

OSOYOO V2.1 Robot Car Kit for Arduino



Online Tutorial Index: <https://osoyoo.com/?p=32220>

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

Table of Contents

OSOYOO V2.1 Robot Car Kit 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
Basic Tutorials.....	10
Tutorial and sample projects.....	11
OSOYOO V2.1 Robot car kit Lesson 1: Basic robot car assembly	12
Objective	12
Parts and Devices	12
Hardware Installation	15
Install device	16
Connection	19
Software Installation.....	24
Final Testing:.....	26
OSOYOO V2.1 Robot car kit Lesson 2: IR Remote Control Robot Car	28
Objective	28
Parts and Devices	28
Hardware Installation	29
Software Installation.....	30
Testing.....	32
Trouble shooting.....	33
OSOYOO V2.1 Robot car kit Lesson 3: Object follow Robot car	35
Objective	35
Parts and devices	35
Hardware installation	36
Software installation	39
Adjust the sensitivity of IR Obstacle Avoidance modules.....	41
Final testing	41
OSOYOO V2.1 Robot car kit Lesson 4: Tracking Line Robot Car.....	43
Objective:.....	43
Parts and Devices	44
Hardware Installation	45
Software Installation.....	46
Adjust the sensitivity of tracking sensor modules.....	48

Testing.....	48
OSOYOO V2.1 Robot car kit Lesson 5: Obstacle Avoidance Robot Car	50
Objective.....	50
Parts and Devices	50
Hardware Installation	52
Software Installation.....	56
Ultrasonic sensor servo initial direction alignment	58
Final Testing	58
Osoyoo V2.1 Robot Car Lesson 6: Use Wifi to control an IoT Robot Car.....	60
Objective.....	60
Parts and Devices	60
Hardware Installation	62
Software Installation.....	66
A) STA mode	69
B) AP mode	70
Final testing.....	71
OSOYOO V2.1 Robot Car Lesson 7: Imitation Driving with Bluetooth APP	73
Objective.....	73
Parts and Devices	73
Hardware Installation	74
Software Installation.....	76
Explanation of APP UI	78
Drive your Robot Car	79
Arduino V2.1 Robot Car Lesson 8: Fighting Game.....	81
Objective.....	81
Parts and Devices	81
Hardware Installation	82
Software Installation.....	83
Play the Fighting Game.....	84

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 V2.0 robot car 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=32220>
- Basic tutorial for Arduino: <https://osoyoo.com/?p=32220/#3>
- Robot car Sample Projects: <https://osoyoo.com/?p=32220/#4>



- OSOYOO robot car introduction video:
<https://osoyoo.com/V2.1robotcar-video.html>
- OSOYOO robot car tutorial PDF download link:
<https://osoyoo.com/manual/V2.1robotcar.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=32220>
- 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 robotic car learning kit is designed for beginners to learn Arduino programming and get hands-on experience on robot design and assembly.

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.

This kit contains module parts including OSOYOO MODEL X motor driver module(*), Ultrasonic Sensor module, Tracking module, Infrared Remote Control, Bluetooth module and ESP8266 Wifi shield, etc. With these modules, the robot car can work in multiple modes such as auto-go, infrared control, obstacle avoidance and line tracking. You can use our Android APP to change working mode through Wifi or Bluetooth.

*OSOYOO MODEL X motor driver module is an improved L298N module which has newly designed wiring sockets and can greatly simplify the assembly procedure and wire connection stability.

Parts and Devices

No.	Picture	Device	Qty.	Data sheet	Buy in Link
1	A blue printed circuit board (PCB) with various components and a blue ribbon cable attached.	OSOYOO basic board	1	click here	Click here to buy
2	A black PCB with a central microcontroller and various connectors and components.	OSOYOO Uart WiFi shield V1.3	1	click here	Click here to buy
3	A blue PCB with a central integrated circuit and several heat sinks.	OSOYOO model X motor driver module	1	click here	Click here to buy
4	A digital voltmeter module with a blue LCD screen displaying "0.00".	Voltage meter	1	click here	Click here to buy
5	A small black PCB with a metal detector element and some resistors.	IR receiver	1	click here	Click here to buy
6	A black remote control device with a numeric keypad and several function buttons.	IR remote controller	1	click here	Click here to buy
7	A blue PCB with two ultrasonic transducers and a central microcontroller.	Ultrasonic Sensor	2	click here	Click here to buy
8	A black PCB with a central microcontroller and two infrared sensors.	Tracking sensor module	1	click here	Click here to buy
9	A blue PCB with two ultrasonic transducers and a central microcontroller.	Ultrasonic Sensor	1	click here	Click here to buy

10		Servo Motor	1	click here	Click here to buy
11		Mount Holder for Ultrasonic Sensor	1		Click here to buy
12		Buzzer Sensor Module	1	click here	Click here to buy
13		HC module	1	click here	Click here to buy
14		IR transmitter	1		Click here to buy
15		Gear motor	4		Click here to buy
16		Metal Motor Holders with screws	4		Click here to buy
17		Wheel	4		Click here to buy
18		Upper car chassis	1		Click here to buy

19	A photograph of a grey metal car chassis with a printed circuit board (PCB) attached at the top.	Lower car chassis	1	Click here to buy
20	A photograph of a jumper wire with two black female connectors and a coiled red cable in between.	3pin female to 3pin female jumper wire	1	Click here to buy
21	A photograph of a jumper wire with one blue male connector and one green female connector.	6pin male to 6pin female jumper wire	1	Click here to buy
22	A photograph of a thin, light-colored ribbon cable.	OSOYOO 2pin PnP cable 20cm	1	Click here to buy
23	A photograph of a flat ribbon cable with multiple colored wires.	20Pin jumper wire Male to female 20cm	some	Click here to buy
24	A photograph of a ribbon cable with two female connectors and a coiled multi-colored cable.	7pin 25cm Female to Female Cable	1	Click here to buy
25	A photograph of a black-handled Philips (cross-head) screwdriver.	Philips screwdriver	1	Click here to buy
26	A photograph of a black-handled hex screwdriver.	Hex Screwdriver	1	Click here to buy
27	A photograph of a small black rectangular battery box with a red and black cable attached.	18650 battery box	1	Click here to buy
28	A photograph of a black battery charger with three slots and a coiled black cable.	Battery charger for 18650 battery (Optional)	1	Click here to buy

29		1Pair 18650 batteries (Optional)	1	Click here to buy
30		9V Battery Box (Optional)	1	Click here to buy
31		9V Battery (Not including)	1	Click here to buy
32		M3*10 Hex Screws	10	
33		M3*10 screw	4	
34		M3 nut	4	
35		Copper pillar	5	
36		Screw for wheel	4	
37		M3 plastic screw	18	

38	A photograph showing one M3 plastic pillar screw and one matching hexagonal nut.	M3 plastic pillar	19		
39	A photograph showing two M3 plastic nuts.	M3 plastic nut	19		
40	A photograph showing one M2.2*4 self tapping screw.	M2.2*4 self tapping screw	1		
41	A photograph showing one M2.2*8 self tapping screw.	M2.2*8 self tapping screw	2		
42	A photograph showing four M1.4*8 screws and four matching hexagonal nuts.	M1.4*8 screw and nut	4		

Basic Tutorials

Here we have prepared some basic tutorials for the users who are not familiar with Arduino, this section will show you what Arduino is, and teach you how to start some simple Arduino projects. Arduino is the largest open-source hardware platform in the world and offers infinite possibilities on what you can achieve using simple microcontroller-based products. Learning how to program using the Arduino platform is a never-ending process.

We believe with this hardware + software support, you are able to become expert programmer (developer) very soon. So don't waste time, just get this kit, and start your project right away!

- Lesson 1: what is Arduino, link: <https://osoyoo.com/?p=11341>
- Lesson 2: Fully compatible with Arduino UNO Rev.3, Link: <https://osoyoo.com/?p=9837>
- Lesson 3: Download and Install Arduino IDE, Link: <https://osoyoo.com/?p=5340>
- Lesson 4: What is a Sketch and How does it Work? Link: <https://osoyoo.com/?p=7246>

- Lesson 5: How to Install Additional Arduino Libraries, Link:
<https://osoyoo.com/?p=5349>
- Lesson 6: Hello World, Link: <https://osoyoo.com/?p=7005>
- Lesson 7: The Serial Monitor, Link: <https://osoyoo.com/?p=8082>
- Lesson 8: IR Remote Receiver Module and Controller, Link:
<https://osoyoo.com/?p=19435>
- Lesson 9: How to use IR control the Active Buzzer? Link:
<https://osoyoo.com/?p=19361>
- Lesson 10: IR Obstacle Avoidance Module, Link:
<https://osoyoo.com/?p=21362>
- Lesson 11: IR Track Sensor, Link: <https://osoyoo.com/?p=35502>
- Lesson 12: Ultrasonic Sensor HC-SR04 Module, Link:
<https://osoyoo.com/?p=19427>
- Lesson 13: Controlling Servo Motor with IR Remote, Link:
<https://osoyoo.com/?p=19388>
- Lesson 14: Use the IR Control to Control a DC Motor Remotely, Link:
<https://osoyoo.com/?p=19315>
- Lesson 15: How to Use the HC-02 BLE, Link: <https://osoyoo.com/?p=19230>
- Lesson 16: IR Transmitting Module and IR Receiving Module, link:
<https://osoyoo.com/?p=12364>

Tutorial and sample projects

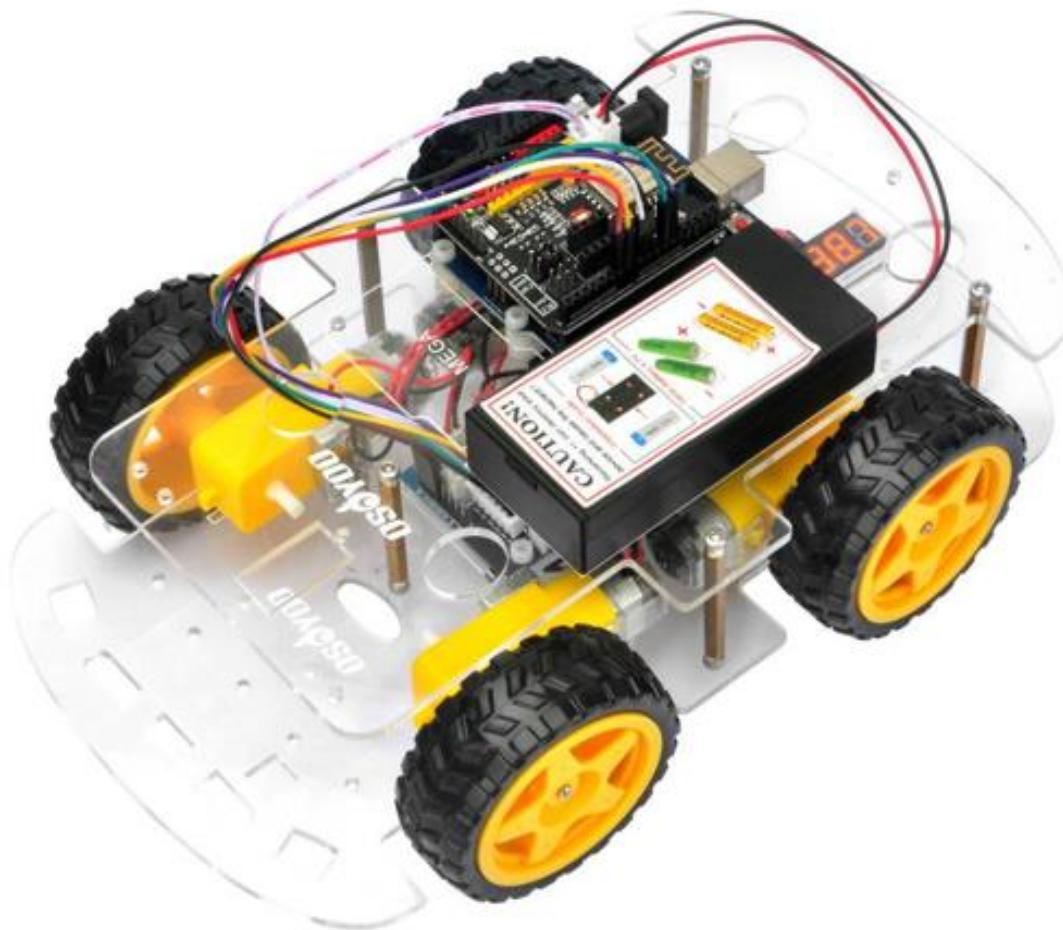
OSOYOO robotic car learning kit is designed for beginners to learn Arduino programming and get hands-on experience on robot design and assembly. We have developed a step-by-step tutorial which evolves from a simple car without any control to a multi-function robotic car controlled by mobile APP. Every 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: Basic robot car assembly, URL <https://osoyoo.com/?p=32224>
- Lesson 2: IR Remote controlled, URL <https://osoyoo.com/?p=32228>
- Lesson 3: Object follow, URL <https://osoyoo.com/?p=32233>
- Lesson 4: Line tracking, URL <https://osoyoo.com/?p=32249>
- Lesson 5: Obstacle avoidance, URL <https://osoyoo.com/?p=32246>
- Lesson 6: WIFI IoT controlled, URL <https://osoyoo.com/?p=32243>
- Lesson 7: Simulator driving with bluetooth, URL <https://osoyoo.com/?p=32238>
- Lesson 8: Robot car fighting game, URL <https://osoyoo.com/?p=32236>

OSOYOO V2.1 Robot car kit Lesson 1:

Basic robot car assembly



Objective

In this “Hello World” version lesson, we will install the most important framework in the smart car and program the car to do some simple movements. If you have passed the test movement of this lesson, it means Arduino, voltage meter, motor control module, motors, batteries , chassis and wire connections between these parts are all functioning well. As your experiments in future lessons are all based on frame work of Lesson One, it is very important to test the installation and sample code in this Lesson properly.

