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ESP32 WIFI Camera Smart Car Kit

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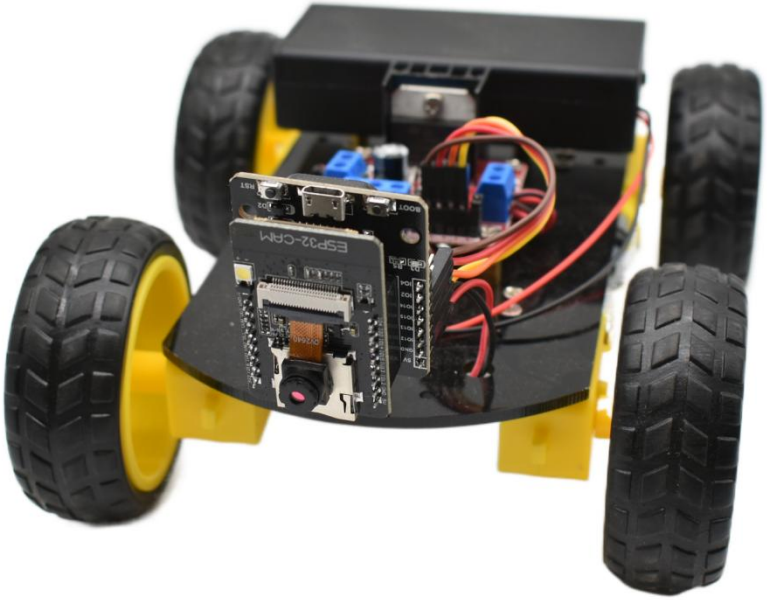

Content

Preface

Company Profile

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

Customer Service

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

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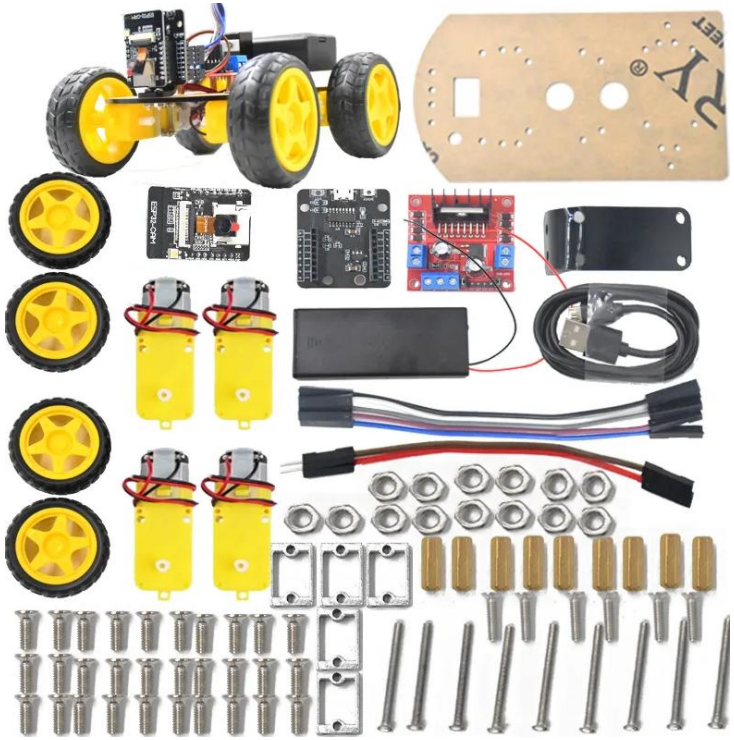
Tutorial

This tutorial include codes,libraries and lessons. It is designed for beginners.



How to Install Arduino IDE

Introduction

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

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

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

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

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

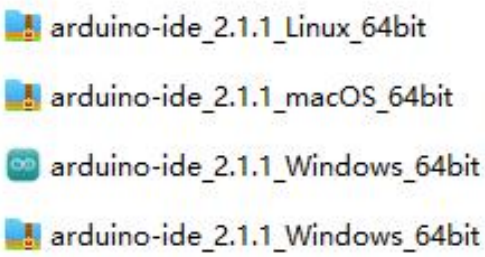
STEP2：Download the development software that is compatible with the operating.

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

Click Windows Win 10 and newer,64 bits.

Click JUST DOWNLOAD.

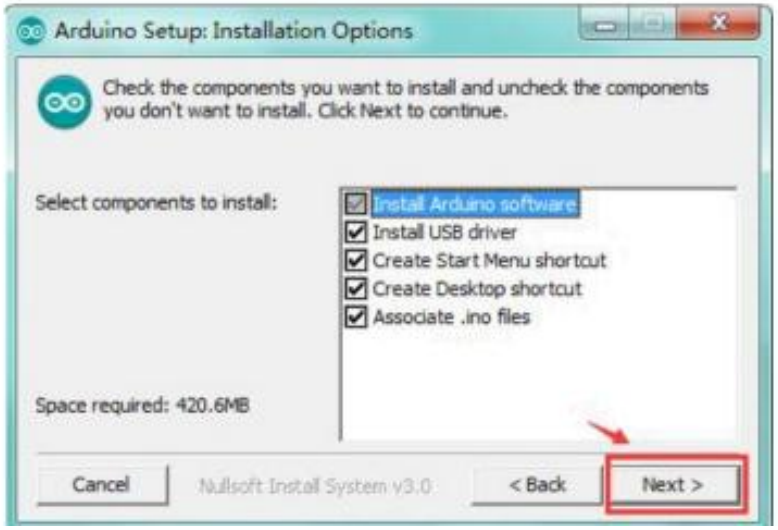
Also version 2.1.1 is available in the material we provided, and the versions of our materials are the latest versions when this course was made.



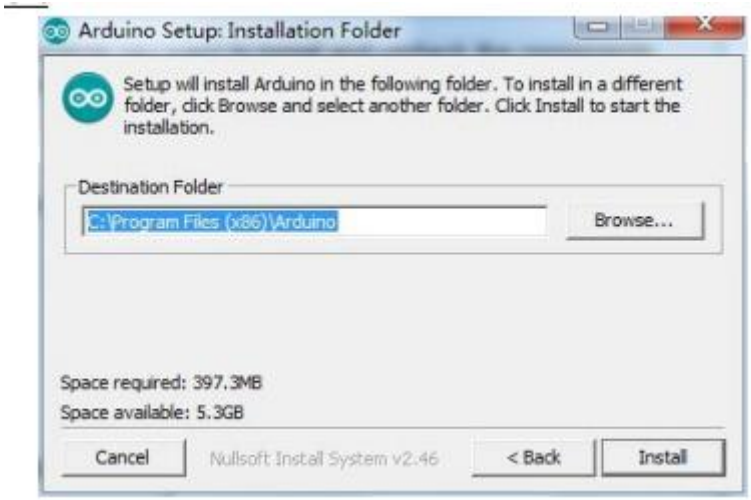
Installing Arduino (Windows)

Install Arduino with the exe. Installation package.

Click I Agree to see the following interface.

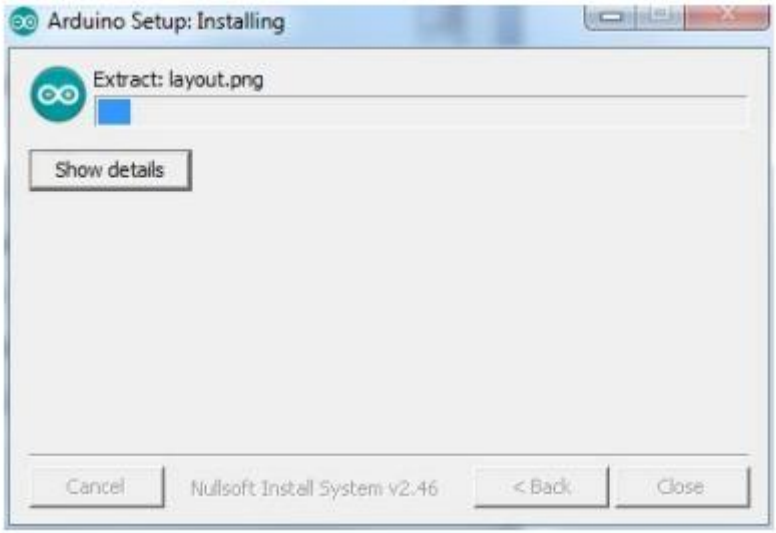

Arduino Setup: Installation Options
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.
Select components to install:
Install Arduino software
Install USB driver
Create Start Menu shortcut
Create Desktop shortcut
Associate .ino files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

Click Next



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

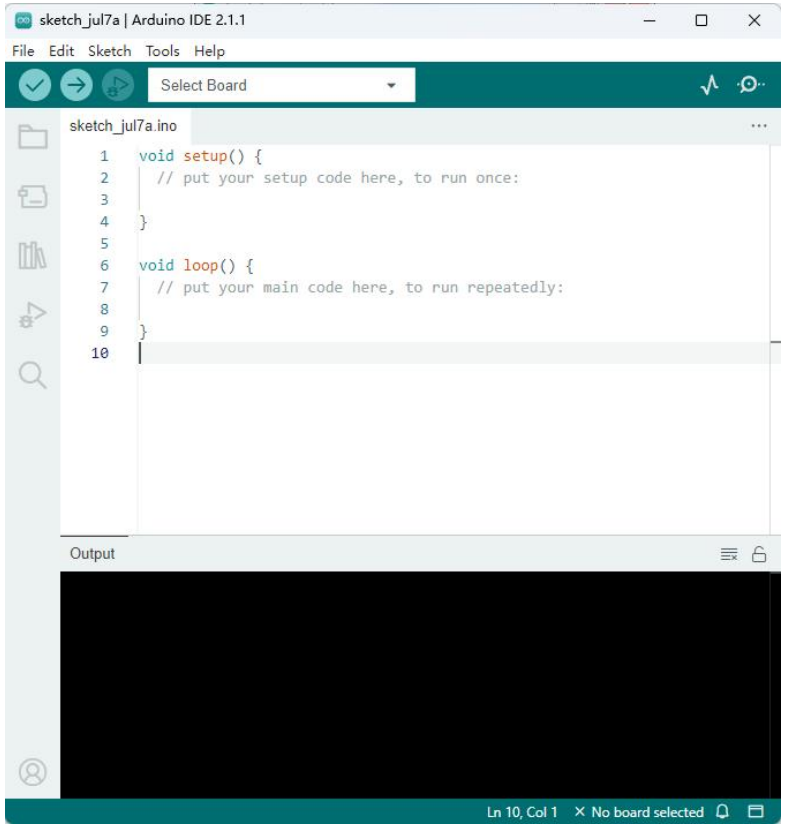
Click Install to initiate installation



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

Next, the following icon appears on the desktop

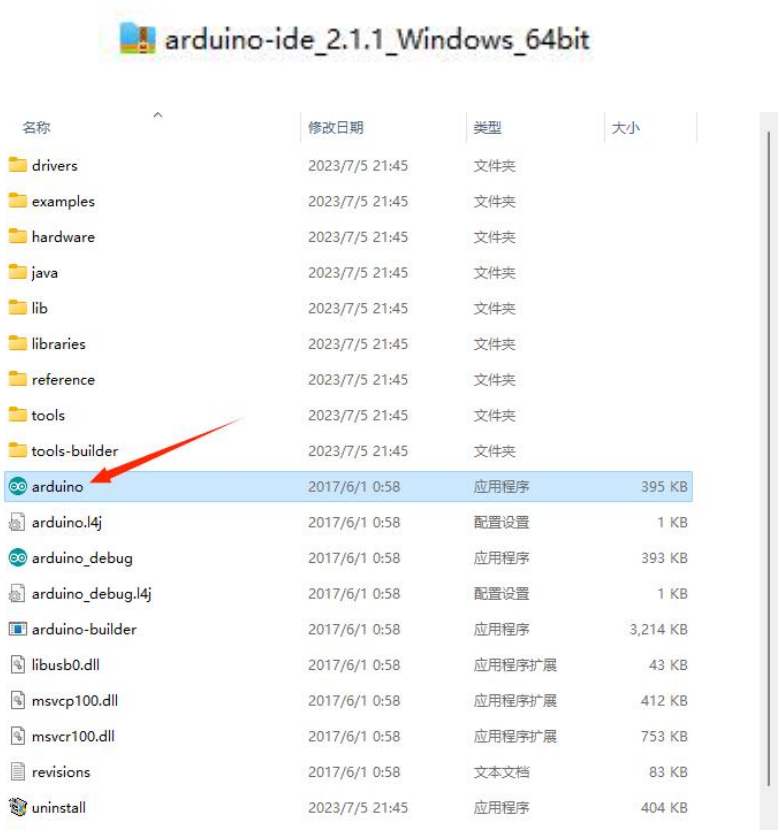
Double-click to enter the desired development environment



