

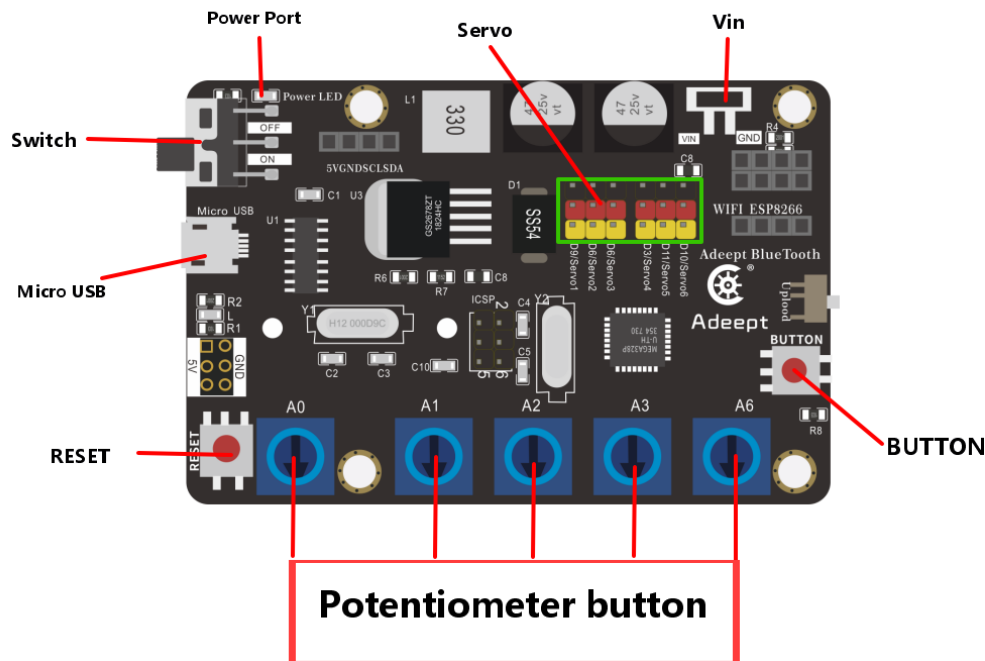
Preparation

Steps:

1. learn about Adeept Arm Drive Board.
2. Building the Arduino Development Environment.
3. Test whether the core components of adeept arm drive board and Servo are intact.

1. Introduction of Adeept Arm Drive Board

The Adeept Arm Drive Board development board is the main component of the robotic arm. Similar to the Arduino UNO development board, it is also an easy-to-use open source electronic prototyping platform, including the hardware part and the software part (Arduino IDE). The Adeept Arm Drive Board development board is mainly composed of a microcontroller (MCU), a universal input/output interface, etc. You can understand it as a microcomputer motherboard. We will introduce the Adeept Arm Drive Board development board in detail.



【1】 Power LED:

Power LED is used to indicate the power status of the system. The LED is on, indicating that the system is powered on and ready to run; the LED is off, indicating that the system is not powered on.

【2】 Servo:

It is the pin interface of Servo.

【3】 Vin (6-24V) :

It is the pin interface for external power supply. Use 6-24V external power supply to power the Adeept SmartHub development board.

【4】 RESET:

Restarting the Adeept SmartHub development board.

【5】 Switch:

When using Vin (6-24V) as an external power supply, Switch can control the OFF and ON of the Adeept SmartHub development board.

【6】 Micro USB:

It is used to connect the Micro USB interface of the computer to realize the serial communication, uploading program and serial monitoring between the Aadept SmartHub development board and the computer.

【7】 Potentiometer button:

Potentiometer button has five buttons: A0, A1, A2, A3, and A6. By rotating these buttons, you can control the movement of the robotic arm.

In the following courses, we will combine the application of various components to further learn the practical application of the Aadept Arm Drive Board development board.

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 program structure

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 The construction of the Arduino development environment

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

<https://store.arduino.cc/usa/>

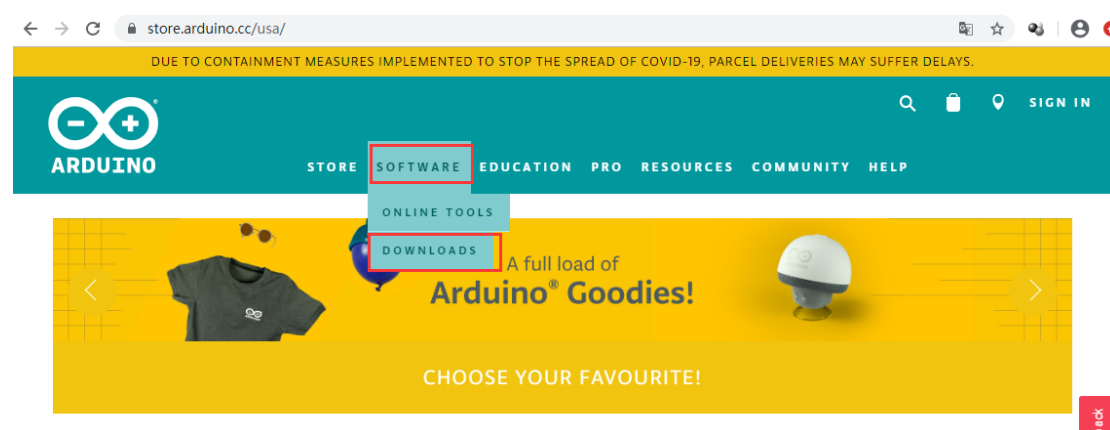
(1) Install Arduino IDE under Windows

We will teach you how to download and install:

1.Open Google Chrome and enter the URL in the address bar:

<https://store.arduino.cc/usa/>

After successfully opening the interface as shown below, we click DOWNLOADS under SOFTWARE.



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.



Download the Arduino IDE



ARDUINO 1.8.12

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board. Refer to the [Getting Started](#) page for installation instructions.

Windows Installer, for Windows 7 and up
Windows ZIP file for non admin install

Windows app Requires Win 8.1 or 10
[Get](#)


Mac OS X 10.10 or newer

Linux 32 bits
Linux 64 bits
Linux ARM 32 bits
Linux ARM 64 bits

[Release Notes](#)
[Source Code](#)
[Checksums \(sha512\)](#)

3. We click the installation package of Windows ZIP file for non admin install. After the interface jumps, we select JUST DOWNLOAD. And then start the download. The download status will be displayed in the lower left of Google Chrome. Then we wait for the download to complete.

Download the Arduino IDE



ARDUINO 1.8.12

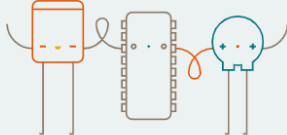
The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is

Windows Installer, for Windows 7 and up
Windows ZIP file for non admin install

Windows app Requires Win 8.1 or 10
[Get](#)

Contribute to the Arduino Software

Consider supporting the Arduino Software by contributing to its development. (US tax payers, please note this contribution is not tax deductible). [Learn more on how your contribution will be used.](#)



SINCE MARCH 2015, THE ARDUINO IDE HAS BEEN DOWNLOADED **SO MANY** TIMES. (IMPRESSIVE!) NO LONGER JUST FOR ARDUINO AND GENUINO BOARDS, HUNDREDS OF COMPANIES AROUND THE WORLD ARE USING THE IDE TO PROGRAM THEIR DEVICES, INCLUDING COMPATIBLES, CLONES, AND EVEN COUNTERFEITS. HELP ACCELERATE ITS DEVELOPMENT WITH A SMALL CONTRIBUTION! REMEMBER: OPEN SOURCE IS LOVE!

\$3

\$5

\$10

\$25

\$50

OTHER

JUST DOWNLOAD

CONTRIBUTE & DOWNLOAD

Contribute to the Arduino Software

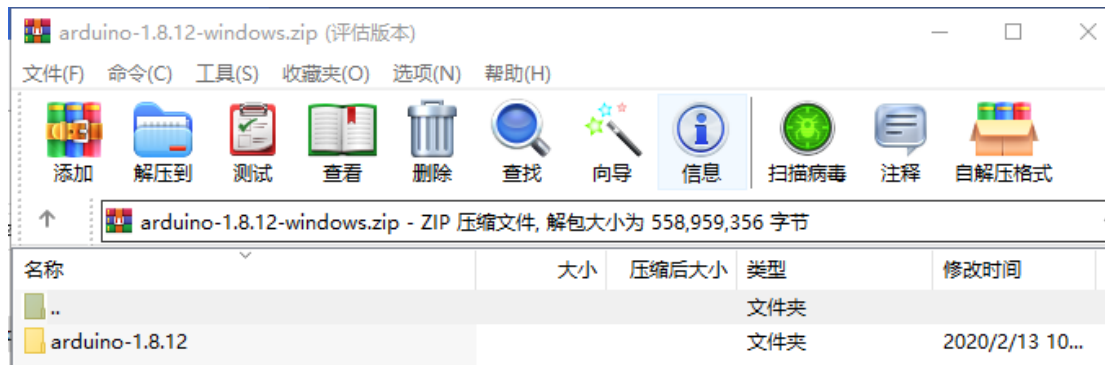
Consider supporting the Arduino Software by contributing to its development. (US tax payers, please note this contribution is not tax deductible). [Learn more on how your contribution will be used.](#)



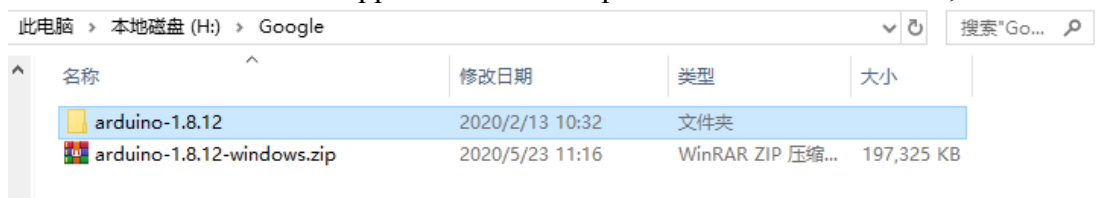
4. After the download is complete, open the folder. There are downloaded compressed installation files:
arduino-1.8.12-windows.zip