Please enter the link to watch the video:

<https://www.youtube.com/watch?v=TIk8UDdEtJY&list=PLvCUFipQZCUTstVBU-7gLYCLhl1fRuca3&index=2&t=0s>

Parts and Devices

No.	Picture	Device	Qty.	Data sheet	Buy in Link
1		OSOYOO basic board	1	click here	Click here to buy
2		OSOYOO Uart WiFi shield V1.3	1	click here	Click here to buy
3		OSOYOO model X motor driver module	1	click here	Click here to buy
4		Voltage meter	1	click here	Click here to buy
5		Gear motor	4		Click here to buy
6		Metal Motor Holders with screws	4		Click here to buy
7		Wheel	4		Click here to buy
8		Upper car chassis	1		Click here to buy
9		Lower car chassis	1		Click here to buy

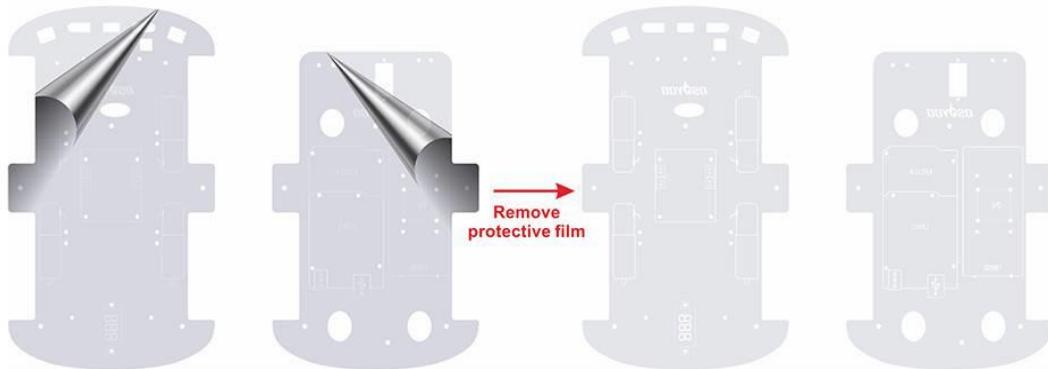
10		3pin female to 3pin female jumper wire	1	Click here to buy
11		6pin male to 6pin female jumper wire	1	Click here to buy
12		OSOYOO 2pin PnP cable 20cm	1	Click here to buy
13		Philips screwdriver	1	Click here to buy
14		Hex Screwdriver	1	Click here to buy
15		18650 battery box	1	Click here to buy
16		Battery charger for 18650 battery (Optional)	1	Click here to buy
17		1Pair 18650 batteries (Optional)	1	Click here to buy
18		9V Battery Box (Optional)	1	Click here to buy

19		9V Battery (Not including)	1		Click here to buy
20		M3*10 Hex Screws	10		
21		M3*10 screw	4		
22		M3 nut	4		
23		Copper pillar	5		
24		Screw for wheel	4		
25		M3 plastic screw	9		
26		M3 plastic pillar	10		
27		M3 plastic nut	10		

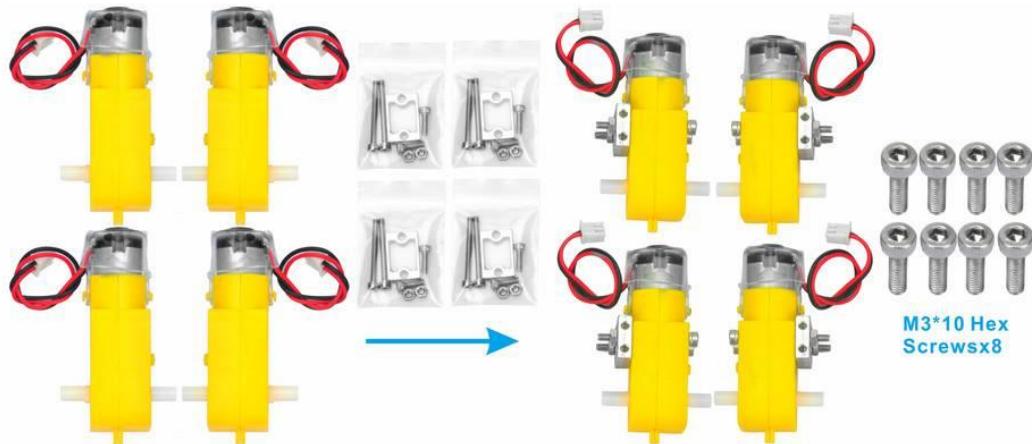
Hardware Installation

Install device

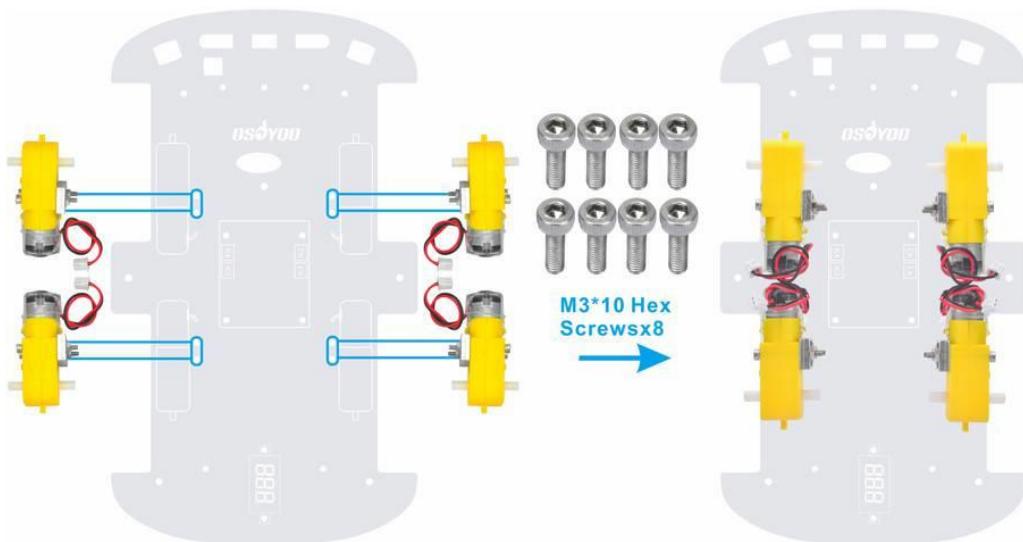
- 1) Remove the protective film on upper and low car chassis (**Each car chassis has one protective film**)



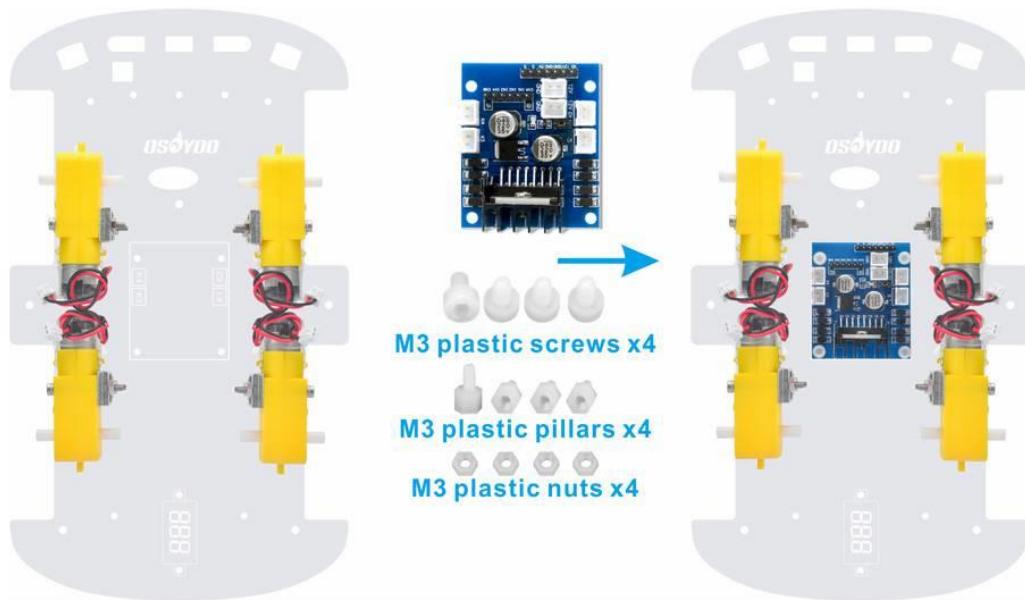
- 2) Fix 4 motors with Metal Motor Holders as follow (**Please check the motor direction before installing metal motor holders**)



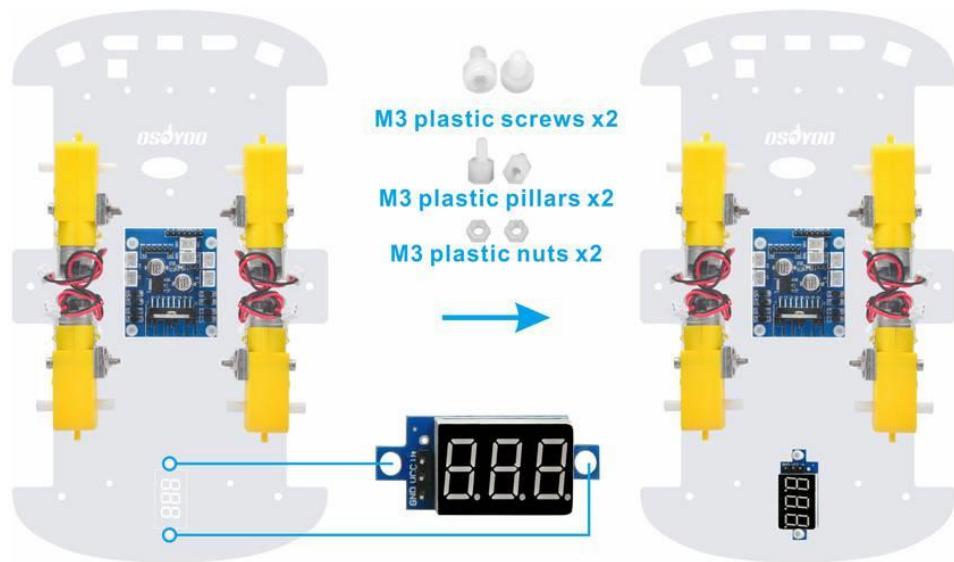
- 3) Fix 4 motors on lower car chassis with screw M3*10 hex screws via hex screwdriver (**screws in metal motor holder package**)



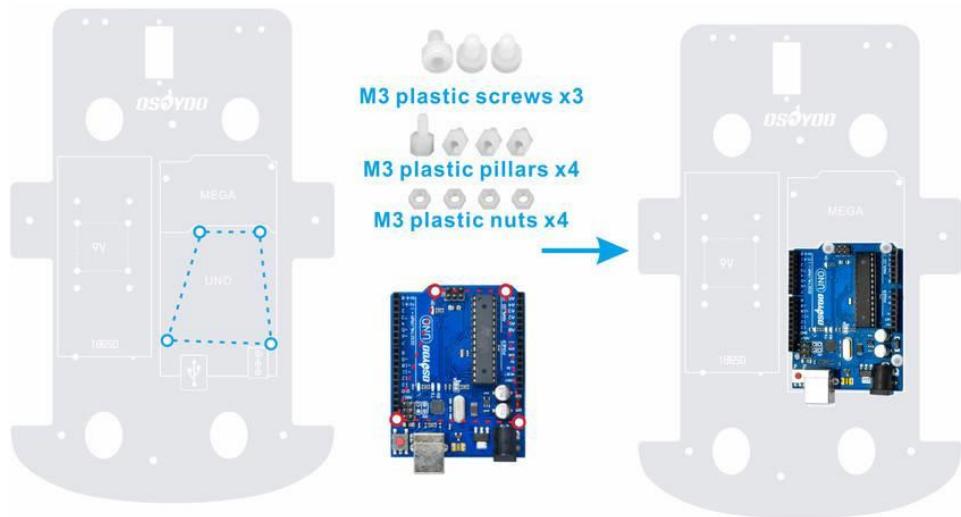
- 4) Install OSOYOO MODEL X motor driver module to lower car chassis with 4pcs M3 plastic screws, plastic pillars and plastic nuts. (**Please make sure you install the OSOYOO MODEL X motor driver module in correct direction.**)



- 5) Install voltage meter on low car chassis with 2pcs M3 plastic screws, plastic pillars and plastic nuts

