

# Lesson 2 Building the Arduino Development Environment

## 2.1 Arduino Development Language

Arduino uses C/C++ to write programs, so before learning Arduino, you need to master the C/C++ language. Although C++ is compatible with the C language, these are two different languages. C is a process-oriented programming language, and C++ is an object-oriented programming language. The early Arduino core library was written in C language. Later, object-oriented ideas were introduced. At present, the latest Arduino core library is written in C and C++.

Generally speaking, the Arduino language refers to a collection of various Application Programming Interfaces (APIs) provided by the Arduino core library files. These APIs are formed by secondary packaging of the lower-level microcontroller support library. For example, the core library of Arduino using AVR microcontroller is the secondary packaging of AVR-Libc (GCC-based AVR support library).

In the traditional development method, multiple registers need to be configured to achieve the corresponding functions. In Arduino, the complicated registers are encapsulated into simple APIs, which can be intuitively controlled, enhancing the readability of the program and improving the development efficiency.

## 2.2 Arduino Development Language

The Arduino program structure is different from the traditional C/C++ program structure-there is no main() function in the Arduino program. In fact, it is not that there is no main() function in the Arduino program, but that the definition of the main() function is hidden in the core library file of the Arduino. In the development of Arduino, the main function is not directly operated, but the two functions of setup() and loop() are used instead.

## 2.3 Arduino Development Language

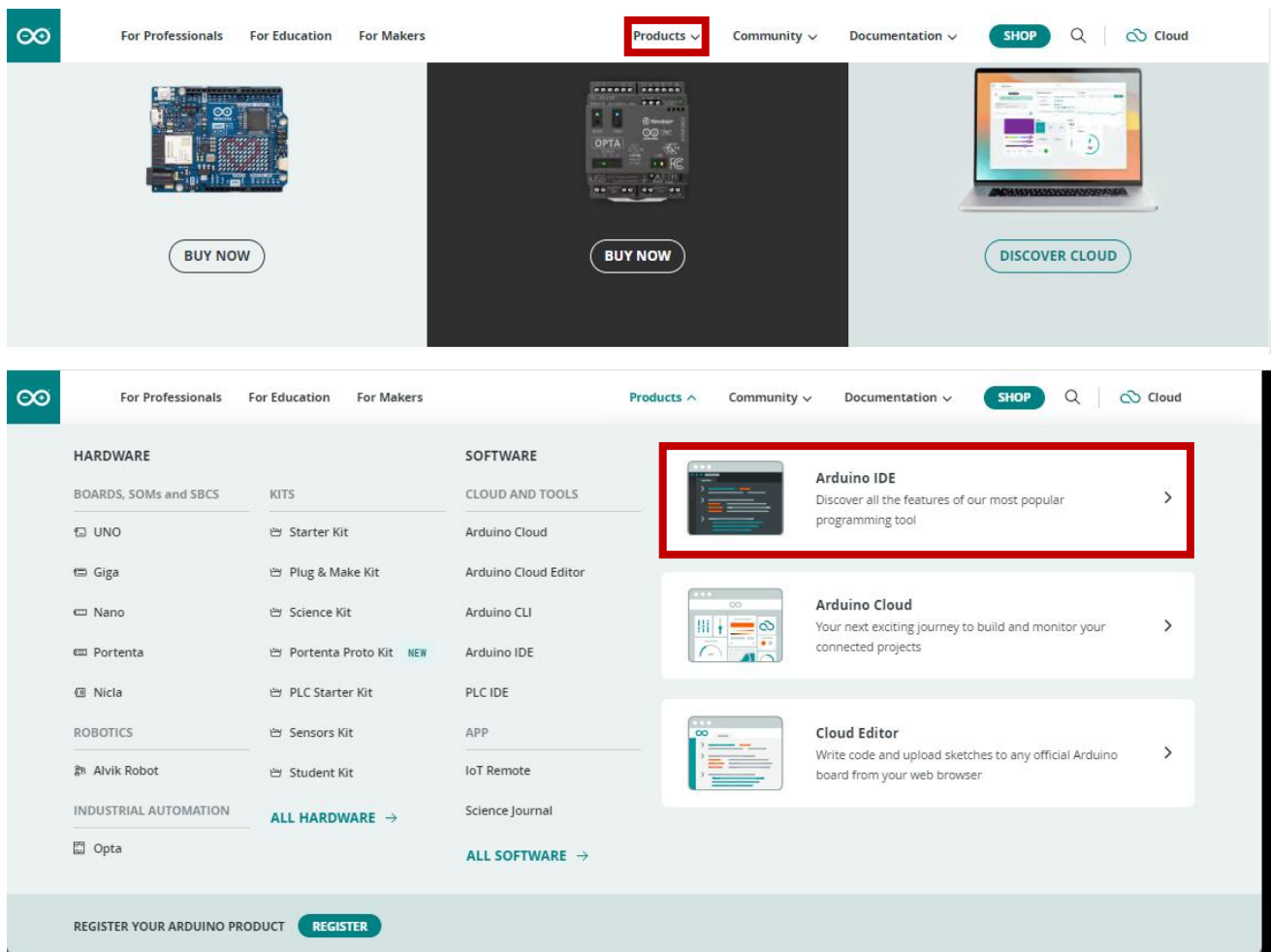
The IDE of the Arduino development environment can be downloaded from the official website. The download address of the Arduino IDE is:

## (1) Install Arduino IDE under Windows

We will teach you how to download and install:<https://www.arduino.cc/>

1. Open Google Chrome and enter the URL in the address bar: <https://www.arduino.cc/>

After successfully opening the interface shown in the figure below, we click on **Products**. Then select 'Arduino IDE'.



2. After jumping to the following interface, slide the mouse to the middle to find the part marked in the red circle. You can find that the official website provides us with installation files for Windows, Mac OS X, and Linux systems.


The screenshot shows the Arduino Cloud website. The top navigation bar includes links for Solutions, Products, Community, Documentation, a SHOP button, a search icon, and a Cloud icon. The main content area features a hero section for the Arduino Cloud Editor, a 'Downloads' section, and a 'Download Options' sidebar.

**Arduino Cloud Editor**

Experience the Arduino IDE online. Whether you're at home or on the go, code, upload and access your projects anytime from your browser **for free**.

[GO TO CLOUD EDITOR](#) [LEARN MORE](#)

## Downloads

 **Arduino IDE 2.3.6**

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, 10.15: "Catalina" or newer, 64 bits
- macOS** Apple Silicon, 11: "Big Sur" or newer, 64 bits

[Release Notes](#)

3. Select the appropriate Windows installation files to download for your computer. After the interface jumps, we select '**JUST DOWNLOAD**'. Then start downloading. The download status will be displayed in the bottom left corner of the Google Chrome browser. Then we wait for the download to complete.



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[Release Notes](#)

## Download Arduino IDE & support its progress

Since the 1.x release in March 2015, the Arduino IDE has been downloaded **95,650,605** times — impressive! Help its development with a donation.