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

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

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



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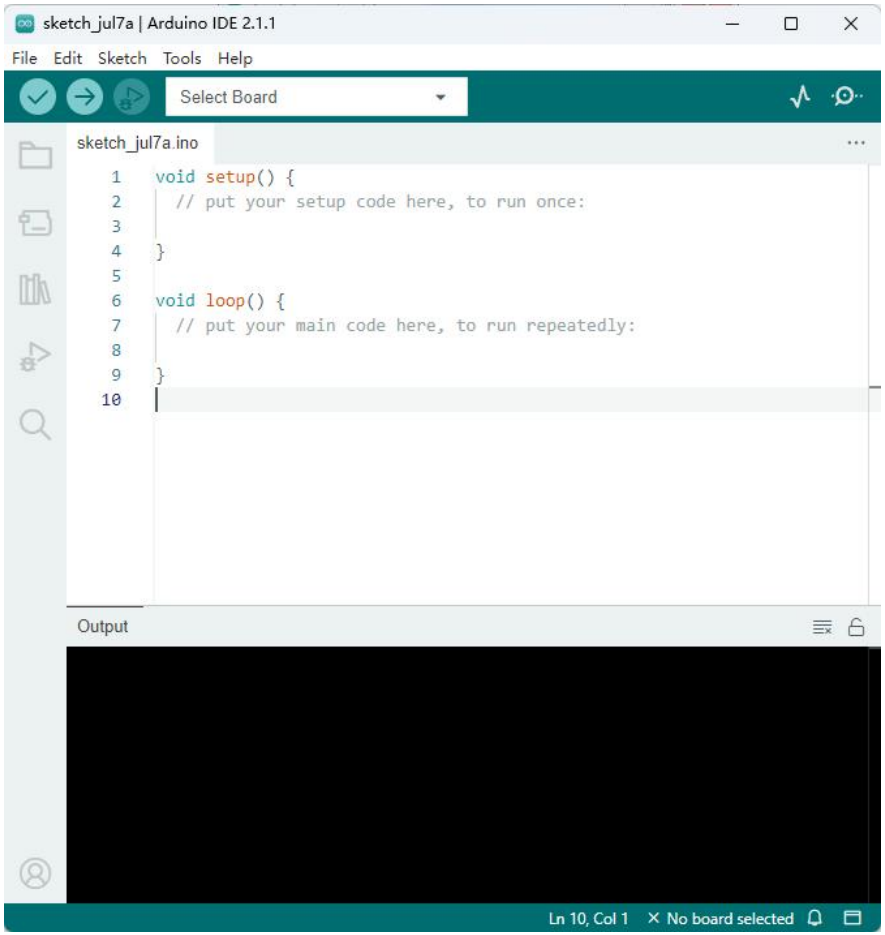
sketch_jul7a | Arduino IDE 2.1.1
File Edit Sketch Tools Help
Select Board
sketch_jul7a.ino
1 void setup() {
2 // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7 // put your main code here, to run repeatedly:
8
9 }
10
Output
Ln 10, Col 1
No board selected

Installing Arduino (Mac)

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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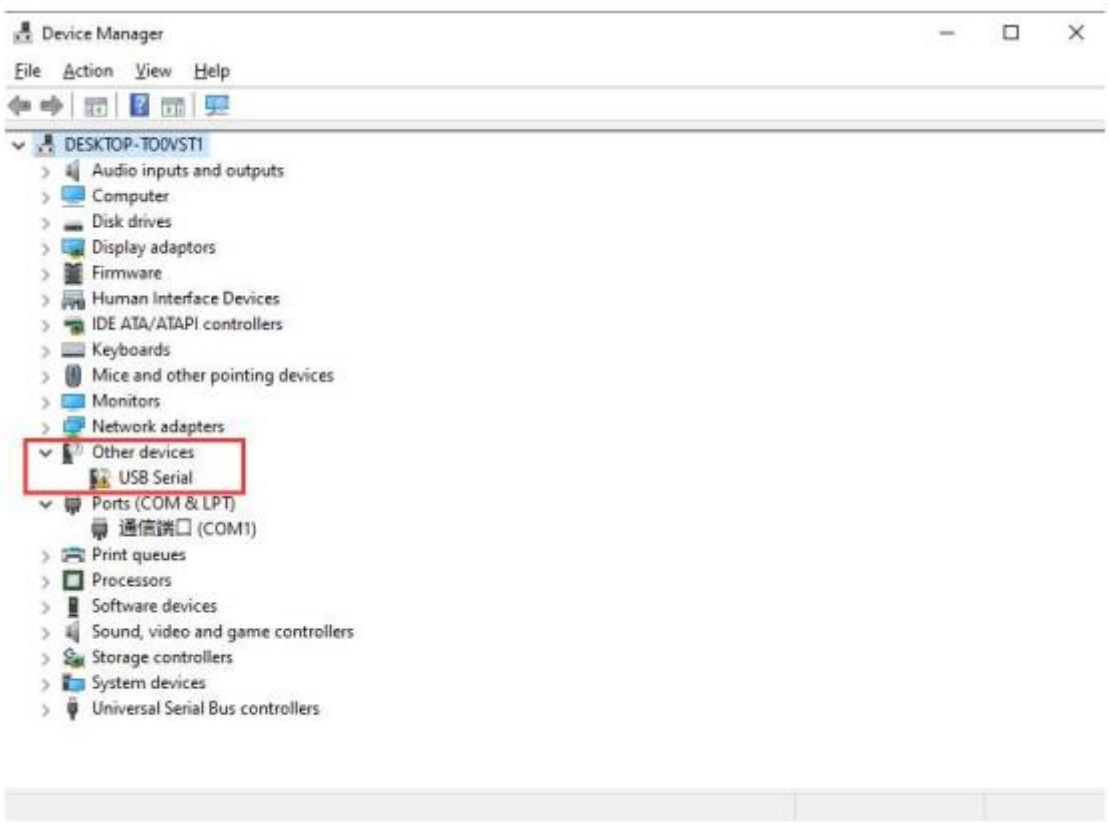
How to Install Arduino Driver

Using the ESP32-CAM-MB module makes it easier to upload code for the ESP32-CAM. The serial port conversion chip of MB is CH340. So before uploading the code, you need to install the CH340 driver. Otherwise you won't be able to find the correct COM port in the Arduino IDE.If your computer has already installed the CH340 driver, you can skip this step.

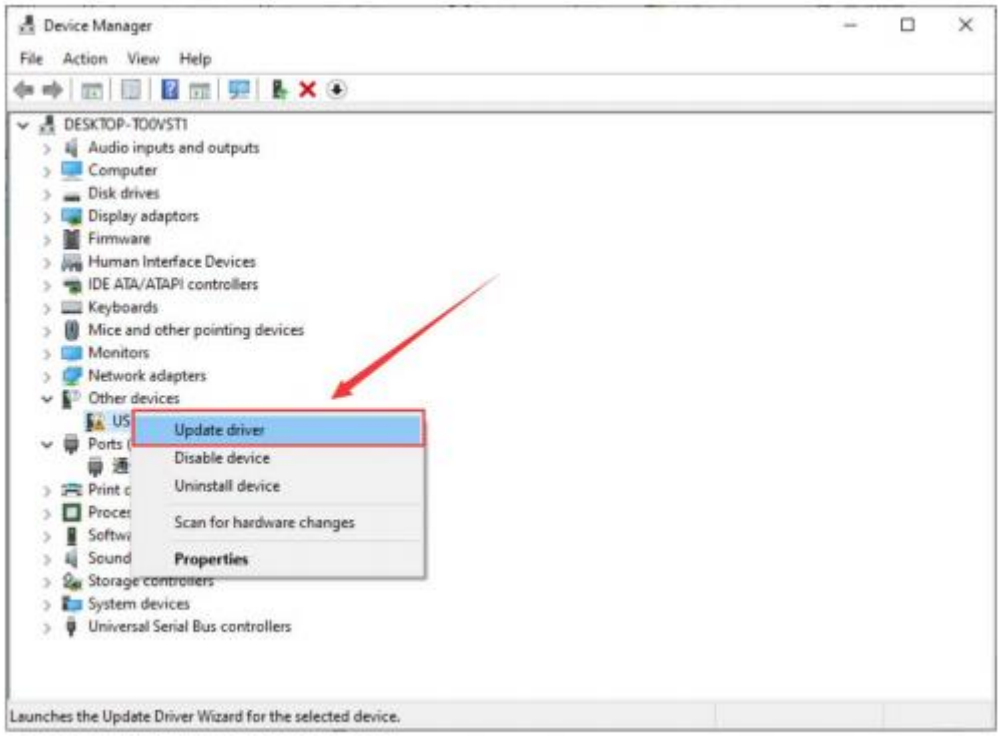
In different systems, the driver installation is similar. Here we start to install the driver on the Win10 system. You can find the “USB_Drive_CH341_3_1” folder in the information we provide, this is the driver file we want to install.