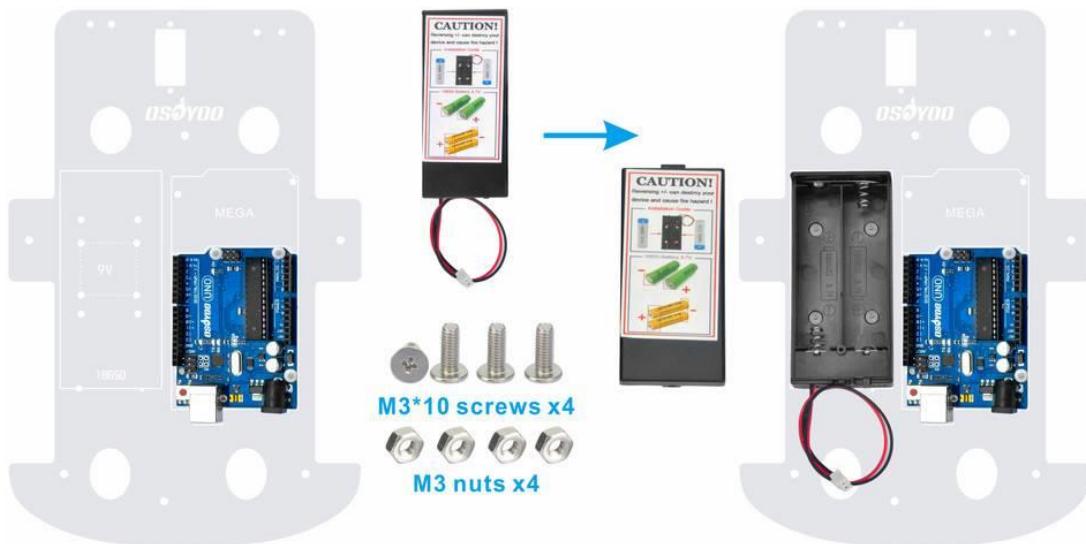


- 6) Fix OSOYOO UNO R3 board on upper car chassis with 4pcs M3 plastic screws, plastic pillars and plastic nuts. (**Please install UNO R3 board at the side with printer**)

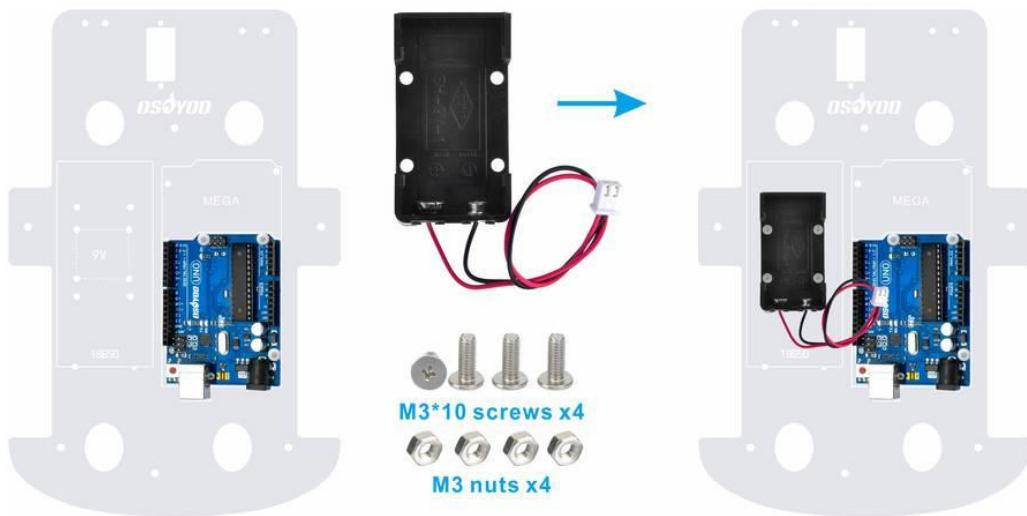


7) There are two kind of robot car set for you to choose to buy. The one is with 2 battery box(18650 battery box and 9V battery box), and the other one is with 1 pair 18650 batteries and 1 piece battery charger for 18650. We recommend to use 18650 batteries as the power. If you want to use 9V battery as the power, please use rechargeable 9V battery. Don't use Carbon zinc battery, as this can't provide enough current for the robot car.

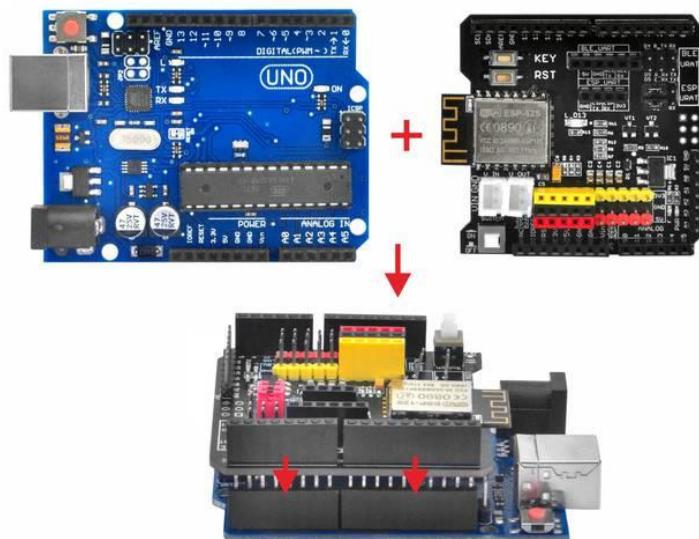
A) Fix this Battery Box on upper chassis with 4pcs M3 x 10 screws and M3 nuts.



B) Please install this Battery Box on upper chassis with 4pcs M3 x 10 screws and M3 nuts. (**These are the same as screws and nuts for 18650 battery box.** If you don't get 9V battery case, please ignore this step).



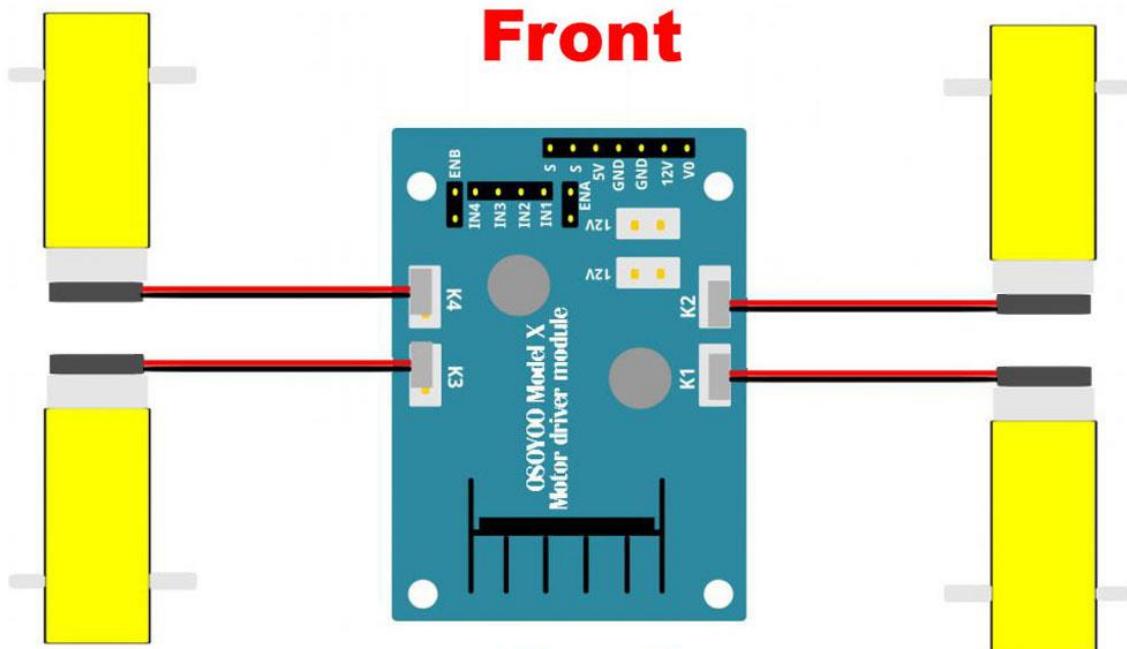
8) Insert OSOYOO Uart WIFI shield V1.3 onto your UNO board



Connection

1) Connect 4 motors to OSOYOO MODEL X motor driver module K1 to K4 sockets as per following graph:

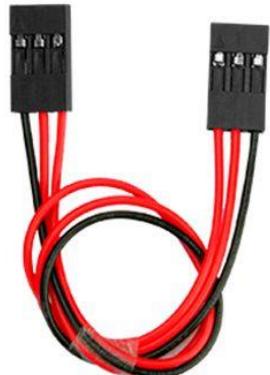
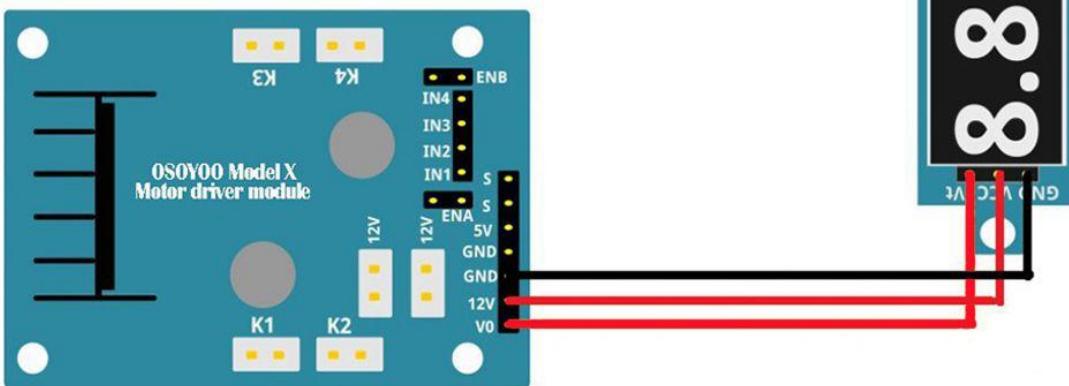
Front



Back

- 2) Connect Voltage Meter to OSOYOO MODEL X motor driver module with 3pin female to female jumper wire as below connection diagram

OSOYOO MODEL X motor dirver module	Colors	Voltage Mete
GND	Black	GND
12V	Red	VCC
V0	Red	VT



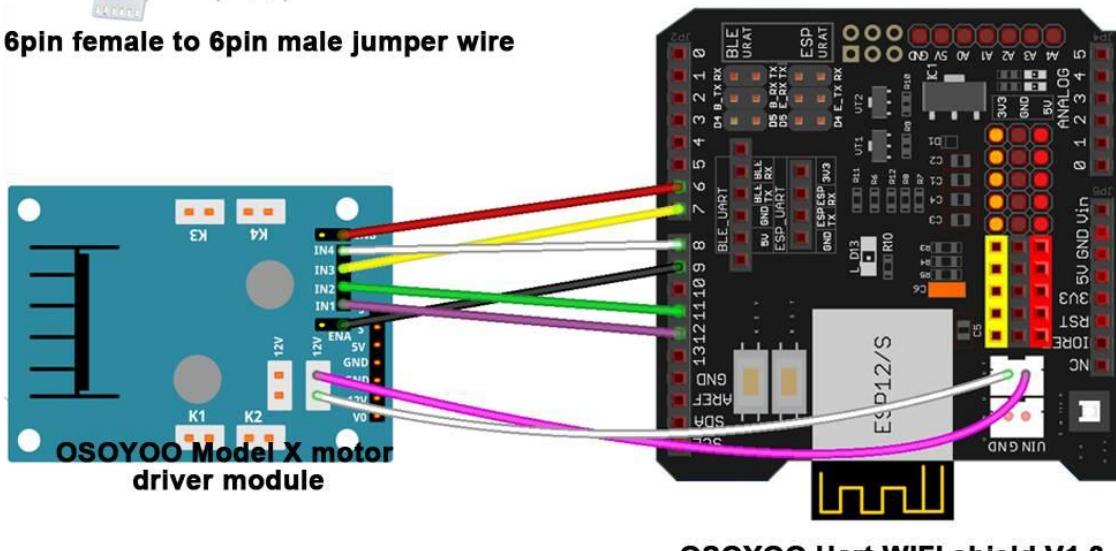
3Pin female to 3Pin
female Jumper wire

- 3) Connect OSOYOO MODEL X motor driver module 6 control pins to OSOYOO Uart WiFi shield V1.3 D6, D7, D8, D9, D11, D12 with 6pin male to 6pin female jumper wire, and 12V-GND socket to VIN-GND socket with OSOYOO 2pin PnP cable 20cm as per following graph



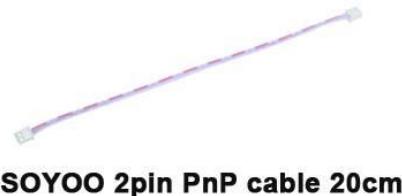
OSOYOO MODEL X motor driver module	Color	OSOYOO Uart Wifi shield V1.3
ENA	Black	D9
IN1	Purple	D12
IN2	Green	D11
IN3	Yellow	D7
IN4	White	D8
ENB	Red	D6

