   pinMode(A1, OUTPUT);
16   pinMode(A0, INPUT);
17   Serial.begin(9600);
18   delay(1000);
19 }
20
21 void loop() {
22   f=checkdistance();
23   Serial.print(f);
```

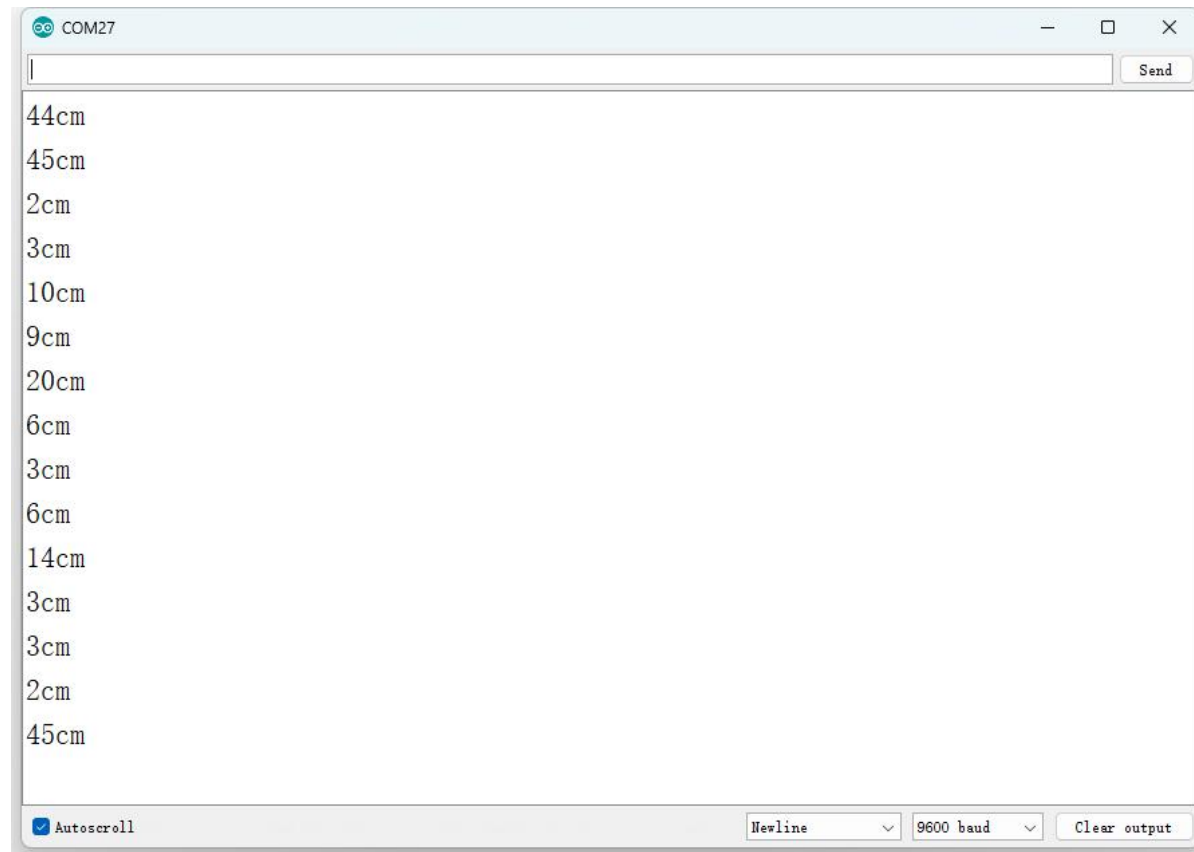
Done uploading.

Archiving built core (caching) in: C:\Users\longt\AppData\Local\Temp\arduino_cache_466252\core\co
Sketch uses 3110 bytes (9%) of program storage space. Maximum is 32256 bytes.