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

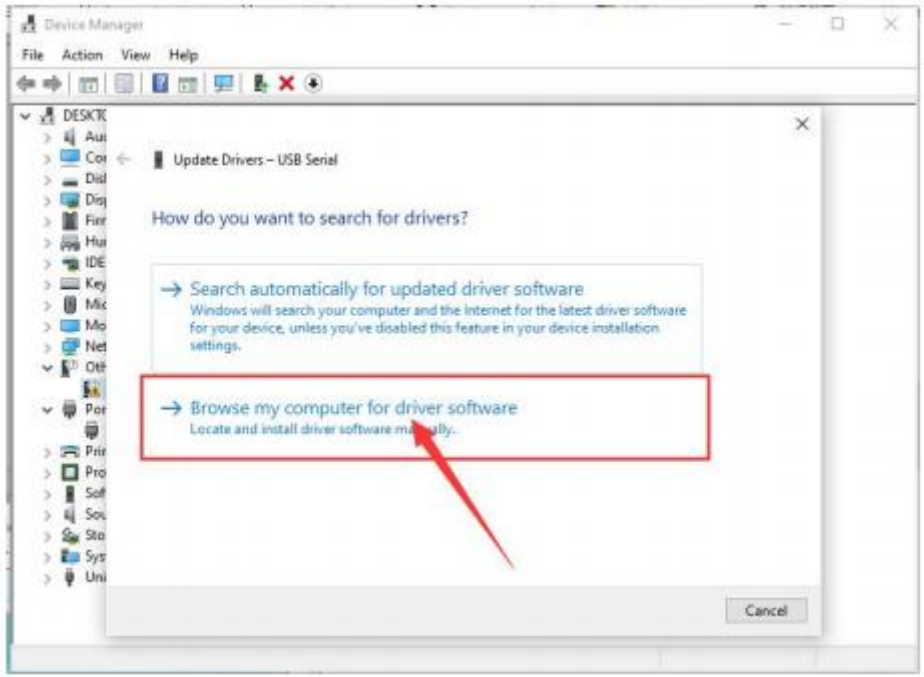
When you connect the Arduino UNOR3 Board to your computer at the first time, right click your “My Computer”—>for “Properties”—>click the “Device manager”, under Other devices, you should see the “USB-Serial” or “Unknown device ”.Or you can search for "devi" in your computer, or you can open the device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



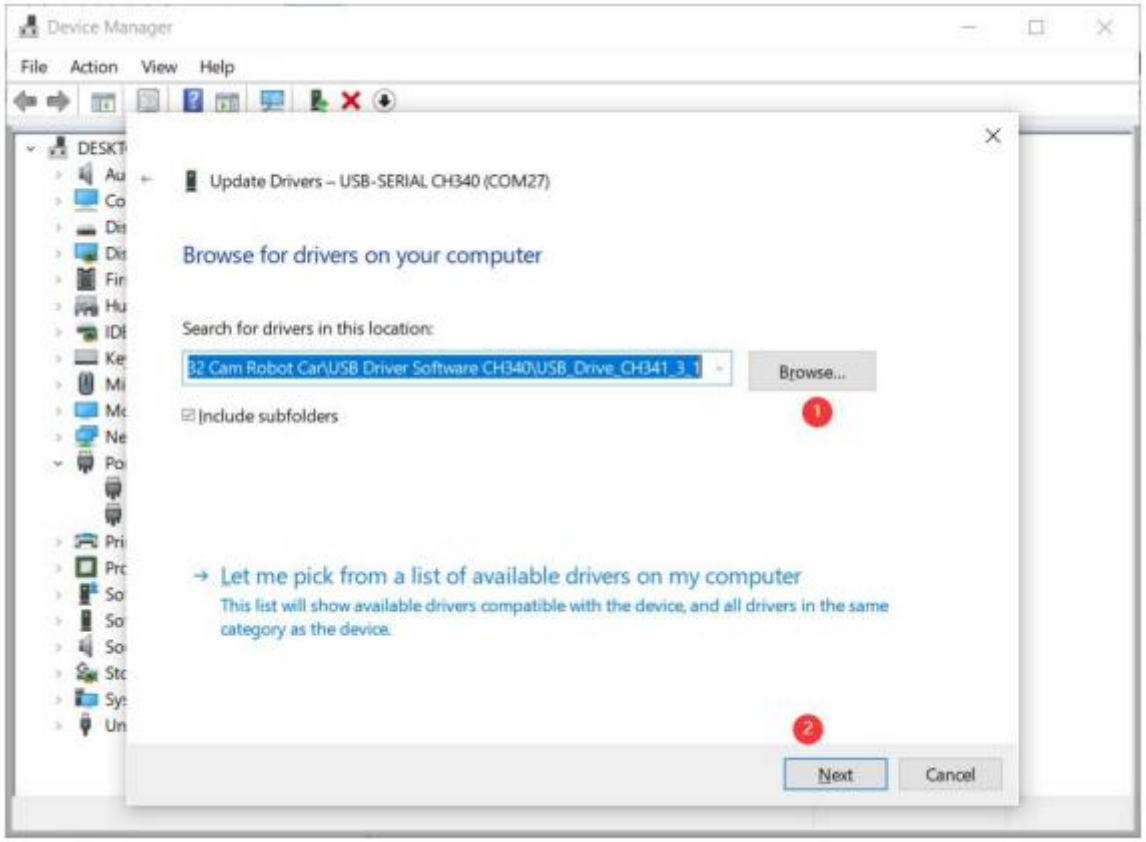
Then right-click on the device and select the top menu option (Update Driver Software...) shown as the figure below.



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

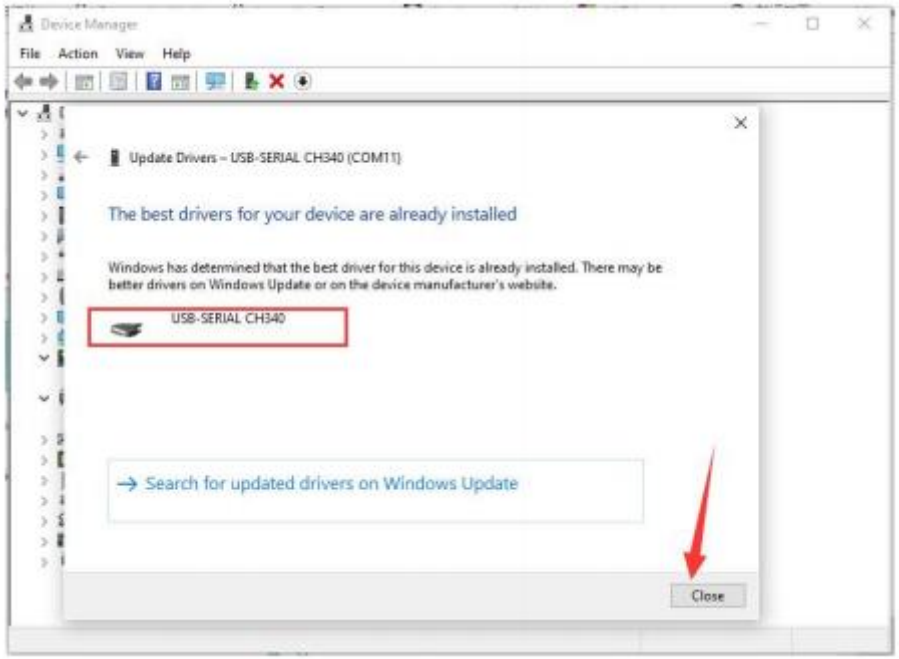


After that, select the browse option and navigate to the drive folder "USB_Drive_CH341_3_1", which can be found in the information we provide.

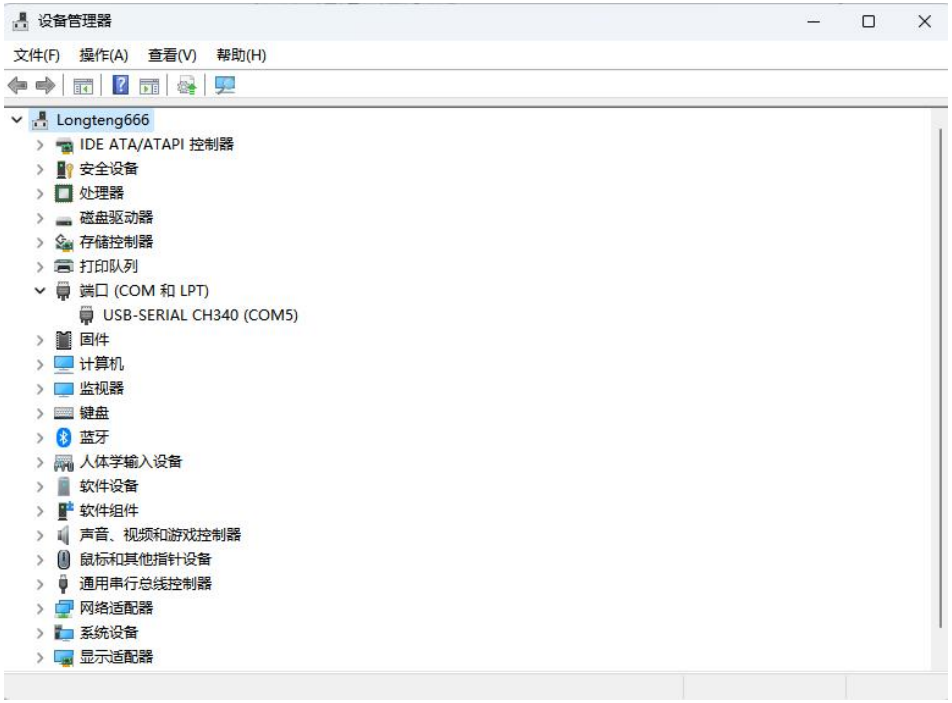


Once the software has been installed, you will get a confirmation message.

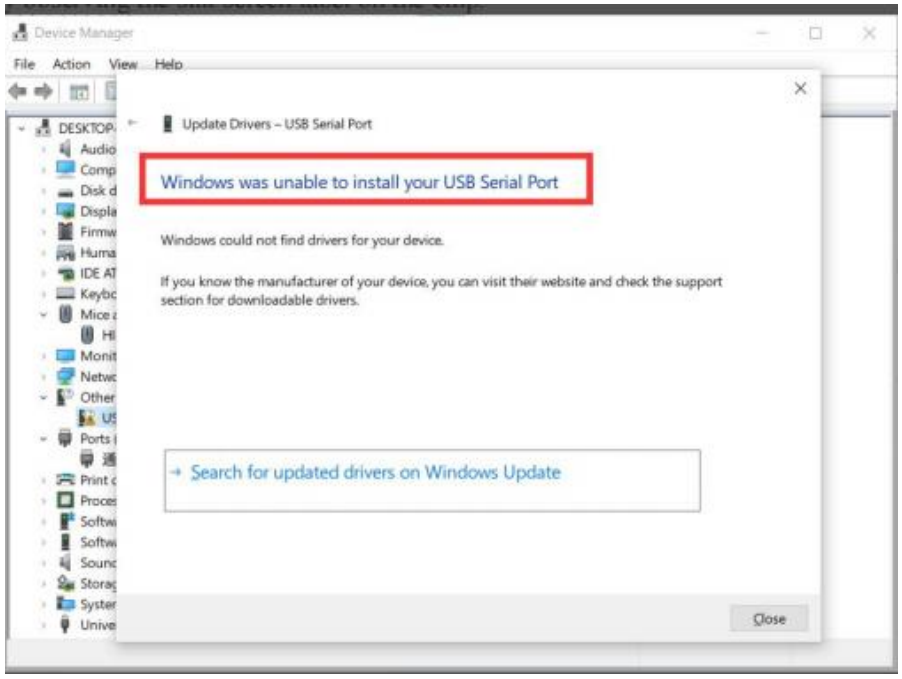
Installation completed, click “Close”.



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



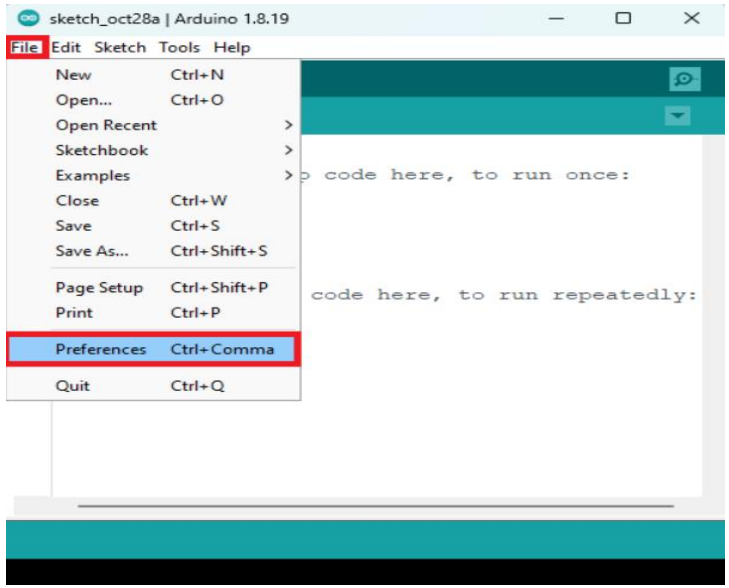
Note:If there is an error message: maybe the serial port conversion chip model of ESP32 CAM MB is "FT232RL", you can refer to Install or update FTDI drivers. You can judge whether the serial port conversion chip is "CH340G" or "FT232RL" by observing the silk screen label on the chip.



