



**FREE YOUR INNOVATION**

Freenove is an open-source electronics platform.  
[www.freenove.com](http://www.freenove.com)

## Warning

When you purchase or use this product, please note the following:

- This product contains small parts. Swallowing or improper operation them can cause serious infections and death. Seek immediate medical attention when the accident happened.
- Do not allow children under 3 years old to play with or near this product. Please place this product in where children under 3 years of age cannot reach.
- Do not allow children lack of ability of safe to use this product alone without parental care.
- Never use this product and its parts near any AC electrical outlet or other circuits to avoid the potential risk of electric shock.
- Never use this product near any liquid and fire.
- Keep conductive materials away from this product.
- Never store or use this product in any extreme environments such as extreme hot or cold, high humidity and etc.
- Remember to turn off circuits when not in use this product or when left.
- Do not touch any moving and rotating parts of this product while they are operating.
- Some parts of this product may become warm to touch when used in certain circuit designs. This is normal. Improper operation may cause excessively overheating.
- Using this product not in accordance with the specification may cause damage to the product.

## About

Freenove is an open-source electronics platform. Freenove is committed to helping customer quickly realize the creative idea and product prototypes, making it easy to get started for those enthusiasts of programing and electronics and launching innovative open source products. Our services include:

- Electronic components and modules
- Learning kits for Arduino
- Learning kits for Raspberry Pi
- Learning kits for Technology
- Robot kits
- Auxiliary tools for creations

Our code and circuit are open source. You can obtain the details and the latest information through visiting the following web sites:

<http://www.freenove.com>

<https://github.com/freenove>

Your comments and suggestions are warmly welcomed, please send them to the following email address:

[support@freenove.com](mailto:support@freenove.com)

## References

You can download the sketches and references used in this product in the following websites:

<http://www.freenove.com>

<https://github.com/freenove>

If you have any difficulties, you can send email to technical support for help.

The references for this product is named Freenove Three-wheeled Smart Car Kit for Arduino, which includes the following folders and files:

- Libraries      Library files of Arduino Software
- Sketches      Code of Arduino Software
- Readme.txt    Instructions
- Tutorial.pdf   Tutorial

## Support

Freenove provides free and quick technical support, including but not limited to:

- Quality problems of products
- Problems in using products
- Questions for learning and technology
- Opinions and suggestions
- Ideas and thoughts

Please send email to:

[support@freenove.com](mailto:support@freenove.com)

On working day, we usually reply to you within 24 hours.

## Copyright

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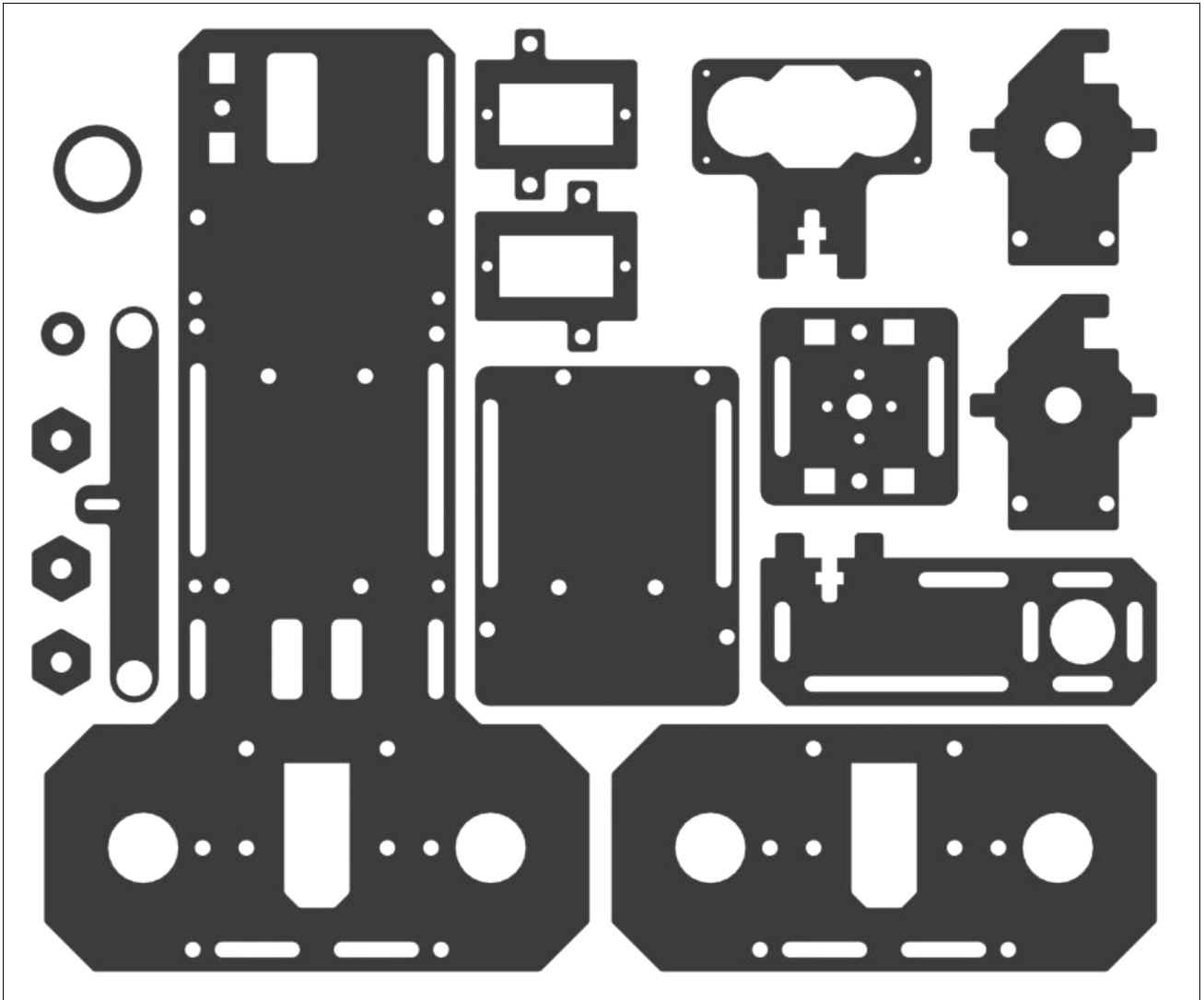
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## List

### Acrylic Sheet

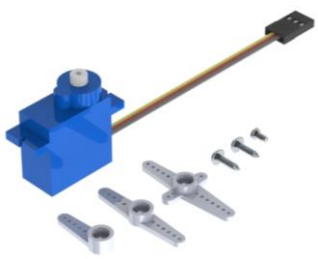





The surface of the acrylic sheet is covered with a layer of protective film, you need to remove it first. Some holes in the acrylic sheets may have residues, so you need to clean them before using it.

## Machinery Parts

<b>M4 Washer</b>  <b>x4</b> Freenove	<b>M2 Nut</b>  <b>x6</b> Freenove	<b>M3 Nut</b>  <b>x12</b> Freenove	<b>M4 Nut</b>  <b>x2</b> Freenove	<b>M2*10 Screw</b>  <b>x6</b> Freenove	<b>M3*4 Screw</b>  <b>x12</b> Freenove
<b>M3*8 Screw</b>  <b>x30</b> Freenove	<b>M3*12 Screw</b>  <b>x4</b> Freenove	<b>M3*30 Screw</b>  <b>x6</b> Freenove	<b>M4*40 Screw</b>  <b>x2</b> Freenove	<b>M3*10 Countersunk Head Screw</b>  <b>x6</b> Freenove	<b>M1.4*6 Self-tapping Screw</b>  <b>x6</b> Freenove
<b>F624ZZ Bearing</b>  <b>x2</b> Freenove	<b>F687ZZ Bearing</b>  <b>x4</b> Freenove	<b>M3*6 Copper Standoff</b>  <b>x14</b> Freenove	<b>M3*12 Copper Standoff</b>  <b>x6</b> Freenove	<b>M3*30 Copper Standoff</b>  <b>x6</b> Freenove	<b>M4 Spring Washer</b>  <b>x4</b> Freenove

## Transmission Parts

<b>Servo x2</b> 	<b>Driven wheel x1</b> 
<b>DC speed reduction motor x2</b> 	<b>Driving wheel x2</b> 



## Electronic Parts

Freenove UNO x2



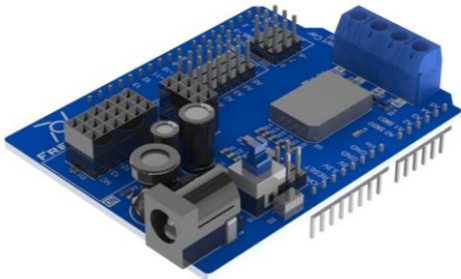
Freenove Passive Buzzer Module x1



Freenove RGB LED Module x1



Freenove Smart Car Shield for Arduino UNO x1



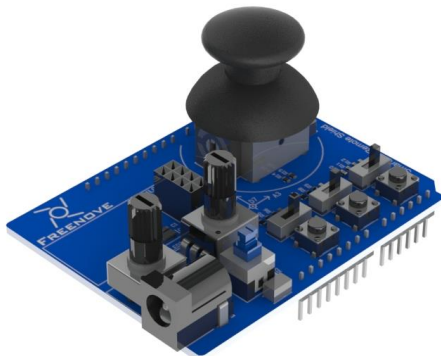
NRF24L01 Module x2



HC-SR04 Ultrasonic Module x1



Freenove Smart Car Remote Shield for Arduino UNO x1



18650x2 Battery Holder x2



USB Cable x1



Jumper Wire M/M x10



## Tools

Cross screwdriver x1



Slotted screwdriver x1



Socket x1



## Self-prepared Parts

At least two 18650 lithium batteries (pointed head) without protection board.  
Four batteries are recommended.



# Preface

Welcome to the Freenove smart car kit! No matter whether you are a senior maker, or novice with little professional technology, this tutorial will help you make something really cool: a smart car with remote control and automatic driving.

This learning kit is based on the popular open source electronics platform Arduino. You can share and exchange your experience and design ideas with enthusiasts all over the world. All components in this kit are individually packaged, including all the electronic components, modules and mechanical components needed in these projects. Meanwhile, there are detailed assembly and commissioning instructions in this book. To ensure that your smart car can be smoothly assembled and run, you can seek free and quick technical support at any time, if you have any problems.

The contents of this book can ensure novice with no professional technology to accomplish the target. If you are interested in the Arduino, and want to learn how to program and build the circuit, please visit our website or contact with us to buy Freenove Starter Kit for Arduino which is specially prepared for the beginners.

## Arduino

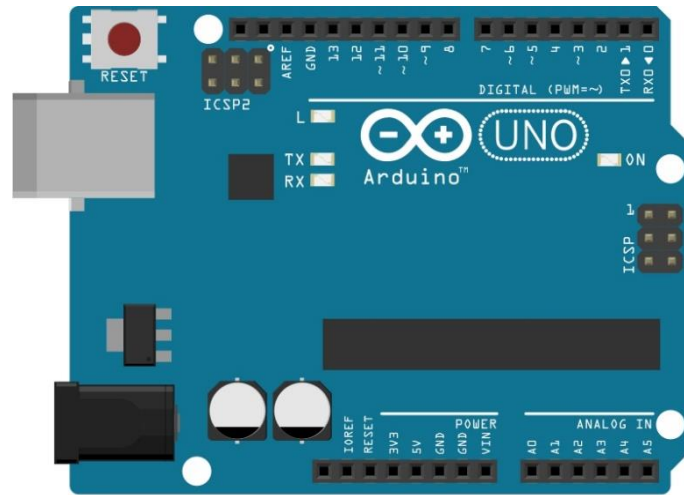
Arduino is an open-source electronics platform based on easy-to-use hardware and software. It's intended for anyone making interactive projects. Usually, an Arduino project consists of circuit and code.

## Arduino Board

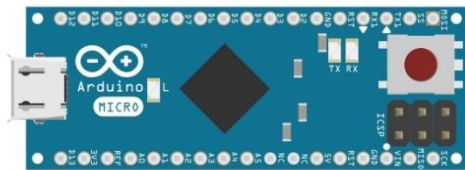
Arduino Board is a circuit board, which integrates micro controller, input, output interface and etc. Arduino Board can use the sensor to sense the environment and receive user's operation to control LED, motor rotation, etc. We just need to assemble circuit and write the code.

Currently, Arduino Board has several models, and the code between boards of different types is universal (some boards may not be completely compatible because of the differences in hardware). Popular boards include:

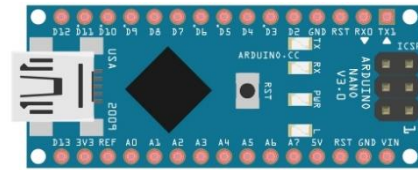
#### UNO



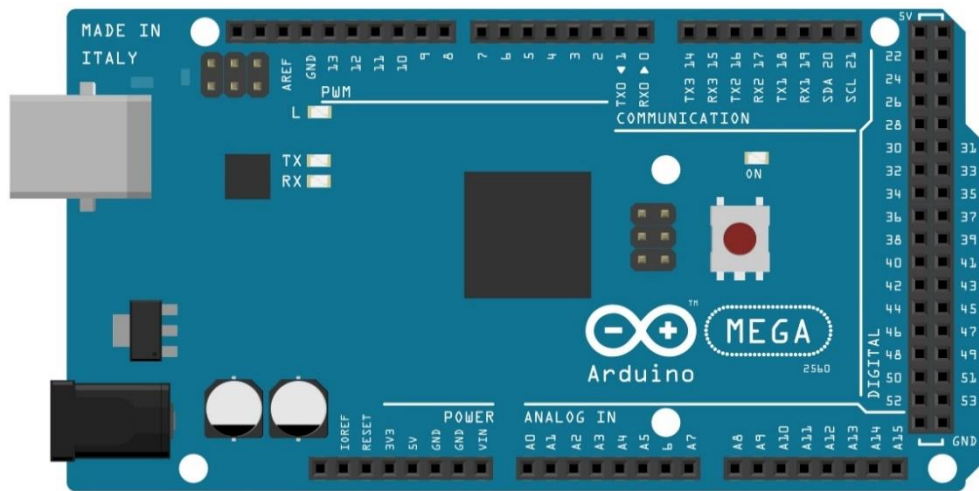
#### MICRO



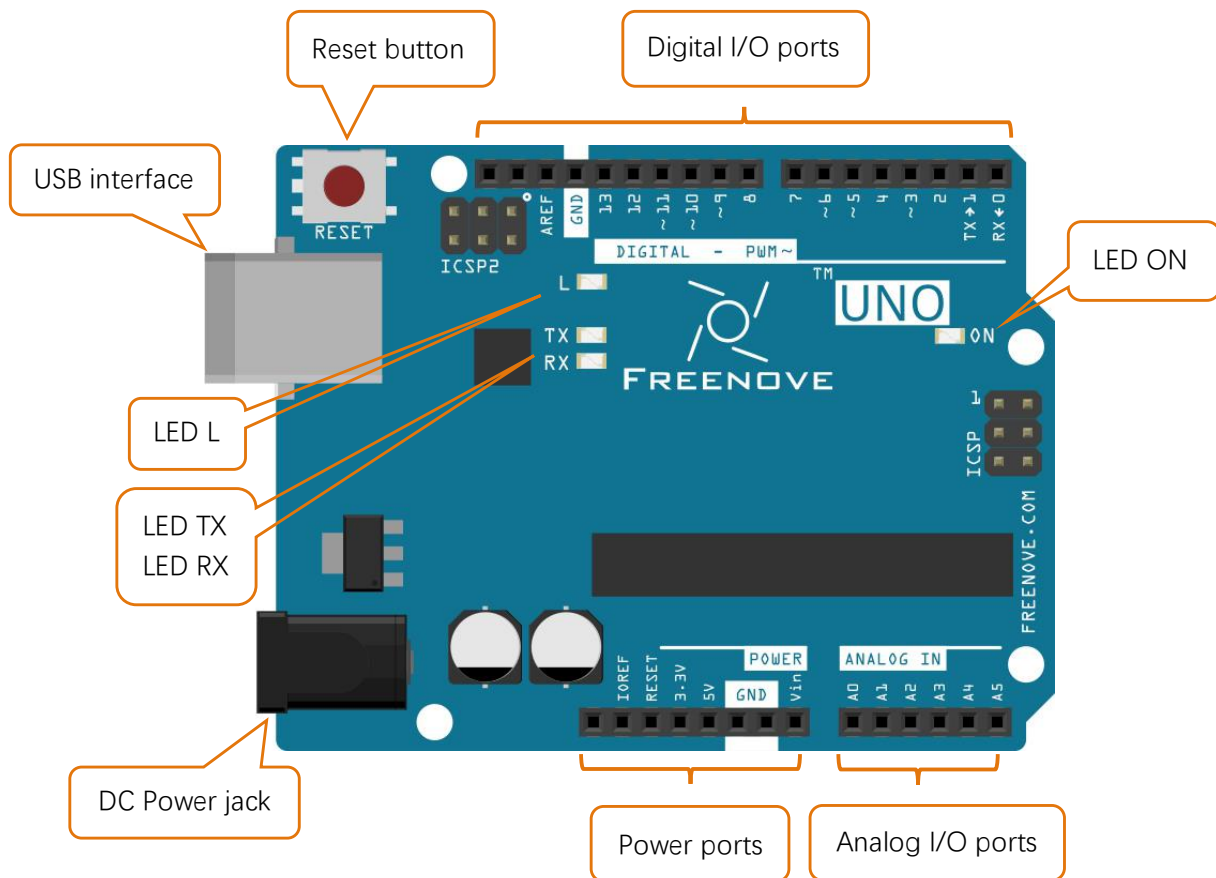
#### NANO



#### MEGA



The board used in this book is Freenove UNO, and it is fully compatible to Arduino UNO. Diagram of Freenove UNO board is shown below:



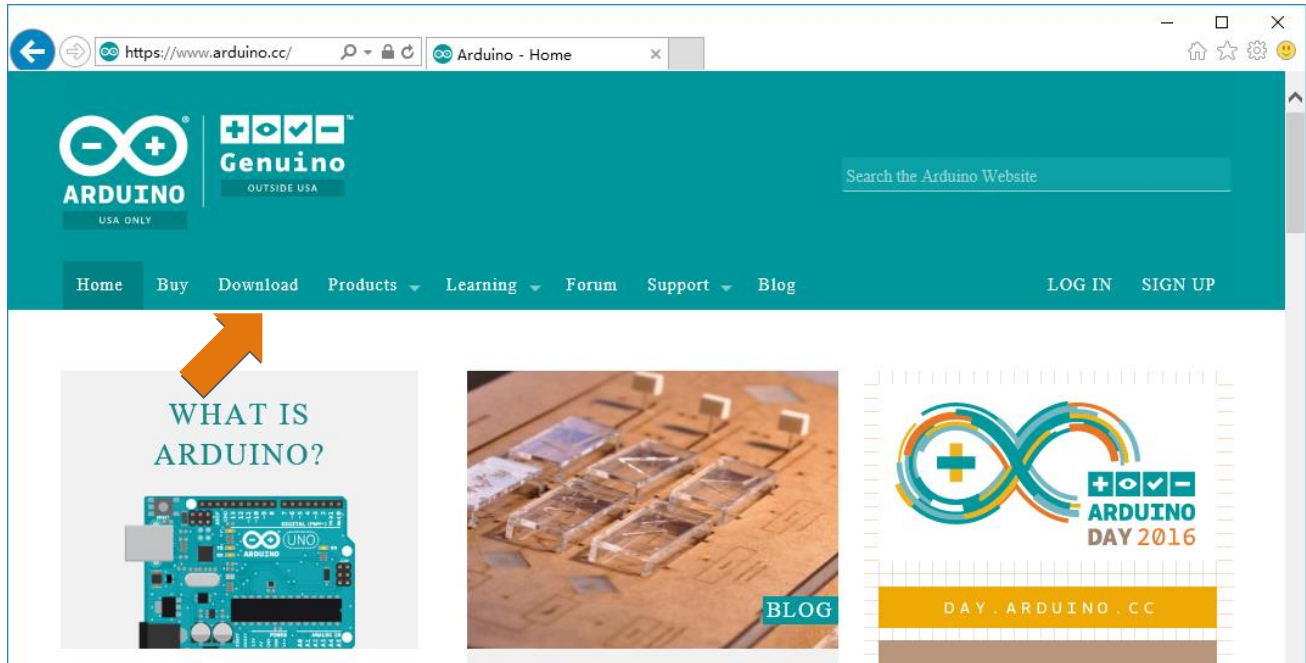
- Digital I/O ports is used to connect to other components or modules, to receive an input signal, or to send a control signal. Usually, we name it by adding a "D" in front of the number, such as D13.
- USB interface is used to provide power, upload code or communicate with PC.
- LED L is connected to digital I/O port 13 (D13).
- LED TX, RX is used to indicate the state of the serial communication.
- DC Power jack is connected DC power to provide power for the board.
- Power ports can provide power for electronic components and modules.
- Analog I/O ports can be used to measure analog signals.
- LED ON is used to indicate the power state.