Global variables use 190 bytes (9%) of dynamic memory, leaving 1858 bytes for local variables. Ma

Arduino Uno on COM27

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Then you can see the data as blow:





Lesson 3 L293D Motor Driver

About this lesson:

In this lesson, you will learn how to use a L293D Motor Driver module.

Component Introduction

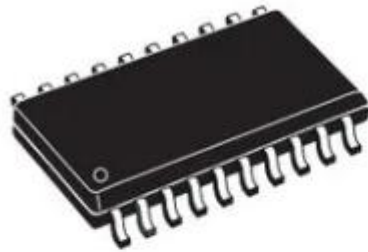
L293D is a high voltage, low current motor driver chip produced by ST company, designed to provide up to 600 mA bidirectional driving current at voltages ranging from 4.5 V to 36 V. It can be used to drive inductive loads, such as relays, solenoids, DC and bipolar stepper motors, as well as other high current/high voltage loads in positive power applications.

Each output is a complete totem pole driver circuit with a Darlington transistor sink and a pseudo Darlington source.

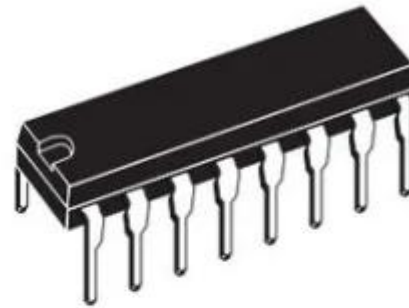
Drivers are enabled in pairs, drivers 1 and 2 are enabled by 1,2EN, and drivers 3 and 4 are enabled by 3,4EN.

The working temperature range of L293D is from 0 ° C to 70 ° C.

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SO(12+4+4)



Powerdip (12+2+2)

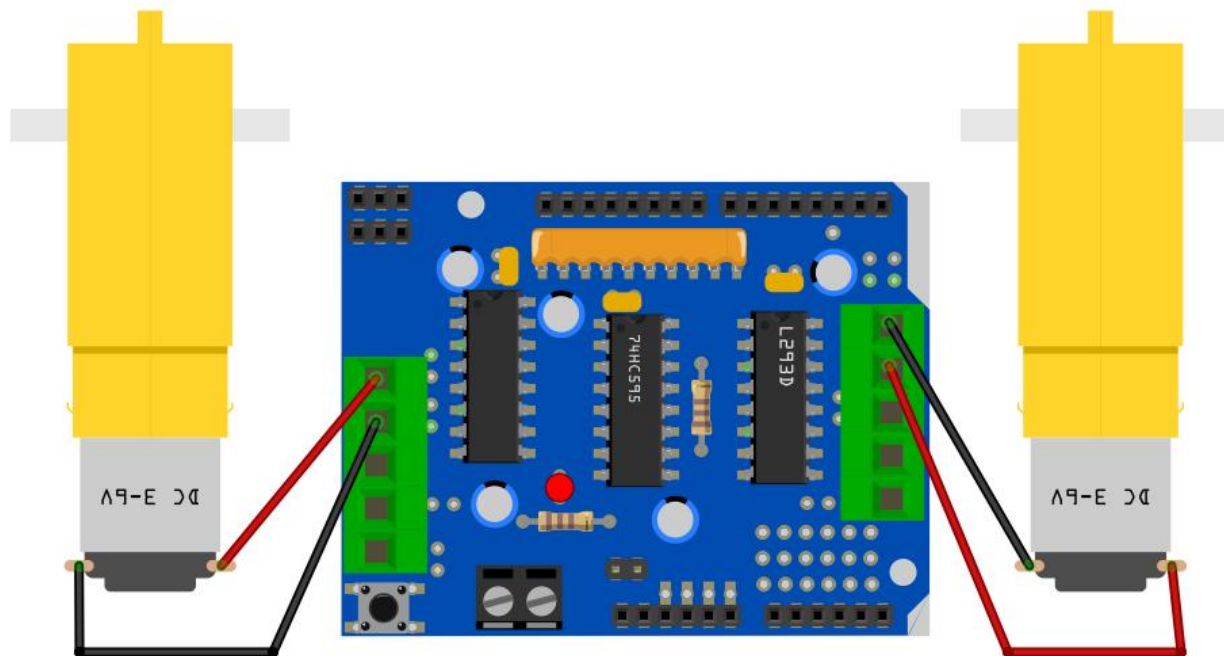
ORDERING NUMBERS:

L293DD

L293D

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Wiring diagram





Attention

After wiring, please open the program in the code folder- Lesson_3_L293D_Motor_Driver and click UPLOAD to upload the program. Before you can run this, make sure that you have installed the < AFMotor> library or re-install it, if necessary. Otherwise, your code won't work.

