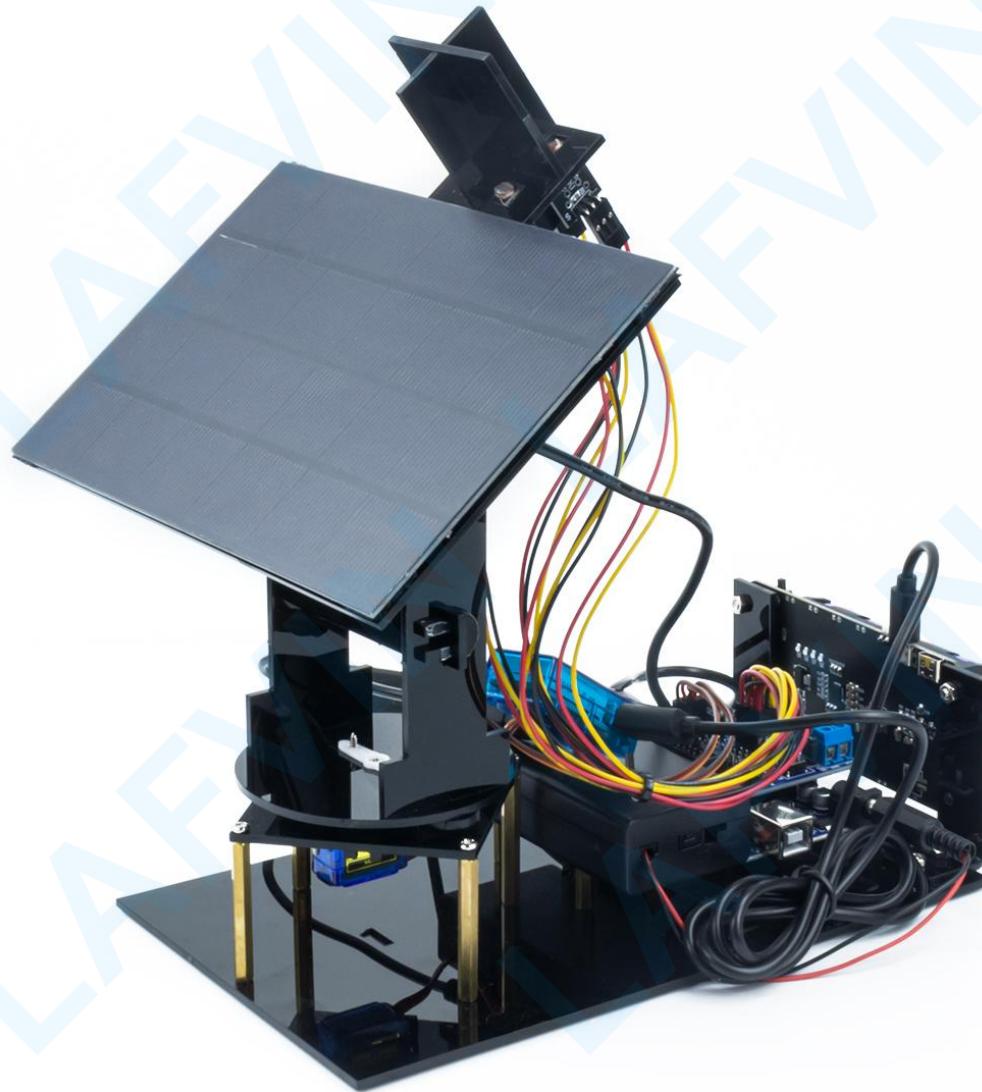


Solar Tracking Kit

LAFVIN





Company Profile

Established in 2011, LAFVIN is a manufacturer and trader specialized in research, development and production of Mega2560, UNO, Nano boards, and all kinds of accessories or sensors used for Arduino, raspberry. We also complete starter kits designed for interested lovers of any levels to learn Arduino or Raspberry. We are located in Shenzhen, China. All of our products comply with international quality standards and are greatly appreciated in a variety of different markets throughout the world.

Customer Service

We are cooperating with a lot of companies from different countries. Also help them to purchase electronic component products in China, and became the biggest supplier of them. We look forward to build cooperate with more companies in future.

By the way, We also look forward to hearing from you and any of your critical comment or suggestions. Pls email us by lafvin_service@163.com if you have any questions or suggestions. As a continuous and fast growing company. We keep striving our best to offer you excellent products and quality service.

Our Store

Aliexpress store: <https://www.aliexpress.com/store/1942043> Brand in Amazon: LAFVIN

Product Catalog

<https://drive.google.com/drive/folders/0BwvEeRN9dKllblZING00TkhYbGs?usp=sharing>

LAFVIN



LAFVIN R3 CH340 x1



Expanding Board x1



Charge Detector x1



18650 Mobile Power Shield x1



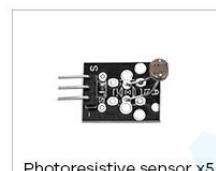
USB Cable x1



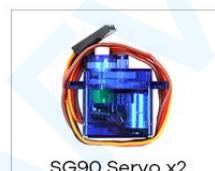
18650 Battery Case x1



Micro Usb cable x1



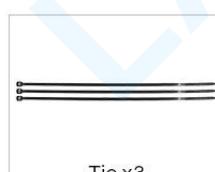
Photoresistive sensor x5



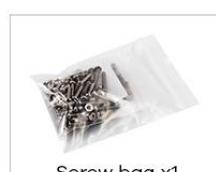
SG90 Servo x2



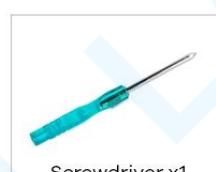
Velcro x4



Tie x3



Screw bag x1

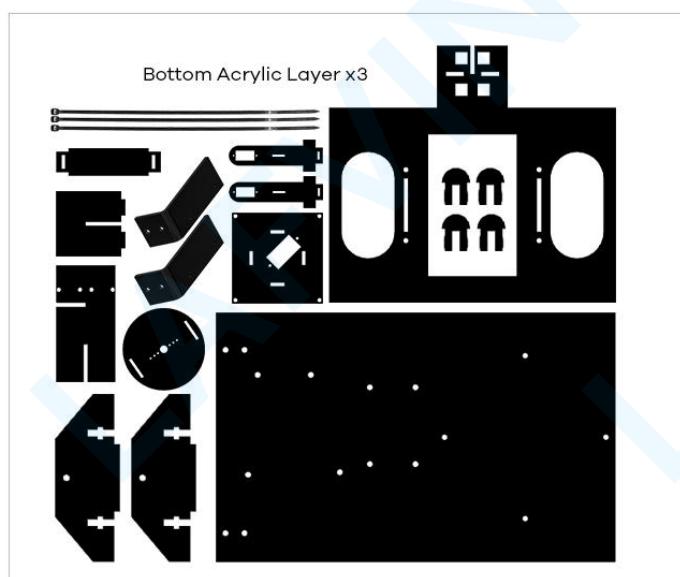


Screwdriver x1



3pin F-F Dupont*4

Package List



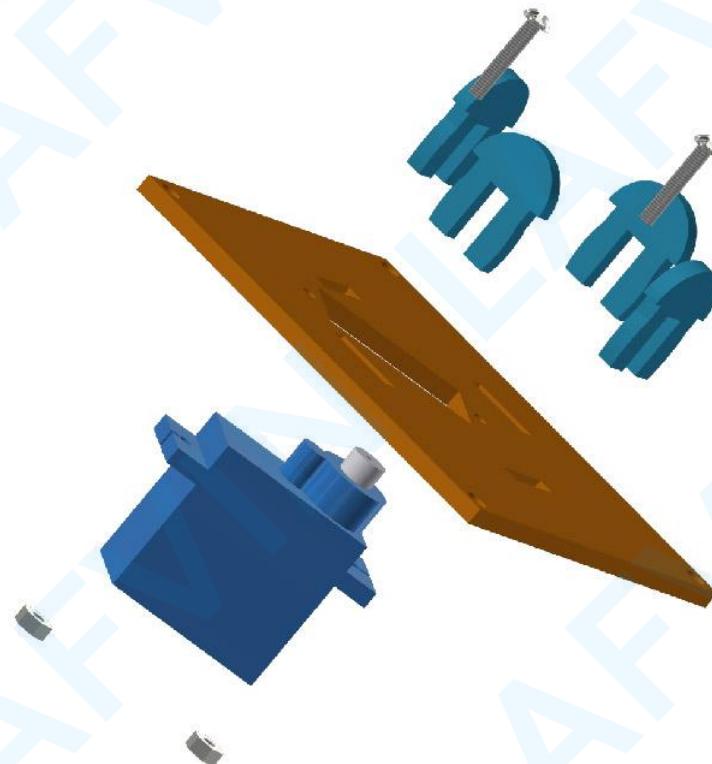
Solar Pannel x1

STEP 1-21:Build

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LA042 STEP 01

1. M2 * 12 mm Screw
2. M2 Nut

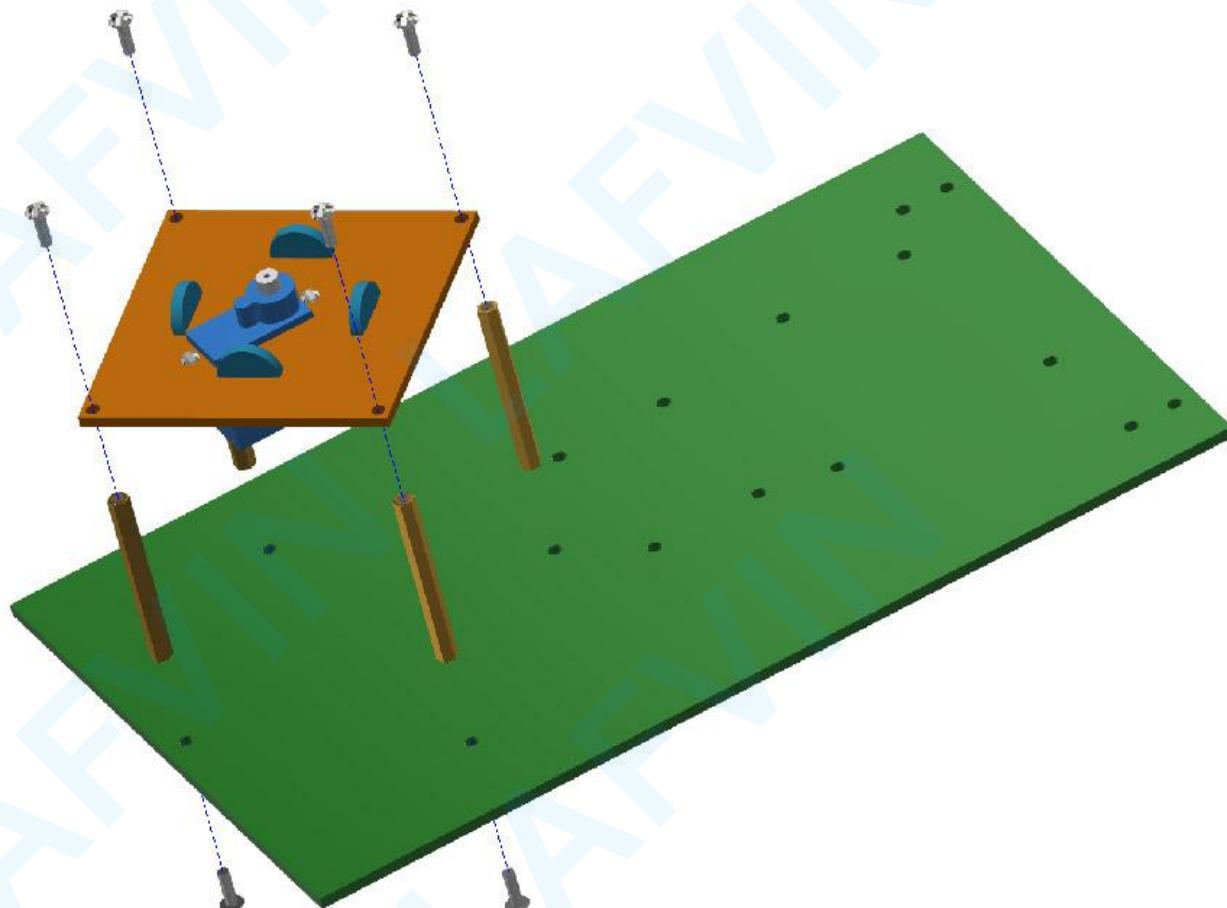


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LA042 STEP 02

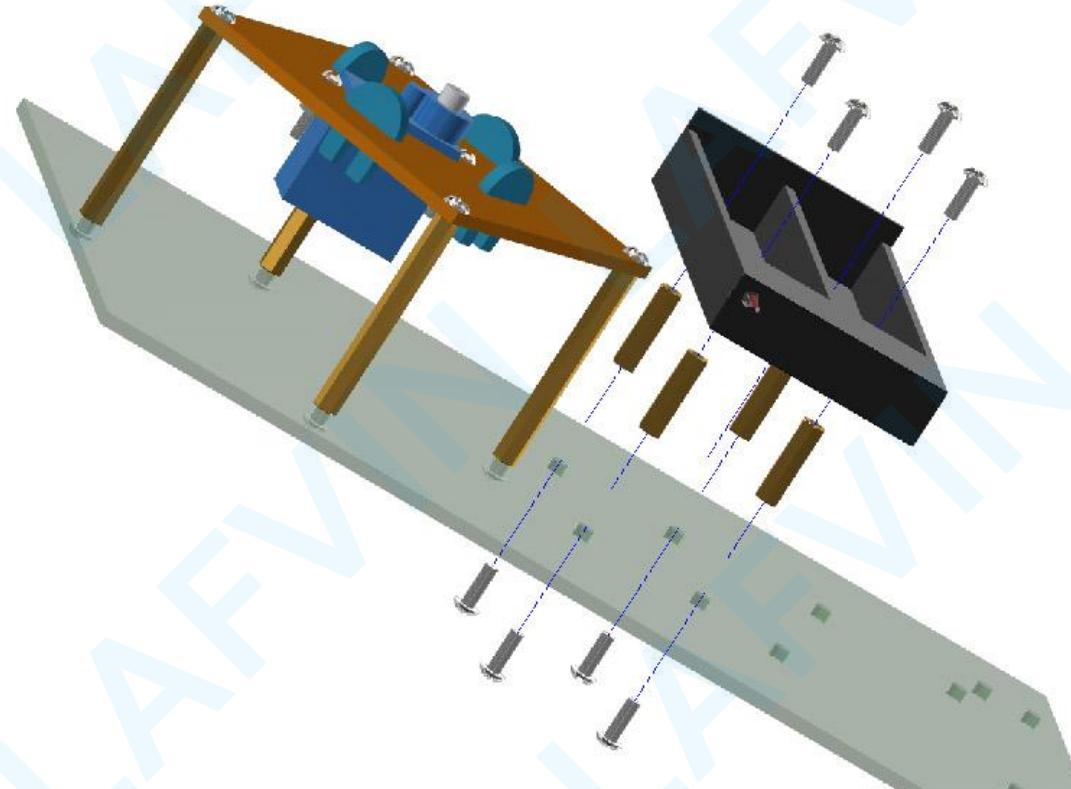
1. M3 * 8 mm Screw

2. M3 *40 mm Copper Cylinder



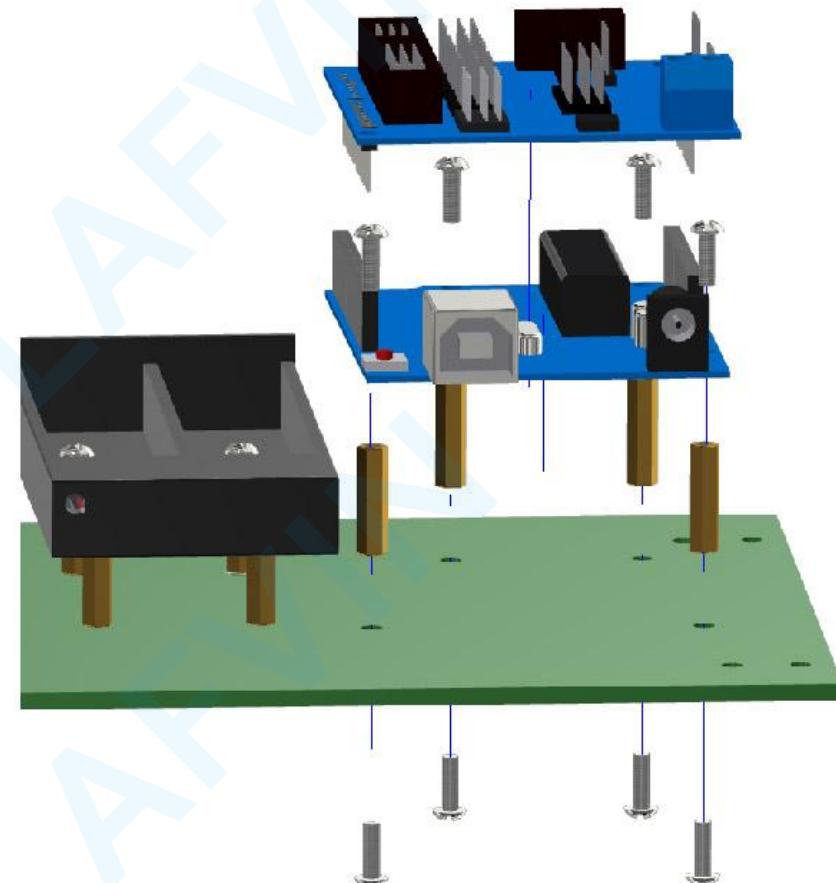
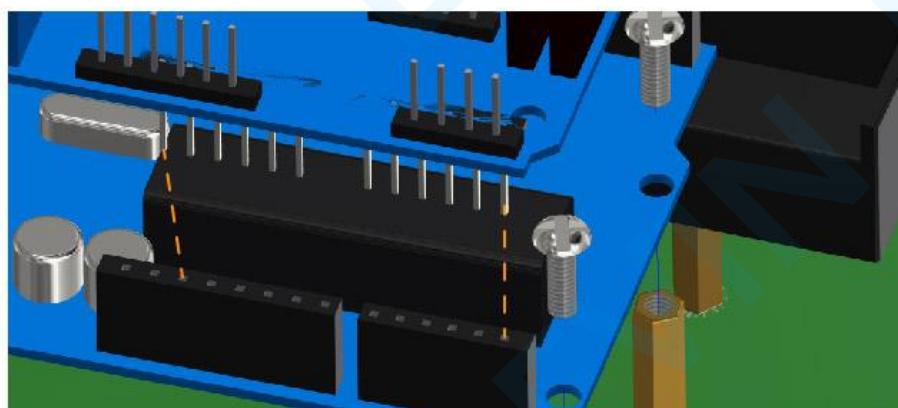
LA042 STEP 03