Freenove UNO is the most suitable board to complete this kit. You can also choose to use Arduino UNO (or other board compatible to it).

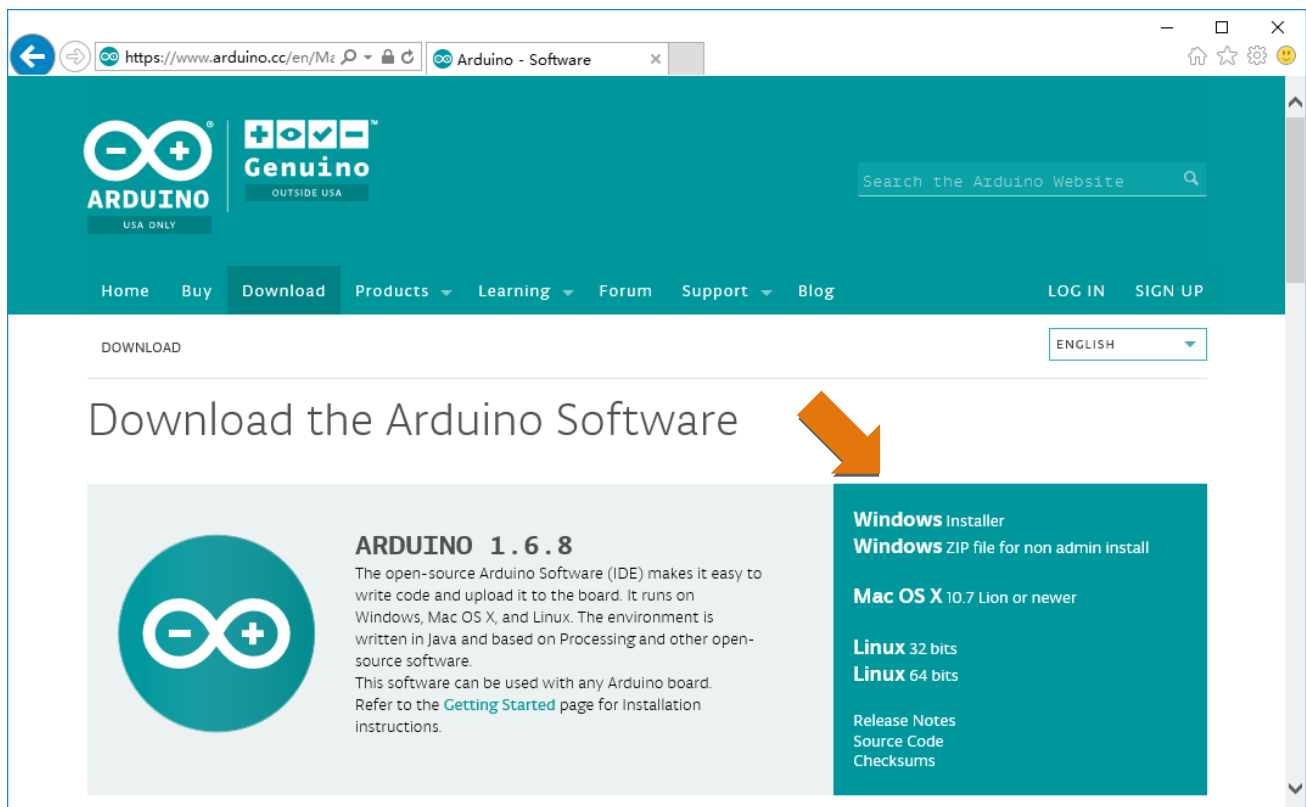
## Arduino Software

Arduino Software (IDE) is used to write and upload the code for Arduino Board.

First, install Arduino Software (IDE): visit <https://www.arduino.cc>, click "Download" to enter the download page.



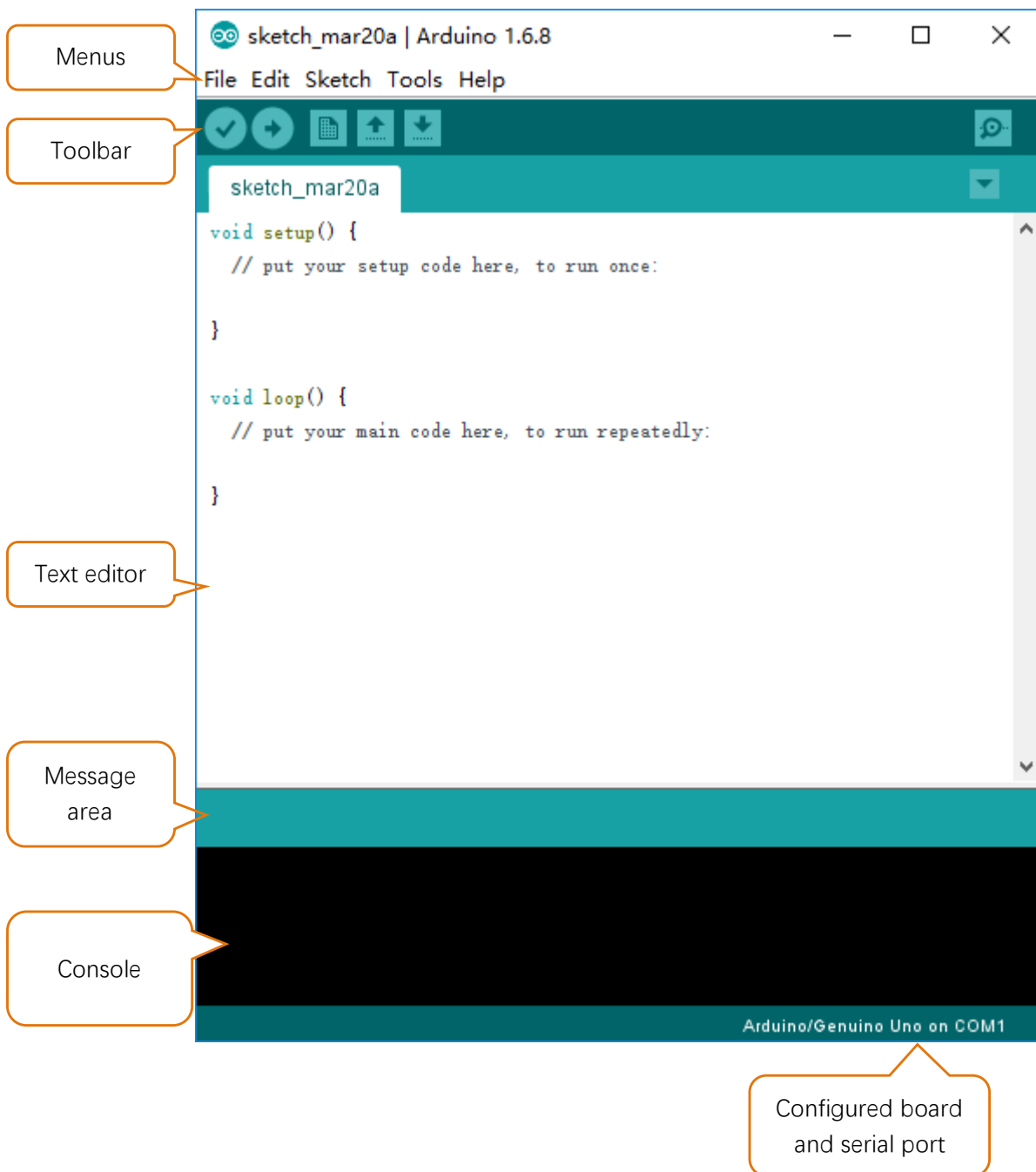
Download corresponding installation program according to your operating system. If you are a Windows user, please select the "Windows Installer" to download and install the driver correctly.



After the download completes, run the installer. For Windows users, there may pop up a installation dialog box of driver during the installation process. When it is popped up, please allow the installation. After installation is complete, an Arduino Software shortcut will be generated in the desktop. Run the Arduino Software.



The interface of Arduino Software is as follows:



Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension **.ino**. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.



Verify

Checks your code for errors compiling it.



Upload

Compiles your code and uploads it to the configured board.



New

Creates a new sketch.



Open

Presents a menu of all the sketches in your sketchbook. Clicking one will open it within the current window overwriting its content.



Save

Saves your sketch.



Serial Monitor

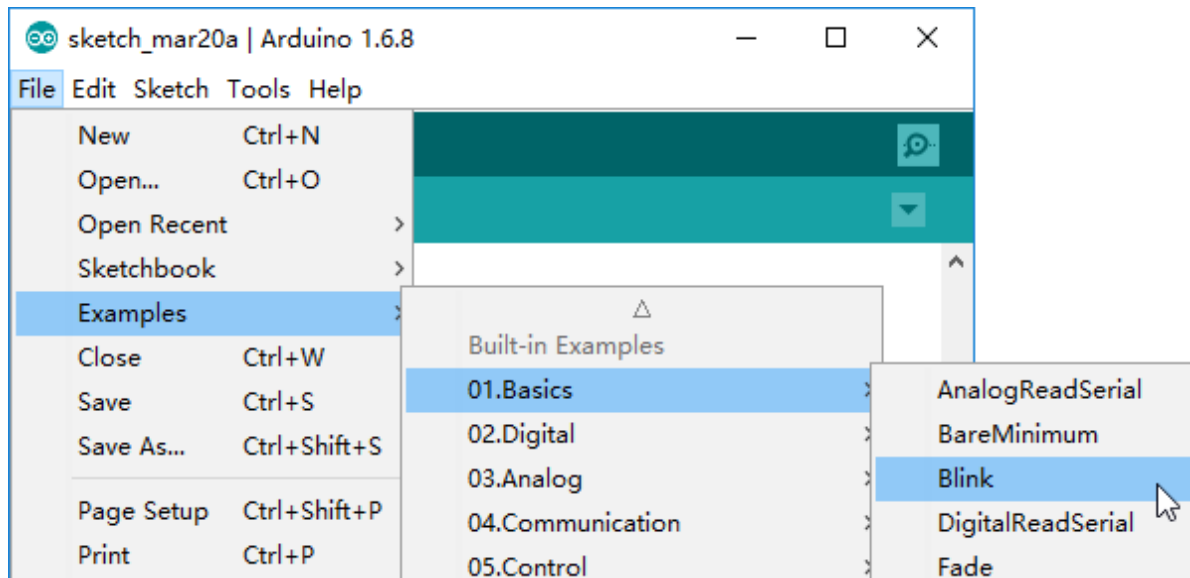
Opens the serial monitor.

Additional commands are found within the five menus: File, Edit, Sketch, Tools, Help. The menus are context sensitive, which means only those items relevant to the work currently being carried out are available.

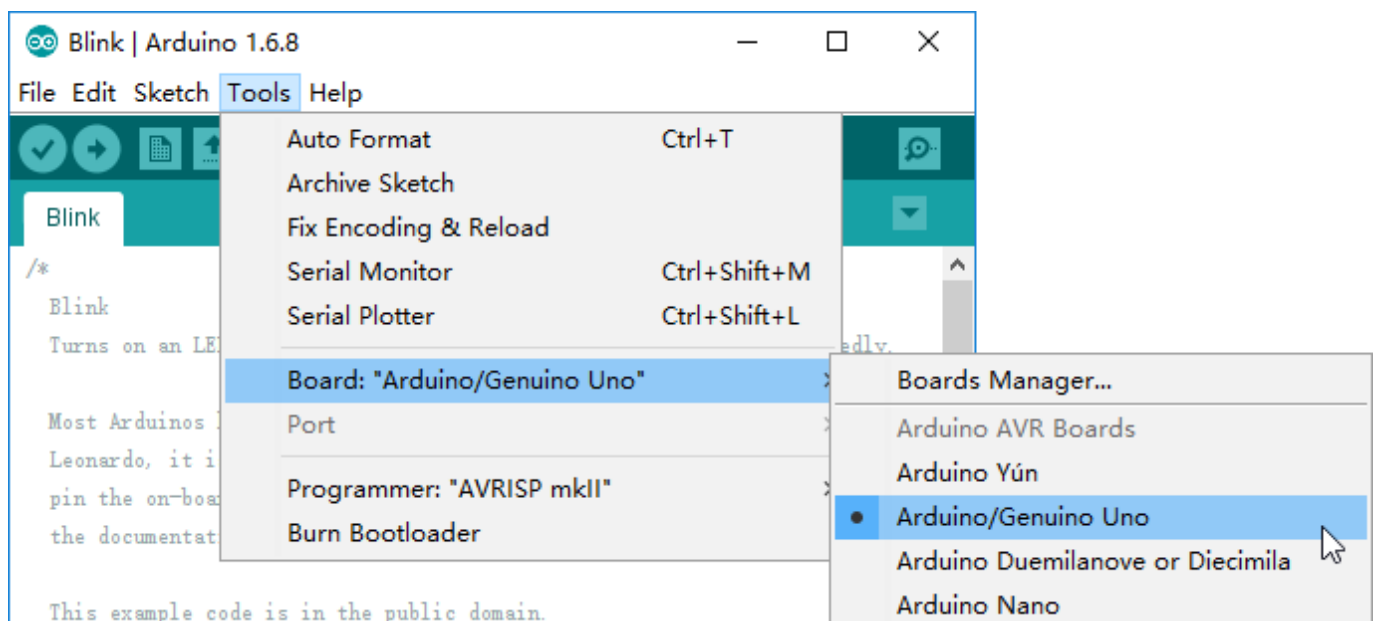


## First Use

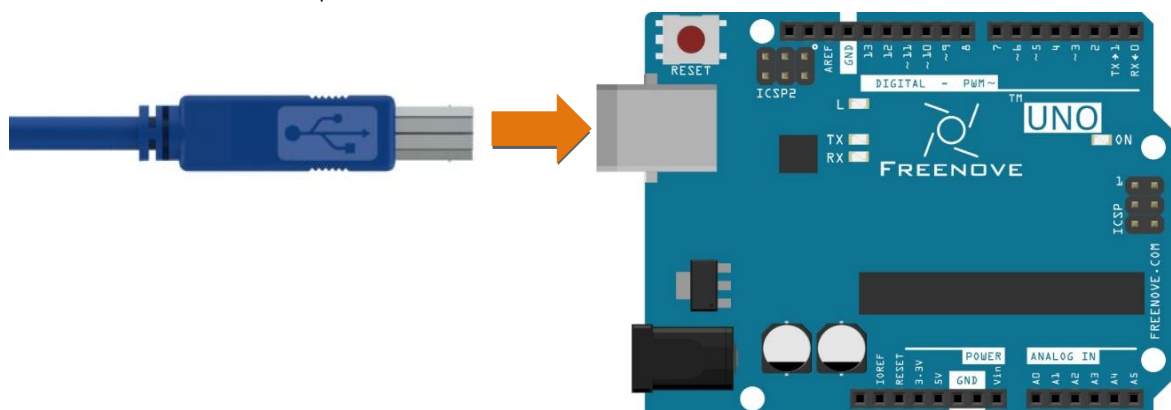
Open the exmple sketch "Blink" with Arduino Software.



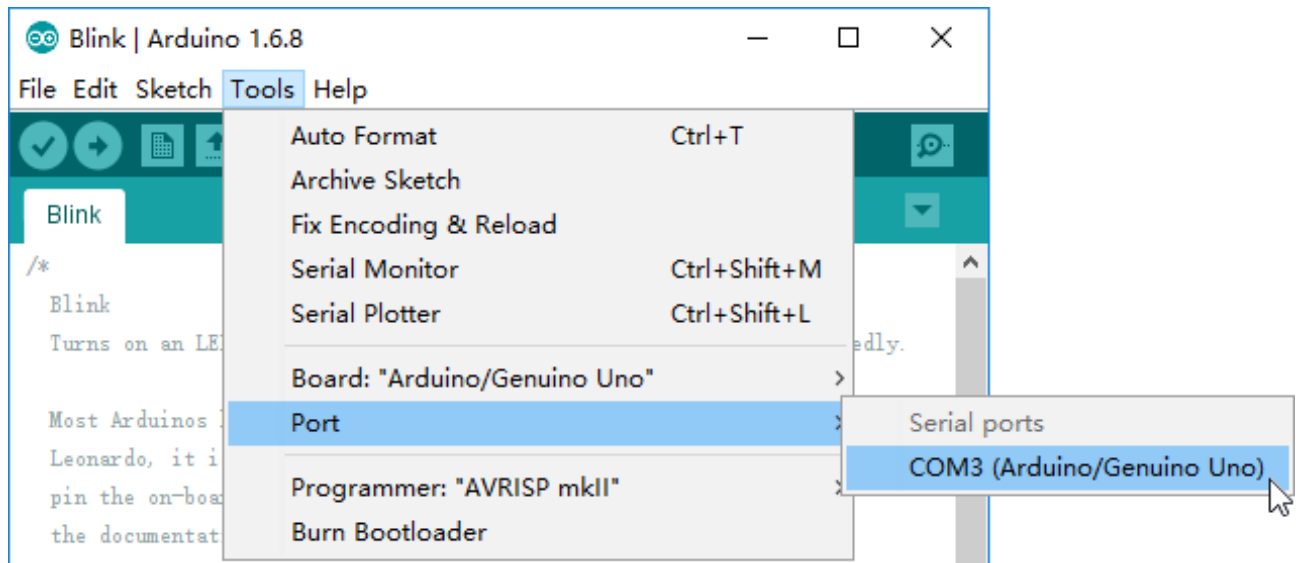
Select board "Arduino/Genuino Uno".



