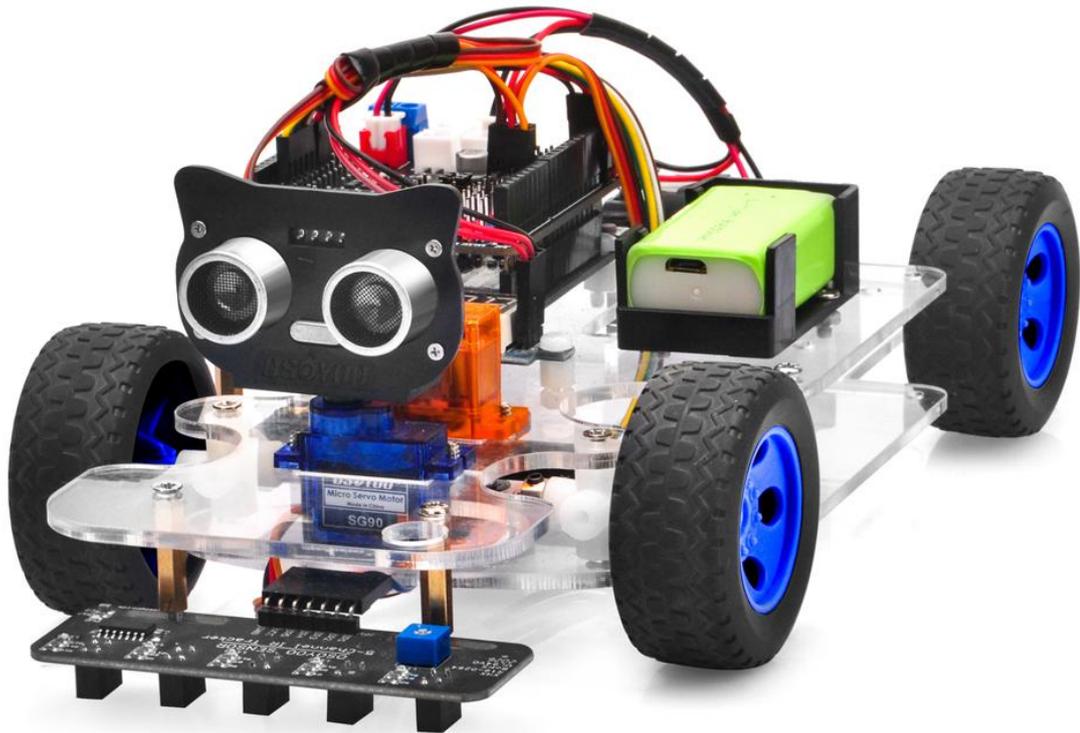


OSOYOO Sport Car for Arduino



Online Tutorial Index: <https://osoyoo.com/?p=40040>

If you have any problem, please feel free to contact us, our email address is support@vership.com

Table of Contents

OSOYOO Sport Car for Arduino.....	0
Preface.....	3
Safety Instruction.....	3
About OSOYOO.....	3
About This Kit.....	3
Online Tutorial Index:.....	3
Customer Service and Tech Support.....	4
OSOYOO V2.1 Robot car kit Lesson 0: Introduction.....	5
Parts and Devices.....	6
Tutorial and sample projects.....	9
OSOYOO Sport Car for Arduino Lesson 1: Hardware Installation and Servo Test.....	11
Objective.....	11
Parts and Devices.....	12
Hardware Installation.....	15
Connection.....	25
Software Installation.....	31
Steering Servo Alignment:.....	32
OSOYOO Sport Car for Arduino Lesson 2: Basic Movement.....	36
Objective.....	36
Software Installation.....	36
Final testing.....	39
OSOYOO Sport Car for Arduino Lesson 3: Line Tracking.....	41
Objective.....	41
Software installation.....	41
Adjust the sensitivity of tracking sensor modules.....	43
Final testing.....	44
OSOYOO Sport Car for Arduino Lesson 4: Obstacle Avoidance.....	45
Objective:.....	45
Software Installation.....	45
Ultrasonic sensor servo initial direction alignment.....	47
Final Testing.....	48
OSOYOO Sport Car for Arduino Lesson 5: Wifi UDP control robot car.....	50
Objective.....	50

Parts and Devices.....	50
Wire Connection.....	51
Software Installation.....	52
Final Testing.....	58
Osoyoo Sport Car for Arduino Lesson 6: Mock Driving with Bluetooth APP.....	59
Objective.....	59
Parts and Devices.....	59
Hardware Installation.....	59
Software Installation.....	60
Explanation of APP UI (UI is different between Android and IOS).....	62
Drive your Robot Car.....	64

Preface

Safety Instruction

- Please turn off battery power when your Robot is connected to Personal Computer or Laptop via USB cable
- Do not plug or unplug and wire or module when power is on,
- Do not even touch the board when power is on or your hand has static charge (you can move static charge by touching metal tap).
- Reversing +/- when connecting modules with OSOYOO board for Arduino, or incorrectly connecting can destroy your electronics and cause fire hazard.
- Please make sure polar direction is correct when you install batteries in your battery box, otherwise it can destroy your device and cause fire hazard.
- Please don't use Carbon zinc batteries as power, as output current of this kind of battery is too low and it is unable to load the robot car
- Do not leave batteries in battery box if you don't use it for long time due to the risk of fire and malfunction.

About OSOYOO

OSOYOO brand owned by Pinetree Electronics Ltd, the only Canadian Owned Science Fair Supplier, Circuit Builder, IOT, Autonomous Smart Machine, Home Electronics Workshop and Arduino Accessory Company.

Pinetree Electronics Ltd established since 2009 in Vancouver, Canada. We are Engineers and Programmers Ourselves, So We Know How Important It Is to CREATE Your Dreams! Not All Robot Kits Are Created Equal: Pay For True Quality & You Will Not Be Disappointed.

For more information and tutorial of OSOYOO products, please visit www.osoyoo.com

About This Kit

OSOYOO sport car for Arduino is a perfect combination of challenge and excitement, learning and fun. The kit comes with step by step ONLINE tutorial with text, picture and video. The kit is great for any skill level — whether you're a pro, enthusiast, or a beginner.

Online Tutorial Index:

- General Introduction: <https://osoyoo.com/?p=40040>

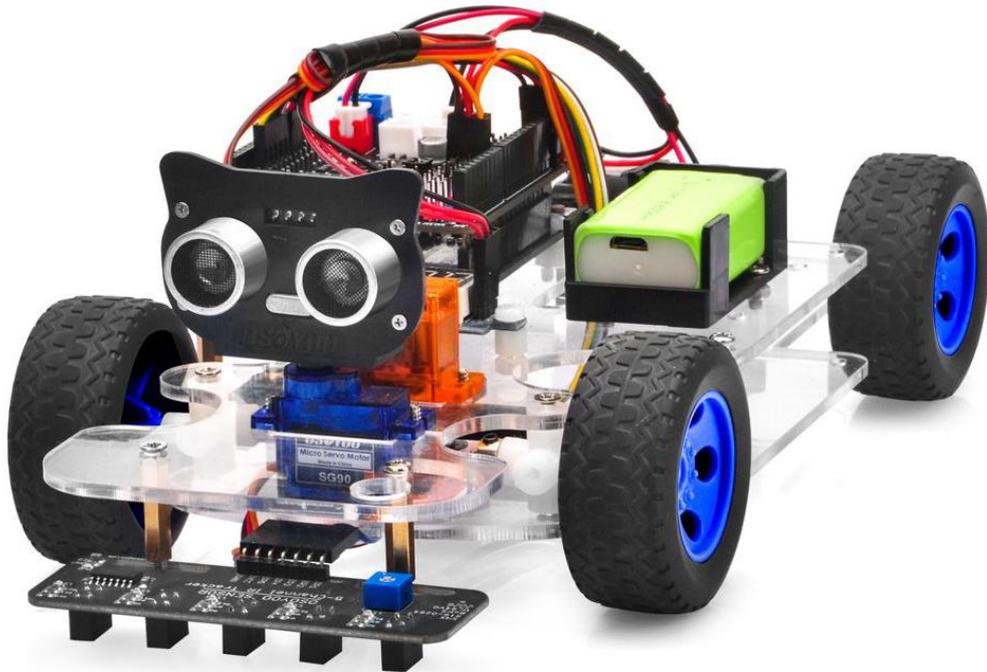
- OSOYOO sport car for Arduino introduction video:
http://osoyoo.com/sport_car_kit.html
- OSOYOO sport car for Arduino tutorial PDF download link:
<https://osoyoo.com/manual/sportcarkit.pdf>

Customer Service and Tech Support

You have following two options to ask for help:

- 1) Leave comments on our tutorial <https://osoyoo.com/?p=40040>
- 2) Send email to support@osoyoo.info. We guarantee that all inquiries will be replied in 24 hours.

OSOYOO V2.1 Robot car kit Lesson 0: Introduction



OSOYOO sport car kit for Arduino uses an easy-to-install Servo Steering Rack to replace the old-fashioned Differential Steering used by most Arduino robots in the market. This Servo Steering Rack works quite similar to real car steering mechanical system and therefore has better performance.

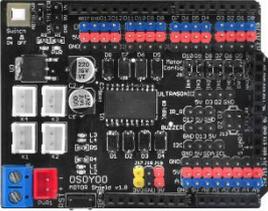
OSOYOO Sport Car Kit for Arduino an educational STEM kit to get hands-on experience about programming, electronics assembling, robot mechanics knowledge. It is an integration solution for robotics learning and made for education.

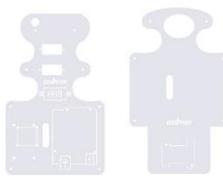
OSOYOO Sport Car Kit for Arduino is an educational and fun kit based on OSOYOO R3 MCU board (Arduino-Compatible) designed for both beginners and professionals to learn electronics, programming and robotics. With our easy-to-follow tutorial assembling this robot car kit would be very intuitive and simple regardless of whether you are an engineer or a novice. Building up your own robotic project has never been so easy and fun. Just follow our tutorial and step by step you will have your own running car kit within no time.

This kit enables you to have a good quality time with your children and empower them to develop and inspire their imaginations. If your kids, family or friends are attracted to the electronics and robotics world, this kit would be a

great choice and perfect gift for them to start their first step on electronic journey.

Parts and Devices

No.	Device	Picture	Qty.	Link
1	OSOYOO UNO R3 (fully compatible with Arduino UNO R3)		1	Click here to buy
2	OSOYOO Motor Shield V1.1		1	Click here to buy
3	MG90S Servo Motor		1	Click here to buy
4	Voltage Meter		1	Click here to buy
5	Tracking Sensor		1	Click here to buy

6	Ultrasonic Sensor		1	Click here to buy
7	Servo Motor		1	Click here to buy
8	Mount Holder for Ultrasonic Sensor		1	Click here to buy
9	ESP8266 WIFI Shield		1	Click here to buy
10	HC module		1	Click here to buy
11	Car Chassis		1	Click here to buy

12	Motor with wires		1	Click here to buy
13	Wheels		4	Click here to buy
14	9V Battery Box		1	Click here to buy
15	9V Battery		1	Click here to buy
16	Phillips Screwdriver		1	Click here to buy
17	Hex Screwdriver		1	Click here to buy

18	L type Wrench		1	Click here to buy
19	20pin 15cm Female to Female Cable		1	Click here to buy
20	7pin 25cm Female to Female Cable		1	Click here to buy
21	3pin 15cm Female to Female Cable		1	Click here to buy
22	Steering cup		2	Click here to buy

Tutorial and sample projects

We have developed a step-by-step tutorial which evolves from a simple car without any control to a multi-function robotic car controlled by mobile APP. Every lesson has detailed sample code with comments, circuit graph, assembly instruction and video. Even if you have no programming experience, you can follow the step-by-step instruction and gradually become a master. Our robotic car is 100% open source. If you are an intermediate player and have time to read our code comments, you can easily customize this robotic

car to make your own project for science fair, college homework or even commercial applications.

- Lesson 1: Hardware Installation and Servo, URL <https://osoyoo.com/?p=39565>
- Lesson 2: Basic Movement, URL <https://osoyoo.com/?p=37134>
- Lesson 3: Line Tracking, URL <https://osoyoo.com/?p=37188>
- Lesson 4: Obstacle Avoidance, URL <https://osoyoo.com/?p=39551>
- Lesson 5: Wifi UDP control robot car, URL <https://osoyoo.com/?p=37202>
- Lesson 6: Mock Driving with Bluetooth APP, URL <https://osoyoo.com/?p=39759>

OSOYOO Sport Car for Arduino Lesson 1: Hardware Installation and Servo Test



Objective

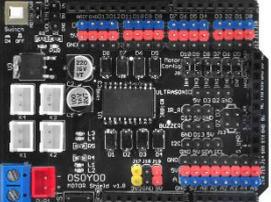
Welcome to the first lesson of OSOYOO Sport Car for Arduino!

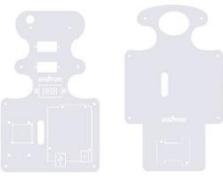
In this lesson, we will install the framework of the robot car and align steering servo to make the car face to front.

As your experiments in future lessons are all based on the frame work of Lesson 1, it is very important to test the installation and sample code in this Lesson properly.

Please enter the link to watch the video: <https://youtu.be/-bi1iFsd1q4>

Parts and Devices

No.	Device	Picture	Qty.	Link
1	OSOYOO UNO R3 (fully compatible with Arduino UNO R3)		1	Click here to buy
2	OSOYOO Motor Shield V1.1		1	Click here to buy
3	MG90S Servo Motor		1	Click here to buy
4	Voltage Meter		1	Click here to buy
5	Tracking Sensor		1	Click here to buy
6	Ultrasonic Sensor		1	Click here to buy

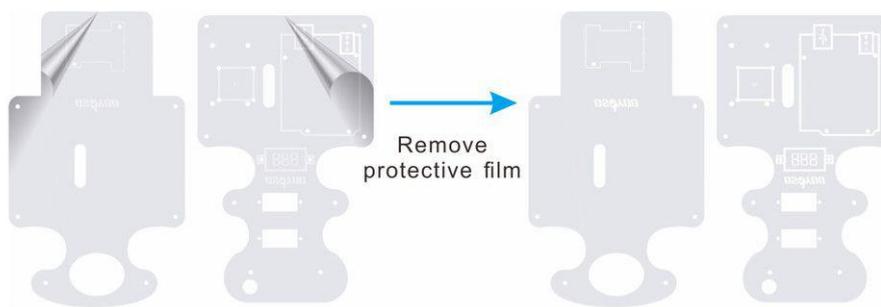
7	Servo Motor		1	Click here to buy
8	Mount Holder for Ultrasonic Sensor		1	Click here to buy
9	Car Chassis		1	Click here to buy
10	Motor with wires		1	Click here to buy
11	Wheels		4	Click here to buy
12	9V Battery Box		1	Click here to buy

13	9V Battery		1	Click here to buy
14	Phillips Screwdriver		1	Click here to buy
15	Hex Screwdriver		1	Click here to buy
16	L type Wrench		1	Click here to buy
17	20pin 15cm Female to Female Cable		1	Click here to buy
18	7pin 25cm Female to Female Cable		1	Click here to buy

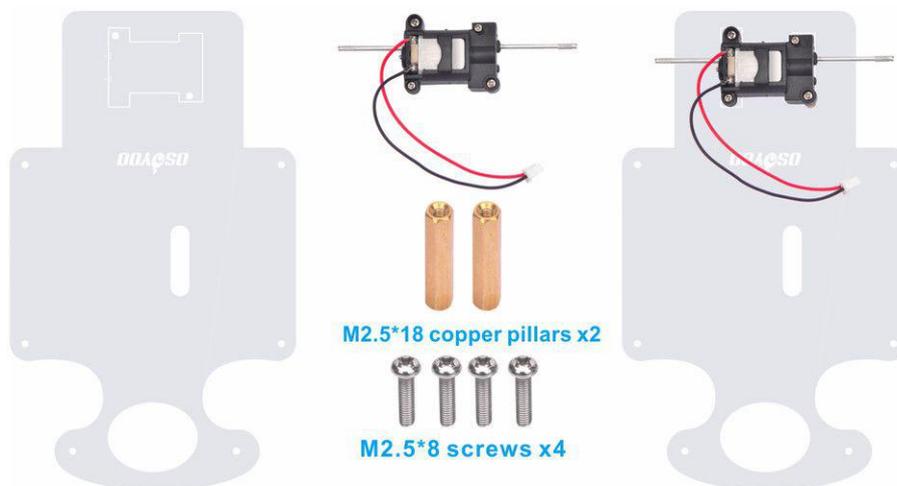
19	3pin 15cm Female to Female Cable		1	Click here to buy
20	Steering cup		2	Click here to buy

Hardware Installation

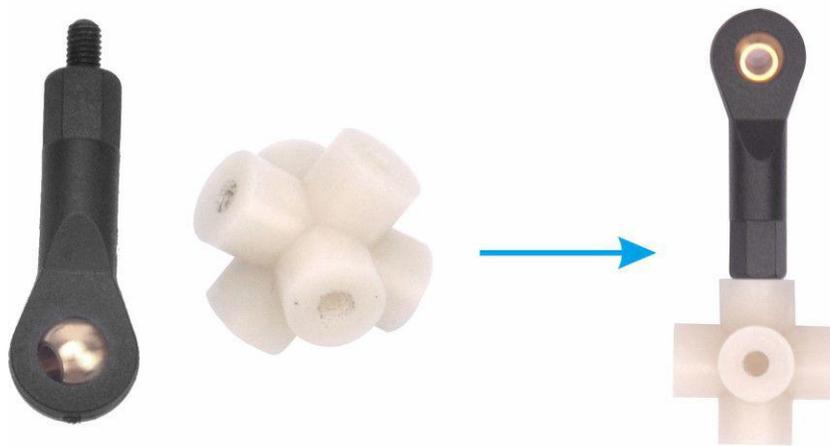
1. Remove the protective film from the chassis.



2. Fix the motor on the lower chassis with 2pcs M2.5*18 copper pillars and 4pcs M2.5*8 screws as follow:



3. Connect steering cup with Rod End Bearing as follow (Attention: Two holes which can be crossed from one side to other side are used to fix wheel, please don't install parts on these two holes) :



4. Install 2pcs Rod End Bearings on the long Acrylic connecting rod as follow:



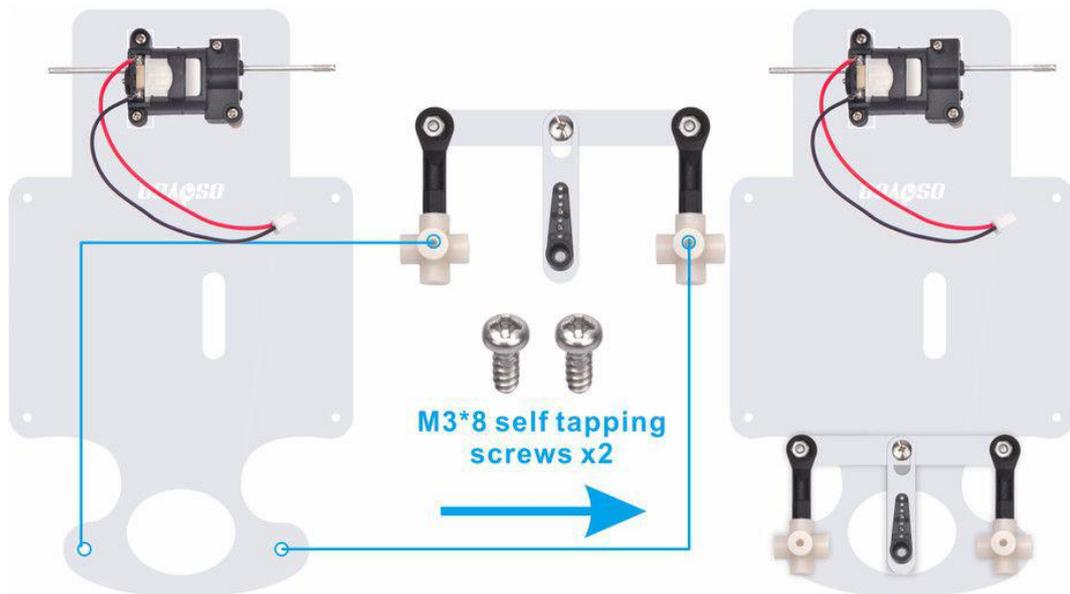
5. Install black servo horn(from the package of orange servo motor) on the short Acrylic connecting rod as follow:



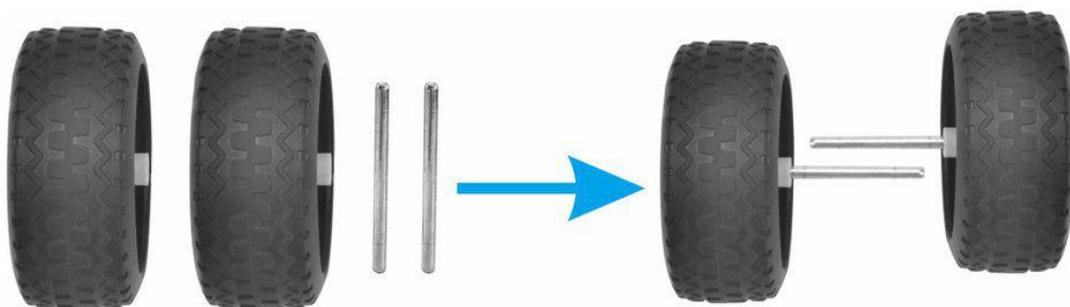
6. Install the short Acrylic connecting rod on the long Acrylic connecting rod with M5*6 metal rivet as follow:



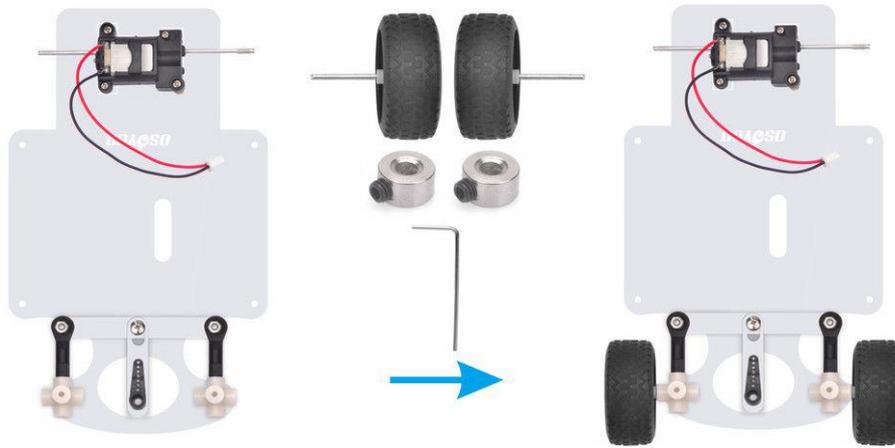
7. Fix the 2pcs steering cup on the lower chassis with 2pcs M3*8 self tapping screws as follow:



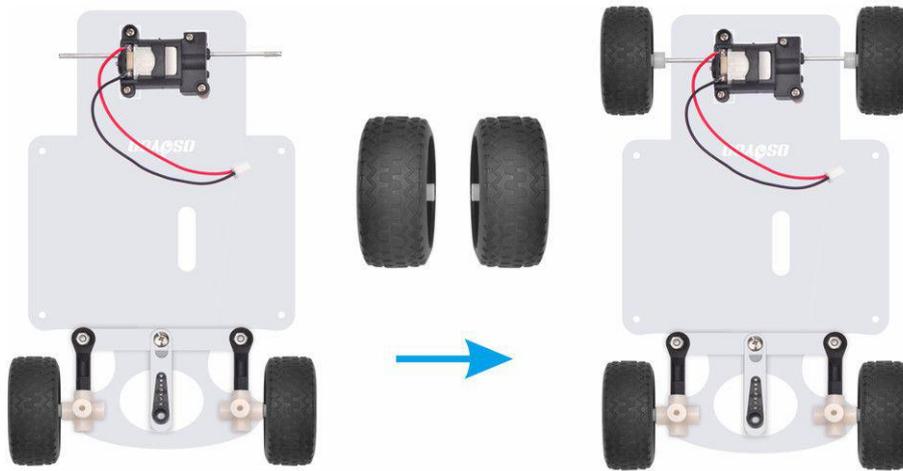
8. Install 2pcs wheels on metal rod as follow:



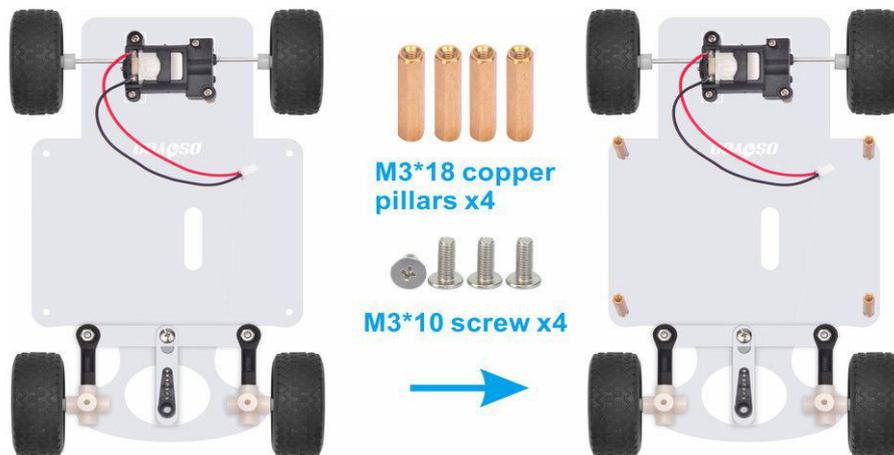
9. Cross 2pcs wheels through steering cup and use L type Wrench to fix these with metal sleeve as follow:



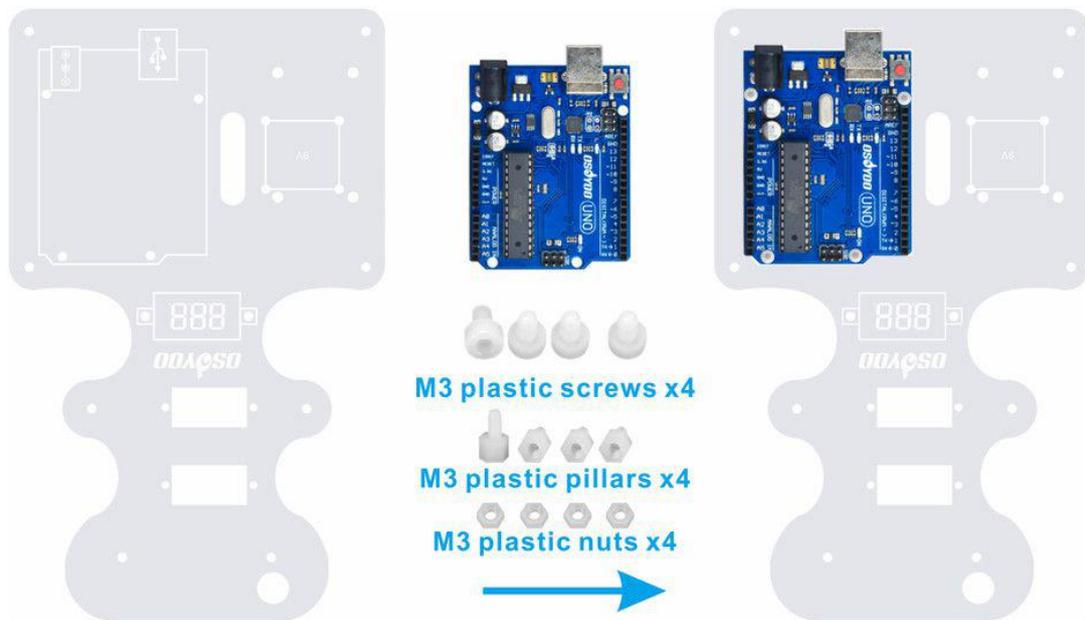
10. Install the other 2pcs wheels on the motor as follow:



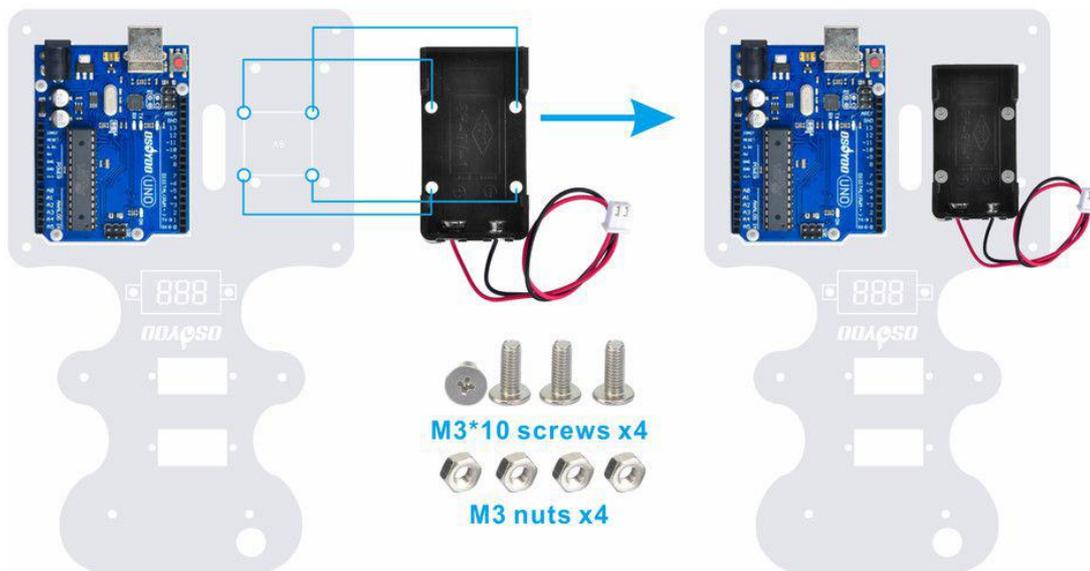
11. Install 4pcs M3*18 copper pillars on the lower car chassis with M3*10 screws as follow:



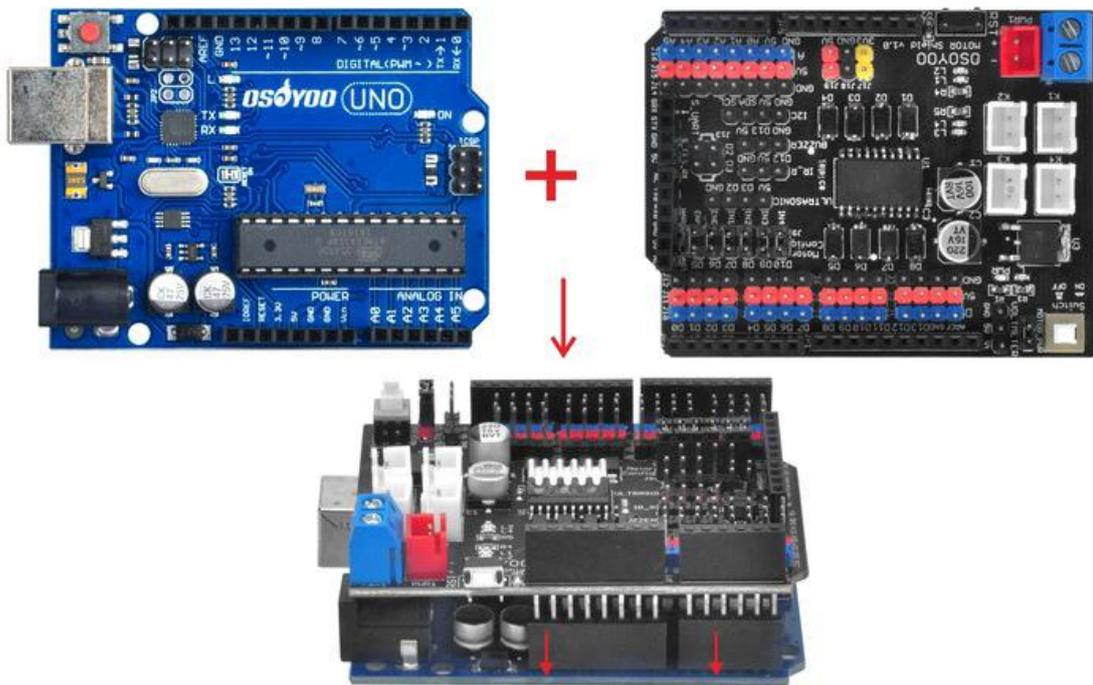
12. Use hex screwdriver to install OSOYOO UNO Board on the upper car chassis with M3 plastic screws, pillars and nuts as follow:



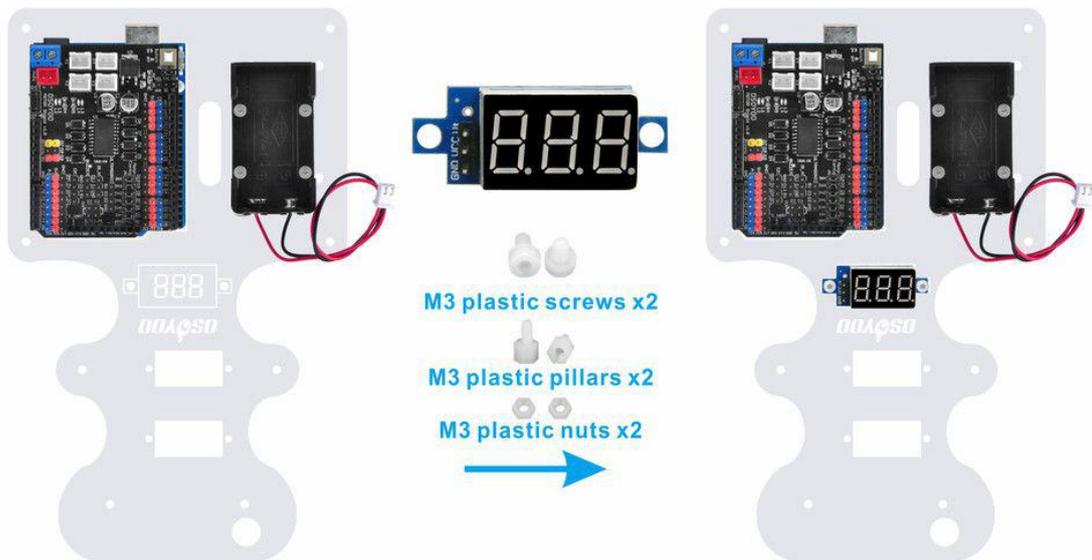
13. Install the 9V battery box on the chassis with M3 Phillips screws and nuts as follow:



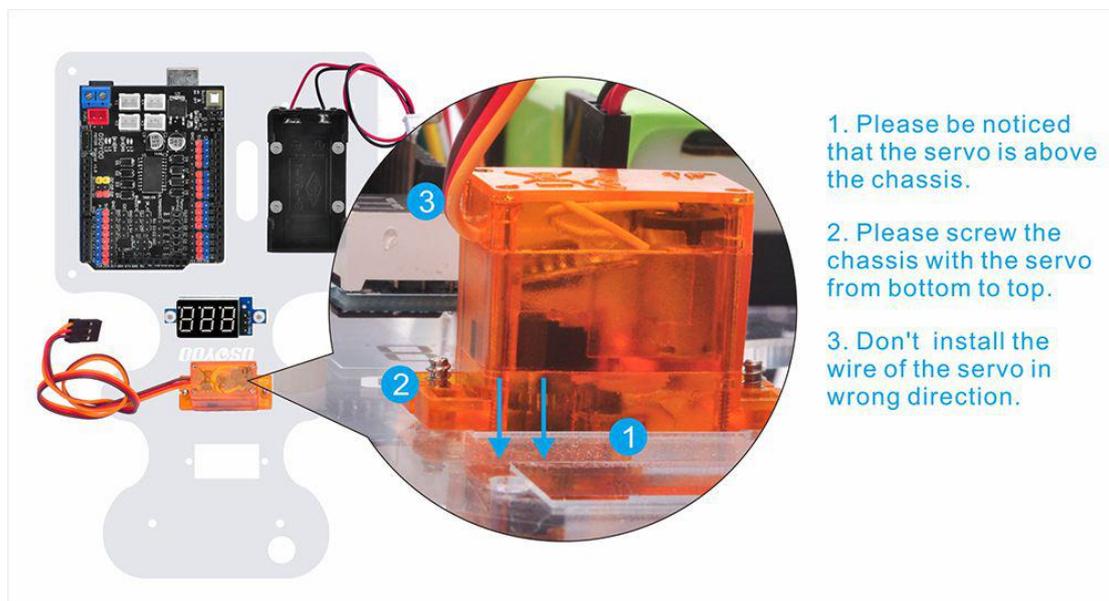
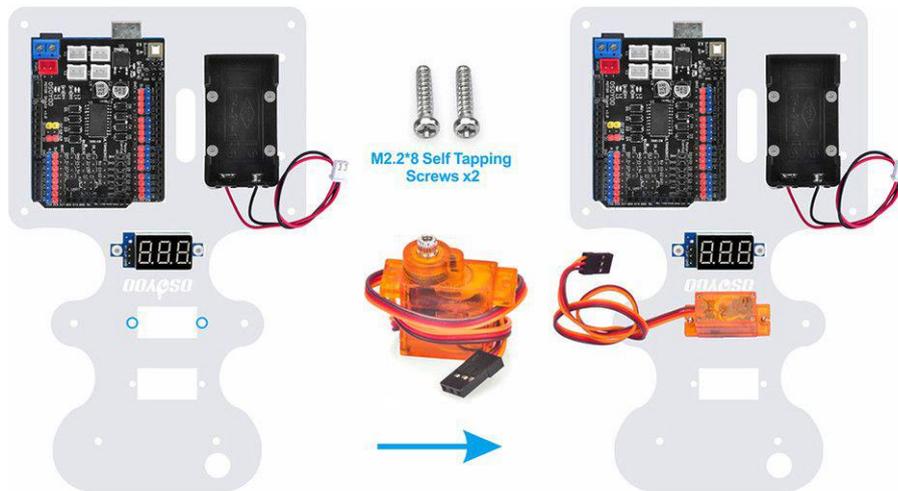
14. Plug the OSOYOO Motor Shield V1.1 Board in OSOYOO UNO board as follow:



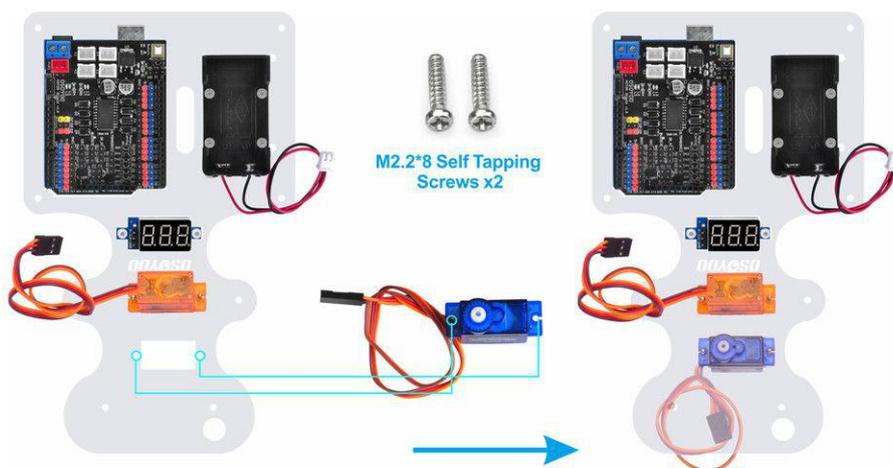
15. Install the voltage meter on the chassis with M3 plastic screws, pillars and nuts as follow:

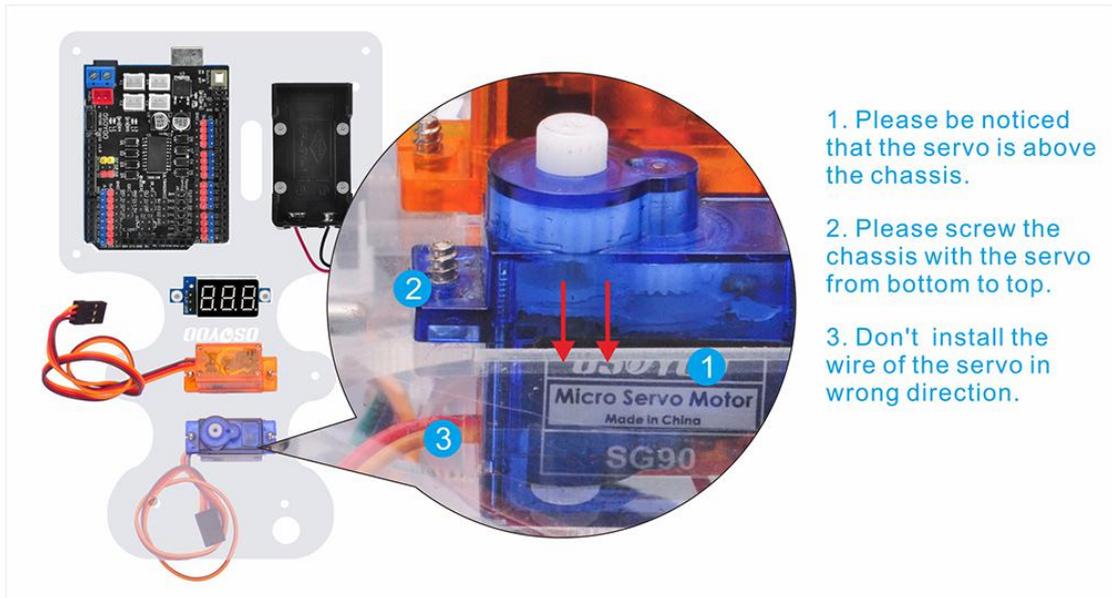


16. Install MG90S servo motor (orange) on the upper car chassis from top to bottom with 2pcs M2.2*8 Self Tapping Screws as follow:

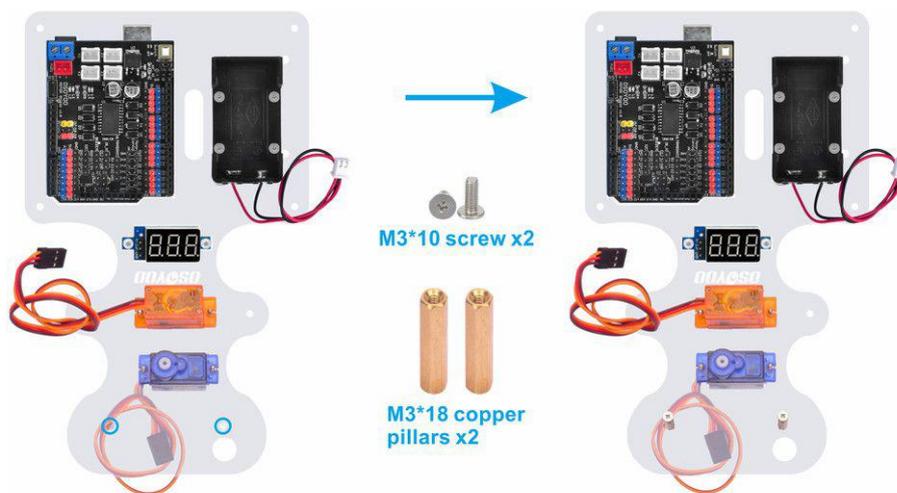


17. Install servo motor (blue) on the upper car chassis from bottom to top with 2pcs M2.2*8 Self Tapping Screws as follow:

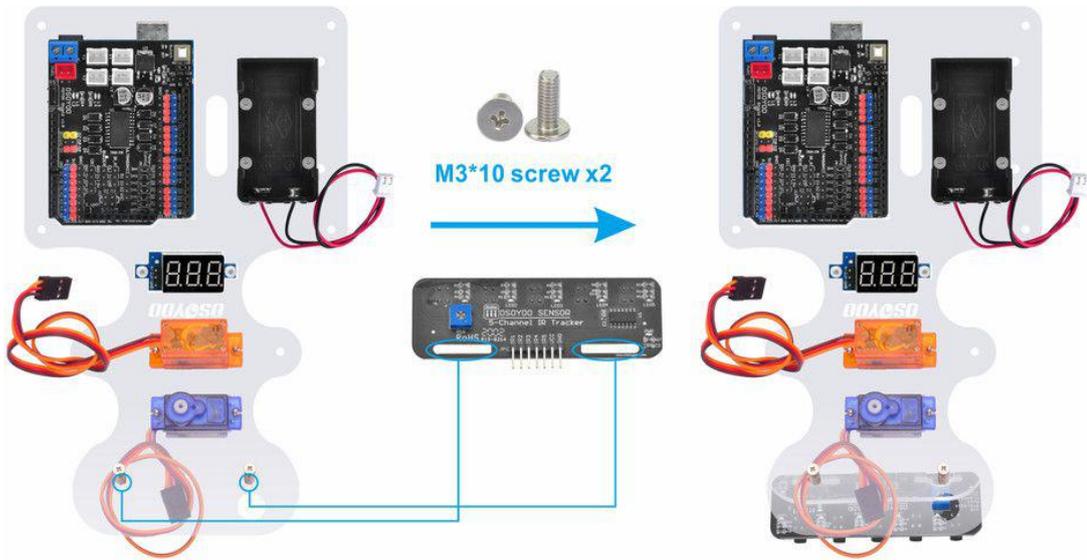




18. Install 2pcs M3*18 copper pillars under the upper car chassis with 2pcs M3*10 screws as follow:



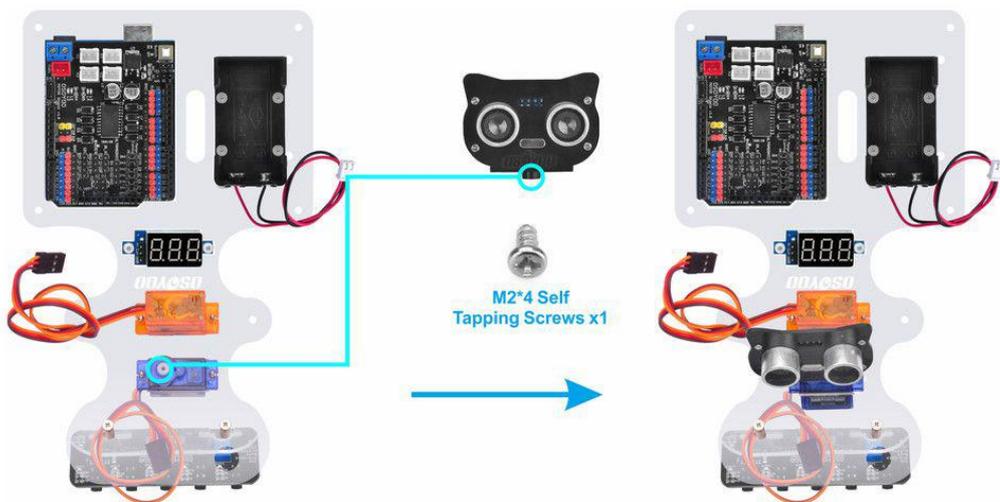
19. Install tracking sensor module under the M3*18 copper pillars with 2pcs M3*10 screws as follow:



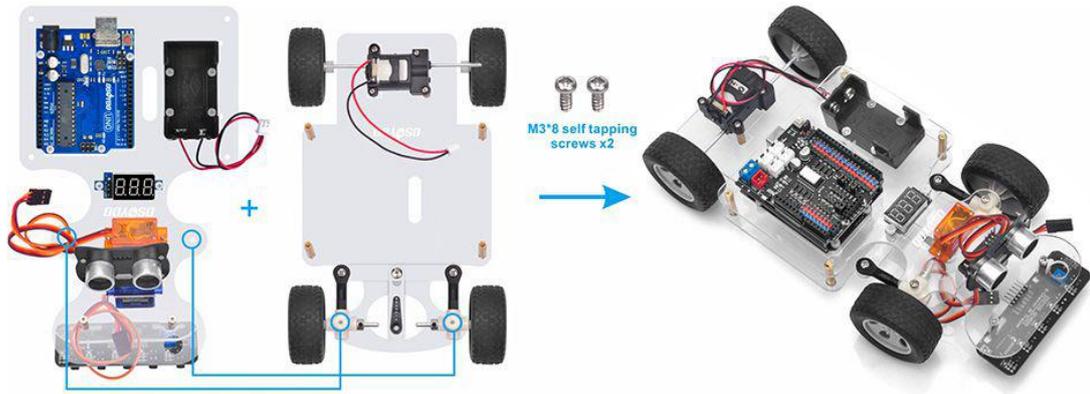
20. Install ultrasonic module to mount holder with 4pcs M1.5*8 screw and M1.5 nuts as follow:



21. Install mount holder for Ultrasonic Module on servo motor with M2*4 Self Tapping screw as follow:



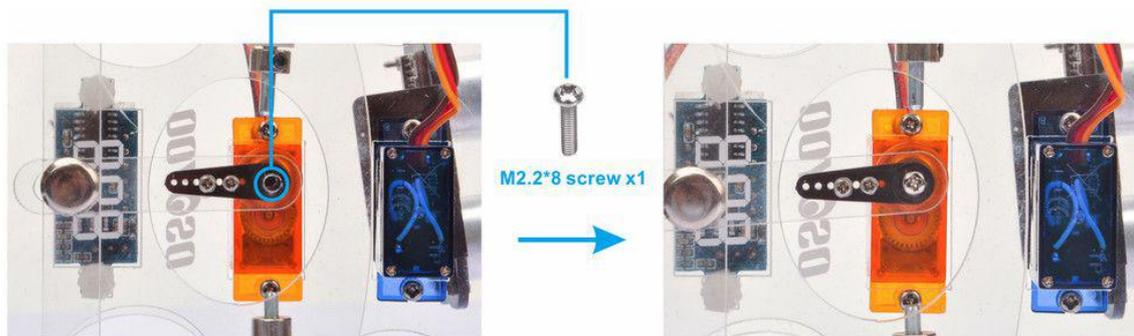
22. Fix steering cup under upper car chassis with 2pcs M3*8 self tapping screws as follow:



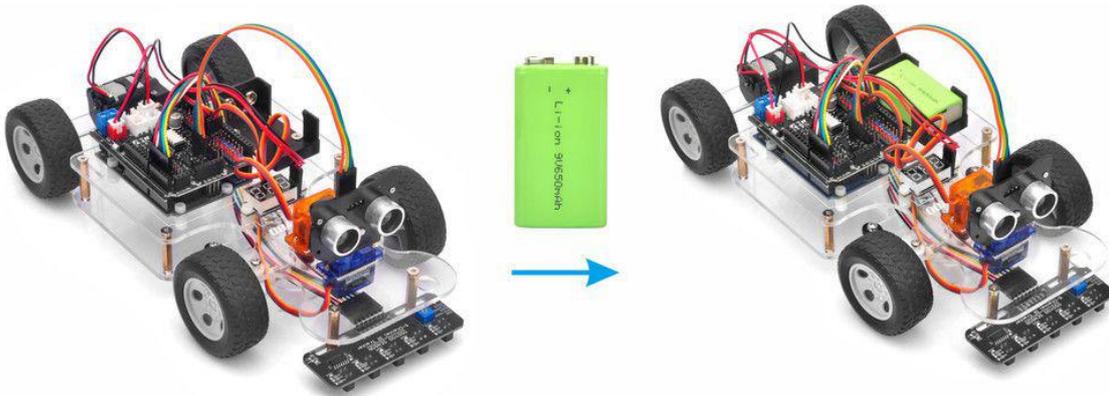
23. Fix upper car chassis and lower car chassis with 4pcs M3*10 screws as follow:



24. Fix MG90S servo motor (orange) on black servo horn with 1pc M2.2*8 Self Tapping Screws as follow:



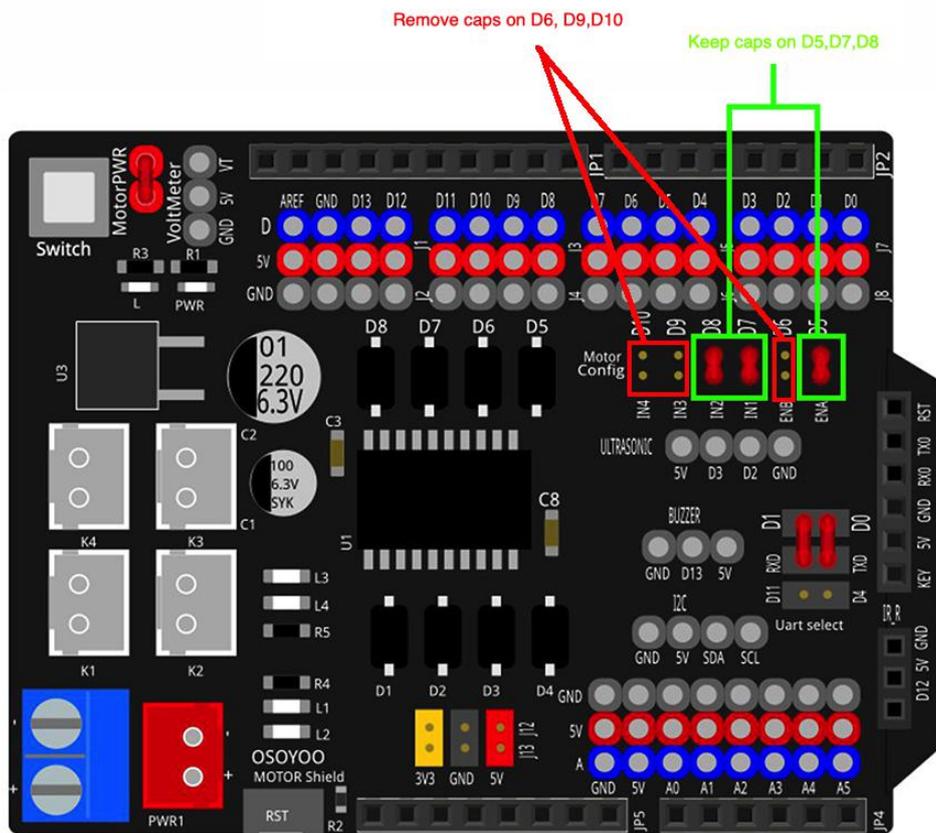
24. Install 9V battery as follow:



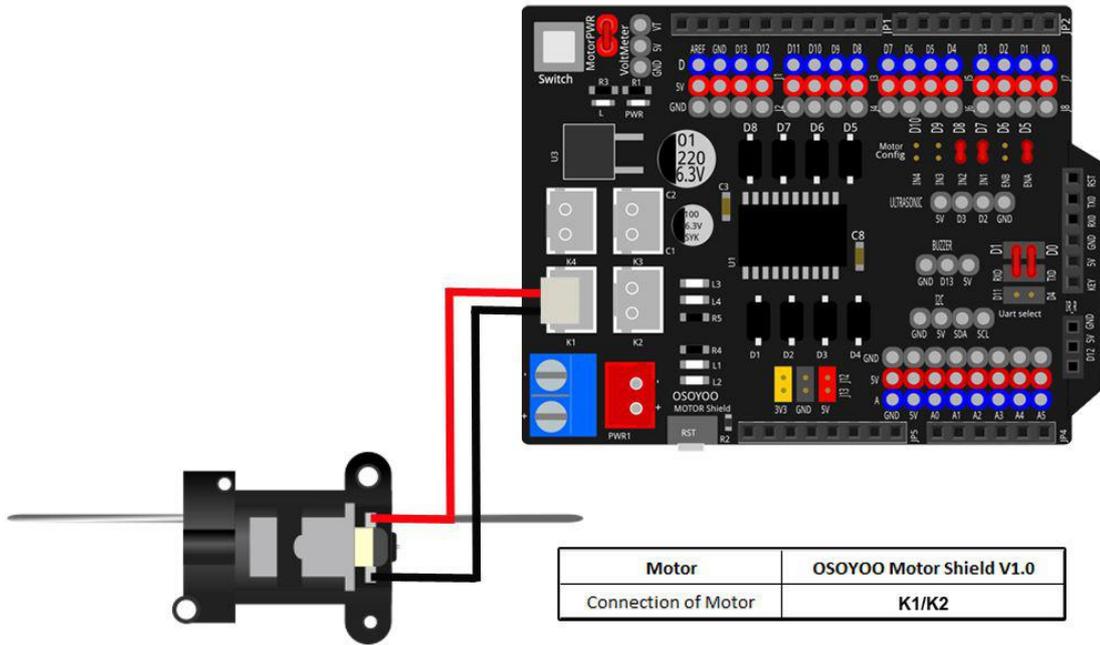
Connection

1) Remove jumper caps on **ENB-D6**, **IN3-D9**, **IN4-D10**

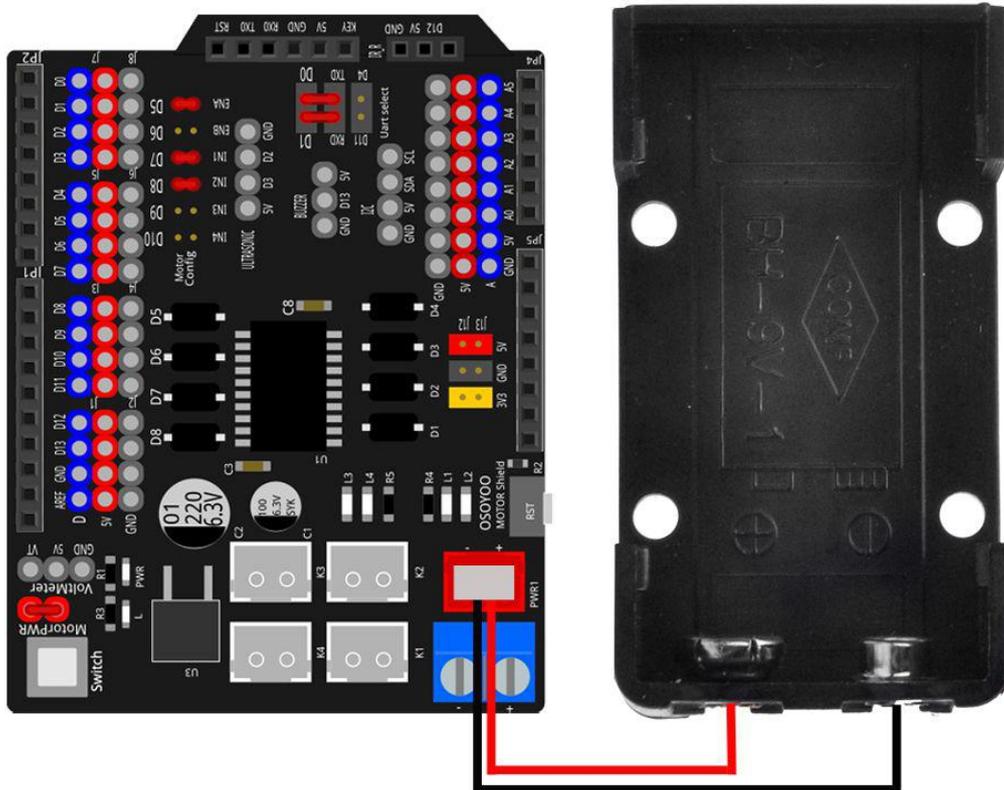
Note: More detail about OSOYOO Motor Shield V1.0 please refer to this link: <https://osoyoo.com/2020/08/06/osoyoo-motor-shield/>



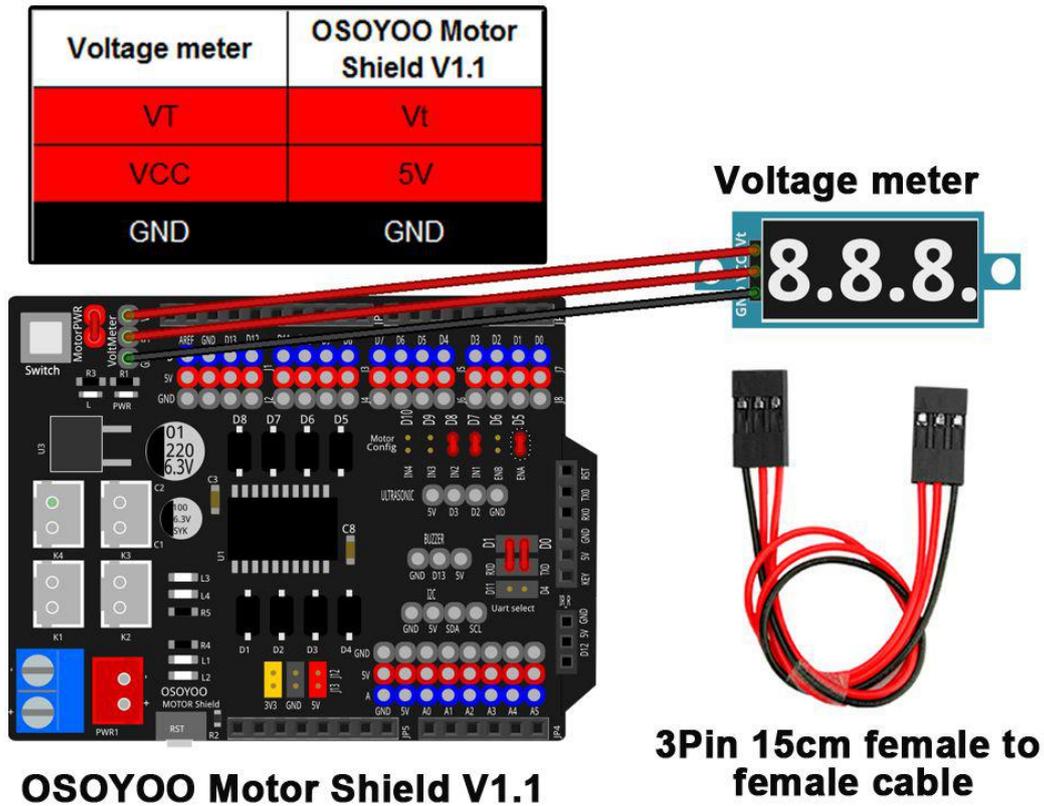
2) Connect the motor to K1 or K2 of OSOYOO Motor Shield V1.1:



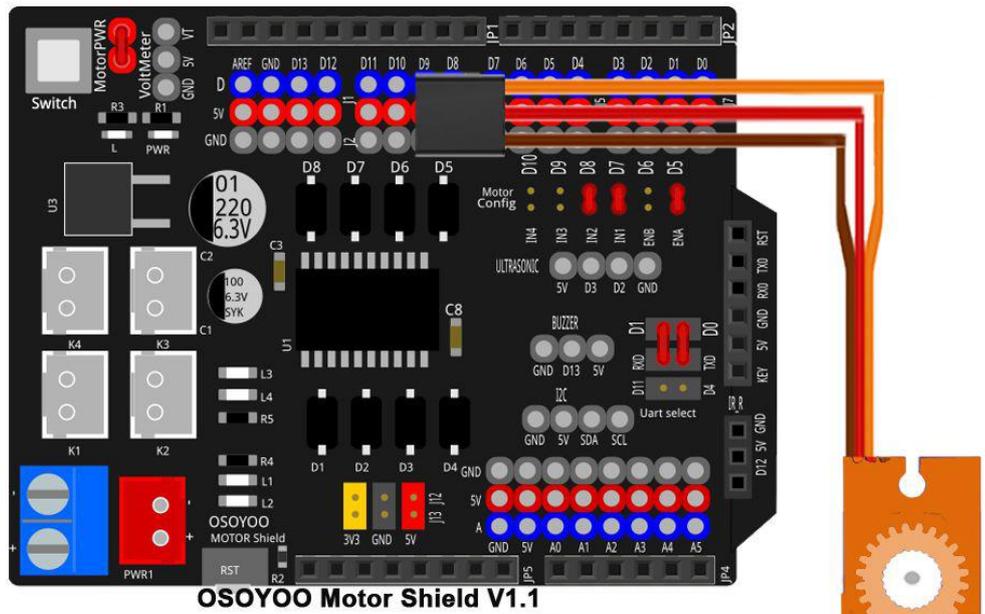
3) Connect the battery box to OSOYOO Motor Shield V1.1 as follow:



4) Connect the voltage meter to OSOYOO Motor Shield V1.1 as follow:

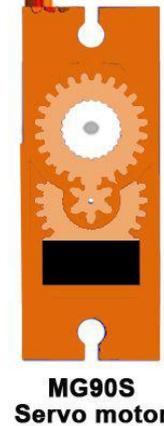
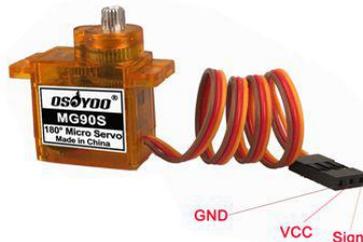


5) Connect the MG90S motor servo (orange) to D9 of OSOYOO Motor Shield V1.1 as follow:

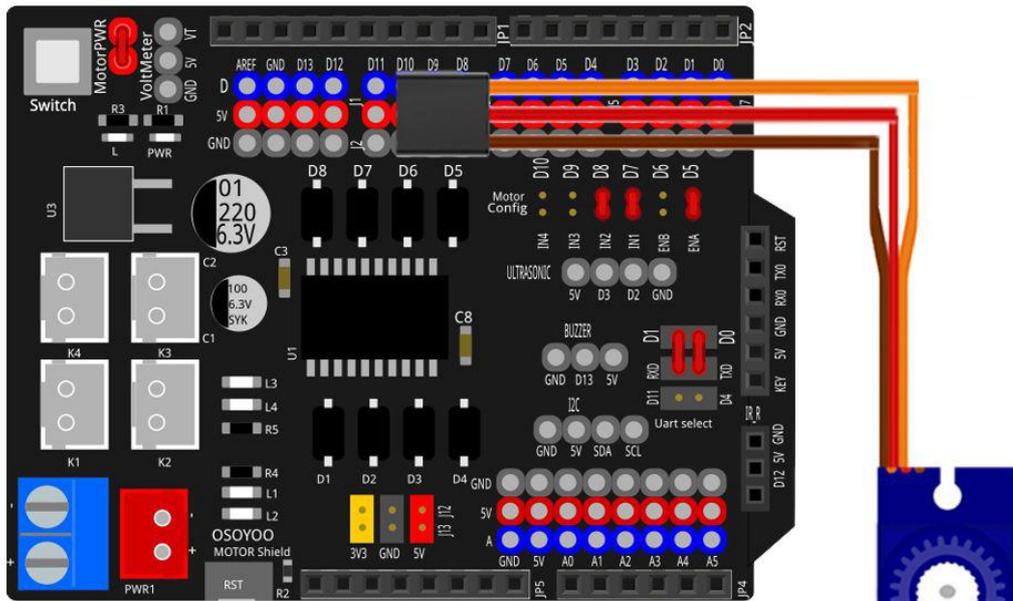


OSOYOO Motor Shield V1.1

OSOYOO Motor Shield V1.1	MG90S servo motor
D9	Orange
5V	Red
GND	Brown



6) Connect the servo motor (blue) to D10 of OSOYOO Motor Shield V1.1 as follow:



OSOYOO Motor Shield V1.1

OSOYOO Motor Shield V1.1	Servo motor
D10	S
5V	V
GND	G

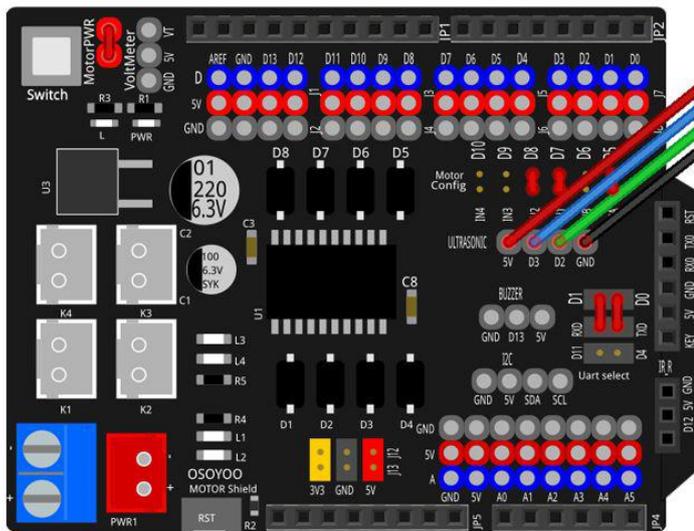
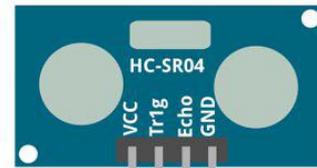


Servo motor

7) Connect the ultrasonic sensor to OSOYOO Motor Shield V1.1 as follow:

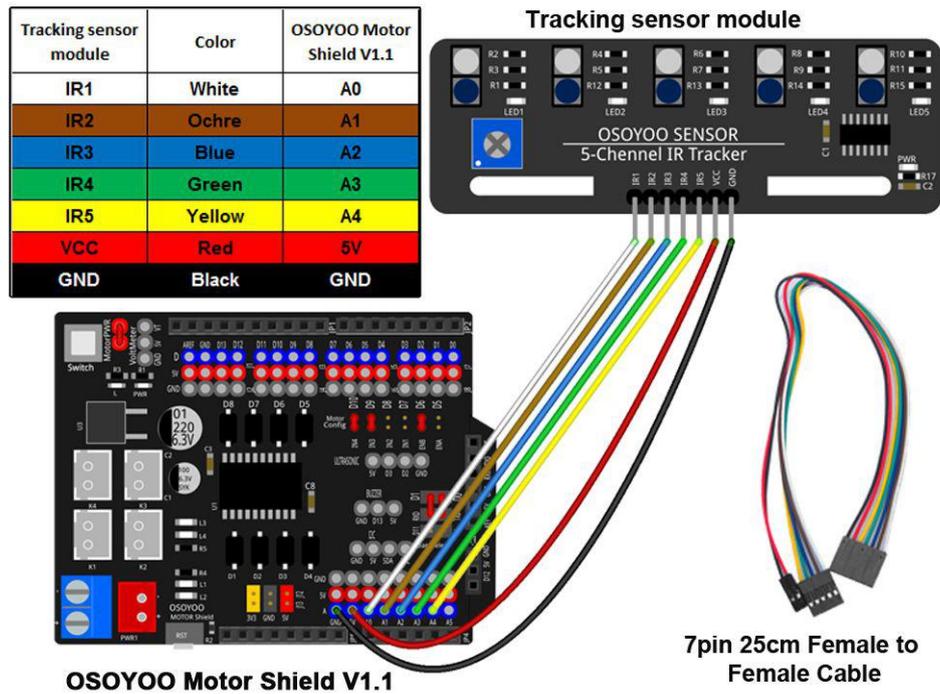
OSOYOO Motor Shield V1.1	Ultrasonic Module
5V	VCC
D3	Trig
D2	Echo
GND	GND

Ultrasonic Module



OSOYOO Motor Shield V1.1

8) Connect the tracking sensor module to OSOYOO Motor Shield V1.1 as follow:



Software Installation

Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/

1. Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step). Download Arduino IDE from <https://www.arduino.cc/en/Main/Software?setlang=en>, then install the software.

Download the Arduino IDE



ARDUINO 1.8.5
The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board. Refer to the Getting Started page for installation instructions.

Windows installer
Windows ZIP file for non-admin install
Windows app [Get](#)

Mac OS X 10.7 Lion or newer

Linux 32 bits
Linux 64 bits
Linux ARM

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

2. Install a zip utility to unzip the code file, such as 7 zip



7 ZIP

Home
[7z Format](#)
[LZMA SDK](#)
[Download](#)
[FAQ](#)
[Support](#)
[Links](#)

English
[Chinese Simpl.](#)
[Chinese Trad.](#)
[Esperanto](#)
[French](#)
[German](#)
[Indonesian](#)
[Japanese](#)
[Portuguese Brazil](#)
[Spanish](#)
[Thai](#)
[Vietnamese](#)

7-Zip is a file archiver with a high compression ratio.

Download 7-Zip 19.00 (2019-02-21) for Windows:

Link	Type	Windows	Size
Download	.exe	32-bit x86	1.2 MB
Download	.exe	64-bit x64	1.4 MB

Download 7-Zip 21.02 alpha (2021-05-06) for Windows:

Link	Type	Windows	Size
Download	.exe	32-bit x86	1.2 MB
Download	.exe	64-bit x64	1.4 MB

Download 7-Zip 21.00 alpha for Windows ARM64:

Download	.exe	64-bit ARM64	1.5 MB
--------------------------	------	--------------	--------

Steering Servo Alignment:

Before you run the sample sketch code, please test the steering servo direction firstly.

If you upload the sketch unsuccessfully, please install servo library into Arduino IDE. Please download the servo library from:

https://osoyoo.com/picture/Arduino_Sport_Car/lesson1/Servo.zip , then import the library into Arduino IDE (Open Arduino IDE-> click Sketch->Include Library->Add .Zip Library)

Step 1. Please download and running following sketch code:

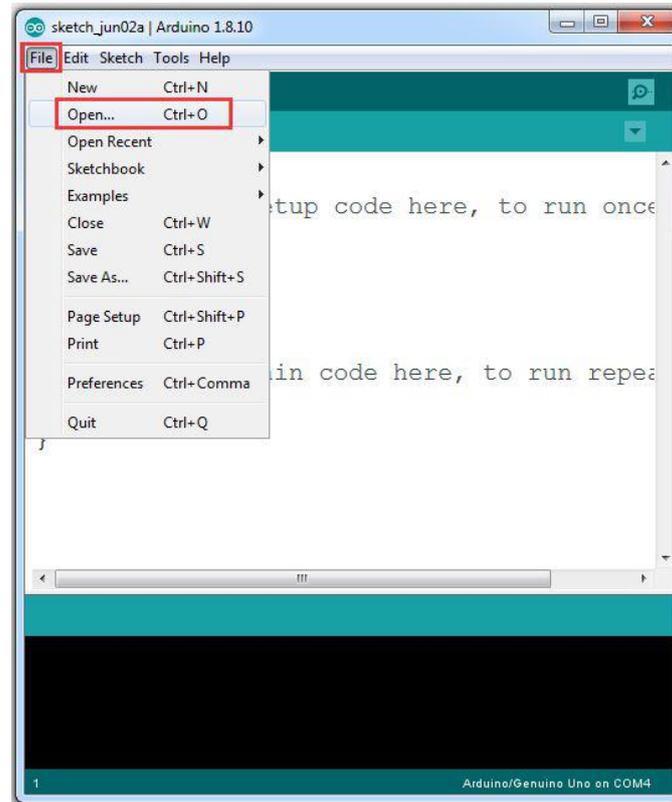
<https://osoyoo.com/driver/sg90car/steering.zip>

Step 2. Unzip this file, you will see a folder named **steering**, enter this folder,

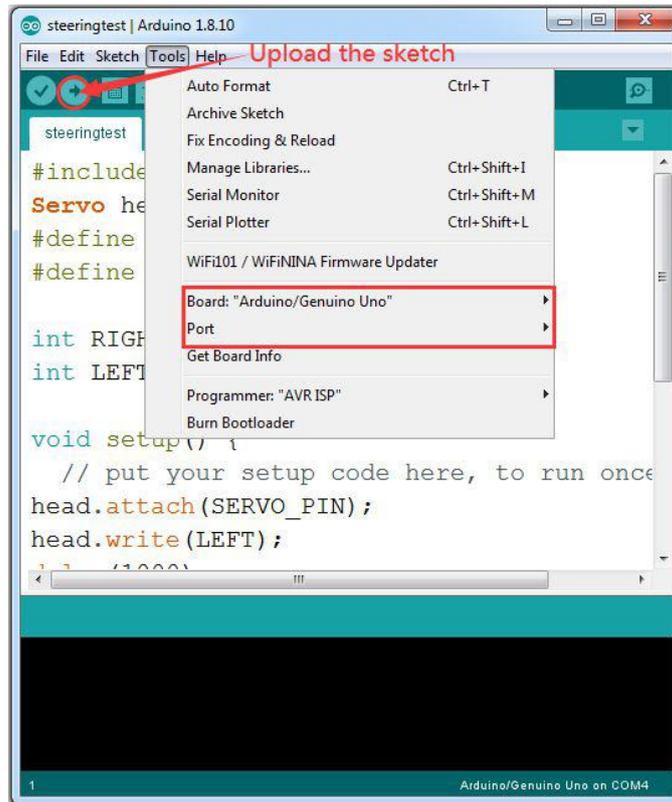
you will find a **steering.ino** file.

Step 3. Connect UNO R3 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "**steering.ino**" in **steering** folder, load the code into Arduino

Notice: Shut off your battery or Unplug your power adapter when upload sketch code to Arduino.

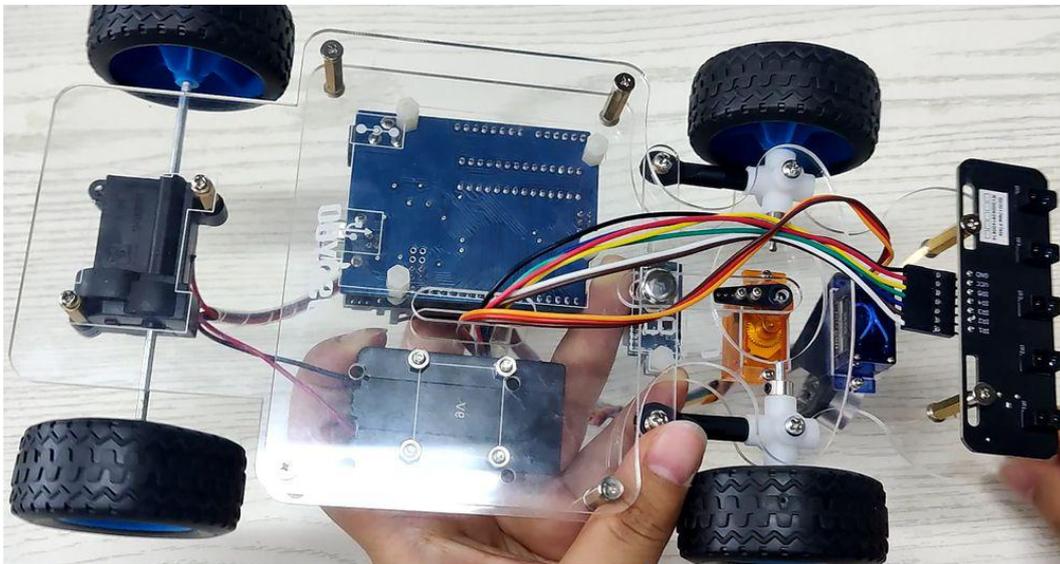


Step 4. Choose corresponding board/port for your project, upload the sketch to the board.



Step 5. If your steering servo does not facing face to center front direction, then you have two options:

Option 1) Use a screw driver to release the steer arm from servo, re-align the wheel direction manually and then fasten the arm onto servo again.



Option 2) you can change the default value of **line 4**

#define FRONT 90

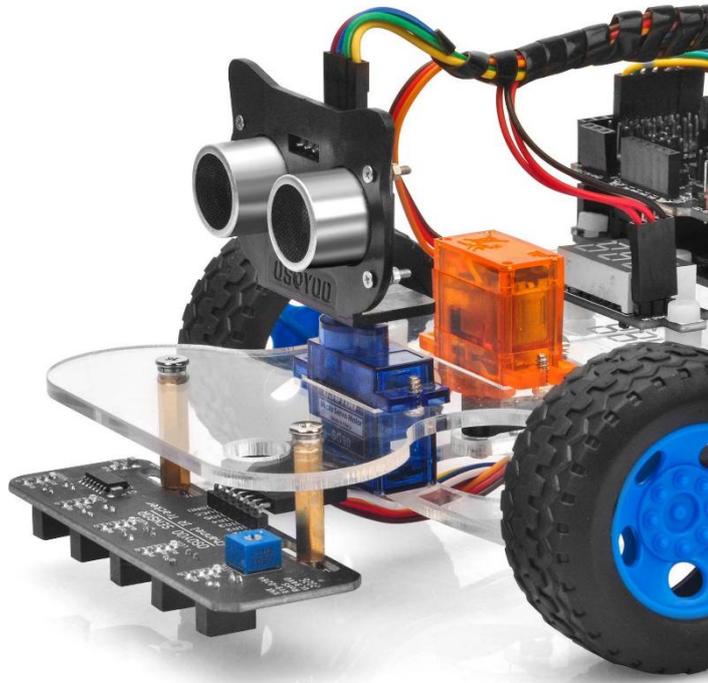
If your steering wheels tends to left, increase the value from 90 to 95, 100, 105 ...

if your steering wheels tends to right, decrease the value from 90 to 85, 80,

75 ...

Run the sketch again until your steering wheels finally faces to front.

Then write down the FRONT value, we will use this value to change the lesson2, 3, 4, 5, 6 sketch code and make steering servo always facing front at default FRONT value.



OSOYOO Sport Car for Arduino Lesson 2: Basic Movement

Objective

In this tutorial, we will use Osoyoo Sport Car for Arduino to do some simple movements. Once the car installation is completed, it is very important to test the installation and sample code. If you have passed the test movement of this lesson, it means Arduino, motor control module, motors, batteries, chassis and wire connections between these parts are all functioning well.

If you don't complete the frame of car, please review lesson 1.

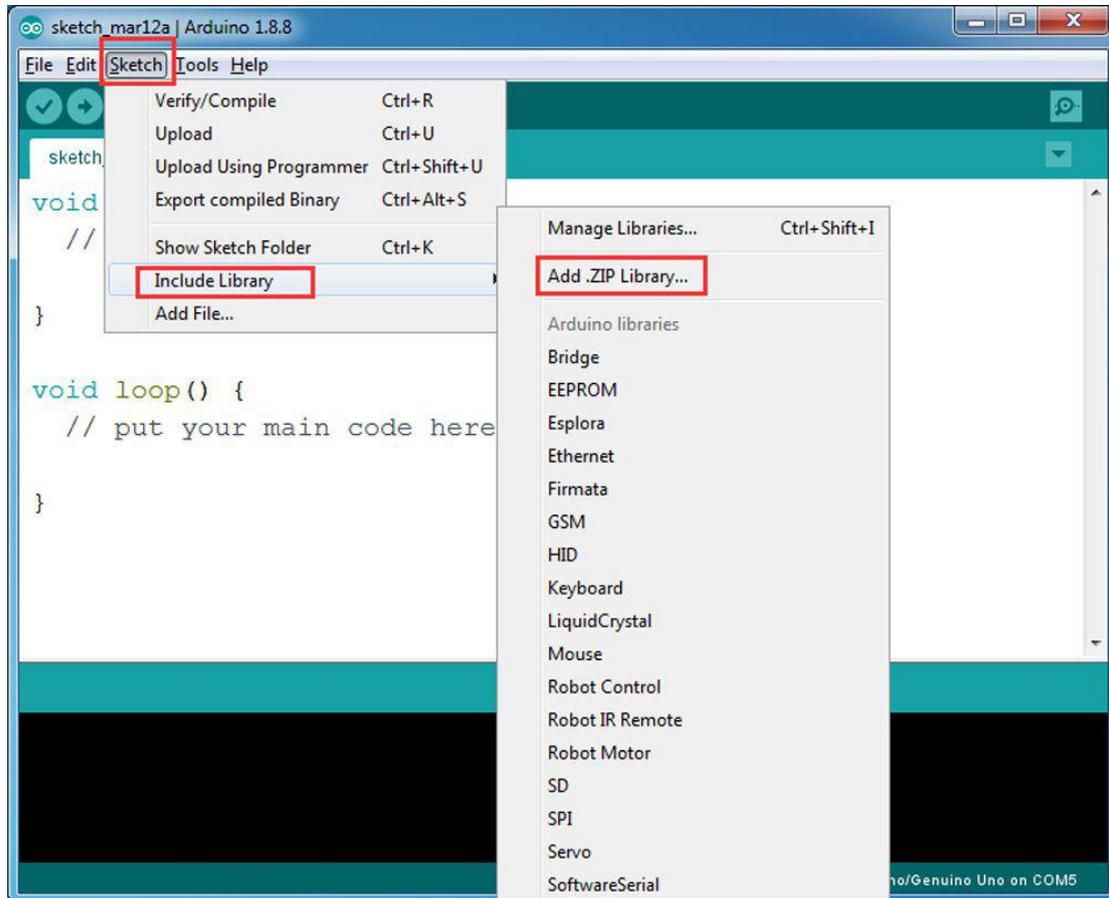
Please enter the link to watch the video: <https://youtu.be/dS-NAC0Nggc>.



Software Installation

Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/

Step 1: Download PWM Servo library zip file from <https://osoyoo.com/driver/sg90car/PWMServo.zip> , then import the library into Arduino IDE(Open Arduino IDE-> click Sketch->Include Library->Add .Zip Library).