1. M3 * 8 mm Screw
2. M3 *16 mm Copper Cylinder



LA042 STEP 04

1. M3 * 8 mm Screw
2. M3 * 16 mm Copper Cylinder

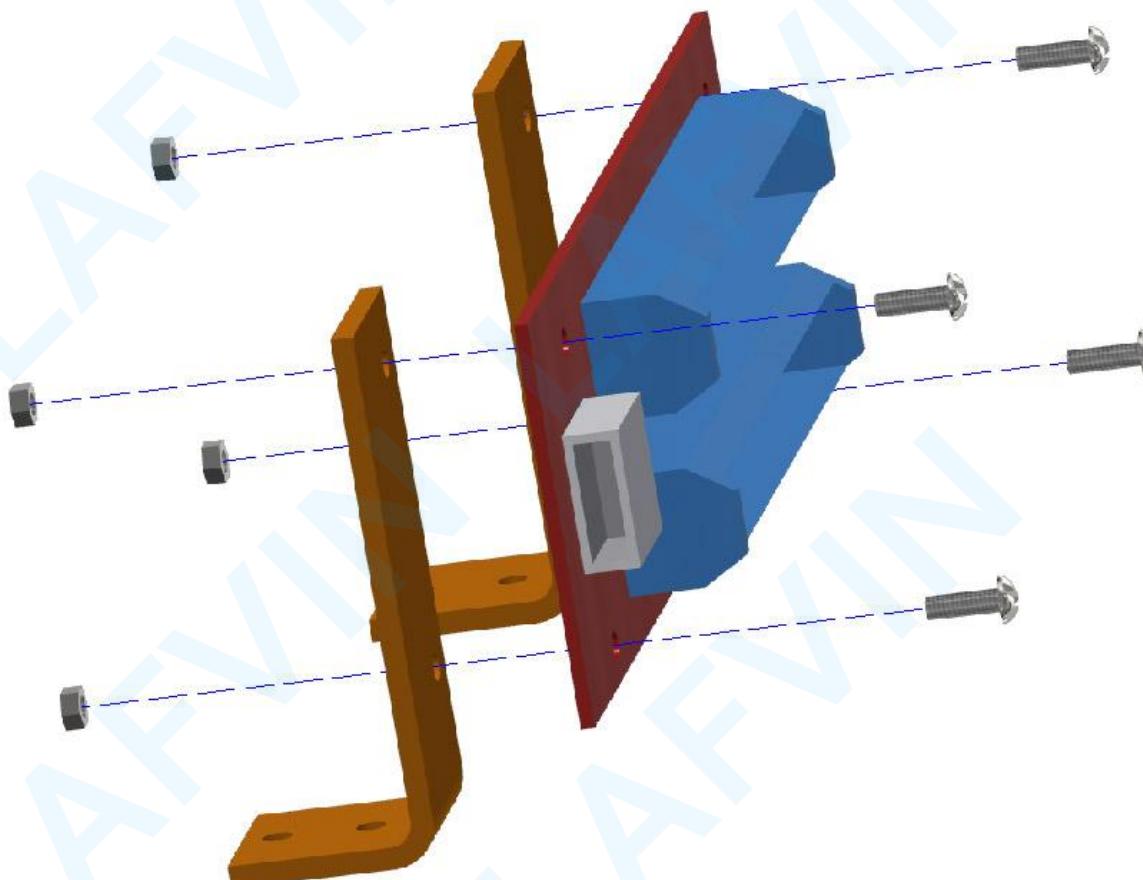


notice the connection location

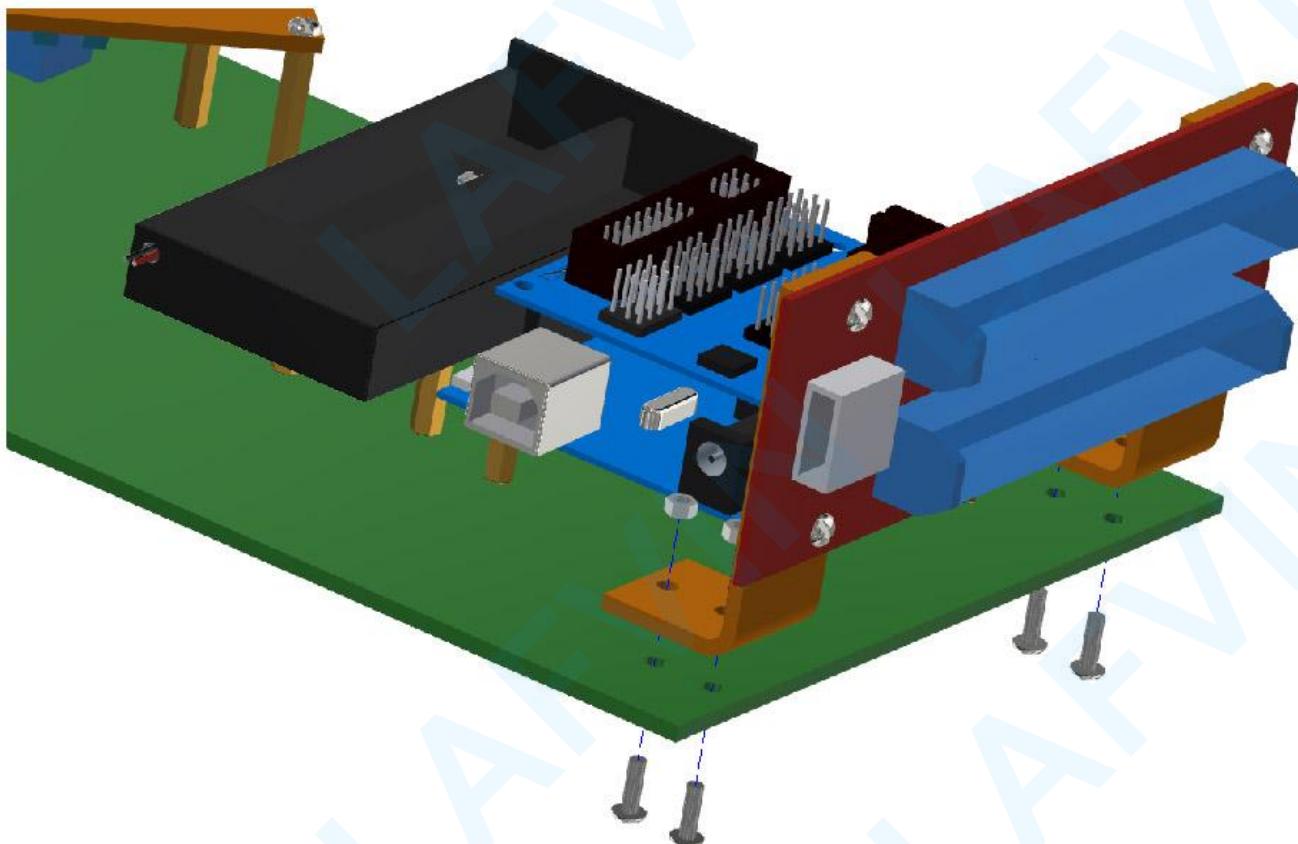
LA042 STEP 05

1. M3 * 8 mm Screw

2. M3 Nut

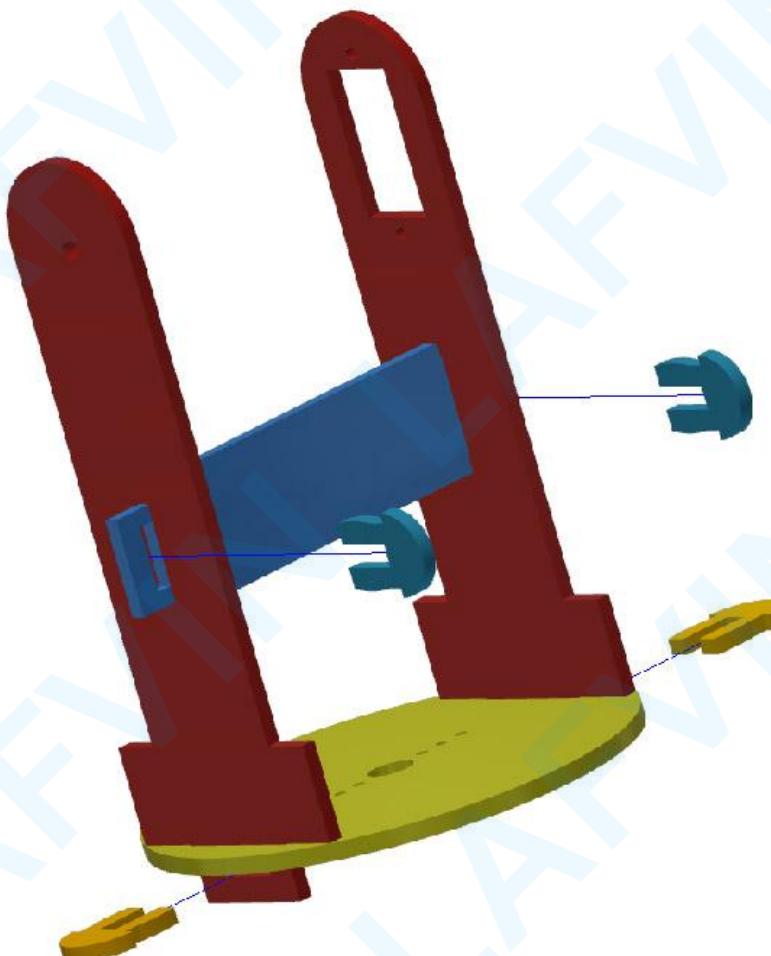


LA042 STEP 06



1. M3 * 8 mm Screw
2. M3 Nut

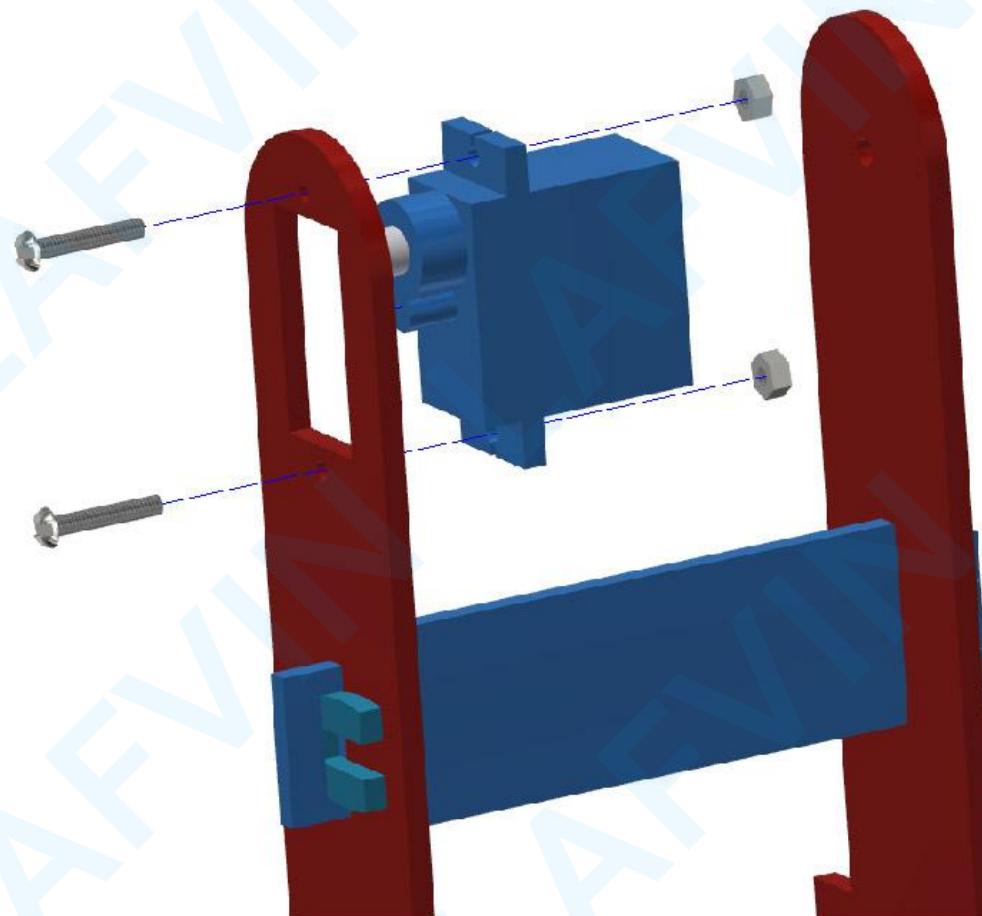
LA042 STEP 07



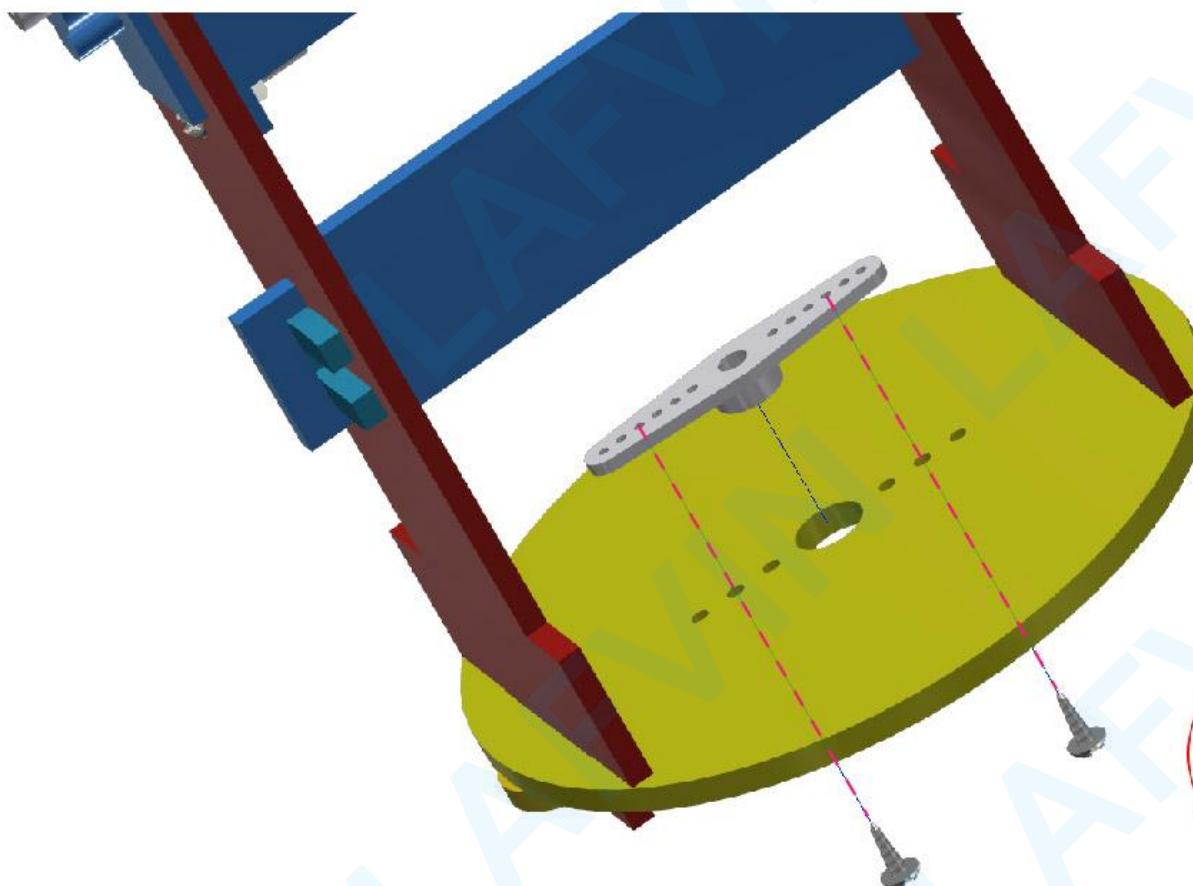
LA042 STEP 08

1. M2 * 12 mm Screw

2. M2 Nut



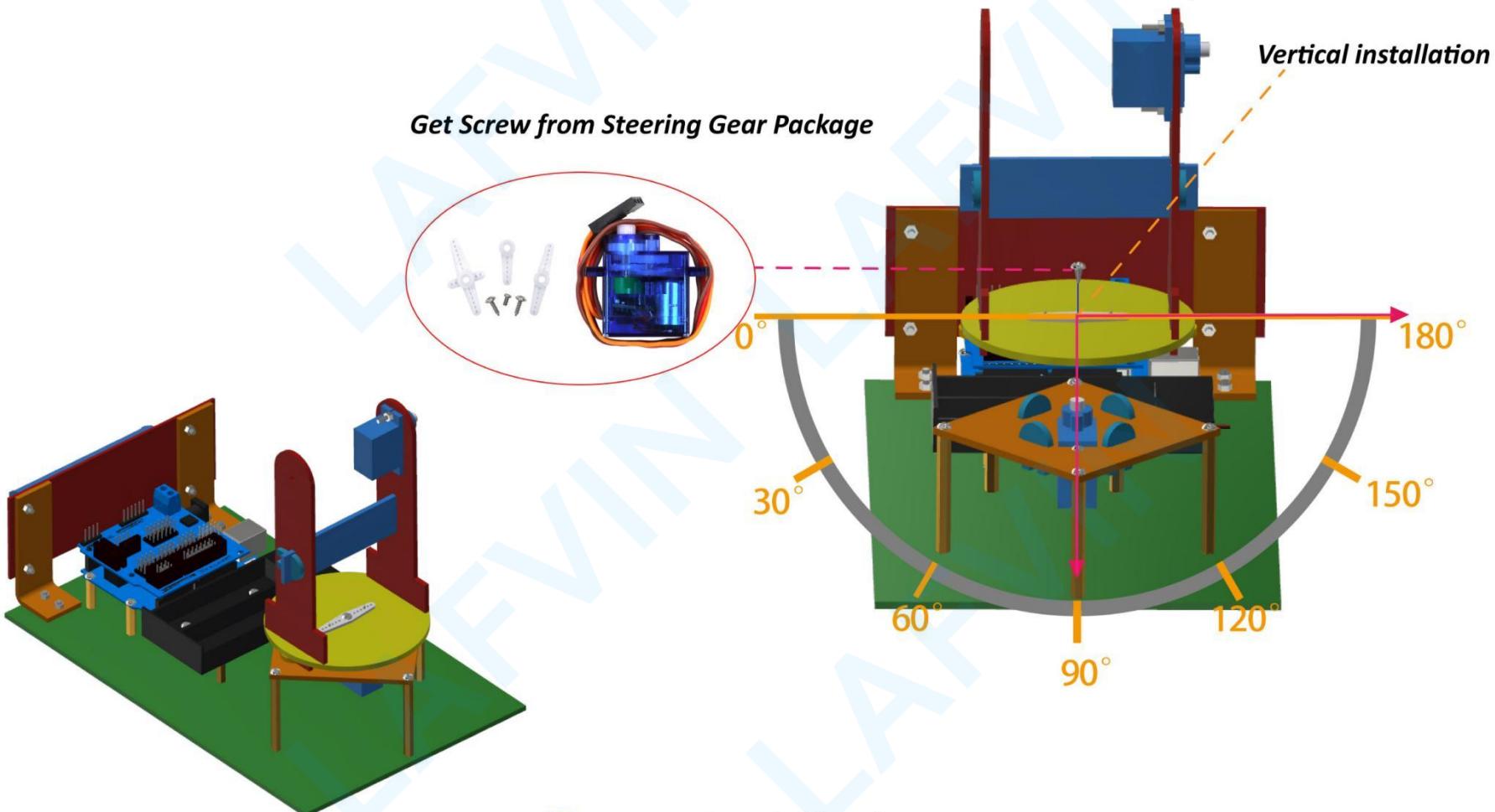
LA042 STEP 09



Get Screw from Steering Gear Package

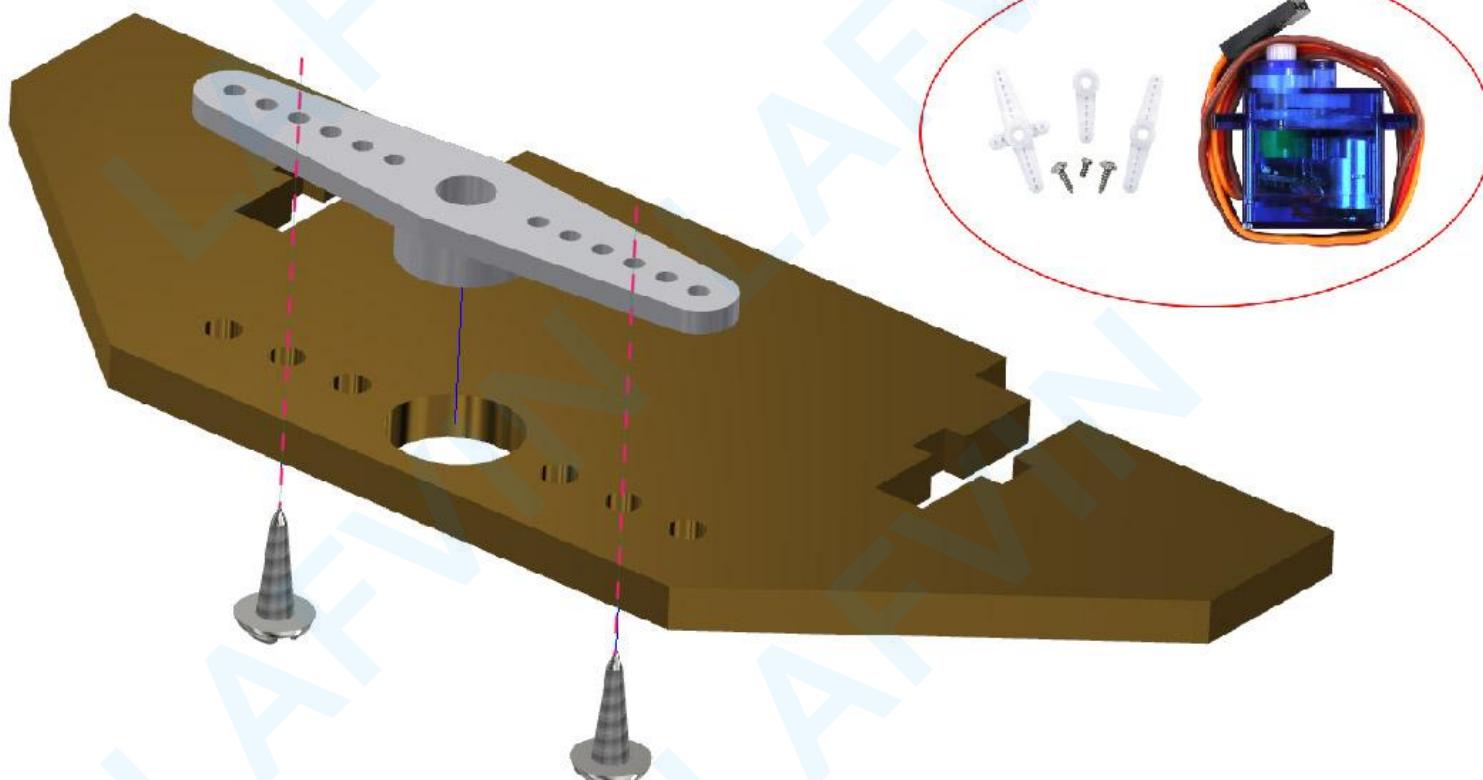


LA042 STEP 10



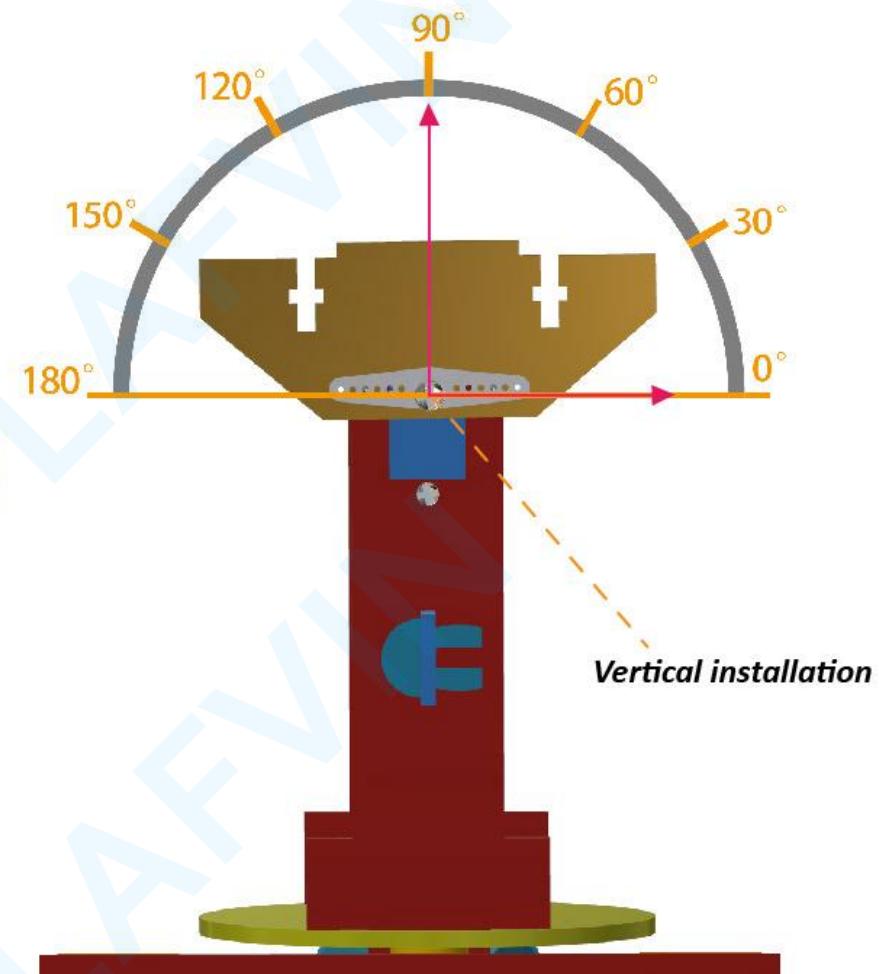
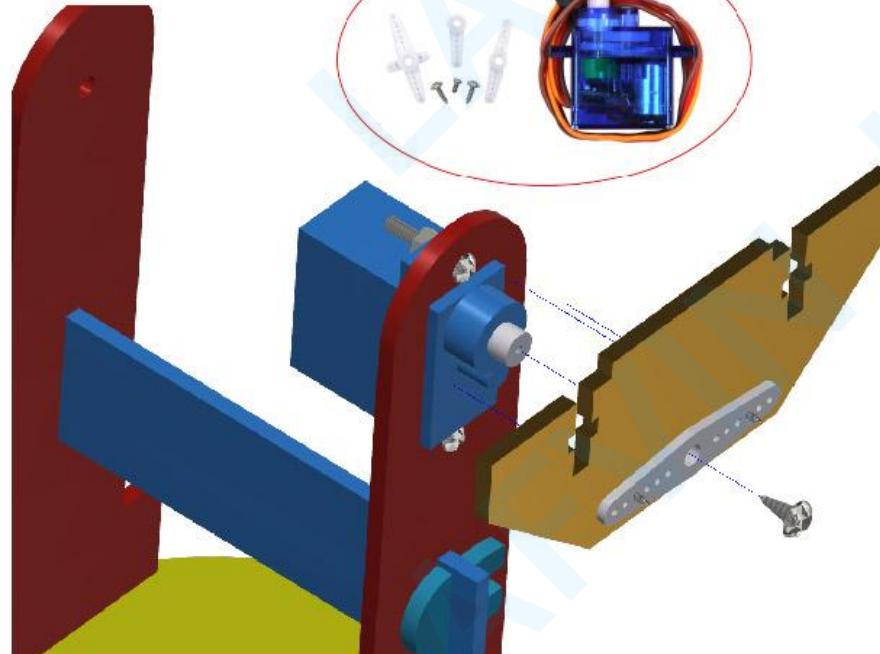
LA042 STEP 11