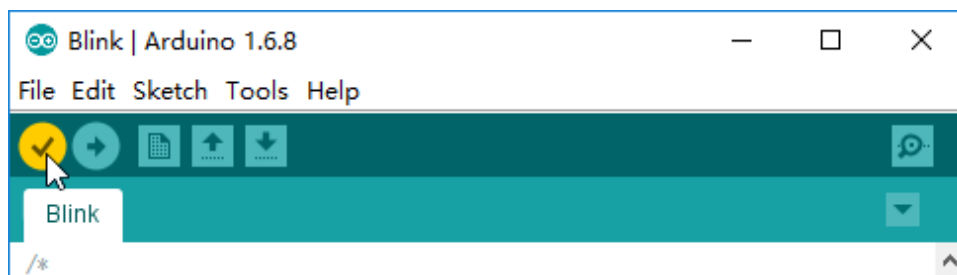
Connect Freenove UNO to computer with USB cable.



Select the serial port. Your serial number may be different from the following figure. If it is not detected immediately, please wait for a while, then click "Tools" to check again.



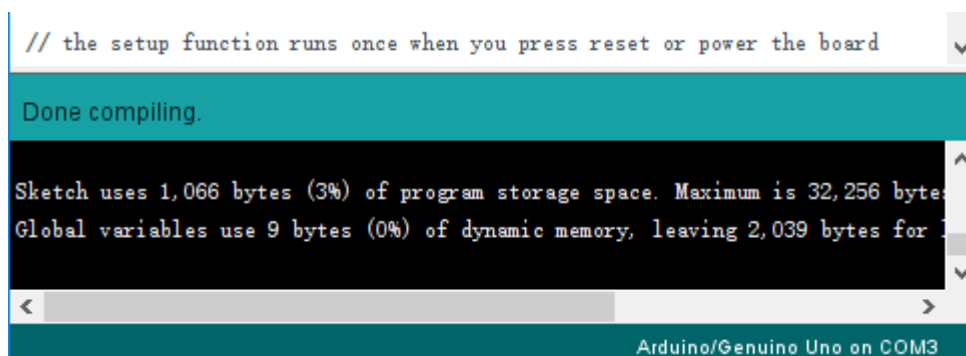
Click "Verify" button.



The following figure shows the code is being compiled.



Wait a moment for the compiling to be completed. Figure below shows the code size and percentage of space occupation.



Usually, when we write code, if it has a syntax error, the interface will prompt the error message. Then the compiling can't be completed.

Click "Upload" button.

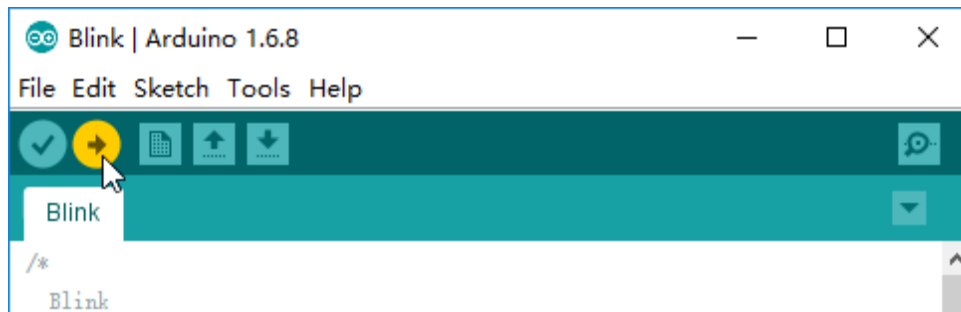
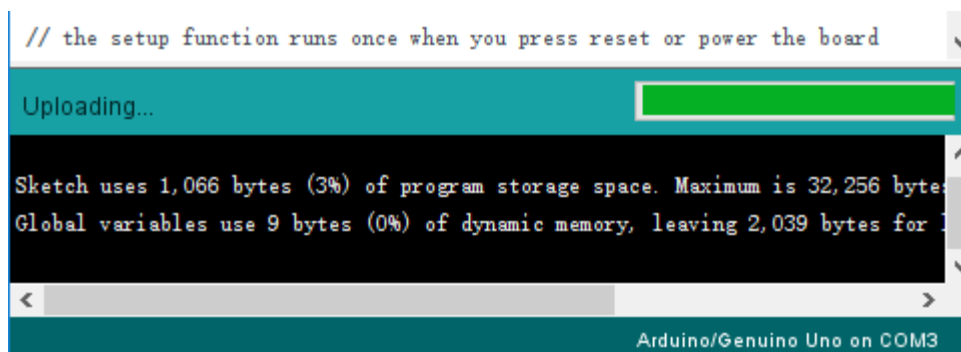
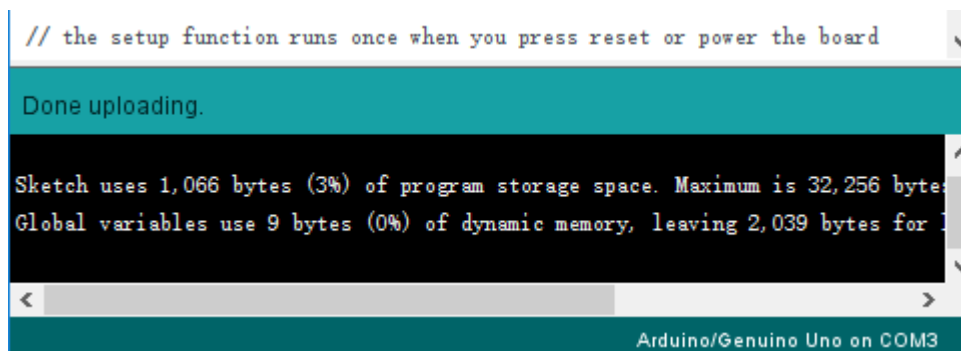


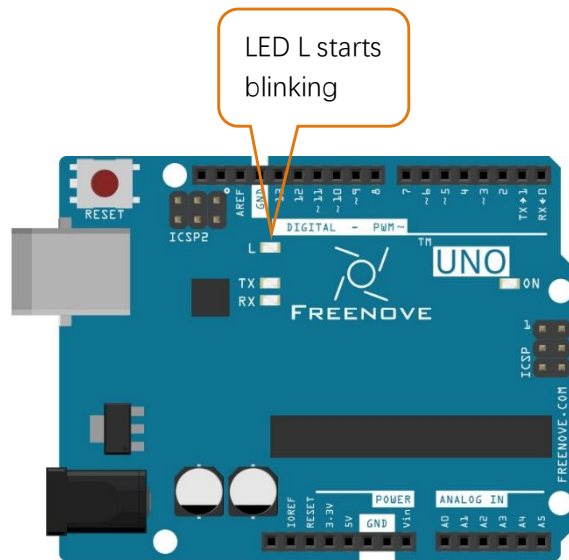
Figure below shows code are uploading.



Wait a moment, then the uploading is completed.



After that, we will see the LED marked with "L" on Freenove UNO starts blinking. It indicates that the code is running now!



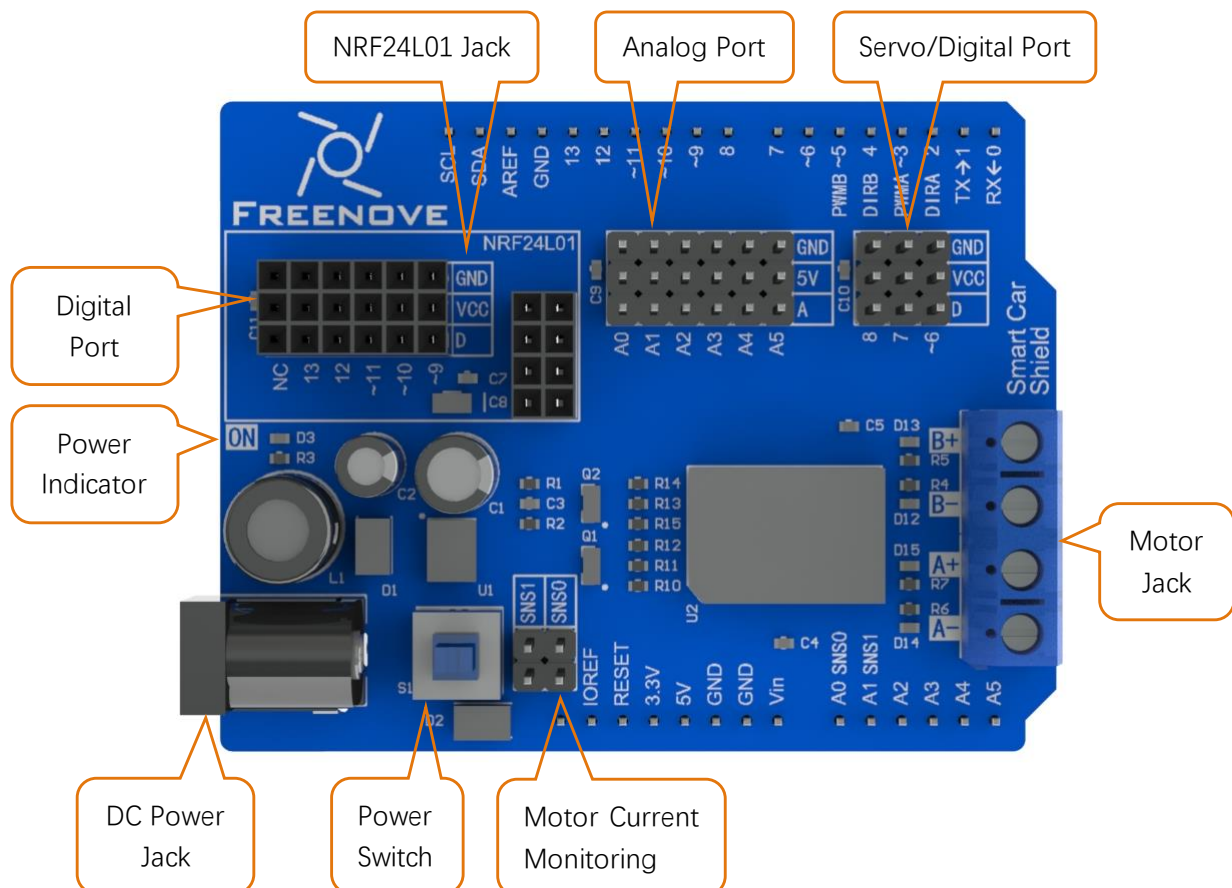
So far, we have completed the first use. I believe you have felt the joy of it. Next, we will use Arduino to control the smart car.

# 1 Freenove Expansion Shield

Generally, a project that is completed by Arduino consists of code and circuit, and it can be simplified by special expansion shield. We can insert the expansion shield directly onto Arduino board, or insert the Arduino board onto the expansion shield.

## Freenove Smart Car Shield for Arduino UNO

Freenove Smart Car Shield for Arduino UNO is a special expansion shield designed to control the smart cars. It applies to Arduino UNO or other compatible control board.

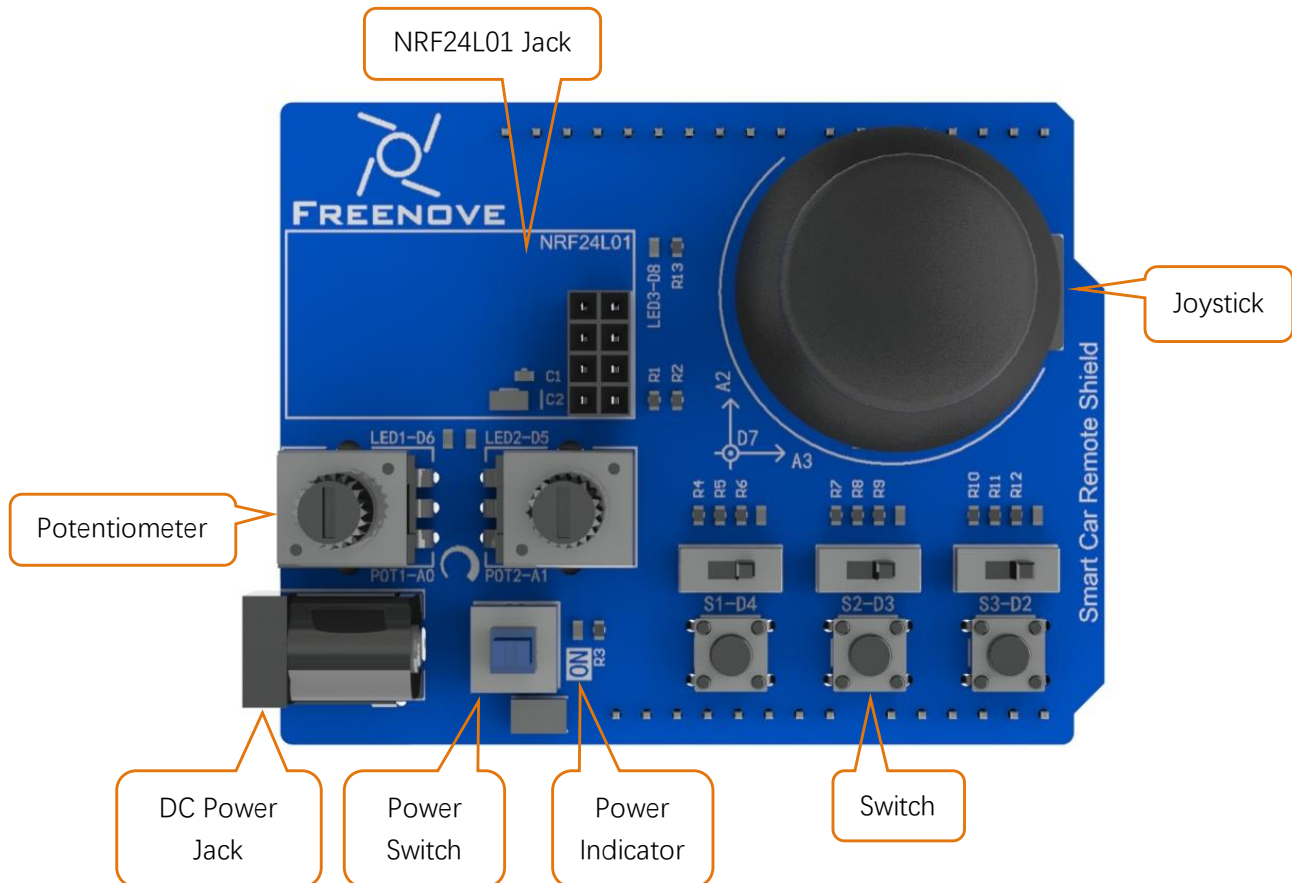


The main functions of the expansion shield are as follows:

- Power: Expansion shield uses 7~12V DC power, and can output 5V 3A power, which is marked with "VCC". Meanwhile, provide power supply for UNO board, and lead 5V power on UNO board to the expansion shield and mark it with "5V".
- Power switch: A switch on the expansion shield to control the on/off of power, and has 1 LED indicator for power state.
- Motor control: Control steering and speed of two motors. Output 4A current at maximum, and each motor outputs 3A current at maximum. Four LEDs on the motor interface indicates the state of each channel.
- Servo jack: Make it very convenient to connect to servo to control the pan-tilt and steering of smart car.
- NRF24L01 jack: Make it easy to connect to NRF24L01 module, and control the smart car wirelessly.
- Digital Port: Lead unoccupied digital port out. NRF24L01 jack uses digital port 9~13, so these interfaces can't be used when use the NRF24L01 module.
- Analog Port: Lead unoccupied analog port out. Analog interface uses power from UNO board to reduce the interference. Monitoring for motor current uses analog port A1, A0, therefore, these part interfaces can't be used when use this function.

## Freenove Smart Car Remote Shield for Arduino UNO

Freenove Smart Car Remote Shield for Arduino UNO is a special expansion shield used for remote control of smart car. It applies to Arduino UNO or other compatible control board.



The main functions of the expansion shield are as follows:

- **Power**: Expansion shield uses 7~12V DC power, and provide power for UNO board. The expansion shield can use the power from UNO board, so the expansion board can work normally when UNO board is powered.
- **Power switch**: A switch on the expansion shield to control the on/off of power, and has 1 LED indicator for power state. It won't work if expansion shield gets powered from UNO.
- **NRF24L01 jack**: Make it easy to connect to NRF24L01 module, and control the smart car wirelessly.
- **Joystick**: Integrated with 2D analog, and can be pressed in a vertical direction. With this joystick, you can control the smart car to run at different speed and direction.
- **Switch**: Include tact switch and toggle switch. When you need to trigger the short-time function, you can use a tact switch, for long-time function, you can use the toggle switch. Beside each switch, there is a LED indicator for switch state. These switches can control other electronic module of smart car or set custom functions.
- **Potentiometer**: Beside each potentiometer there is a LED indicator for the potentiometer state. These potentiometers can control other electronic module of smart car or set custom functions.

## 2 Control Smart Car by Remote Control

First, let's use the remote control to control the smart car.

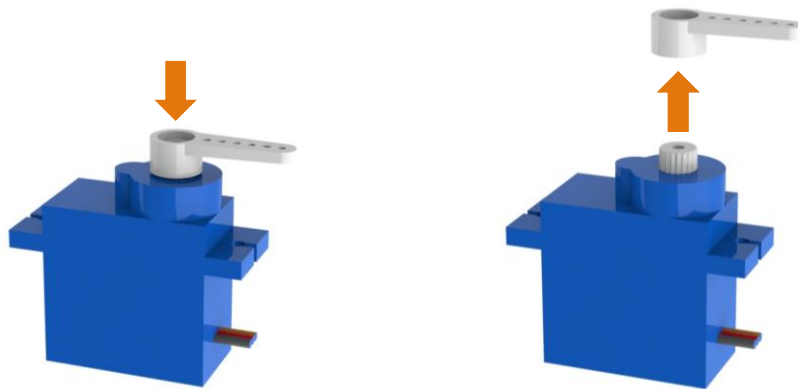
### Step 1.1 Adjust the Servo

First, get to know about the servo.

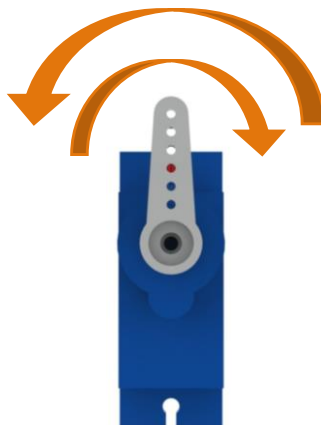
The servo can be connected with the rocker arm, and can drive other parts to move through the rocker arm. There are 3 kinds of rocker arm, and 3 screws for the servo. The smaller one screw is used to fix the rocker arm onto it.



Install or remove the rocker arm.



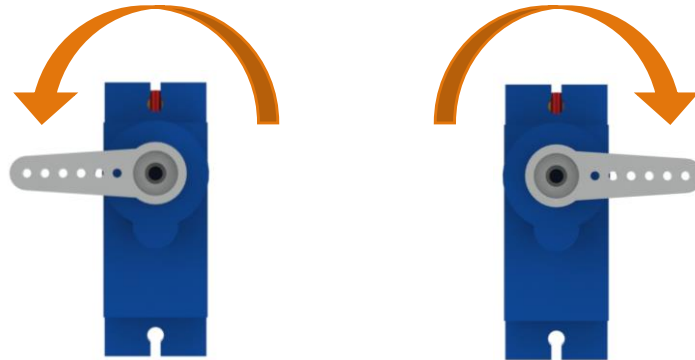
Turn the rocker arm to make it rotate in the range from 0 to 180 degrees.