6pin female to 6pin male Jumper wire



OSOYOO Uart WIFI shield V1.3

OSOYOO MODEL X motor driver module	OSOYOO Uart WiFi shield V1.3
12V	VIN
GND	GND

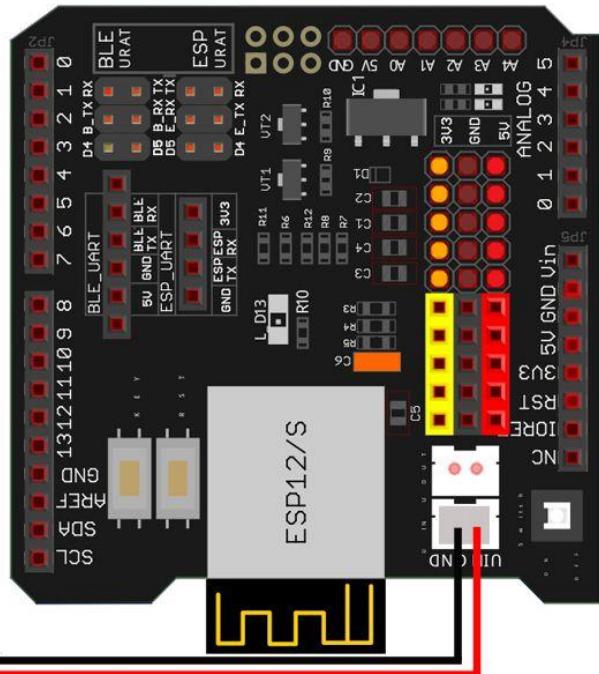
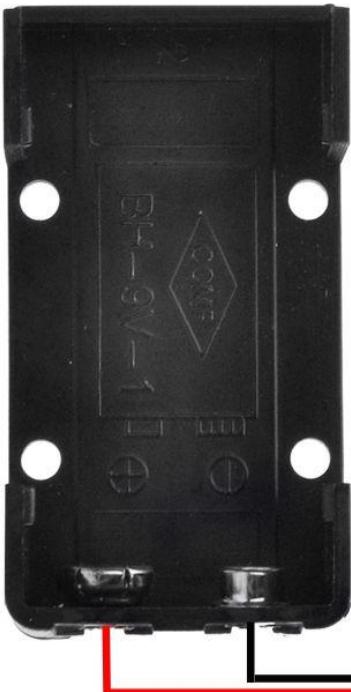
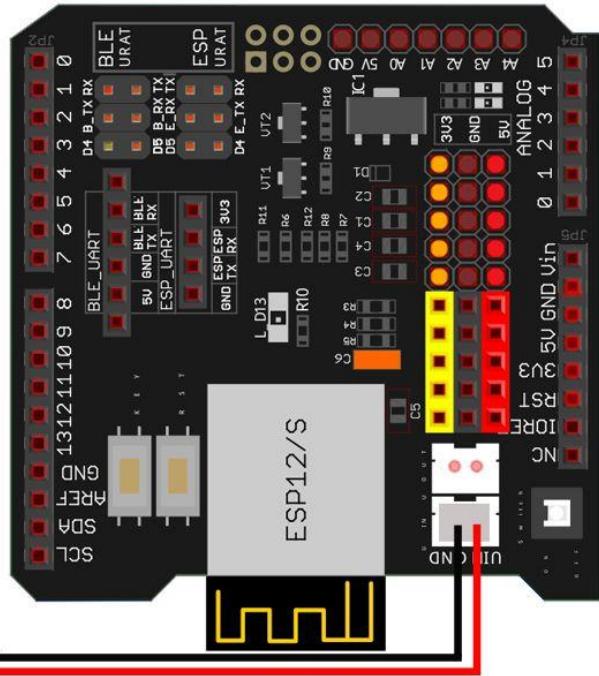


OSOYOO 2pin PnP cable 20cm

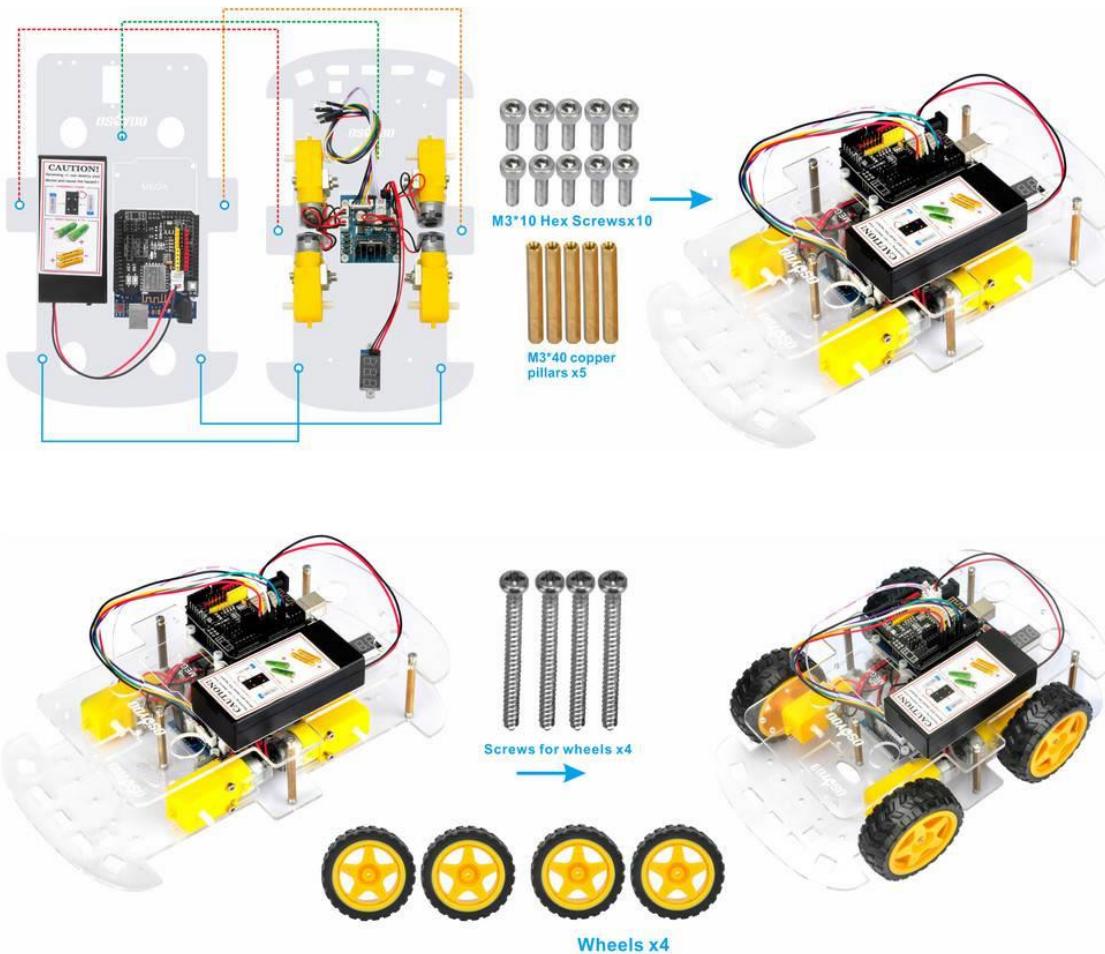
Caution:

When insert/remove this 6-pin plug into Model X 6-pin male socket, please hold the plastic pin-holder to do operation. Never drag the wires to pull the plug out of the socket, otherwise it will damage the wires.

- 4) Connect battery box (battery box for 18650 batteries or for 9V battery) to VIN-GND socket of OSOYOO Uart WiFi shield V1.3 according below connection diagram



5) Connect upper chassis to lower chassis with five copper pillars and fix copper pillars with 10pcs M3*10 hex screws, then install 4 wheels onto the motors.



Now hardware installation is almost down. Before we install 18650 batteries into the box, we need burn the sample code into Arduino First.

Software Installation

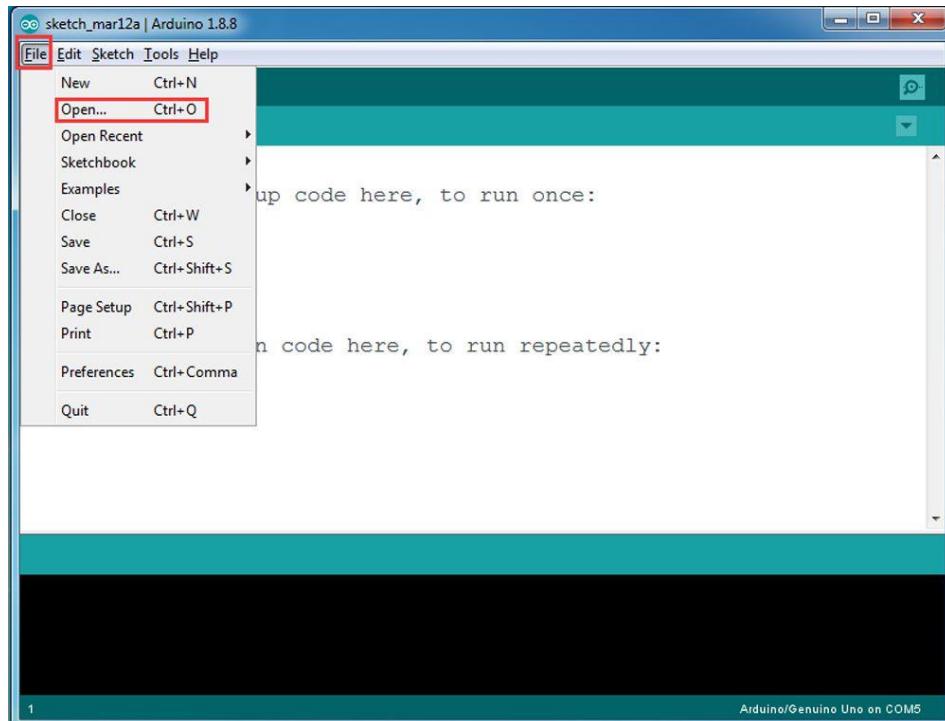
Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/

Step 1: 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.

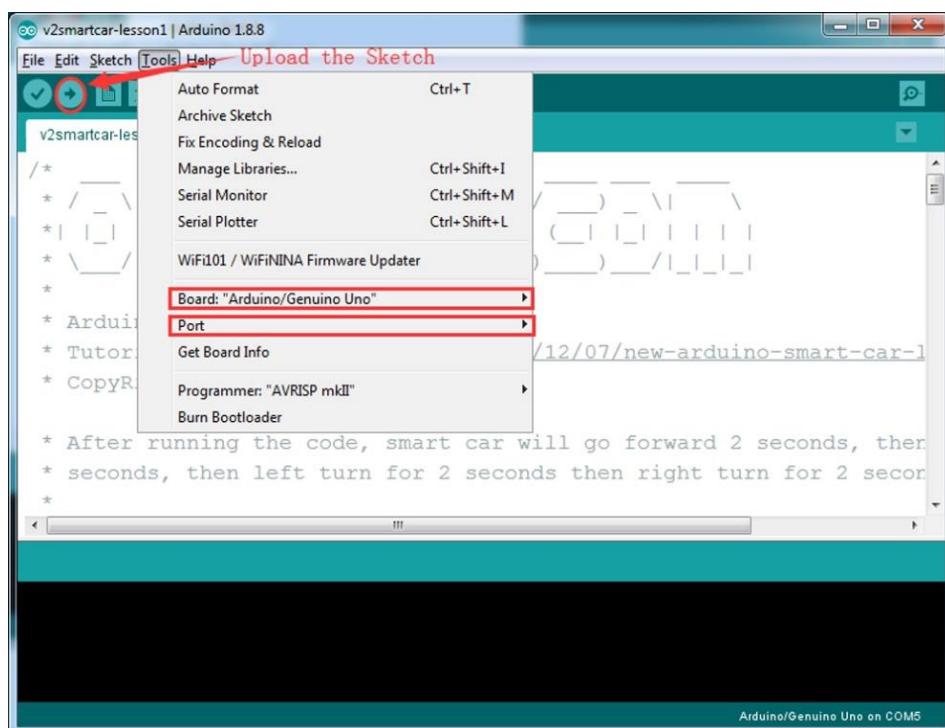
Step 2: Download Lesson One sample code

from <https://osoyoo.com/driver/v2smartcar-lesson1.zip> , unzip the download zip file smartcar-lesson1.zip, you will see a folder called v2smartcar-lesson1.

Step 3: Connect Arduino UNO to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code “v2smartcar-lesson1.ino” in smartcar-lesson1 folder, load the code into arduino.



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



Final Testing:

Note:1) Recommend 18650 batteries as these batteries can make the car run smoothly.

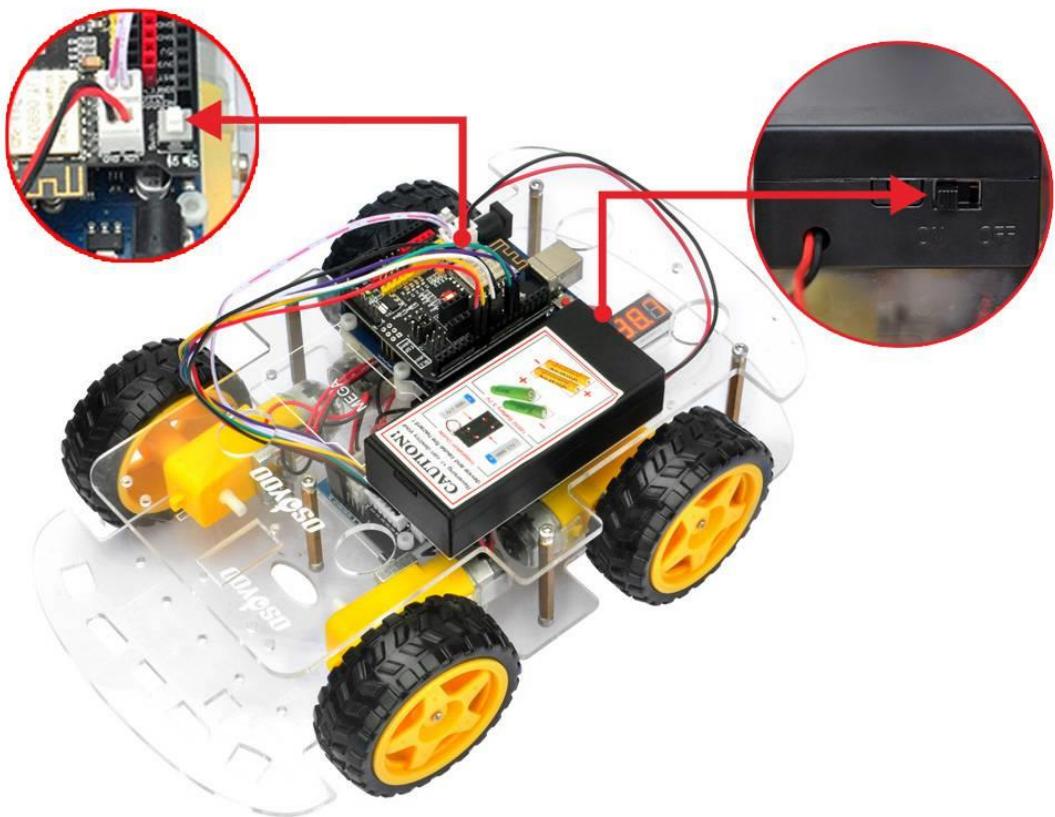
2) The 18650 batteries we used in lessons are around 65 mm (2.56 inch) long, without an internal protection circuit.