Get Screw from Steering Gear Package

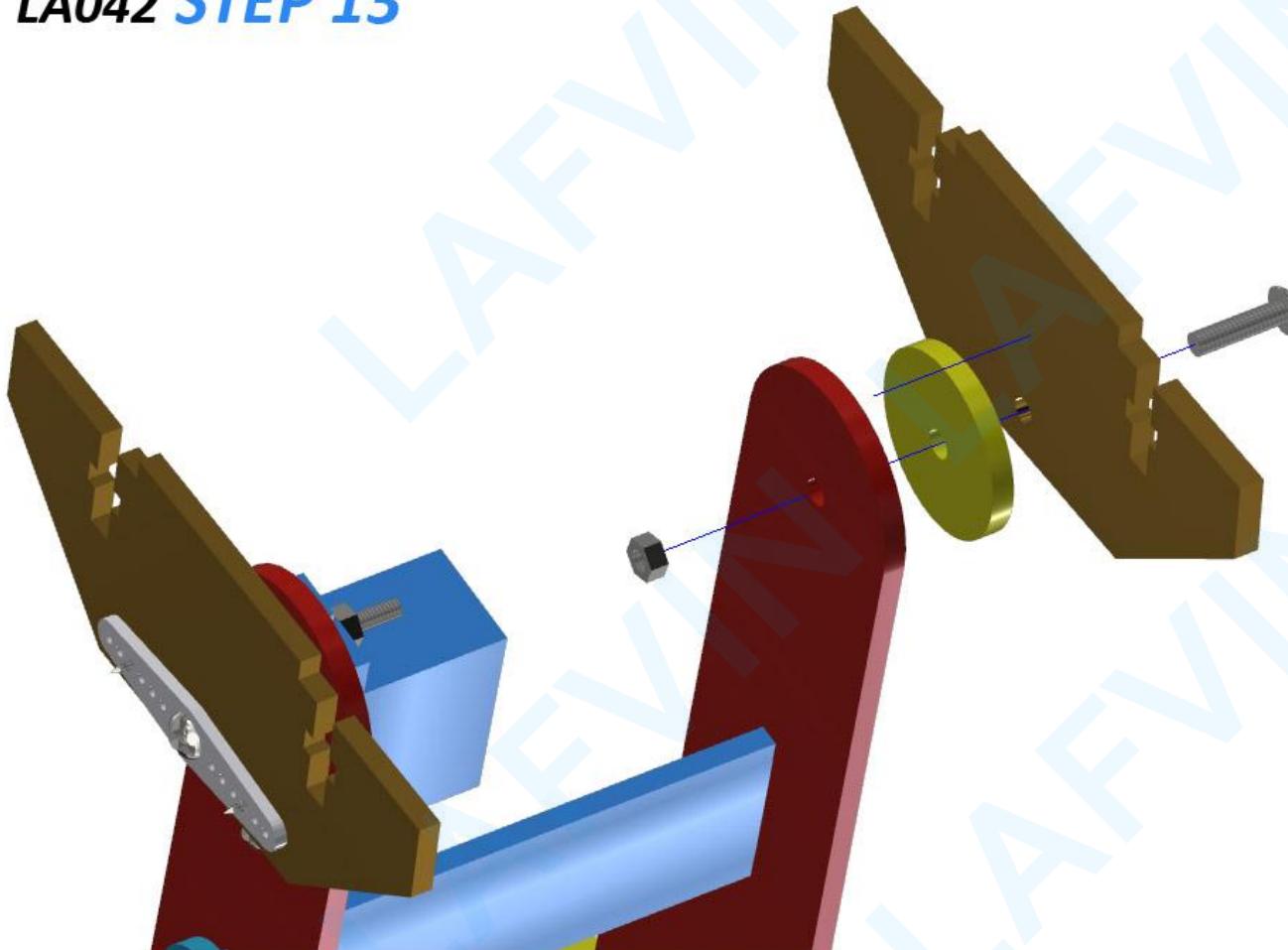


LA042 STEP 12

Get Screw from Steering Gear Package



LA042 STEP 13

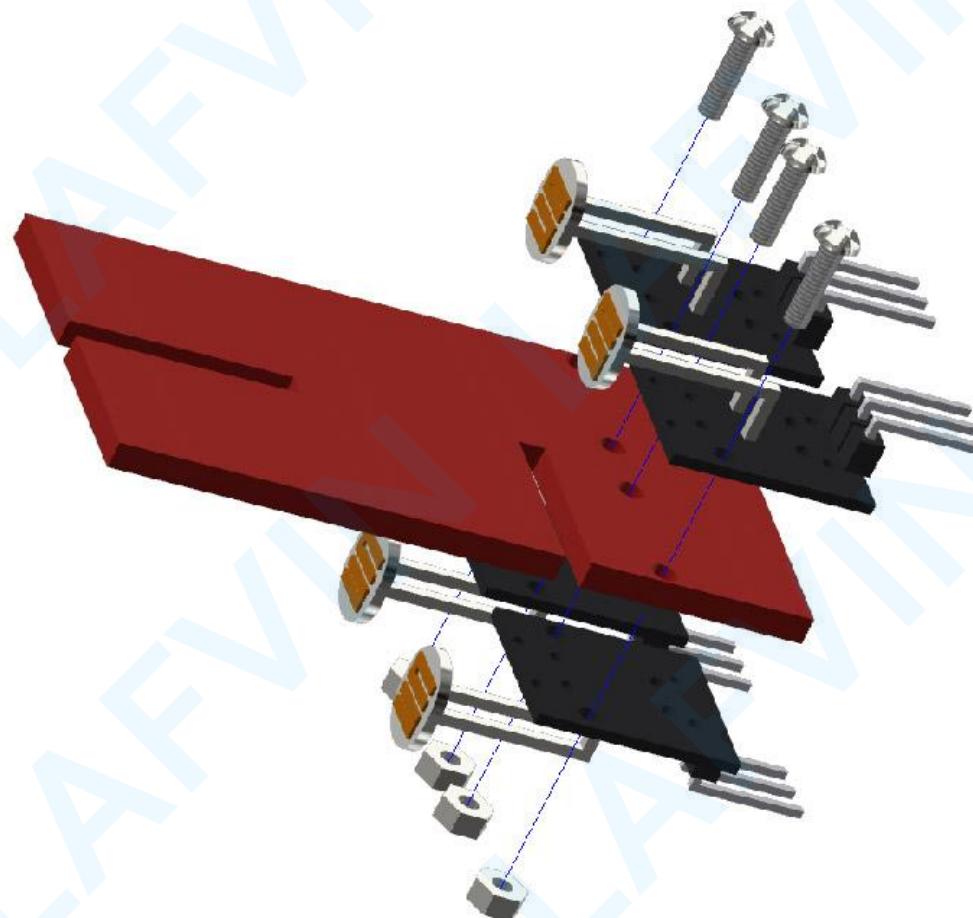


1. M3 * 12 mm Screw
2. M3 Nut

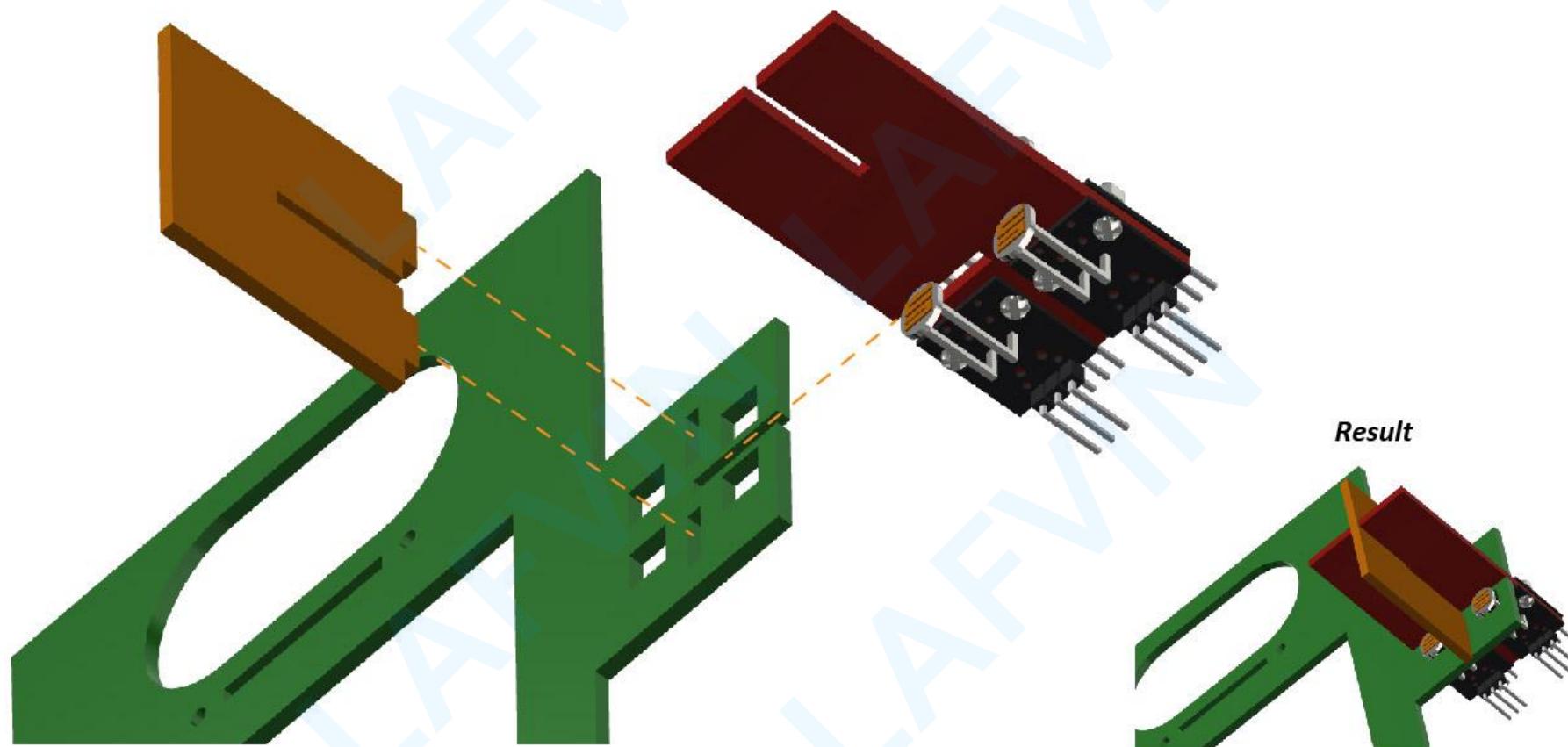
LA042 STEP 14

1. M2 * 12 mm Screw

2. M2 Nut



LA042 STEP 15

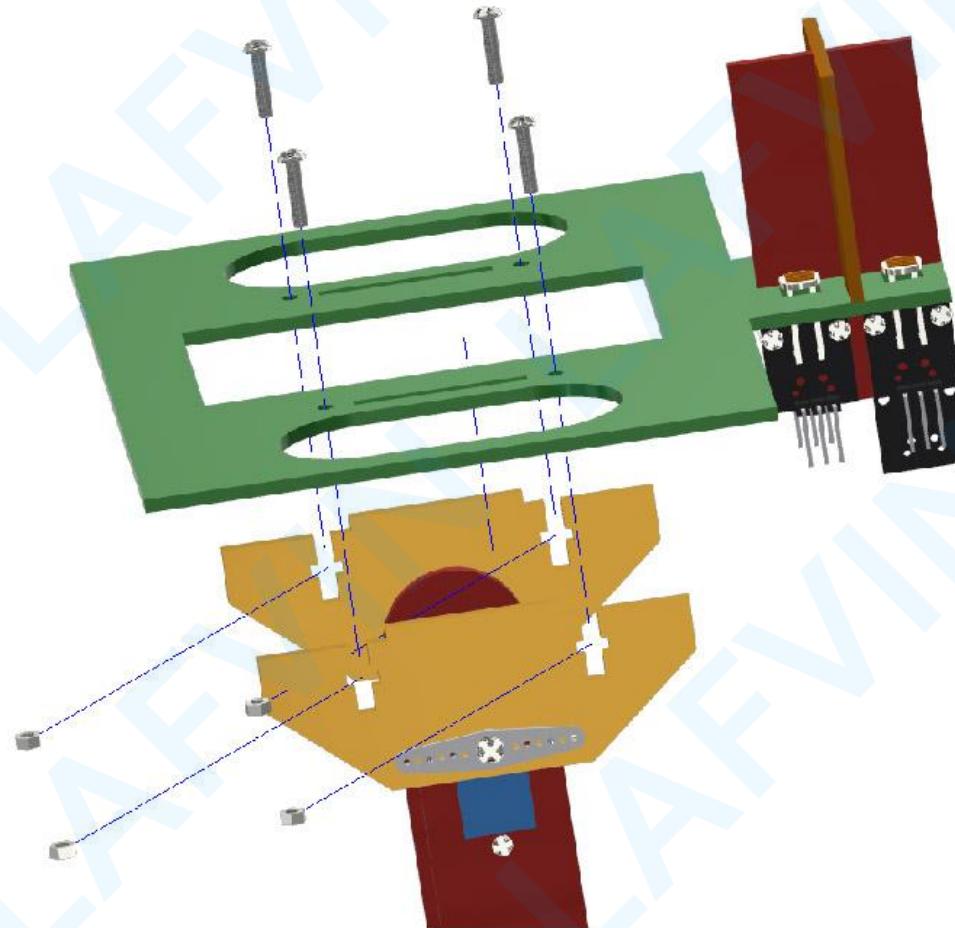


Result

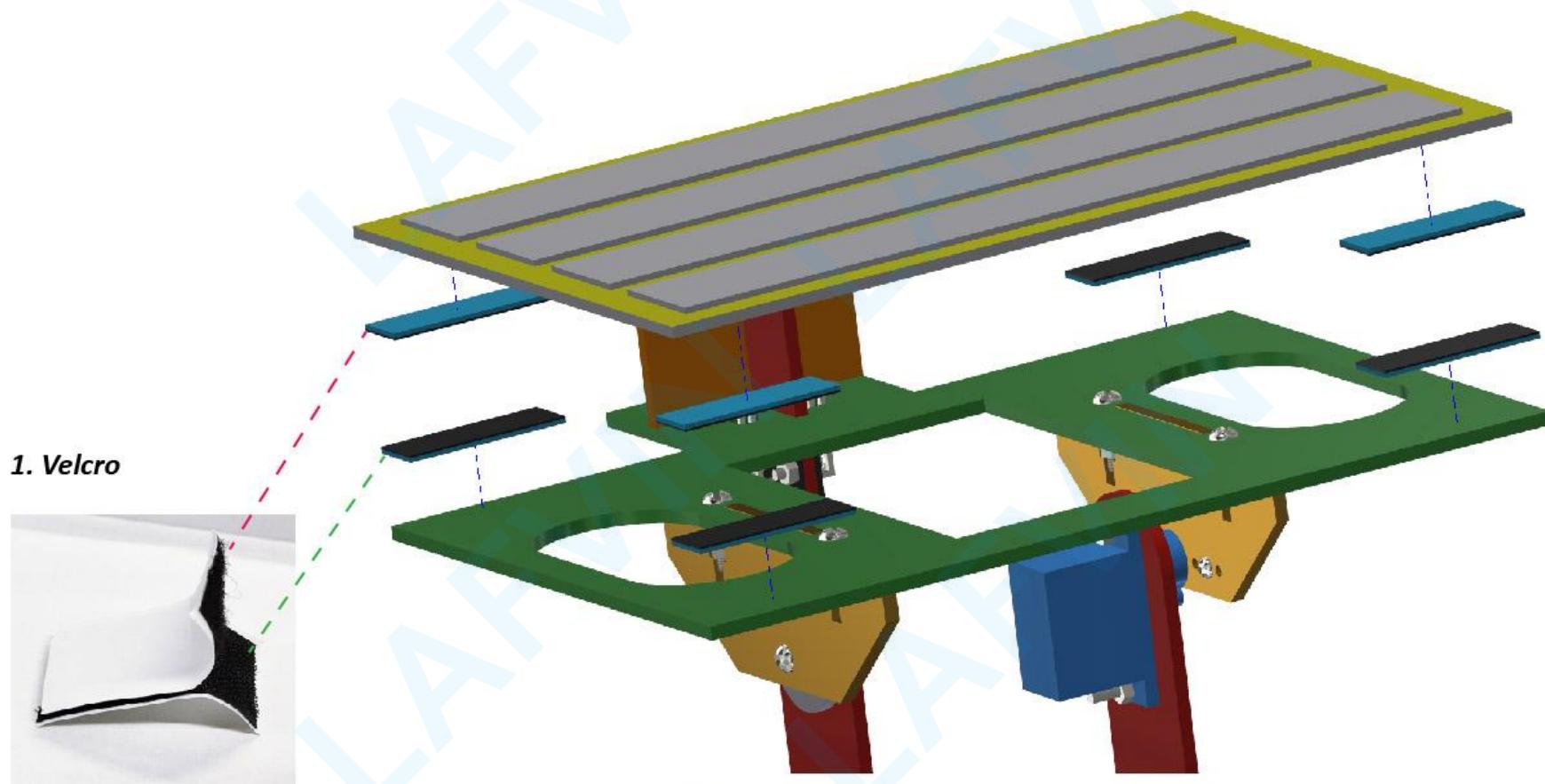
LA042 STEP 16

1. M3 * 12 mm Screw

2. M3 Nut



LA042 STEP 17

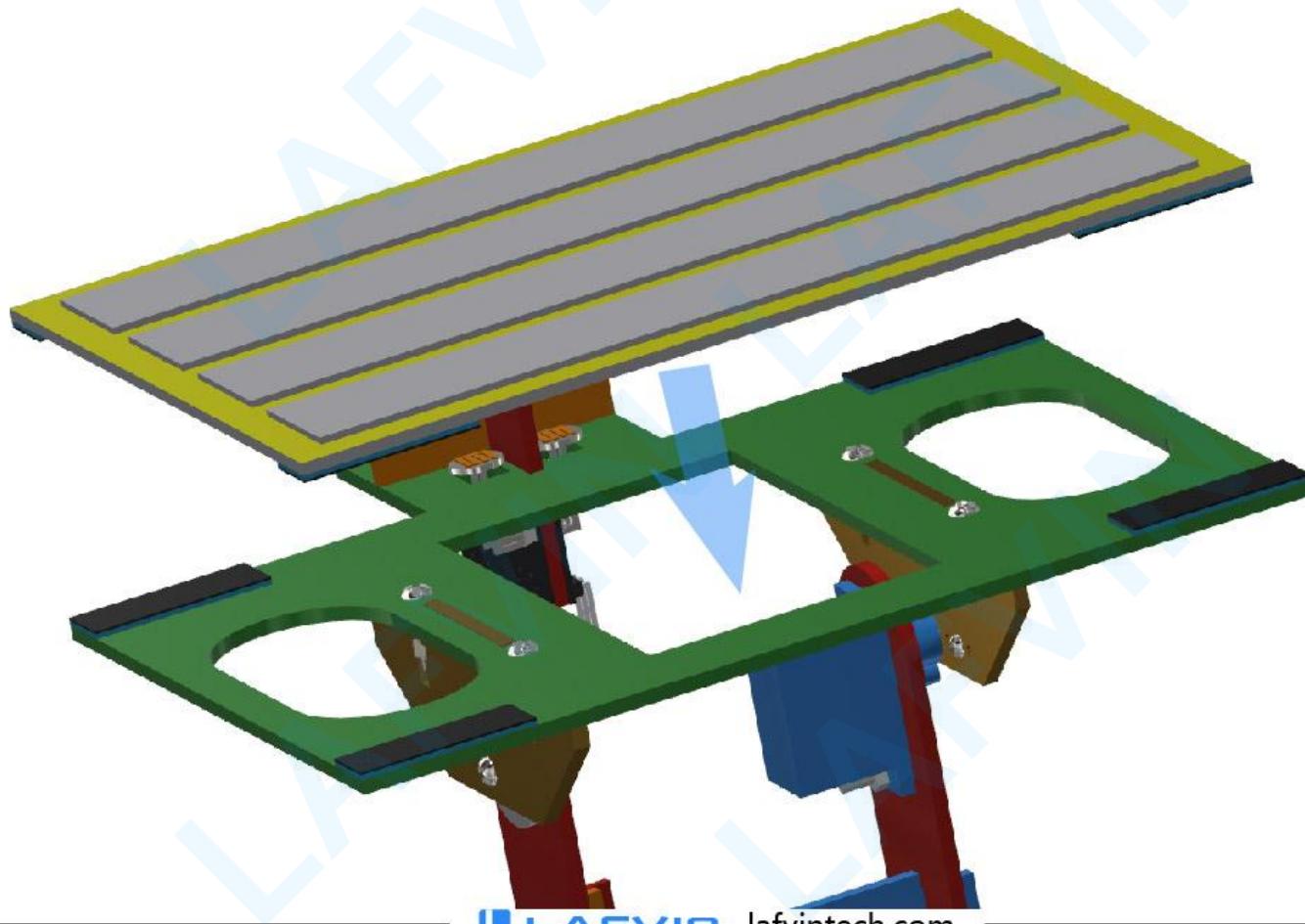


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LA042 STEP 18

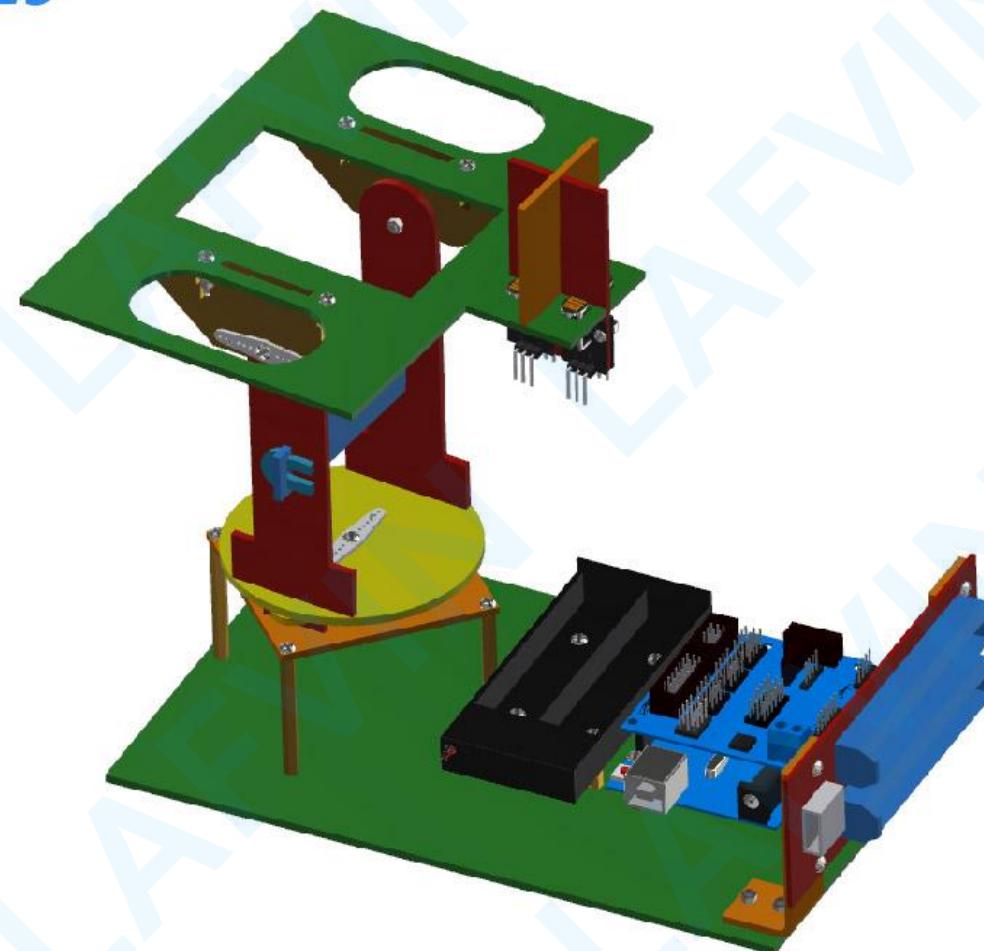


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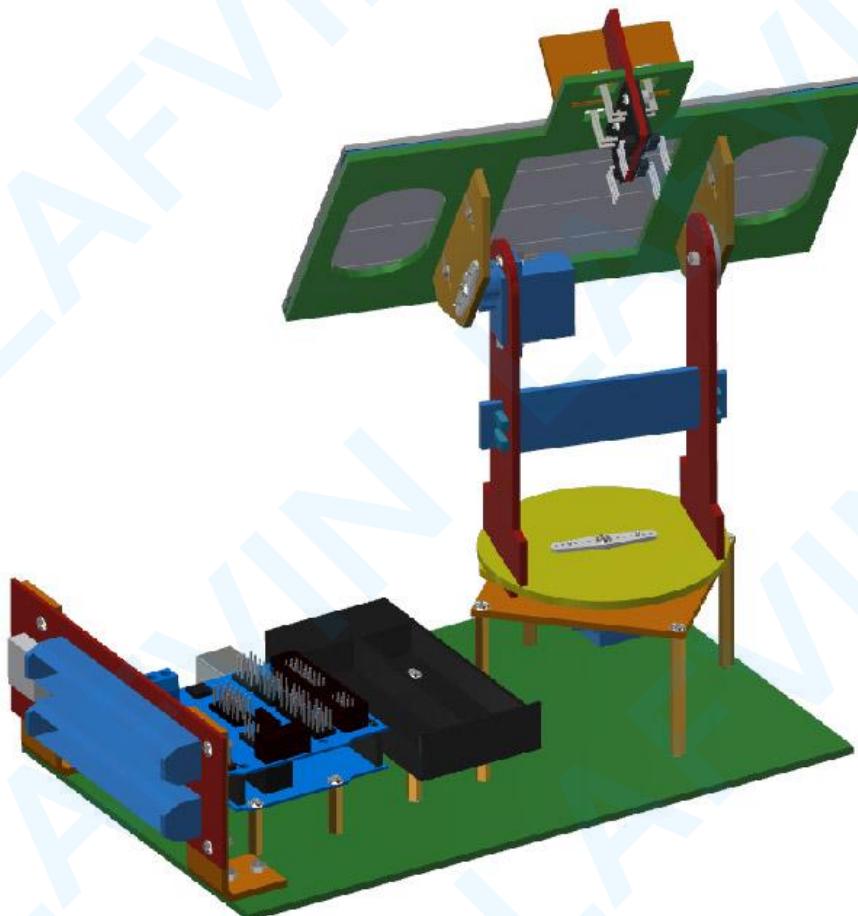
LA042 STEP 19