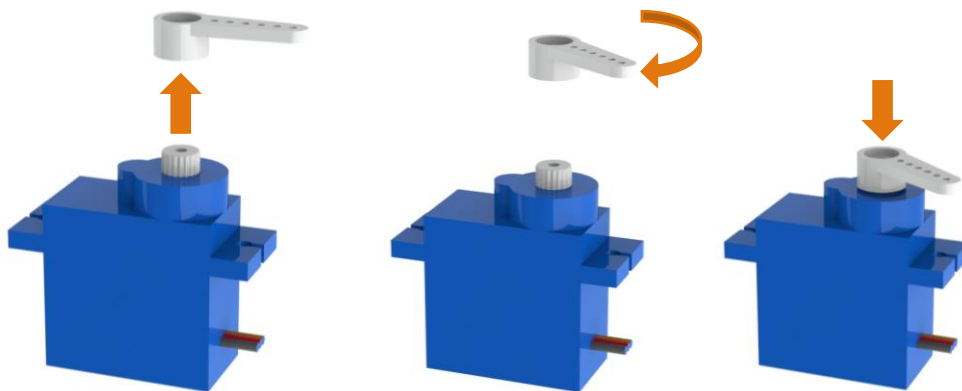


Now adjust the servo. The purpose we do this is to rotate the shaft of servor to the middle position, and ensure that the servo can drive the corresponding parts to move in the desired range.

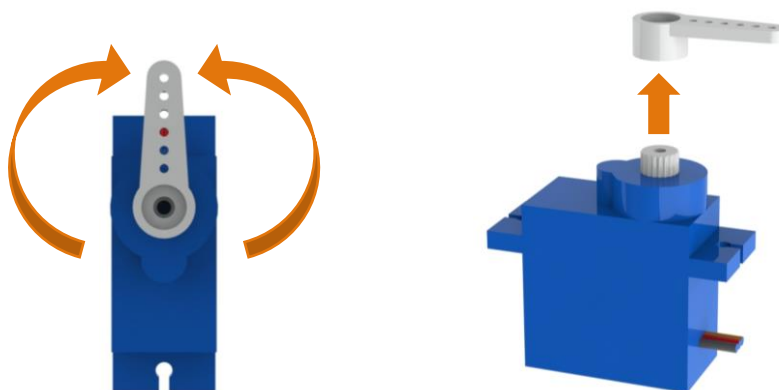
We need to adjust the servo, so that the rocker arm can basically rotate the same angle to the right or left.



If the rocker arm can't rotate around the same angle, remove the rocker arm and reinstall it from other angle. Turn the rocker arm to both sides and see whether it meets the requirement. Repeat this operation until the rocker arm can basically rotate the same angle to the right or left.



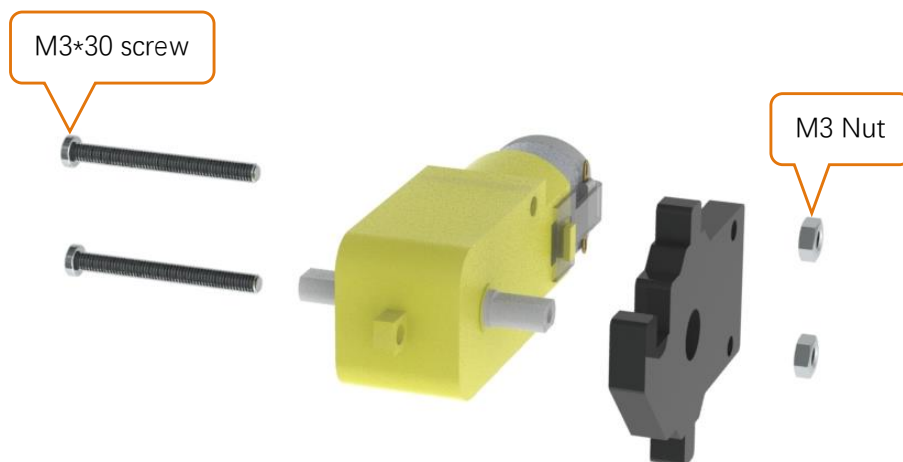
After the adjustment is finished, turn the rocker arm to the middle position, and take it off.



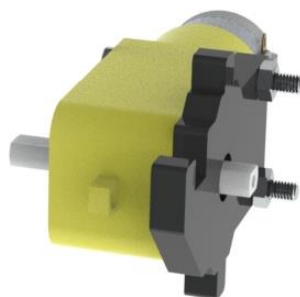
Make sure that all servos have been adjusted, and no unexpected rotation of the shaft happen in the following installation process. If it happens , you will need to adjust it once again before installing.

## Step 1.2 Assemble the Smart Car

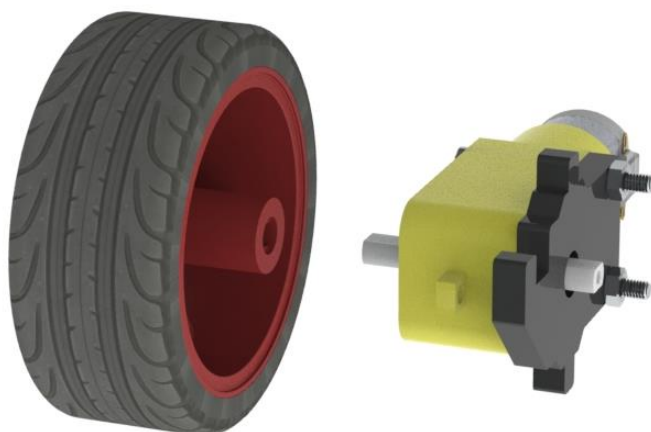
Assemble the following components



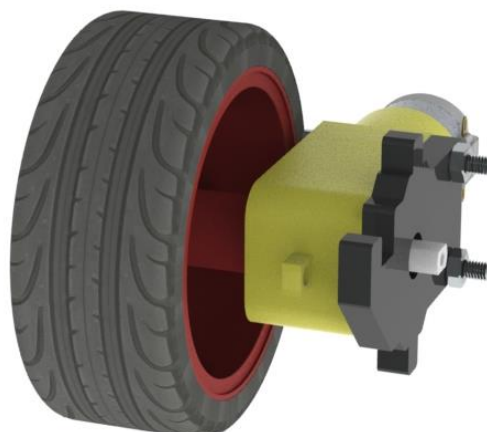
Effect diagram after assembling



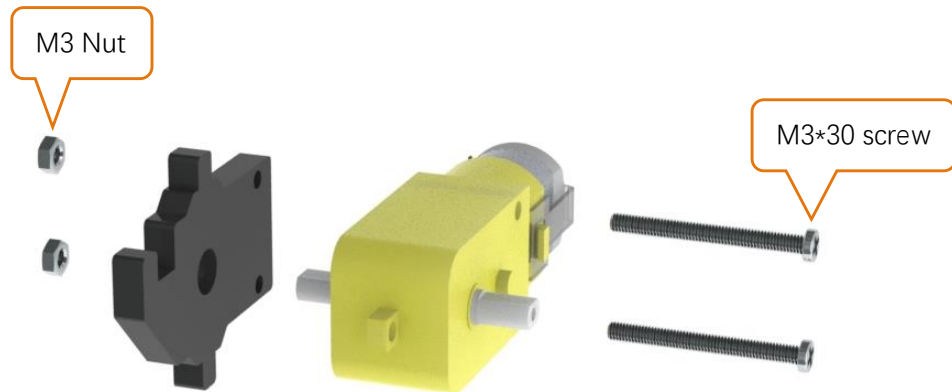
Install the wheel(Left)



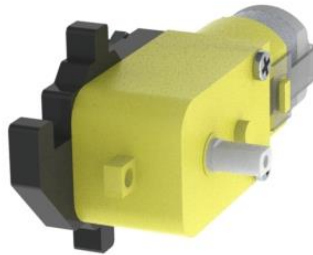
Effect diagram after assembling



Assemble the following components



Effect diagram after assembling



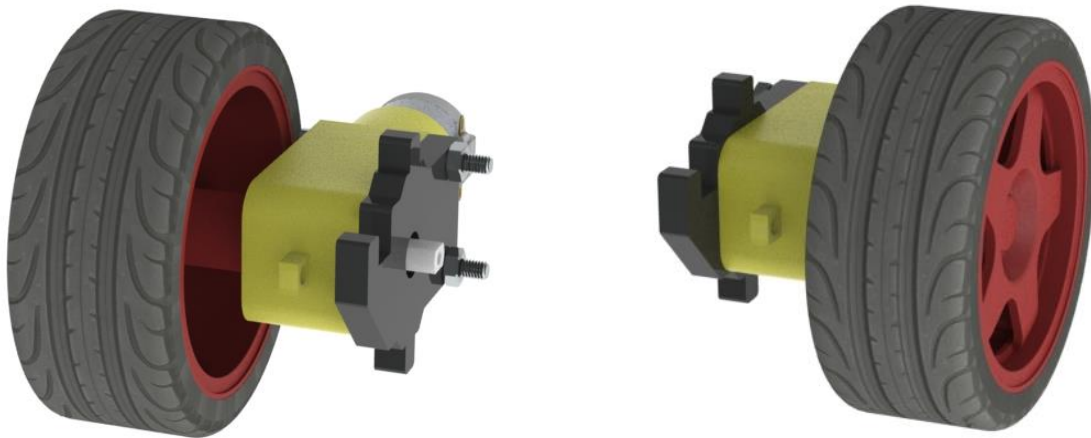
Install the wheel(Right)



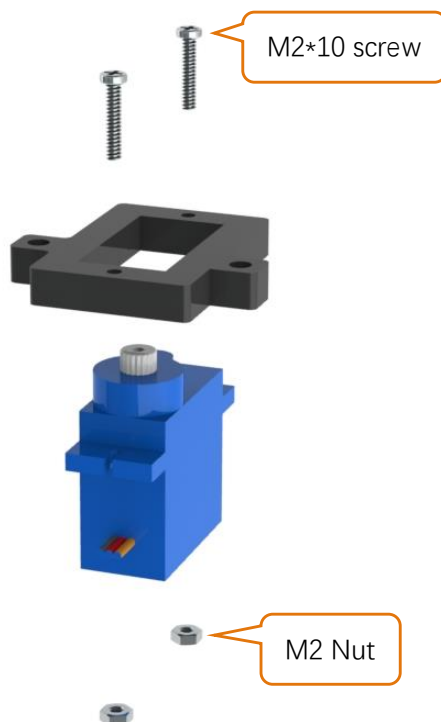
Effect diagram after assembling



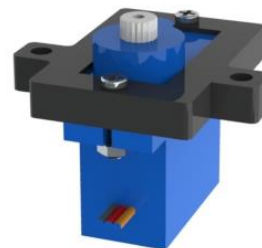
After finishing the previous installing, you'll get two pats as follows:



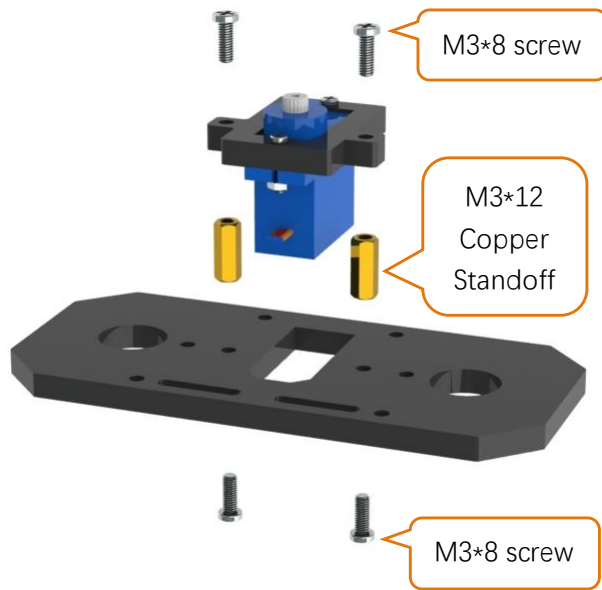
Assemble the following components



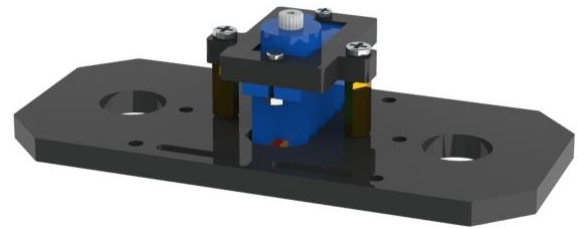
Effect diagram after assembling



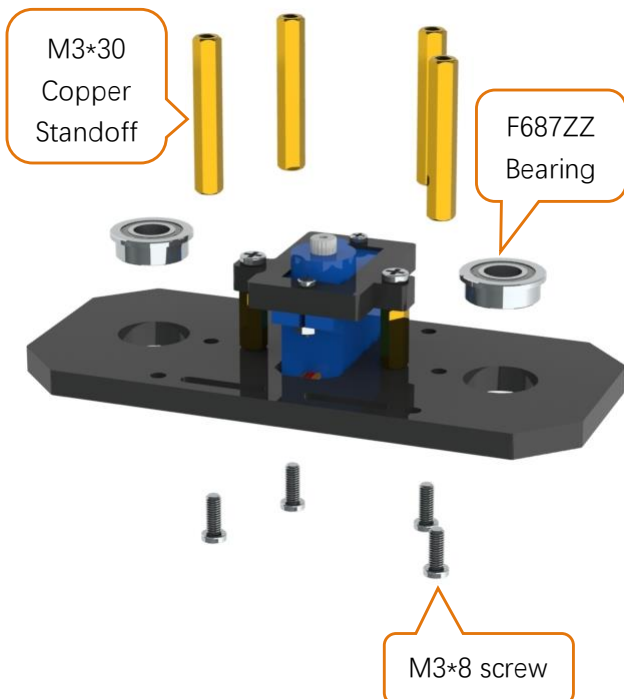
Assemble the following components



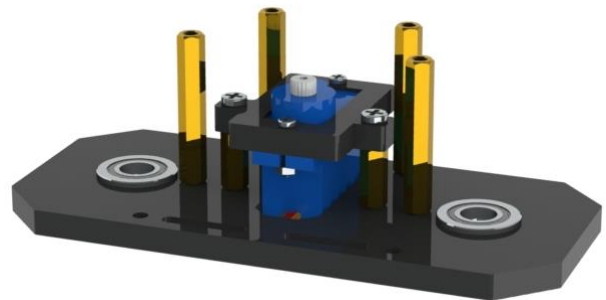
Effect diagram after assembling



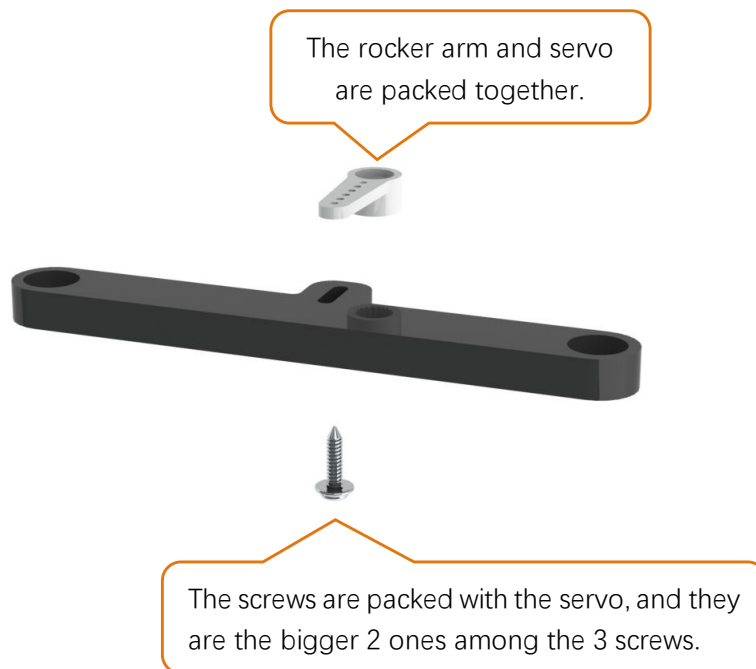
Assemble the following components



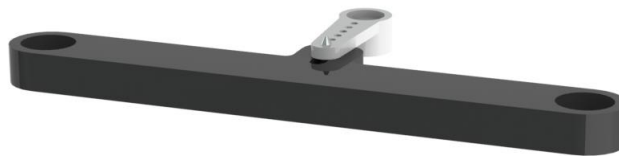
Effect diagram after assembling



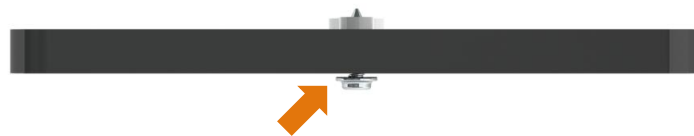
Assemble the following components



Effect diagram after assembling

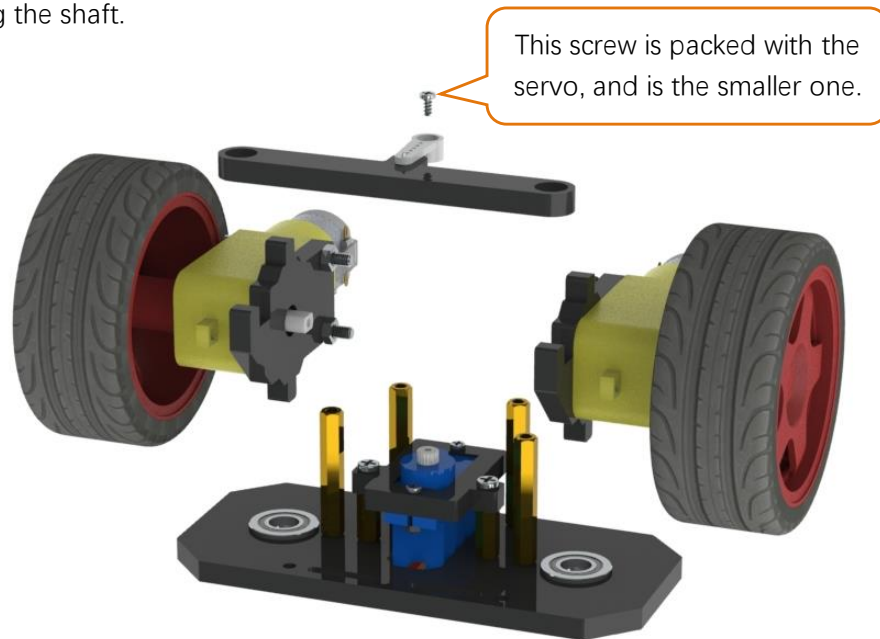


Pay attention not to tighten the screw, otherwise the acrylic plate can't move freely.