How to Install ESP32 Add-on in Arduino IDE

To install the ESP32 board in your Arduino IDE, follow these next instructions:

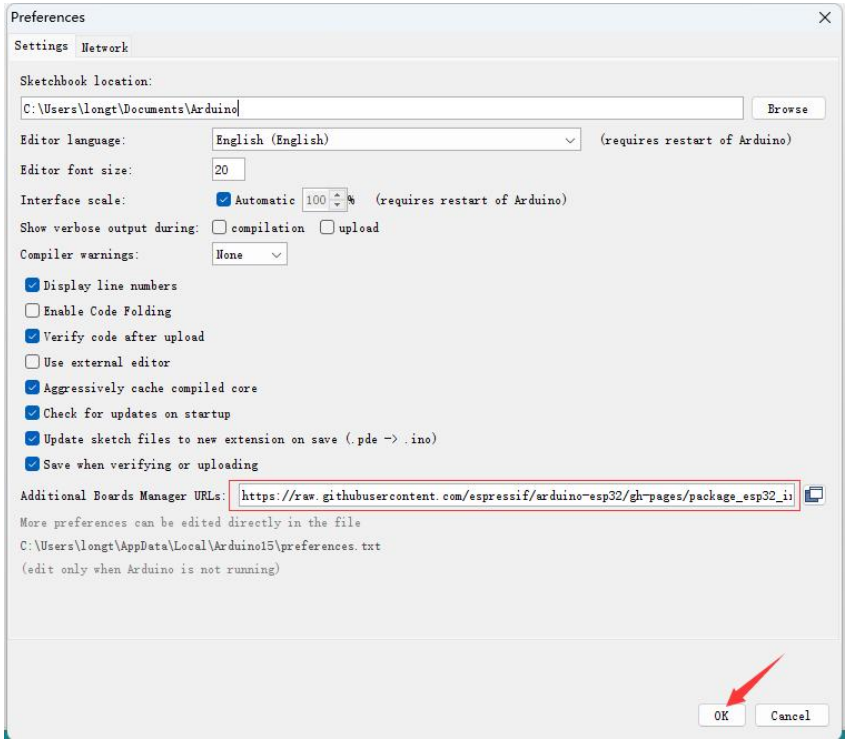
1.In your Arduino IDE, go to File> Preferences



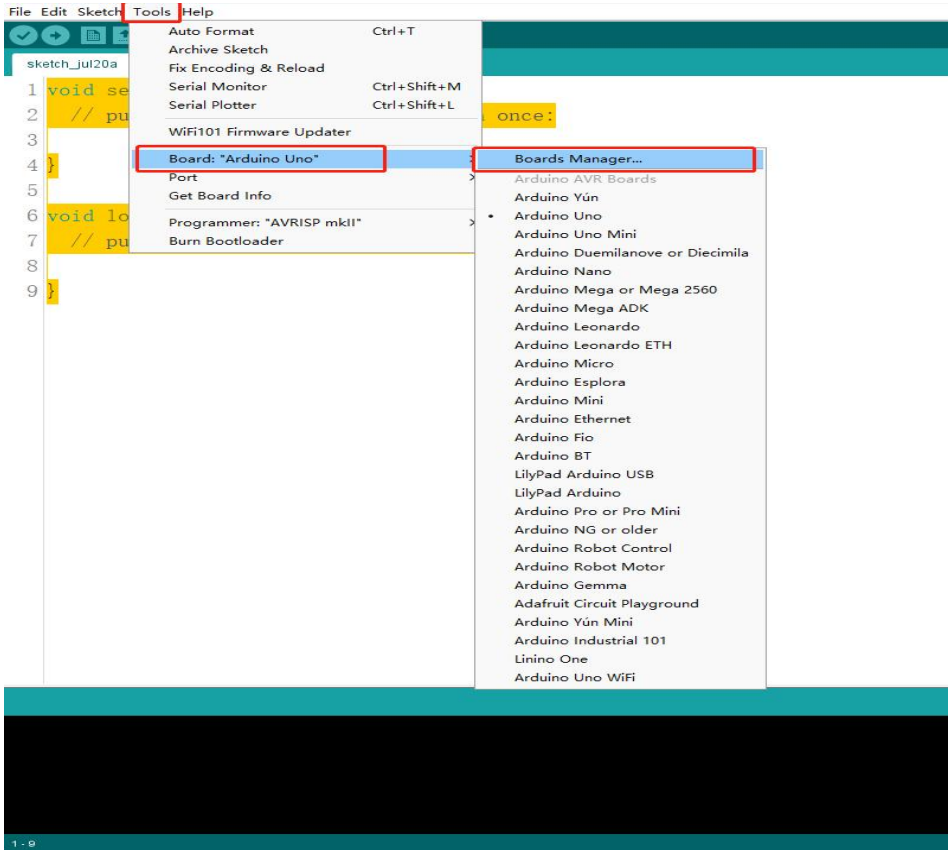
2.Enter the following into the “Additional Board Manager URLs” field:

https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json

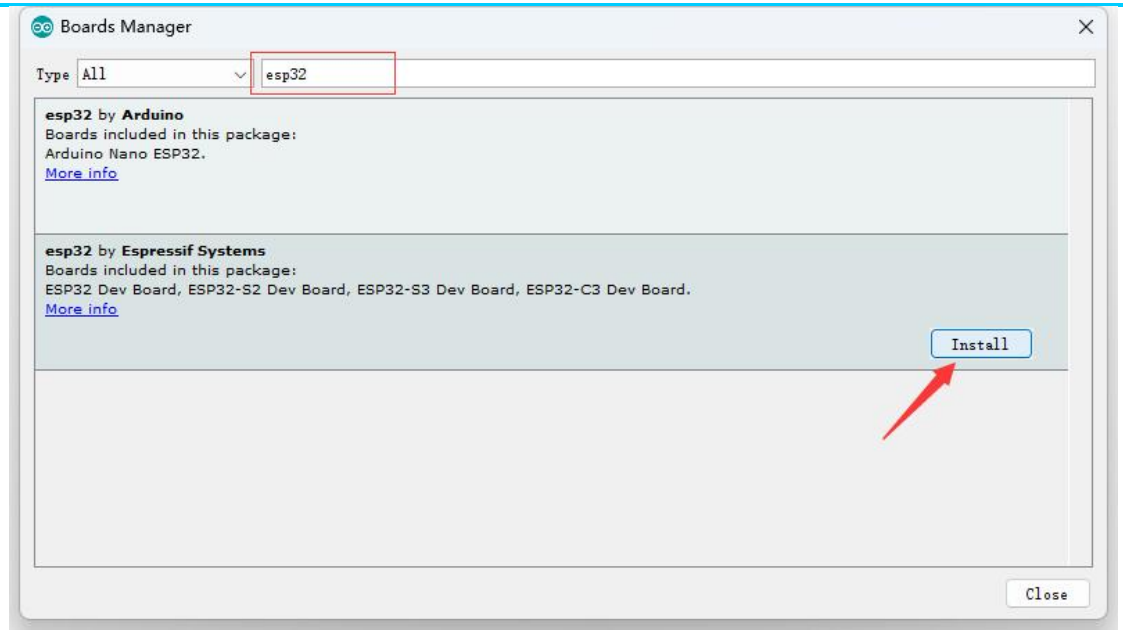
Then, click the “OK” button:



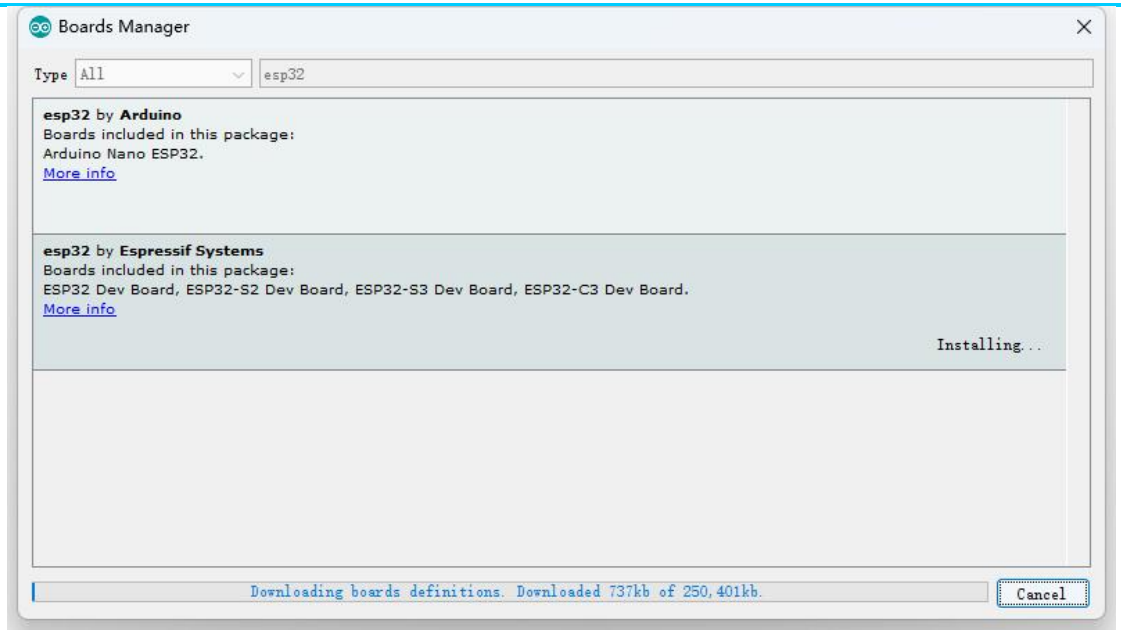
3.Open the Boards Manager. Go to **Tools > Board > Boards Manager…**



4. Search for **ESP32** and press install button for the "**ESP32 by Espressif Systems**":



5.That’s it. It should be installed after a few seconds.