1. Final View 1



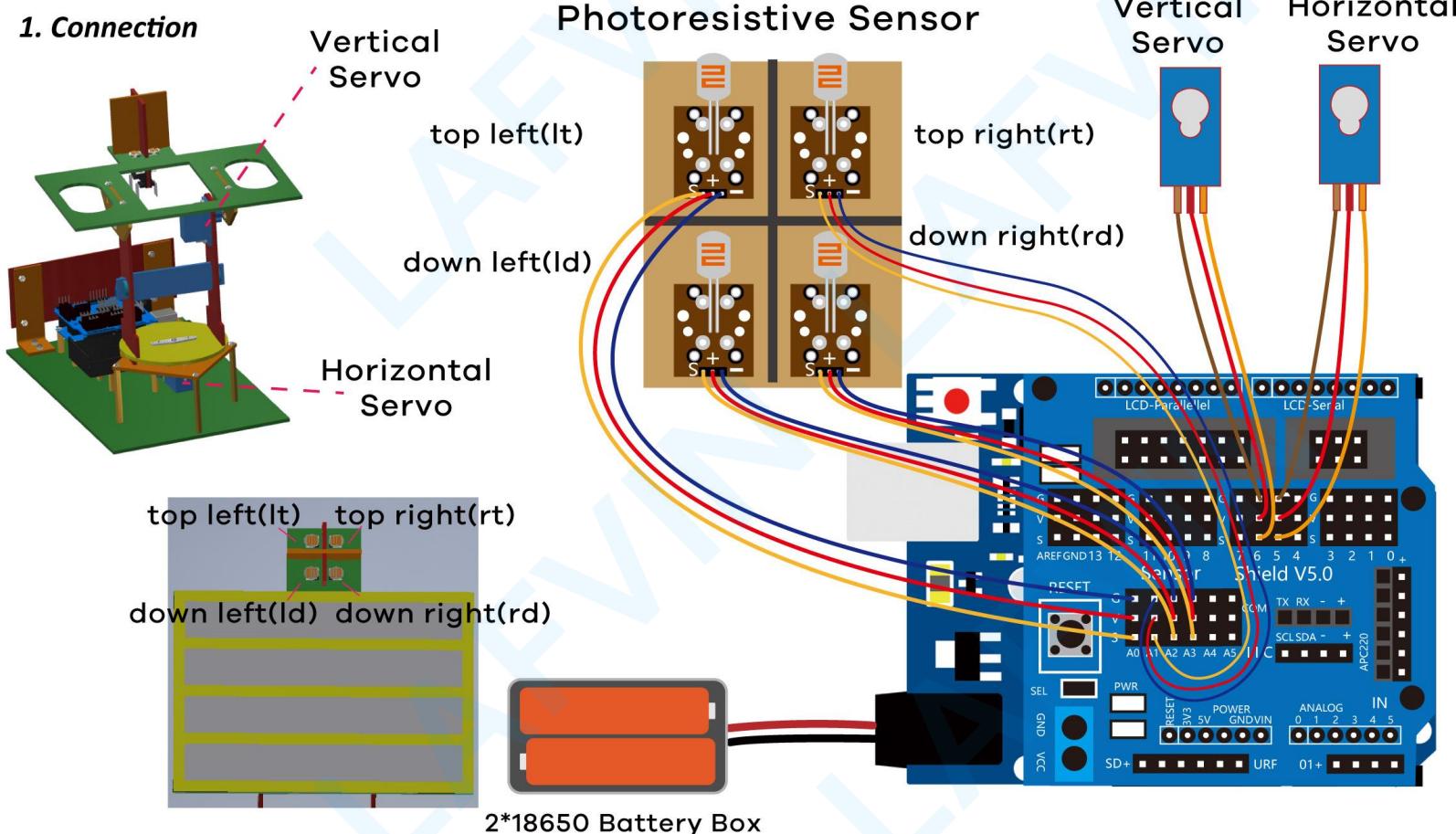
LA042 STEP 20

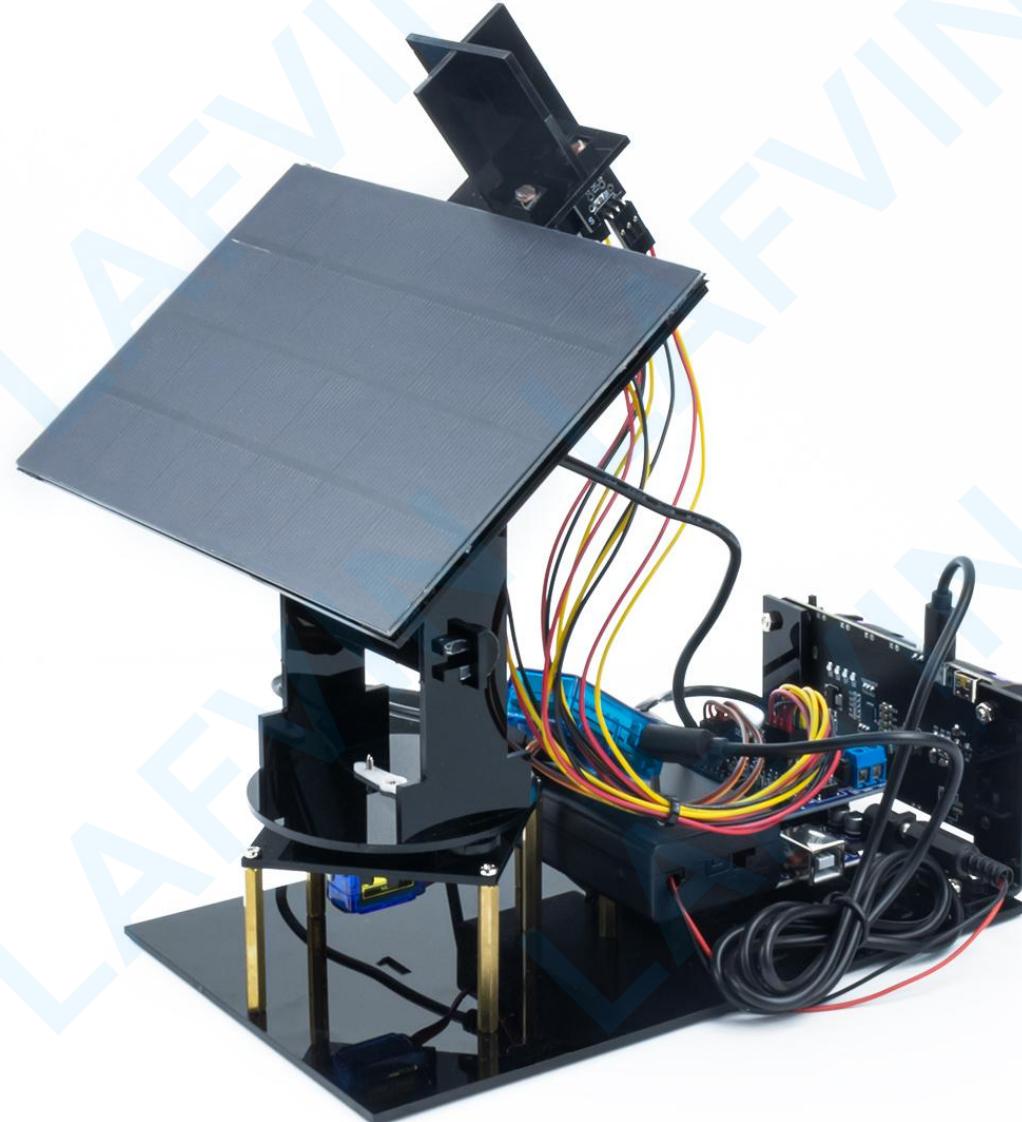
1. Final View 2



LA042 STEP 21

1. Connection





STEP 22:Install Arduino IDE

Go to <https://www.arduino.cc/en/Main/Software>. If you have questions about the installation of Arduino IDE, you can refer to <https://www.arduino.cc/en/Guide>.

Before starting this installation procedure, make sure you have the latest version of the Arduino IDE installed in your computer. If you don't, uninstall it and install it again. Otherwise, it may not work.

Downloads



Arduino IDE 1.8.19

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

Refer to the [Getting Started](#) page for Installation instructions.

SOURCE CODE

Active development of the Arduino software is [hosted by GitHub](#). See the instructions for [building the code](#). Latest release source code archives are available [here](#). The archives are PGP-signed so they can be verified using [this](#) gpg key.

DOWNLOAD OPTIONS

Windows Win 7 and newer
Windows ZIP file

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

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

Mac OS X 10.10 or newer

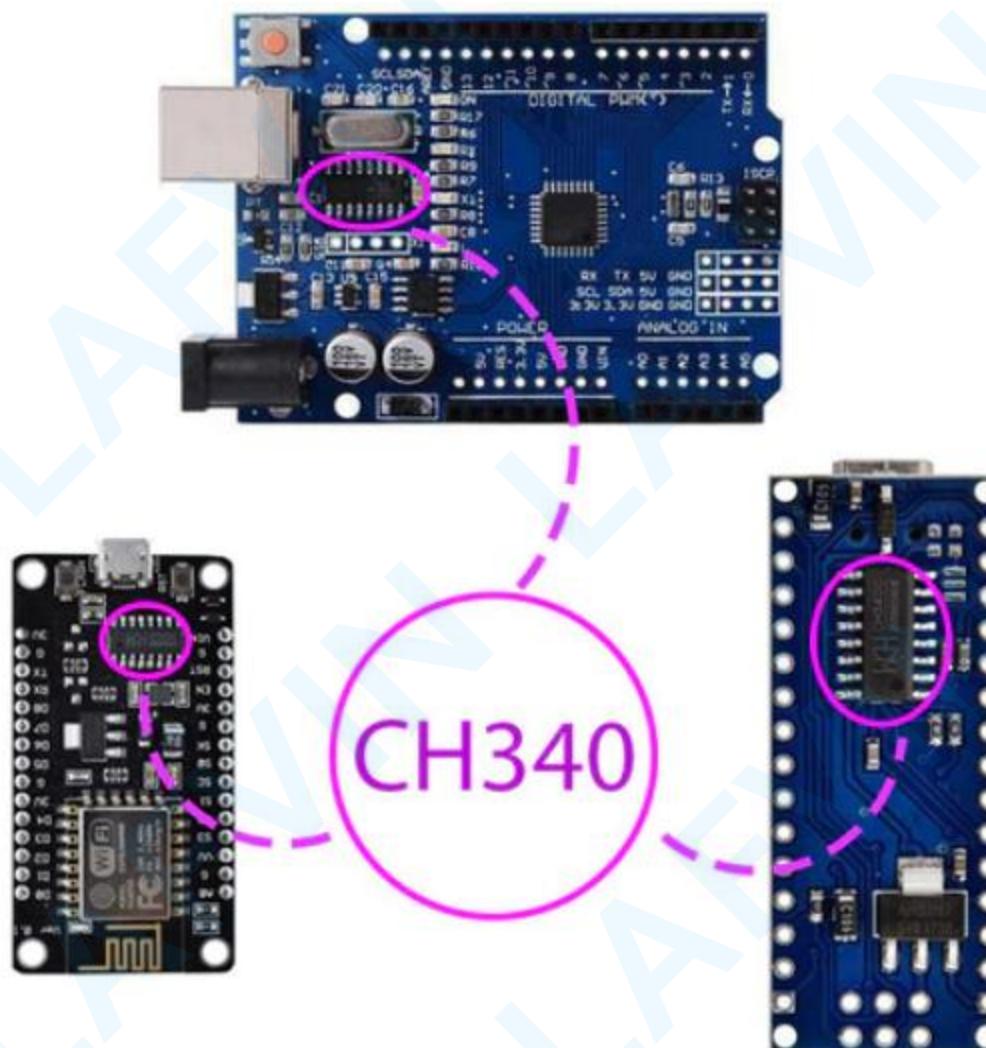
[Release Notes](#)
[Checksums \(sha512\)](#)

STEP 23:Install Arduino Driver

What is CH340 Driver?

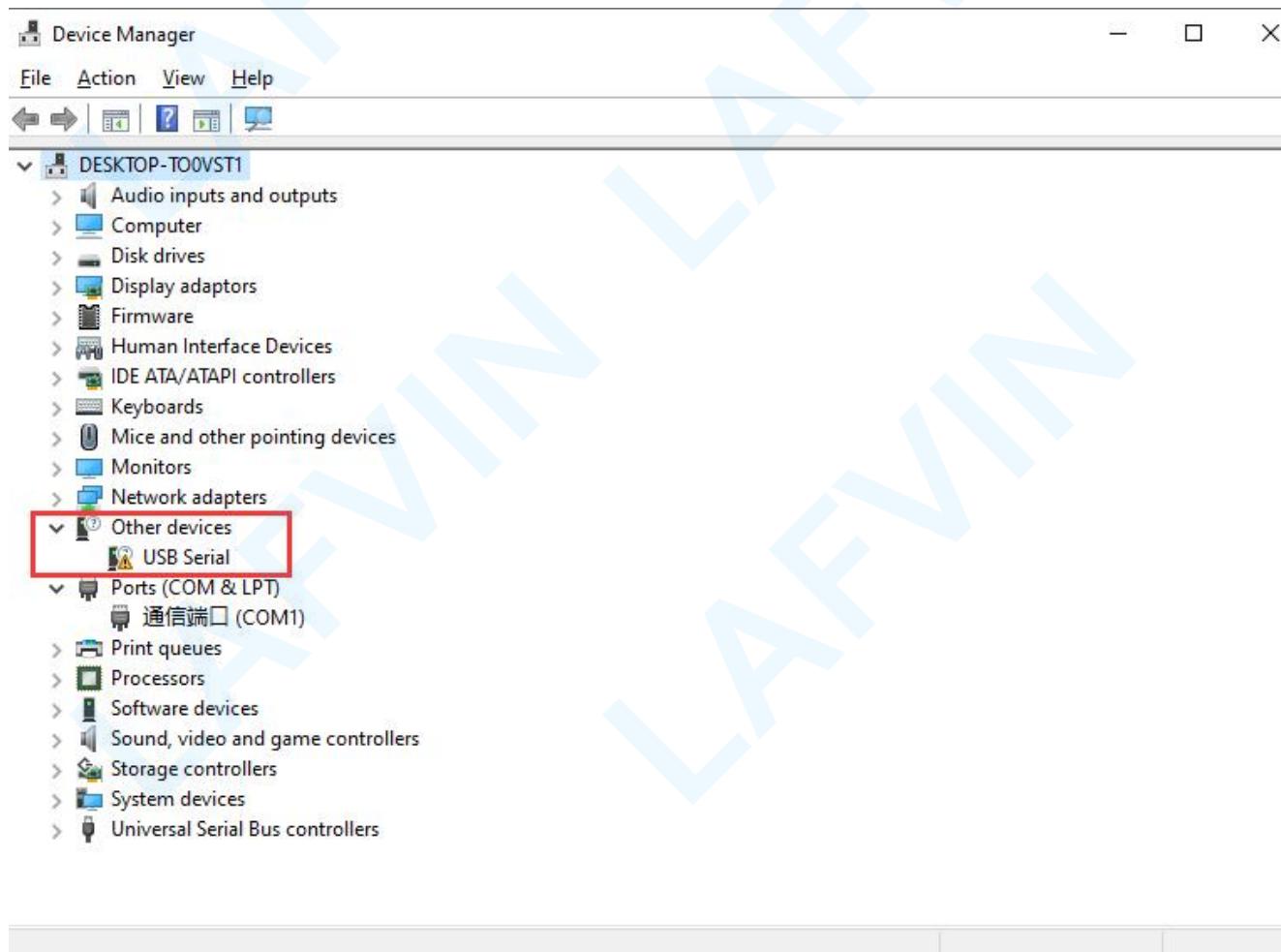
CH340 is a TTL (serial) to USB converter and vice versa. This chip has been used in some boards such as Arduino boards, ESP8266, etc. The boards using the CH340 chip, don't need a programmer in order to access the processor or to program them. But there is a downside. An extra driver must be installed before starting to work with boards having this IC.

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.**



If you connect your board to the computer before installing the driver, your computer will not recognize the board correctly and you will see following image in Device Manager.

To open Device Manager, search for it in the Windows Start menu.



Follow the steps below to install the CH340 driver:

①: Downloading the driver

First, download the CH340 driver from the this link.

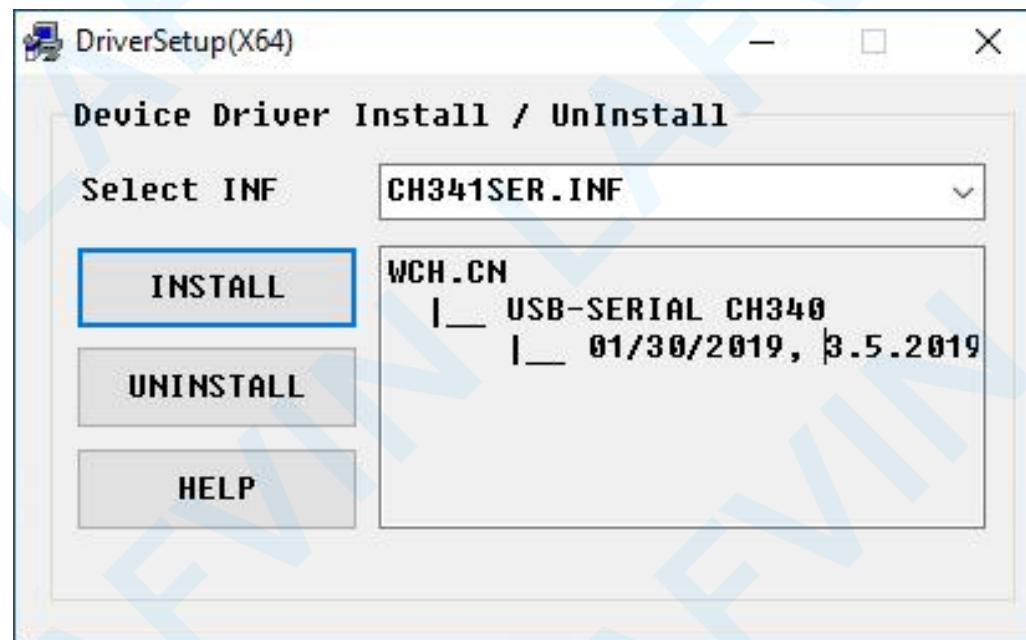
[Windows CH340 Driver](#)

You can also download the latest version of the driver directly from the [manufacturer's site](#)

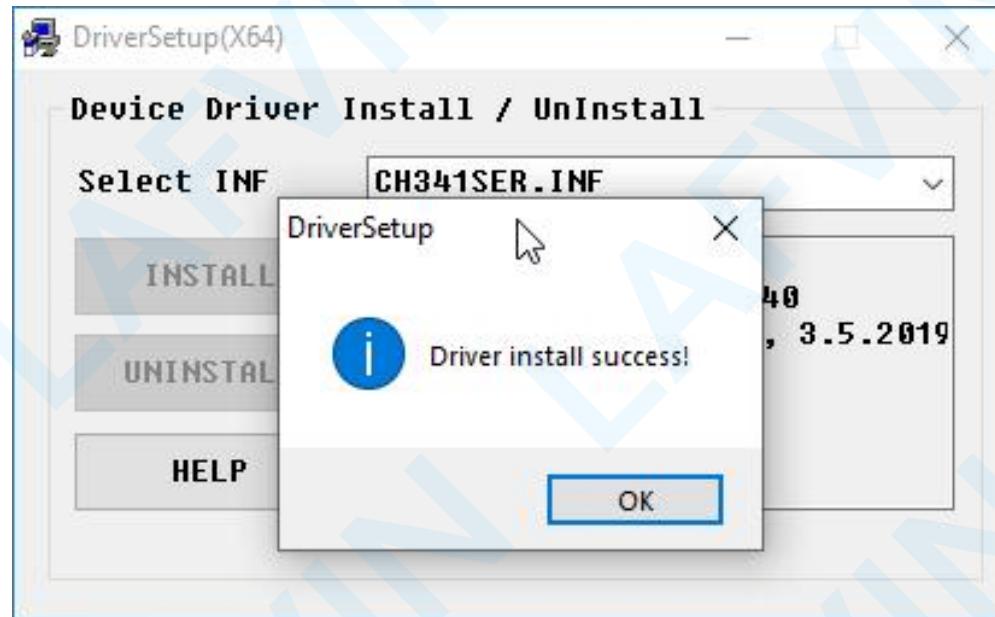
file name	file content
CH341SER.ZIP	CH340/CH341 USB to serial port Windows driver, supports Windows XP/Vista/7/8/8.1/10/11/SERVER 2003/2008/2012/2016/2019/2022 -32/64bit, Microsoft WHQL Certified, supports USB to 3-line and 9-line serial port.
CH341SER_LINUX.ZIP	CH340/CH341 USB to serial port LINUX driver, supports 32/64-bit operation system.
CH341SER_MAC.ZIP	CH340/CH341 USB to serial port MAC OS driver, supports 32/64-bit operation system, contains instructions for use.