5. Double-click to open the file and unzip it.



6. The file arduino-1.8.12 appears after decompression. As shown follows;



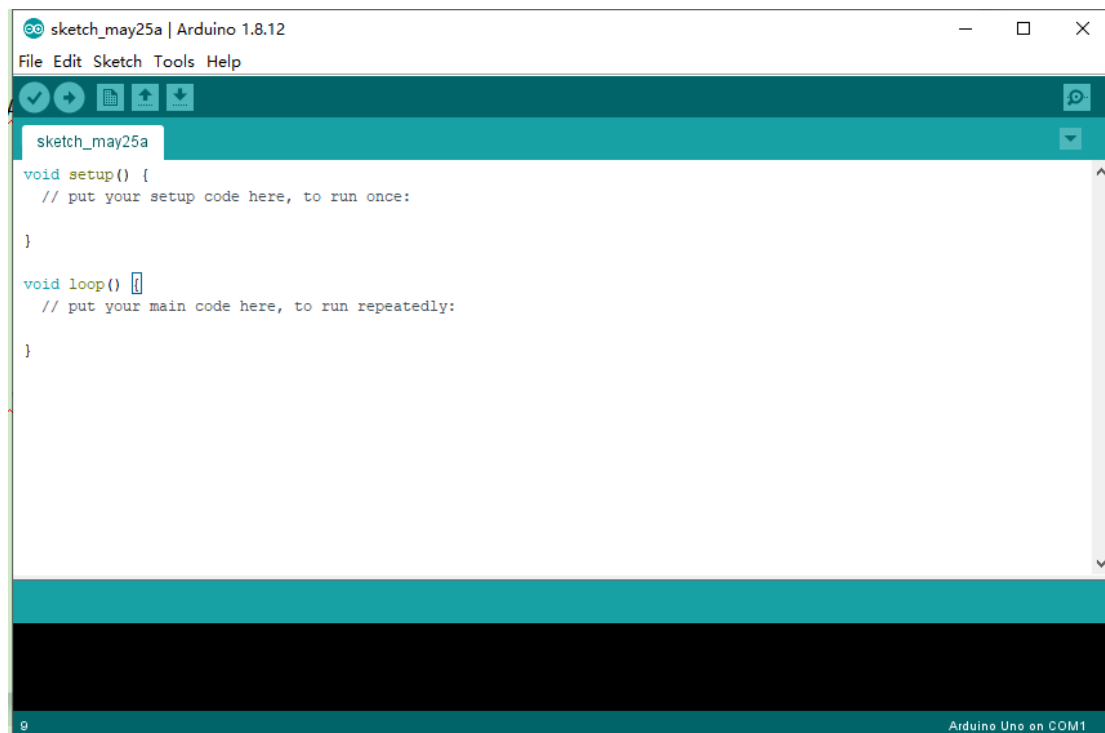
7. Open the arduino-1.8.12 folder and double-click arduino.exe to open the software.

www.aadept.com



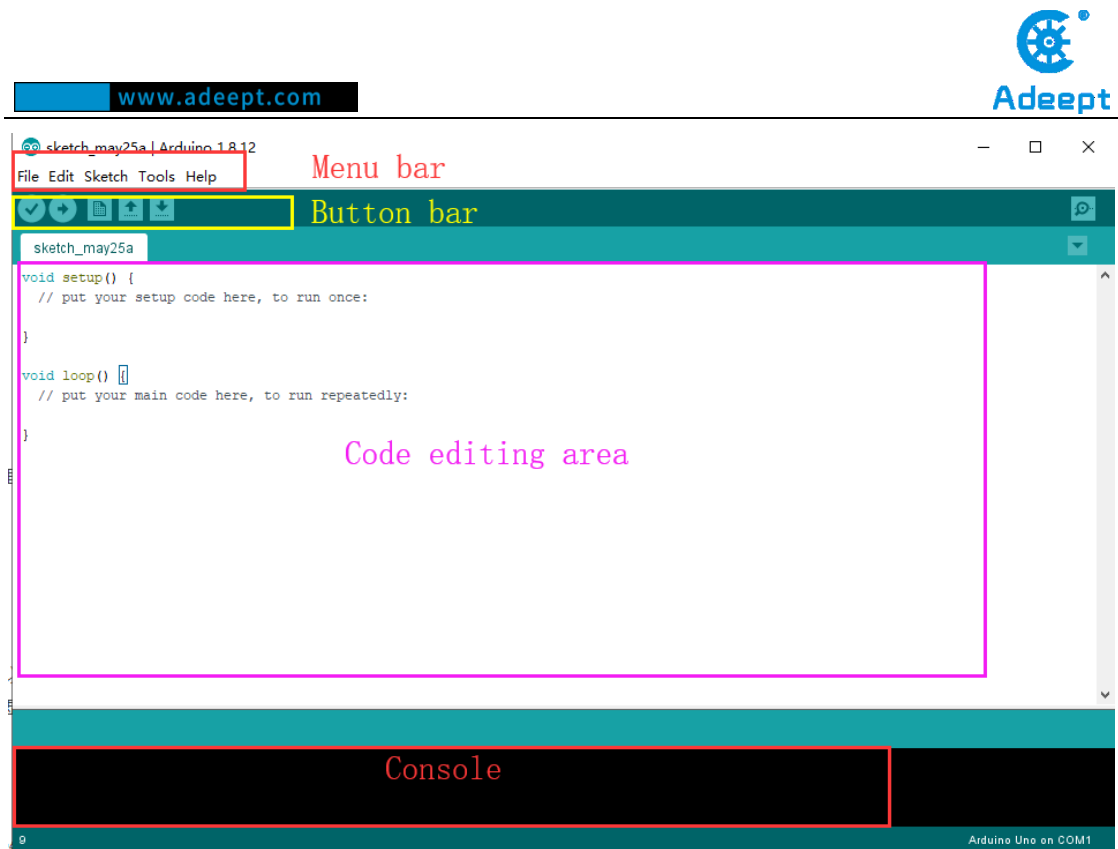
名称	修改日期	类型	大小
drivers	2020/2/13 10:32	文件夹	
examples	2020/2/13 10:32	文件夹	
hardware	2020/2/13 10:32	文件夹	
java	2020/2/13 10:32	文件夹	
lib	2020/2/13 10:32	文件夹	
libraries	2020/2/13 10:32	文件夹	
reference	2020/2/13 10:32	文件夹	
tools	2020/2/13 10:32	文件夹	
tools_builder	2020/2/13 10:32	文件夹	
arduino.exe	2020/2/13 10:32	应用程序	395 KB
arduino.l4j.ini	2020/2/13 10:32	配置设置	1 KB
arduino_debug.exe	2020/2/13 10:32	应用程序	393 KB
arduino_debug.l4j.ini	2020/2/13 10:32	配置设置	1 KB

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



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.

sketch_may25a | Arduino 1.8.12

File Edit Sketch Tools Help

✓	Undo	Ctrl+Z
	Redo	Ctrl+Y
	Cut	Ctrl+X
	Copy	Ctrl+C
	Copy for Forum	Ctrl+Shift+C
	Copy as HTML	Ctrl+Alt+C
	Paste	Ctrl+V
	Select All	Ctrl+A
	Go to line...	Ctrl+L
	Comment/Uncomment	Ctrl+Slash
	Increase Indent	Tab
	Decrease Indent	Shift+Tab
	Increase Font Size	Ctrl+Plus
	Decrease Font Size	Ctrl+Minus
	Find...	Ctrl+F
	Find Next	Ctrl+G
	Find Previous	Ctrl+Shift+G

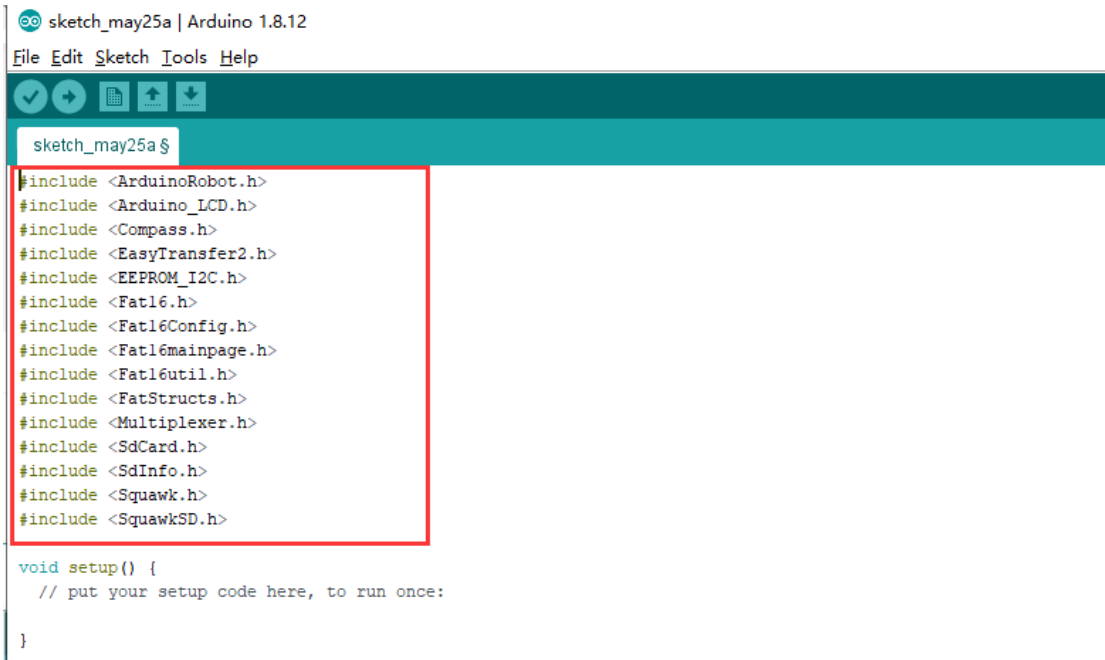
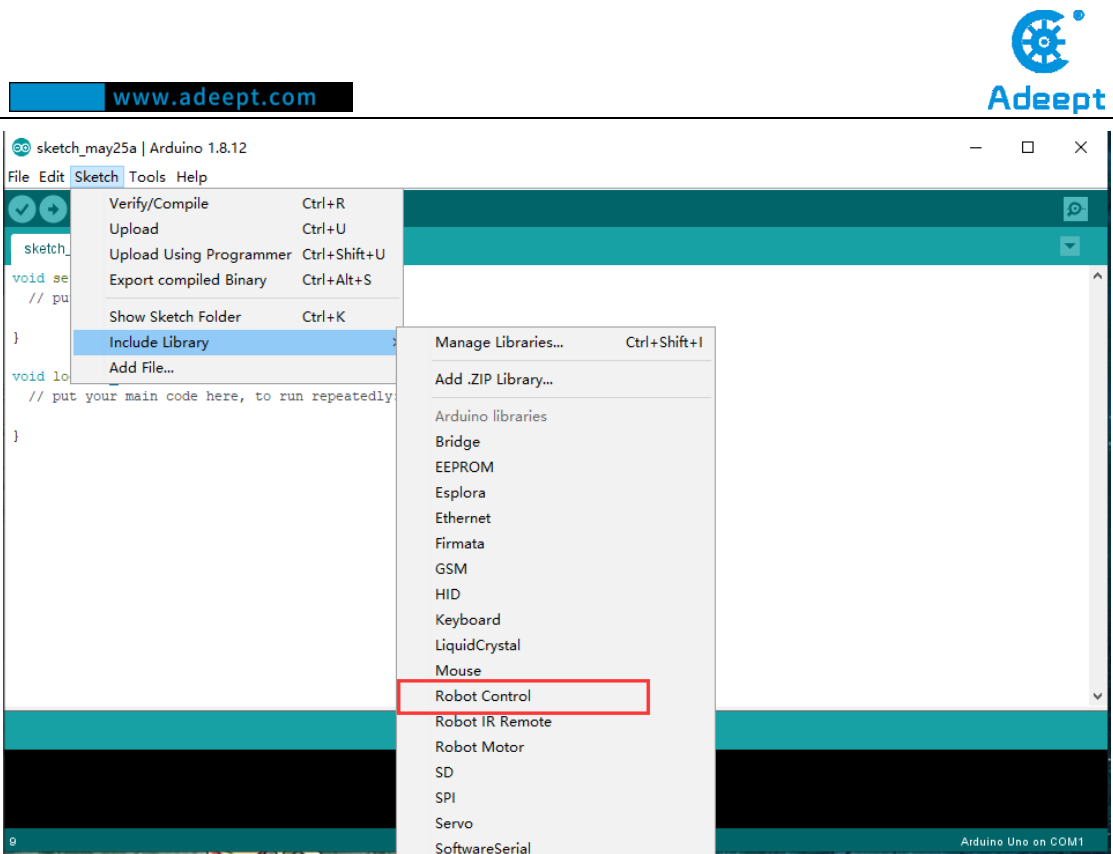
3. Sketch can perform Verify/Compile, Upload and other operations on the written project.