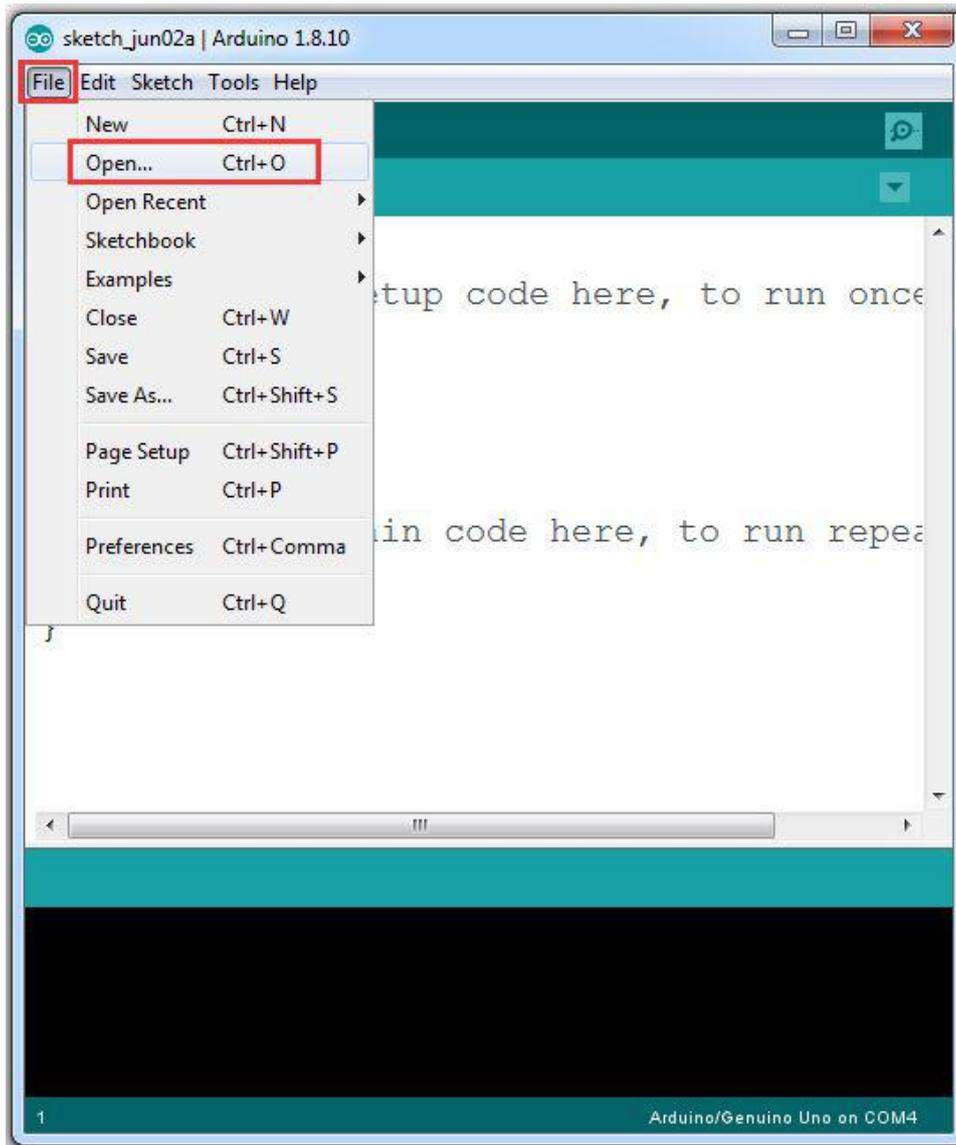


You will see a pop-up windows , now you can go to your download folder and select PWM Servo.zip file and upload this file to Arduino library.

Step 2: Download [Lesson 2 sample code](https://osoyoo.com/driver/sg90car/sg90car-lesson2b.zip) from <https://osoyoo.com/driver/sg90car/sg90car-lesson2b.zip>, unzip the download zip file, you will see a folder called sg90car-lesson2.

Step 3: Connect UNO R3 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "sg90car-lesson2b.ino" in sg90car-lesson2b folder, load the code into Arduino.

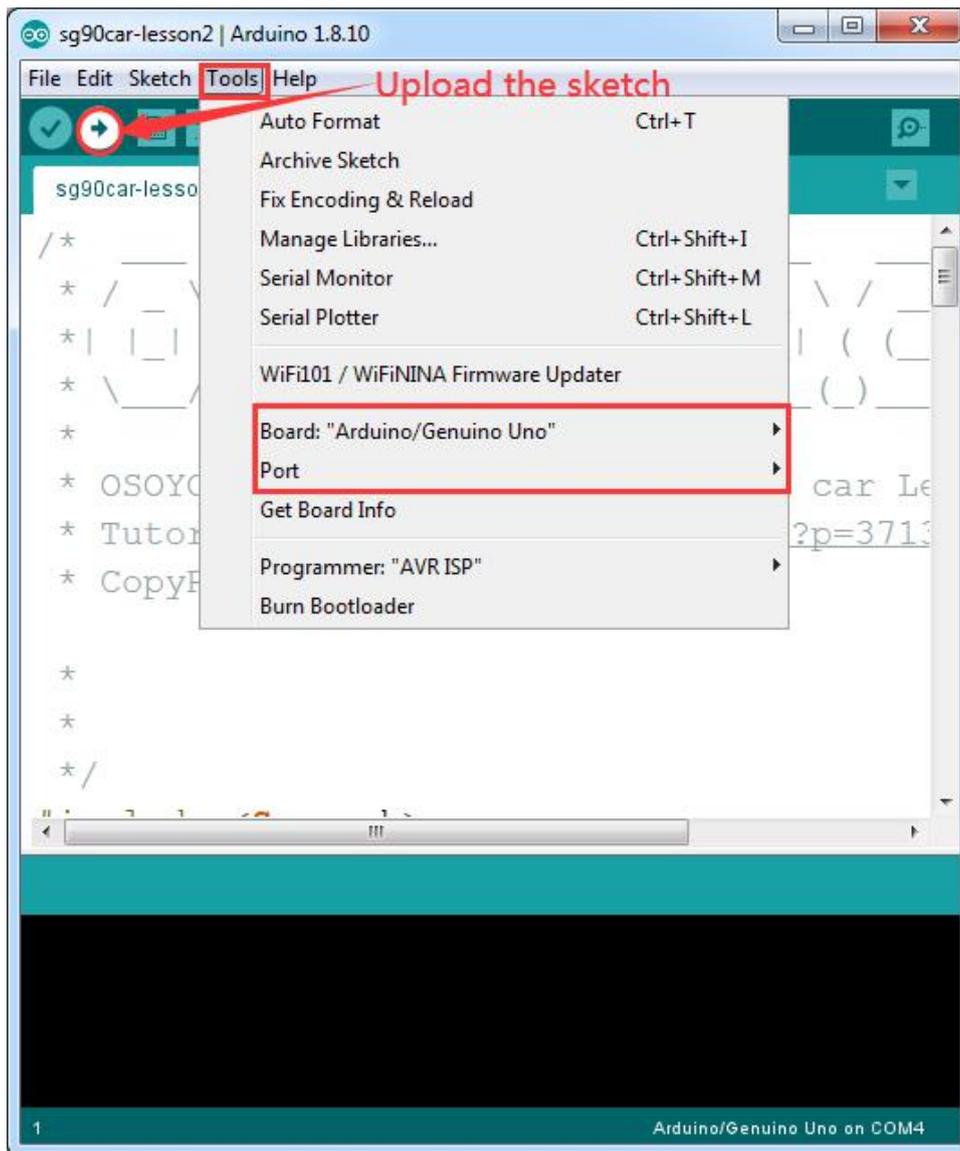
Notice: Shut off your battery or Unplug your power adapter when upload sketch code to Arduino.



Step 4: Please change the default value 90 in line 19 as the FRONT value in [lesson 1](#). If you align the wheel direction manually as [the option 1 in Step 5 of lesson1](#), please skip this step.

```
#define FRONT 90 // steering to front
```

Step 5: Choose corresponding board/port for your project, upload the sketch to the board.



Final testing

1. Disconnect Arduino from PC and confirm that the power switch of the OSOYOO Motor Shield V1.1 is off, then put a 9V battery into battery box.
(Note: make sure polar direction is correct, otherwise it can destroy your device and cause fire hazard).

2. Put the car on the ground, turn on the switch of OSOYOO Motor Shield V1.1, the car should go forward, backward, left turn, right turn, go backward, back to right, back to left, then stop.

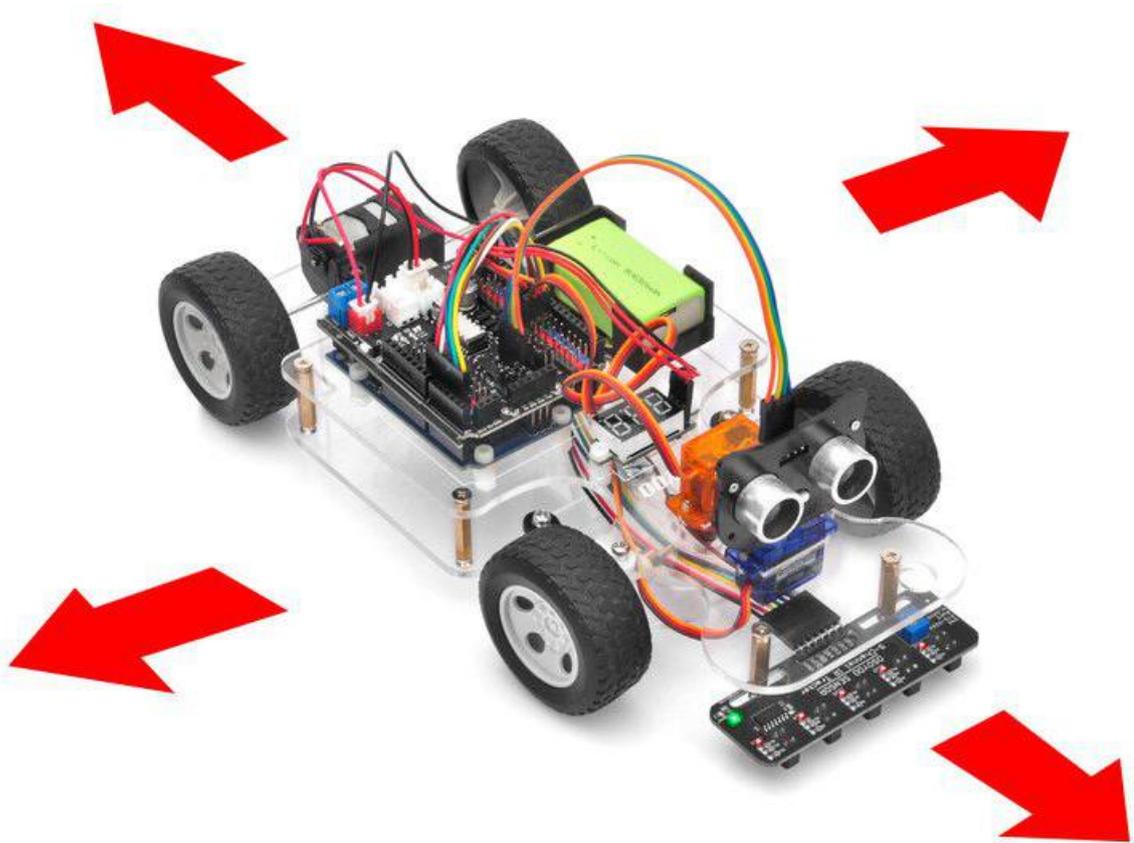
Note: If the car does not move as per above mentioned result, you should check your wire connection, jumper caps on OSOYOO Motor Shield V1.1, battery voltage (must over 7.2v).

3. If you want to change the angel of the right or left, please edit the line 20 and 21 of the code and upload the sketch again: **(Note: the angel can't be set more than 35)**

```
int SHARP_RIGHT=FRONT+33;  
int SHARP_LEFT=FRONT-33;
```

4. If you want to change the speed of the car, please revise the following code of the sketch (**Note: the max value is 255**)

```
#define SPEED 190  
#define HI_SPEED 220
```



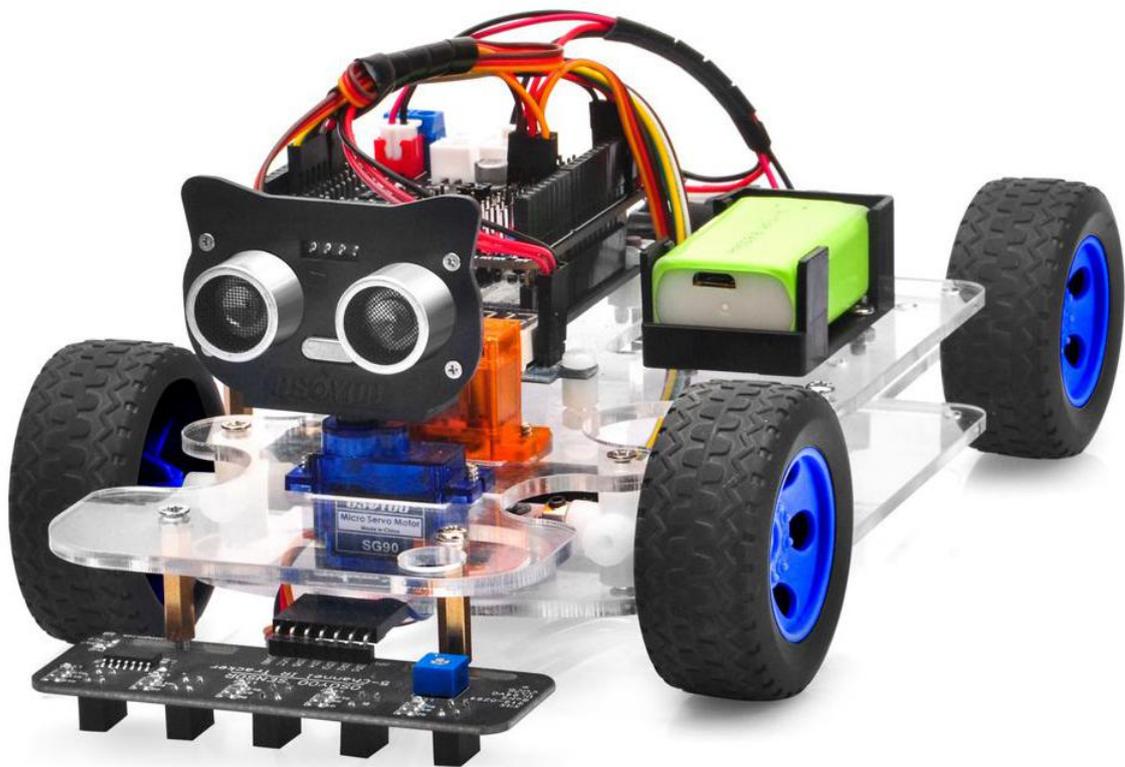
OSOYOO Sport Car for Arduino Lesson 3: Line Tracking

Objective

In this tutorial, we will use 5-line tracking sensor to guide OSOYOO Sport Car for Arduino to move along the black track line in the white ground automatically.

If you don't complete the frame of car, please review lesson 1

Please enter the link to watch the video: <https://youtu.be/E27bMqSlcts>



Software installation

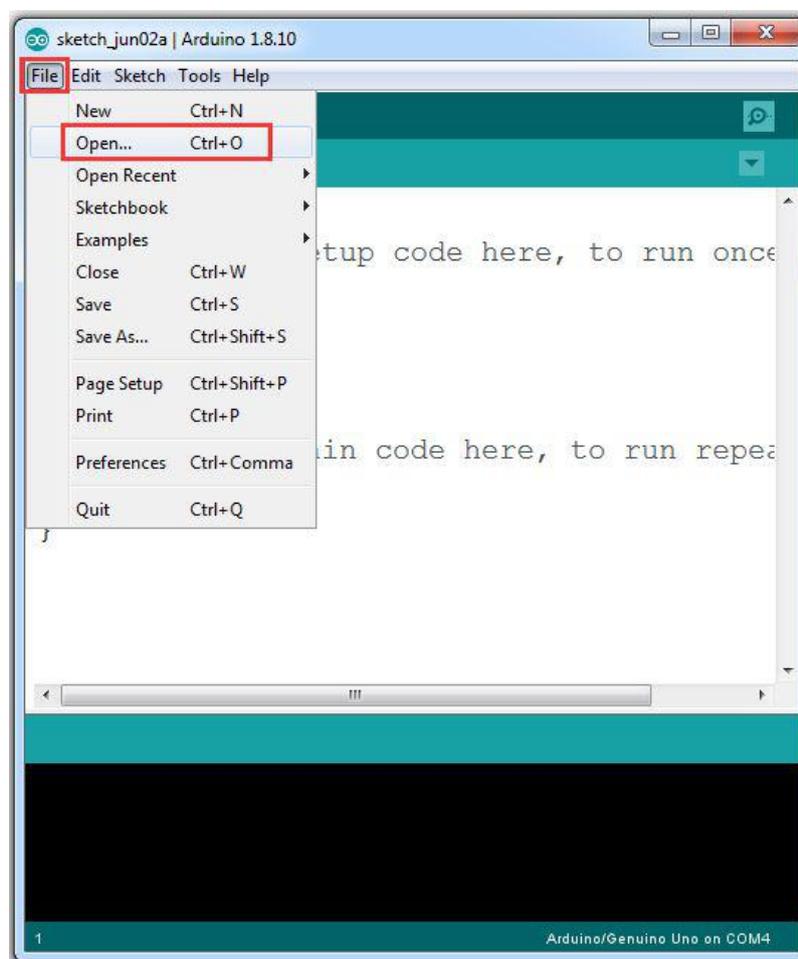
Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/

Step 1: Please download PWM Servo library from <https://osoyoo.com/driver/sg90car/PWMServo.zip>, then import the library into Arduino IDE. If you completed lesson 2, please skip this step.

Step 2: Download [Lesson 3 sample code](https://osoyoo.com/driver/sg90car/sg90car-lesson3b.zip) from <https://osoyoo.com/driver/sg90car/sg90car-lesson3b.zip>, unzip the download zip file sg90car-lesson3.zip, you will see a folder called sg90car-lesson3b.

Step 3: Connect UNO R3 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "sg90car-lesson3b.ino" in sg90car-lesson3b folder, load the code into Arduino.

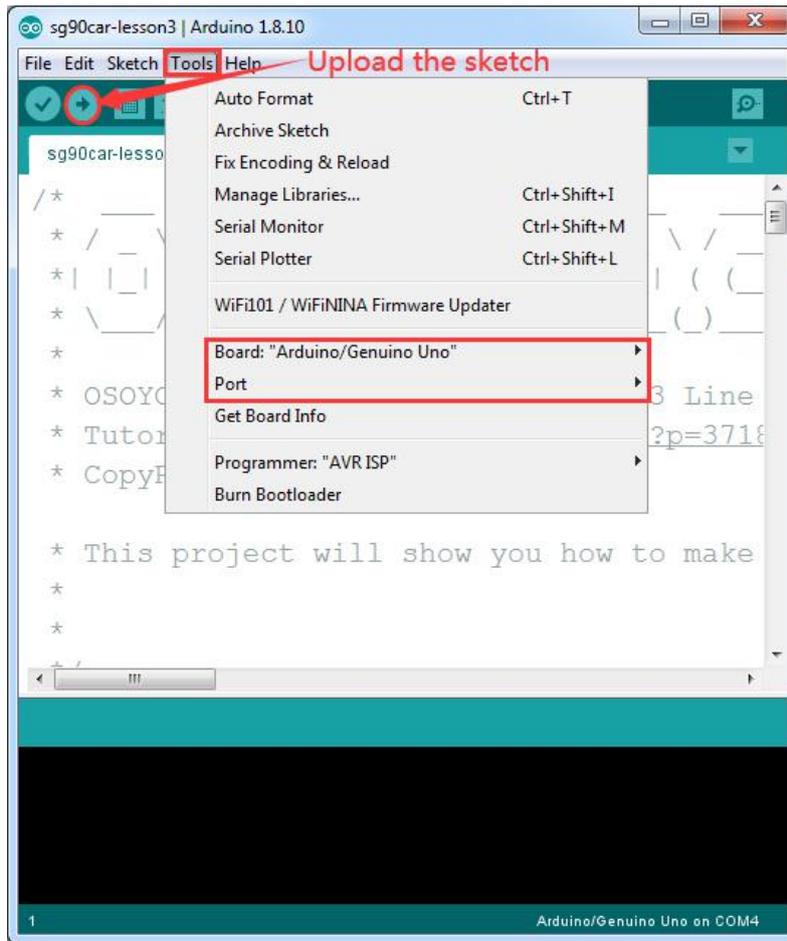
Notice: Shut off your battery or Unplug your power adapter when upload sketch code to Arduino.



Step 4: Please change the default value 90 in line 22 as the FRONT value in [lesson 1](#). If you align the wheel direction manually as [the option 1 in Step 5 of lesson1](#), please skip this step.