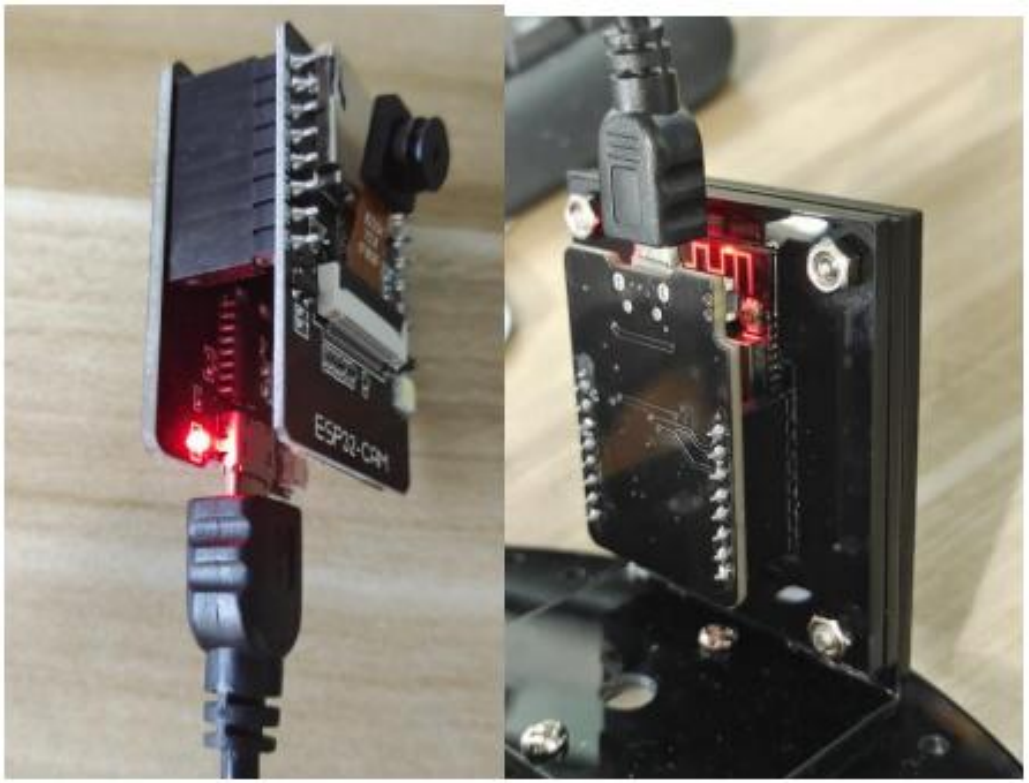


Upload ESP32 CAM Robot Car Code

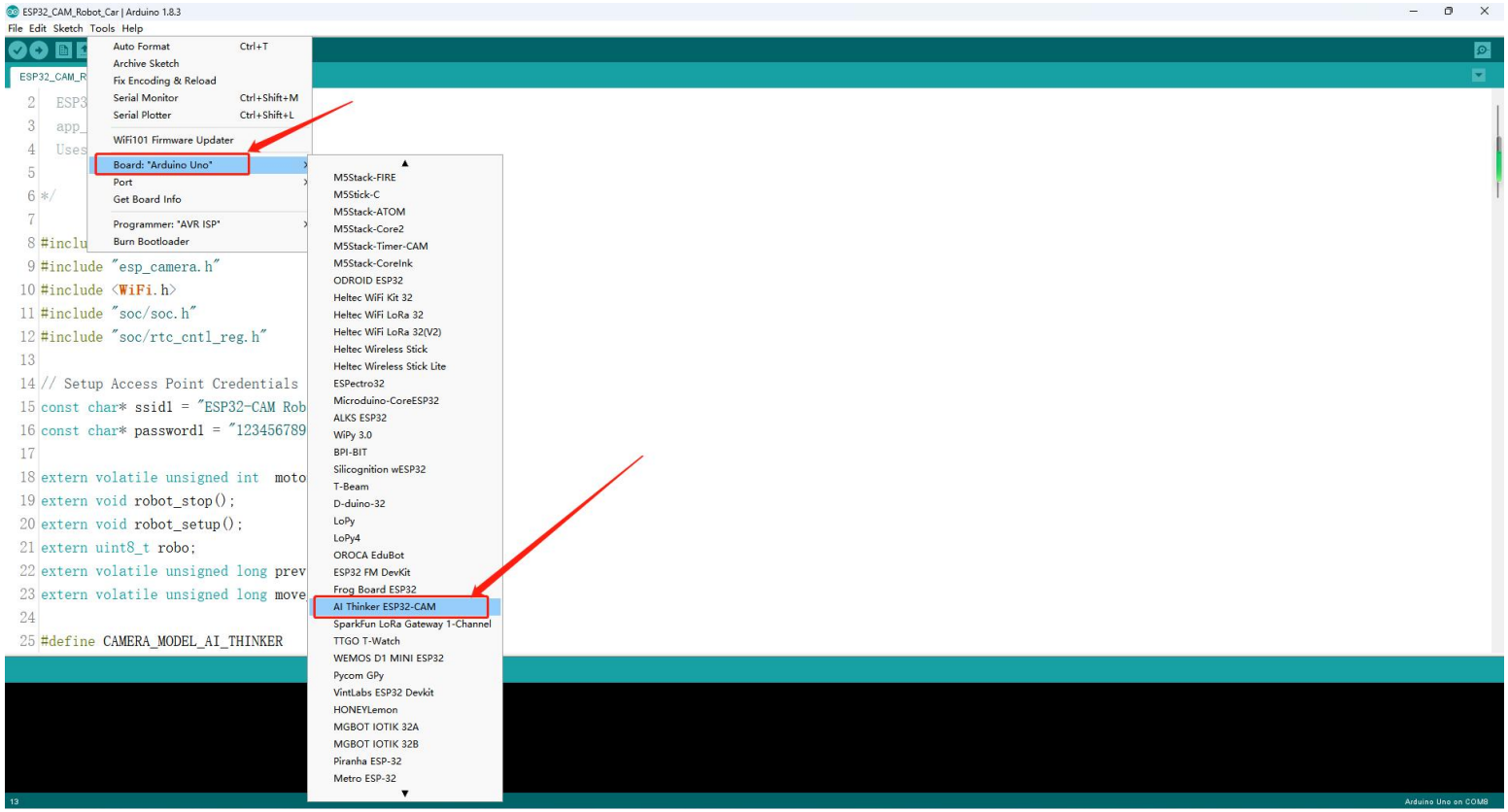
1. Start Arduino IDE, open the code in **File>Open...>>>ESP32_CAM_Robot_Car.ino**


ESP32_CAM_Robot_Car | Arduino 1.8.3
File Edit Sketch Tools Help
Open an Arduino sketch...
查找范围(I):
ESP32_CAM_Robot_Car
主文件夹
桌面
库
此电脑
网络
名称
修改日期
app_httpd.cpp
2023/8/14 14:42
ESP32_CAM_Robot_Car.ino
2023/8/14 11:22
对象名称(N):
对象类型(T):
All Files (*.*)
打开(O)
取消

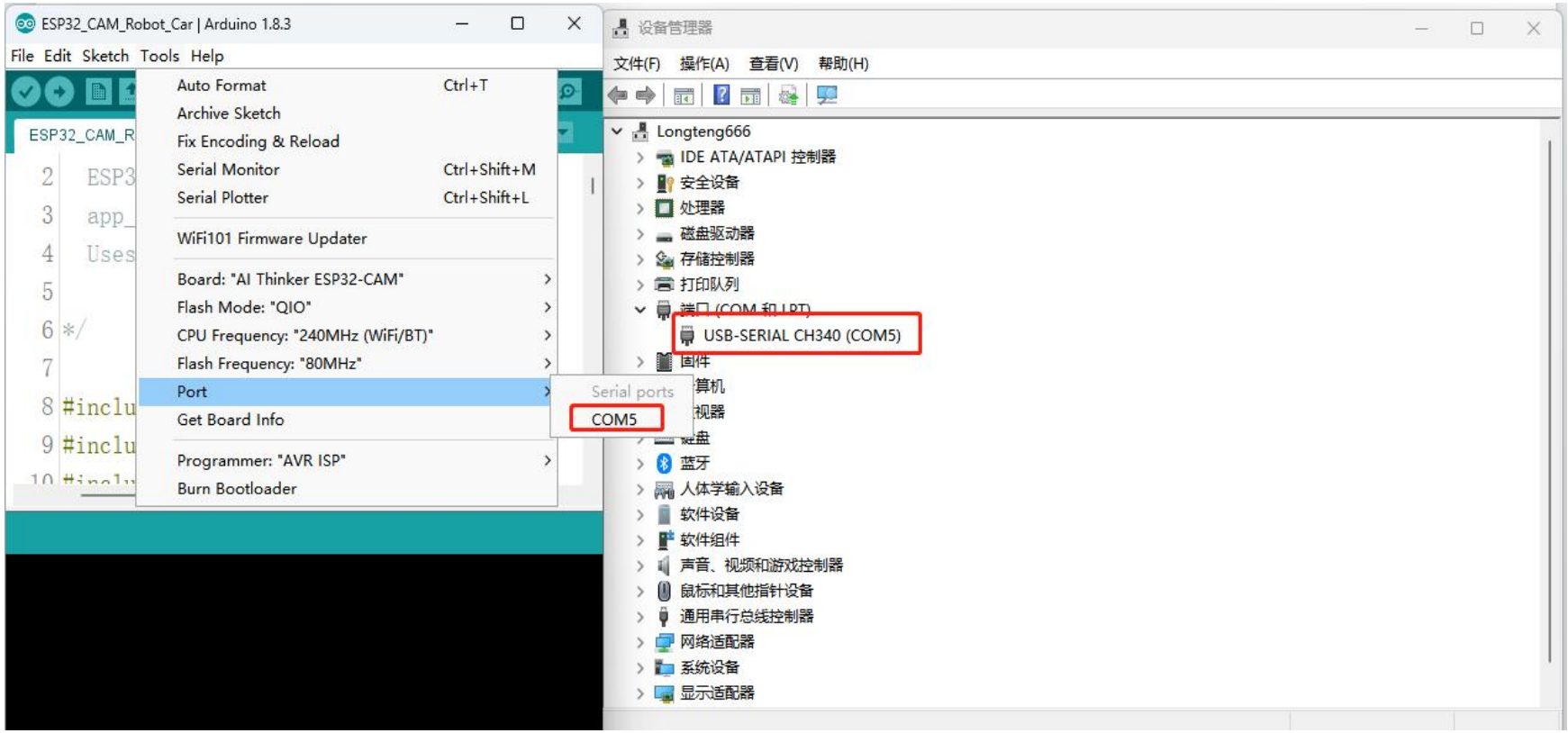
2. Plug the ESP32 CAM board to your computer. Then, follow these steps:



3. Select your Board in **Tools > Board menu>>>>>AI Thinker ESP32-CAM**

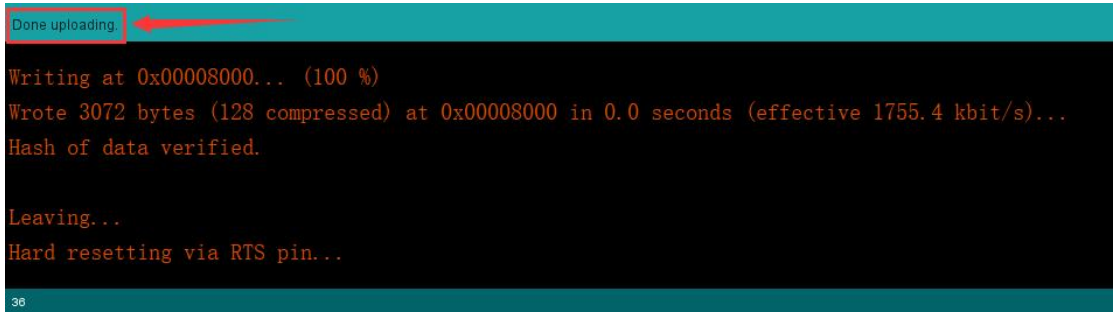


4. Select the Port (if you don't see the COM Port in your Arduino IDE, you need to How to Install Arduino Driver)

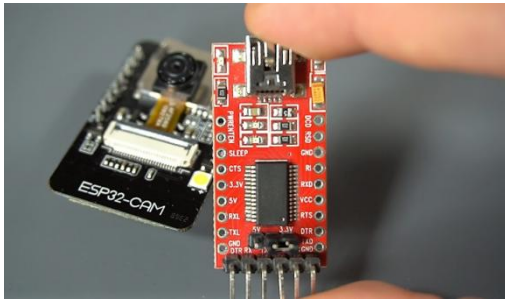


5. Press the Upload button in the Arduino IDE. Wait a few seconds while the code compiles and uploads to your board.

6. If everything went as expected, you should see a "**Done uploading.**" message.

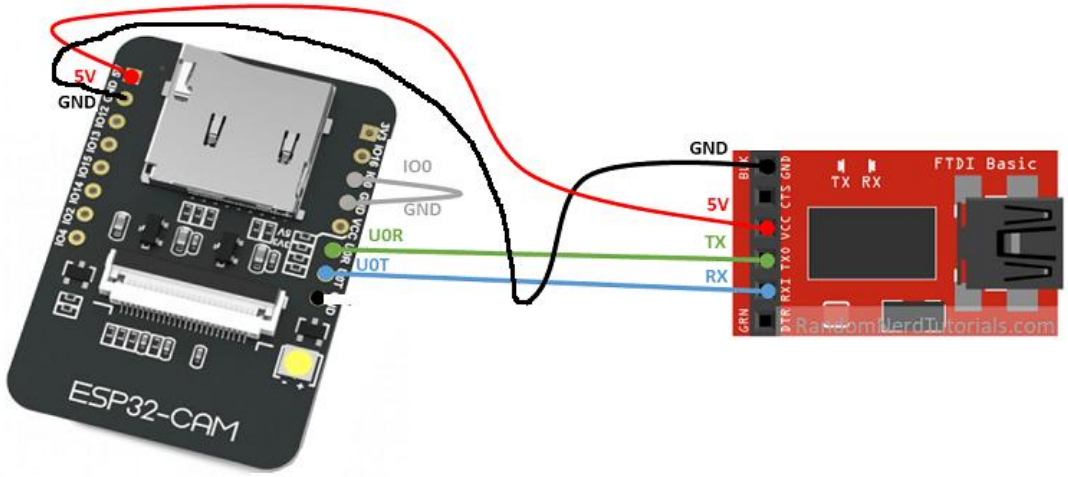


NOTE：If the code download fails, you can also download the code through the FTDI programmer.