If your car is in the opposite direction, just swap the positive and negative poles of the motor.

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.



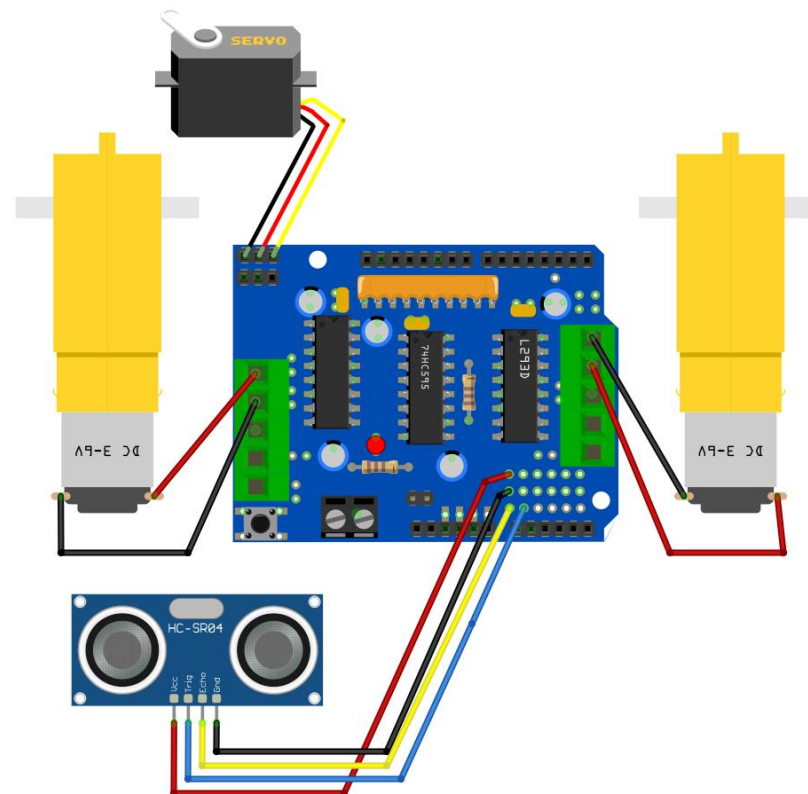
Lesson 4 Ultrasound Obstacle Avoidance Car

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.

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Wiring diagram





Attention

After connecting, please open the the program and load up the code - Lesson_4_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.