sketch_may25a | Arduino 1.8.12

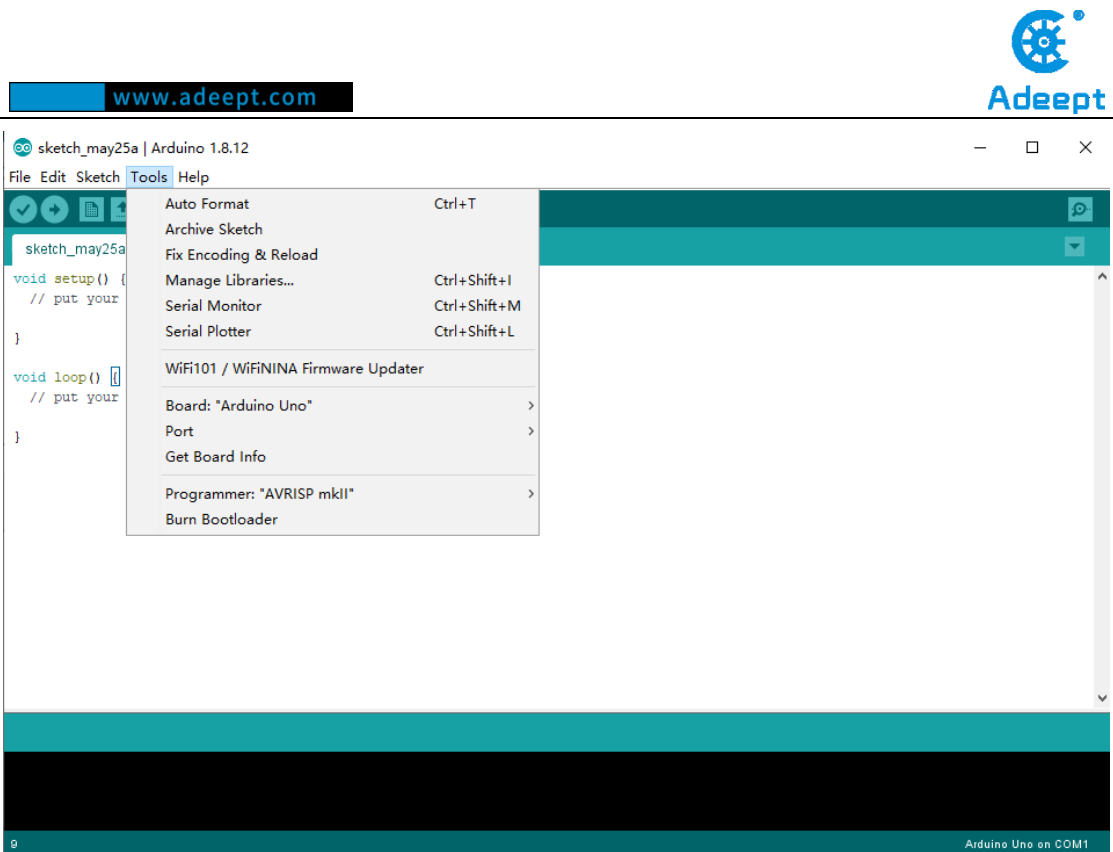
File Edit Sketch Tools Help

✓	Verify/Compile	Ctrl+R
→	Upload	Ctrl+U
	Upload Using Programmer	Ctrl+Shift+U
	Export compiled Binary	Ctrl+Alt+S
	Show Sketch Folder	Ctrl+K
	Include Library	>
	Add File...	

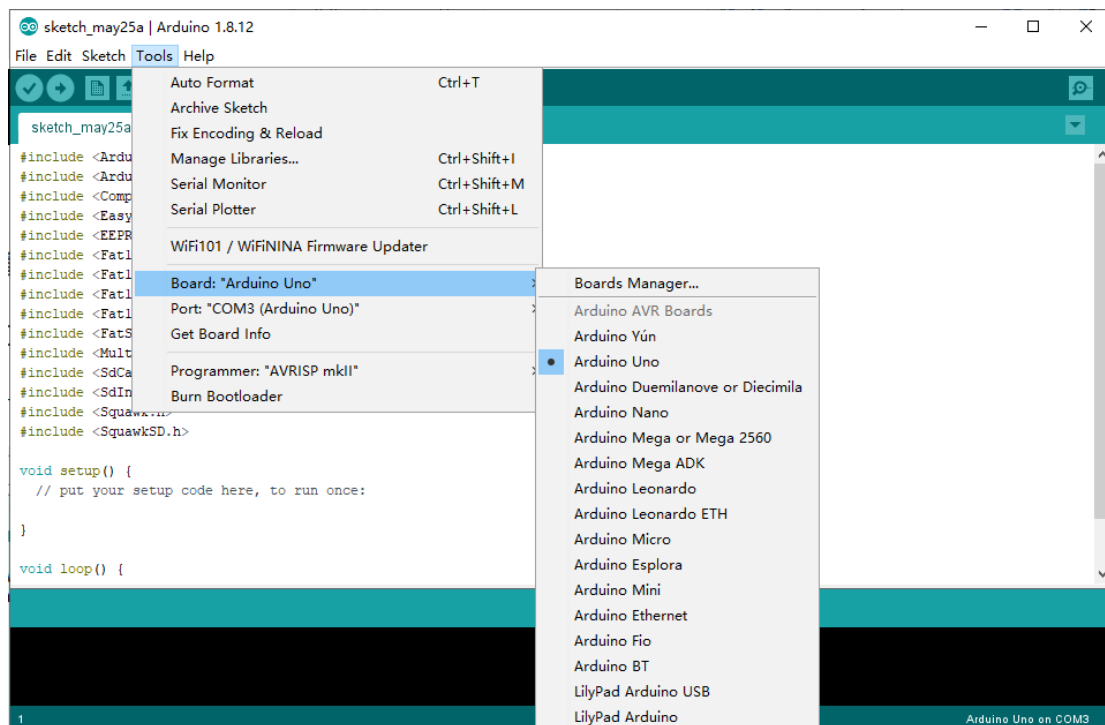
The Include Library can load the library. After selecting the library file in the list, the relevant header files are automatically added in the code editing area.



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

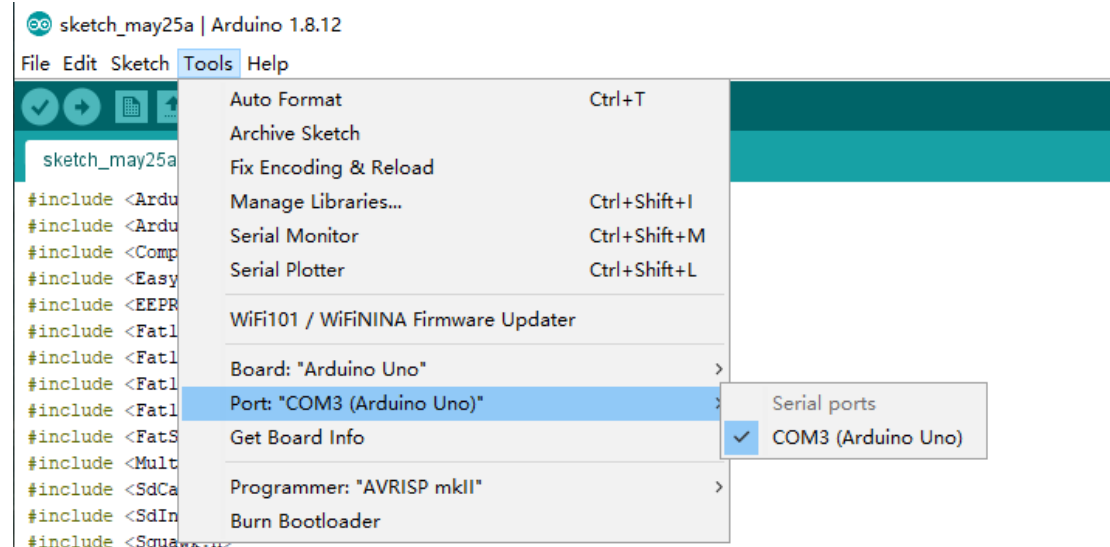


Board can choose different development boards. Our course uses Arduino Uno development board, so we need to choose Arduino Uno. The list contains many Arduino development board models. We choose the corresponding ones according to the model.



Port can set the port used by Arduino IDE to download the program, that is, the port number of the development board connected to the computer. The port display of each

computer is different. When we use the Arduino Uno to connect to the computer, it displays the COM3 port number.



(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. New :

Open a new program editing window to create a new project.

4. Open :

This button can open an existing draft file. You will use it when you need to open a file that you have downloaded or used before.

5. Save :

Save the program file being edited.

(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.