Connect the ESP32-CAM board to your computer using an FTDI programmer.

Follow the next schematic diagram:



Important: GPIO 0 needs to be connected to GND so that you're able to upload code.

ESP32-CAM	FTDI Programmer
GND	GND
5V	VCC (5V)
U0R	TX
U0T	RX
GPIO 0	GND

To upload the code, follow the next steps:

1) Go to **Tools** > **Board** and select **AI-Thinker ESP32-CAM**.

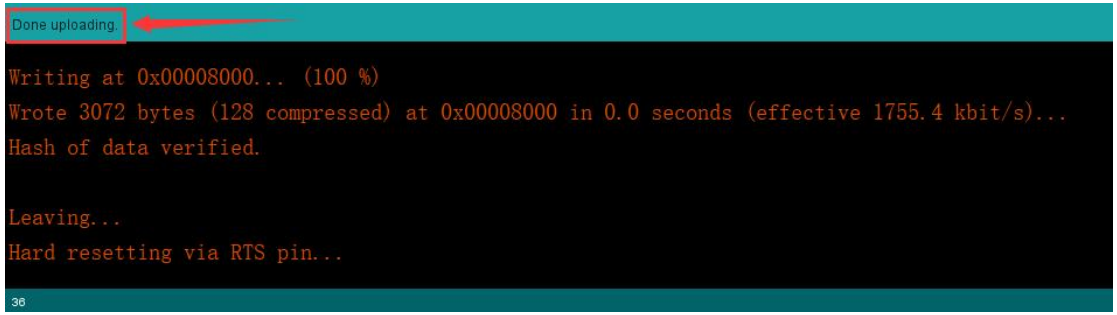
2) Go to **Tools** > **Port** and select the COM port the ESP32 is connected to.

3) Then, click the upload button to upload the code.

4) When you start to see these dots on the debugging window as shown below, press the ESP32-CAM on-board RST button.

```
esptool.py v2.6-beta1
Serial port COM10
Connecting........_____.....____.....____
```

After a few seconds, the code should be successfully uploaded to your board.



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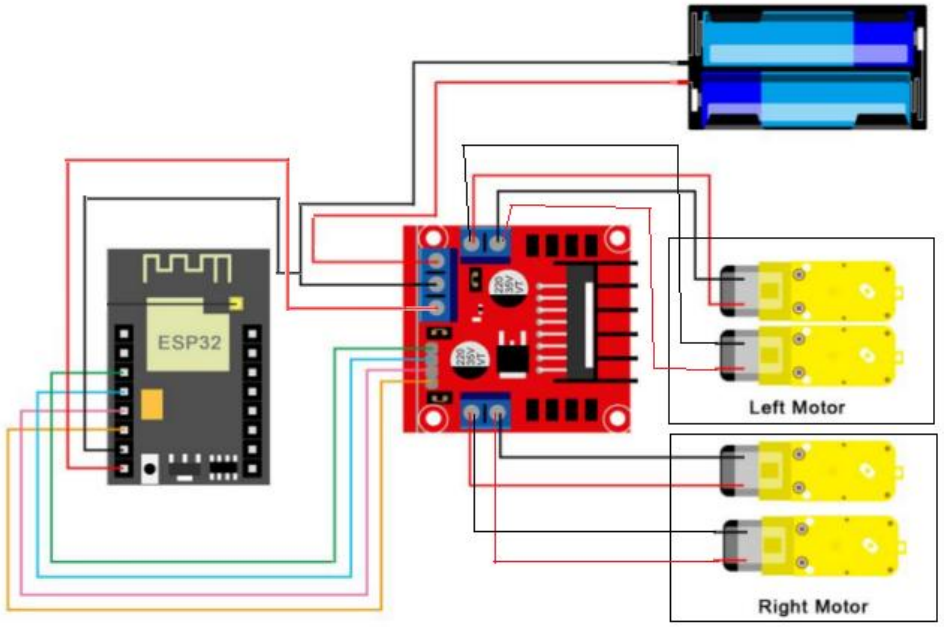
Connect the Module Wires



Note:

1.Focus on red wire (positive pole) and black wire(negative pole), otherwise it may affect the control direction and power supply.

2.Due to transportation safety restrictions,please purchase 18650 batteries by yourself.

Test Your Camera Smart Car

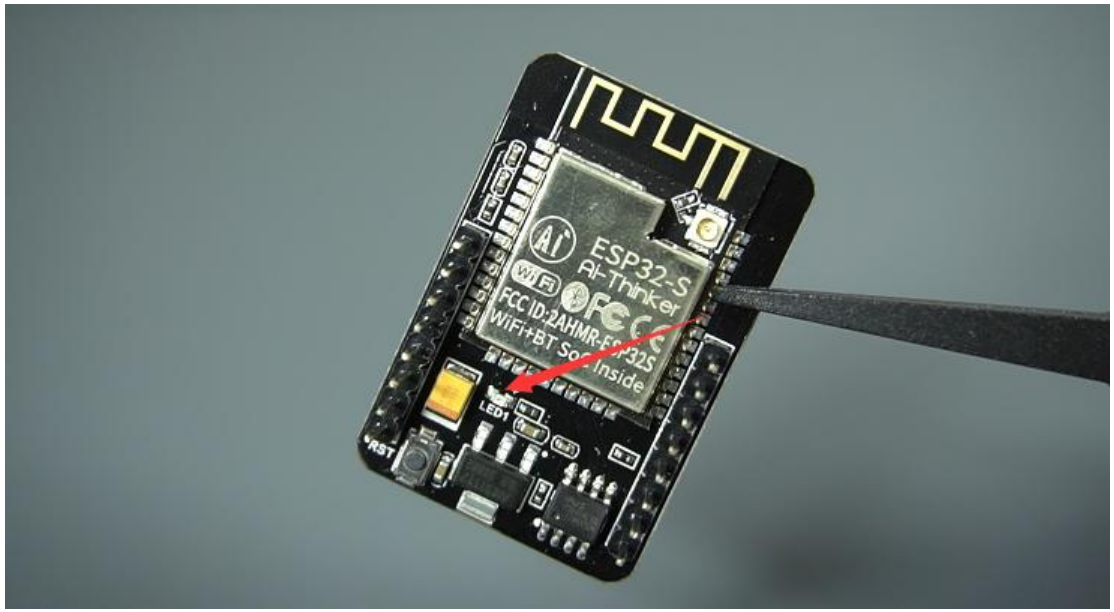
After connecting the line correctly and uploading the code successfully.You'll need to connect your controlling device (phone, tablet or computer) to the WiFi access point created by the ESP32CAM module. Here is how to go about doing that:

①Turn on the power switch of the battery box and the switch of the voltage conversion module at the same time.

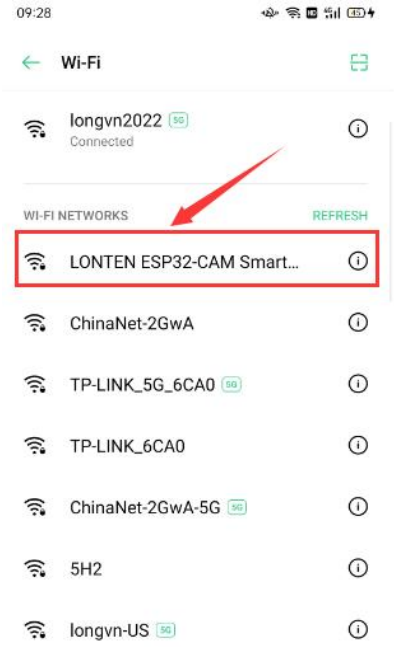
②Wait until you see the ESP32CAM LED (the white one) flash and red LED is always on,this indicates that the WiFi

access point has been established.

Note:If the red LED does not light up. Check whether the battery is low in power (the battery needs to be replaced if the voltage is lower than 7V), and whether the wiring of the power supply is in poor contact.



③Open the WiFi network settings on your controller device. Look for the LONTEN ESP32-CAM Smart Car WiFi Network (if you renamed the network SSID in your code then you should, of course, look for that network instead).

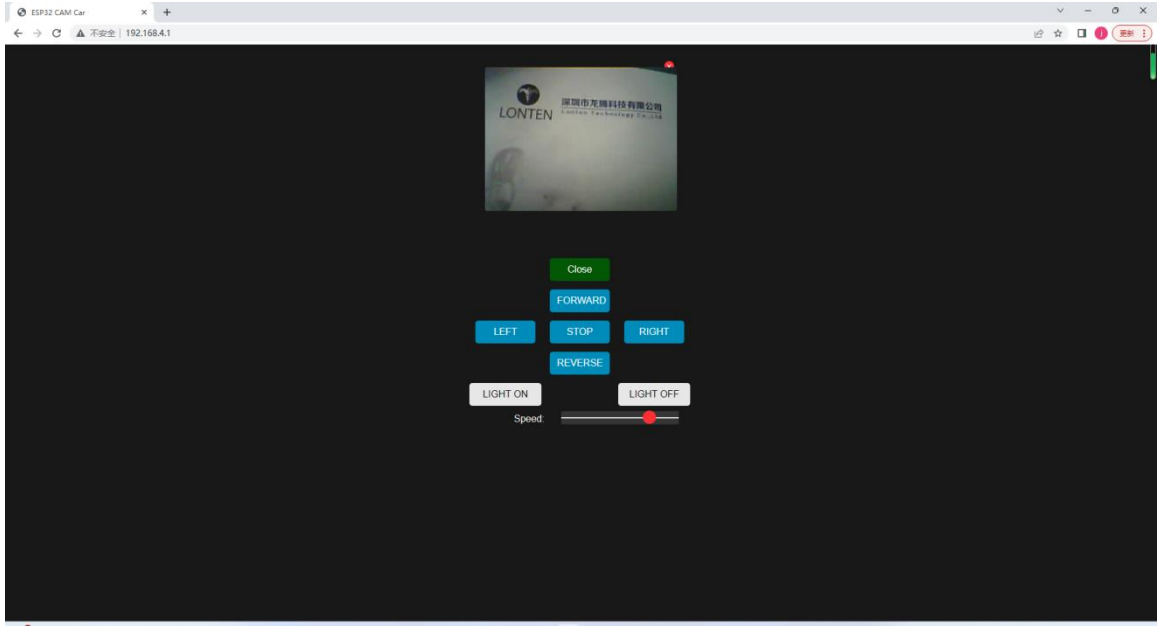


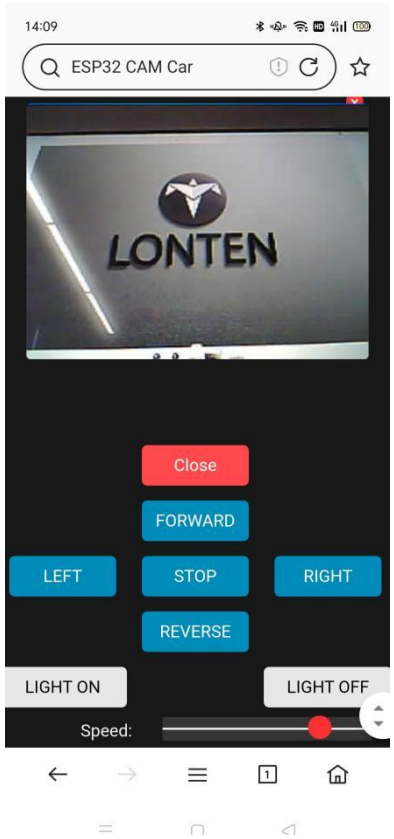
④Connect to the network using the password “1234567890”. If you changed the password then, of course, you’ll need to use the new one you programmed.