CONTRIBUTE AND DOWNLOAD

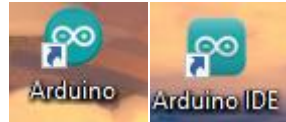
or

JUST DOWNLOAD

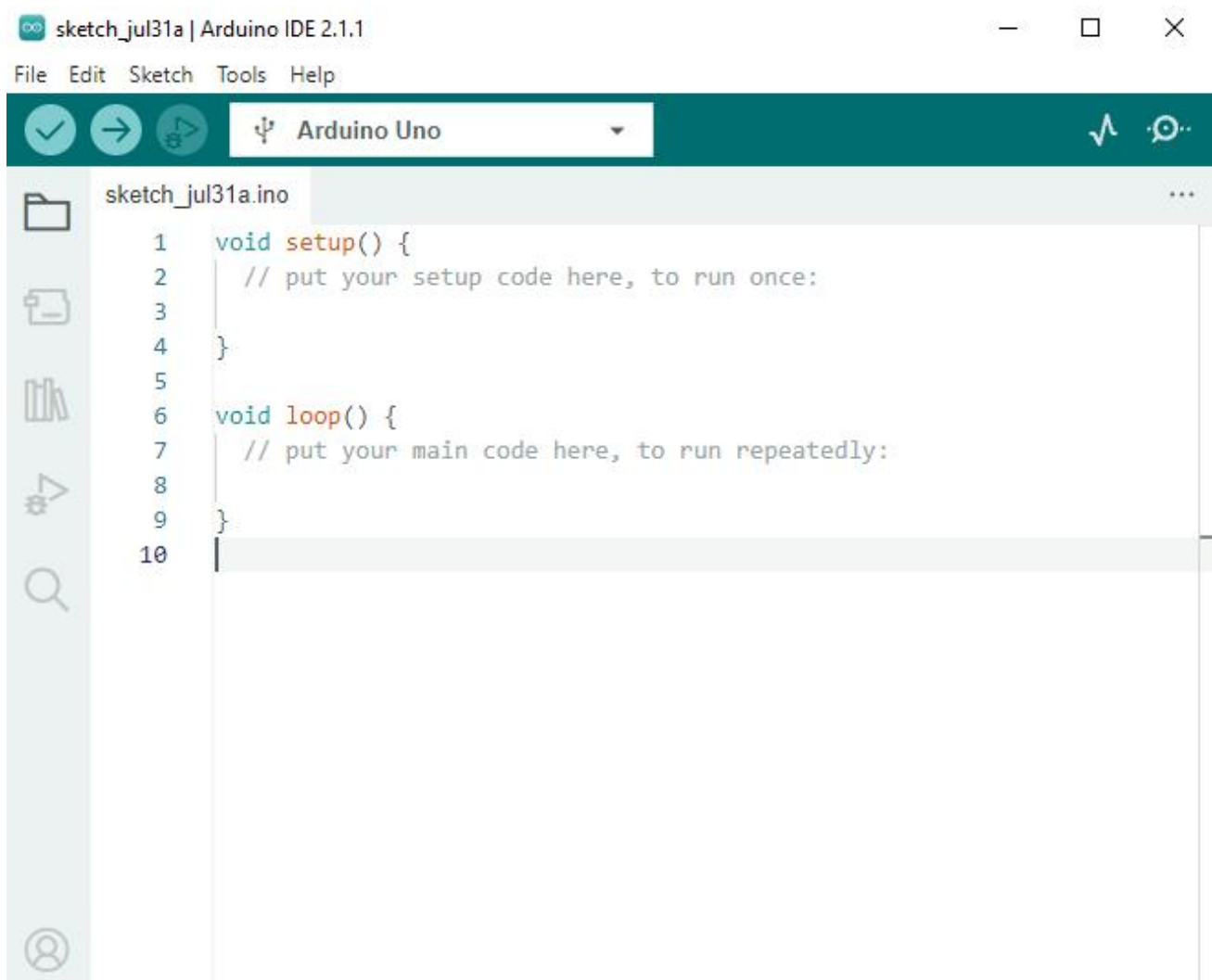


Learn more about [donating to Arduino](#).

4. After the download completes, run the installer. For Windows users, there may pop up an installation dialog during the installation. When it pops up, please allow the installation.
5. After installation is completed, an Arduino Software shortcut will be generated in the desktop. Run the Arduino software.

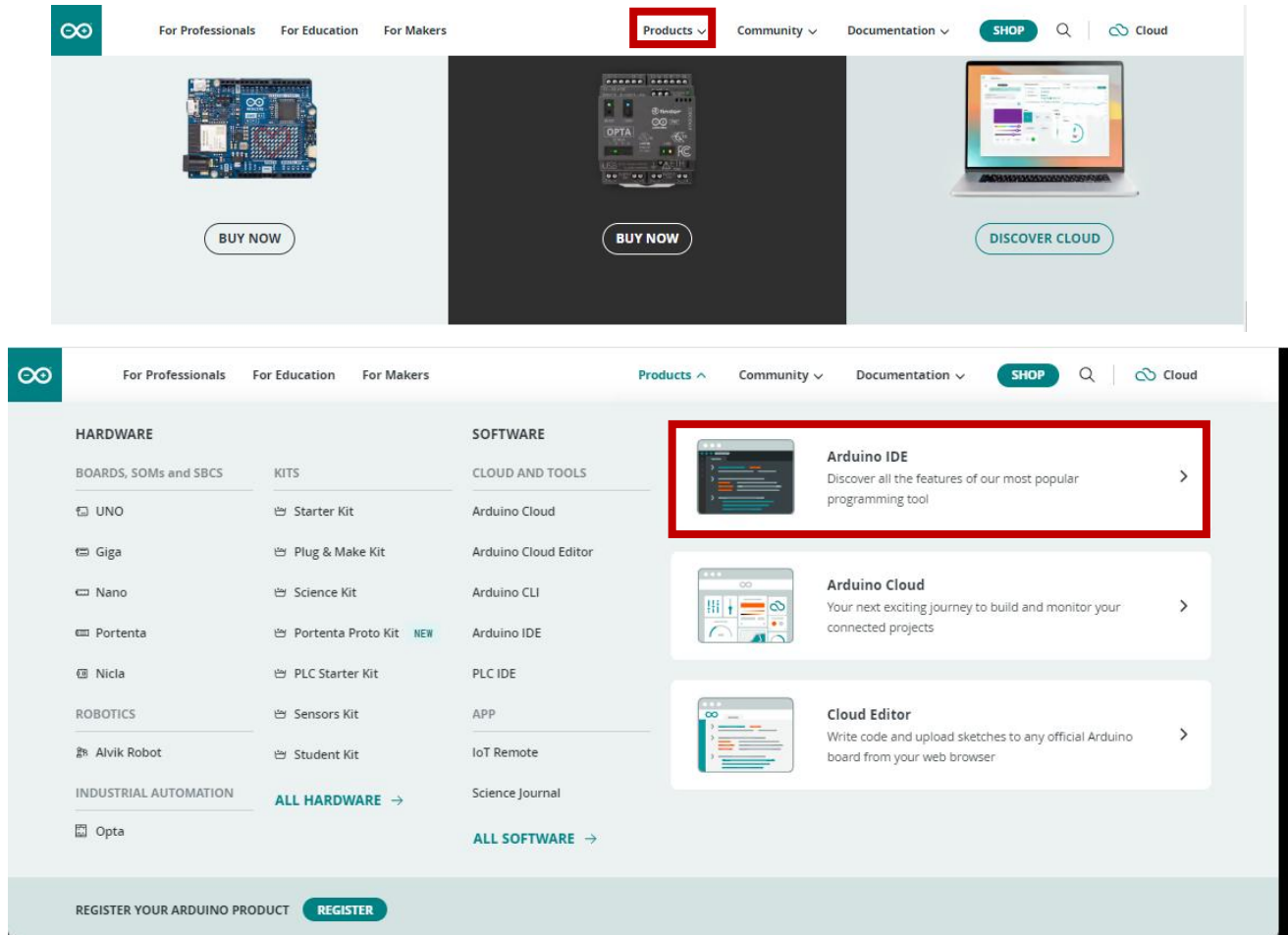


6. The interface will show as follows after the Arduino software is opened, indicating that our software has been downloaded and installed successfully.



## (2) Install Arduino IDE under MacOS

Enter the website URL: <https://www.arduino.cc/> in the address bar. After successfully opening the interface as shown below, click the list icon, then click "Products" to enter the product page. Then select 'Arduino IDE'.