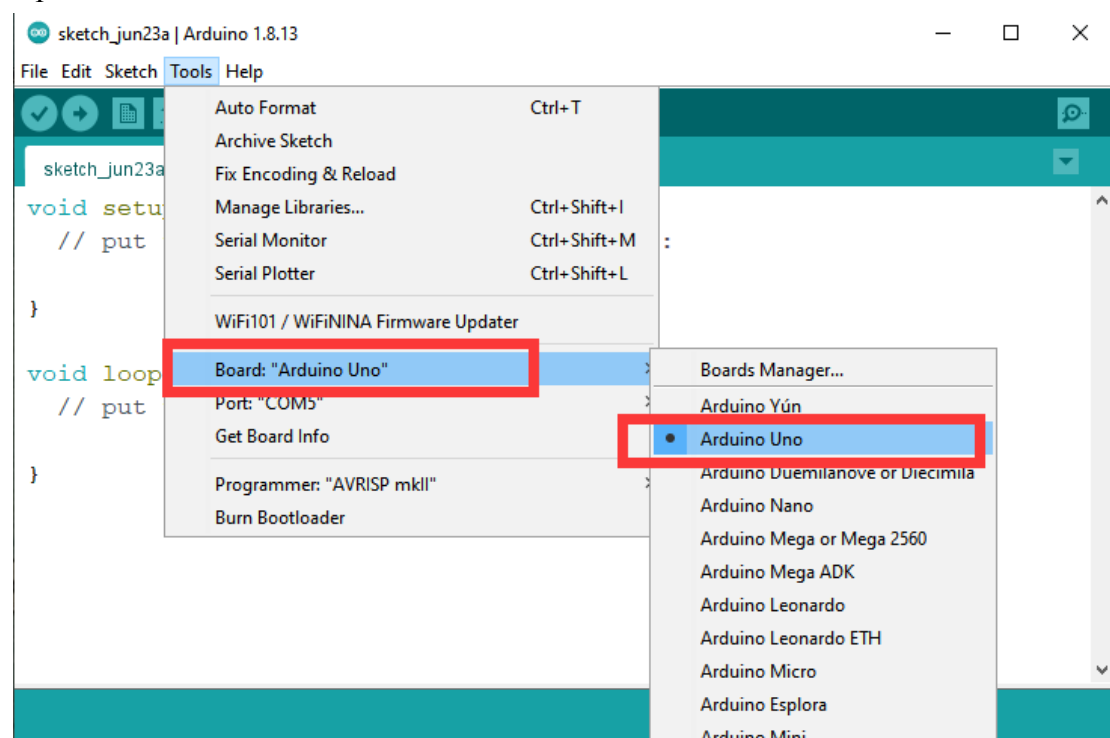
2.5 Connecting the Adeept Arm Drive Board and the computer

(1) Connecting the Adeept Arm Drive Board and the computer

You need to use USB Cable to connect the Adeept Arm Drive Board to the computer. As shown below:

(2) Select the Arduino Uno development board in Tools

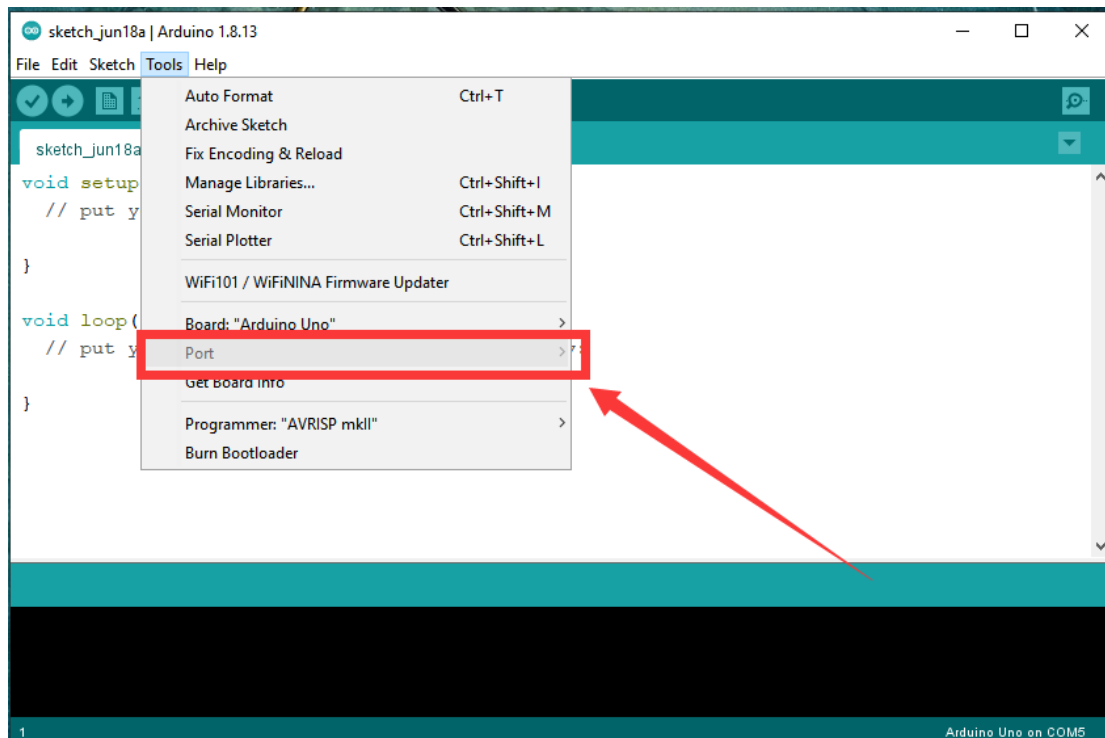
Open Arduino IDE under Tools—>Board. Select Arduino UNO in the list.



(3) Install CH341SER driver

1. Open the Arduino IDE, in the Port on the Tools toolbar, you will see that the serial

port cannot be accessed, which means that you have not installed the serial port driver.

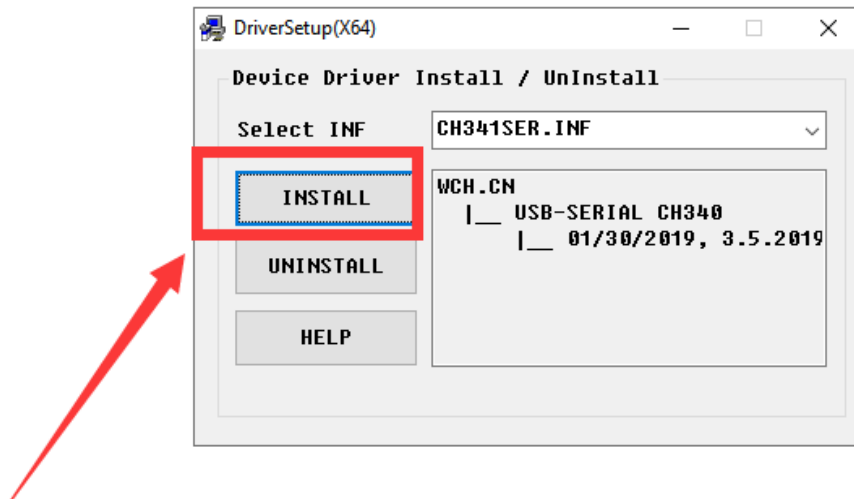


2. You need to find the user folder provided by Adeept: AdeeptRoboticArmforArduinoV3_5, find the 01 Software Package folder, and open the Adeept driver folder. If you are using a Windows system, you can directly double-click to open CH341SER_Windows.EXE, install corresponding driver according to the computer operating system (For the installation of non Windows systems, please refer to the corresponding installation instructions in the package provided by us).

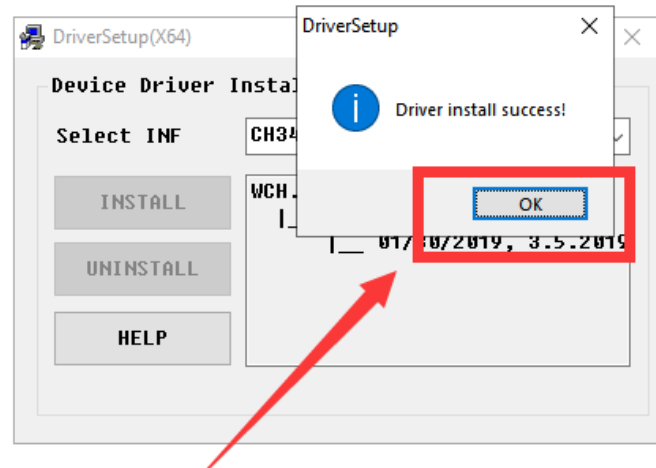
Name	Date modified	Type	Size
Adeept driver introduction.txt	6/17/2020 2:18 PM	Text Document	1 KB
CH341SER_ANDROID.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	2,360 KB
CH341SER_LINUX.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	9 KB
CH341SER_MAC.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	149 KB
CH341SER_Windows.EXE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

3. Click INSTALL. Wait for the installation to succeed. And click OK.

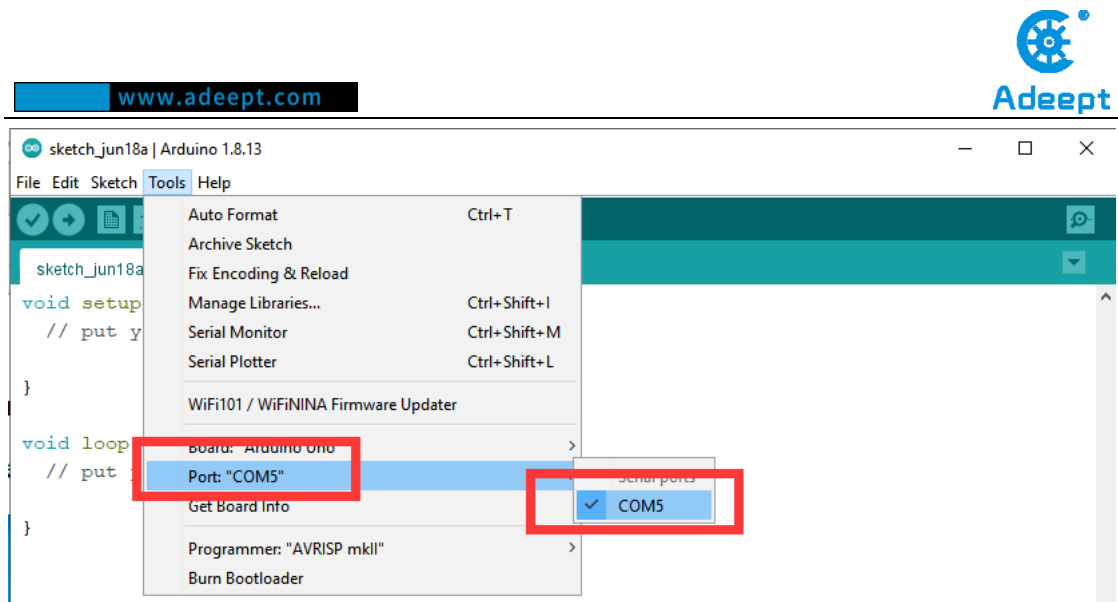
Name	Date modified	Type	Size
Adeept driver introduction.txt	6/17/2020 2:18 PM	Text Document	1 KB
CH341SER_ANDROID.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	2,360 KB
CH341SER_LINUX.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	9 KB
CH341SER_MAC.ZIP	6/17/2020 2:18 PM	WinRAR ZIP 压缩...	149 KB
CH341SER_Windows.EXE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



4.Now you will find the Arduino serial port is accessible (different computer configuration has different serial port).It means that the Arduino UNO development board has been successfully connected to the computer. You will need to pay attention to this connection step in the following course.