⑤Once the network connection is established, open a web browser.

⑥In the Address Bar type the following IP address – 192.168.4.1

⑦You should now see the web-based interface.Click the Star button to start the video stream. If all is working you should see the output of the camera on the ESP32CAM.

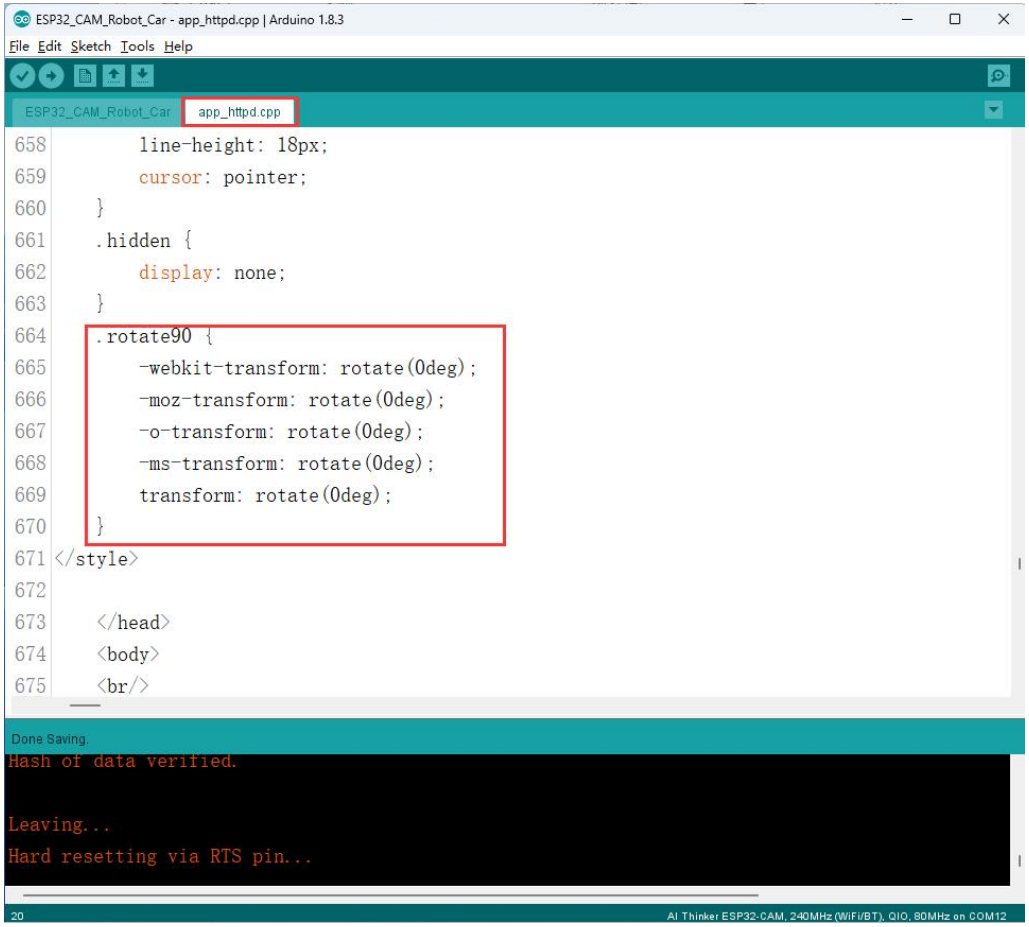



14:09
ESP32 CAM Car
LONTEN
Close
FORWARD
LEFT
STOP
RIGHT
REVERSE
LIGHT ON
LIGHT OFF
Speed:

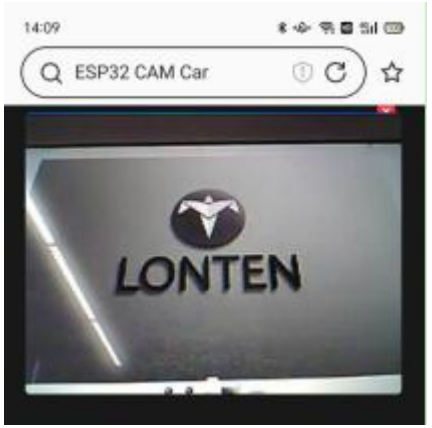
Rotate Camera Image

In the file **app_httpd.cpp** the camera image can be rotated. This may be necessary if the camera image is upside down, for example. This happens again depending on how the camera is aligned in the robot car.

If you find that the image is upside down, you can modify the angle in the code, 0deg,90deg,180deg,270deg represent the four commonly used directions.


ESP32_CAM_Robot_Car - app_httpd.cpp | Arduino 1.8.3
File Edit Sketch Tools Help
ESP32_CAM_Robot_Car
app_httpd.cpp
658 line-height: 18px;
659 cursor: pointer;
660 }
661 .hidden {
662 display: none;
663 }
664 .rotate90 {
665 -webkit-transform: rotate(0deg);
666 -moz-transform: rotate(0deg);
667 -o-transform: rotate(0deg);
668 -ms-transform: rotate(0deg);
669 transform: rotate(0deg);
670 }
671 </style>
672
673 </head>
674 <body>
675
Done Saving.
Hash of data verified.
Leaving...
Hard resetting via RTS pin...
20
AI Thinker ESP32-CAM, 240MHz (WiFi/BT), QIO, 80MHz on COM12

```
.rotate90
{
-webkit-transform: rotate(0deg);
-moz-transform: rotate(0deg);
-o-transform: rotate(0deg);
-ms-transform: rotate(0deg);
transform: rotate(0deg);
}
```



//

```
.rotate90
{
-webkit-transform: rotate(180deg);
-moz-transform: rotate(180deg);
-o-transform: rotate(180deg);
-ms-transform: rotate(180deg);
transform: rotate(180deg);
}
```

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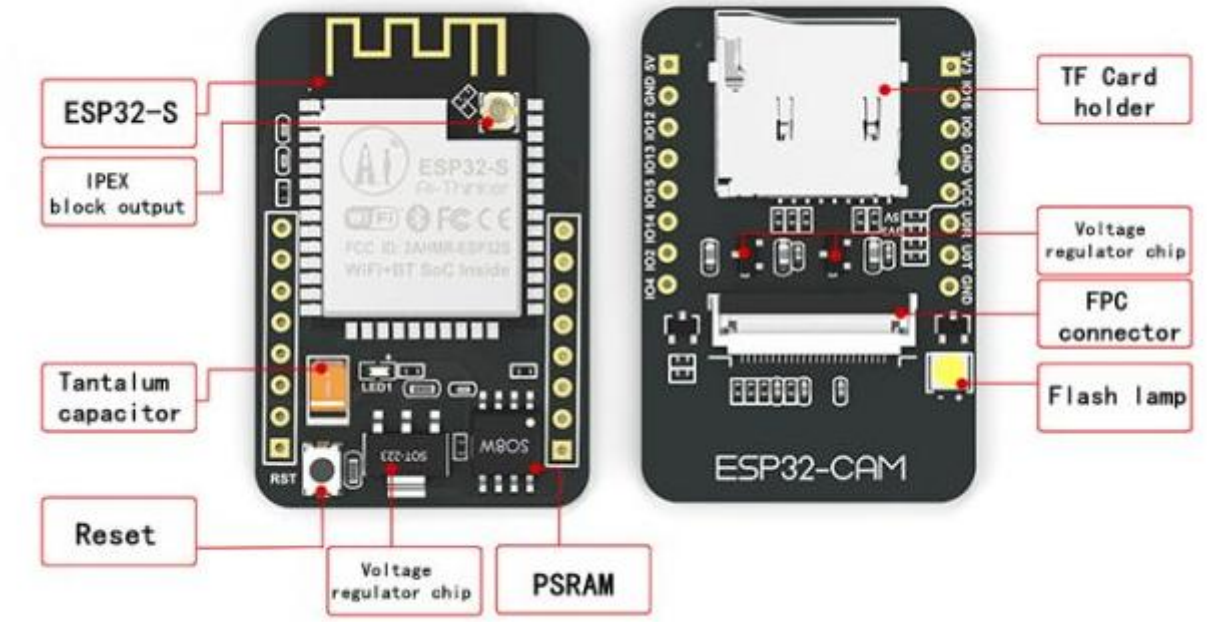
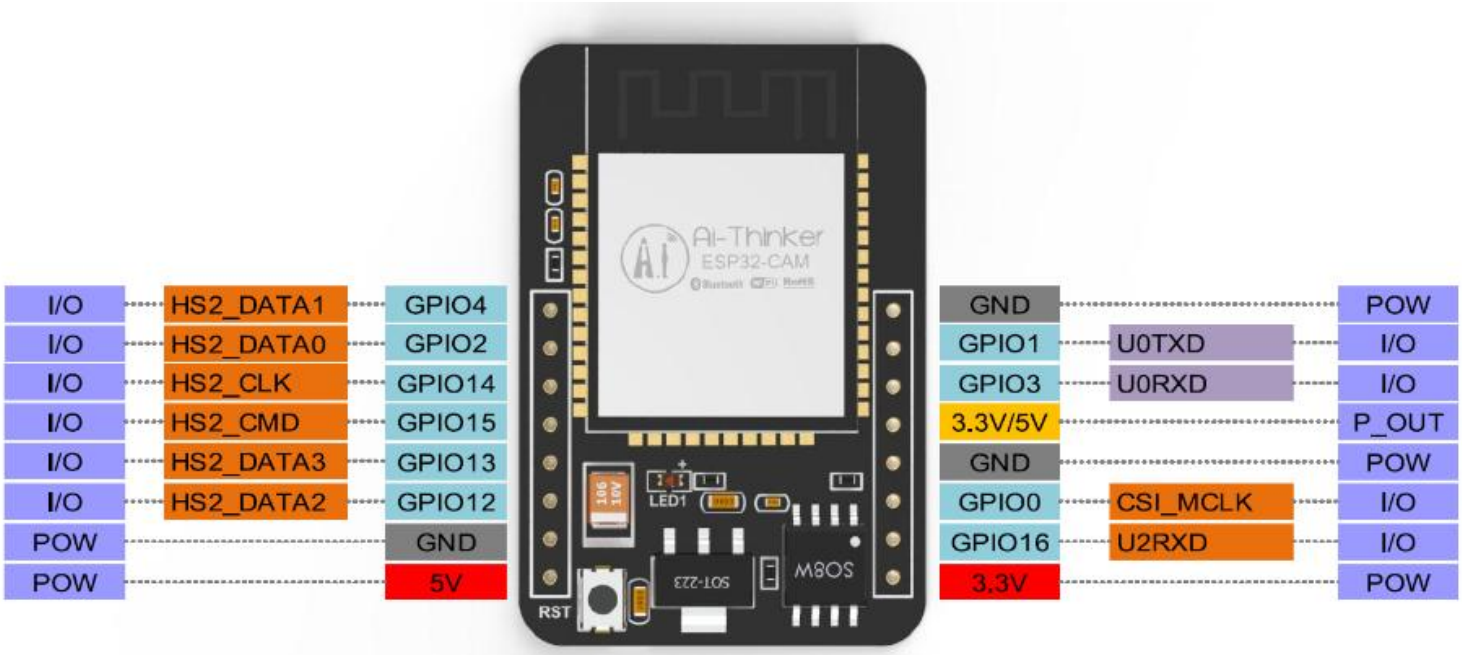
ESP32-CAM Specifications





The ESP32-CAM is based upon the ESP32-S module, so it shares the same specifications. It has the following features:

- 802.11b/g/n Wi-Fi
- Bluetooth 4.2 with BLE
- UART, SPI, I2C and PWM interfaces

- Clock speed up to 160 MHz
- Computing power up to 600 DMIPS
- 520 KB SRAM plus 4 MB PSRAM
- Supports WiFi Image Upload
- Multiple Sleep modes
- Firmware Over the Air (FOTA) upgrades possible
- 9 GPIO ports,Built-in Flash LED

Camera Specifications

The ESP32-CAM includes an OV2640 camera module.