3) Check the box instruction and make sure polar direction is correct, otherwise it can destroy your device and cause fire hazard.

Please install your 18650 batteries in battery box for 18650 as per following instruction:

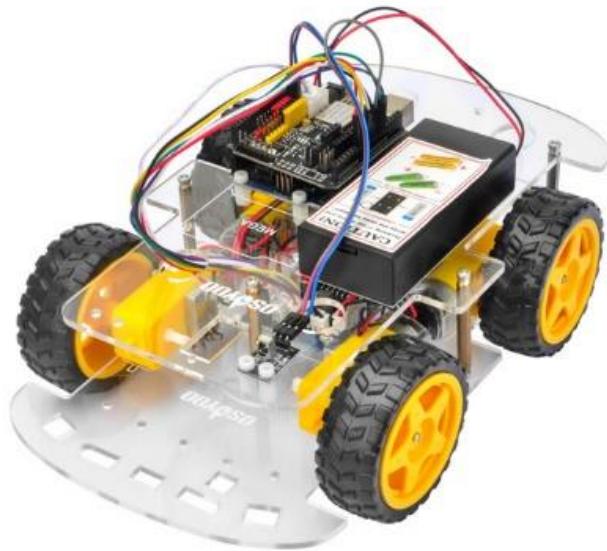


Disconnect Arduino from PC, put battery into battery box. When you put the car on the ground and turn on the switch on OSOYOO Uart WIFI shield V1.3 and the switch on battery box if you install battery box for 18650, the car should go forward 2 seconds, then go backward 2 seconds, then left turn for 2 seconds, then right turn for 2 seconds, then stop. (If the car does not move as per above mentioned result, you should check your wire connection, battery voltage (must over 7.2v).



OSOYOO V2.1 Robot car kit Lesson 2: IR

Remote Control Robot Car



Objective

In this tutorial, we will use Osoyoo Smart DIY kit to make a simple remote controlled smart car. Once the car installation is completed, we will use a Infrared Remote to control the car movements including go forward, go back, left turn and right turn.

Please enter the link to watch the video:

<https://www.youtube.com/watch?v=eSu8XfcTsEk&list=PLvCUFipQZCUTstVBU-7gLYCLhI1fRuca3&index=3&t=0s>

Parts and Devices

No.	Picture	Device	Qty.	Data sheet	Buy in Link
1		IR receiver	1	click here	Click here to buy
2		IR remote controller	1	click here	Click here to buy

3		20Pin jumper wire Male to female 20cm	some		
4		Hex Screwdriver	1		Click here to buy
5		M3 plastic screw	18		
6		M3 plastic pillar	19		
7		M3 plastic nut	19		

Hardware Installation

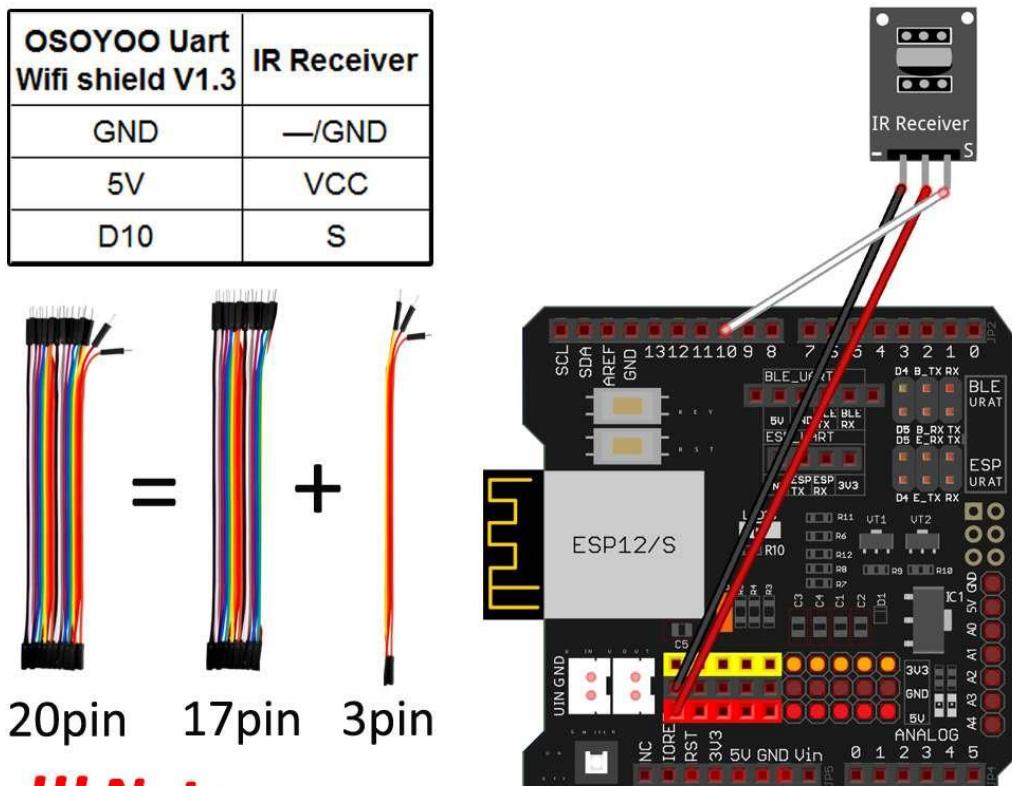
Step 1: Install the smart car basic frame work as per [Smart Car Lesson 1](#) . If you have already completed installation in Lesson 1 , just keep it as is.

Step 2: Add an IR receiver module onto the car. Install the IR receiver module with 2pcs M2.5*10 plastic screws, M2.5 plastic pillars and M2.5 plastic nuts at the front of upper chassis.



Step 3: Connect the S pin in IR receiver to D10 pin in UNO board, GND to GND, VCC to 5V, as the following photo (**Remember: DO NOT remove any**

existing wires installed in Lesson 1) :

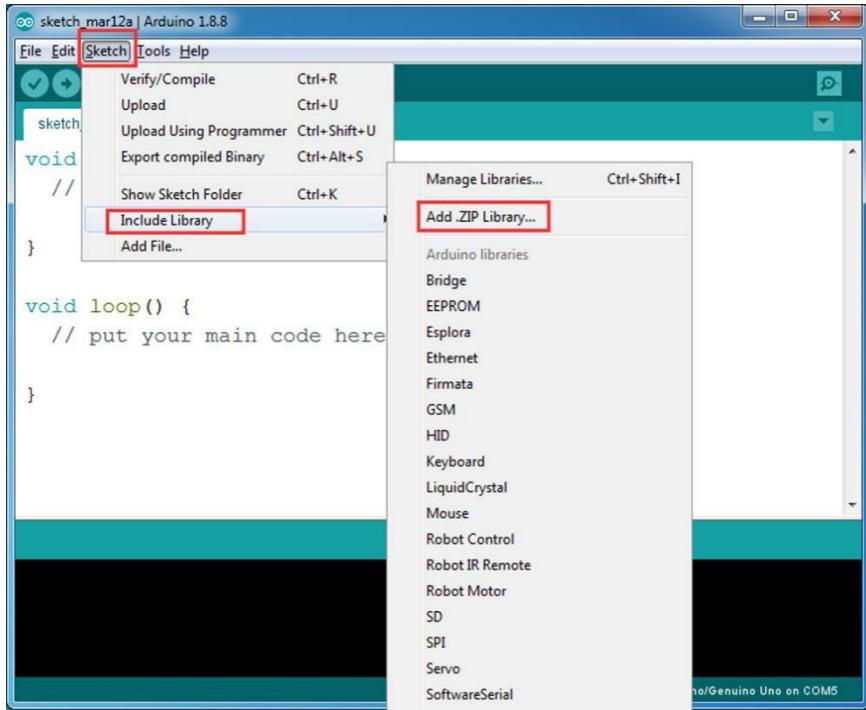


Software Installation

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/

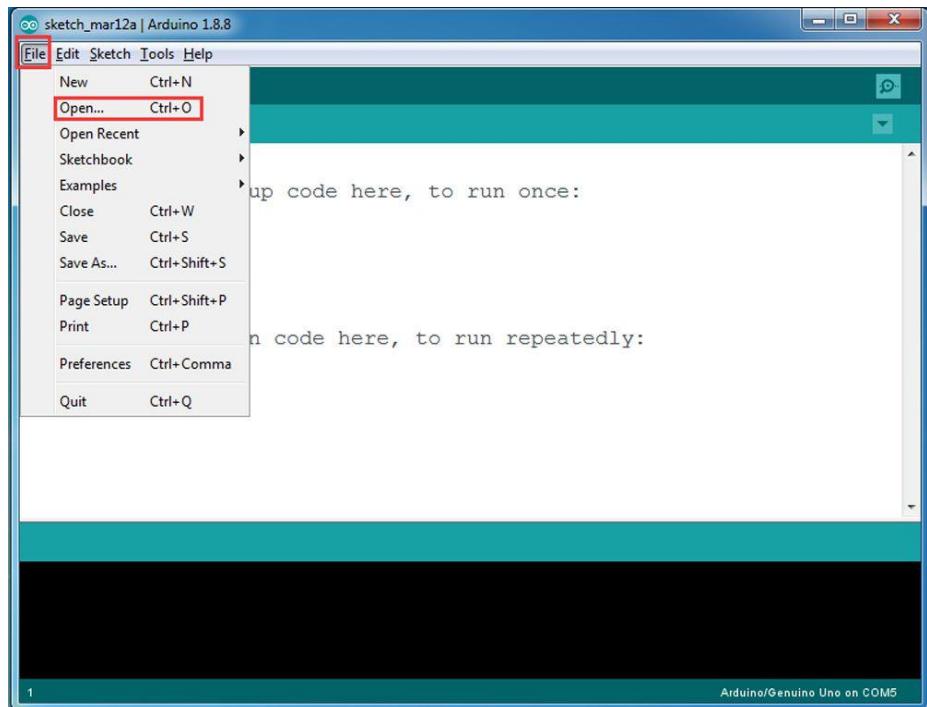
Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step) Download Arduino IDE from <https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

Step 2: Install IRremote library into Arduino IDE (If you have already installed IRremote library, please skip this step) Download IRremote library from <https://osoyoo.com/wp-content/uploads/samplecode/IRremote.zip>, then import the library into Arduino IDE(Open Arduino IDE-> click Sketch->Include Library->Add .Zip Library)

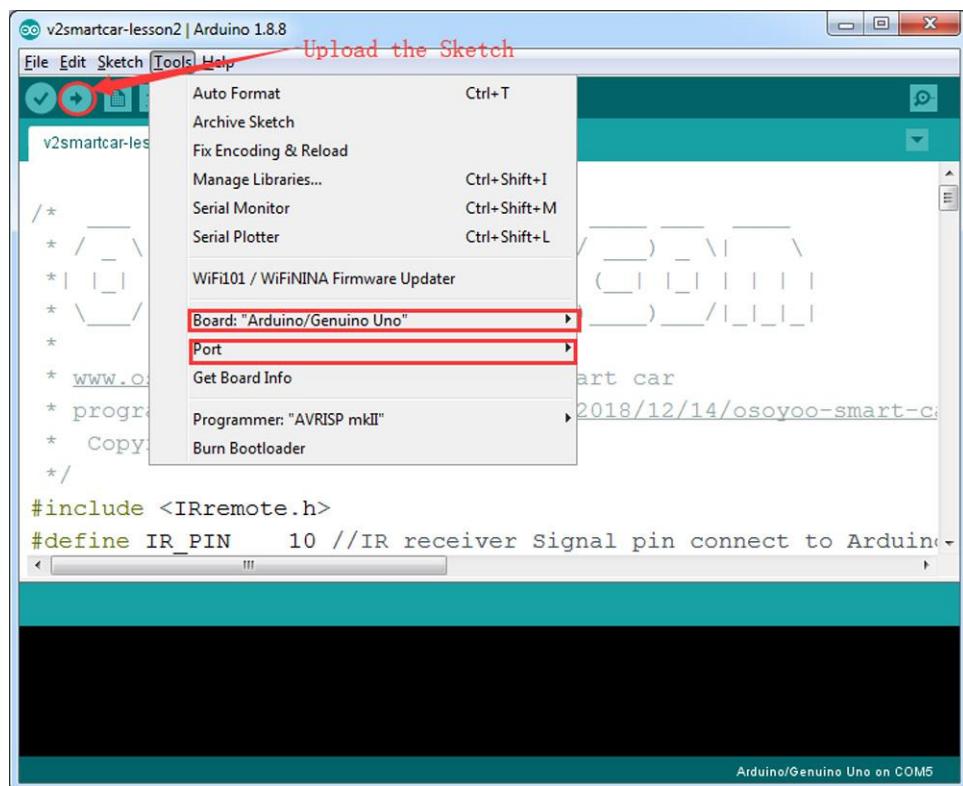


Step 3: Download Lesson 2 IRremote smart car sample code from <https://osoyoo.com/driver/v2smartcar-lesson2.zip> and unzip the download zip file smartcar-lesson2.zip, you will see a folder called smartcar-lesson2

Step 4: Connect UNO R3 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code “smartcar-lesson2.ino” in smartcar-lesson2 folder, load the code into arduino.