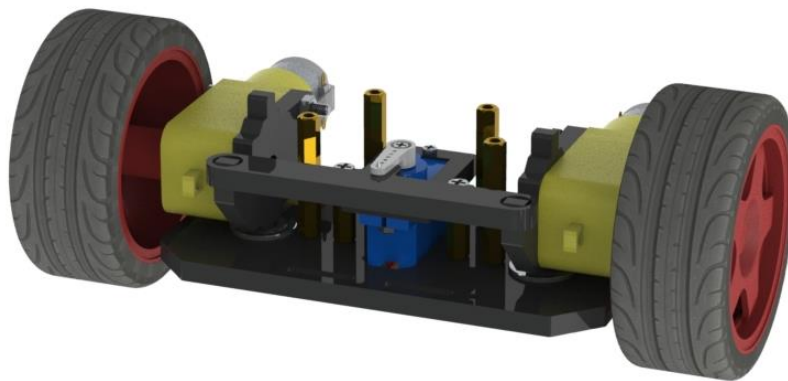


Assemble the following components

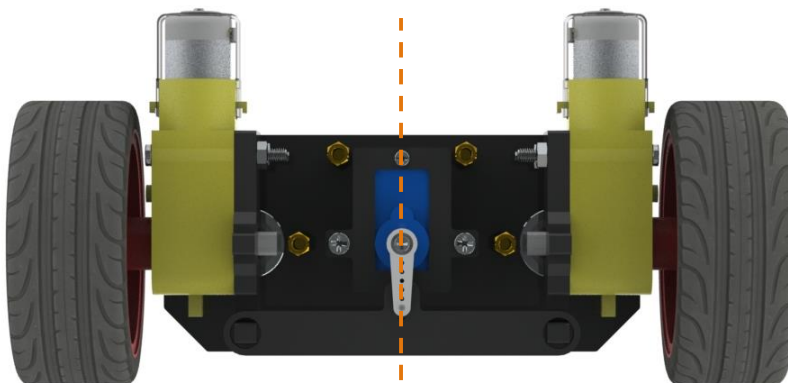
The rocker arm should be installed in the middle position between its rotation range. A little deviation is acceptable. If it is not installed in the middle position, you should remove the rocker arm and install it again instead of turning the shaft.



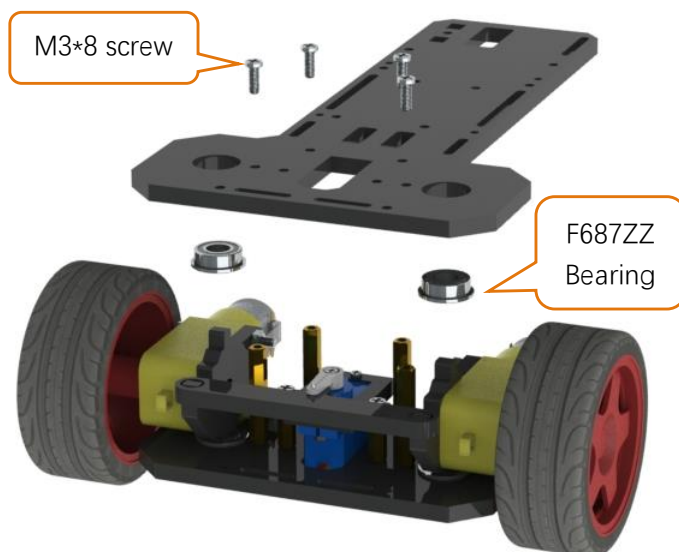
Effect diagram after assembling



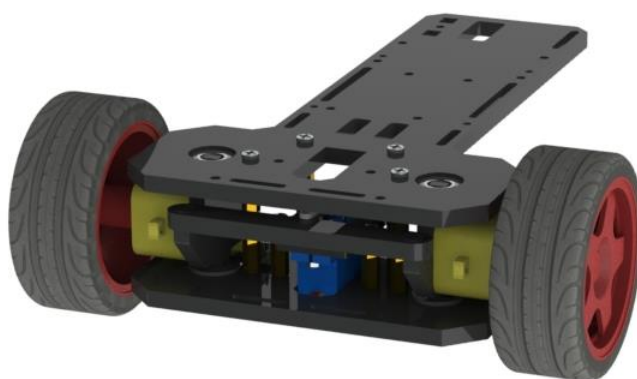
When we look the front axle from vertical direction, the rocker arm should be installed in the middle position between its rotation range. If you turn the shaft by accident, you need adjust the servo according to Step 1.1 and install it again.