1. After jumping to the following interface, slide the mouse to the middle to find the part marked in the red circle. You can find that the official website provides us with installation files for Windows, Mac OS X, and Linux systems.

**Arduino Cloud Editor**

Experience the Arduino IDE online. Whether you're at home or on the go, code, upload and access your projects anytime from your browser **for free**.

[GO TO CLOUD EDITOR](#) [LEARN MORE](#)

## Downloads

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

[Release Notes](#)

2. Fill in information such as your email address, and then click **"JUST DOWNLOAD"** to download the software.

**Stay in the Loop: Join Our Newsletter!**

As a beginner or advanced user, you can find inspiring projects and learn about cutting-edge Arduino products through our **weekly newsletter**!

email \*

☒ I confirm to have read the [Privacy Policy](#) and to accept the [Terms of Service](#) \*

☐ I would like to receive emails about special deals and commercial offers from Arduino.

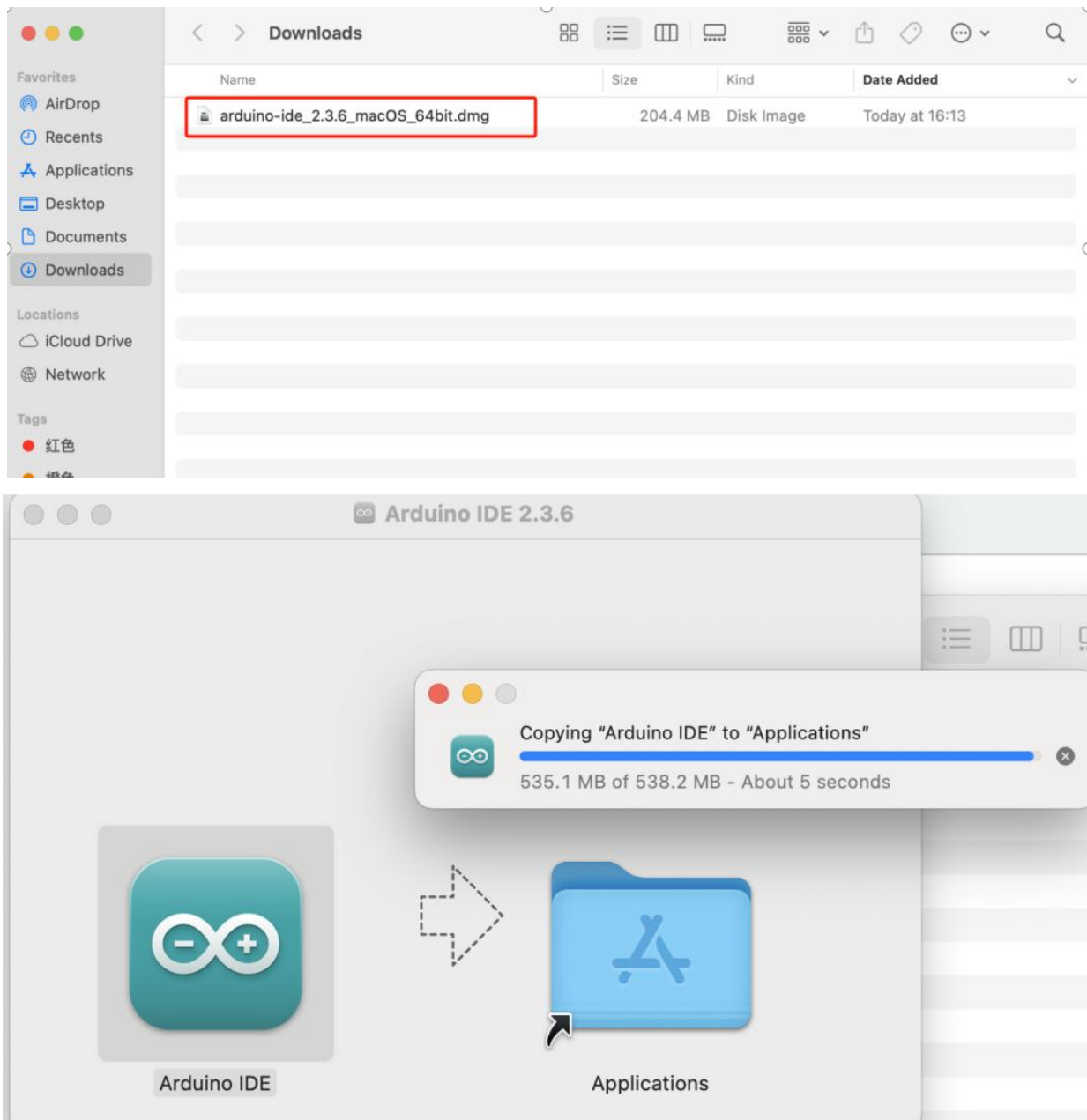
[SUBSCRIBE & DOWNLOAD](#)

or

[JUST DOWNLOAD](#)