The OV2640 has the following specifications:

- 2 Megapixel sensor
- Array size UXGA 1622×1200
- Output formats include YUV422, YUV420, RGB565, RGB555 and 8-bit compressed data
- Image transfer rate of 15 to 60 fps

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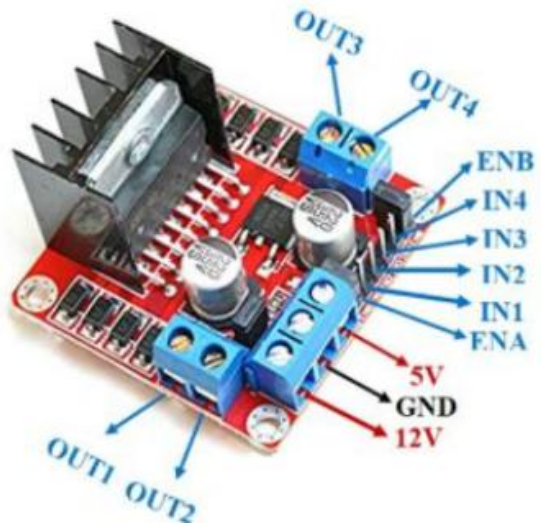
L298N Motor Driver Module



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

Pin Name	Description
IN1 & IN2	Motor A input pins. Used to control the spinning
IN3 & IN4	Motor B input pins. Used to control the spinning
ENA	Enables PWM signal for Motor A
ENB	Enables PWM signal for Motor B
OUT1 &	Output pins of Motor A
OUT3 &	Output pins of Motor B
7-35V	input from DC power Source
5V	Supplies power for the switching logic circuitry
GND	Ground pin

L298N Module Pinout Configuration

Features & Specifications

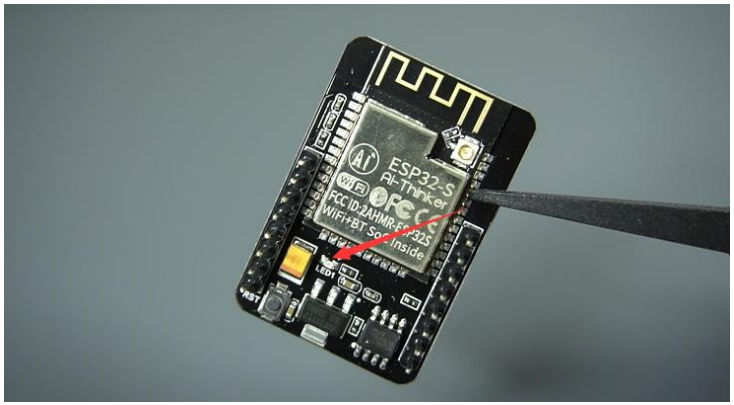
- Driver Model: L298N 2A
- Driver Chip: Double H Bridge L298N
- Motor Supply Voltage (Maximum): 46V
- Motor Supply Current (Maximum): 2A
- Logic Voltage: 5V
- Driver Voltage: 5-35V
- Driver Current:2A
- Logical Current:0-36mA
- Maximum Power (W): 25W
- Current Sense for each motor

- Heatsink for better performance
- Power-On LED indicator

Troubleshooting Guide

1.The wifi Access Point named "LONTEN ESP32-CAM Smart Car" is not found in the mobile phone wifi connection list.

Check if the red LED light stays on, when the red LED stays on, the wifi Access Point is in a connectable state. If the red LED light doesn't turn on, you can try the following:



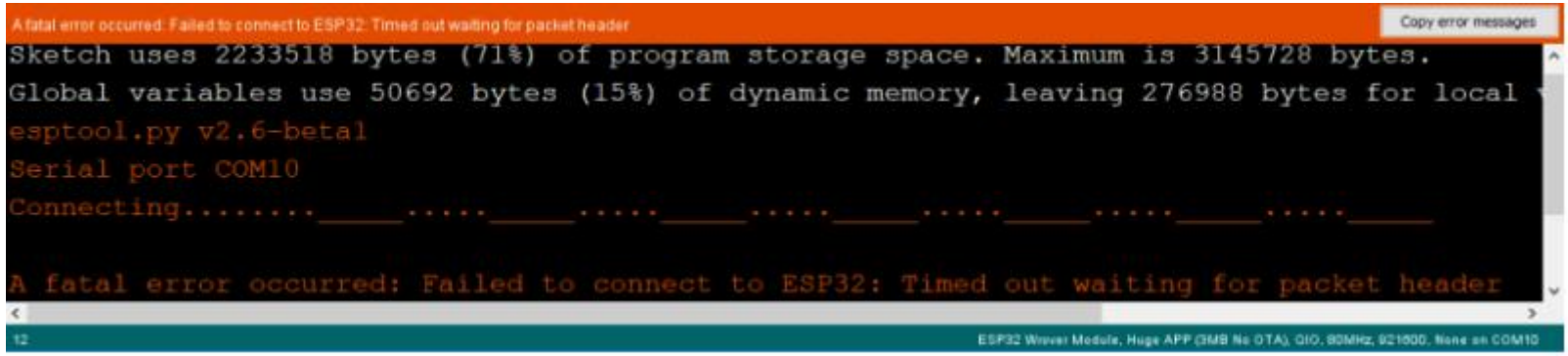
- Press the RST button to reset
- Check whether the battery is low in power (the battery needs to be replaced if the voltage is lower than 7V), and whether the wiring of the power supply is in poor contact.
- Check whether the OV2640 camera is installed correctly

2.Can’t open web server

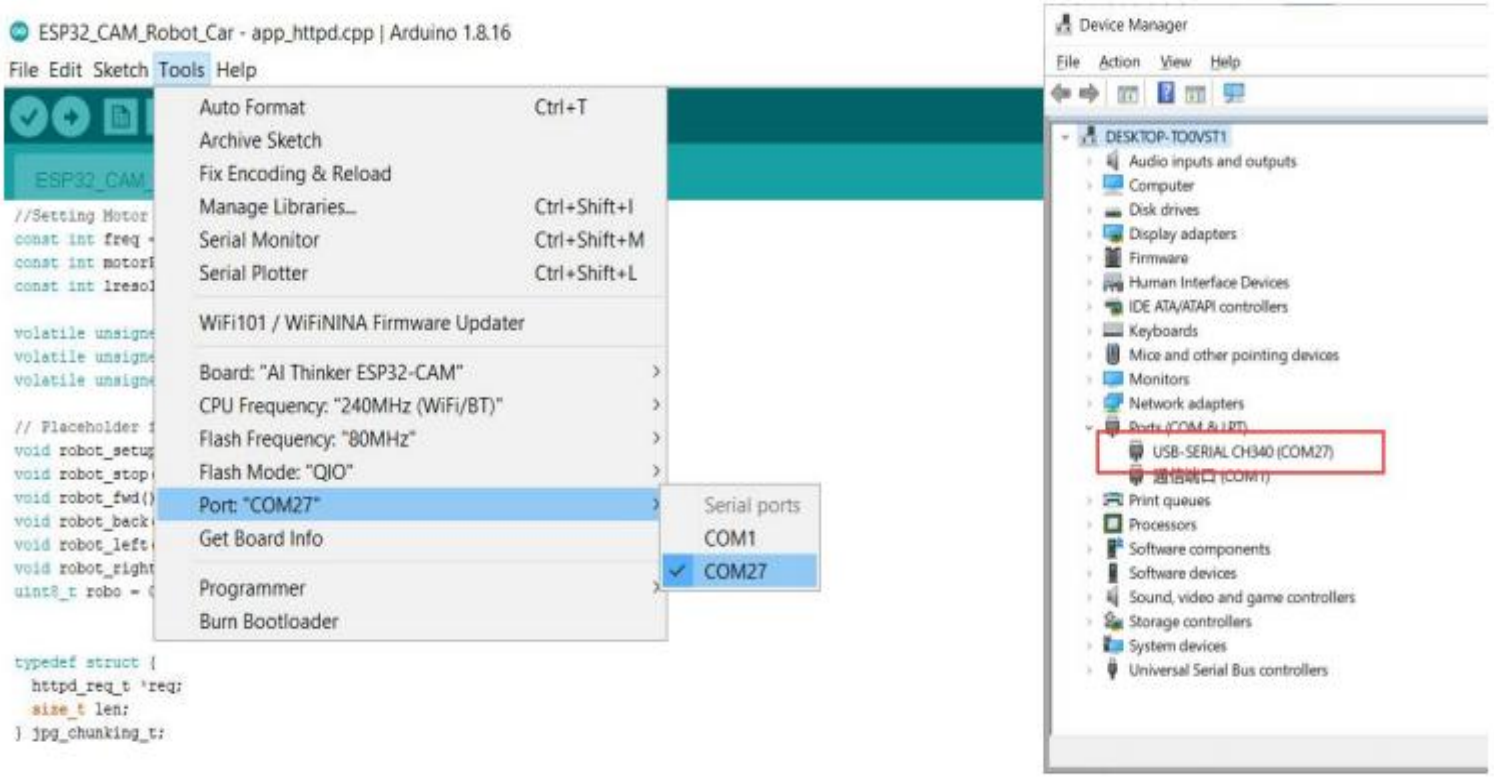
- Try refreshing the page

◆ If the ESP32-CAM is printing the IP address ： 192.168.4.1, but when you try to open the web server in your web browser you see a blank screen, it usually means that you are trying to access the ESP32-CAM web server with multiple web browser tabs.At the moment, these ESP32-CAM sketches only work with one client connected at a time.

3.Failed to connect to ESP32: Timed out waiting for packet header



◆ Means you have selected the wrong COM port, you can check in the device manager which COM port the ESP32 board is connected.



◆ if you don’t see the COM Port in your Arduino IDE, you need to install the Arduino CH340 Drivers Or Install or update FTDI drivers.

4.Camera init failed with error 0x20003 or similar

If you get this exact error, it means that your camera OV2640 is not connected properly to your ESP32 board.The camera has a tiny connector and you must ensure it’s connected in the the right away and with a secure fit, otherwise it will fail to establish a connection.