②: Installing the driver

After downloading the driver, open it and click Install.(**Note:** Before installing the driver software, you must connect the Arduino board to your computer with a USB cable)



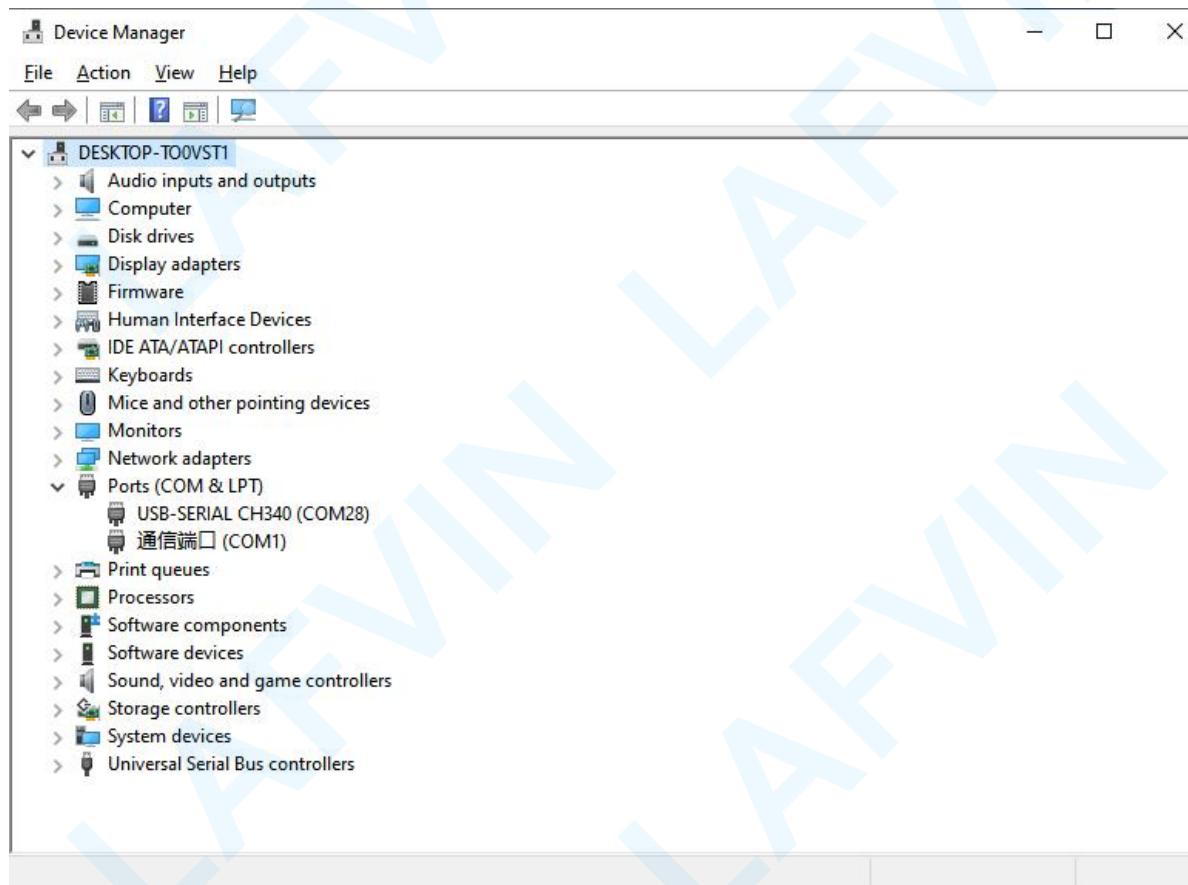
After successful installation you should see this message



Note: In some cases, you may need to reset Windows after the driver installation is complete.

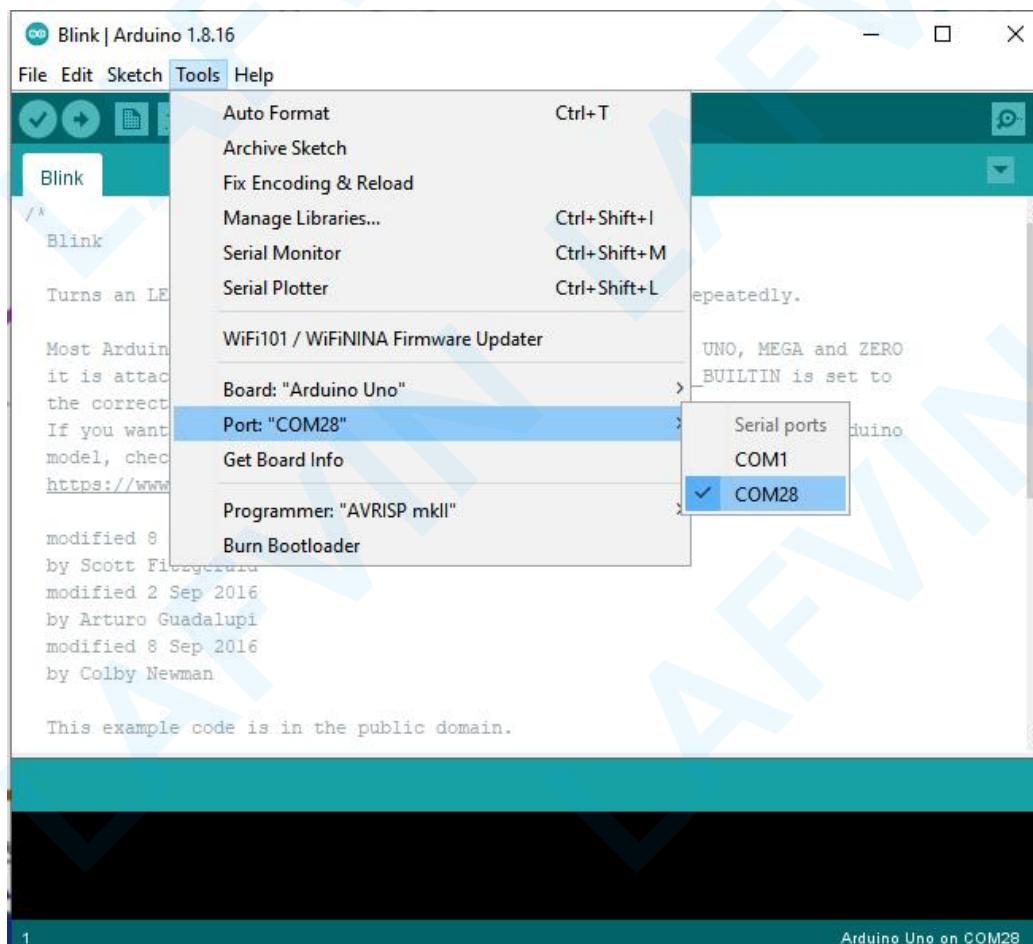
③: Checking Correct Driver Installation in Device Manager

If your driver has been installed correctly, and if you connect your board to a computer, then you can see its name and port number in the Port section. For example, my Arduino board is connected to COM27.

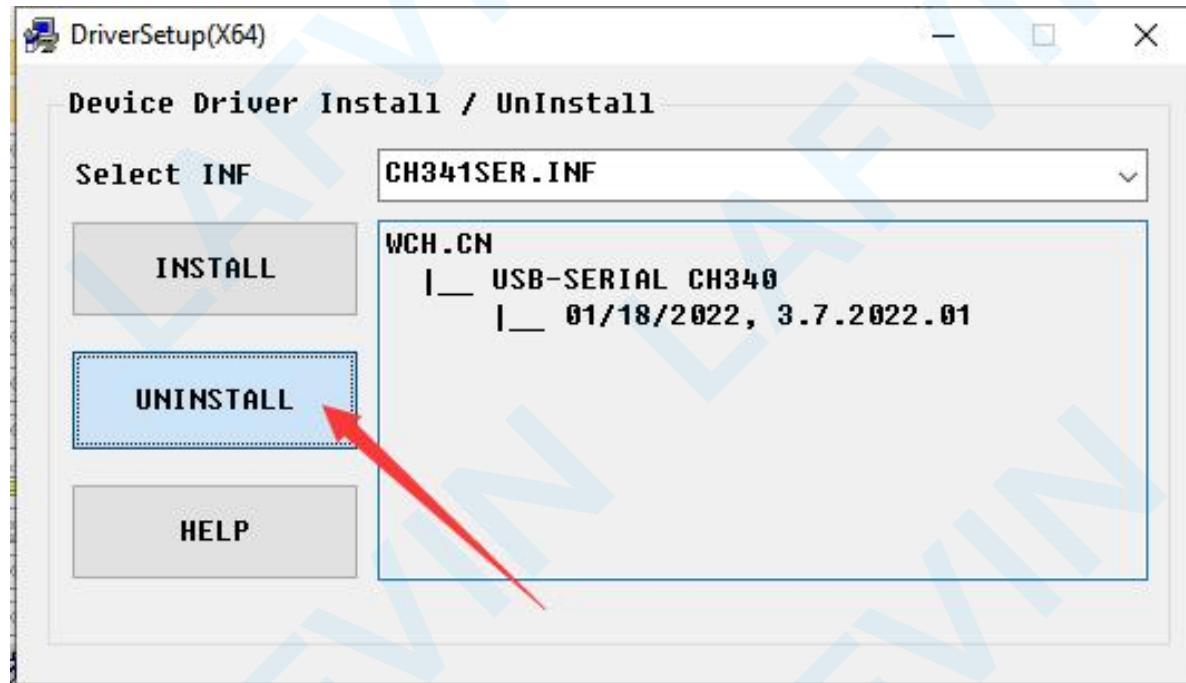


④: Checking Correct Driver Installation in Arduino IDE

Open the Arduino IDE software. Go to the Tools menu and from the Port section, select the port number appropriate port that your board is connected to. Note that this port number must be the same as the number you saw in the previous step.



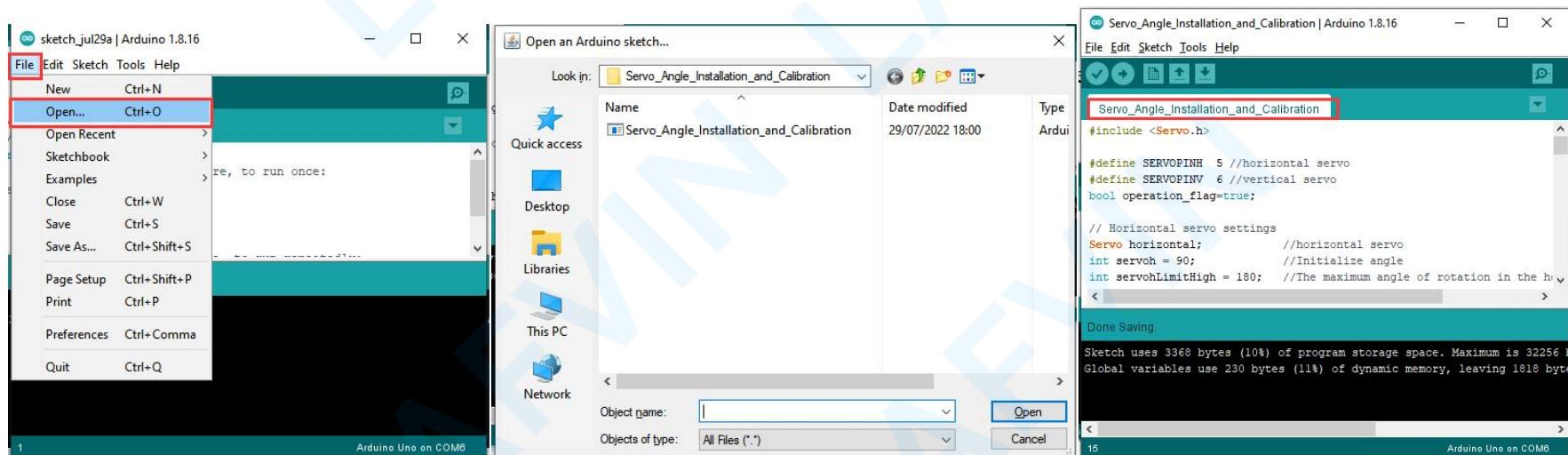
If you don't find the Arduino CH340 device in your computer's device manager or Arduino IDE, it means you didn't install the driver successfully. You can try **uninstall** the driver, restarting your computer, and then [repeating the above steps.](#)



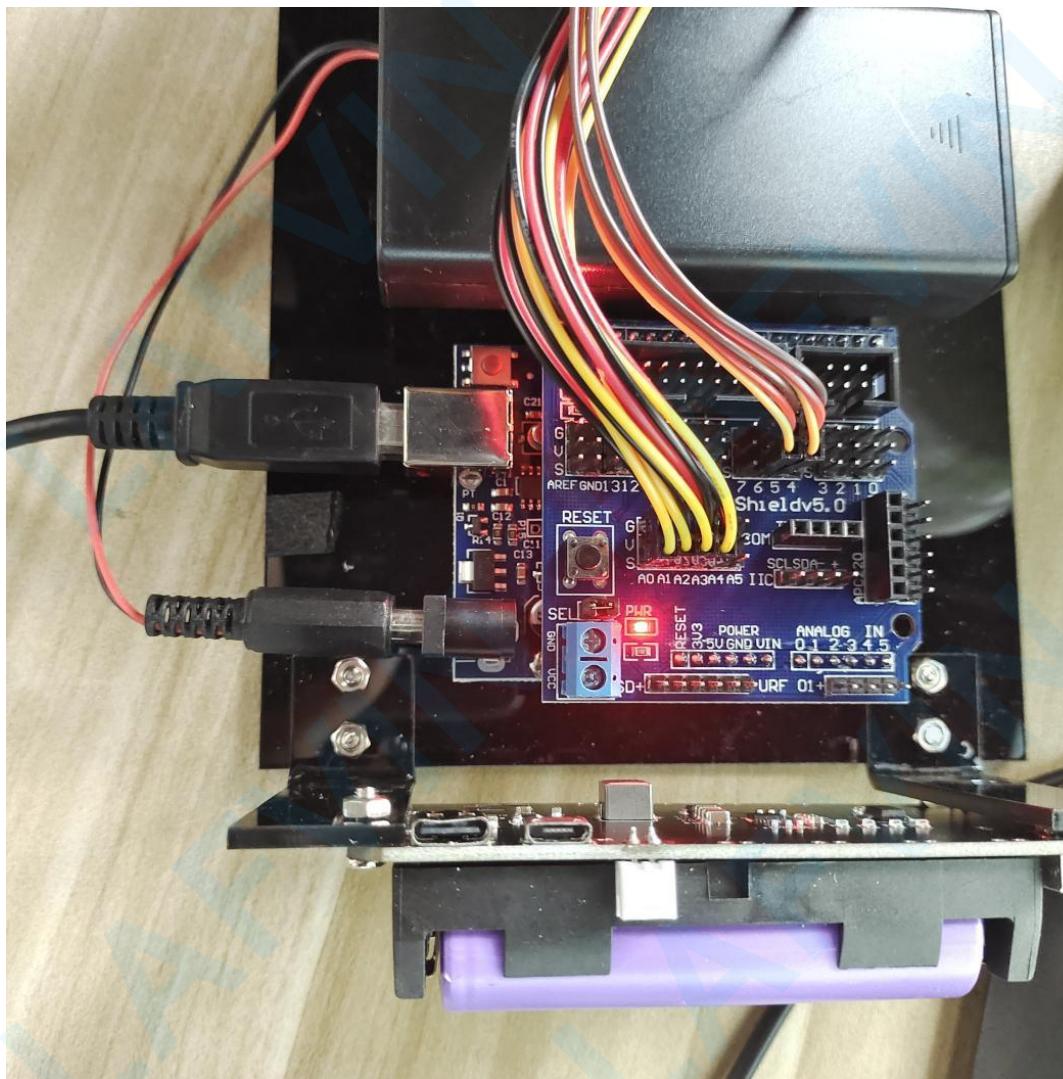
STEP 24: Servo Angle Installation and Calibration

If you strictly follow the instructions to install the servo's swing arm structure, you have completed the angle calibration of the servo. If you find that the servo is turning in the wrong position, you can follow the steps below to complete the angle calibration of the servo.

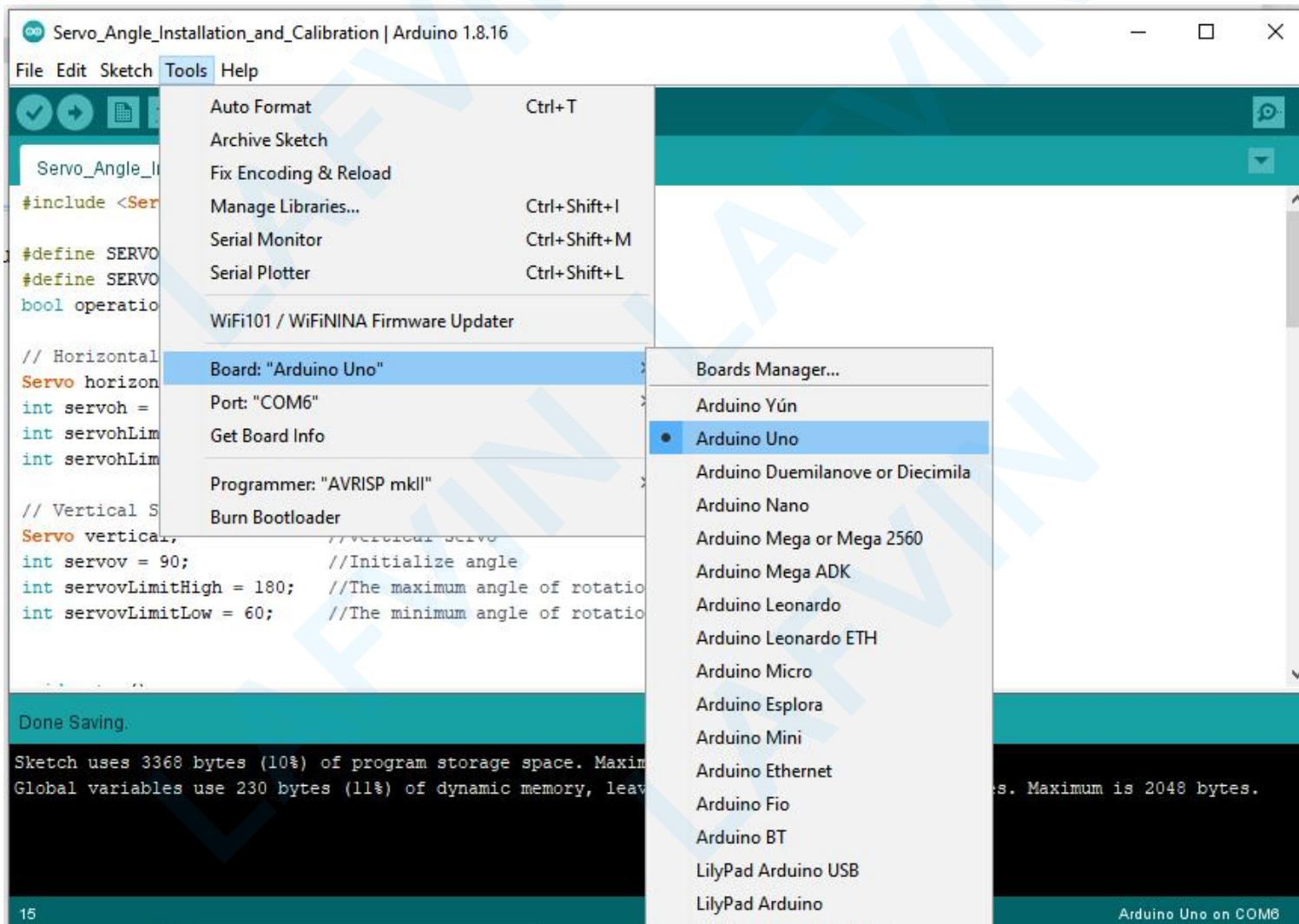
- ① Start Arduino IDE, open the code in **File>Open...>>>Servo_Angle_Installation_and_Calibration.ino**



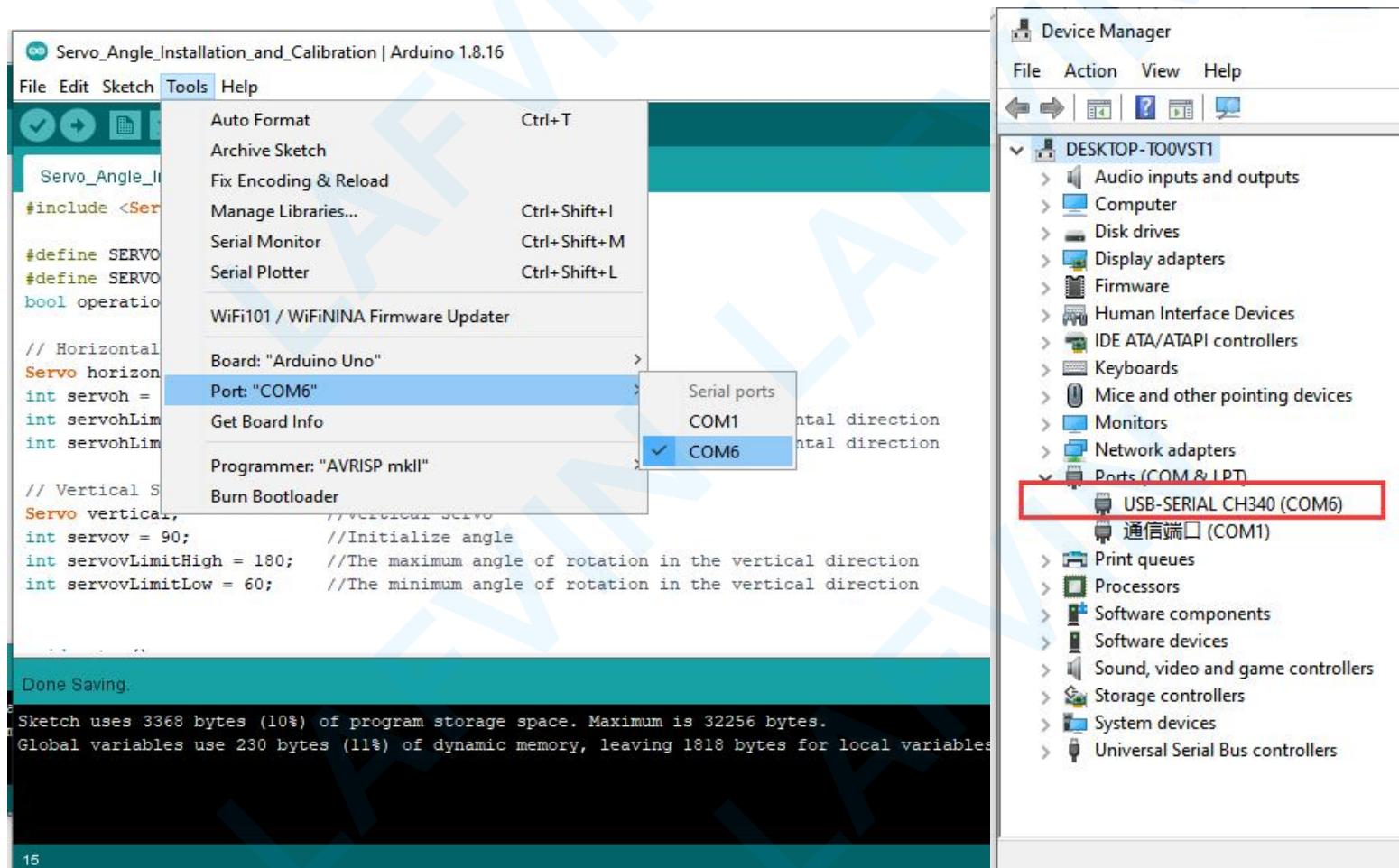
- ② Connect the Arduino board to your computer with a USB cable