Assemble the following components



Effect diagram after assembling

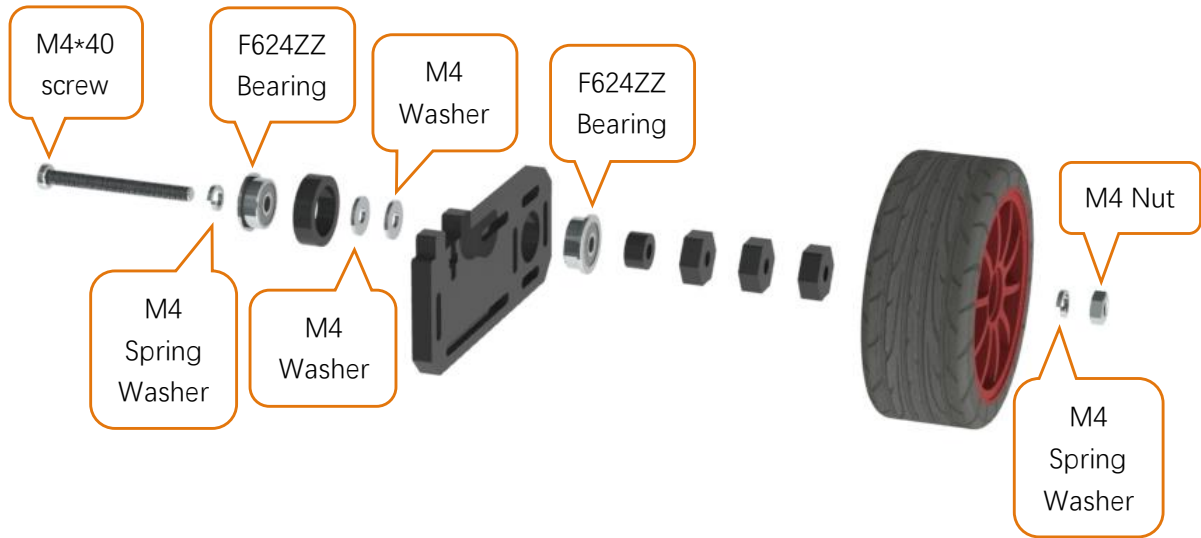


The two wheels can turn left and right





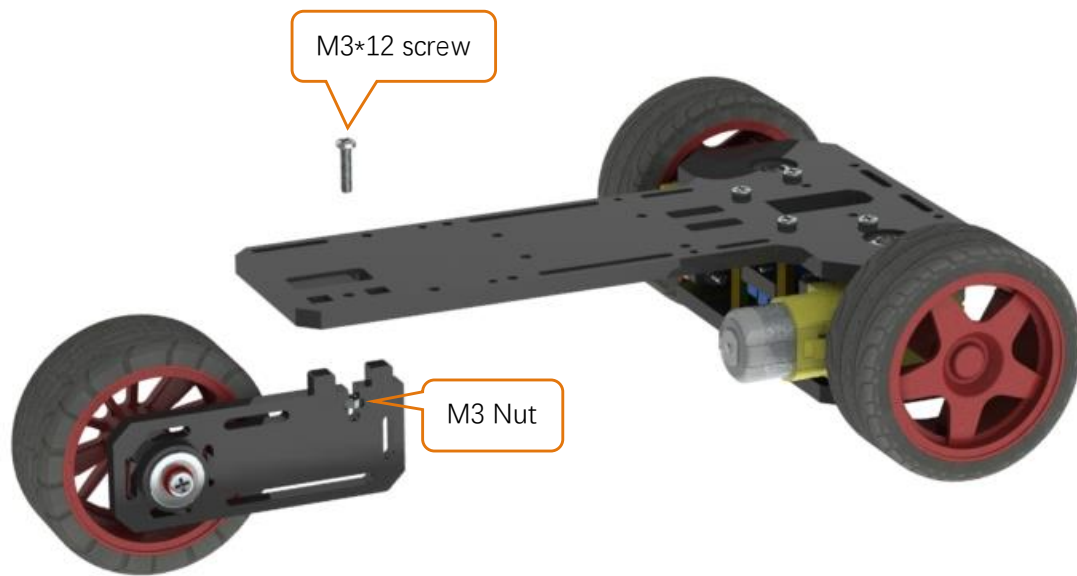
Assemble the following components



Effect diagram after assembling



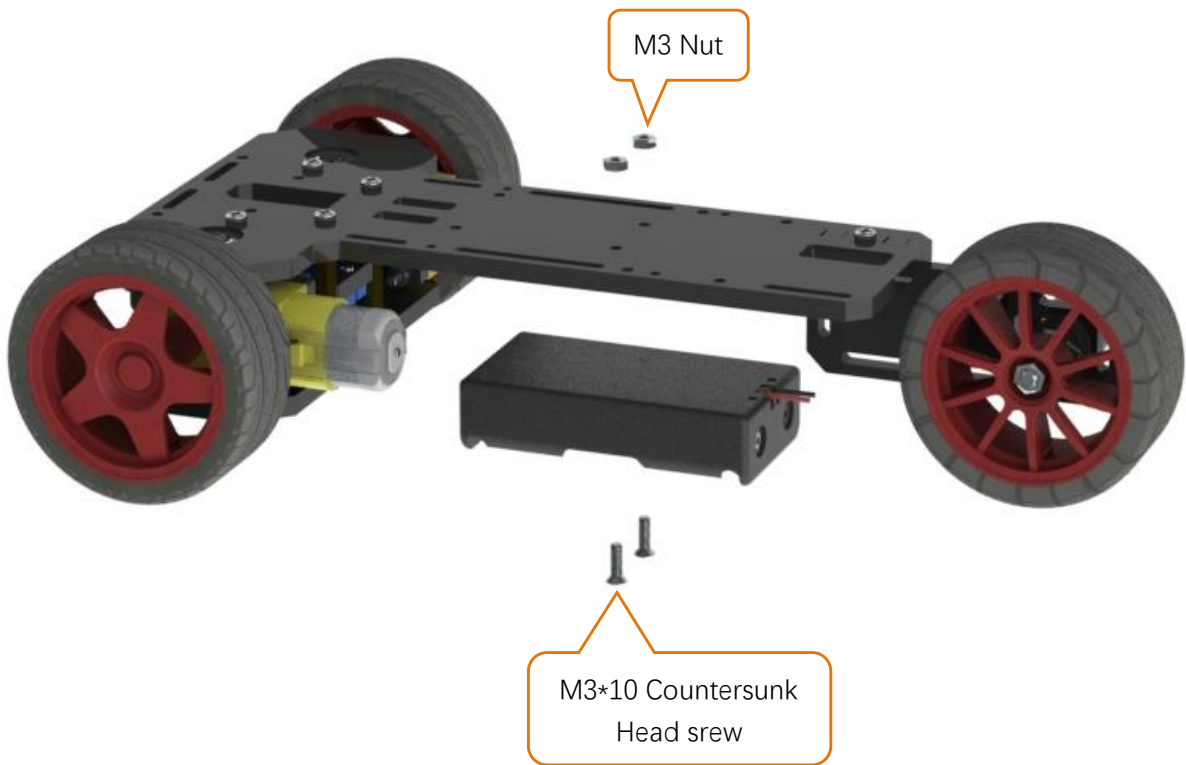
Assemble the following components



Effect diagram after assembling



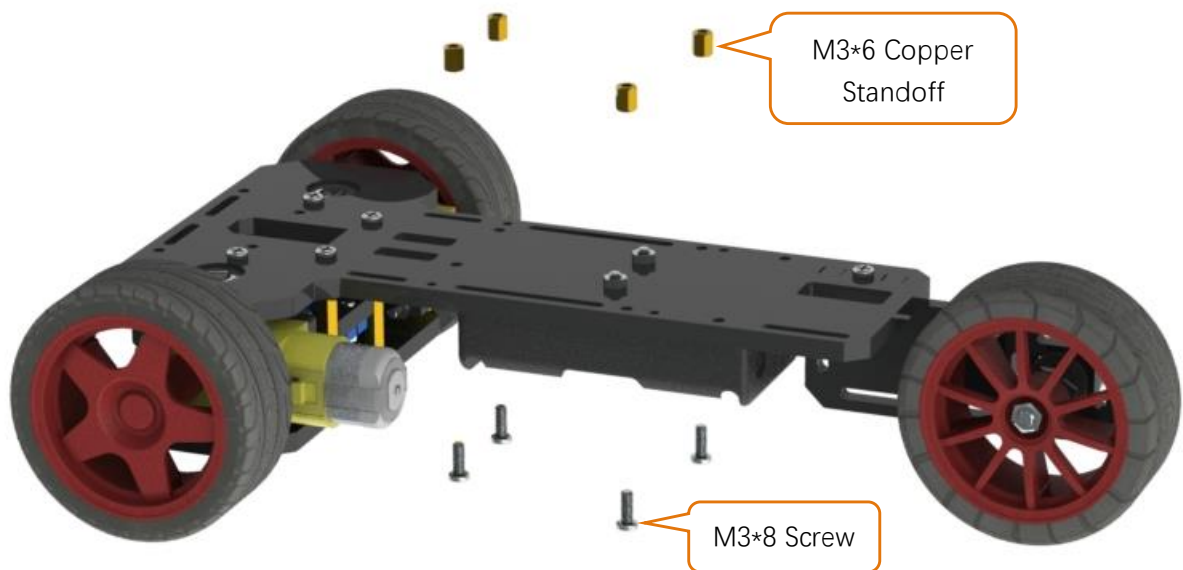
Assemble the following components



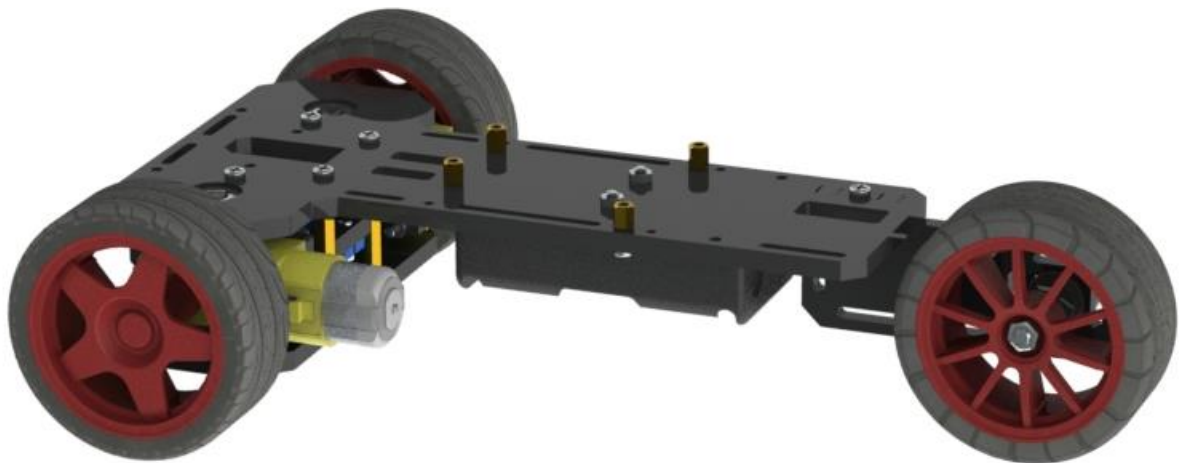
Effect diagram after assembling



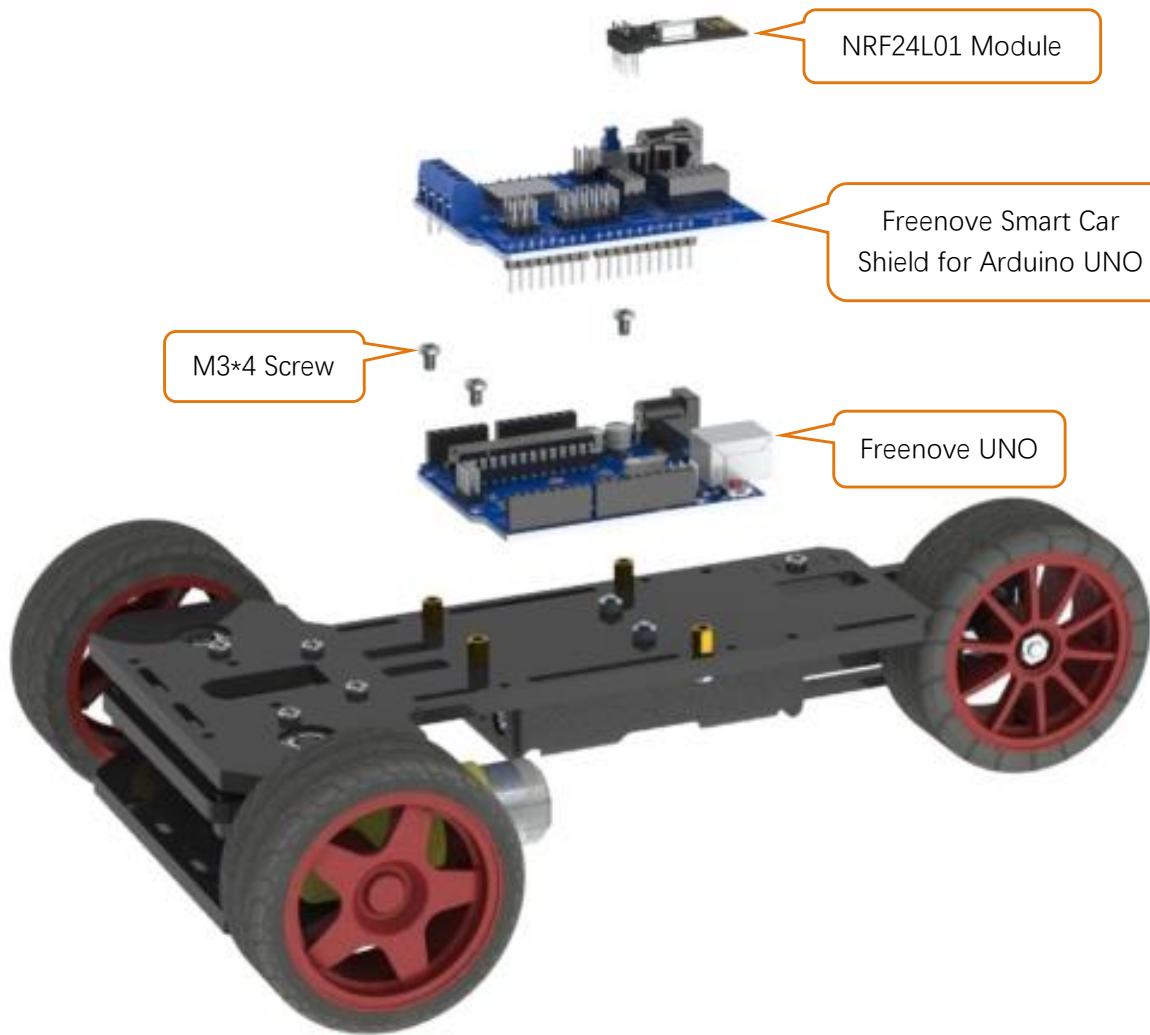
Assemble the following components



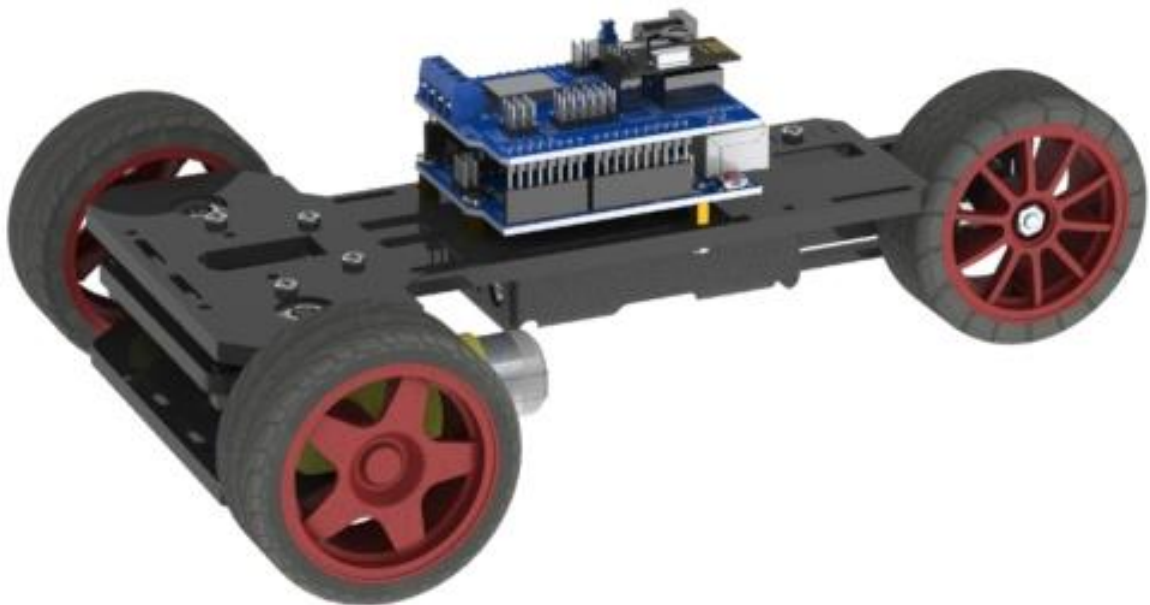
Effect diagram after assembling



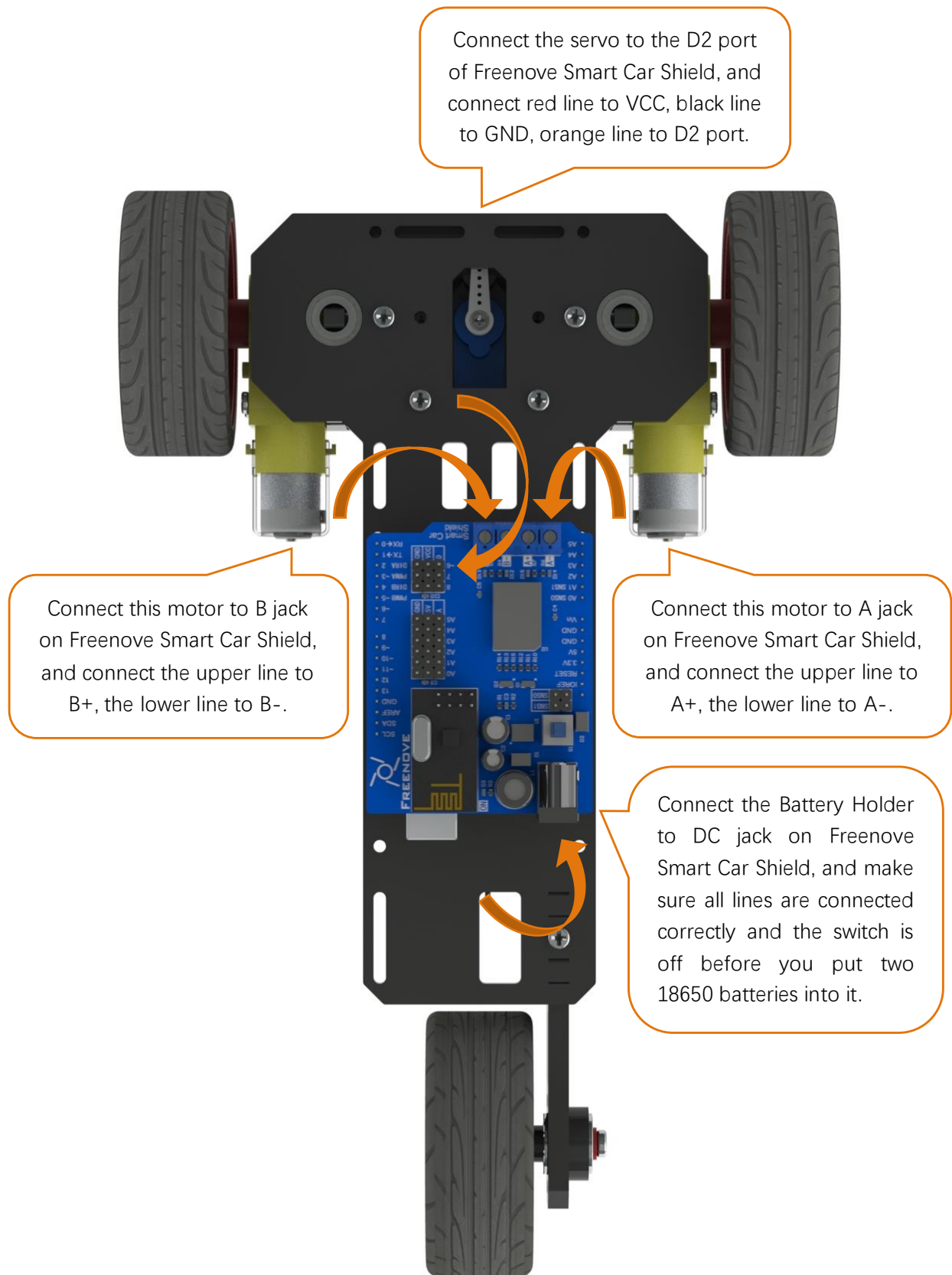
Assemble the following components



Effect diagram after assembling

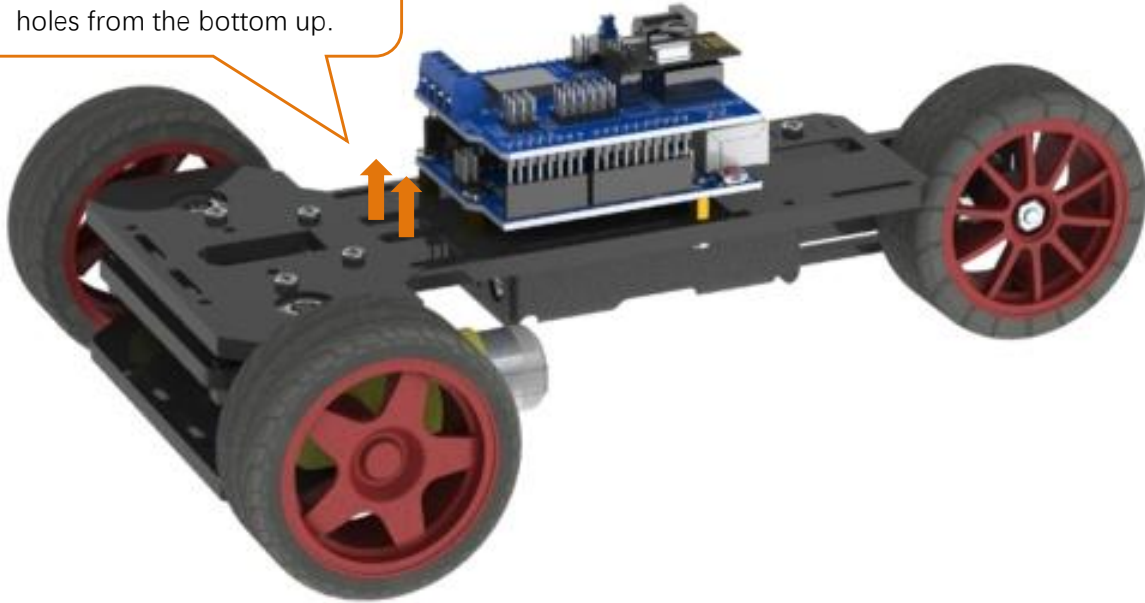


Build the line connection



Please pay attention to the following line-connecting

Pass the lines of all motors  
(including servo) through these  
holes from the bottom up.





## Step 1.3 Assemble the Remote Control

Assemble the following components

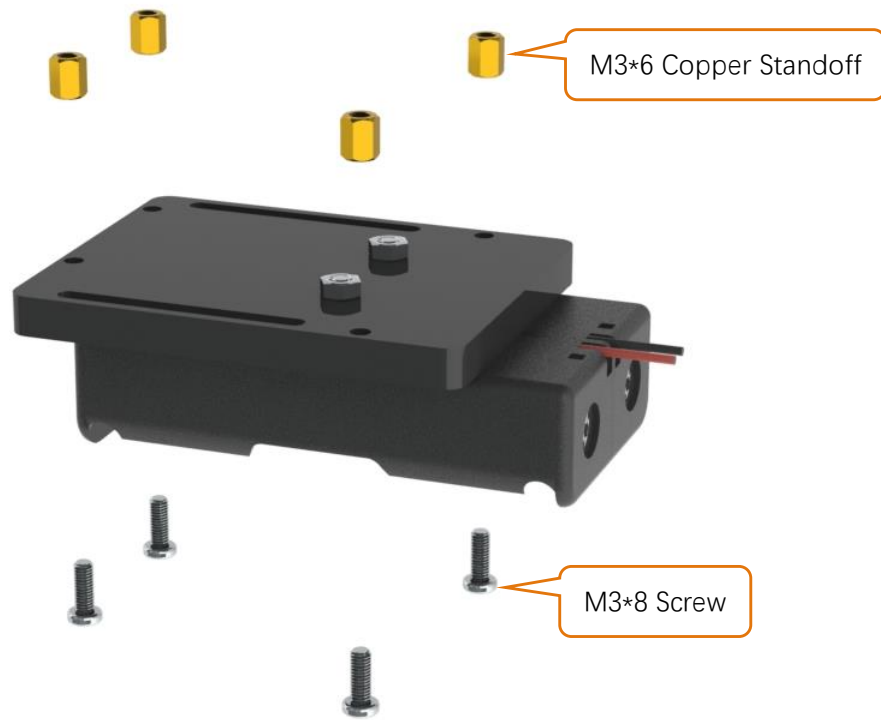


Effect diagram after assembling

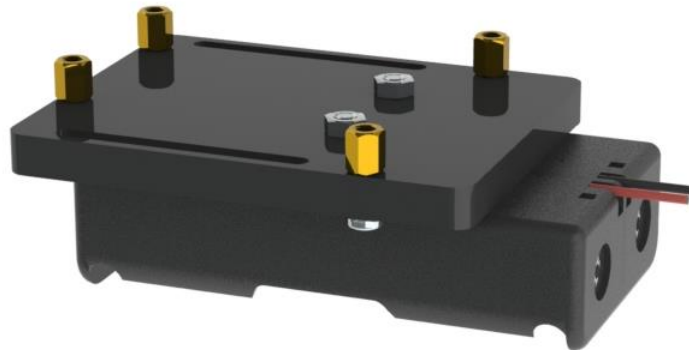




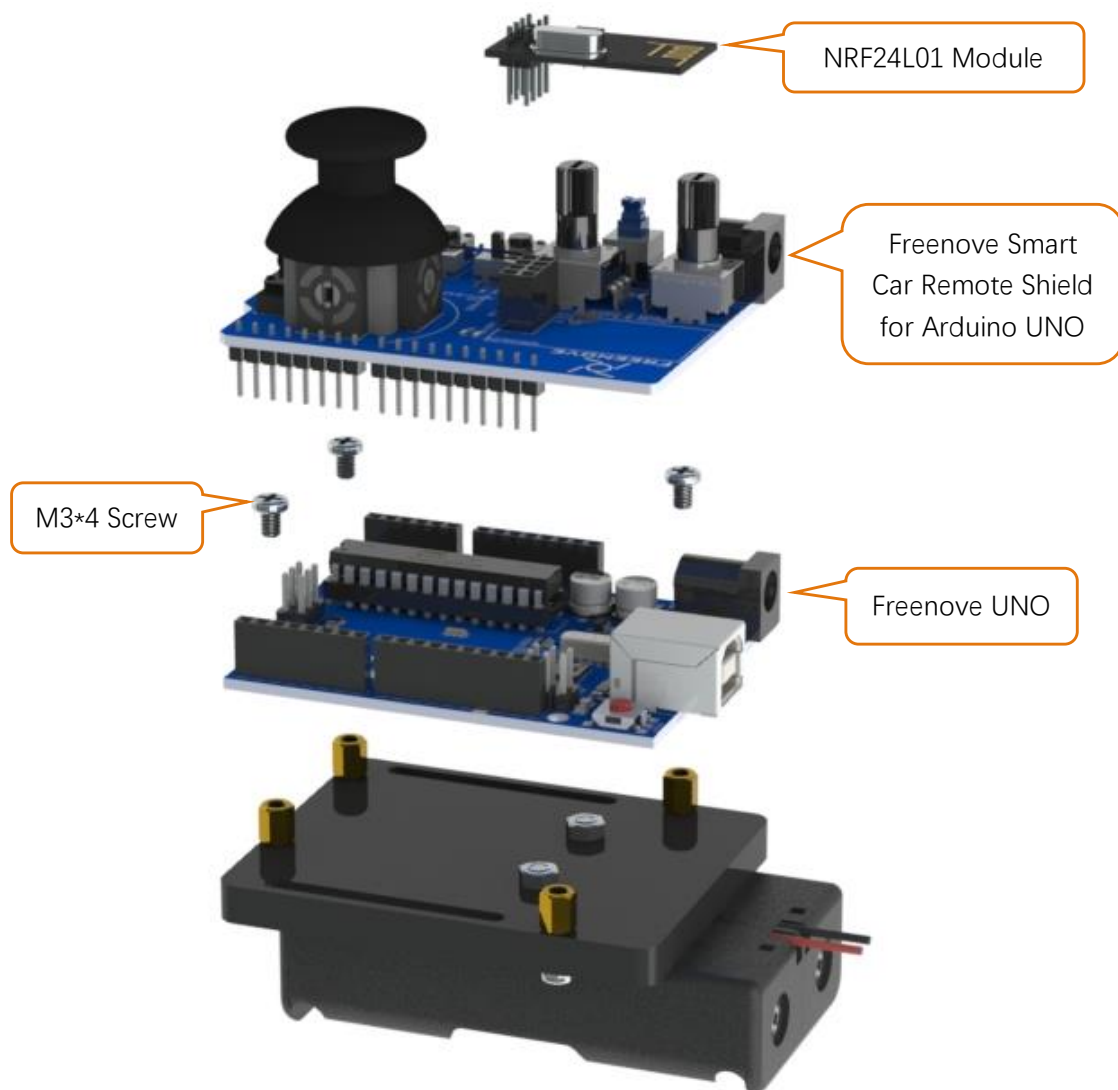
Assemble the following components



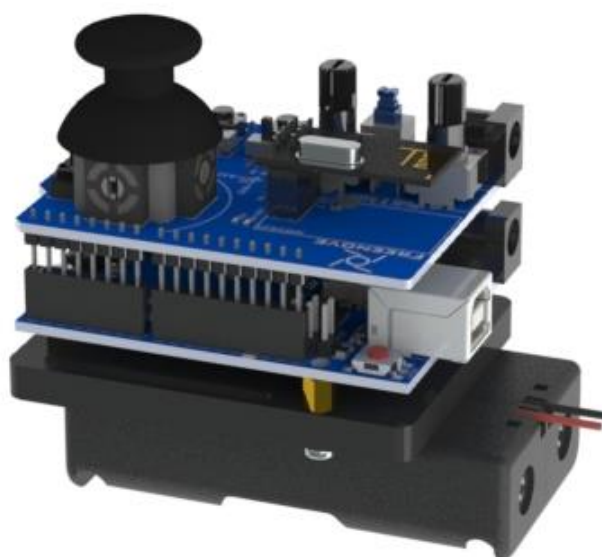
Effect diagram after assembling



Assemble the following components

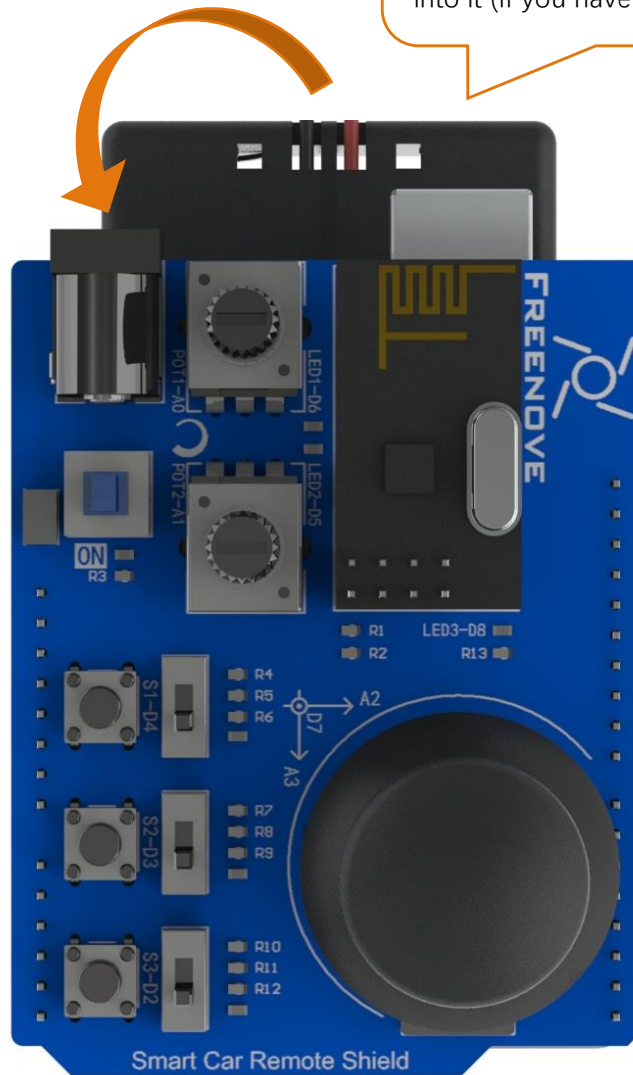


Effect diagram after assembling



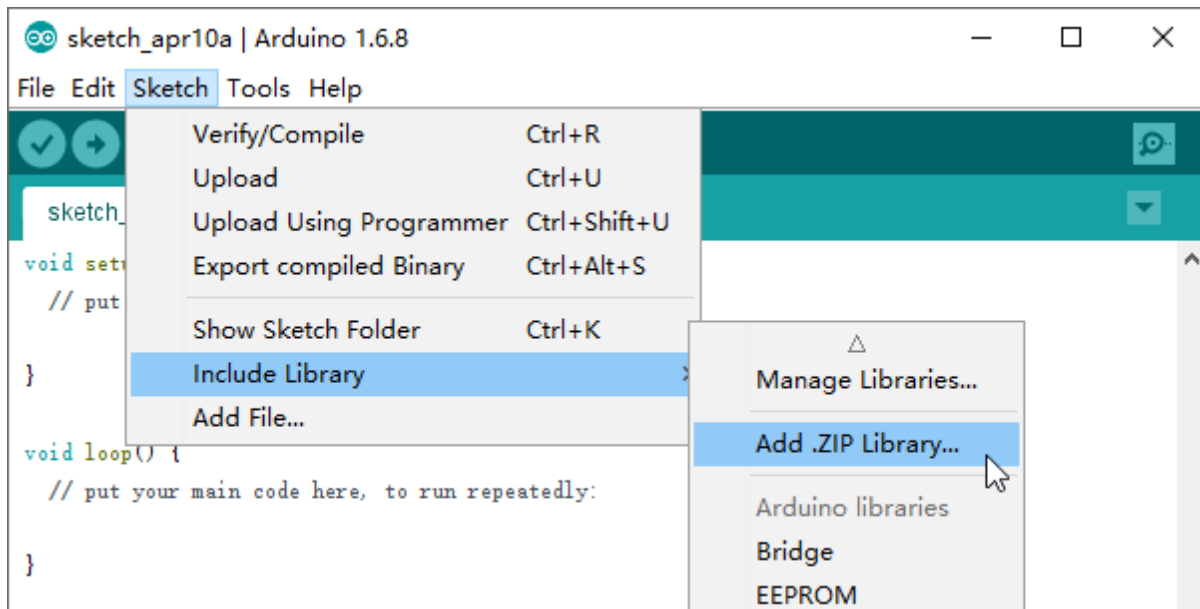
Build the line connection

Connect the Battery Holder to DC jack on Freenove Smart Car Remote Shield, and put two 18650 batteries into it (If you have prepared that).