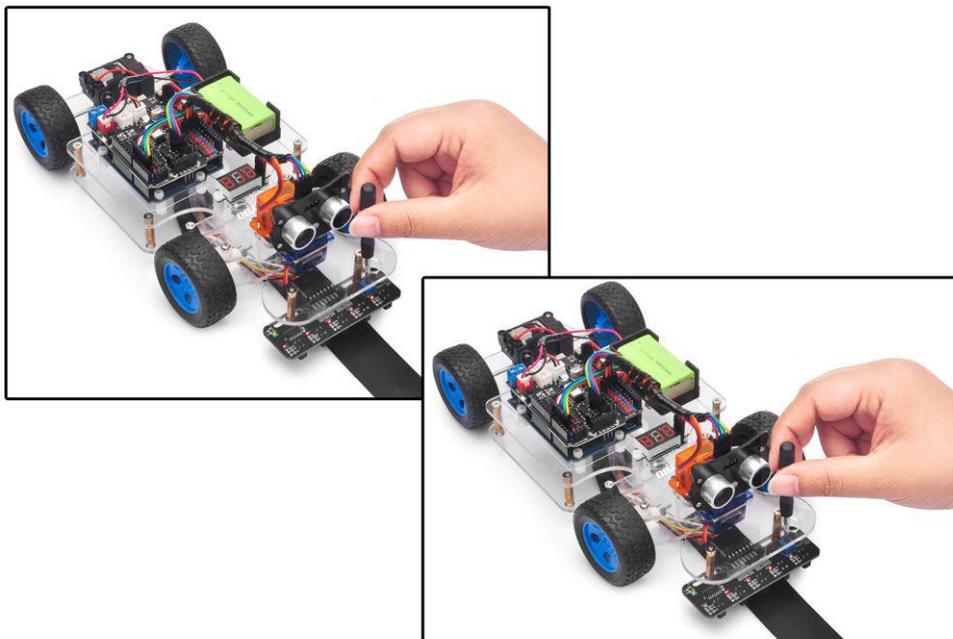
```
#define FRONT 90 // steering to front
```

Step 5: Choose corresponding board/port for your project, upload the sketch to the board.



Adjust the sensitivity of tracking sensor modules

Turn on and hold the car and adjust the potentiometer on the tracking sensor with cross screwdriver until you get the best sensitivity status: the signal indicate LED light will turn off when sensor is above white ground, and the signal LED will turn on when the sensor is above black track



Final testing

1. Prepare a black track (the width of the black track is more than 20mm and less than 30mm) in white ground. Please note, the bend angle of track can't be larger than 30 degree. If the angle is too large, the car will move out of the track.

2. Disconnect Arduino from PC and confirm that the power switch of the OSOYOO Motor Shield V1.1 is off, then put a 9V battery into battery box.

3. Put the car on the track, turn on the switch of OSOYOO Motor Shield V1.1, the car will move along the black track.

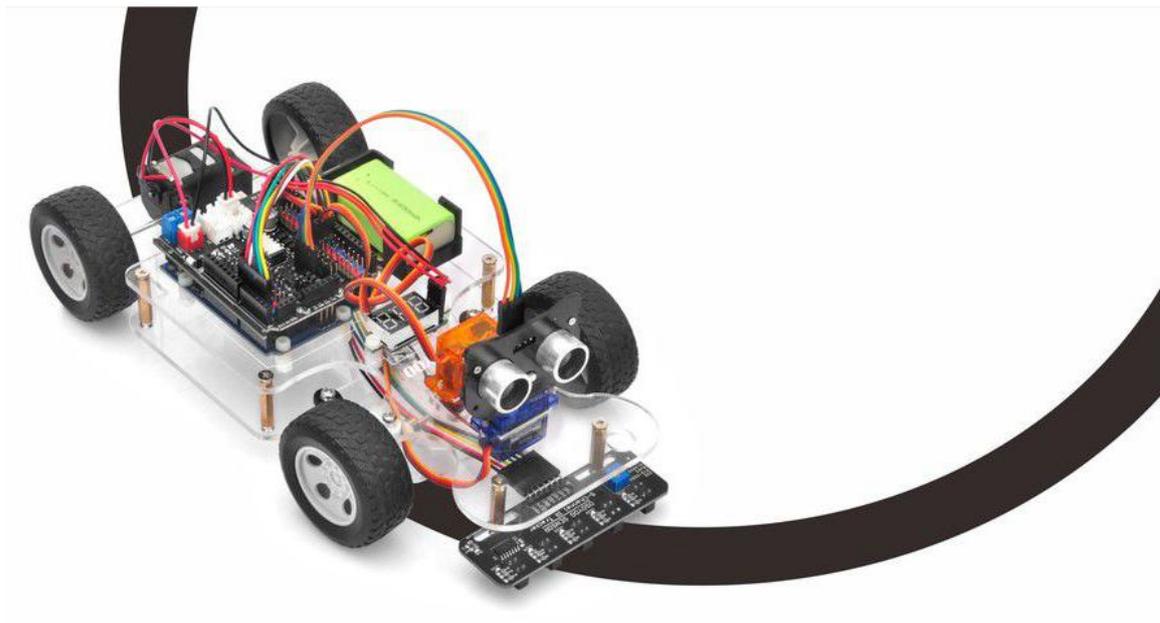
Note: If the car does not move as per above mentioned result, you should check your wire connection of tracking sensor, battery voltage (must over 7.2v).

4. If you want to change the angel of the right or left, please edit the line 23 to 26 of the code and upload the sketch again: (**Note: the angel can't be set more than 35**)

```
int SHARP_RIGHT=FRONT+33;  
int SHARP_LEFT=FRONT-33;  
int RIGHT=FRONT+20;  
int LEFT=FRONT-20;
```

5. If you want to change the speed of the car, please revise the following code of the sketch (**Note: the max value is 255**)

```
#define SPEED 90  
#define FAST_SPEED 120  
#define MID_SPEED 100
```



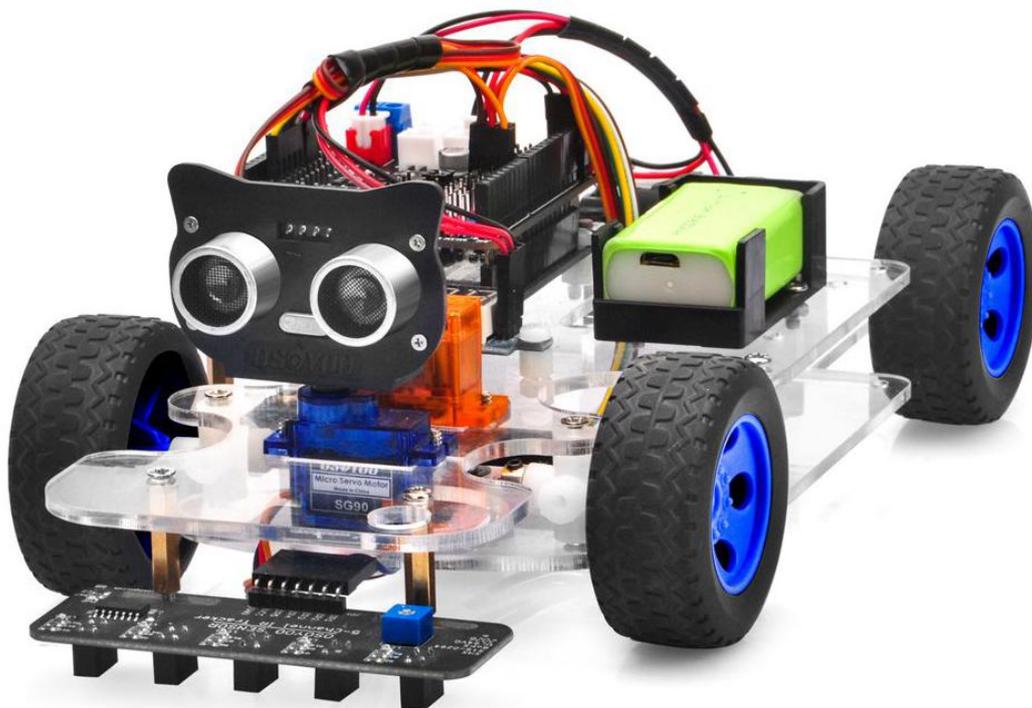
OSOYOO Sport Car for Arduino Lesson 4: Obstacle Avoidance

Objective:

In this tutorial, we will use the ultrasonic module to “see” obstacle and measure the distance. If the distance is less than predefined threshold value, the sport car will turn around from the obstacle automatically.

If you don't complete the frame of car, please review lesson 1

Please enter the link to watch the video: <https://youtu.be/splP-eMleOA>



Software Installation

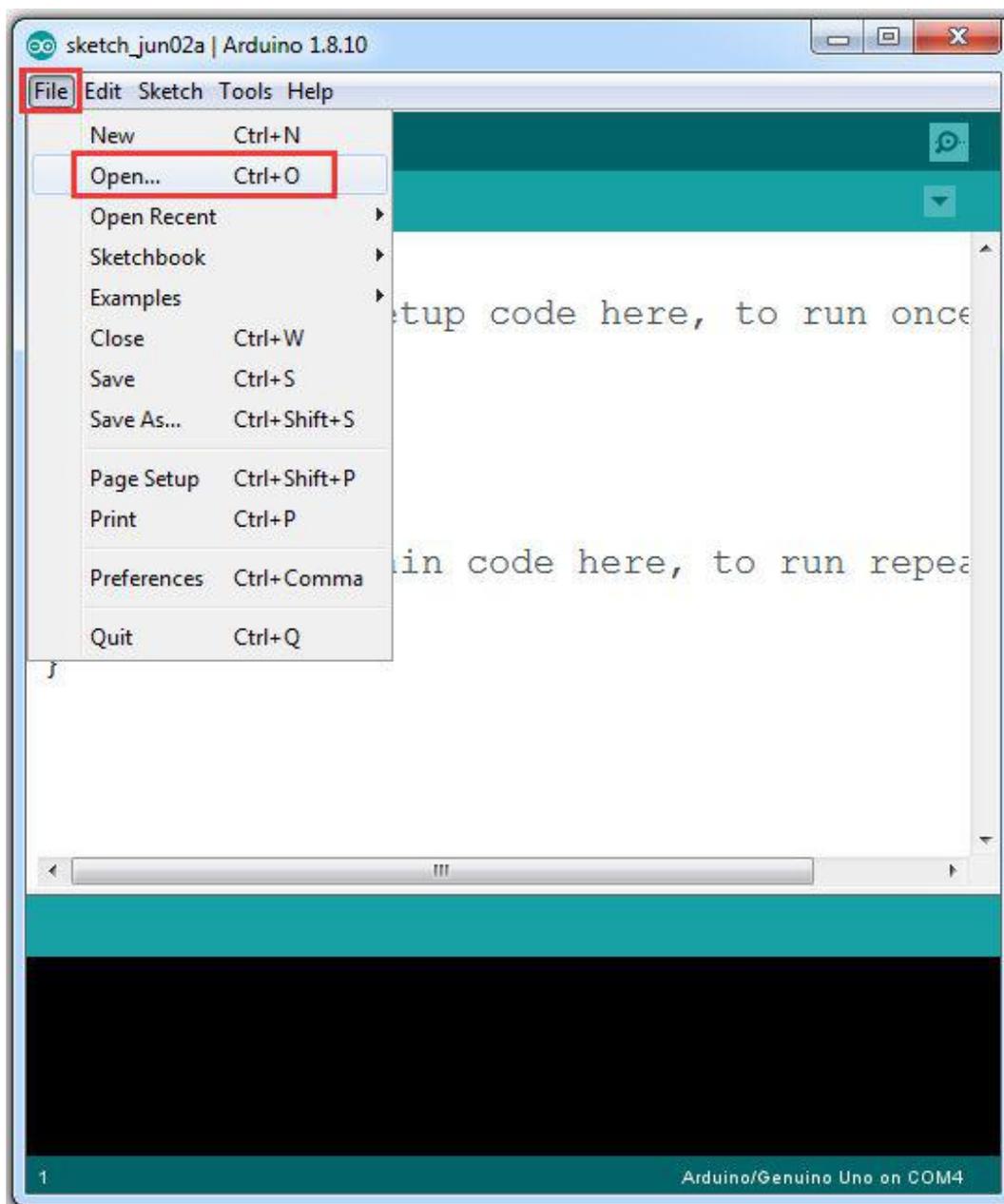
Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/

Step 1: Please download PWM Servo library from <https://osoyoo.com/driver/sg90car/PWMServo.zip>, then import the library into Arduino IDE. If you completed lesson 2, please skip this step.

Step 2: Download [Lesson 4 sample code](https://osoyoo.com/driver/sg90car/sg90car-lesson4b.zip) from <https://osoyoo.com/driver/sg90car/sg90car-lesson4b.zip>, unzip the download zip file sg90car-lesson4b.zip, you will see a folder called sg90car-lesson4b.

Step 3: Connect UNO R3 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "sg90car-lesson4b.ino" in sg90car-lesson4b folder, load the code into Arduino.

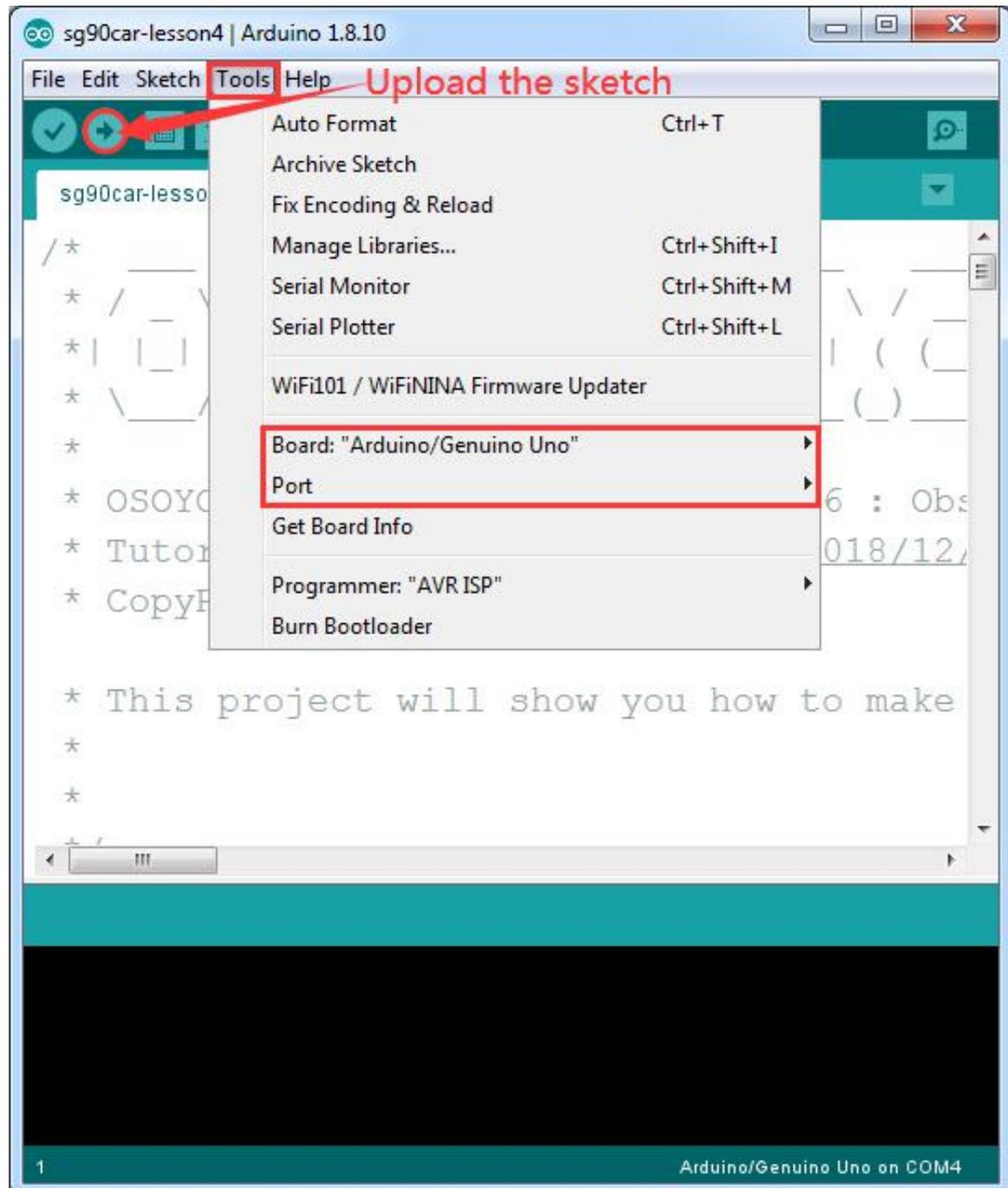
Notice: Shut off your battery or Unplug your power adapter when upload sketch code to Arduino.



Step 4: Please change the default value 90 in line 19 as the FRONT value in [lesson 1](#). If you align the wheel direction manually as [the option 1 in Step 5 of lesson 1](#), please skip this step.

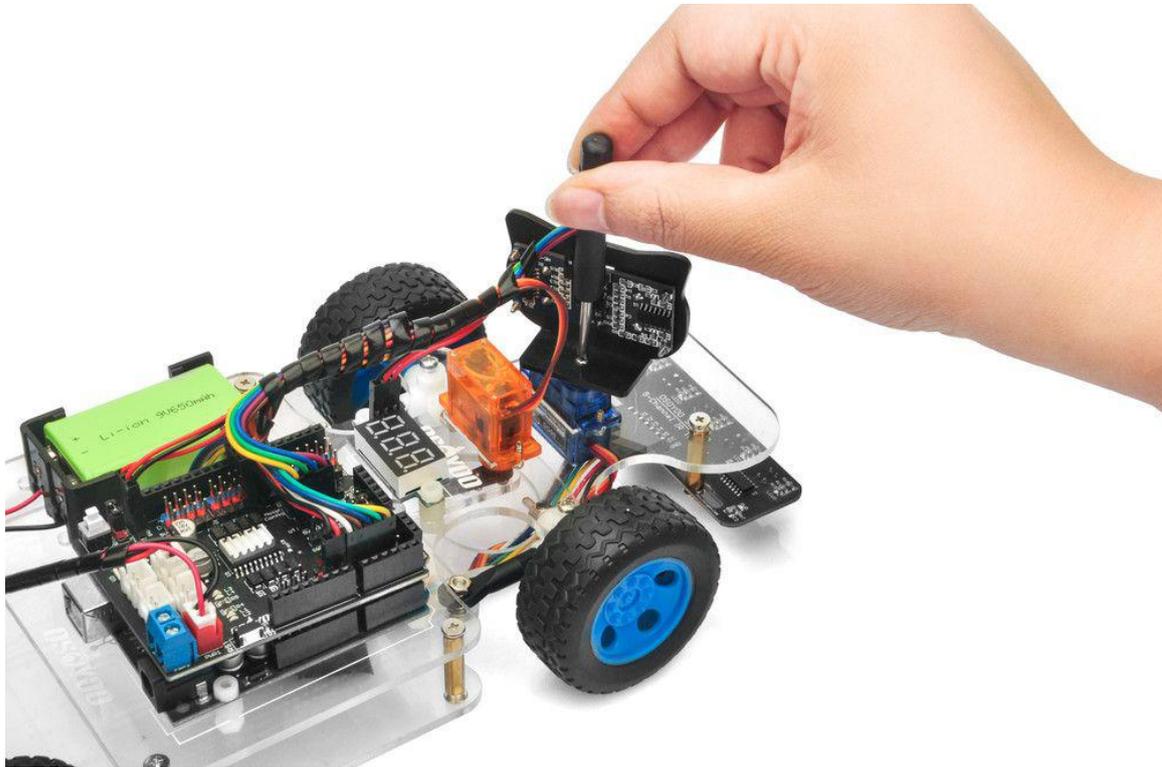
```
#define FRONT 90 //degree when steering facing straight forward
```

Step 5: Choose corresponding board/port for your project, upload the sketch to the board.



Ultrasonic sensor servo initial direction alignment

After power on the car, Ultrasonic sensor will move and finally stops at a direction for 2 seconds. During this first 2 seconds, you must make sure the Ultrasonic sensor (two eyes) is facing straight forward. If it is not straight forward, you should turn off the car immediately and remove the sensor from servo, reinstall it and make it facing straight forward direction as following picture. Otherwise the obstacle avoidance program will not work properly.



Final Testing

1. Disconnect Arduino from PC and confirm that the power switch of the OSOY00 Motor Shield V1.1 is off, then put a 9V battery into battery box. **(Note: make sure polar direction is correct, otherwise it can destroy your device and cause fire hazard).**

2. Put the car on the ground, and turn on the switch of OSOY00 Motor Shield V1.1. If no obstacle is detected, the car will go forward. If any obstacles is detected, the car will stop, the ultrasonic module will turn from right to left to detect surrounding obstacle. The robot car will decide to make left turn, right turn or backward according to obstacle sensor data and our obstacle avoidance algorithm.

Sometimes your car might have collision and make your Ultrasonic sensor position change, you must remember to do sensor direction alignment again as per link [Ultrasonic sensor servo initial direction alignment](#).

Note: If the car does not move as per above mentioned result, you should check your wire connection of tracking sensor, battery voltage (must over 7.2v).