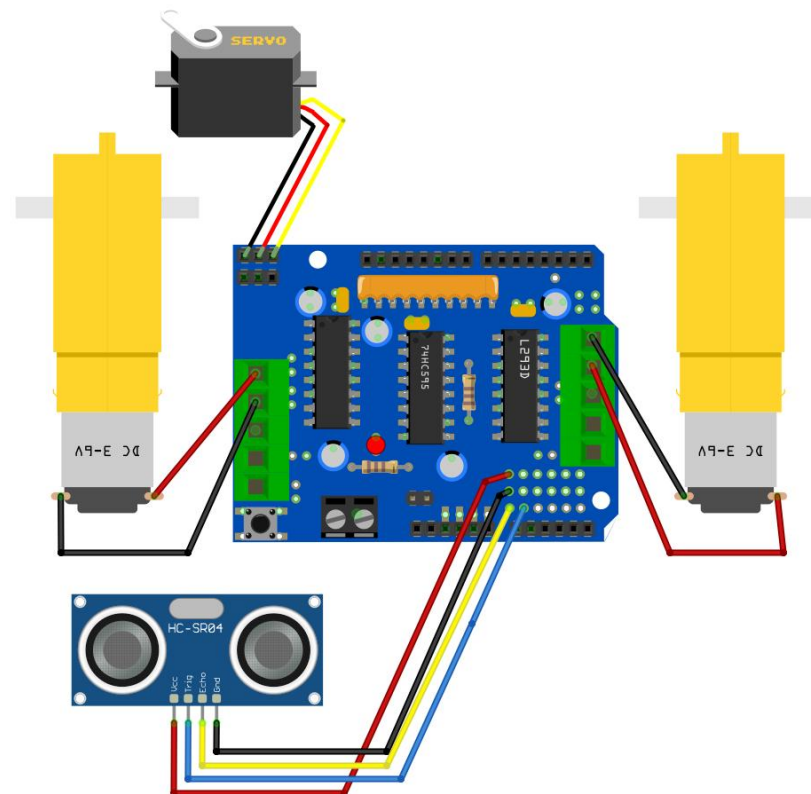
Lesson 5 Follow Car

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.

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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.

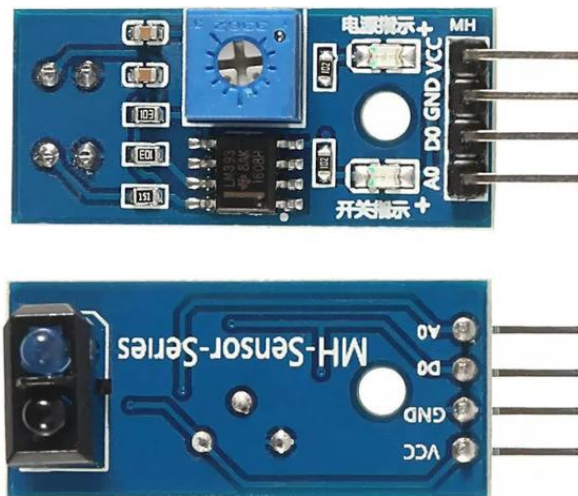
When the robot is less than 10 cm away from your hand, he will stop. Move your hand straight forward. When the robot is more than 20cm away from your hand, the robot will approach your hand.

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Lesson 6 Line-Tracking sensor

About this lesson:

In this lesson, you will learn how to use the Tracking Sensor. we will use an TCRT5000 infrared reflection sensor and an LED attached to pin of the Arduino Uno board to build a simple circuit to make a tracking light.