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



Testing

Press IR controller keys to control the car movements as per following instruction table

IR Remote Key	Car movement
▲	Go forward
▼	Go backward
◀	Turn left
▶	Turn right



Trouble shooting

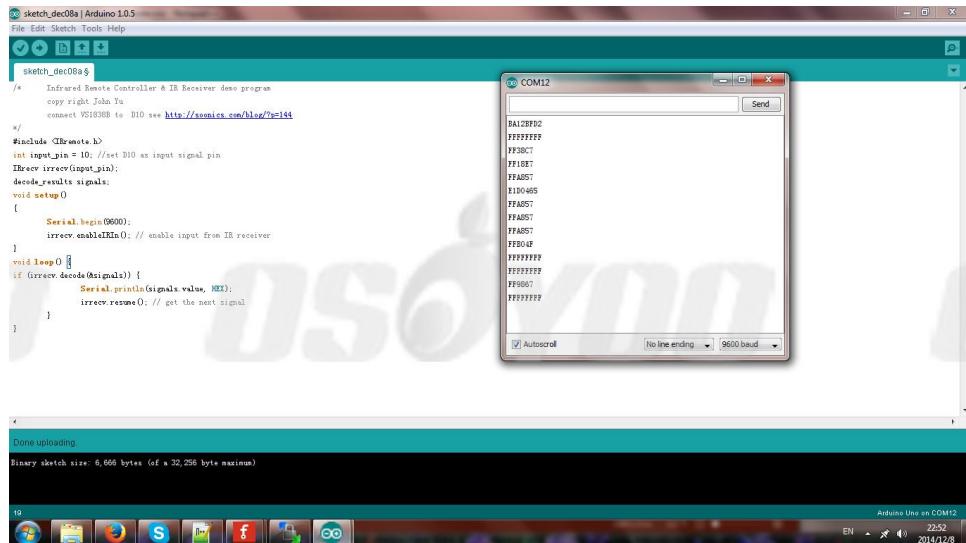
Some user found that this IR remote does not work. The reason might be the IR remote sends different button code which does not match our sample code. In order to solve this problem. Please take following steps:

Step A) Get the IR code of each button in your IR remote.

Copy code from following link: <https://osoyoo.com/wp-content/uploads/samplecode/irdemo.ino>

Upload above sketch into your Arduino and open the serial monitor in your upper-right corner.

Press the “▲” “▼” “>” “<” “OK” button in your remote, you will see their IR code as following picture:



Write down the IR code of your control buttons “▲” “▼” “>” “<” “OK” button,

STEP B) replace the IR code in lesson 2 sketch file:

Open your Lesson 2 code again, then you will see following lines define the IR CODE of each button:

```
#define IR_ADVANCE      0x00FF18E7      //code from IR controller "▲"  
button  
  
#define IR_BACK        0x00FF4AB5      //code from IR controller "▼"  
button  
  
#define IR_RIGHT       0x00FF5AA5      //code from IR controller ">"  
button  
  
#define IR_LEFT        0x00FF10EF      //code from IR controller "<"  
button  
  
#define IR_STOP         0x00FF38C7      //code from IR controller "OK"  
button  
  
#define IR_turnsmallleft 0x00FFB04F      //code from IR controller "#"  
button
```

Please change the value of each button in above lines to match the code from **Step A).** If you don't know how to change, just [Send Email](#) to us and give us the code of each button from **Step A)**, I can help you to change the code and email new sketch file to you.

Above method can also allow you to use other IR sending device (i.e. TV remote, DVD remote, air conditioner remote etc.) to control the car. Just use Step A) to get the key code of your remote and change the sketch file in Step B), it will work.

OSOYOO V2.1 Robot car kit Lesson 3: Object follow Robot car



Objective

In this lesson, we will install 2pcs IR Obstacle Avoidance modules on robot car and program the car to follow object movements. The principle of this experiment is based on IR detection object. The car receives the signal from the IR Obstacle Avoidance module, and then the program will drive the car to take actions.

You must complete **lesson 1 (assembling the car)** before you continue on with this lesson.

Please enter the link to watch the video: <https://www.youtube.com/watch?v=7-mrbLRUjjc&list=PLvCUFipQZCUstVBU-7gLYCLhi1fRuca3&index=4&t=0s>

Parts and devices

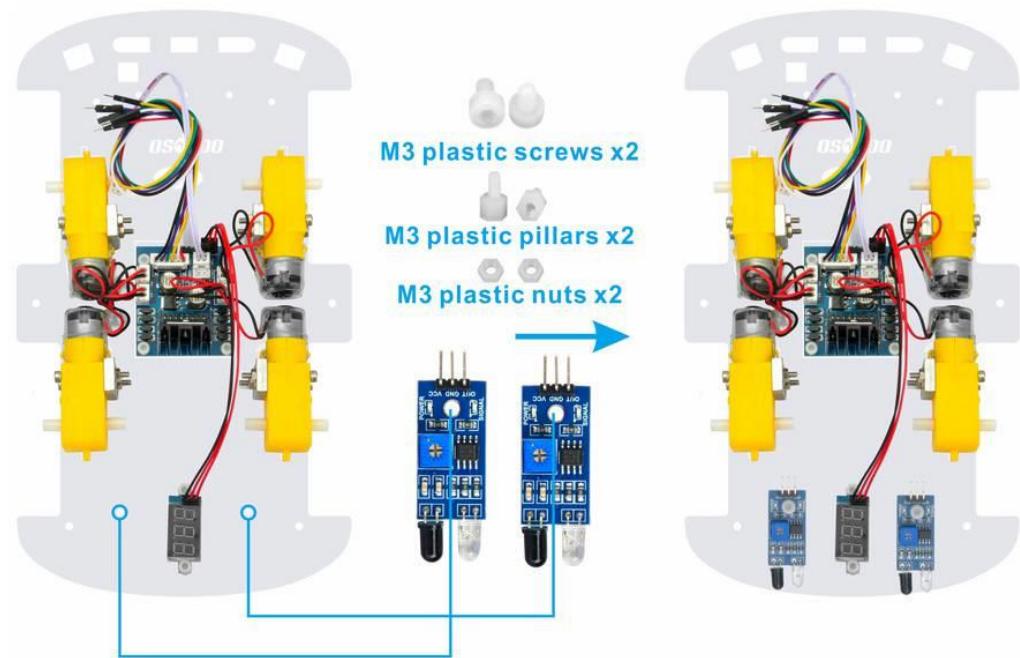
No.	Picture	Device	Qty.	Data sheet	Buy in Link
-----	---------	--------	------	------------	-------------

1	A small blue printed circuit board with a white ultrasonic sensor module attached. The module has four pins: Vcc, GND, Trig, and Echo.	Ultrasonic Sensor	2	click here	Click here to buy
2	A bundle of 20 individual wires, each with a male and female connector, colored in red, black, blue, green, yellow, and orange.	20Pin jumper wire Male to female 20cm	some		
3	A black-handled Philips (cross-head) screwdriver with a standard tip.	Philips screwdriver	1		Click here to buy
4	A black-handled hex screwdriver with a hexagonal tip.	Hex Screwdriver	1		Click here to buy
5	Two white M3 plastic screws.	M3 plastic screw	2		
6	Two white M3 plastic pillars (bolts).	M3 plastic pillar	2		
7	Two white M3 plastic nuts.	M3 plastic nut	2		

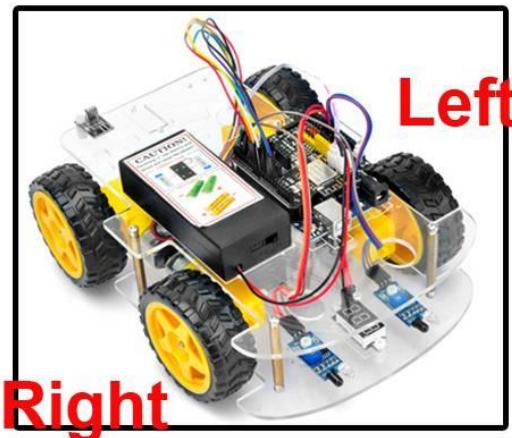
Hardware installation

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

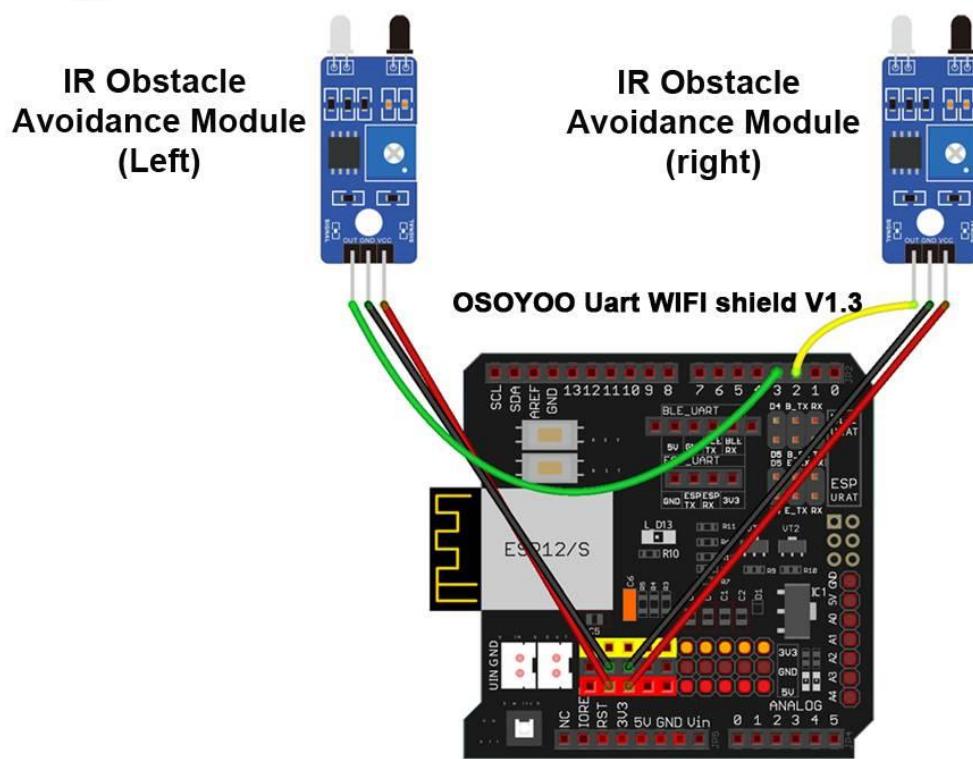
Step 2: Remove the screws on copper pillars and add 2pcs IR Obstacle Avoidance modules onto the car. Install the IR Obstacle Avoidance modules with 2pcs M3 plastic screws, M3 plastic pillars and M3 plastic nuts at the back of low car chassis.



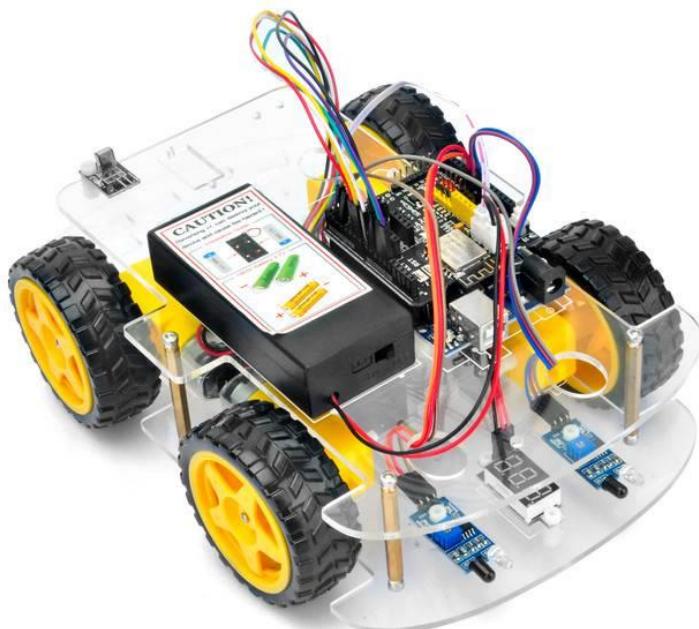
Step 3: Connect 2pcs IR Obstacle Avoidance modules as below diagram
 (Remember: DO NOT remove any existing wires installed in Lesson1):



IR Obstacle Avoidance Module	OSOYOO Uart Wifi shield V1.3
VCC(left)	5V
GND(left)	GND
Out(left)	D3
VCC(right)	5V
GND(right)	GND
Out(right)	D2



Step 4: Fix the screws on copper pillars to connect upper chassis to lower chassis.