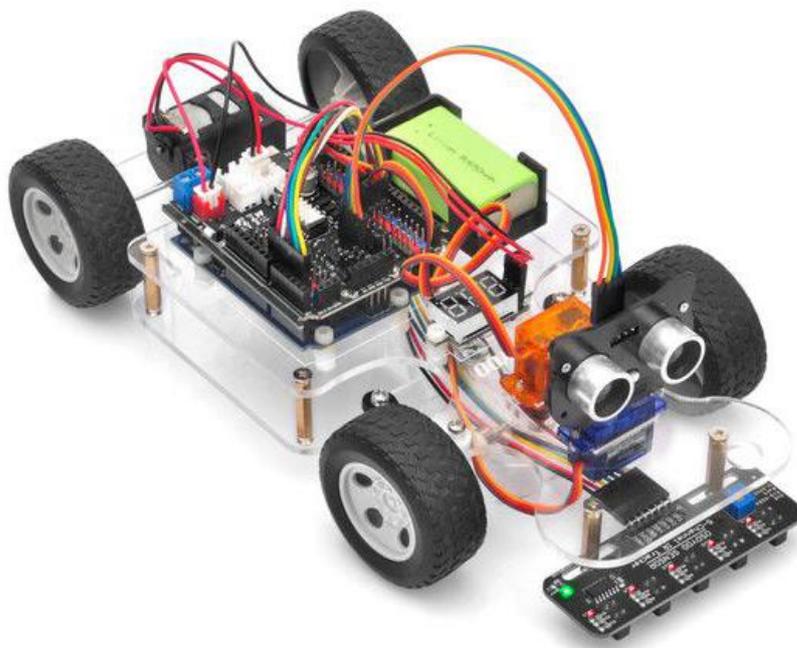
4. If you want to change the angel of the right or left, please edit the line 20 to

23 of the code and upload the sketch again: (**Note: the angel can't be set more than 35**)

```
int SHARP_RIGHT=FRONT+33;  
int SHARP_LEFT=FRONT-33;  
int RIGHT=FRONT+20;  
int LEFT=FRONT-20;
```

5. If you want to change the speed of the car, please revise the following code of the sketch (**Note: the max value is 255**)

```
#define SPEED          170  
#define FAST_SPEED    230  
#define MID_SPEED     180
```



OSOYOO Sport Car for Arduino Lesson 5: Wifi UDP control robot car

Objective

In this lesson, we will use Mobile to control our robot car and make an imitation driving. Since is a mock driving, we will use a virtual steering wheel and gear in our APP to imitate their counterparts in real car.

You must complete lesson 2 Basic Movement before you continue on with this lesson.

If you don't complete the frame of car, please review lesson 1

Please enter the link to watch the video: <https://youtu.be/kB9tmr2VHvs>



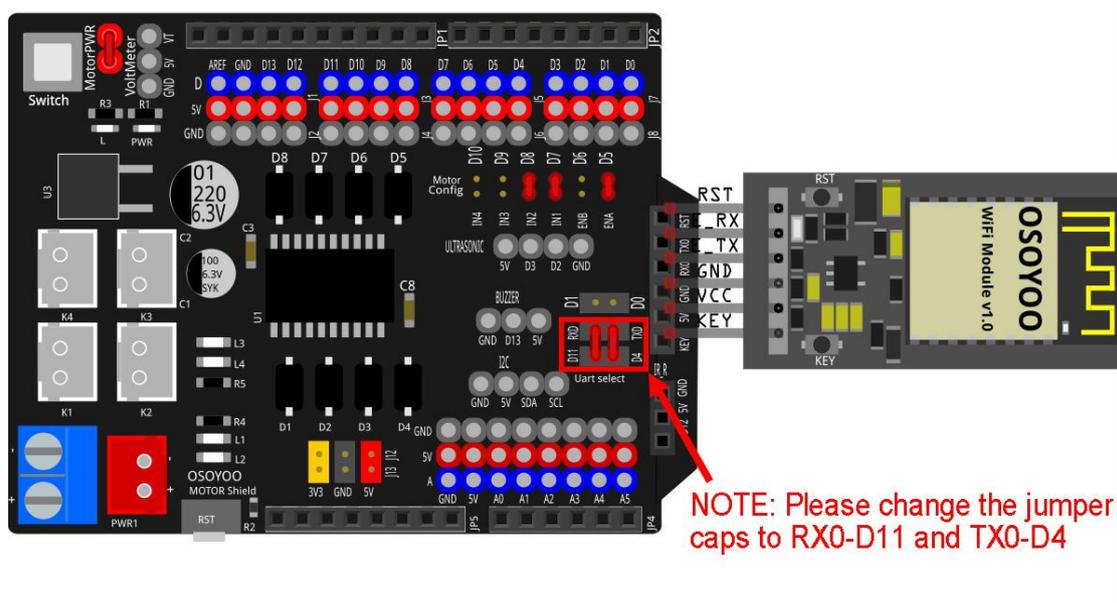
Parts and Devices

No.	Device	Picture	Qty.	Accessories
-----	--------	---------	------	-------------

1	ESP8266 WIFI Shield		1	Click here to buy
---	---------------------	---	---	-----------------------------------

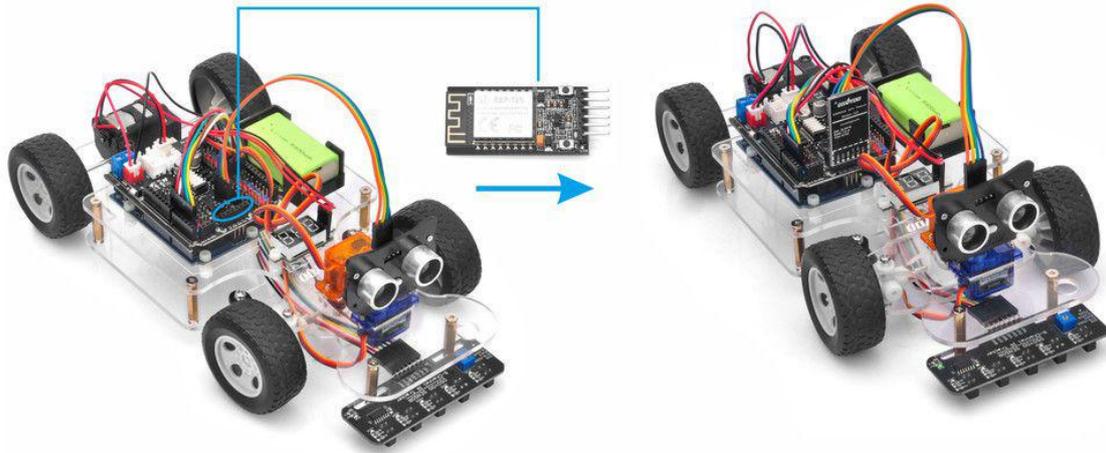
Wire Connection

ESP8266 Wifi Module must be inserted into Soft Serial Port Slot



Remove Jumper on ENB-D6,IN3-D9,IN4-D10

PART	Motor Shield
IN1 jumper	D7
IN2 jumper	D8
ENA jumper	D5
Steer Servo	D9
Back Motor cable	K1 or K2
E_TX jumper	D4
E_RX jumper	D11

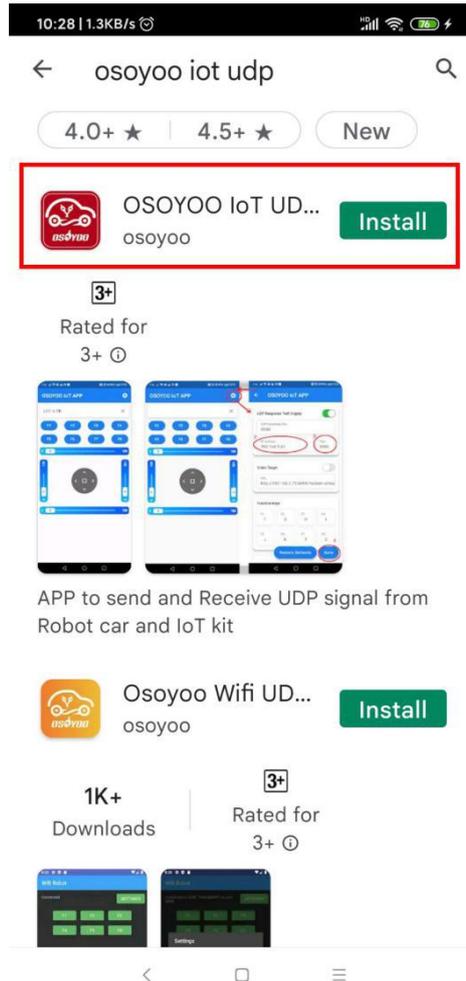


Software Installation

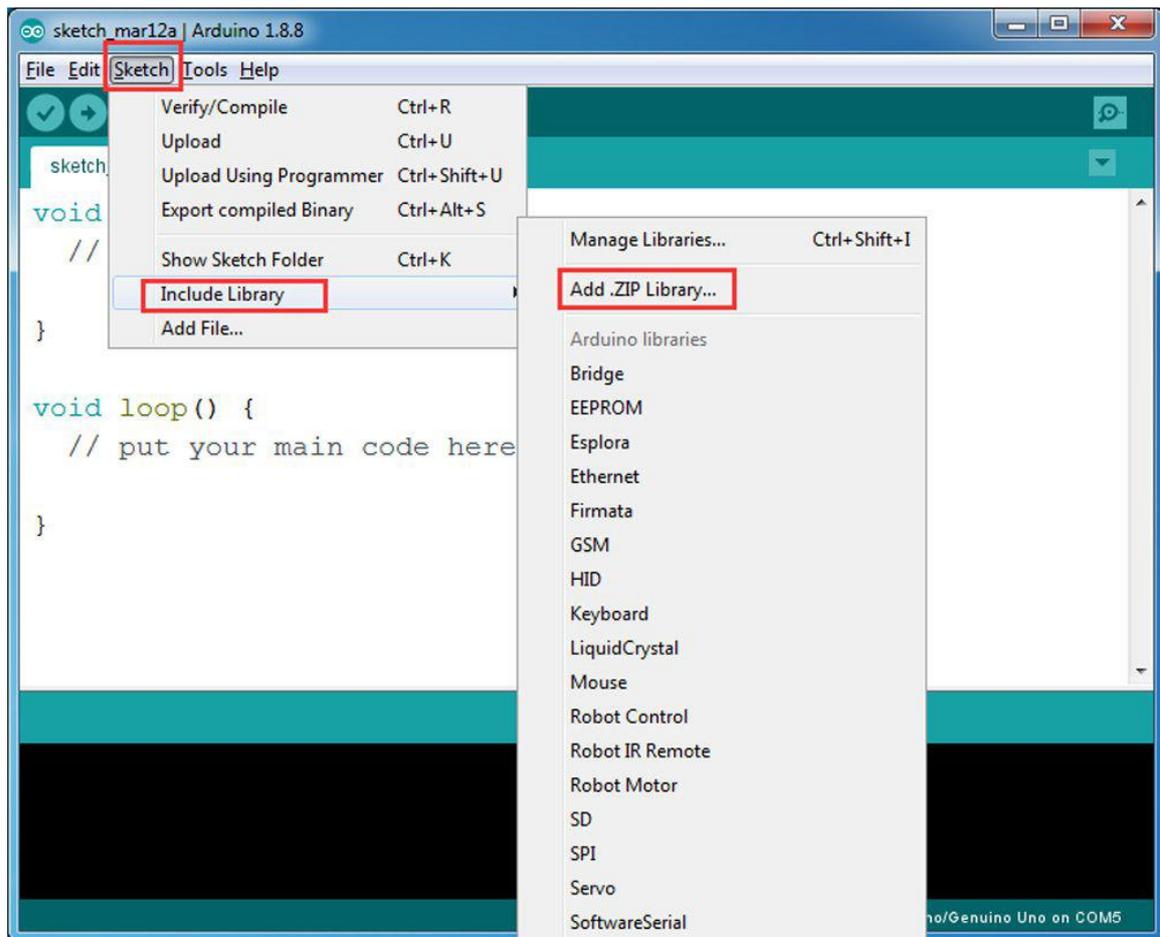
Please download PWM servo library from <https://osoyoo.com/driver/sg90car/PWMServo.zip>, then import the library into Arduino IDE. If you completed lesson 2, please skip this step.

Step 1) Download OSOYOO Wifi UDP Robot Car control APP

In Google Play or Apple Store, please search key words “OSOYOO Wifi UDP Robot Car”, you will find a red icon APP as following:



Step 2) Please download the [WiFiEsp-master](https://osoyoo.com/driver/WiFiEsp-master.zip) library zip file from <https://osoyoo.com/driver/WiFiEsp-master.zip>. Open Arduino IDE ->click Sketch ->Include Library ->Add .ZIP library, then load above zip file into Arduino.



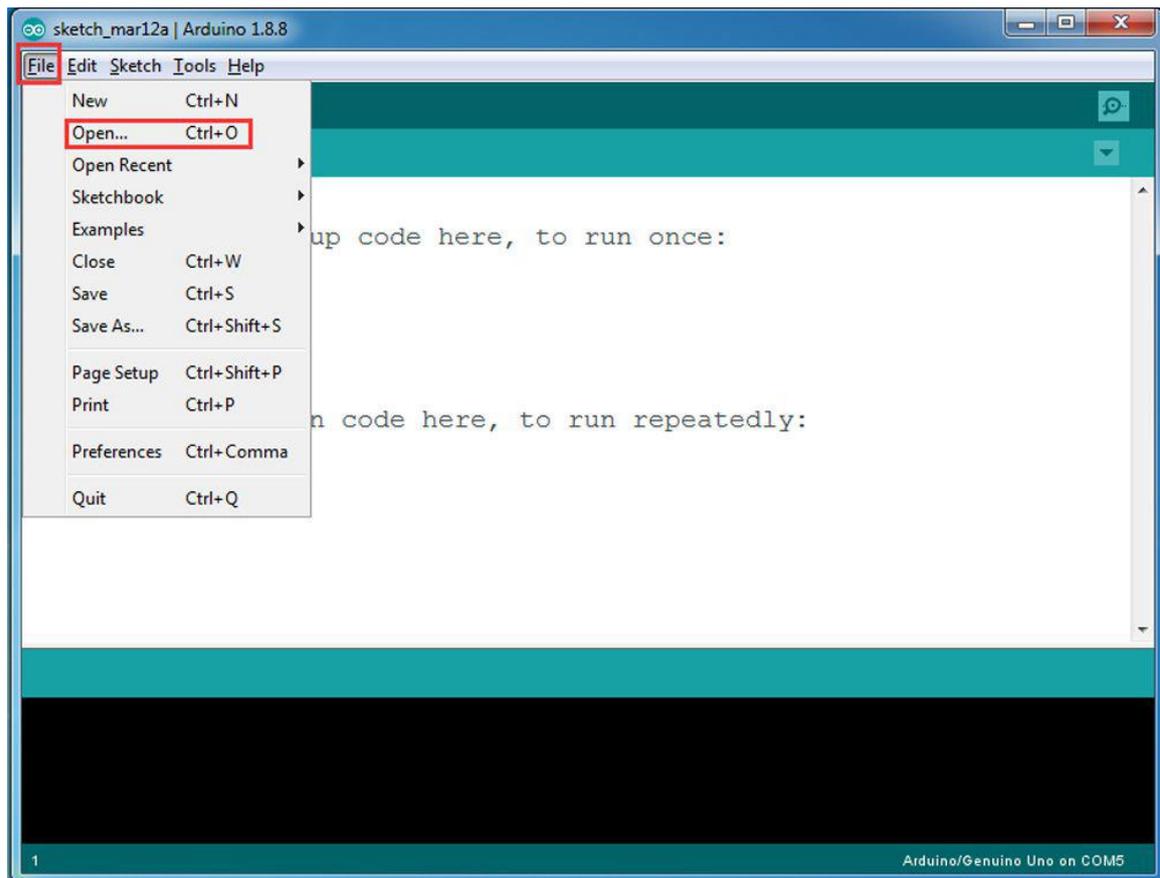
Step 3) Arduino Sketch code Installation:

The Car can work in two Wifi modes: STA mode and AP mode. The Arduino sketches for these two modes are different. Let's explain these two modes one by one

A) STA mode

In STA mode, V3 Robot Car will be a client device of your LAN router. You need save the SSID name and password of your LAN router in Arduino sketch. Once the sketch is running, your router DHCP service will assign an IP address to your robot car and your APP will use this IP address to access your car.

1) Please download STA mode sketch code from <https://osoyoo.com/driver/sg90car/sg90car-lesson5A1.zip>. Unzip the file, you will see a folder "sg90car-lesson5A1". Open Arduino IDE -> click file -> click Open -> choose code "sg90car-lesson5A1.ino" in above folder, load the code into Arduino



2) You need change the code in line 43,45

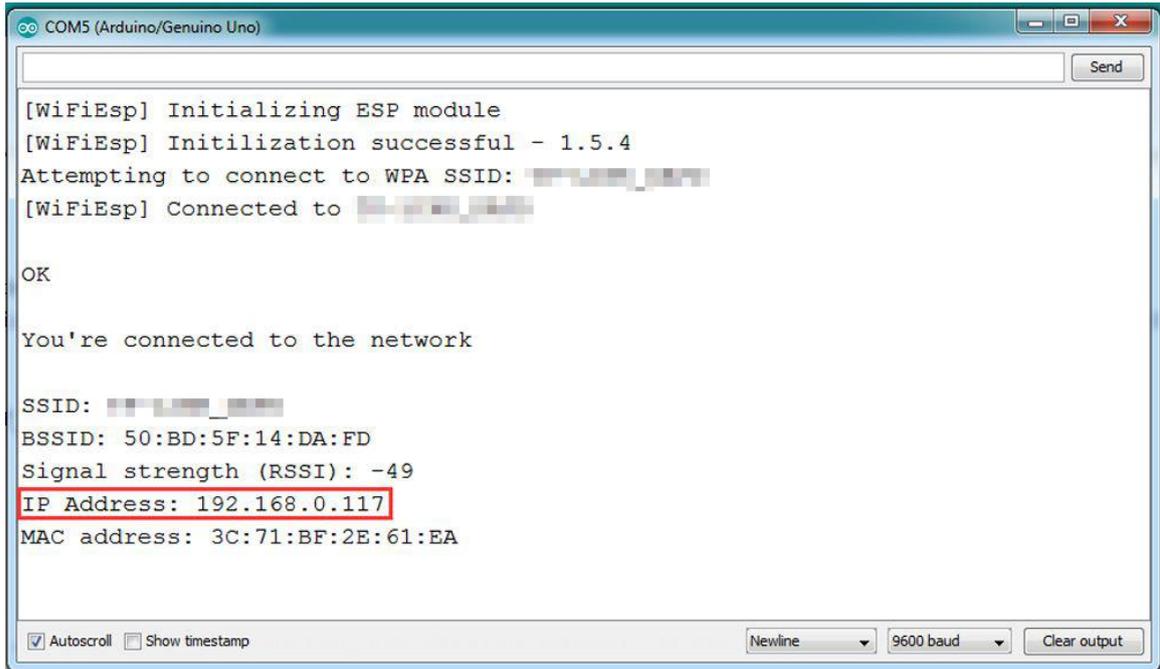
```
char ssid[] = "YOUR_ROUTER_SSID"; // replace this with your  
router wifi SSID
```

```
char pass[] = "YOUR_ROUTER_WIFI_PASSWORD"; // replace with  
your wifi password
```

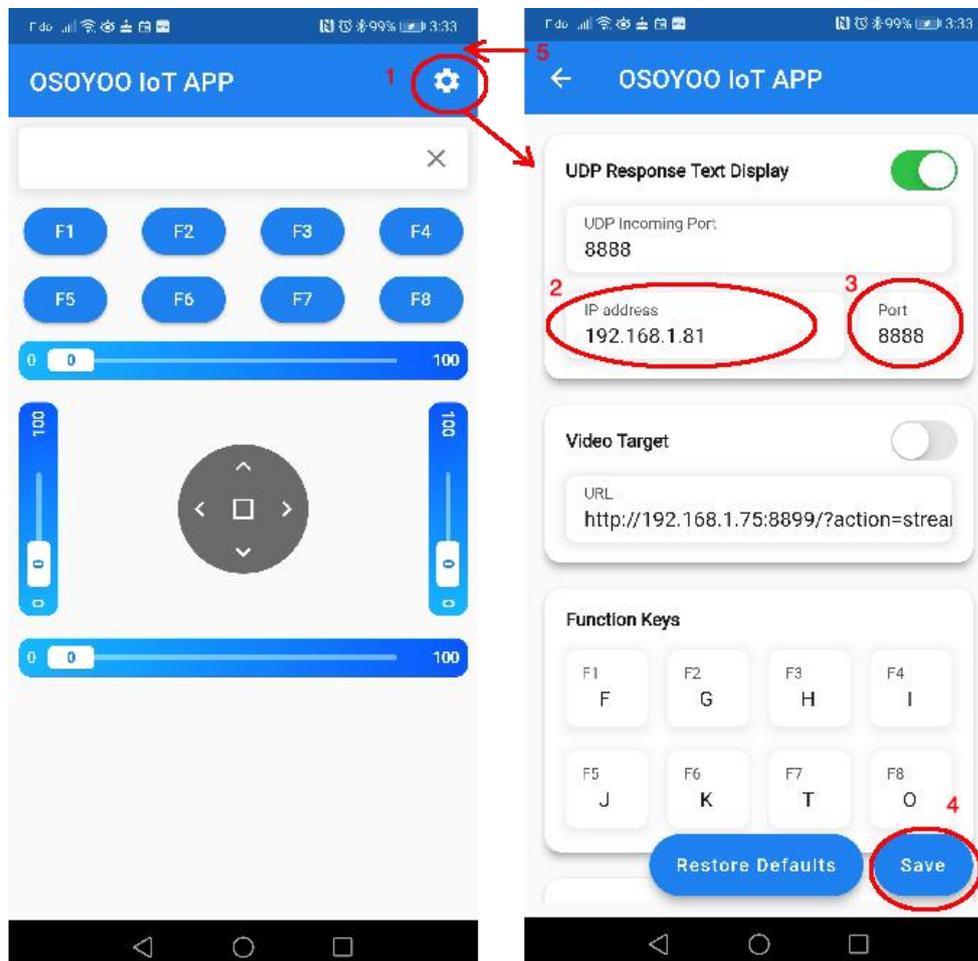
3) Please change the default value 90 in line 19 as the FRONT value in [lesson 1](#). If you align the wheel direction via [the option 1 in Step 5](#), please skip this step.

```
#define FRONT 90 //degree when steering facing straight  
forward
```

4) Upload the sketch to Arduino. Finally, click the Serial monitor window in upper right corner of Arduino IDE, you will see following result



Step 5) in this mode, you will see an IP address which is our LAN IP address assigned by my router. Please write down this IP address and click Setting to set up robot IP address and set this IP address to your APP Setting section and **Port** to **8888** in settings.