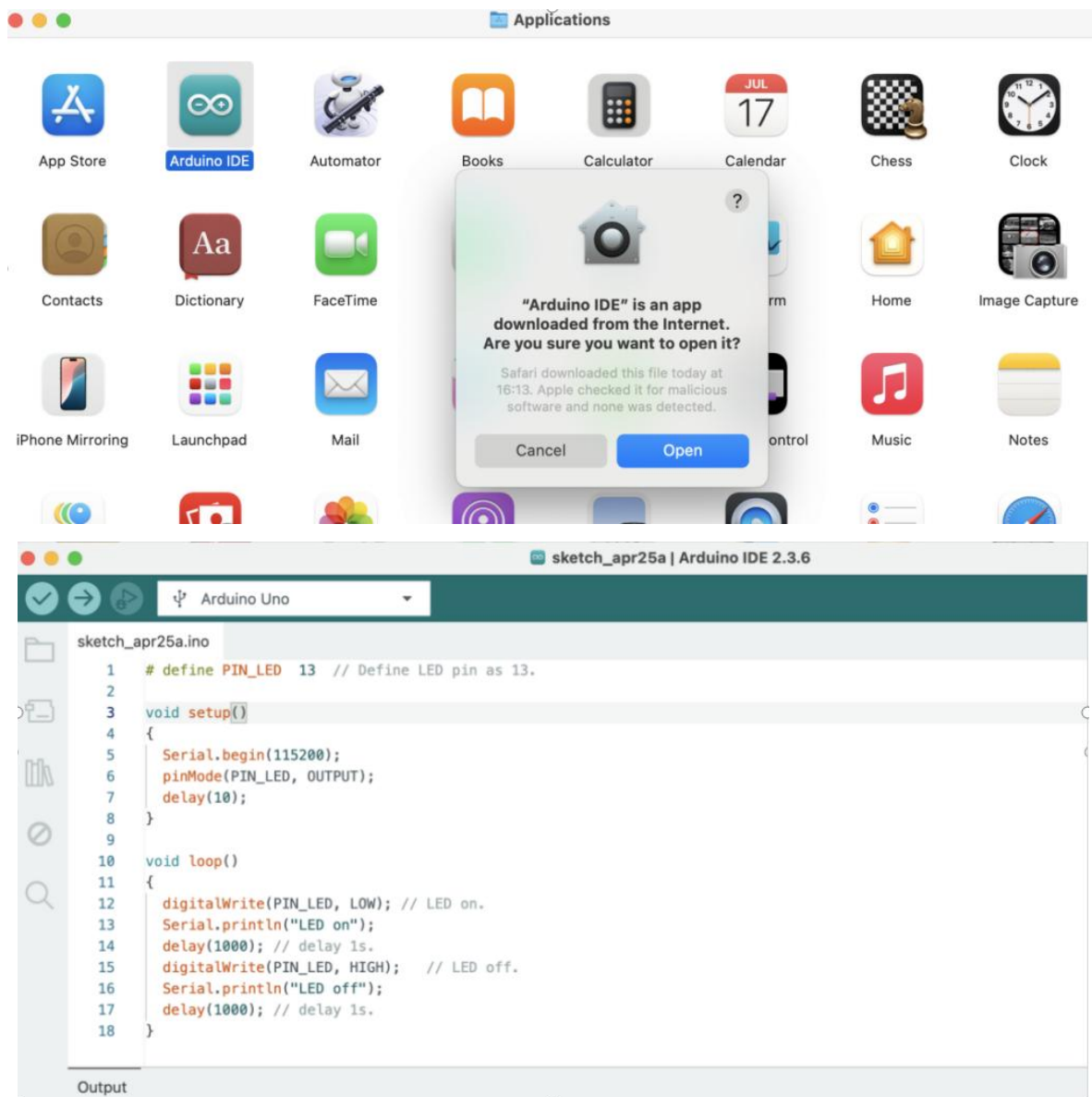


3. Open the downloaded software and drag "Arduino IDE" to "Applications" to install the software.



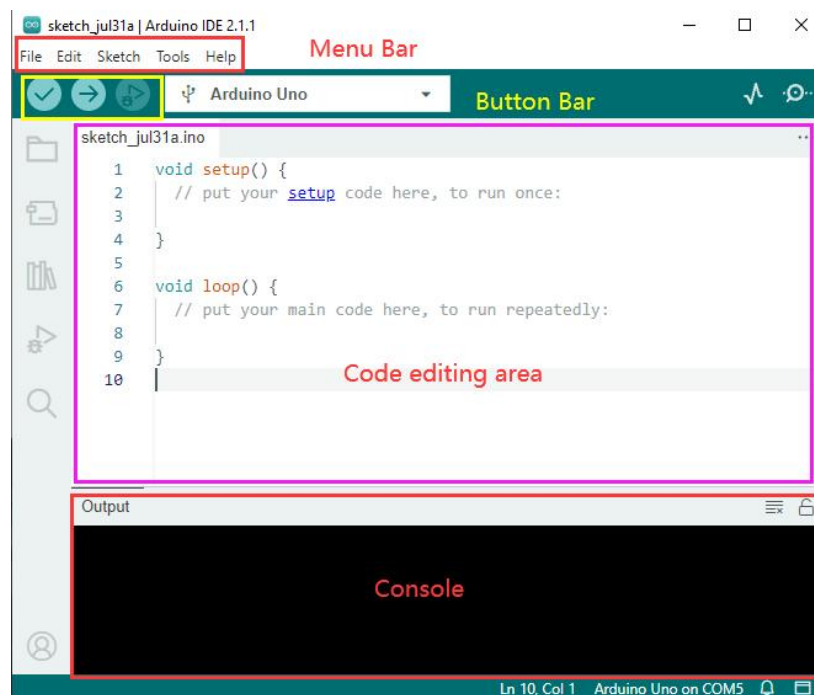
4. After the installation is successful, Arduino IDE can be opened normally.





## 2.4 Introduction of Arduino Software Interface

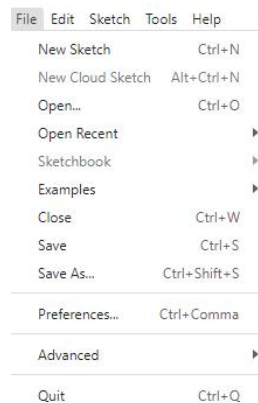
The following figure is the interface introduction of Arduino software



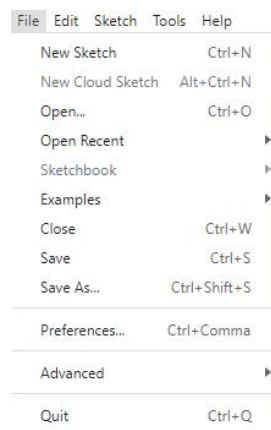
### (1) Menu bar

Menu bar contains File, Edit, Sketch, Tools and Help.

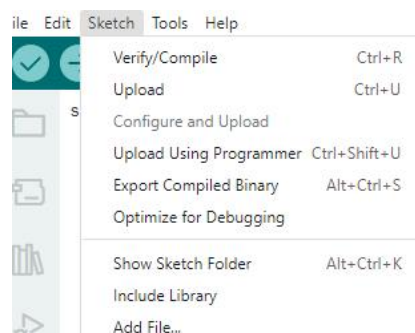
(1) "File" can operate new file, open file, save file, close file, save, etc. For the Examples, you can check the official sample program.



(2) "Edit" has the functions for the program code of editing, copying and pasting, commenting, indenting, searching, etc.

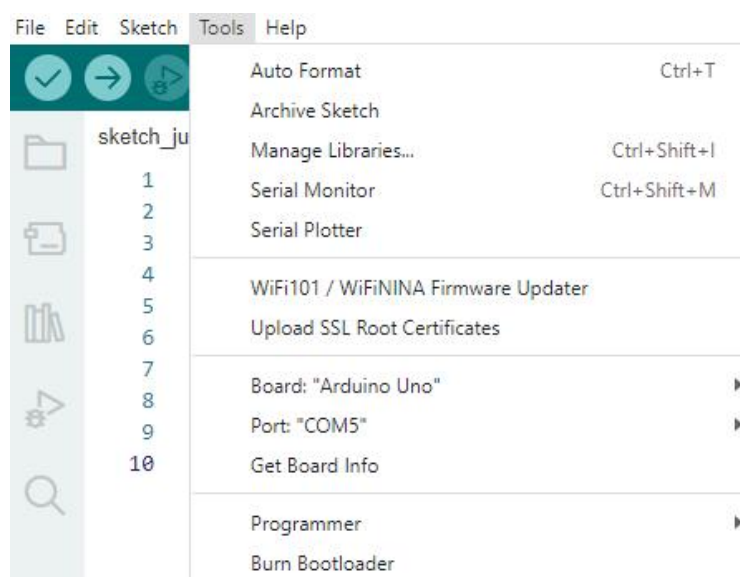


(3) Sketch can perform Verify/Compile, Upload and other operations on the written project.



The Include Library can load the library. After selecting the library file in the list, the relevant header files are automatically added in the code editing area.

(4) Board and Port are often used in "Tools".



Board can choose different development boards.

## (2) Button bar

Button bar includes functions of Verifying, Uploading, Building New, Opening and Saving.

### ( 1 ) Verify :

Checking and compilation. This button is used to check the correctness of your "syntax" or code. If your code has any syntax errors or undefined variables, an error message will appear at the bottom of the IDE screen. At the same time, the line of error code will be marked with a red background color for easy modification. But if it is correct, you will see the message that the compilation is complete.

### ( 2 ) Upload :

Download the program code to the Arduino development board. It is better to click Verify first, and then click Upload.

## (3) Code editing area

The code editing area is where to write program code and code comments.

## (4) Console

The debug window will output information showing various compilation and debugging results. For example, if your code is written incorrectly, you will be prompted about what went wrong.

## 2.5 Install CH340 Driver

### Connecting the Arduino and the computer

You need to use a USB cable to connect the Arduino board to the computer and turn on the power switch on the Arduino board.