2.6 The solution for situation that Arduino IDE cannot be opened

When opening the Arduino IDE, you will suddenly encounter a situation that it cannot be opened.



【Solution】

You need to find the Arduino15 folder in the \Users\ASUS\AppData\Local\Arduino15 directory of the C drive. As shown below:

Name	Date modified	Type	Size
cache	5/21/2020 6:35 PM	File folder	
logs	5/21/2020 6:34 PM	File folder	
library_index.json	6/10/2020 10:45 AM	JSON File	12
library_index.json.sig	6/10/2020 10:45 AM	SIG File	
package_index.json	6/10/2020 10:45 AM	JSON File	
package_index.json.sig	6/10/2020 10:45 AM	SIG File	
preferences.txt	6/10/2020 10:43 AM	Text Document	

You need to delete the package_index.json file, and then reopen the Arduino IDE.

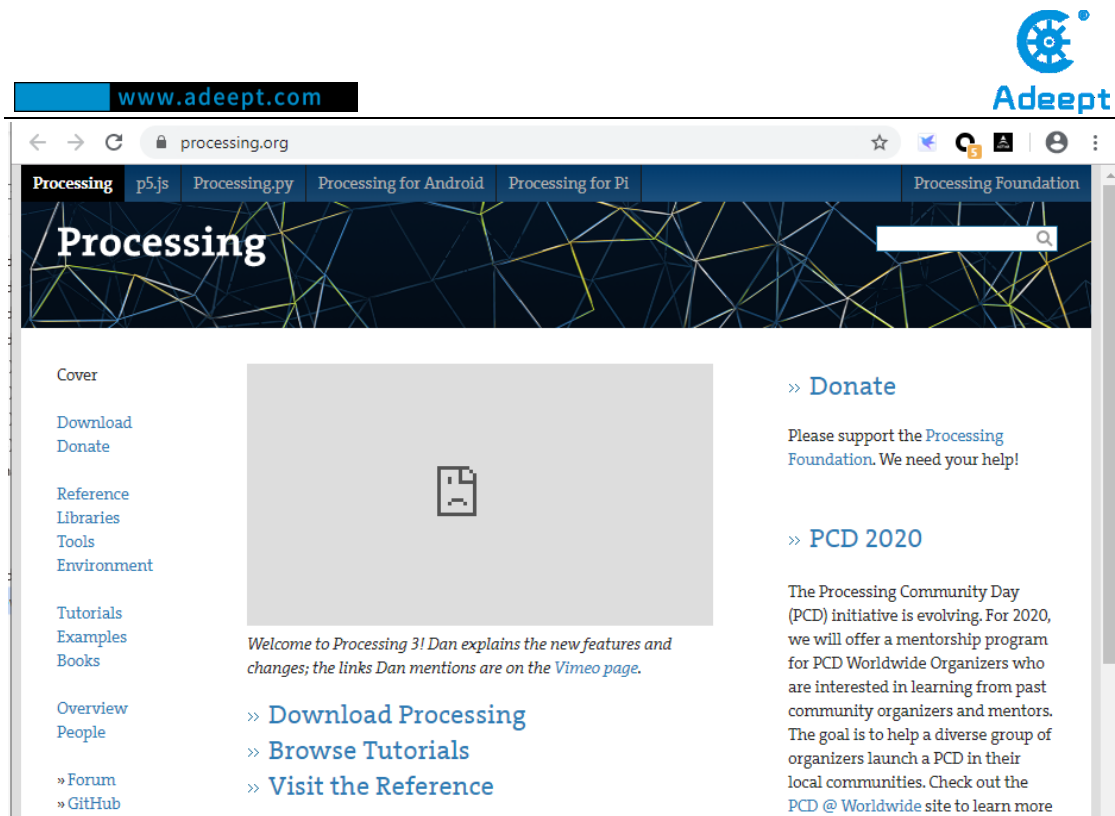
cache	5/21/2020 6:35 PM	File folder
logs	5/21/2020 6:34 PM	File folder
library_index.json	6/10/2020 10:58 AM	JSON File
library_index.json.sig	6/10/2020 10:58 AM	SIG File
package_index.json	6/10/2020 10:58 AM	JSON File
package_index.json.sig	6/10/2020 10:58 AM	SIG File
package_index.txt	6/10/2020 10:45 AM	Text Document
preferences.txt	6/10/2020 10:58 AM	Text Document

2.7 Download Processing

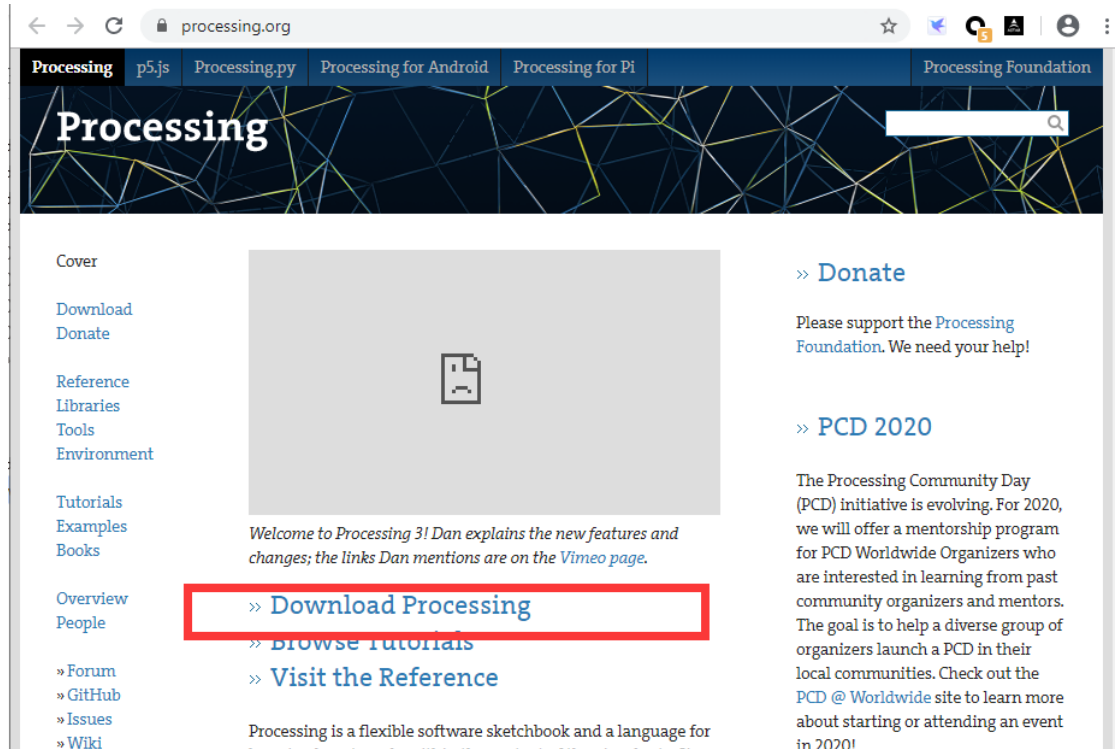
Processing is a revolutionary and forward-looking new computer language. Its concept is to introduce programming languages in the environment of electronic art and introduce the concept of electronic art to programmers. It is an extension of the Java language and supports many existing Java language architectures. It is not only much simpler in syntax, but has many intimate and user-friendly designs. Processing can be used on Windows, MAC OS X, MAC OS 9, Linux and other operating systems. The latest version is Processing 3. The work done in Processing can be used on the personal computer side or exported to the Internet in the form of Java Applets.

How to download Processing?

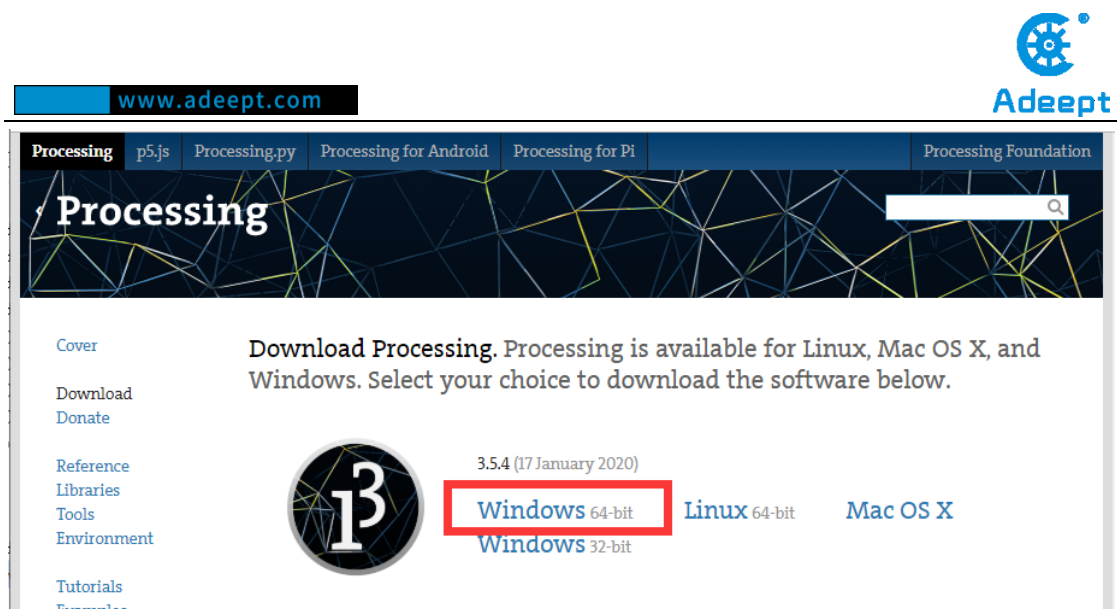
1. Enter this URL with Google Chrome: <https://processing.org/>



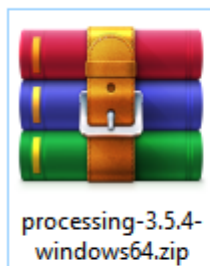
2. Click Download Processing, as shown below:



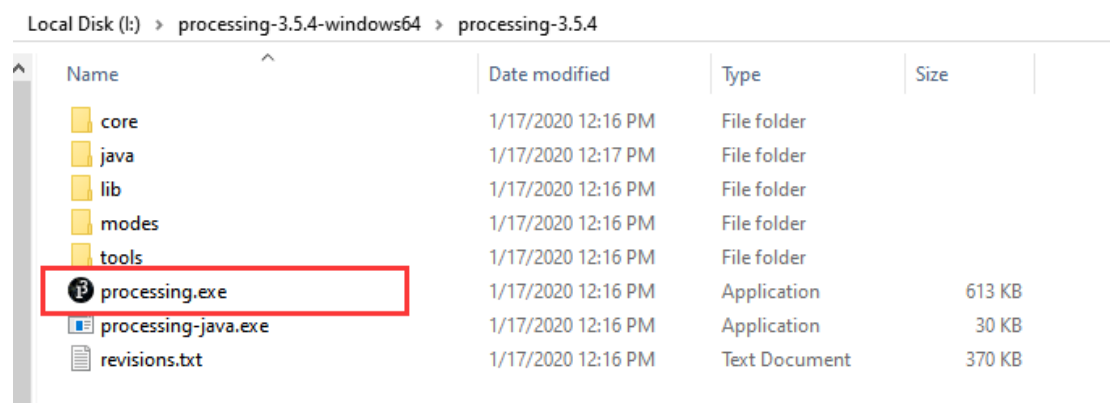
3. The operating system we choose to use here is windows 64-bit, select "Windows 64-bit".