Now your Robot car is connected to your LAN, you can use Mobile phone under same LAN to control the robot car. If your APP is in WAN, you need to go to your Router Control Panel, forward Port 8888 to Robot car LAN IP address, then you can use Router IP to control the car. This feature makes our robot car A REAL INTERNET OF THING device

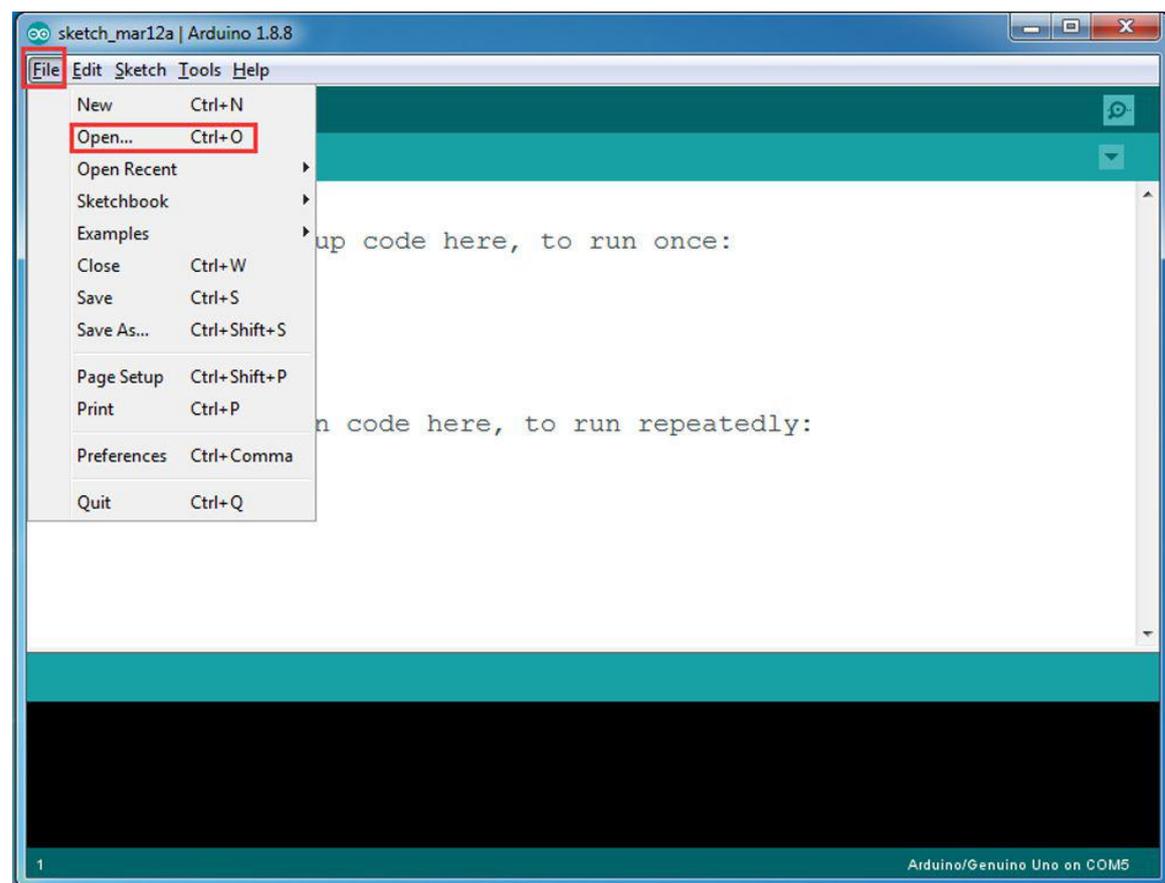
B) AP mode

Sometimes we are in outdoor and do not have a LAN or Wifi Router. In order to control the car, we need to use AP mode.

When working in AP mode, our robot car itself will become a Wifi Hot Spot. Our cell phone can connect to Robot Car as its wifi client. The IP address of Robot is fixed as 192.168.4.1 and It is not connected to WAN.

1) Please download sketch from following link:

<https://osoyoo.com/driver/sg90car/sg90car-lesson5B1.zip>. Unzip the file, you will see a folder “v3car-lesson5B1”. Open Arduino IDE -> click file -> click Open -> choose code “v3car-lesson5B1.ino” in above folder, load the code into Arduino



2) Open your Arduino Serial monitor, and you will see a similar result as STA mode. A new Wifi SSID “osoyoo_robot” with IP address 192.168.4.1 will show up in the window. This means your Robot car has a Wifi Hot Spot name “osoyoo_robot”, its IP address is 192.168.4.1

3) Connect your cell phone to “osoyoo_robot” wifi hot_spot, and set IP address

as “192.168.4.1” and port to 8888 to your APP Setting section

Now your Robot car become a Wifi Hot Spot, you can use Mobile phone control the robot car.

Final Testing

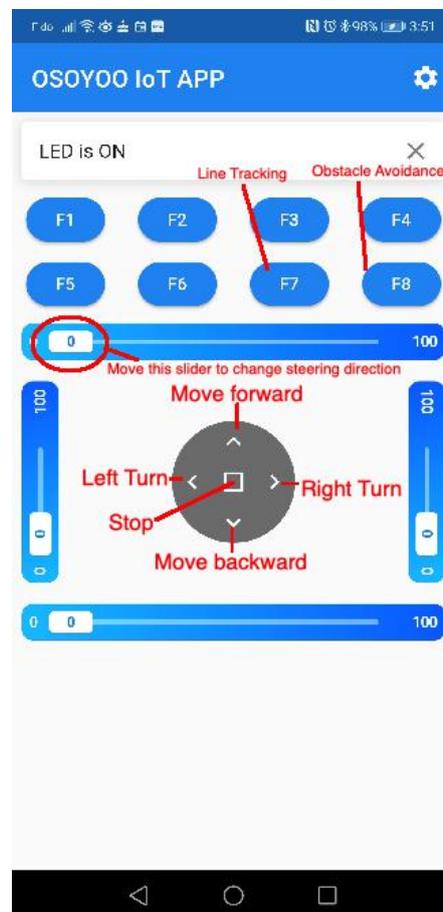
Trun on the car. Now click “Setting” to set up robot IP address.

A) In STA mode, you need connect cell phone to the same LAN ssid of your robot car and set IP address same as the Robot IP showed in Arduino Serial Monitor.

B) In AP mode, you need contact your cell phone to “osoyoo_robot” wifi hot_spot and set IP address as 192.168.4.1

you can click the ◀ button to make left turn(rotate steering wheel counterclockwise) , click ▶ button to make right turn (rotate steering wheel clockwise), if you keep press these two buttons, it will turn at sharper angle.

▲ button will make car move forward and ▼ key will make car move backward.as per link [Ultrasonic sensor servo initial direction alignment](#)



Osoyoo Sport Car for Arduino Lesson 6: Mock Driving with Bluetooth APP

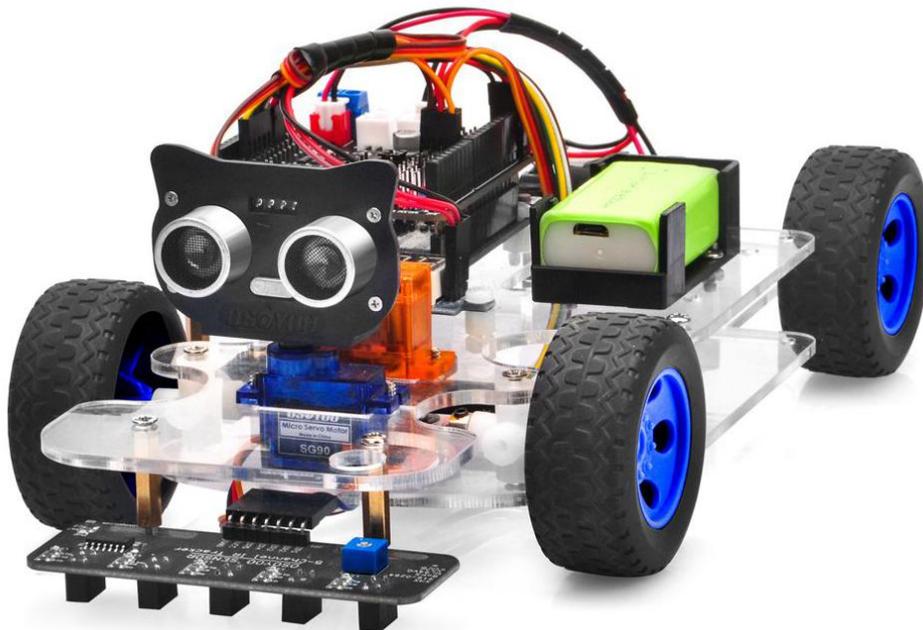
Objective

In this lesson, we will use Mobile to control our robot car and make an imitation driving. Since is a mock driving, we will use a virtual steering wheel and gear in our APP to imitate their counterparts in real car.

You must complete lesson 2 Basic Movement before you continue on with this lesson.

If you don't complete the frame of car, please review lesson 1.

Please enter the link to watch the video: <https://youtu.be/oDtI7Z7qcm8>



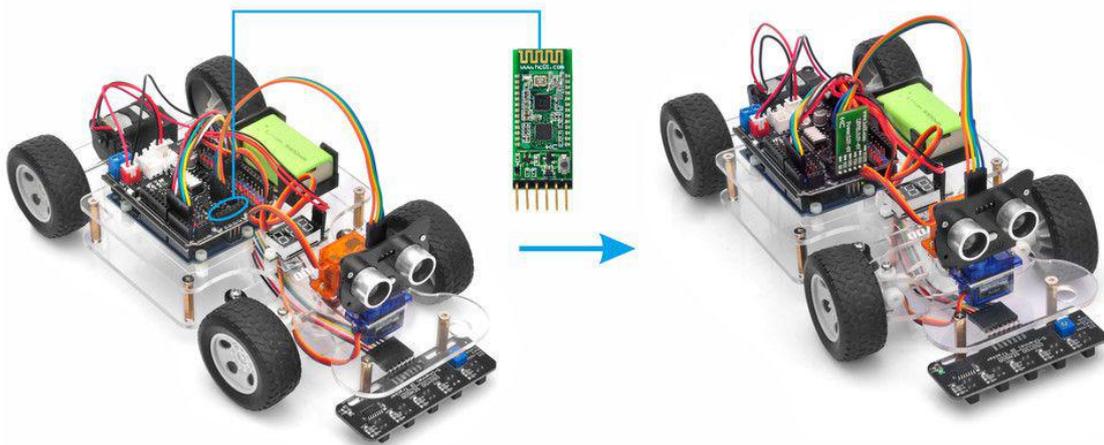
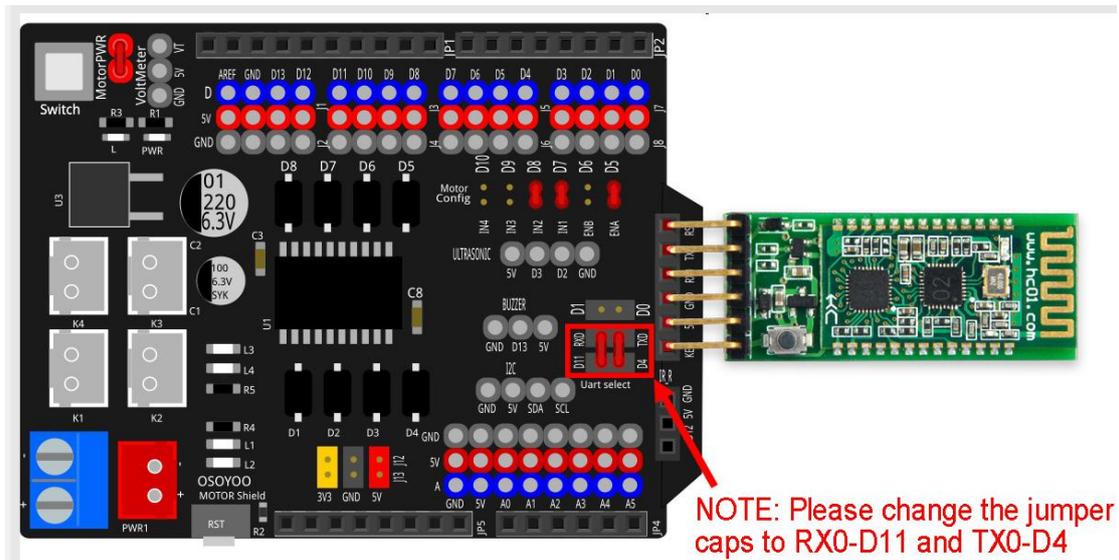
Parts and Devices

No.	Picture	Device	Qty.	Accessories
1		HC module	1	

Hardware Installation

Step 1: Install the smart car basic frame work as per [Lesson 2](#). If you have already completed installation in Lesson 1, just keep it as is.

Step 2: Insert Bluetooth Module into OSOYOO motor shield V1.0 Bluetooth slot as following graph (Remember: DO NOT remove any existing wires installed in Lesson 1):



Software Installation

Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/
OSOYOO imitation driving Robot APP		Search “OSOYOO imitation driving” in Google Play or Apple APP store

Step 1: Please download PWM Servo library from <https://osoyoo.com/driver/sg90car/PWMServo.zip>, then import the library into Arduino IDE. If you completed lesson 2, please skip this step.

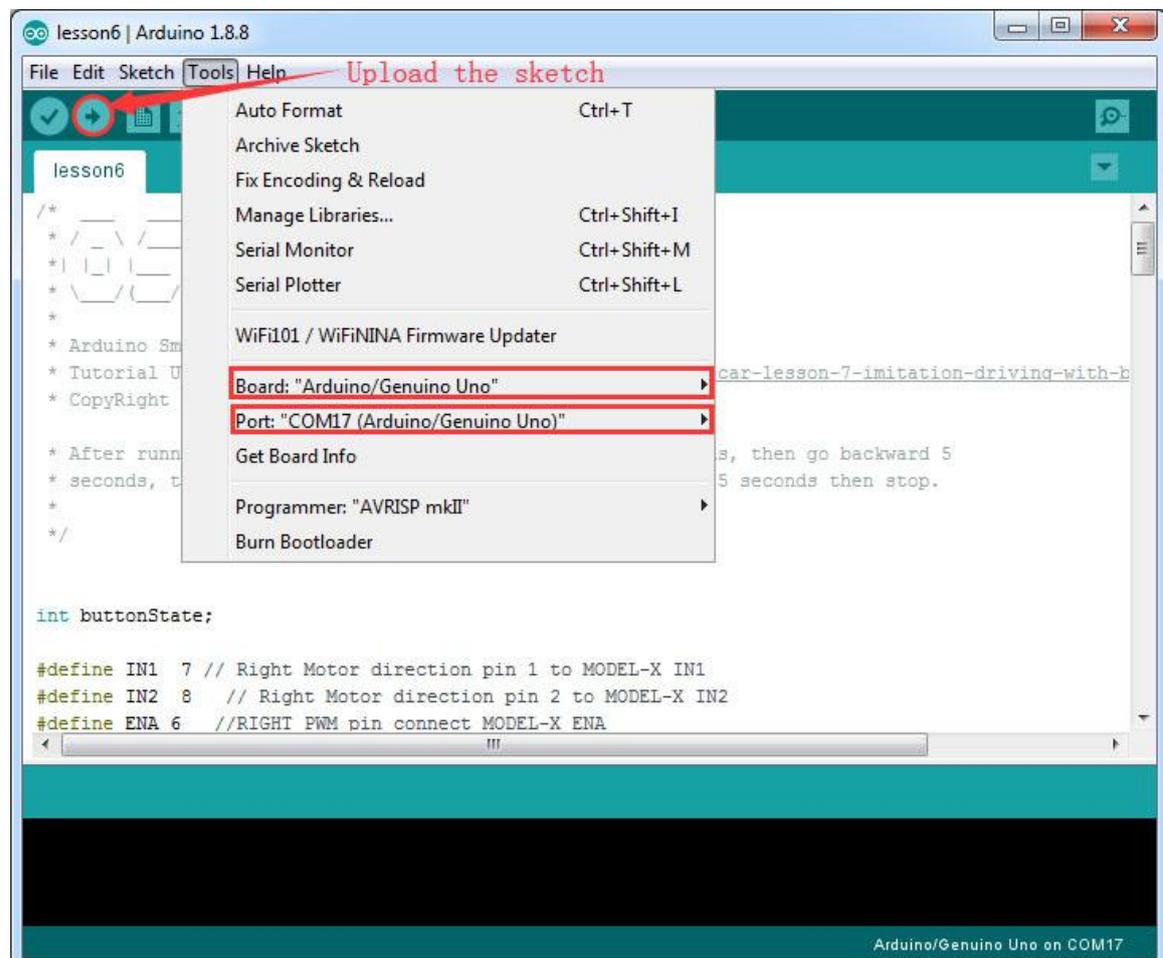
Step 2: Download [Lesson 6 sample code](https://osoyoo.com/driver/sg90car/sg90car-lesson6B.zip) from <https://osoyoo.com/driver/sg90car/sg90car-lesson6B.zip>. Unzip the downloaded file, you will see a folder called **sg90car-lesson6B**.

Step 3: Connect Arduino UNO to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "lesson6.ino" in lesson6 folder, load the code into arduino. **(Notice: Remove the Bluetooth module and Shut off your battery or Unplug your power adapter when upload sketch code to Arduino.)**

Step 4: Please change the default value 90 in line 19 as the FRONT value in [lesson 1](#). If you align the wheel direction via [the option 1 in Step 5](#), please skip this step.

```
#define FRONT 90 //degree when steering facing straight forward
```

Step 5: Choose corresponding board/port for your project, upload the sketch to the board.



Step 6: Install APP into your mobile phone:

1) Install APP on Android device as following

In Google Play store search APP name “OSOYOO imitation driving”, download the APP as following and install it in your smart phone

If you can not use Google Play to find the APP, please Download the APP from following link :<https://osoyoo.com/driver/v1car.apk>.



2) Install APP on Apple IOS device as following

In Apple APP store search APP name “OSOYOO imitation driving”, download the APP as following and install it in your smart phone



Explanation of APP UI (UI is different between Android and IOS)



-
- **BT Search button:** When click this button, you will see a Bluetooth device list which has been paired with your APP. Select HC-02 device to connect the car. Once HC-02 is connected, Bluetooth Status will change from Disconnected to Connected. You can only control your car when Bluetooth is connected.
- **Engine toggle :** When Engine toggle is set to OFF(white), car will stop and all buttons in the APP will be disabled. When Engine toggle is set to ON(red), car will start to move. All other movement control buttons will active.
- **Forward/Backward gear switch:** This gear switch can control the car is moving ahead or reverse like real car gear.
- **F1,F2,F3,F4,F5 customized button.** In this lesson, we only use F5 which pause the the car movement. The difference between F5 and Engine OFF button is that Engine OFF button when touched, all other buttons will be disabled. You should toggle Engine button again to enable other button. On the other hand, when F5 is clicked, the car will stop but all other buttons is still active. Even you do not touch any button just change your cell phone angle position(like you move the steering wheel), the car will move again.
- **Direction Steering Wheel :** When you rotate your mobile phone angle, the steering wheel will change angle as per your mobile phone rotation angle. This will make your car change direction. For example, when steering wheel make clockwise rotation, car will move to left. Remember, the steering and Forward/Backward gear should work together same as you are driving a real car. For example, when you want back your car to a right side packing lot, you need set Gear to R position and rotate your steer to count-clockwise direction.
- **Speed+:** Make the robot car speed up
- **Speed-:** Make the robot car slow down

Drive your Robot Car

Now you have installed your hardware and software for this lesson, let's drive our car!

Step 1) Put your robot car onto the ground and turn on the battery switch.

Step 2)Go to your mobile phone ->Setting ->Bluetooth setting and search a Bluetooth device called HC-02, pair it with code 1234

Step 3)Open OSOYOO imitation driving Robot APP, Click BT Search button and find the bluetooth you have paired

Step 4)Turn on Engine toggle, click **Speed+** to make the robot speed up as the robot car is very slow at first. When you rotate your mobile phone angle, your car will change direction.

Enjoy your driving!

On Android device

1. Open OSOYOO imitation driving Robot APP



2. Click BT Search and scan Bluetooth device



3. Choose HC-02 device till device is connected



4. Turn on engine toggle



5. Click Speed+ to make the car move, click gear switch to control car move forward or backward rotate mobile phone angle to change car direction,



On IOS device

1. Open OSOYOO imitation driving Robot APP



2. Click Connect and scan Bluetooth device



3. Choose HC-02 device till APP shows Disconnect



4. Turn on engine toggle



5. Click Speed+ to make the car move, click gear switch to control car move forward or backward rotate mobile phone angle to change car direction,