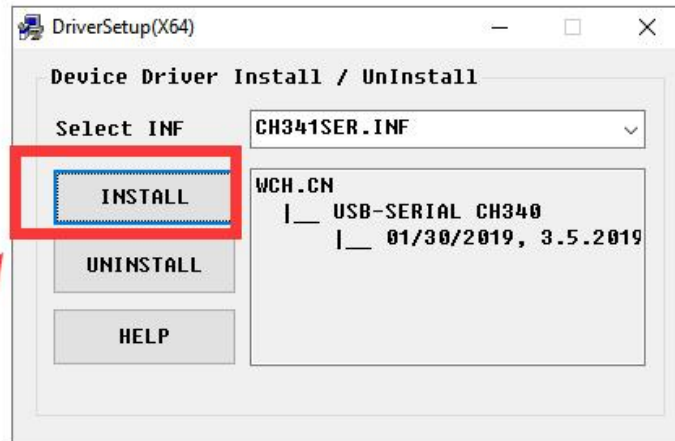
### Install CH340 driver

You need to find the user folder provided by Adeept: **Adeept 4WD Smart Car**, find the 01 Software Package folder, and open the Adeept driver folder. If you are using a Windows system, you can directly double-click to open CH341SER\_Windows.EXE, install corresponding driver according to the computer operating system. For MAC and Linux systems, you need to decompress the file corresponding to the system name, and then install the CH340 driver.

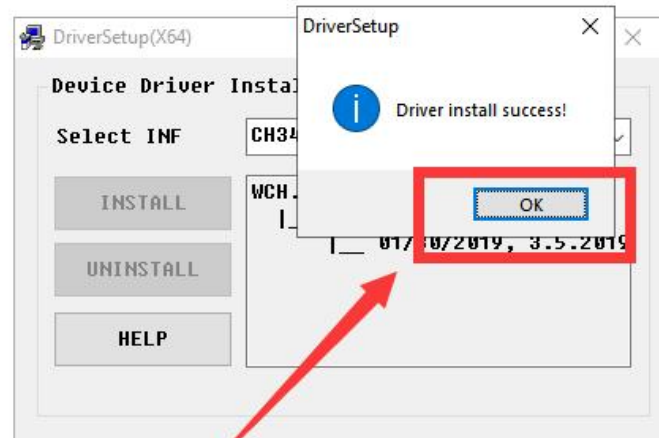
### Windows:

1. Enter the driver folder, select **CH341SER\_Windows.EXE**, and double-click to open it.

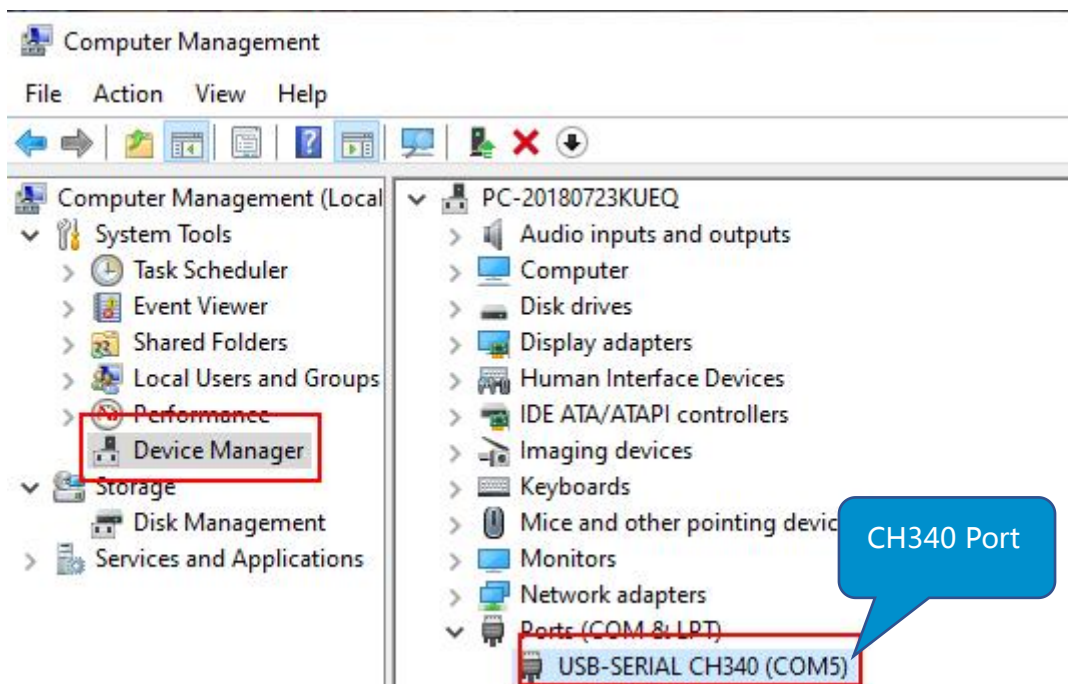
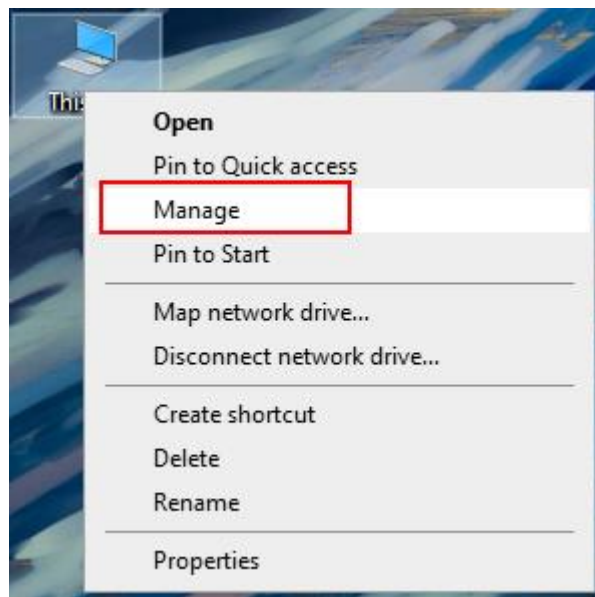
Name	Date modified	Type	Size
Adeept driver introduction.txt	6/17/2020 2:18 PM	Text Document	1 KB
CH341SER_ANDROID.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	2,360 KB
CH341SER_LINUX.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	9 KB
CH341SER_MAC.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	149 KB
CH341SER_Windows.EXE	6/17/2020 2:18 PM	Application	277 KB



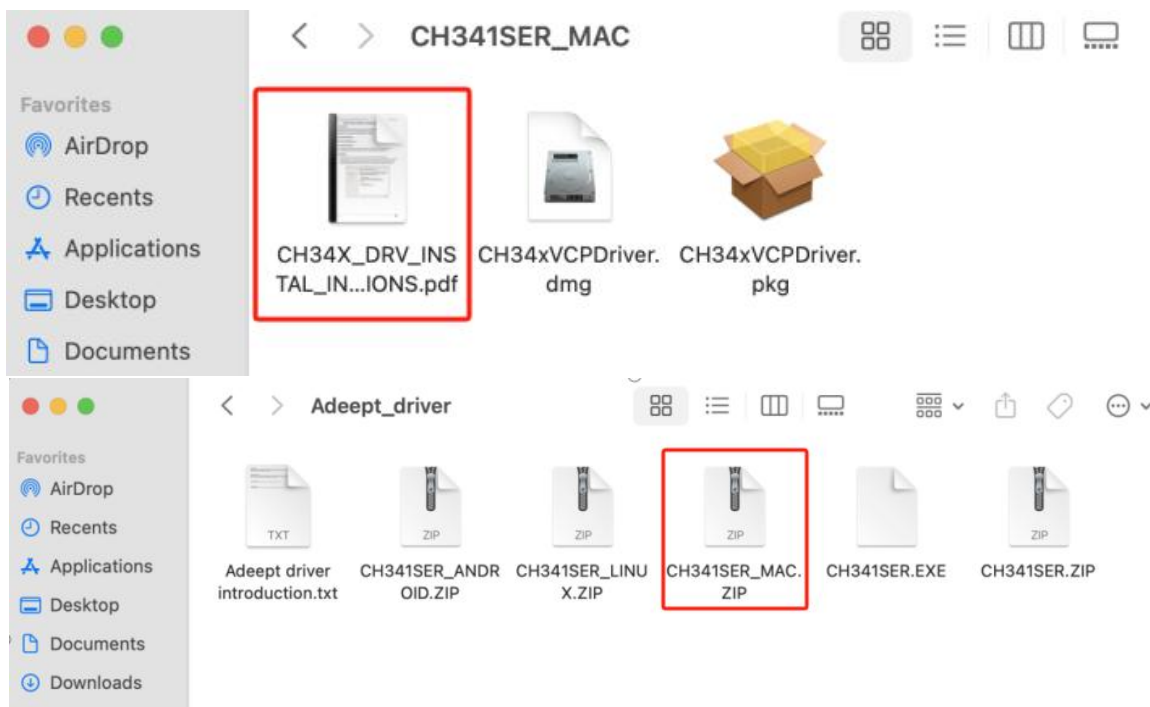
Adeept driver introduction.txt	6/17/2020 2:18 PM	Text Document	1 KB
CH341SER_ANDROID.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	2,360 KB
CH341SER_LINUX.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	9 KB
CH341SER_MAC.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	149 KB
CH341SER_Windows.EXE	6/17/2020 2:18 PM	Application	277 KB