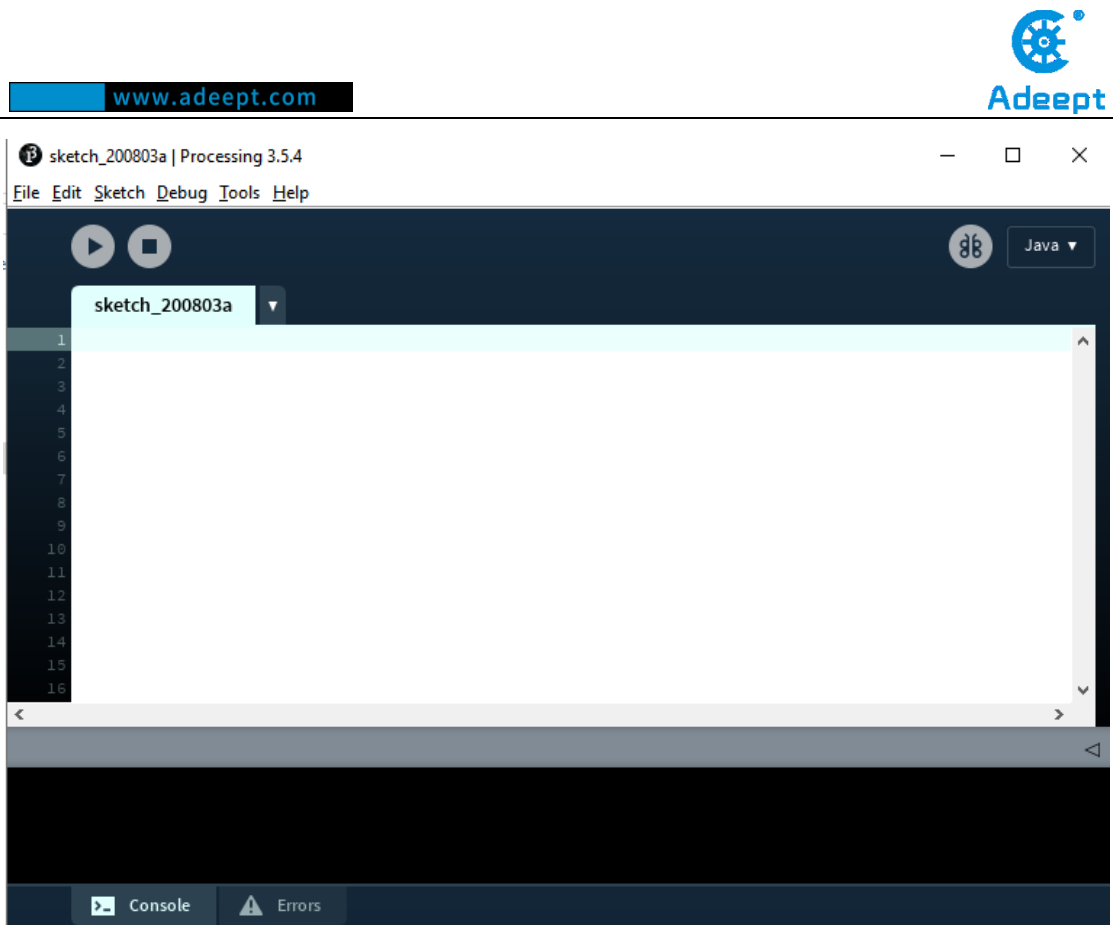
4. When finish downloading, you will get a compressed file "processing-3.5.4-windows64.zip".



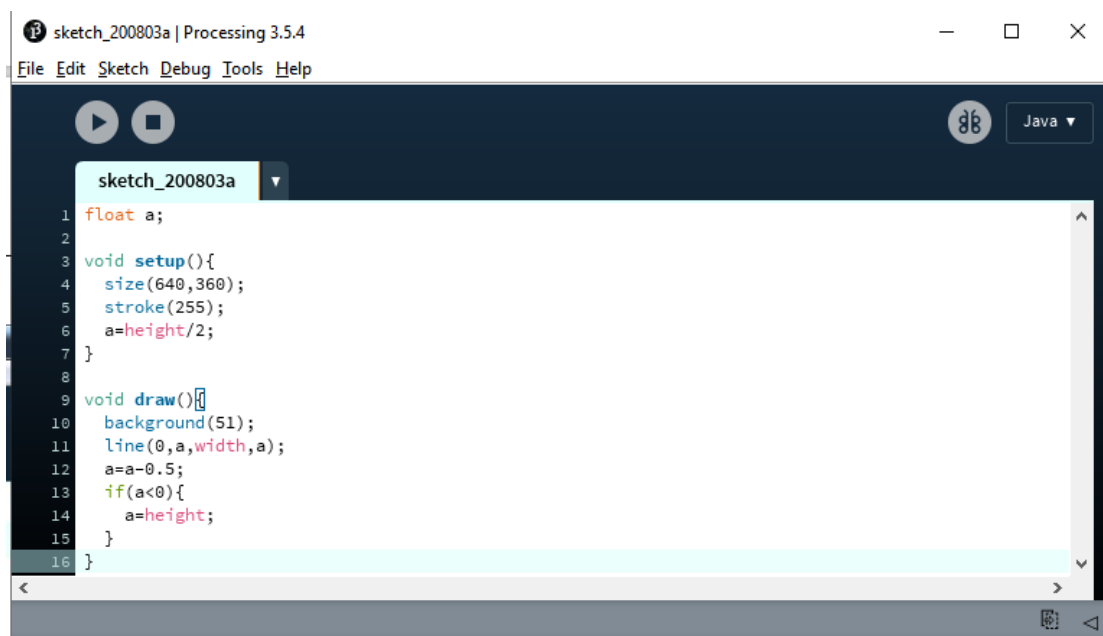
5. After extracting this file, you can get the following file, just click to run processing, it can be run directly without installation.



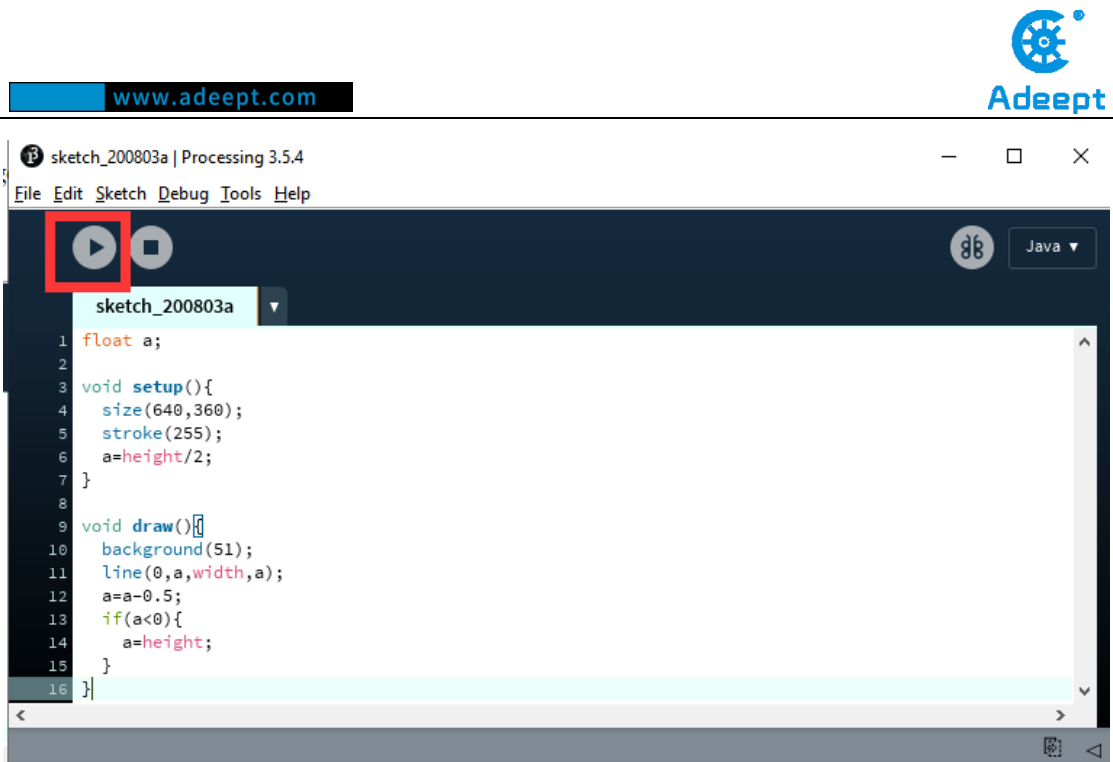
6. The interface is as follows after the Processing runs