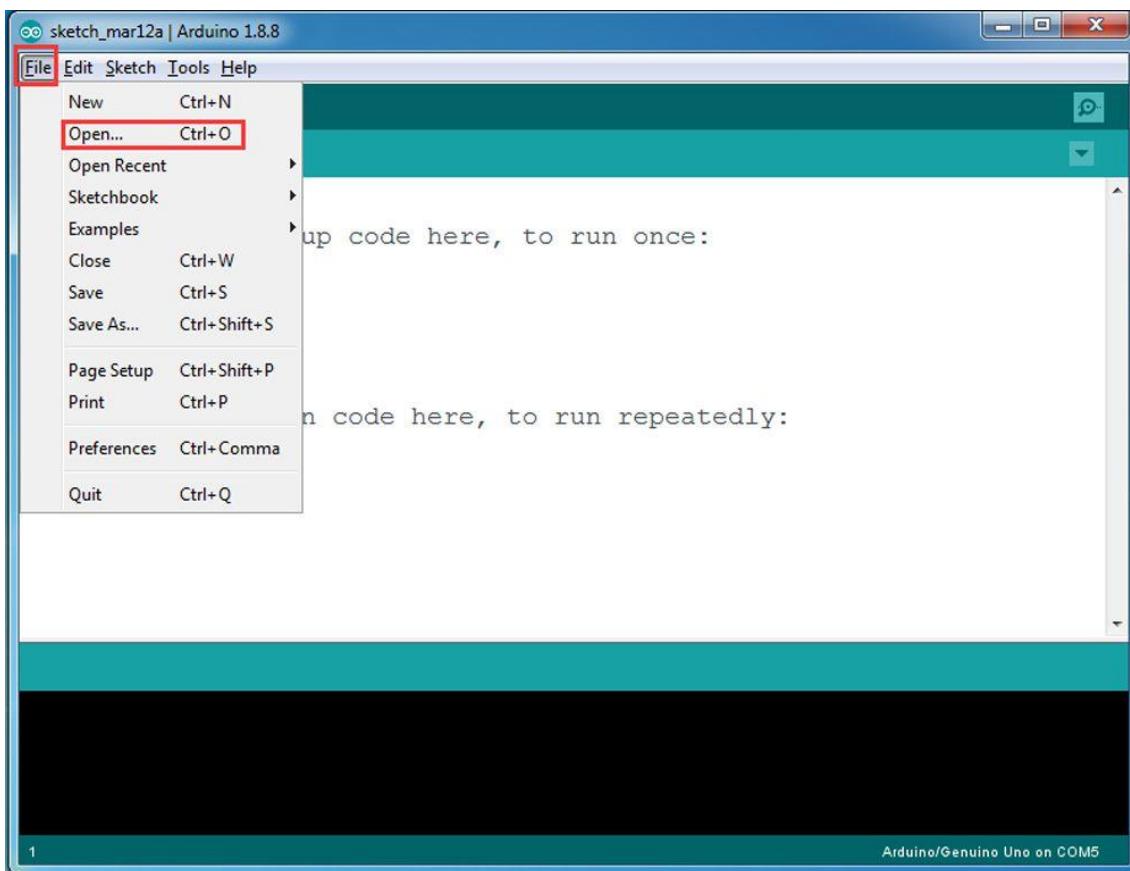
Software installation

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/

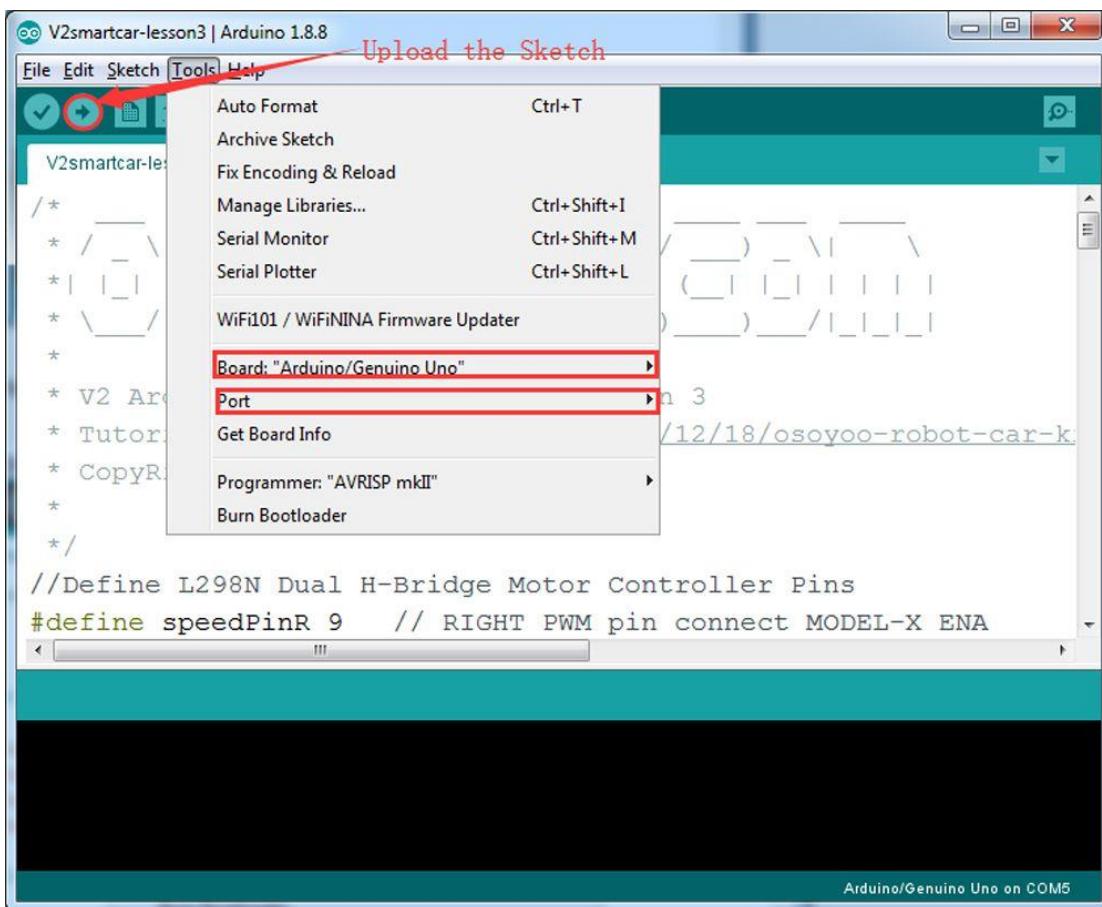
Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step) Download Arduino IDE from <https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

Step 2: Download Lesson One sample code from <https://osoyoo.com/driver/v2smartcar-lesson3.zip> , unzip the download zip file v2smartcar-lesson3.zip, you will see a folder called v2smartcar-lesson3.

Step 3: Connect Arduino UNO to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code “v2smartcar-lesson3.ino” in v2smartcar-lesson3 folder, load the code into arduino.



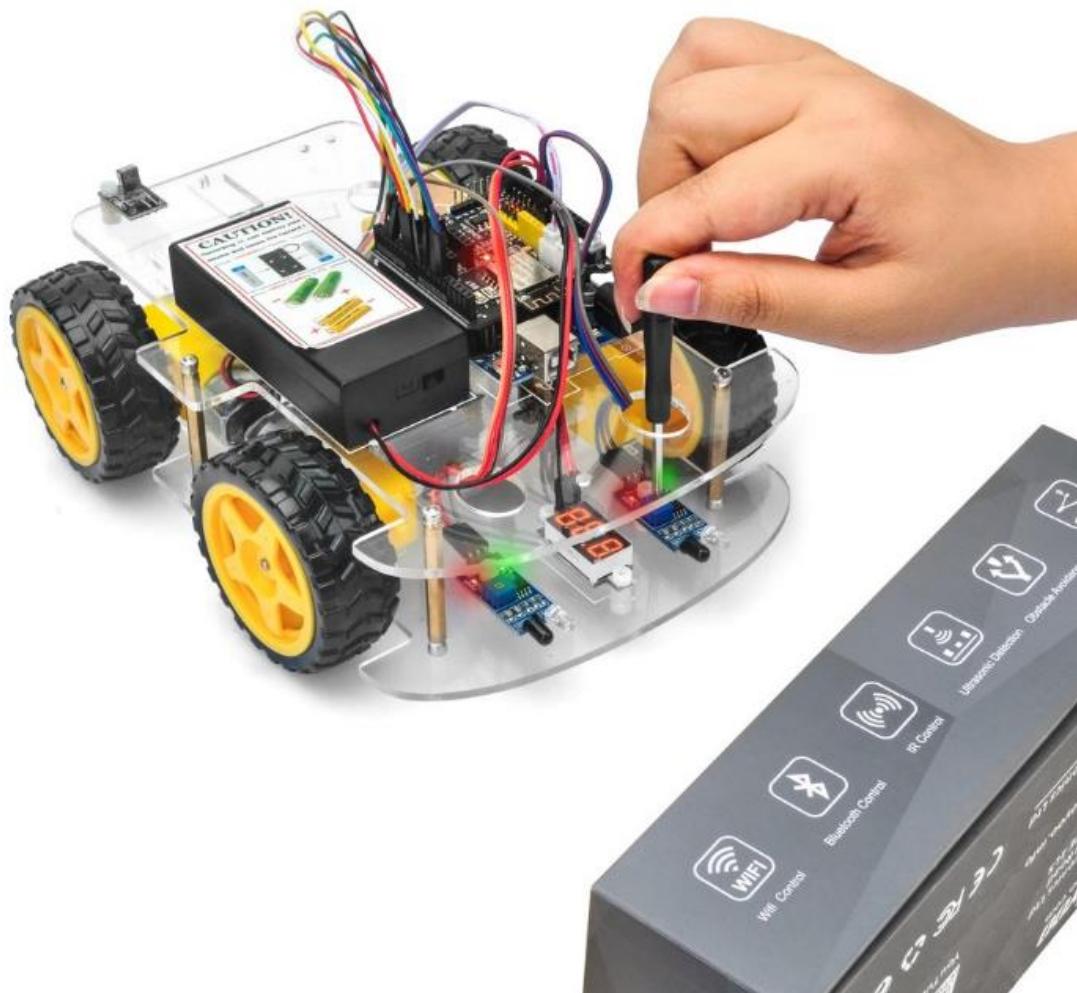
Step 4: Choose corresponding board/port for your project, upload the sketch to the board.



Adjust the sensitivity of IR Obstacle Avoidance modules

Turn on the car, put object about 10cm ahead of each IR Obstacle Avoidance modules and adjust potentiometer on IR Obstacle Avoidance modules to detect object or your hand.

Note: When these module detect objects, the power indicator and signal indictor are on. When you move object over detection distance, the power indicator is on. If the signal indictor is always on even though the object is over detection distance, you also need to adjust the potentiometer



Final testing

Turn on the car, move object or your hand ahead of car, and then the car will move accordingly: looks like you pull it. It goes forward when both IR Obstacle Avoidance modules detect object or your hand; it turns right when the right IR Obstacle Avoidance modules detect object; it turns left when the left IR Obstacle Avoidance modules detect object.

When object or your hand is over 10cm ahead, it will stop.

Note:

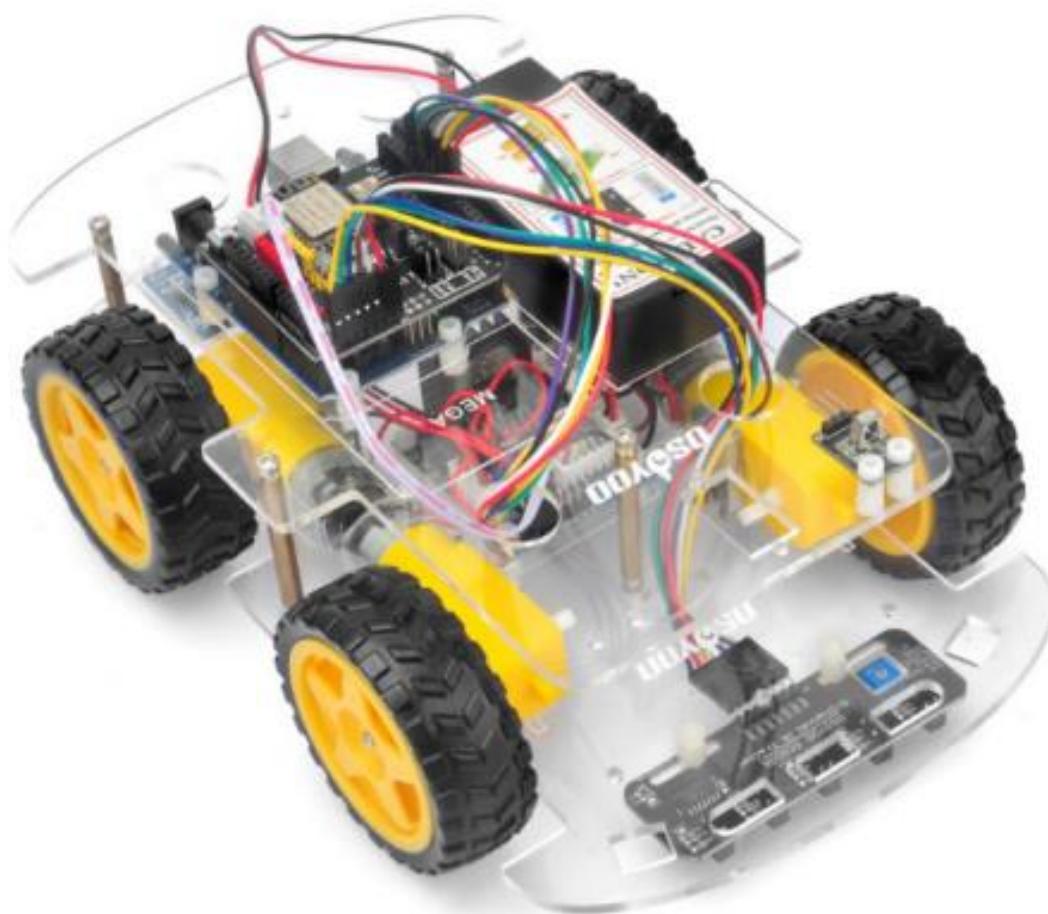
1) As IR Obstacle Avoidance modules are installed at the back of the

car, all movement directions are contrary to other courses.