2. Turn to the main interface of your computer, select "This PC" and right-click to select "Manage" .

**Mac OS:**

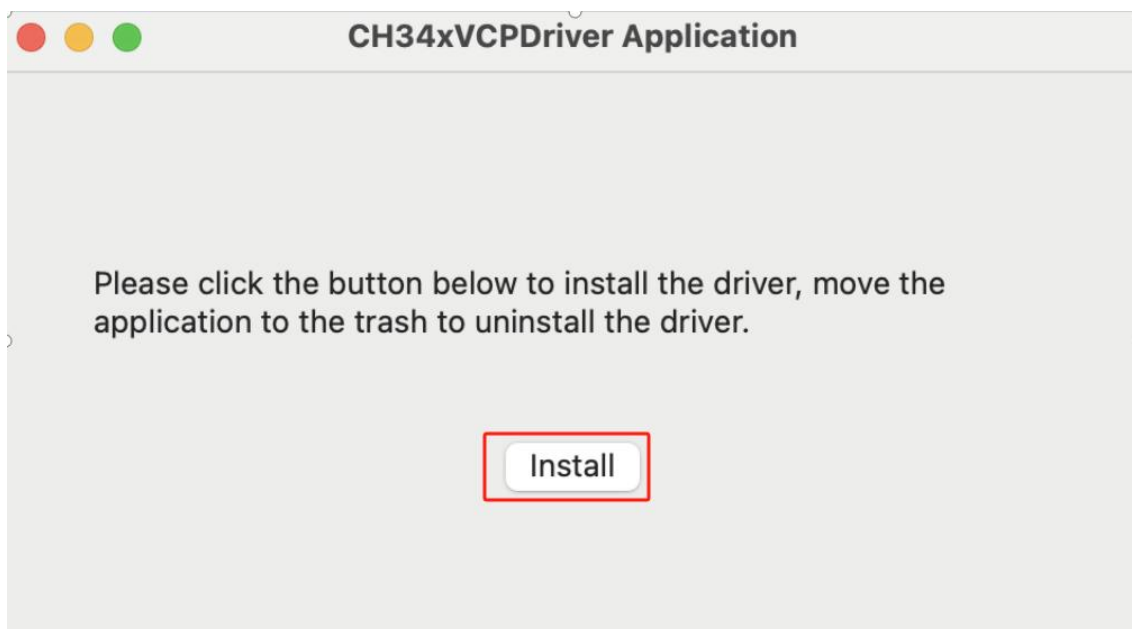
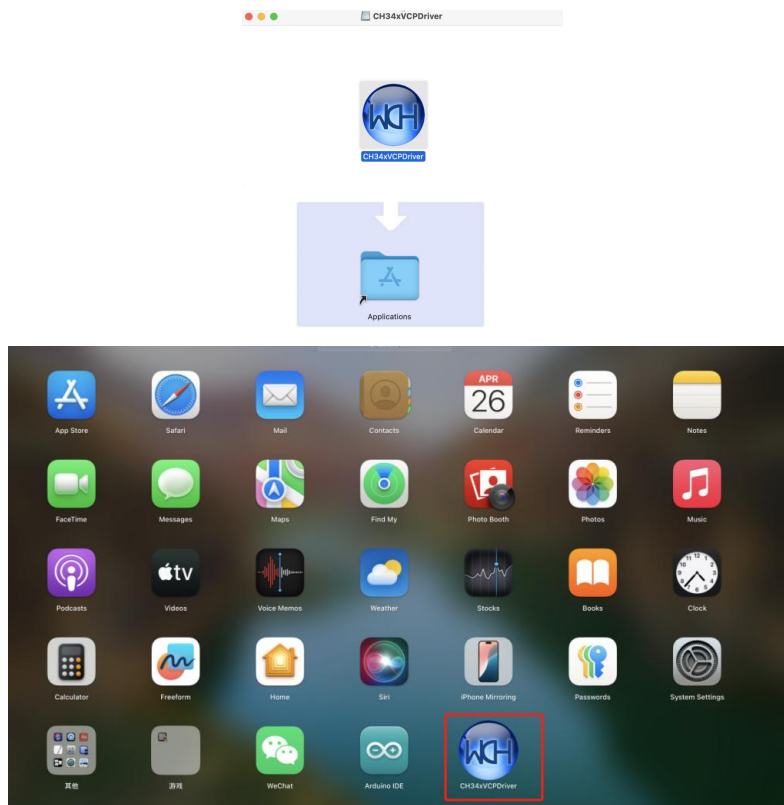
Enter the driver folder, unzip the CH341SER\_MAC.ZIP file, and then enter the folder. First, read the "**CH34X\_DRV\_INSTAL\_INSTRUCTIONS.pdf**" document, and then select the corresponding installation method according to the macOS version.



1.The Mac OS version of the computer used in the example is **15.3.2**. Therefore, according to the instruction manual, we use the **".dmg"** file for installation.







2. There are two ways to check if the driver is installed successfully:

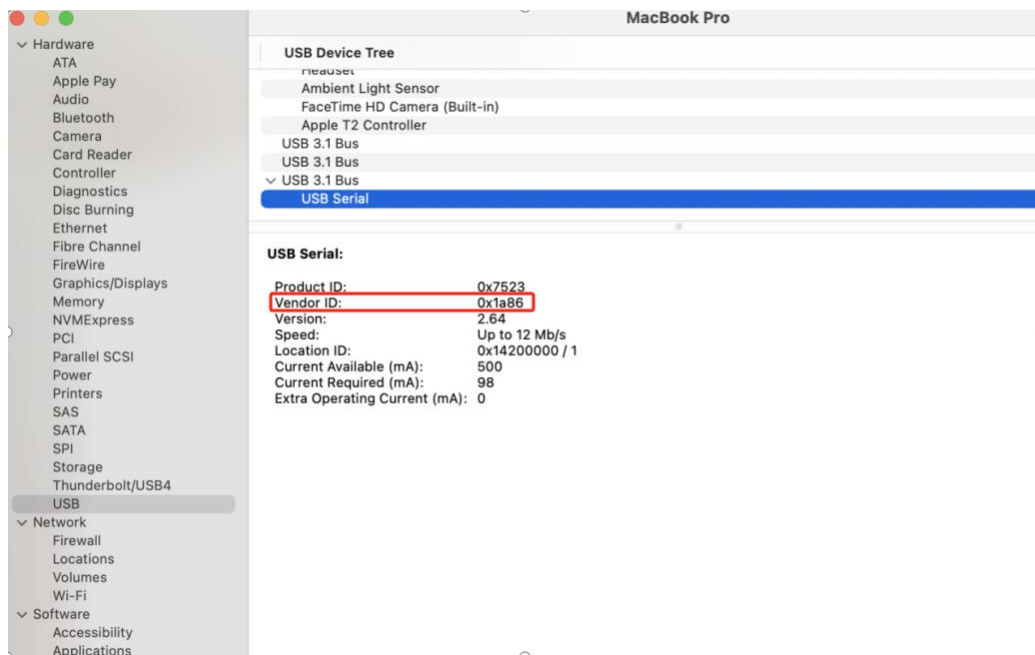
1) Open the terminal and enter "**ls /dev/tty\***" to check if "**usbserial\***" exists.

```

adeept@AdeeptdeMacBook-Pro ~ % ls /dev/tty*
/dev/tty                                /dev/ttyse
/dev/tty.BLTH                          /dev/ttysf
/dev/tty.Bluetooth-Incoming-Port      /dev/ttyt0
/dev/tty.usbserial-1420             /dev/ttyt1
/dev/ttyp0                             /dev/ttyt2
/dev/ttyp1                             /dev/ttyt3
/dev/ttyp2                             /dev/ttyt4
/dev/ttyp3                             /dev/ttyt5
/dev/ttyp4                             /dev/ttyt6
/dev/ttyp5                             /dev/ttyt7