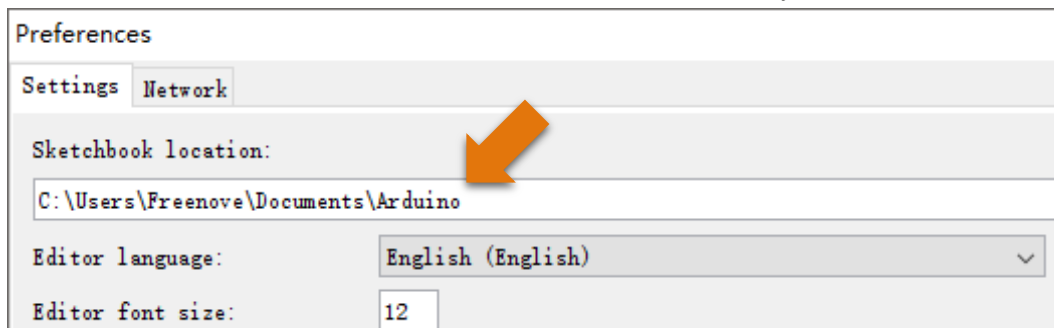


## Step 1.4 Upload the Sketch

Before uploading the code, we need to import the library file we need. These library files are contributed by other open source developers, which is not previously installed in Arduino Software. Click Add.ZIP Library, and then add the RF24.zip under Libraries folder.



When these libraries are added, you can locate them in the libraries under Sketchbook location in the File-Preference window. You can view the source code of these library files to understand their specific usage.



Then, connect the UNO of the smart car to the computer and upload the code:

Sketches\Car\Remote\_control\Remote\_control.ino

After it is finished, pull out the USB cable from the computer. Then, put smart car on the ground, and turn on the switch.

Connect the UNO of the remote control to the computer and upload the code:

Sketches\Remote\Remote.ino

If the remote control is fitted with batteries, you can pull out the USB cable and turn on the switch;

If not, the UNO needs to keep the connection with USB cable.

Now, you can enjoy the fun of controlling your smart car with remote control. The function of uploaded sketch includes:

- Control the marching direction of the smart car. When you push the joystick with different strength, your smart car will march with different speed and steering degree.
- Adjust the front wheels. The potentiometer POT1 on the remote control can be used to adjust the corresponding relationship between the joystick and steering degree. When you release the joystick, the wheel of smart car may not be in the middle position, so it can be adjusted through the potentiometer.
- Adjust the motor. The potentiometer POT2 on the remote control is used to adjust the corresponding relationship between the joystick and the motor of smart car. When you release the joystick, the smart car may be still marching, or the LED beside motor interface is still on, so it can be adjusted through this potentiometer.

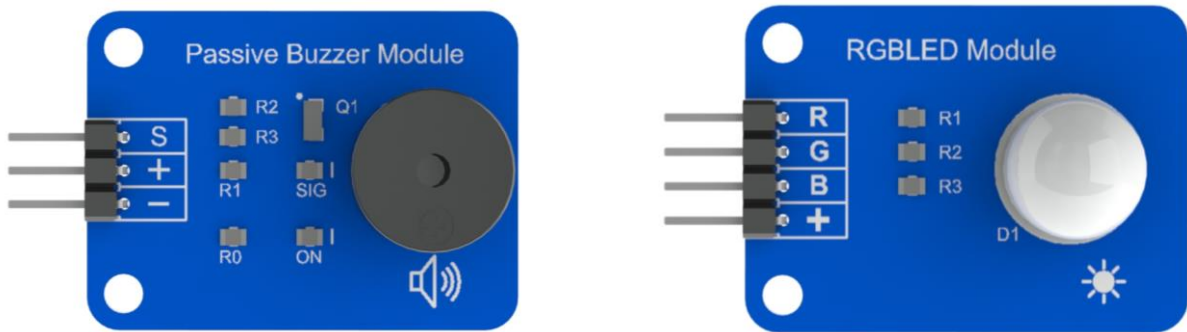
If your smart car fails to march as expected, please try to eliminate the malfunction in the following ways:

- The power indicator LED does not light on. Make sure that the battery has been charged, and installed correctly.
- Can't be controlled by remote control. Please check whether the code is uploaded correctedly, and NRF24L01 module is properly installed. Meanwhile, make sure that the smart car power is open, and remote control power is also open or use USB cable for power supply. When the wireless communication is normal, the LED signal on the remote control will keep blinking.
- Smart car can not steer. Please check whether the servo line is correctly connected.
- Smart car marches in a deviated direction. Adjust the rotary potentiometer POT1 to make it right.
- The wheels are not in the middle position when you release the joystick. Adjust the potentiometer POT1.
- The front wheels can not rotate. Please check whether the motor line is correctly connected.
- The front wheel rotates in a wrong direction. Just change the connection of motor line.
- Smart car keeps marching when you release the joystick. Turn this potentiometer POT2 to adjust.
- LED beside the motor interface is still on when you release the joystick. Turn this potentiometer POT2 to adjust.
- Other questions. Please contact us for more technical help!

## 3 Expand remote control smart car

So far, we have been able to control the smart car with the remote control. Now we will install some interesting accessories for the smart car.

The following is a buzzer module and RGB LED module.

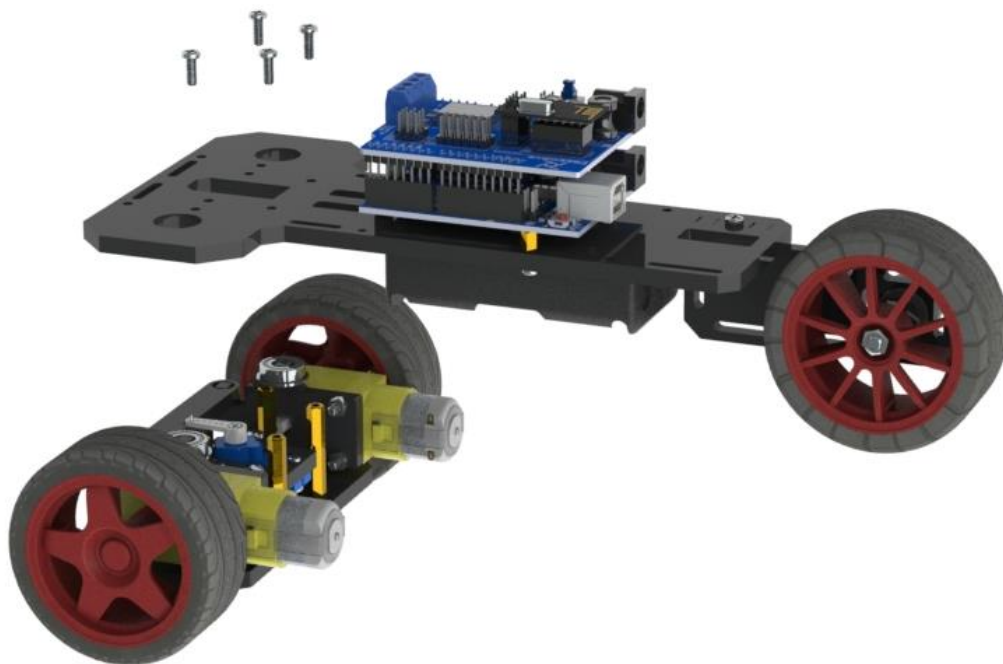


Buzzer module is used to make a sound, and RGB LED module can create different colors of light. In this lesson, we will use the buzzer module to work as the smart car horn, and RGB LED module as the warning light. The fixing hole of the Freenove electronic module is unified, so these modules can be installed on the smart car. You can visit our website or contact us to purchase other electronic modules for further creation.

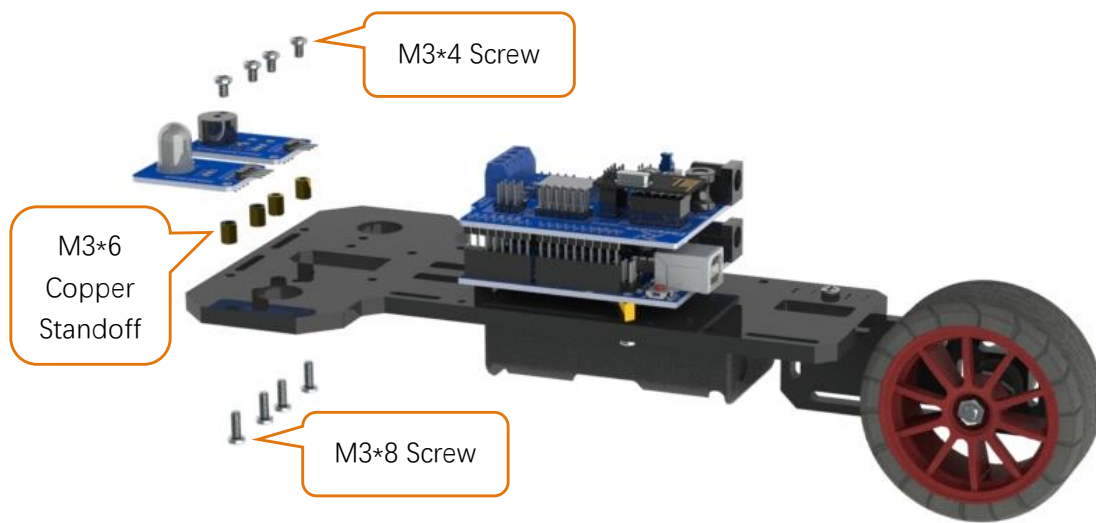
### Step 1.1 Assemble the Modules

Please turn off the power switch before assembling the modules!

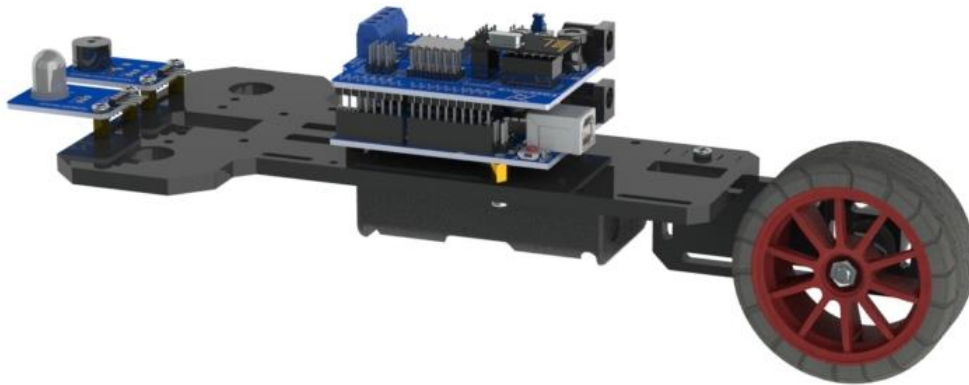
In order to install the buzzer and RGB LED module in front of the smart car, you need to remove some of the components first.



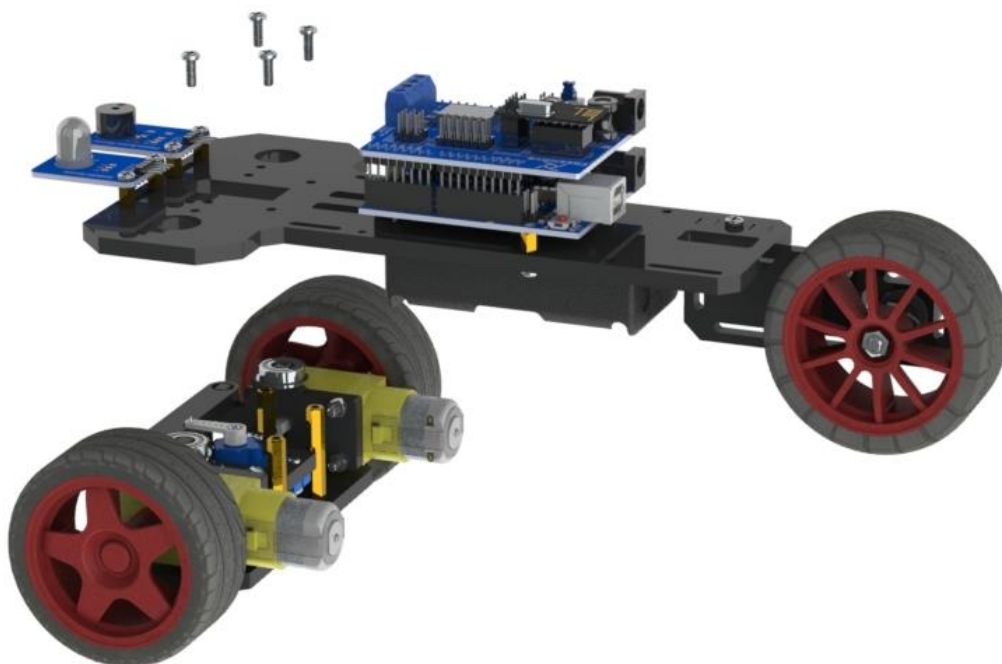
Then fix the following electronic modules on the smart car



Effect diagram after the modules are fixed.

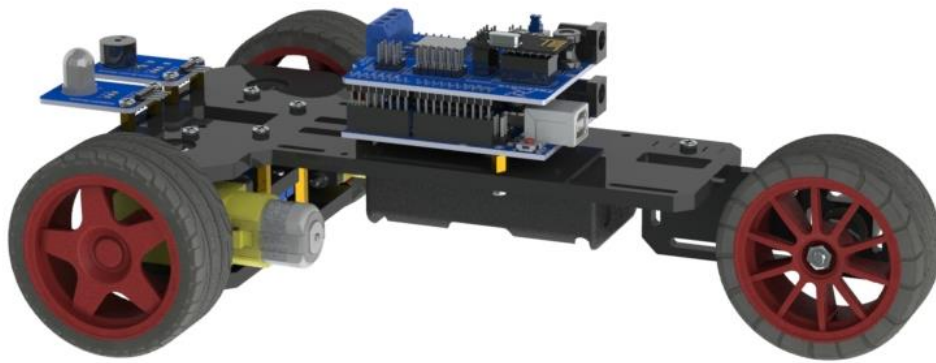


Then reassemble the removed components together.





Effect diagram after assembling





## Step 1.2 Connect The Modules

Connect these two modules to the expansion shield with jumper. Here is the instruction:

Module	Module Interface	Expansion Shield Interface
Buzzer	S	D3
	+	VCC
	-	GND
RGB LED	R	A3
	G	A4
	B	A5
	+	VCC

After the connection is confirmed correct, put the smart car on the ground, and turn on the switch. As the code that previously uploaded has already contained the function of controlling these two modules, so no need to upload the code again.

Now, you can start controlling these modules with the remote control. The function of uploaded sketch includes:

- Control the buzzer. You can use the tact switch and toggle switch S1 to make the buzzer beep.
- Control RGB LED light. You can use the tact switch and toggle switch S2 and S3 to make the RGB LED generate colorful light.

If these modules fail to work as expected, please try to eliminate the malfunction in the following ways:

- The buzzer can't beep. Check that whether the connection is correct, and the LED on the module should be "on" under normal condition.
- The buzzer can't stop beep. Make sure that the toggle switch S1 is closed, and the LED beside that should be "off".
- RGB LED can't light. Please check whether the connection is correct.
- The RGB LED can't stop blinking. Make sure that the toggle switch S1 and S3 are closed, and the LED beside that should be "off".
- Other questions. Please contact us for more technical help!

## 4 Automatic-driving Smart Car

From previous project, we have been able to control the smart car with a remote control, and install some interesting accessories for the smart car. Now we're trying to make your smart car drive automatically with the help of ultrasonic sensor.

The following is the ultrasonic ranging module.

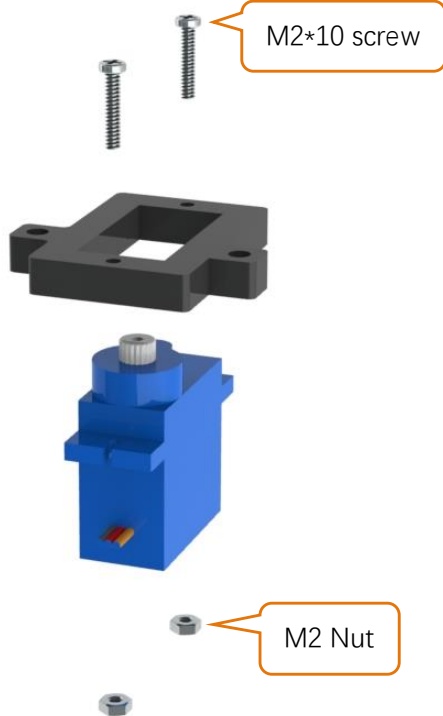


When ultrasonic ranging module works, it will send out ultrasonic wave. Once it encounters an obstacle, the ultrasonic wave will reflect back. Then this module can calculate the distance from the obstacle according to the reflected time.

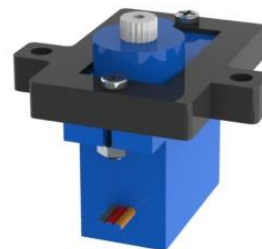
### Step 1.1 Assemble The Pan-tilt

First, assemble the pan-tilt.