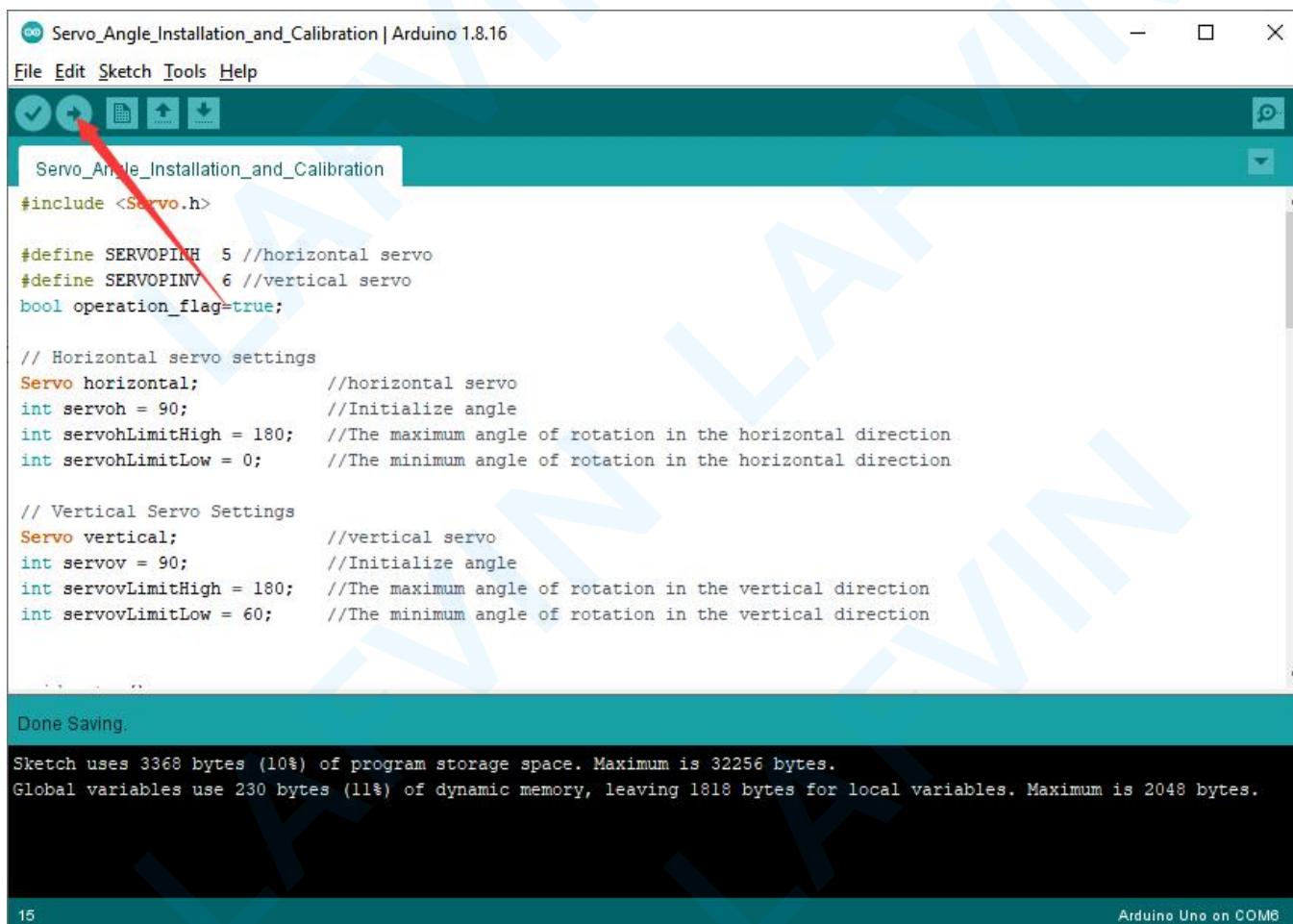
③ Select your Board in **Tools > Board menu>>>>Arduino UNO**



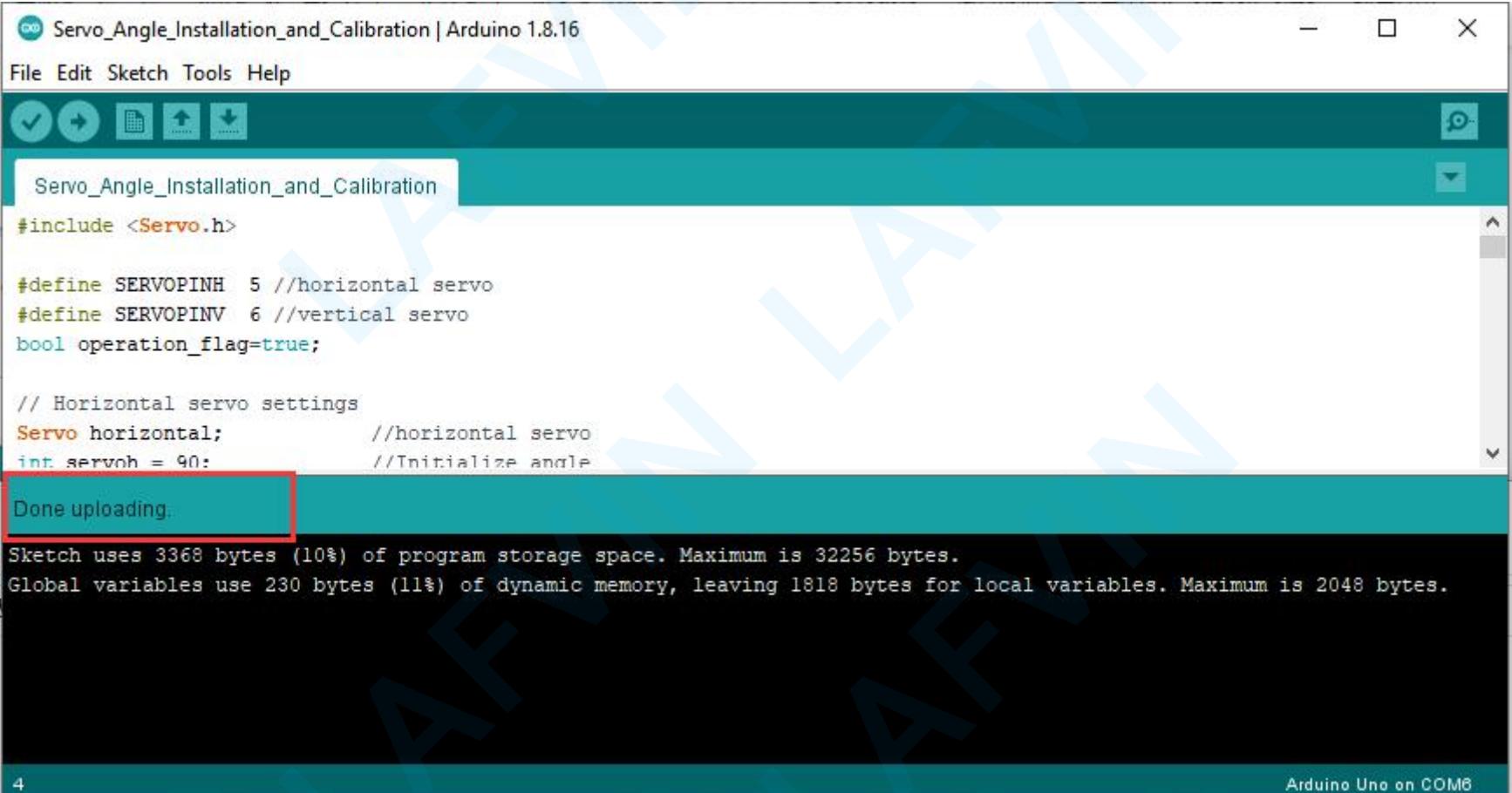
④Select the Port (if you don't see the COM Port in your Arduino IDE, you need to [install the Arduino CH340 Drivers](#))



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



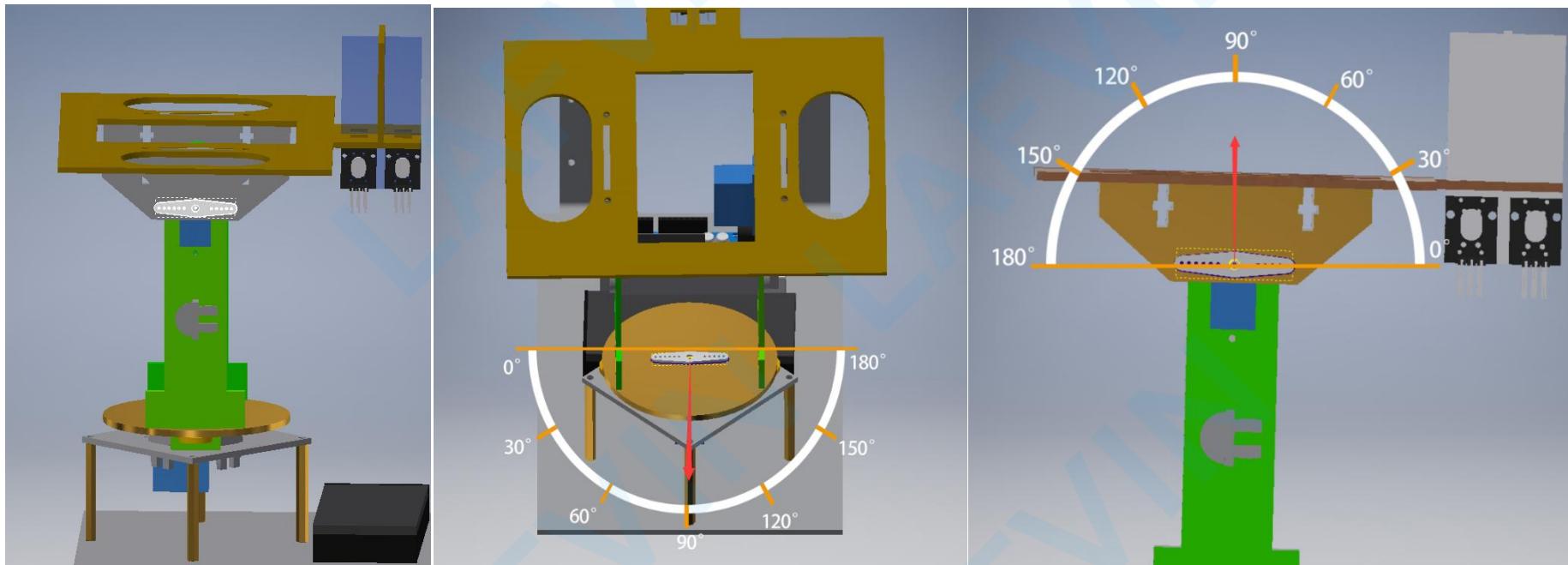
If everything went as expected, you should see a “**Done uploading.**” message.



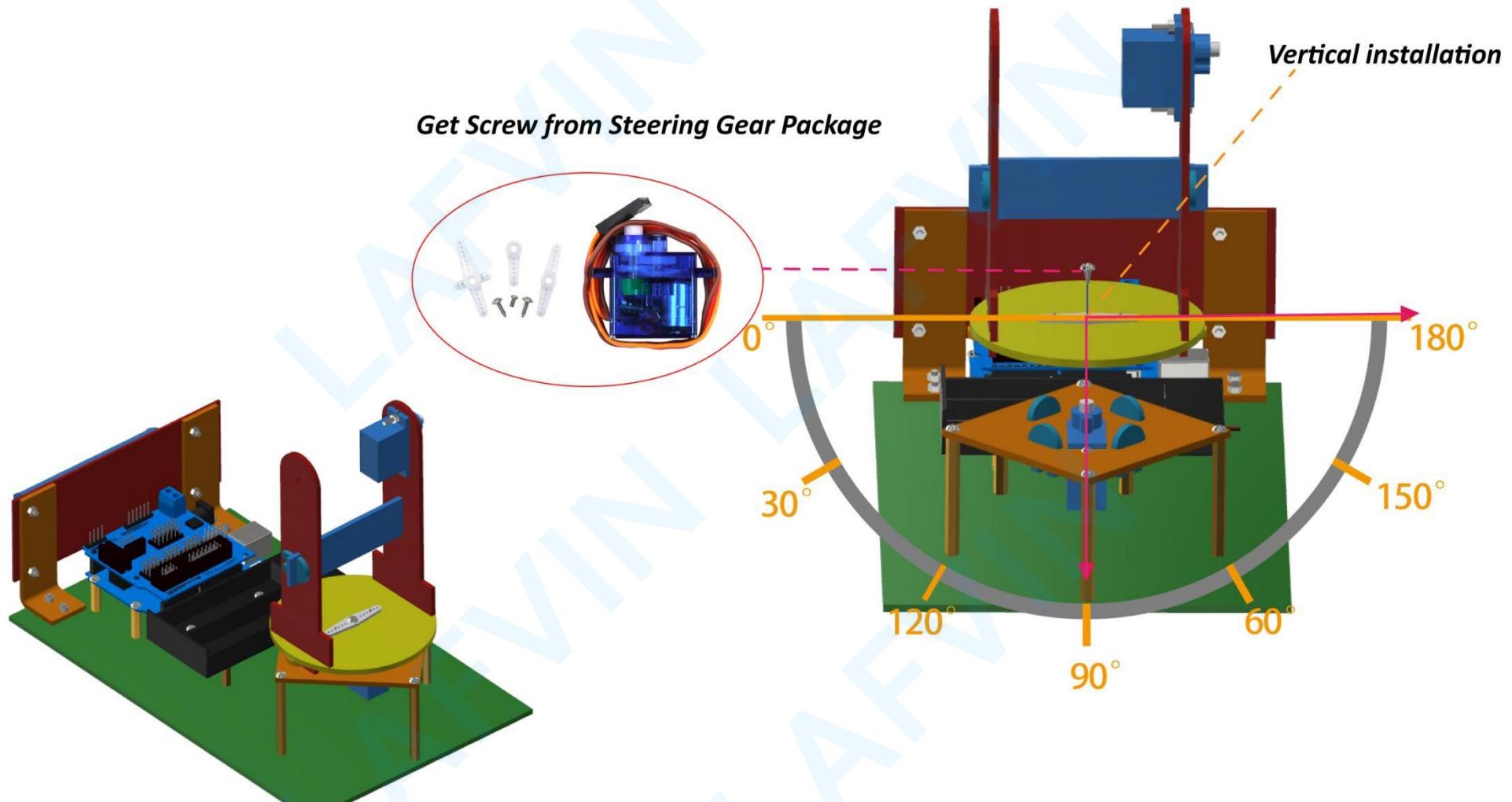
The screenshot shows the Arduino IDE interface with the following details:

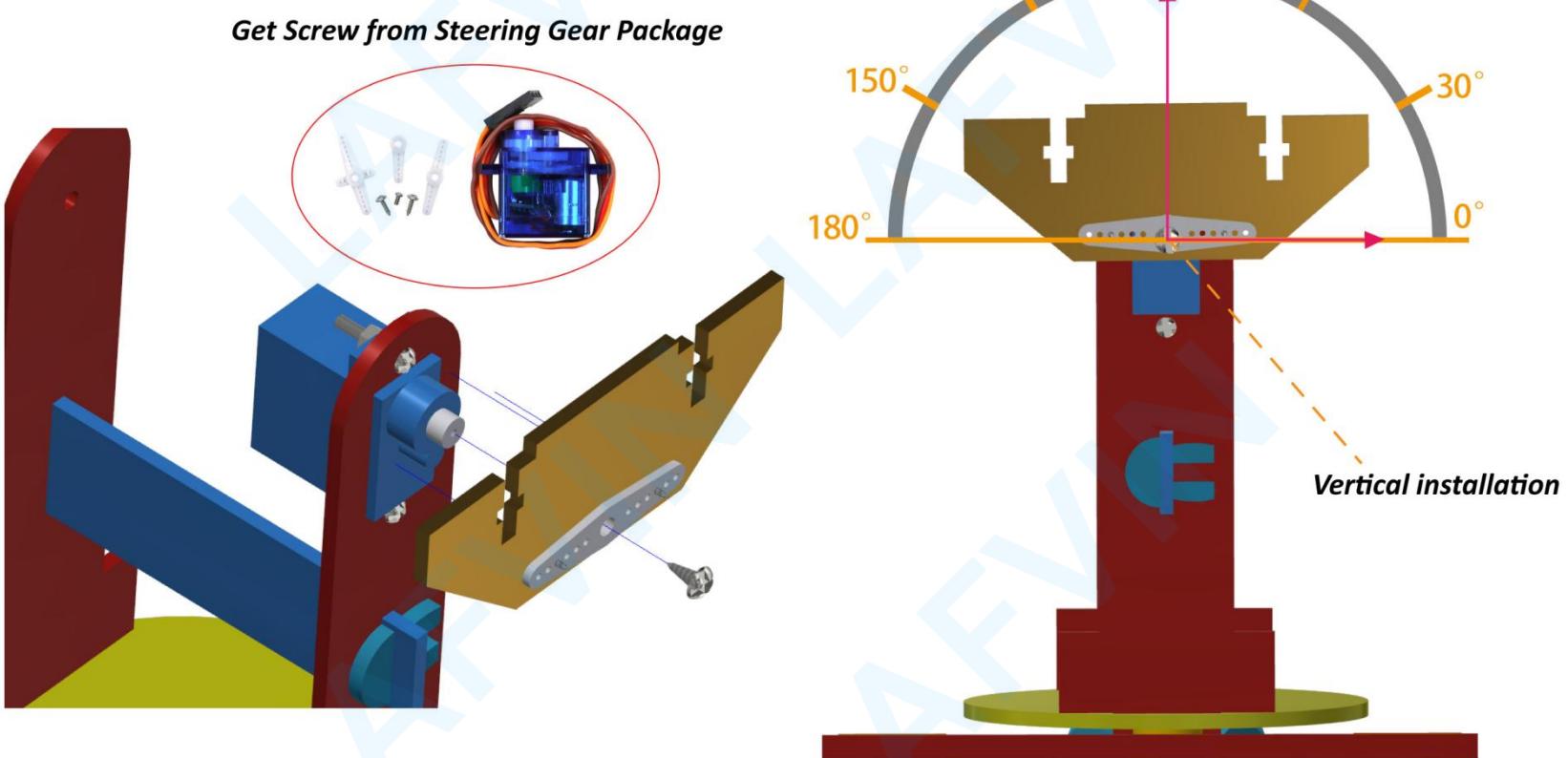
- Title Bar:** Servo_Angle_Installation_and_Calibration | Arduino 1.8.16
- Menu Bar:** File Edit Sketch Tools Help
- Sketch Area:** The code for "Servo_Angle_Installation_and_Calibration" is displayed. It includes definitions for horizontal and vertical servos, a boolean variable for operation, and servo settings. A red box highlights the "Done uploading." message at the bottom of the code area.
- Message Area:** Shows memory usage statistics: "Sketch uses 3368 bytes (10%) of program storage space. Maximum is 32256 bytes." and "Global variables use 230 bytes (11%) of dynamic memory, leaving 1818 bytes for local variables. Maximum is 2048 bytes."
- Status Bar:** Arduino Uno on COM6

⑥ After uploading the code successfully. Both the horizontal and vertical servos will turn to the initial angle of 90° and you should see the following state.



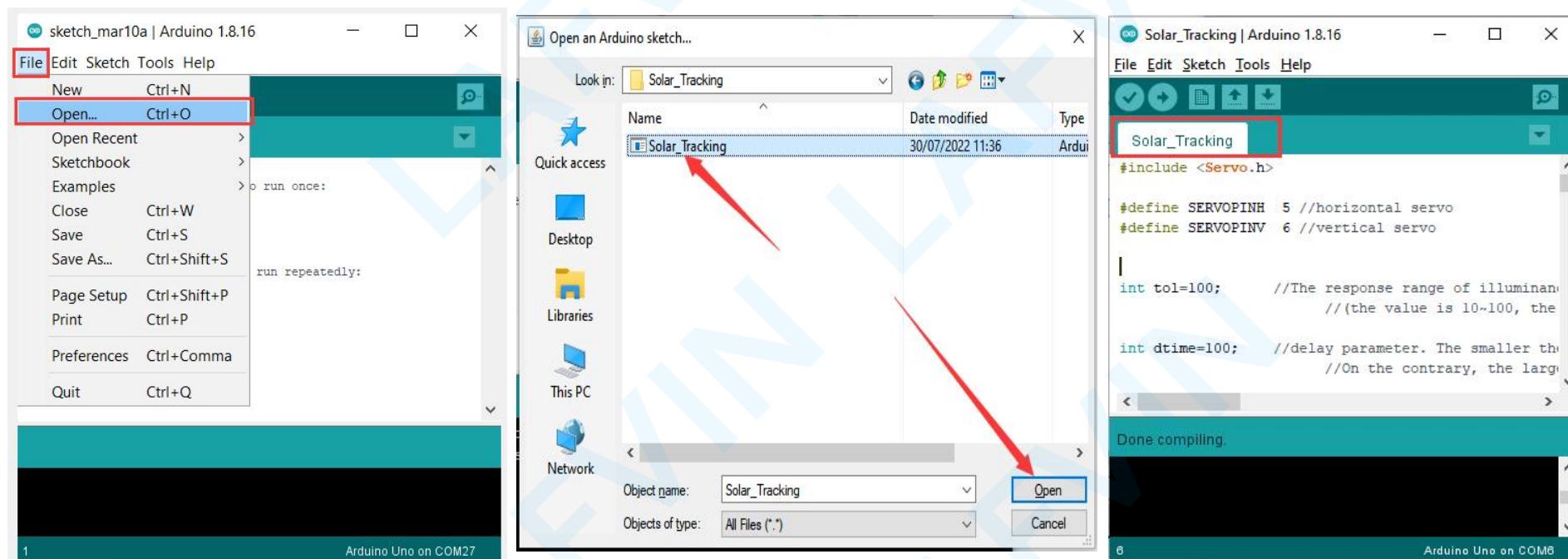
Otherwise, you need to take out the fixing screw of the servo gear, and then install it according to the steps in the instruction book (pay attention to the vertical direction marked)