```

2) Open the system report and check the usb Serial. If "**Vendor ID: 0x1a86**" appears.

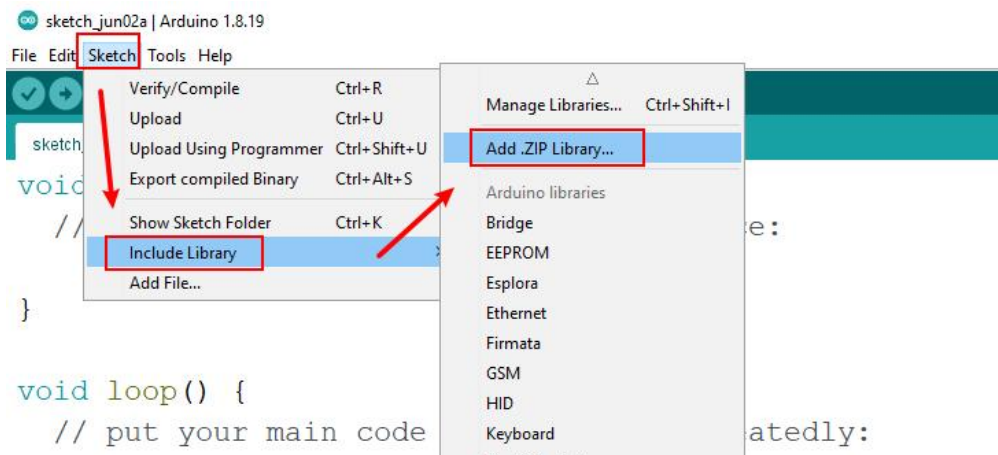


## 2.6 Uploading the First Code

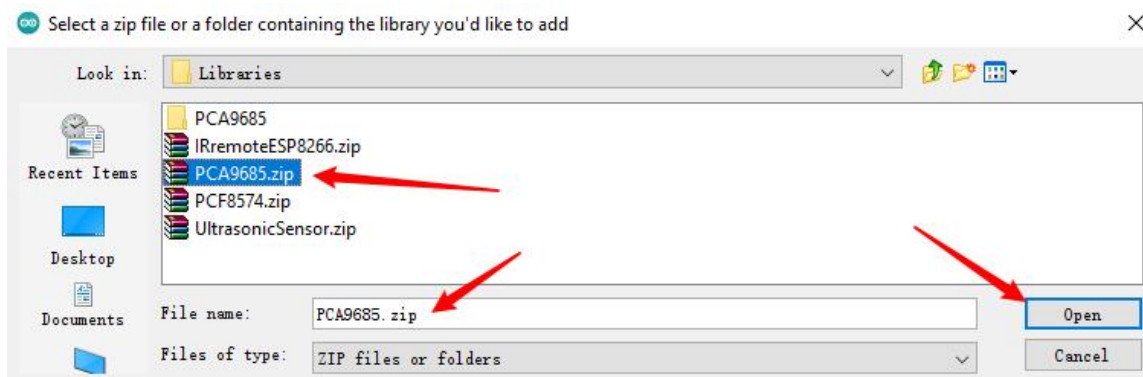
Here we use "00\_Servo\_90" in "Adeept\_4WD\_Smart\_Car\_Kit\_for\_Arduino\Code" as an example. The servo on the car is controlled by PCA9685. Therefore, it is necessary to add the related libraries to Arduino IDE.

### How to Add libraries

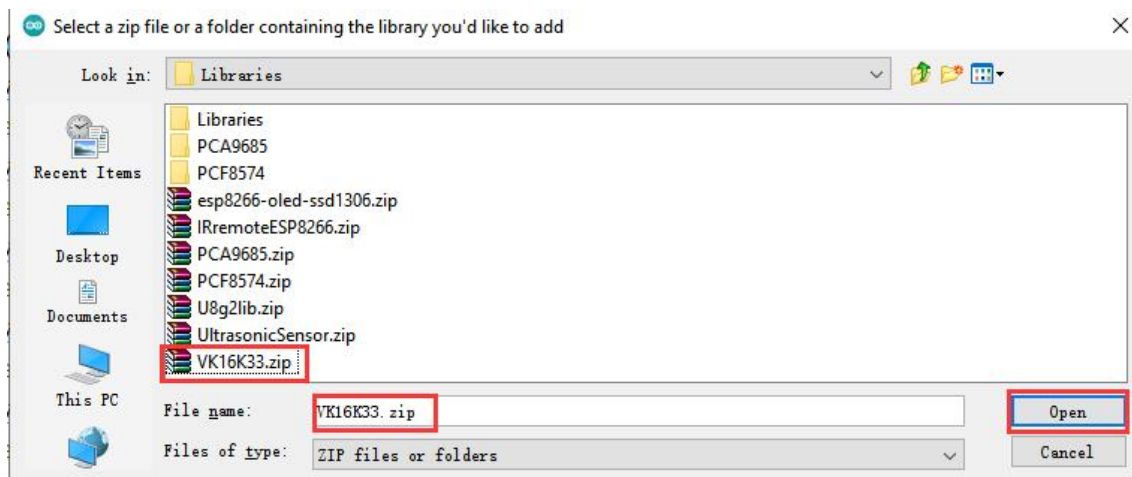
Open Arduino IDE, click [Sketch](#) on Menu bar, move your mouse to [Include Library](#) and then click [Add .ZIP library](#).



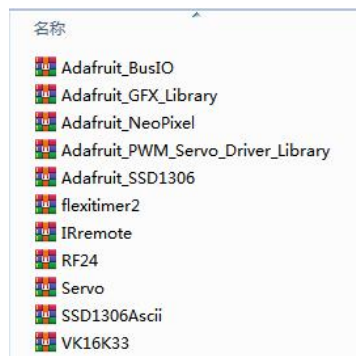
Enter **Adeept\_4WD\_Smart\_Car\_Kit\_for\_Arduino\Libraries** folder, Add PCA9685.



Add VK16K33.