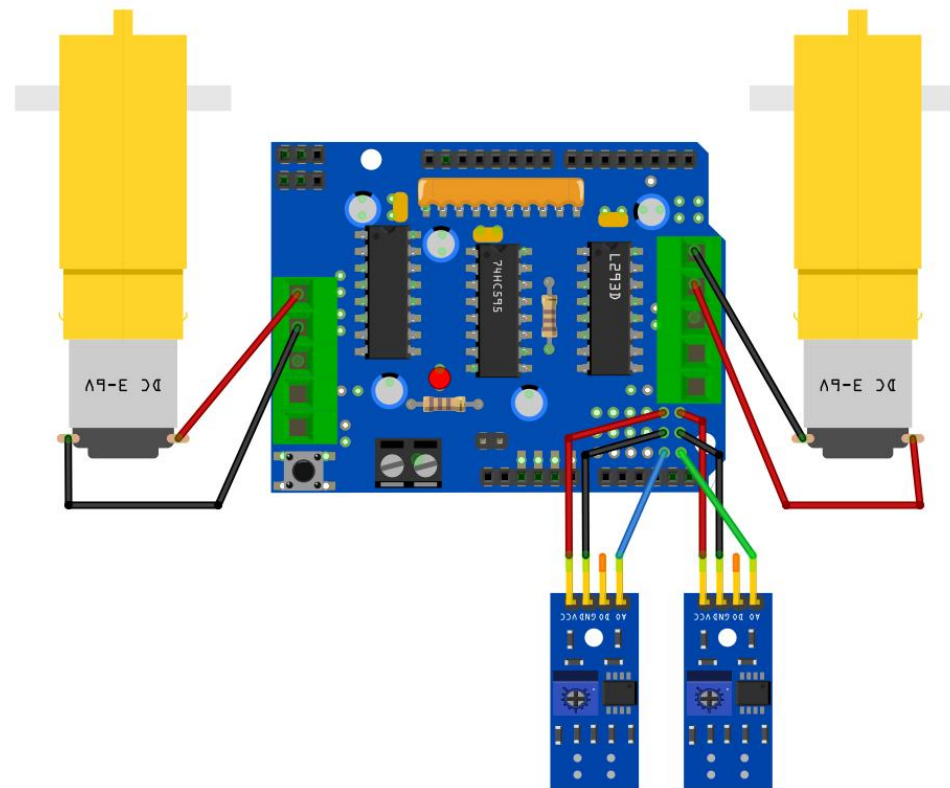


Component Introduction

The infrared emitting diode of the TCRT5000 sensor continuously emits infrared radiation. When the emitted infrared radiation is not reflected back or is not strong enough (indicating that the diode is always off), the photosensitive transistor is always in the off state, and the module outputs a high level; When the detected object appears within the detection range (indicating that the diode is lit up), the infrared is reflected back with sufficient intensity, and the photosensitive transistor is saturated. At this time, the module outputs a low level.

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Wiring diagram





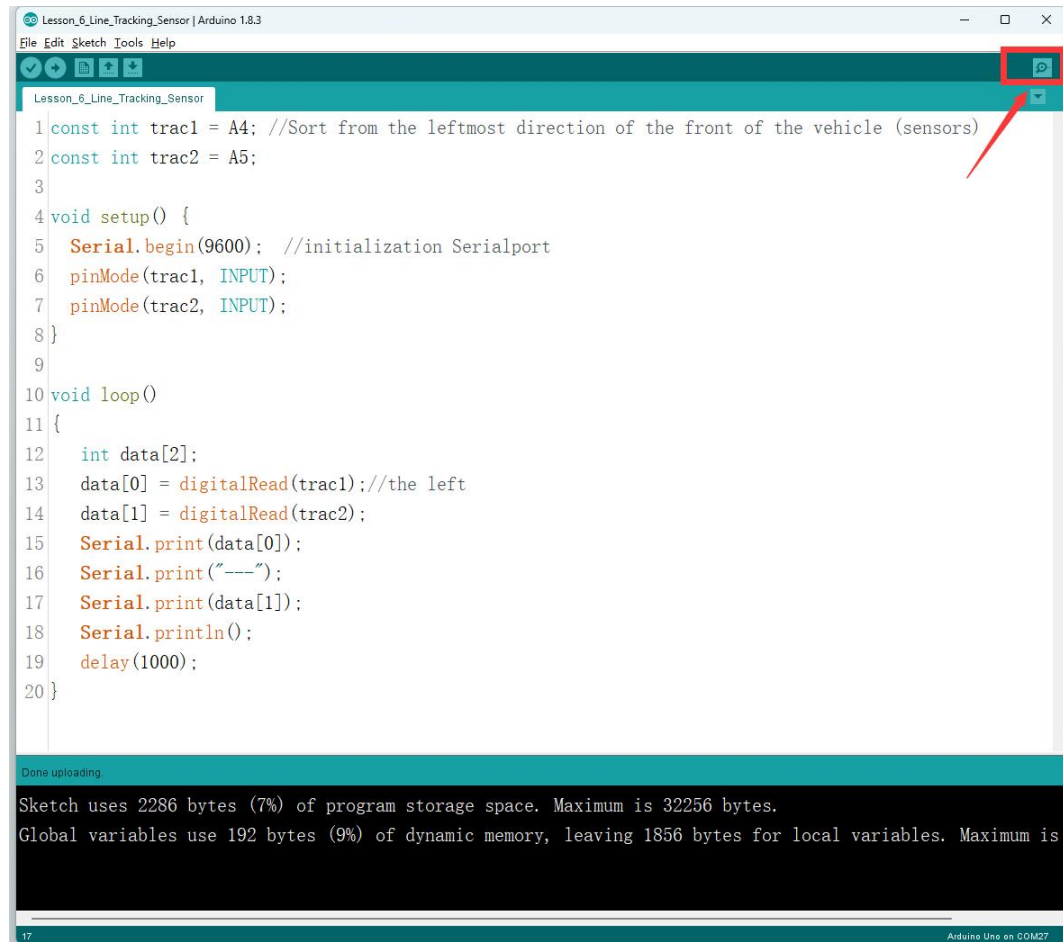
Attention