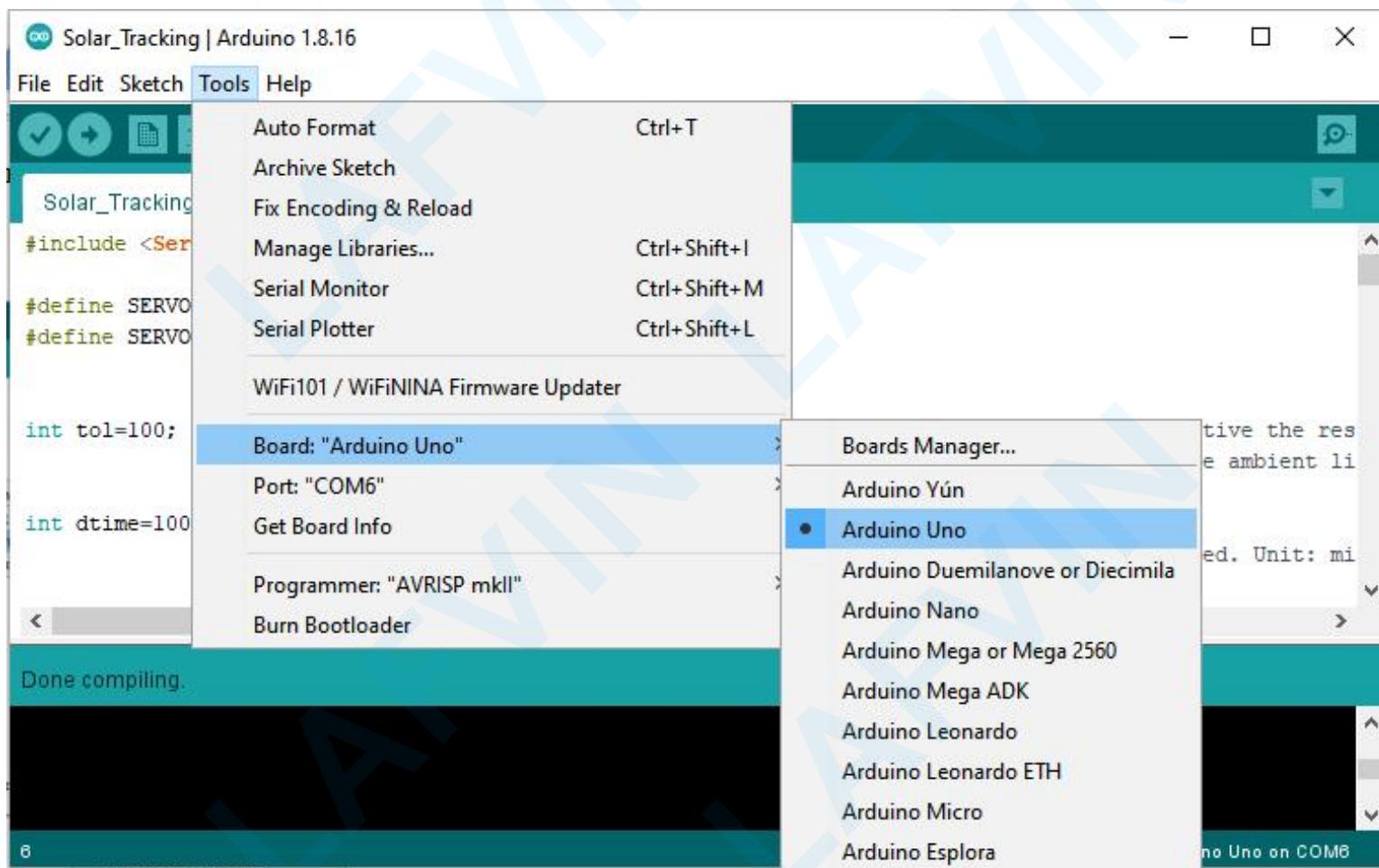


STEP 25: Upload Solar Tracking Code

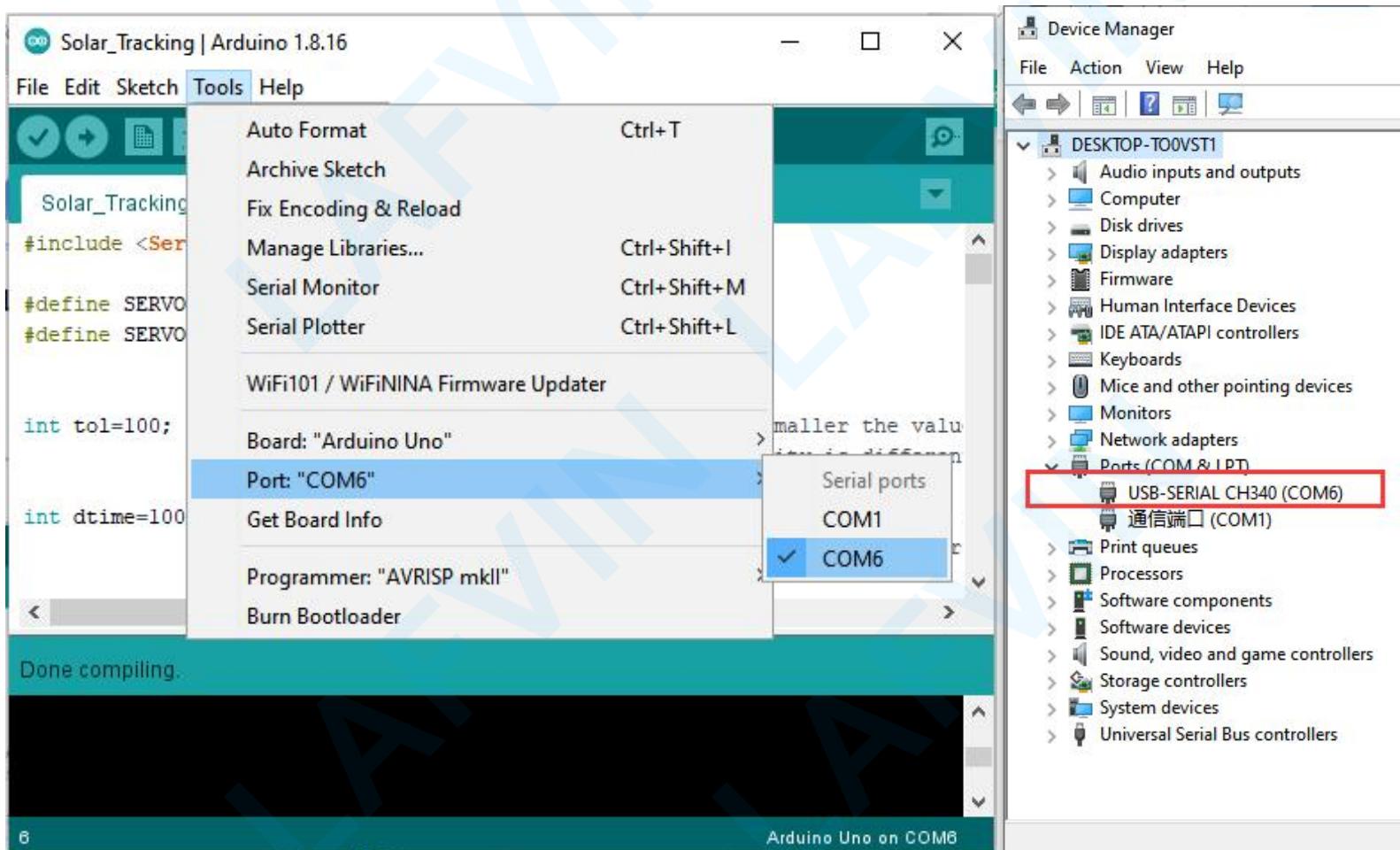
① Open the code in **File>Open...>>>Solar_Tracking.ino**



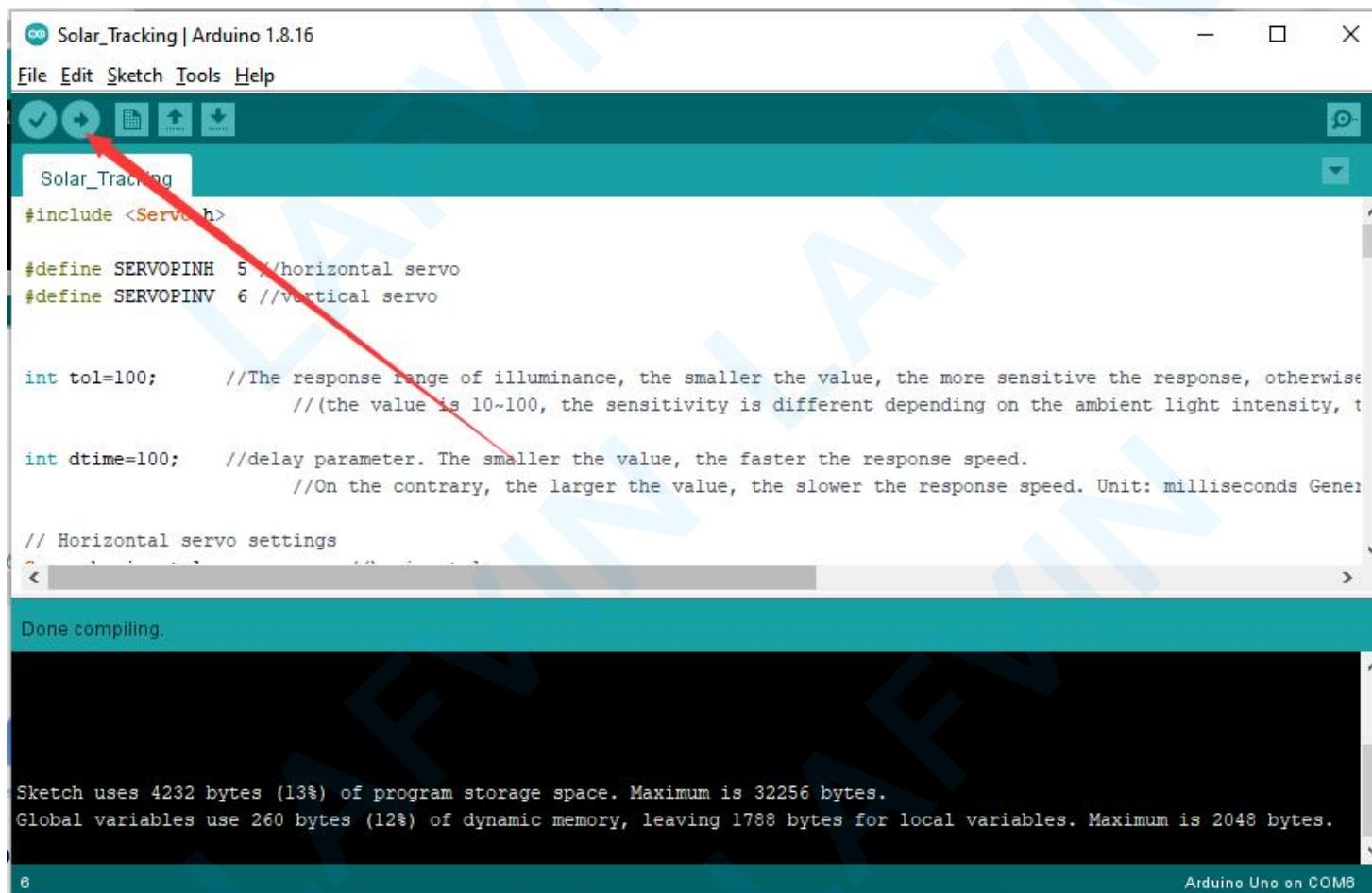
- ② Select your Board in **Tools > Board menu>>>>Arduino UNO**



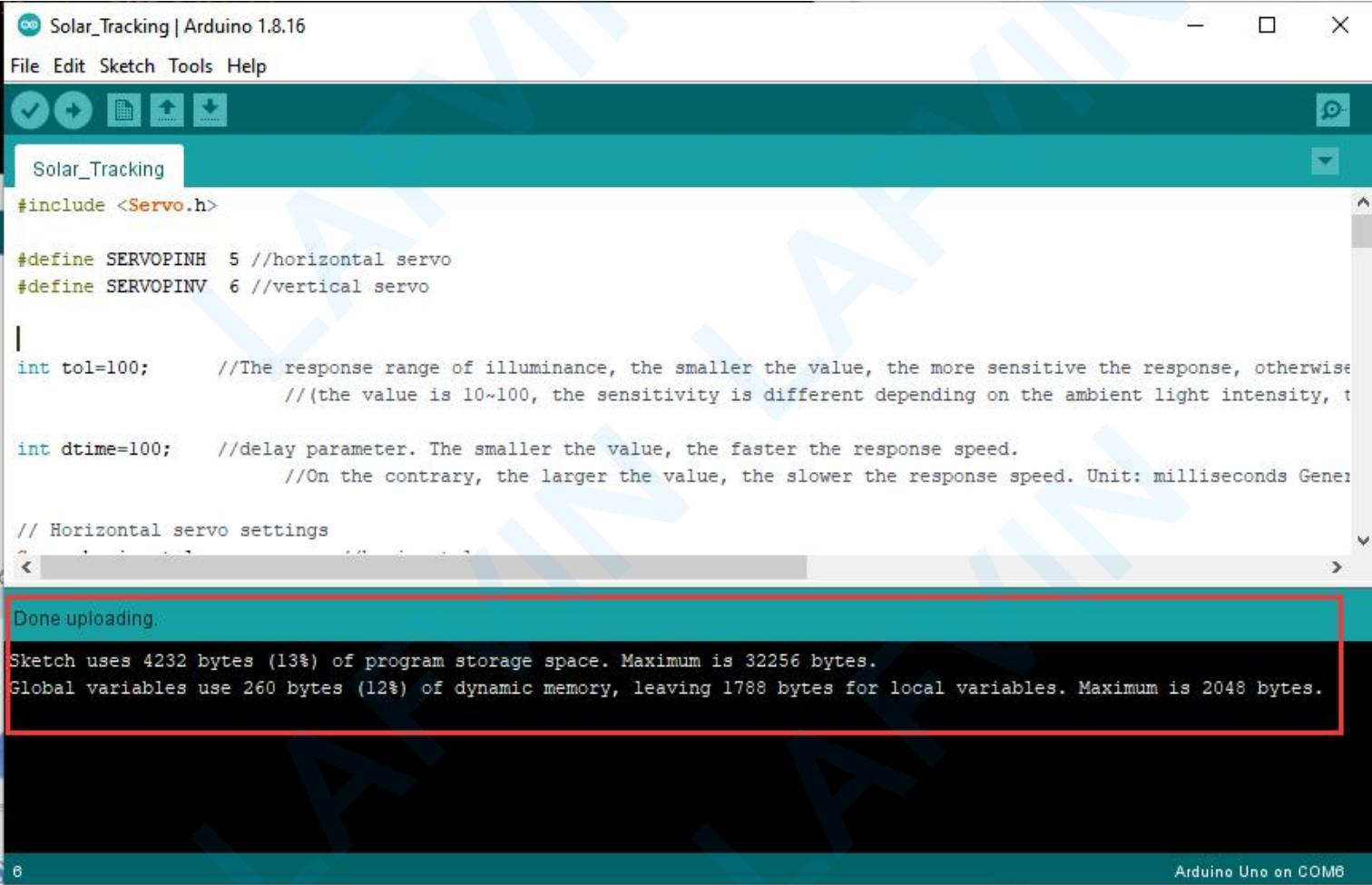
③Select the Port (if you don't see the COM Port in your Arduino IDE, you need to [install the Arduino CH340 Drivers](#))



- ④Press the Upload button in the Arduino IDE. Wait a few seconds while the code compiles and uploads to your board.



If everything went as expected, you should see a “**Done uploading.**” message.



The screenshot shows the Arduino IDE interface with the following details:

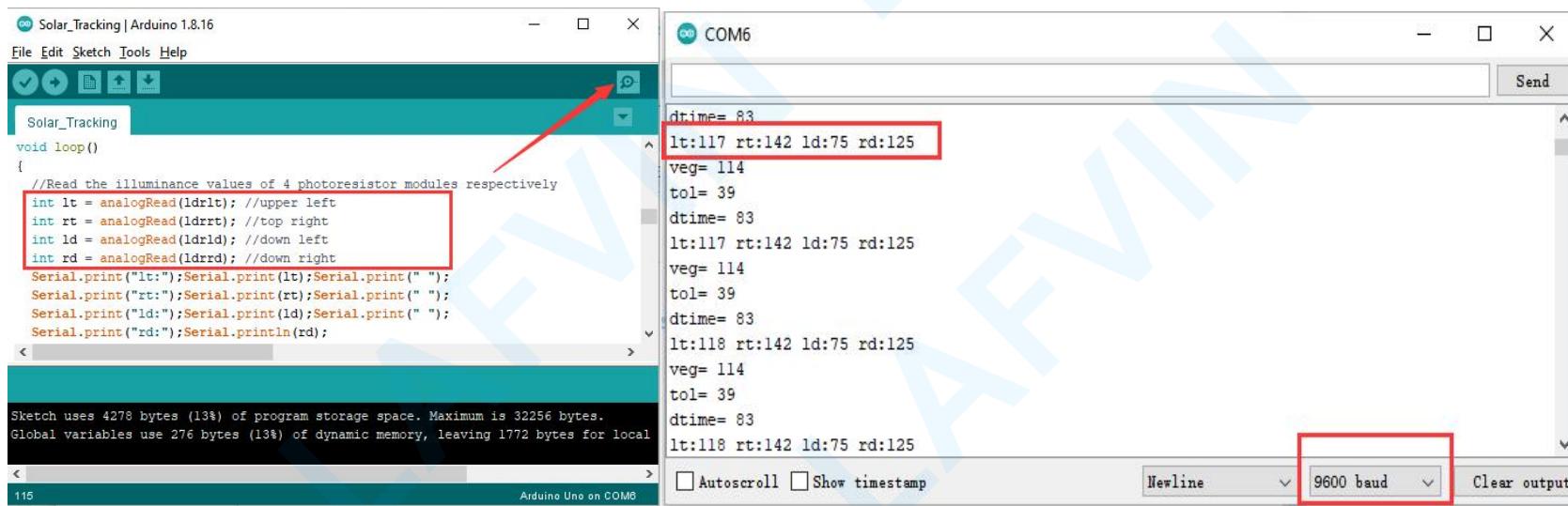
- Title Bar:** Solar_Tracking | Arduino 1.8.16
- Menu Bar:** File Edit Sketch Tools Help
- Toolbar:** Includes icons for Open, Save, Upload, and Download.
- Sketch Area:** Displays the code for the Solar_Tracking sketch. The code includes definitions for servos, variables for tolerance and delay, and comments explaining their functions.
- Serial Monitor Area:** Shows the upload progress and a success message:

```
Done uploading.  
Sketch uses 4232 bytes (13%) of program storage space. Maximum is 32256 bytes.  
Global variables use 260 bytes (12%) of dynamic memory, leaving 1788 bytes for local variables. Maximum is 2048 bytes.
```
- Status Bar:** Shows the board as "Arduino Uno" and the port as "COM8".

STEP 26: Track the Sun

When you have successfully uploaded the code, turn on the power switch. The solar panels will point in the direction of the brightest light in the environment.

Click the icon  in the upper right corner of the Arduino IDE and set the baud rate to 9600. You can open the serial monitor to view the real-time value (0~1024) of each photosensitive sensor. "0" represents the maximum brightness, and "1024" represents the darkest brightness.



Can't track the sun?

- Maybe you forgot to calibrate the initial angle of the servo arm.

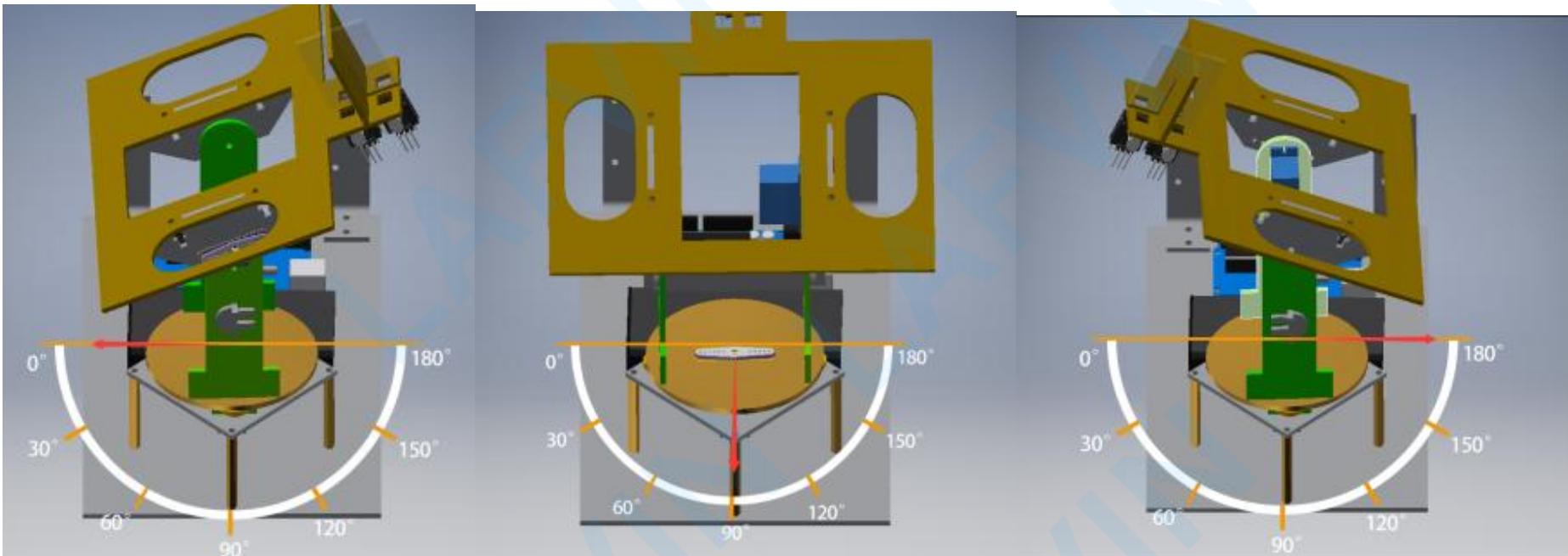
[STEP 24:Servo Angle Installation and Calibration](#)

- Maybe the wiring of the light sensor is not correct.

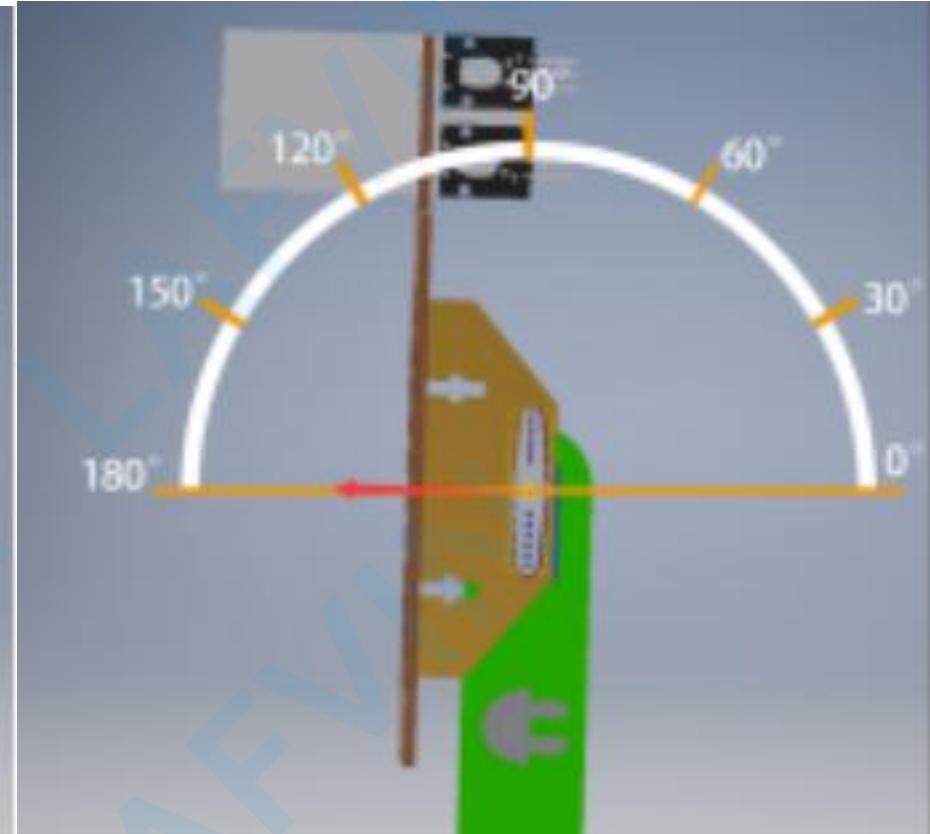
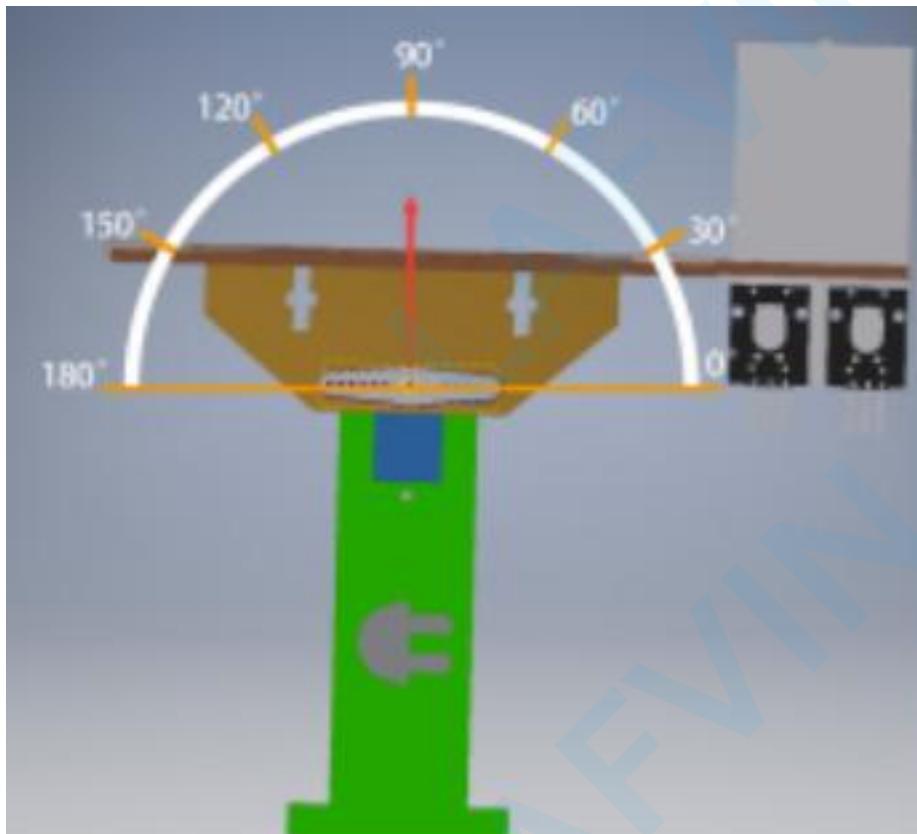
[STEP 21:Wiring](#)

Important Parameters	Function
tol	The response range of illuminance, the smaller the value, the more sensitive the response, otherwise it is slow (the value is 10~100, the sensitivity is different depending on the ambient light intensity, the indoor light source changes greatly, you should set the “tol” number higher; the change is smaller under the sun. You should set the “tol” value a little smaller.)
dtime	delay parameter. The smaller the value, the faster the response speed. On the contrary, the larger the value, the slower the response speed. Unit: milliseconds General value (10~100) .