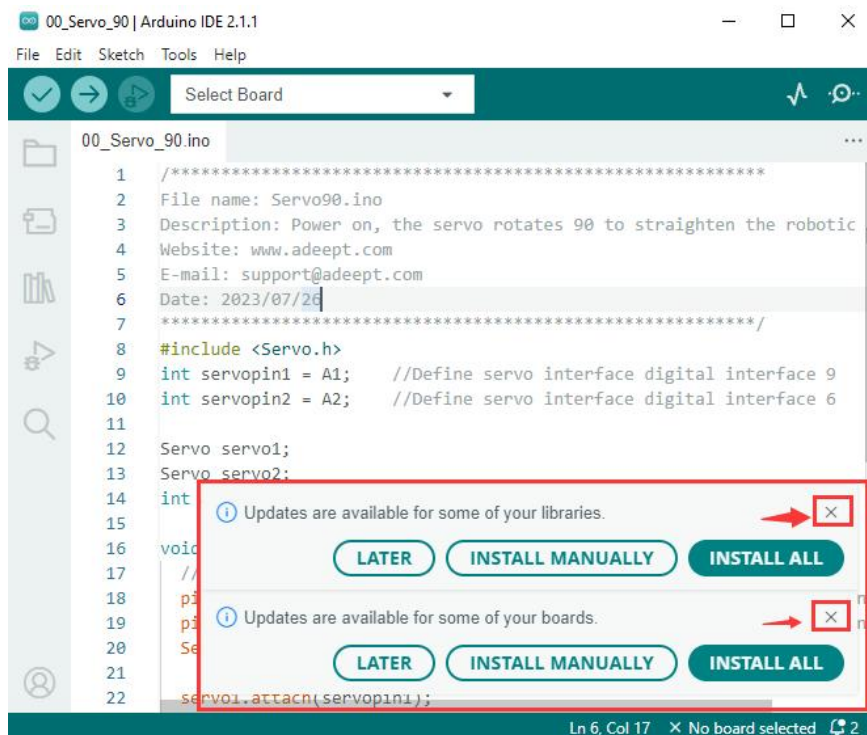
You need to add **all the ZIP files** in the folder to the Arduino IDE one by one.

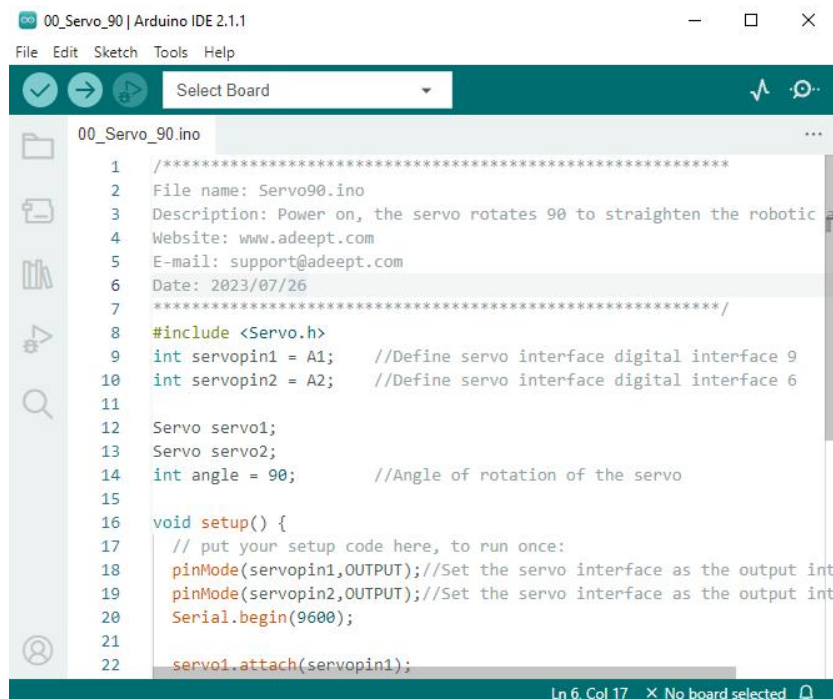


## Upload code

1. Connect your computer and Arduino Board with a USB cable.
2. Open "00\_Servo\_90" folder in "Adeept\_4WD\_Smart\_Car\_Kit\_for\_Arduino/Code" , double-click "00\_Servo\_90.ino" . The code is to rotate the servo motors to 90°

Please ignore the update prompt.





```

00_Servo_90 | Arduino IDE 2.1.1
File Edit Sketch Tools Help
Select Board

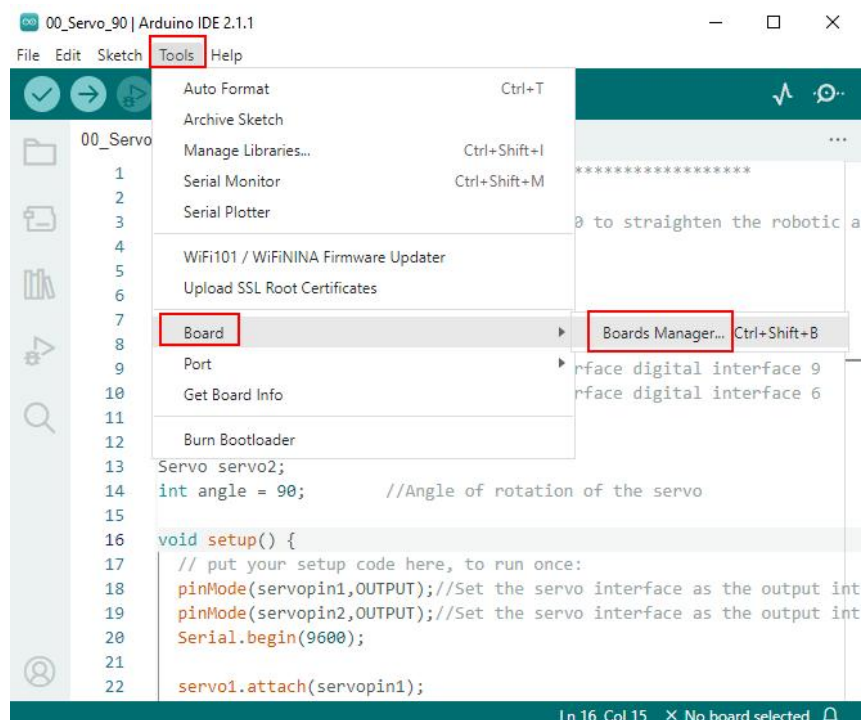
00_Servo_90.ino
1  /*****
2  File name: Servo90.ino
3  Description: Power on, the servo rotates 90 to straighten the robotic
4  Website: www.adeept.com
5  E-mail: support@adeept.com
6  Date: 2023/07/26
7  *****/
8  #include <Servo.h>
9  int servopin1 = A1;    //Define servo interface digital interface 9
10 int servopin2 = A2;    //Define servo interface digital interface 6
11
12 Servo servo1;
13 Servo servo2;
14 int angle = 90;        //Angle of rotation of the servo
15
16 void setup() {
17   // put your setup code here, to run once:
18   pinMode(servopin1,OUTPUT);//Set the servo interface as the output int
19   pinMode(servopin2,OUTPUT);//Set the servo interface as the output int
20   Serial.begin(9600);
21
22   servo1.attach(servopin1);

```

Ln 6, Col 17 X No board selected

### 3. Install development board.

Click **Tools** --> **Board** --> **Board Manager..**, Enter "Arduino" in the left column, select "Arduino AVR Boards", click "INSTALL". Wait for the installation to complete. Once the installation is complete, click the second icon from the left to close the left sidebar.



```

00_Servo_90 | Arduino IDE 2.1.1
File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Manage Libraries... Ctrl+Shift+I
Serial Monitor Ctrl+Shift+M
Serial Plotter
WiFi101 / WiFININA Firmware Updater
Upload SSL Root Certificates
Board Boards Manager... Ctrl+Shift+B
Port
Get Board Info
Burn Bootloader

00_Servo
1
2
3
4
5
6
7
8
9
10
11
12
13 Servo servo2;
14 int angle = 90;    //Angle of rotation of the servo
15
16 void setup() {
17   // put your setup code here, to run once:
18   pinMode(servopin1,OUTPUT);//Set the servo interface as the output int
19   pinMode(servopin2,OUTPUT);//Set the servo interface as the output int
20   Serial.begin(9600);
21
22   servo1.attach(servopin1);

```

Ln 16, Col 15 X No board selected