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.

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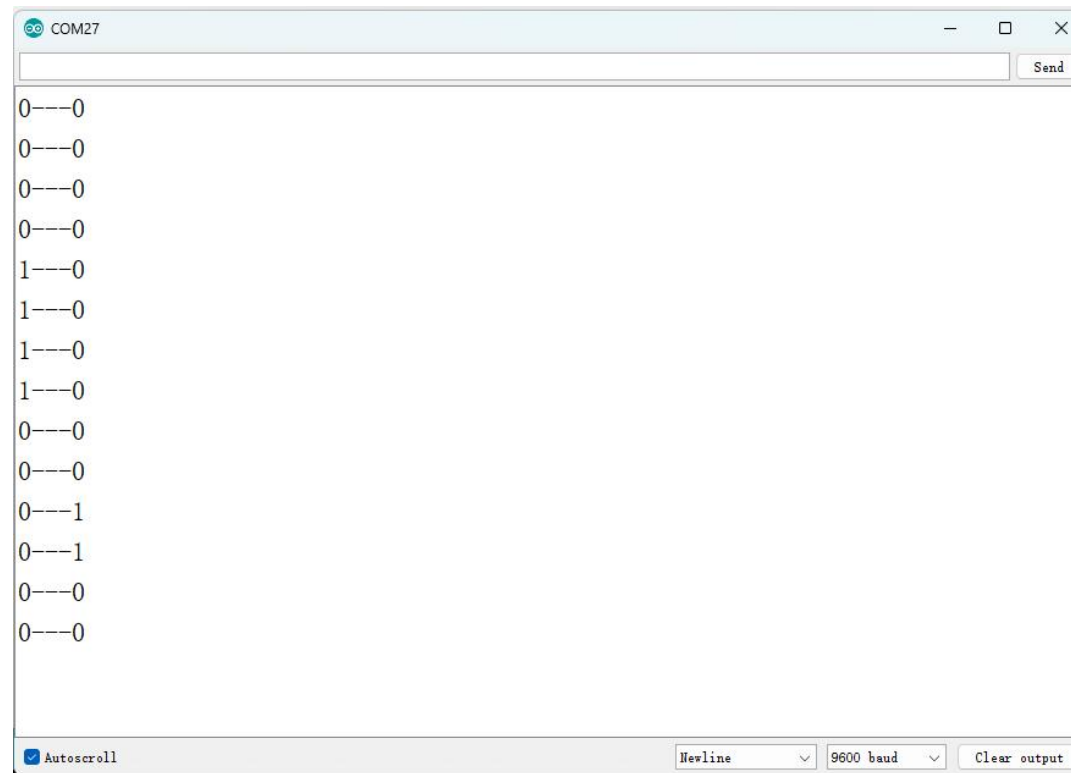
```
Lesson_6_Line_Tracking_Sensor | Arduino 1.8.3
File Edit Sketch Tools Help
Lesson_6_Line_Tracking_Sensor
1 const int trac1 = A4; //Sort from the leftmost direction of the front of the vehicle (sensors)
2 const int trac2 = A5;
3
4 void setup() {
5   Serial.begin(9600); //initialization Serialport
6   pinMode(trac1, INPUT);
7   pinMode(trac2, INPUT);
8 }
9
10 void loop()
11 {
12   int data[2];
13   data[0] = digitalRead(trac1); //the left
14   data[1] = digitalRead(trac2);
15   Serial.print(data[0]);
16   Serial.print("----");
17   Serial.print(data[1]);
18   Serial.println();
19   delay(1000);
20 }

Done uploading.