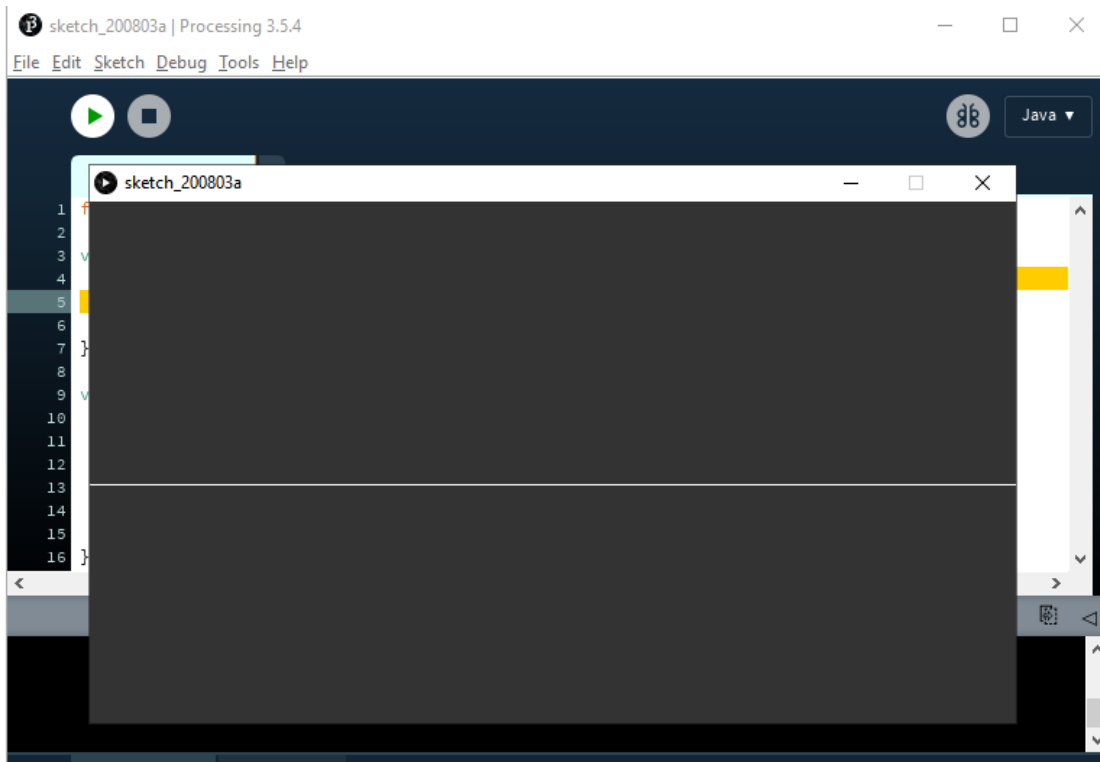
7. Let's write a simple code that implements the following functions "Change the variable to create a moving line. When the line moves out of the window edge, the variable becomes 0 and the line goes back to the bottom of the screen"



8. Click "Run".



9. Running effect is as follow.

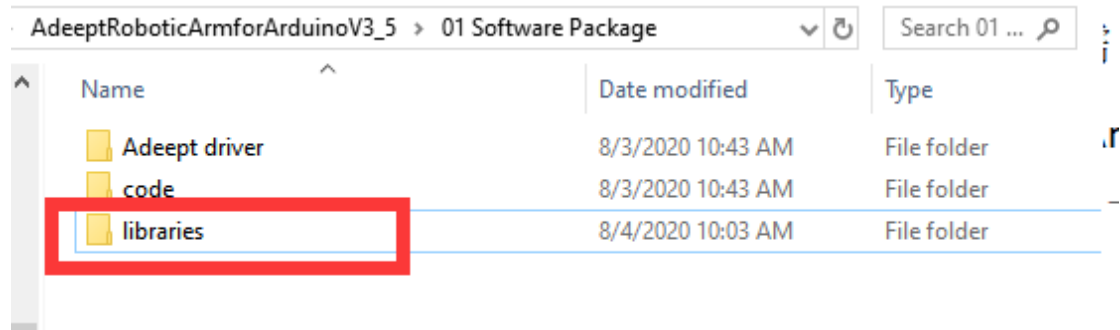


We need to upload a piece of code to the Aadept Robotic Arm Drive Board before starting to assemble the robotic arm. Find out "00 The servo initialization code of robotic arm assembly" in the documentation we provided and upload the code from the file to Aadept Robotic Arm Drive Board.

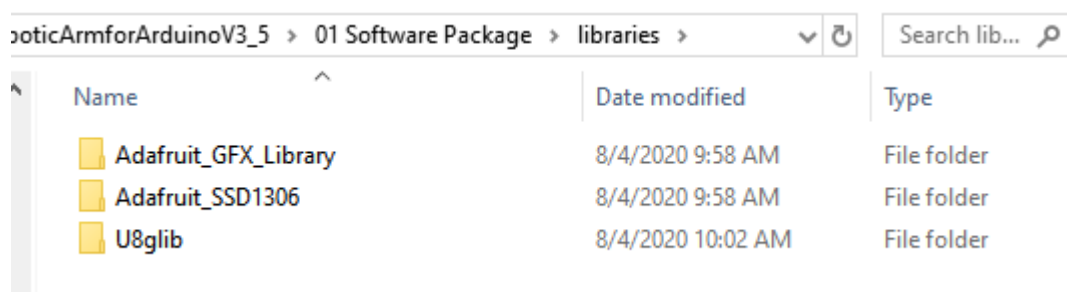
2.8 Configuring the "libraries" folder of the Arduino IDE

Before using Aadept Robotic Arm, you need to configure the "libraries" folder under the downloaded Arduino IDE directory.

First, you need to find the user folder provided by Aadept: AadeptRoboticArmforArduinoV3_5, and find the "libraries" folder under the 01 Software Package folder, as shown below:



Open the "libraries" folder, as shown below:



You need to copy "Adafruit_GFX_Library", "Adafruit_SSD1306", "U8glib". Copy all three files to the "libraries" under the Arduino IDE installation

directory, as shown in the figure below:

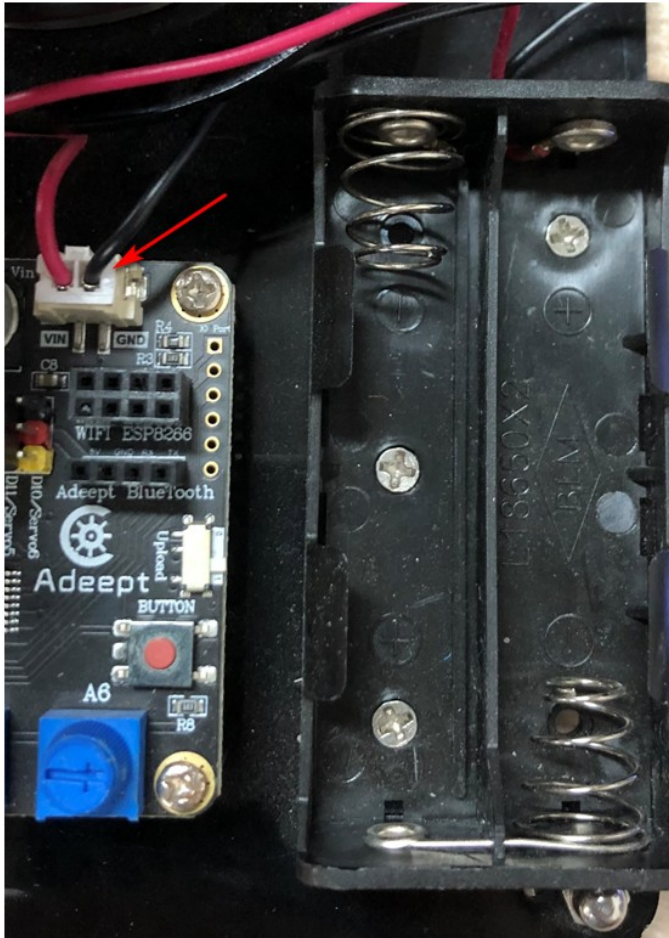
Name	Date modified	Type	Size
drivers	6/16/2020 11:44 AM	File folder	
examples	6/16/2020 11:44 AM	File folder	
hardware	6/16/2020 11:44 AM	File folder	
java	6/16/2020 11:44 AM	File folder	
lib	6/16/2020 11:44 AM	File folder	
libraries	6/16/2020 11:44 AM	File folder	
reference	6/16/2020 11:44 AM	File folder	
tools	6/16/2020 11:44 AM	File folder	
tools-builder	6/16/2020 11:44 AM	File folder	
arduino.exe	6/16/2020 11:44 AM	Application	72 KB
arduino.l4j.ini	6/16/2020 11:44 AM	Configuration sett...	1 KB
arduino_debug.exe	6/16/2020 11:44 AM	Application	69 KB
arduino_debug.l4j.ini	6/16/2020 11:44 AM	Configuration sett...	1 KB

Paste the three folders in "libraries". As shown below:

Name	Date modified	Type
Adafruit_Circuit_Playground	7/1/2020 6:11 PM	File folder
Adafruit_GFX_Library	8/4/2020 10:11 AM	File folder
Adafruit_NeoPixel	7/1/2020 6:14 PM	File folder
Adafruit_SSD1306	8/4/2020 10:11 AM	File folder
ArduinoJson	7/7/2020 3:23 PM	File folder
Bridge	7/1/2020 6:11 PM	File folder
Dht11	7/7/2020 3:23 PM	File folder

3. Test adeept arm drive board and Servo.

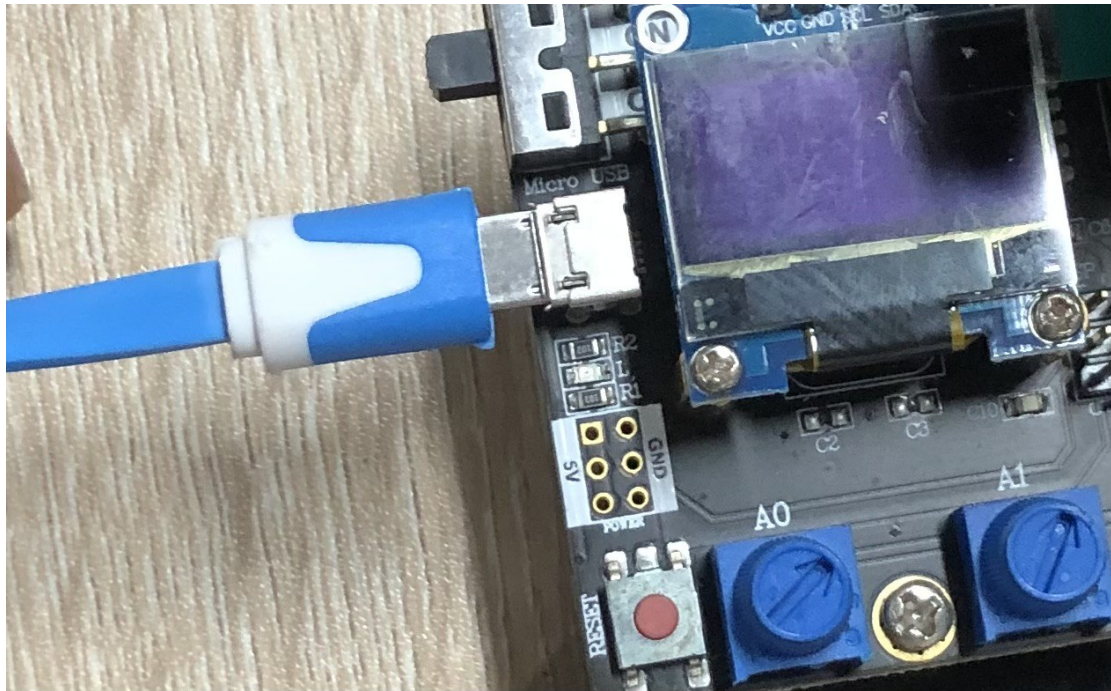
- 3.1 Refer to the assembly of the base plate in the "assembly of the robotic arm" and assemble pedestals (including fixed drive plate and battery box).
- 3.2 Connect the junction port of the battery box to the drive board, as shown in the figure:



3.3 For Windows computer users, please find the "ch341ser_windows. Exe" file under the file path: "\\ adeeptroboticamforarduinov3_5 \\ 01 software package \\ adeept driver \\", and double-click to run and install the serial port driver. Then open the installed Arduino IDE (software).