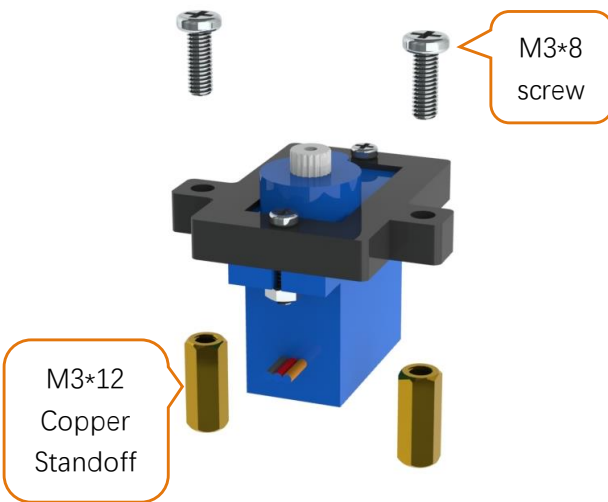
Assemble the following components



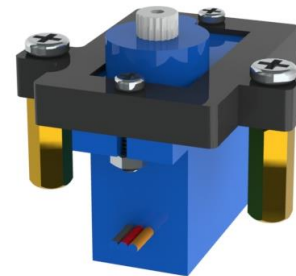
Effect diagram after assembling



Assemble the following components



Effect diagram after assembling



Assemble the following components

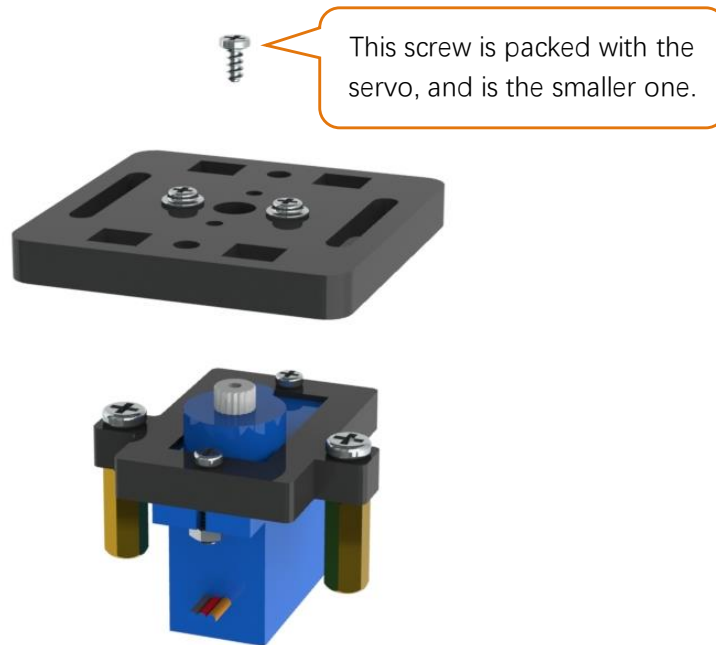


Effect diagram after assembling



Assemble the following components

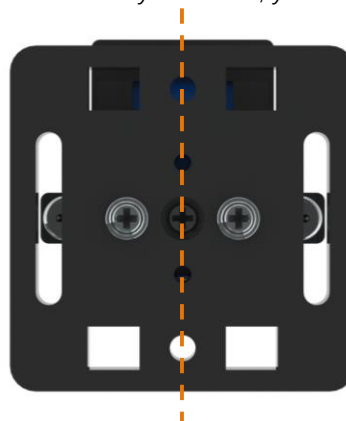
The rocker arm should be installed in the middle position between its rotation range. A little deviation is acceptable. If it is not installed in the middle position, you should remove the rocker arm and install it again instead of turning the shaft.



Effect diagram after assembling



When we look the front axle from vertical direction, the rocker arm should be installed in the middle position between its rotation range. If you turn the shaft by accident, you need adjust the servo and install it again.



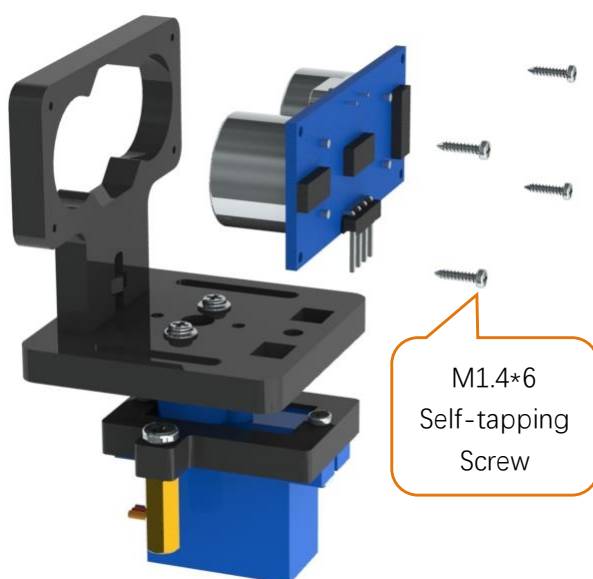
Assemble the following components



Effect diagram after assembling



Assemble the following components. Please put the jumper connected to the ultrasonic module first before assembling, otherwise it could be difficult to connect jumper after assembling.



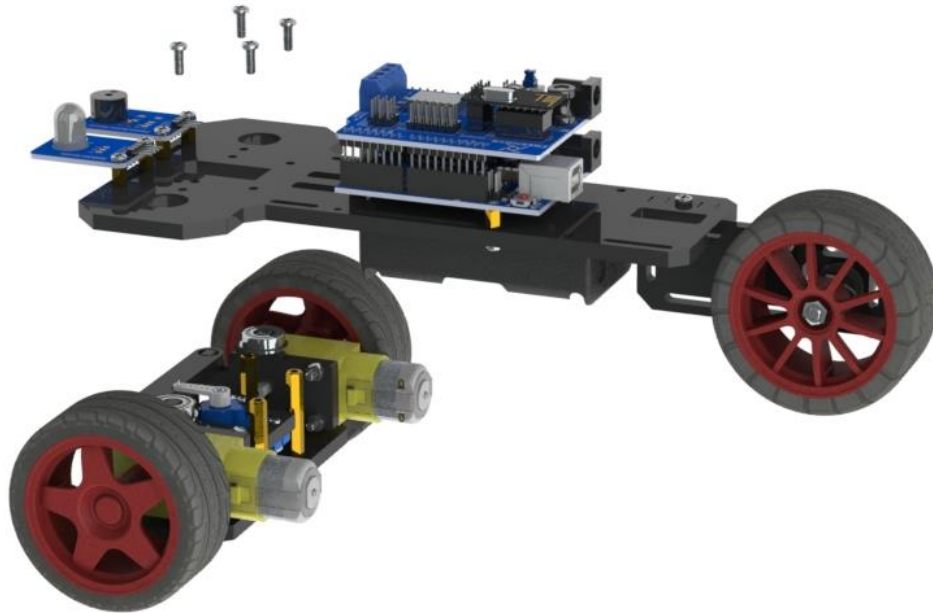
Effect diagram after assembling



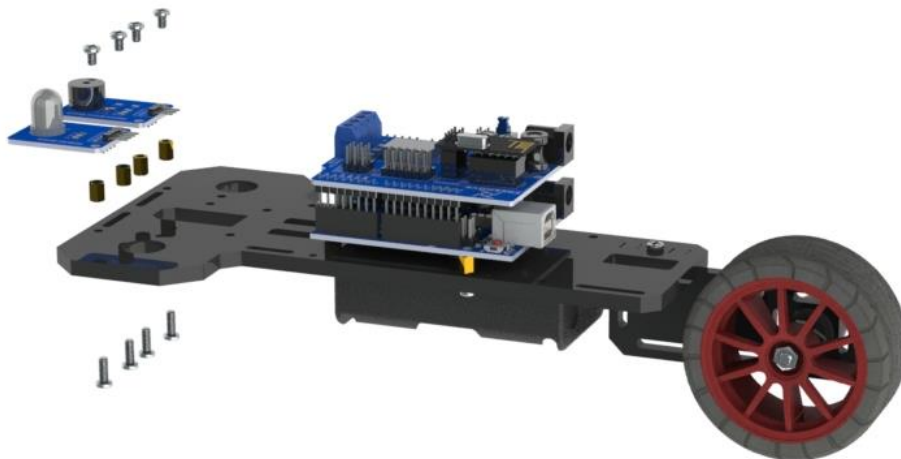
## Step 1.2 Install The Pan-tilt

Please turn off the power switch before assembling these modules.

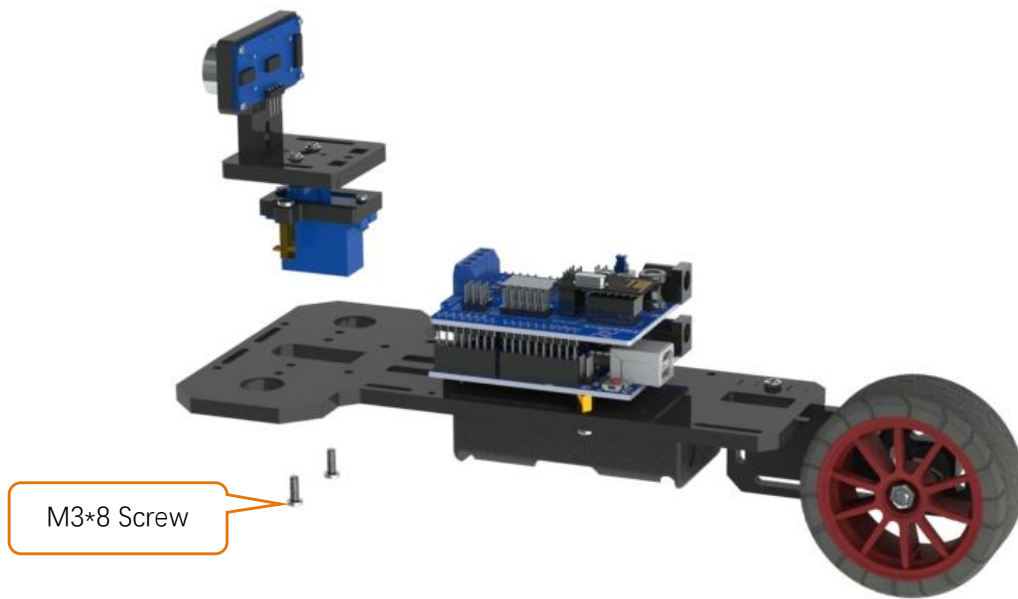
To remove the electronic modules installed in front of the smart car, we need to remove some components first.



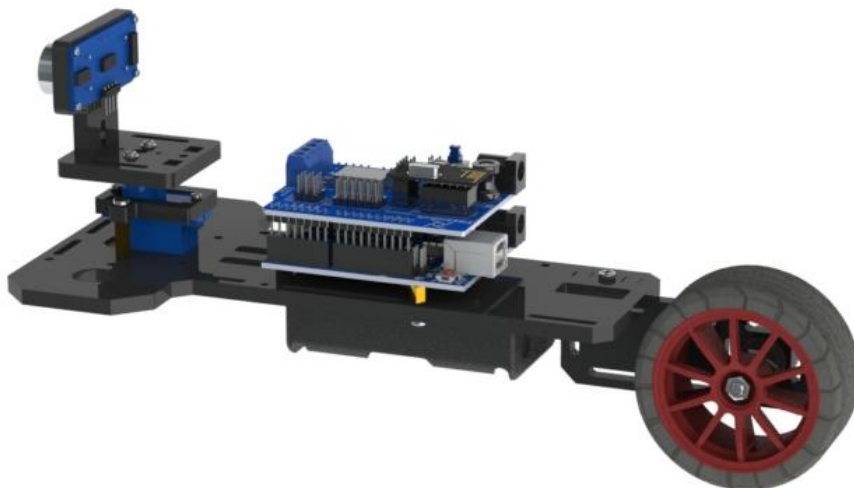
Remove the following electronic modules



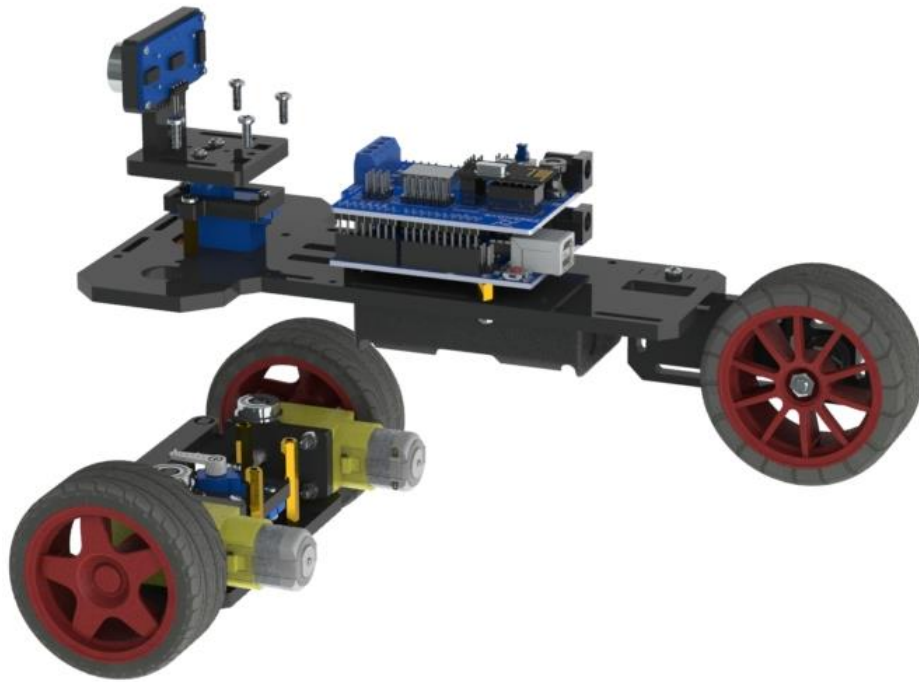
Assemble the pan-tilt



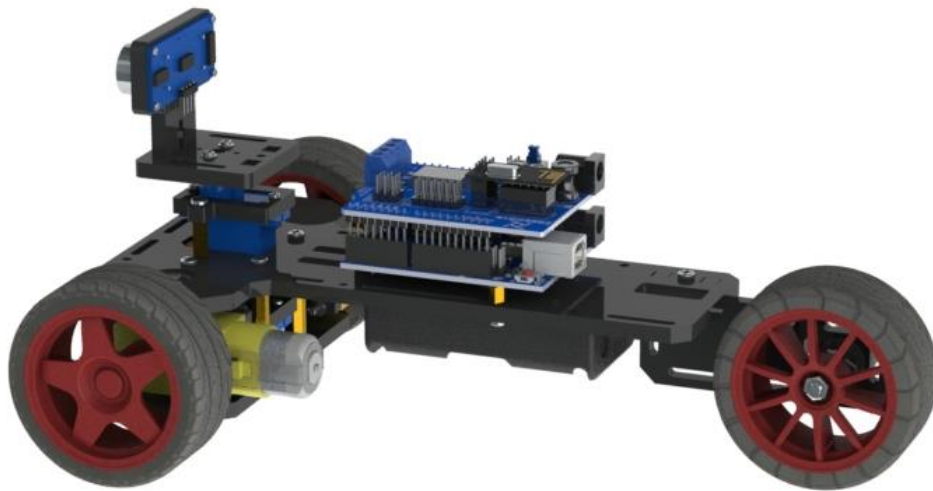
Effect diagram after assembling



Assemble the removed components



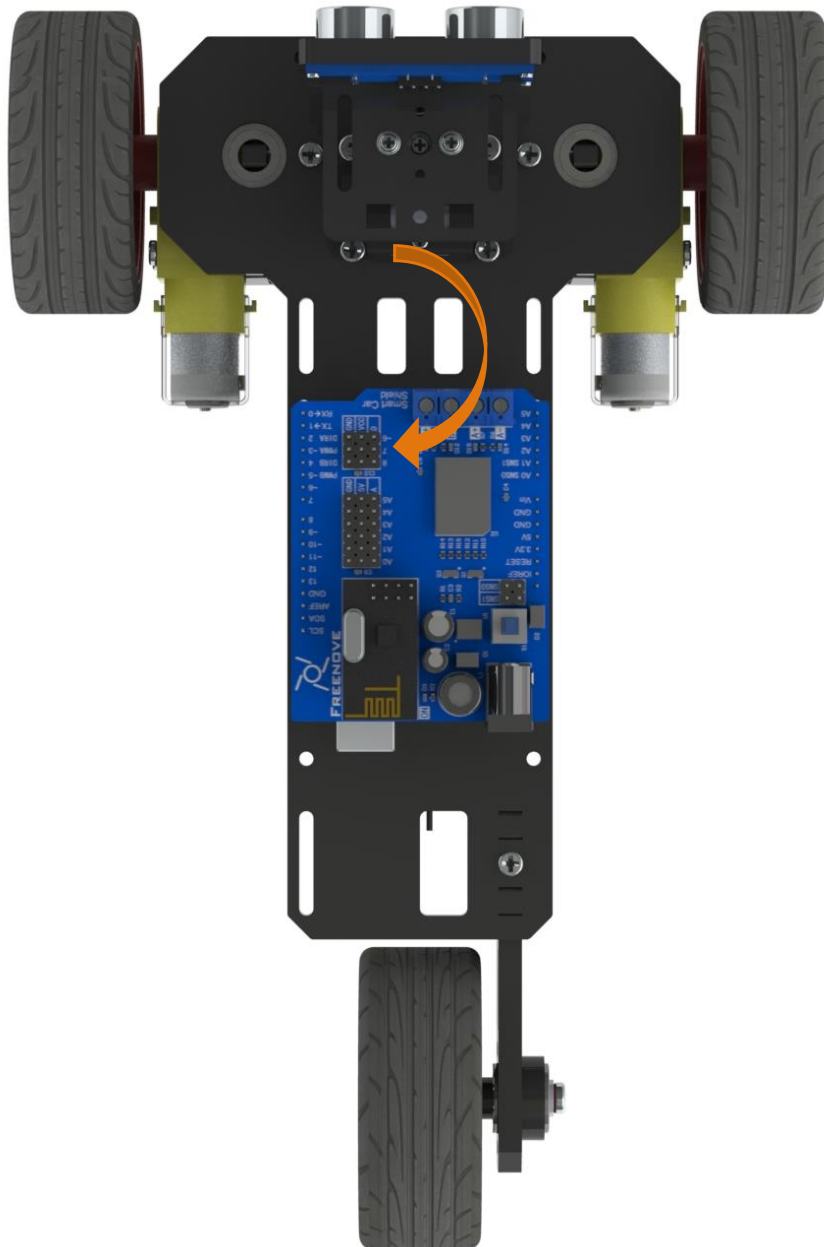
Effect diagram after assembling





Build the line connection

Connect the pan-tilt servo to D3 port of Freenove Smart Car Shield, and red line to VCC, black line to GND, orange line to D3.



## Step 1.3 Connect The Module

Connect the ultrasonic ranging module to expansion shield with the jumper. The connection table is as follows:

Module	Module Interface	Expansion shield Interface
Ultrasonic	Vcc	5V
	Trig	A4
	Echo	A5
	Gnd	GND

Check again to make sure there is no wrong connection!

## Step 1.4 Upload The Sketch

Connect the UNO of the smart car to the computer and upload the code:

Sketches\Car\Automatic\_drive\Automatic\_drive.ino

After it is finished, pull out the USB cable from the computer. Then, put smart car on the ground, and turn on the switch.

Now, you can see that your smart car starts marching automatically. The function includes:

- Rotate the pan-tilt to detect front obstacles.
- Change the marching direction when it encounters obstacles.

If your smart car fails to march as expected, please try to eliminate the malfunction in the following ways:

- Pan-tilt can't rotate. Check whether the connection of servo lines is correct.
- Smart car can't avoid obstacles. Check whether the connection of ultrasonic module lines is correct.
- Steering servo deviates its expectation. Modify the value of the variable "dirServoOffset" to adjust the code.
- Pan-tilt servo deviates its expectation. Modify the value of the variable "plaServoOffset" to adjust the code.
- Other questions. Please contact us for more technical help!

## What's next?

Thanks for your reading.

This book is all over here. If you find any mistakes, missions or you have other ideas and questions about contents of this book or the kit and ect, please feel free to contact us, and we will check and correct it as soon as possible.

After completing the projects of this book, you can try to remodify this smart car, including purchasing and installing other electronic modules of Freenove, or improving the code to achieve different functions you want.

If you want to learn more about Arduino, Raspberry Pi, smart cars, robots and orther interesting products in science and technology, please continue to focus on our website. We will continue to launch cost-effective, innovative and exciting products.

Thank you again for choosing Freenove products.