Sketch uses 2286 bytes (7%) of program storage space. Maximum is 32256 bytes.
Global variables use 192 bytes (9%) of dynamic memory, leaving 1856 bytes for local variables. Maximum is

17 Arduino Uno on COM27
```


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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.





Lesson 7 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:

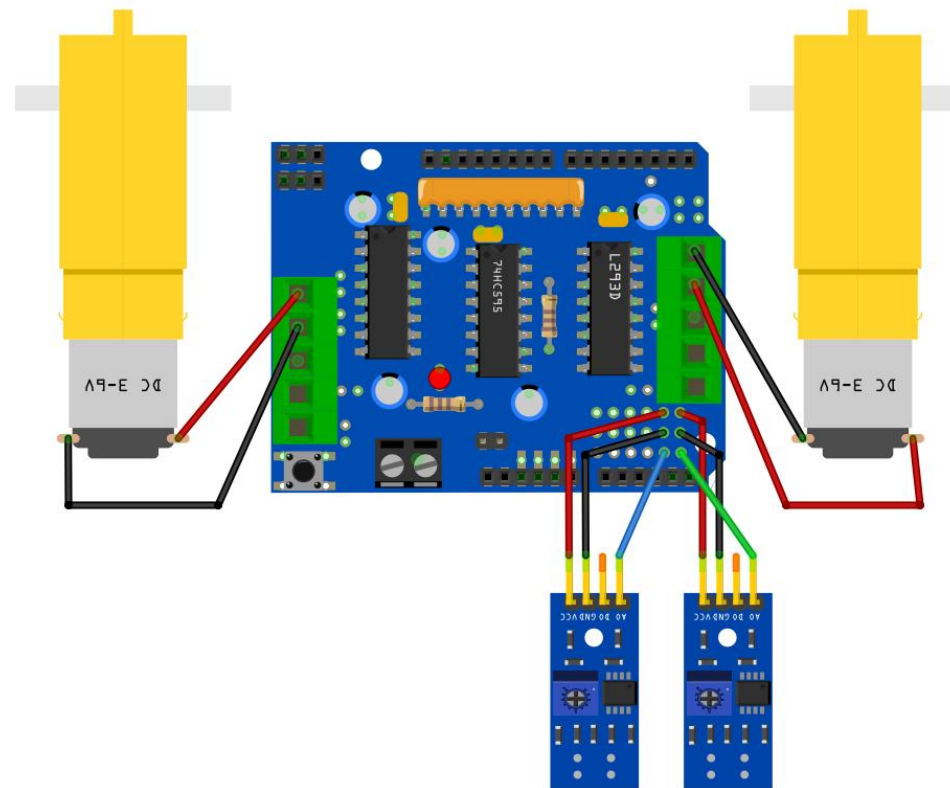
If adjusted well the sensibility of the tracking sensor

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.

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Wiring diagram





Result

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