(For the installation of non Windows systems, please refer to the corresponding installation instructions in the package provided by us, For details, refer to "(3) install ch341ser driver" in Section 2.5 of this document)

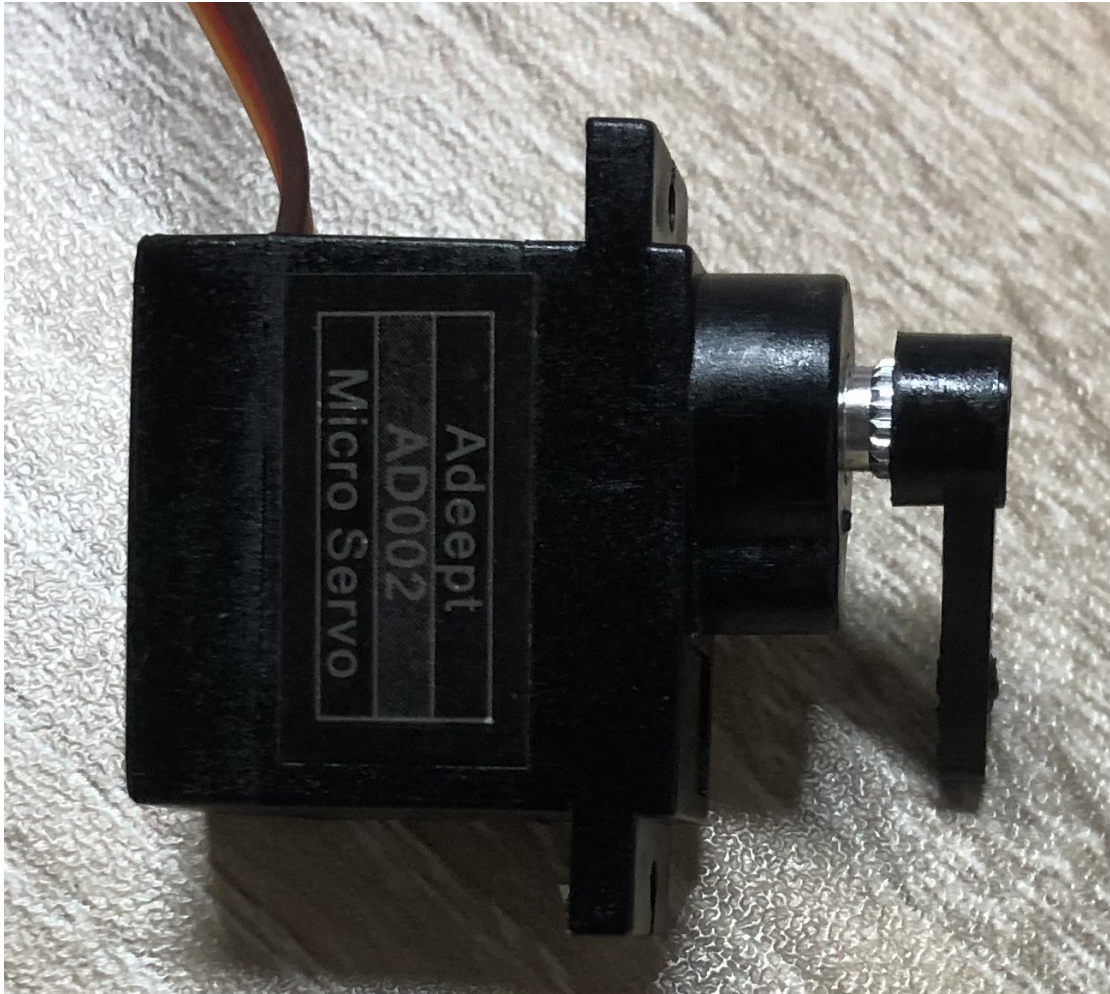
3.4 Click the menu bar of Arduino IDE interface: Tools - > port, check the existing port of the computer and write it down. Then, the USB end of micro USB cable is connected to the USB interface of the computer, and the micro interface is connected to the driver board, as shown in the figure:



At this time, please click the menu bar of Arduino IDE interface again: Tools - > port to check whether the computer adds a new port to insert the device. If a new port appears, proceed to step 3.5.

If there is no new port (except the existing port), please plug and unplug the micro USB cable again. If there is no new port, please contact the merchant to help you confirm whether the driver board hardware is damaged during transportation or due to other non user reasons, and replace the product for you.

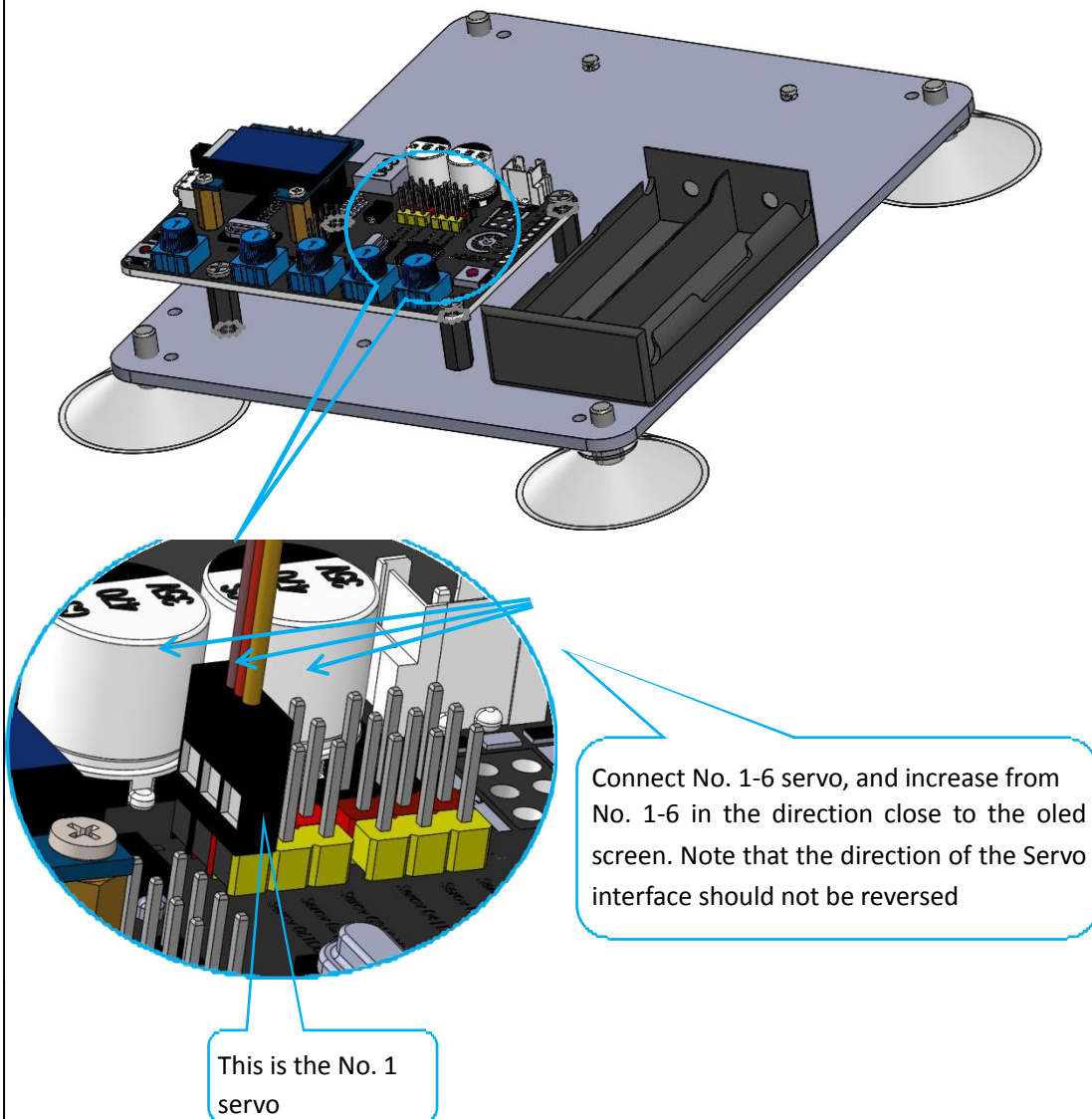
- 3.5 Unplug the USB end of the micro USB cable from the USB interface of the computer, and simply fix any rudder disc of each steering gear to the anti-skid teeth of the steering gear output shaft (the rudder disc cap has teeth connected with the anti-skid teeth, which can be easily connected to one after rotating and aligning), as shown in the figure:



Then, connect the connecting wire connectors of all 6 steering gears (including one spare steering gear) to the drive board (pay attention to the correct connection method, as shown in the steering gear connecting wire in the figure below) as shown in the figure:

Connect five servos to the Adept Arm Drive Board.

For convenience to read, only one end of the servo power cable is shown here.



(please remember to disconnect the micro USB cable from the computer first to prevent damage to the driver board caused by possible short circuit operation)

You can see the right side of the connection position, such as "D11 / servo5", where 11 represents pin 11 of the drive board, corresponding to "myservo.attach (11);" in the Arduino code to be tested later Pin 11 in.

3.6 Open the test program file under the " 02 Course Code/unpacking_test_code" directory: "unpacking_test_code.ino", and then click the menu bar of the Arduino IDE interface: Tools - > development board - > Arduino AVR boards - > click and select "Arduino uno", Tools - > port - > click and select the port of the corresponding drive board.

3.7 Then click the "Upload" button on the Arduino IDE interface. After the upload is completed, the test can be carried out.

Test code description:

Servo test:

- There are two control modes in the test: 0, separate control; 1. Full control.
- By clicking the button marked on the drive board, you can switch the next pin load steering gear to be tested.
- Please refer to the code Notes for details.

OLED test:

- After the program is uploaded, the OLED on the driver board displays "OLED OK!" Then the OLED is normal.(The content of the test displayed here can be changed)