The angle the servo can turn in the horizontal direction. Min=0° Max=180°



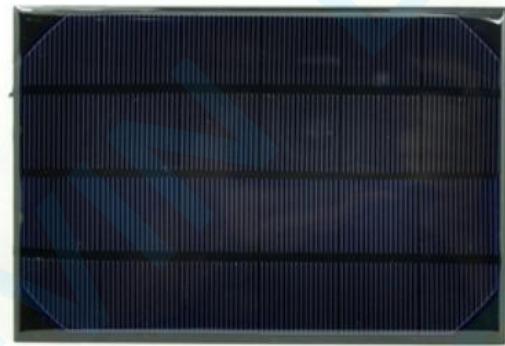
The angle the servo can turn in the vertical direction. Min=90° Max=180°



STEP 27: Store Energy

Solar Panel

Solar panels use the photoelectric effect to directly convert solar radiation into electrical energy. The photoelectric conversion efficiency of monocrystalline silicon solar panels is only about 15%, and the highest is 24%, which is the highest photoelectric conversion efficiency among all types of solar panels.



6V 3W

【Model】 : 6V 3W monocrystalline solar panel

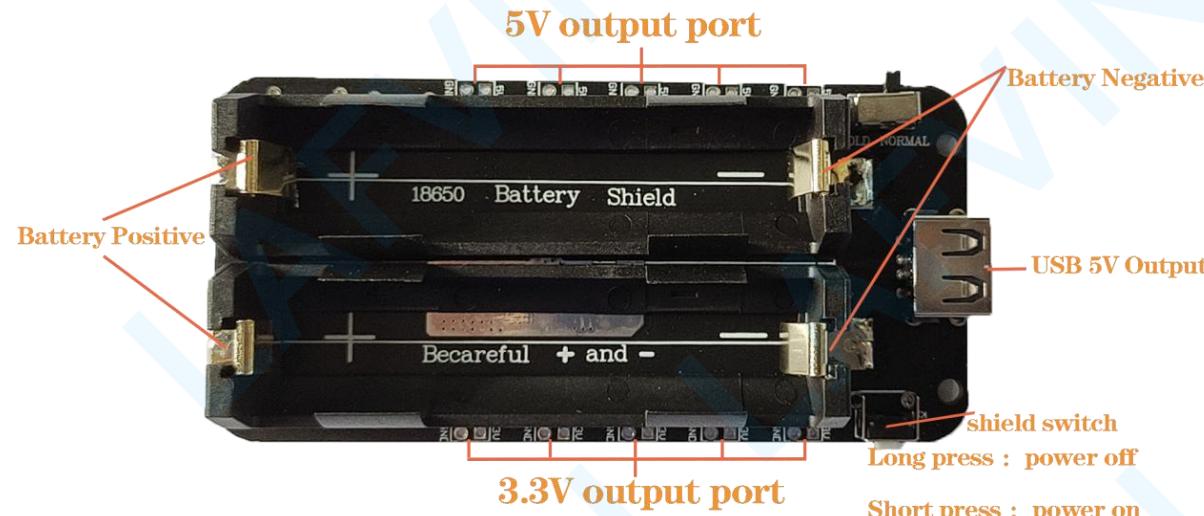
【Maximum open circuit voltage】 : 7V

【Current】 : 0~400MA

【Size】 : 110*162*2mm

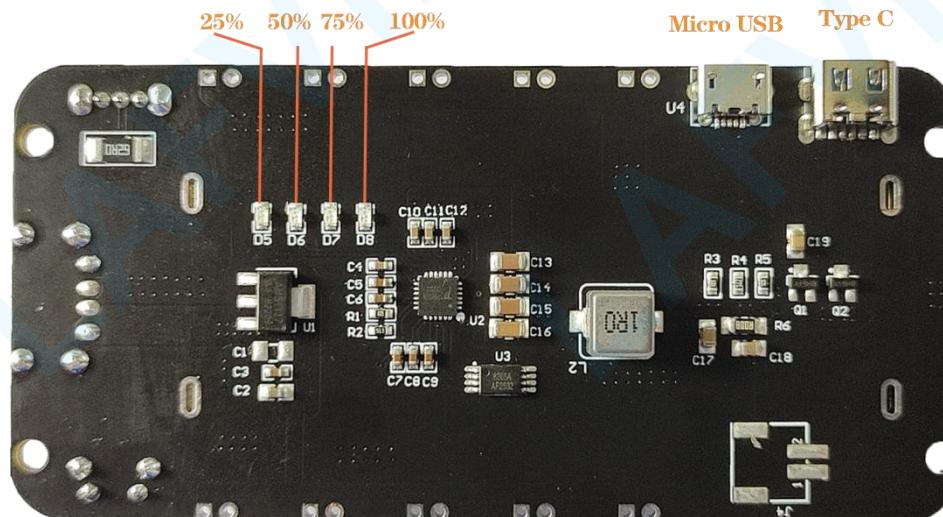
Note: Solar panels have high requirements on light intensity. The nominal power is the peak value under direct sunlight at noon. The sunlight in the morning and evening and the sunlight that is not strong cannot reach the nominal value. So if you want to store electricity faster, you should take advantage of the highest intensity sunlight at noon. The charging efficiency in the morning and afternoon will be very low.

18650 Mobile Power Shield

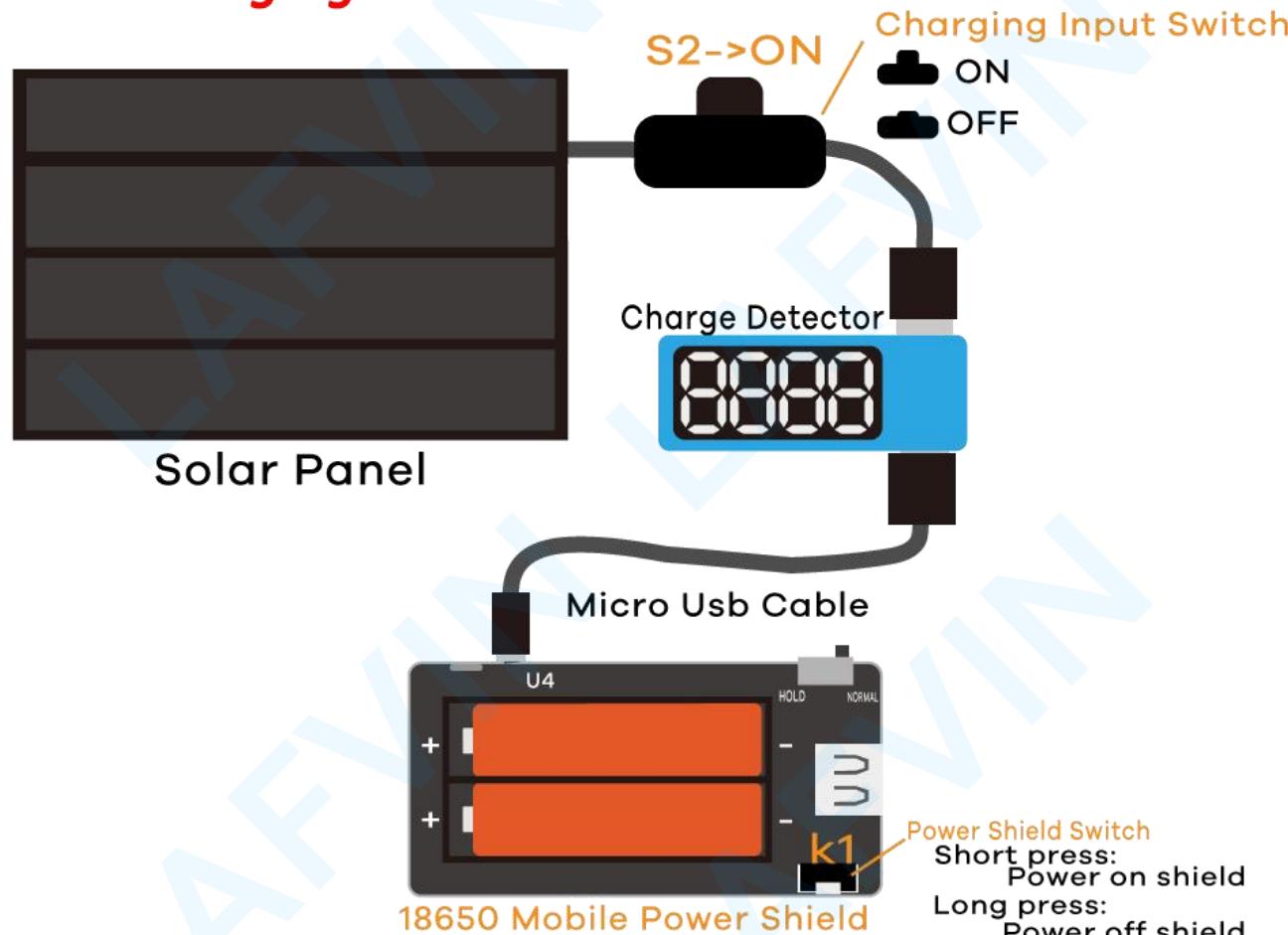


Charging Indication

Charging Input



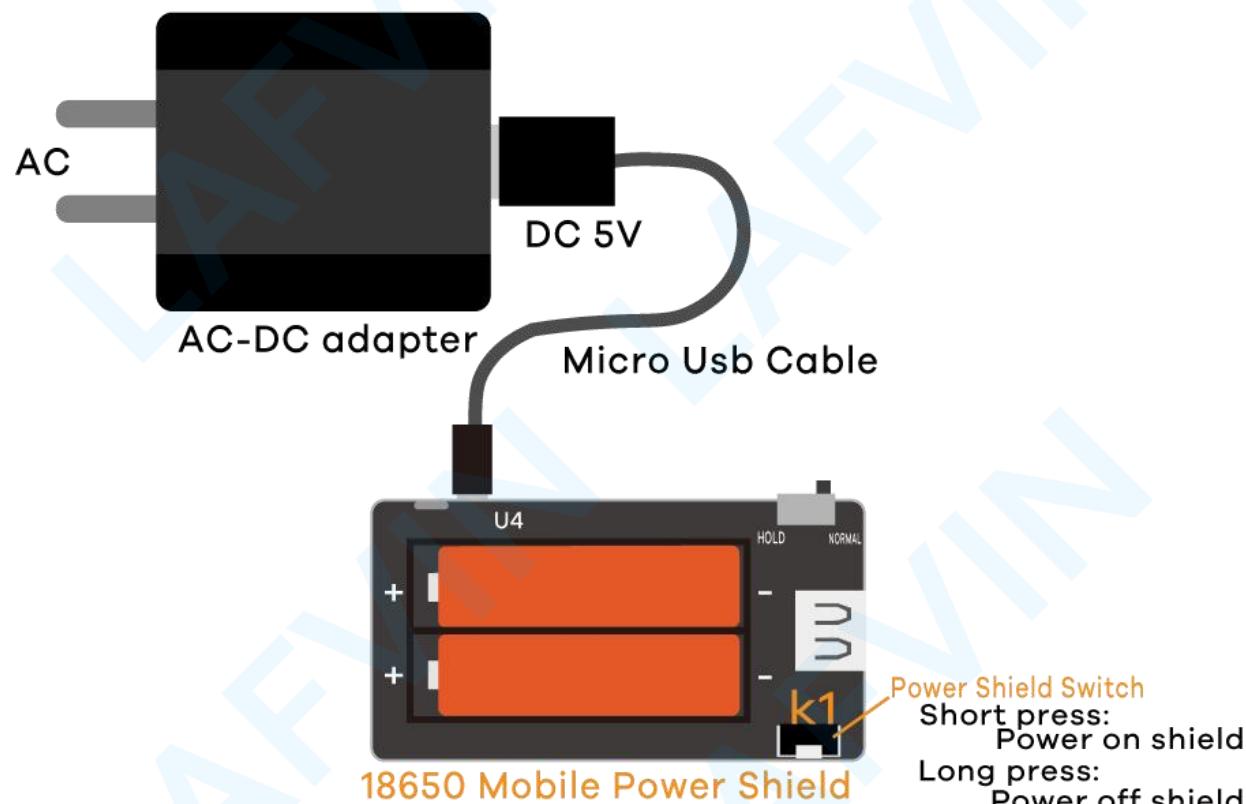
Solar Charging



Tip:

- Solar Charging: S2->ON remove the phone
- DC Adapter Charging: S2->ON remove the phone
- Charge the Phone: S2->OFF K1->ON connect phone

DC Adapter Charging



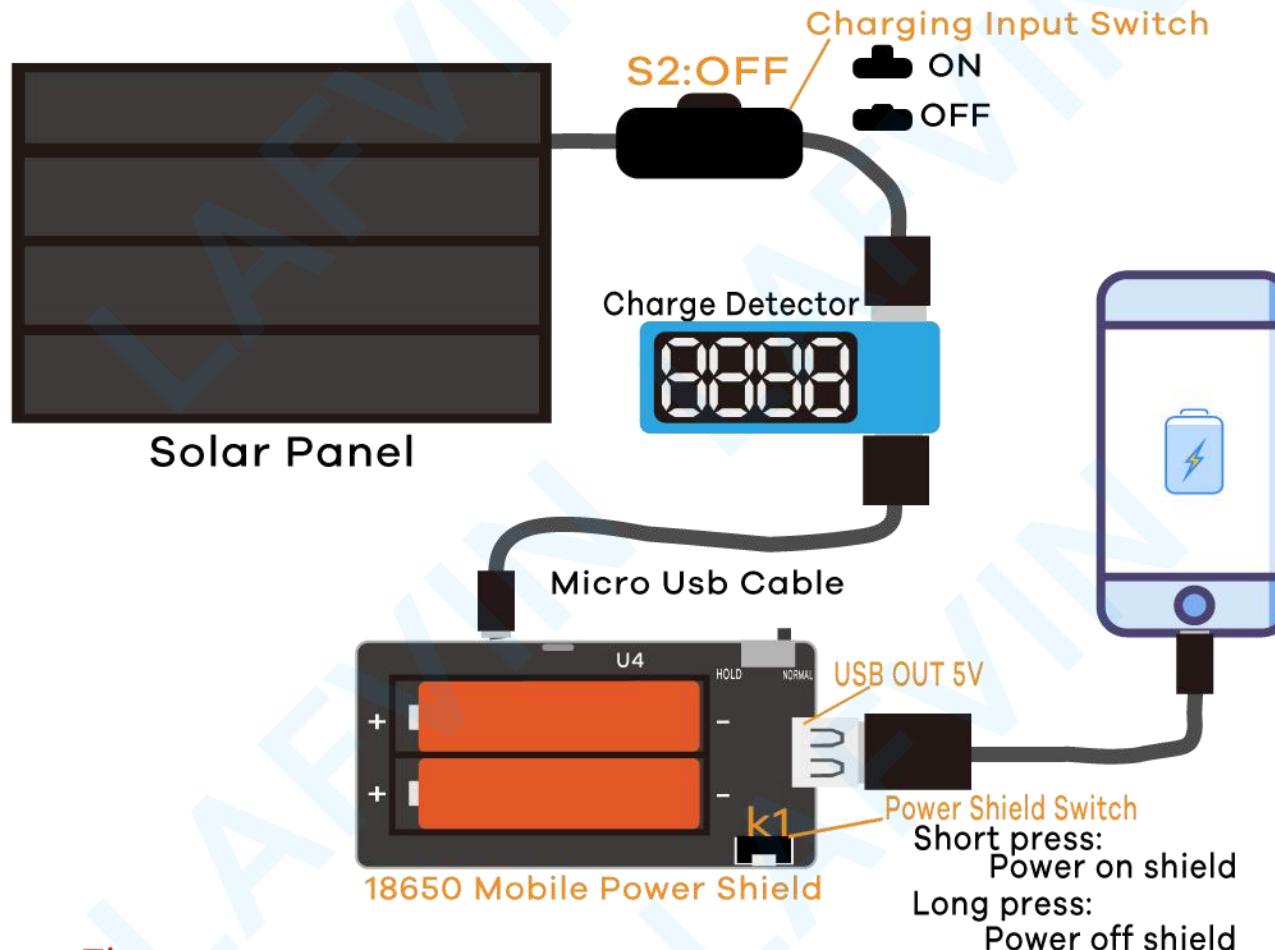
Tip:

Solar Charging: S2->ON remove the phone

DC Adapter Charging: S2->ON remove the phone

Charge the Phone: S2->OFF K1->ON connect phone

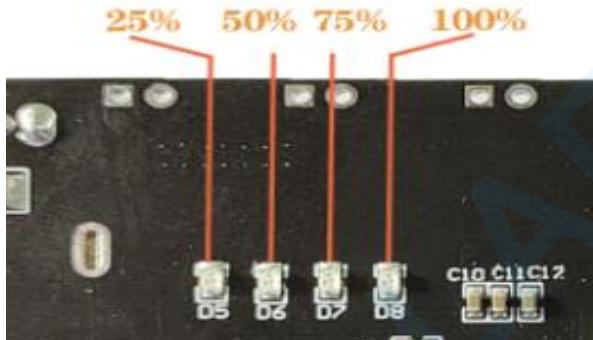
Charge the phone



Tip:

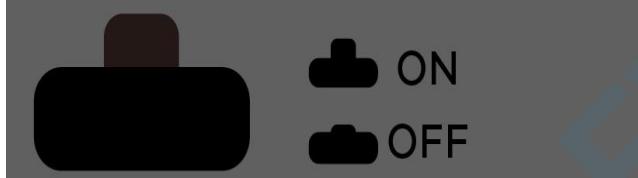
- Solar Charging: S2->ON remove the phone
- DC Adapter Charging: S2->ON remove the phone
- Charge the Phone: S2->OFF K1->ON connect phone

Charging Indication



The LED indicator will flash when charging. When charging is complete, all four LED lights will light up.

S2 Charging Input Switch



- ① When you want to store solar energy, turn on the solar charging input power switch **S2** and remove the phone.
- ② When the sun is weak, or when there is no sunlight. When you can choose to use the DC adapter to charge the power Mobile Power Shield, turn on the solar charging input power switch **S2** and remove

k1 Power Shield Switch

 Short press:
Power on shield
Long press:
Power off shield

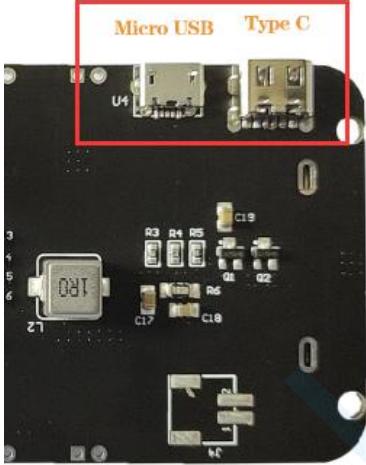
Tip:

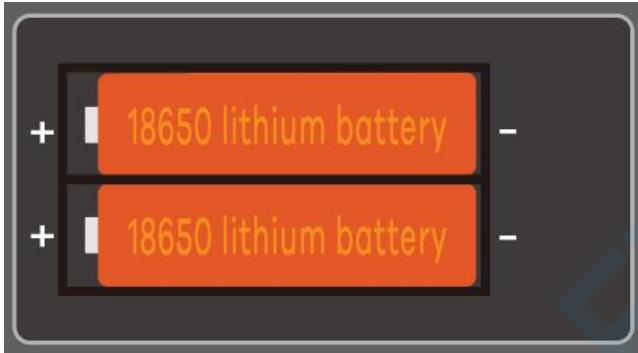
Solar Charging: S2->ON remove the phone
DC Adapter Charging: S2->ON remove the phone
Charge the Phone: S2->OFF K1->ON connect phone

the phone.

③ When you want to charge the mobile phone through the USB 5V OUT connector, turn off the solar charging input power switch **S2** and turn on the shield switch at the same time, so that the internal 18650 battery can provide a stable charging current to the mobile phone.

Due to the instability of the sun's light intensity, the current provided by the solar energy is relatively small. It is not recommended that you use the USB 5V OUTPUT to charge your phone while using solar charging.

<p>Charging Input</p> 	<p>Although it is a green energy source, due to the low energy efficiency of solar cells, it may take several days to complete the charging if it encounters cloudy days or weak sunlight. You can choose to charge the 18650 Mobile Power Shield using a 5V DC adapter.</p>
 <p>Charge Detector</p>	<p>The voltage and current are displayed cyclically. When connected to the solar panel for charging, the charging voltage and current are detected. The greater the intensity of the sun's rays, the more current the solar cells produce and the faster they charge. Usually when the noon sunlight is strong enough, the charging current generated by the solar cell is more than 0.3A. If the sun is very weak, the charge</p>

<p>current :0.31A</p>  <p>voltage :4.83V</p>	detector may not show any value.
	<p>Pay attention to the installation direction of the positive and negative poles of the battery.</p> <p>Important: If the battery is removed and then installed again, the Mobile Power Shield cannot be woken up by the K1 switch. You need to activate Mobile Power Shield. Activation method: Charge the Mobile Power Shield for a few seconds using a solar battery or DC adapter.</p>