2) The car can only move forward, turn right and turn left, but cannot move backward.



OSOYOO V2.1 Robot car kit Lesson 4: Tracking Line Robot Car



Objective:

In this lesson, we will add 5 channel black/white tracking sensor module to the framework built in Lesson 1. If you have not completed installation in Lesson 1, please review [Lesson 1](#)

The software in this lesson will read data from these 5 channel black/white tracking sensor module and automatically guide the smart car to move along the black track line in the white ground.

Please enter the link to watch the video:

<https://www.youtube.com/watch?v=cHQxxtyltZI&list=PLvCUFipQZCUTstVBU-7gLYCLhl1fRuca3&index=5&t=0s>

Parts and Devices

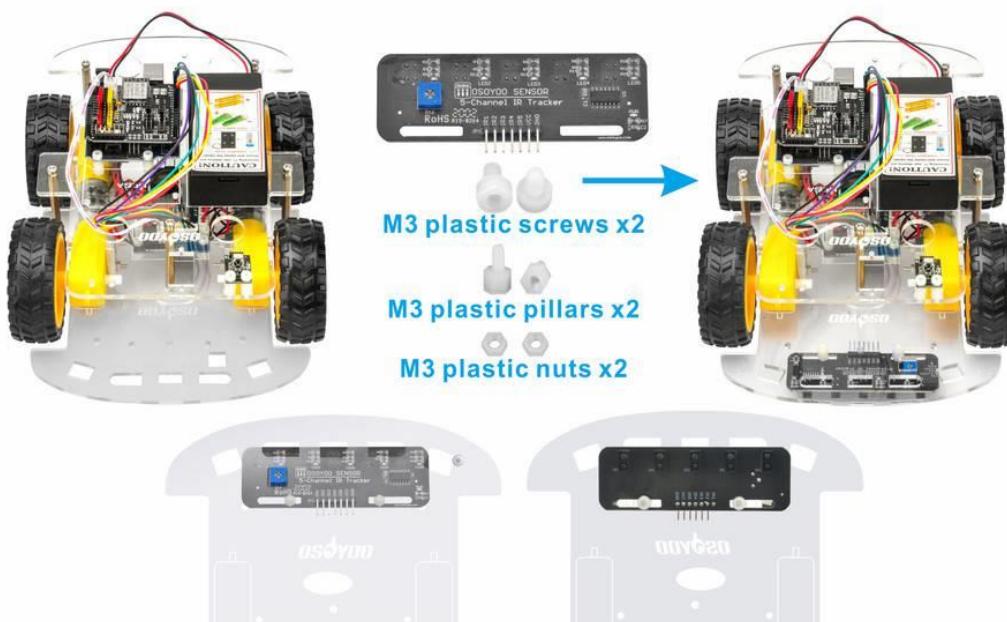
No.	Picture	Device	Qty.	Data sheet	Buy in Link
1	A small black rectangular electronic component with a blue square sticker in the center. It has several pins and a small heat sink attached to one side.	Tracking sensor module	1	click here	Click here to buy
2	A multi-colored ribbon cable with two female connectors at both ends, used for connecting the tracking sensor module to the breadboard.	7pin 25cm Female to Female Cable	1		Click here to buy
3	A standard Phillips head screwdriver with a black handle and a metal shaft.	Philips screwdriver	1		Click here to buy
4	A standard hex screwdriver with a black handle and a metal shaft.	Hex Screwdriver	1		Click here to buy
5	Two white plastic M3 screws, each with a flat head and a threaded shank.	M3 plastic screw	2		
6	Two white plastic M3 pillars, which are cylindrical spacers used for mounting.	M3 plastic pillar	2		
7	Two white plastic M3 nuts, used for securing the pillars to the breadboard.	M3 plastic nut	2		

Hardware Installation

Step 1: Motor driver (Model-X) pin installation.

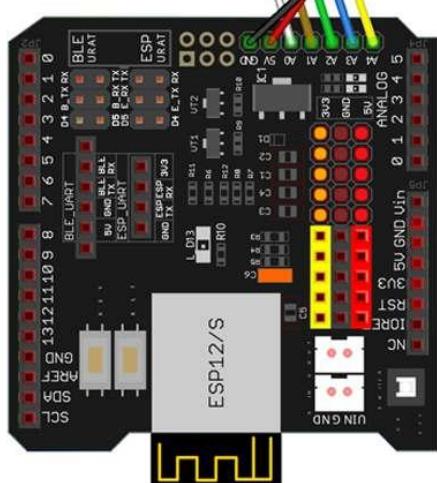
Start the installation from previous status of [Smart Car Lesson 1](#). If you have installed Lesson 2 or 3, you can remove the wires.

Step 2: Install tracking sensor modules under lower car chassis with 2pcs M3 plastic screws, M3 plastic pillars and M3 plastic nuts.



Step 3: Connect GND-VCC pin of tracking sensor module to GND-5V of OSOYOO Uart WiFi shield V1.3; connect IR1, IR2, IR3, IR4, IR5 pins to A0, A1, A2, A3, A4 with 7pin 25cm female to female cable as the following photo shows (Remember : DO NOT remove any existing wires installed in Lesson 1):

Tracking sensor module



OSOYOO Uart WiFi shield V1.3



7pin 25cm Female to Female Cable

Tracking sensor module	IR1	IR2	IR3	IR4	IR5	VCC	GND
Color	White	Ochre	Blue	Green	Yellow	Red	Black
OSOYOO Uart WiFi shield V1.3	A0	A1	A2	A3	A4	5V	GND

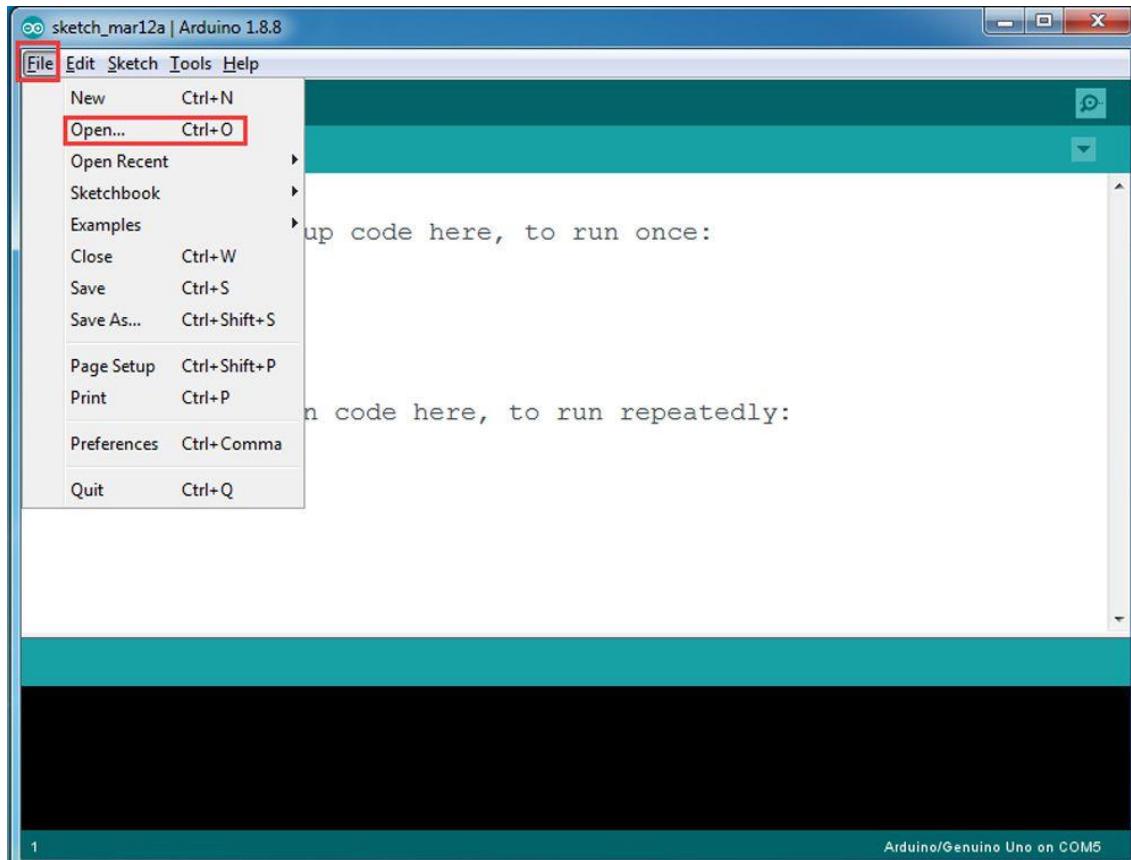
Software Installation

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 unzips zip files		Download 7zip here for free https://www.7-zip.org/

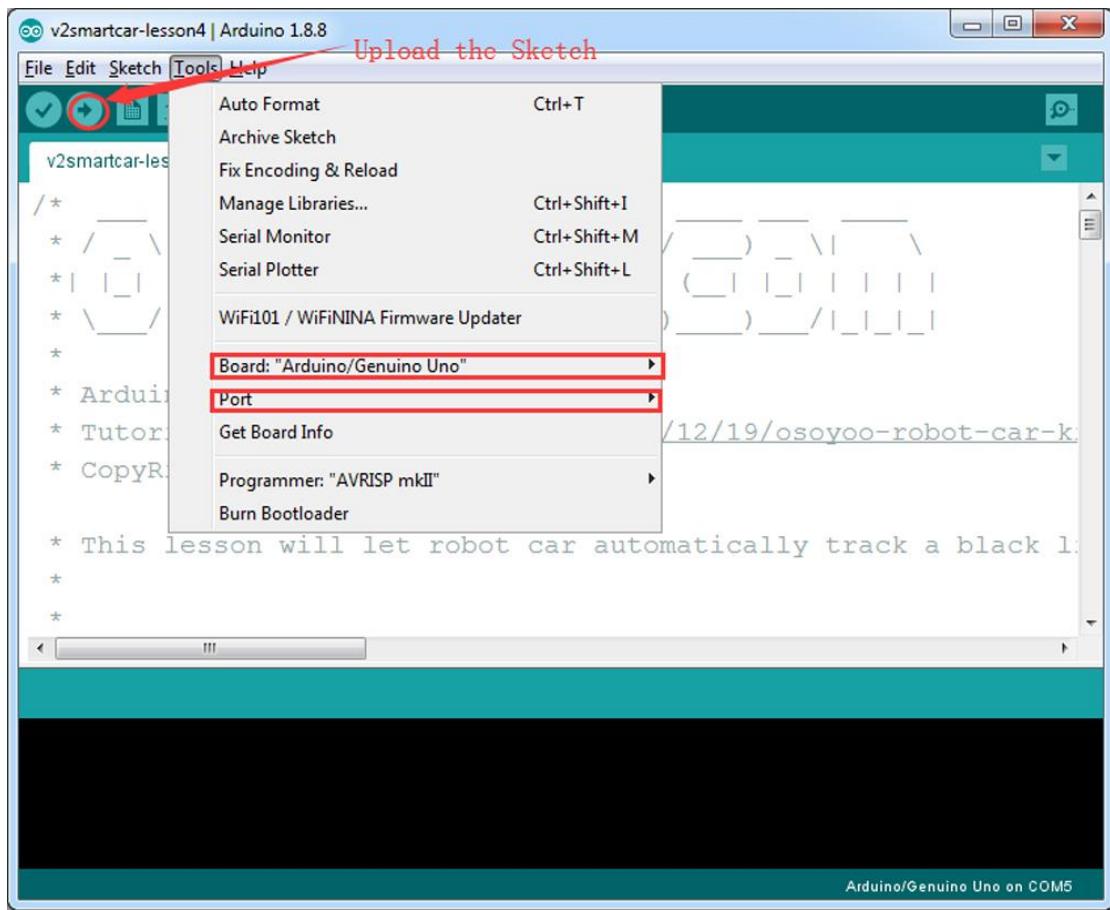
Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step). Download Arduino IDE from <https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

Step 2: Download Lesson 4 tracking smart car sample code from http://osoyoo.com/picture/V2.1_Arduino_Robot_Car/code/v2smartcar-lesson4.zip, unzip the download zip file smartcar-lesson4.zip, you will see a folder called smartcar-lesson4.

Step 3: Connect UNO R3 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code “smartcar-lesson4.ino” in smartcar-lesson4 folder, load the code into arduino.

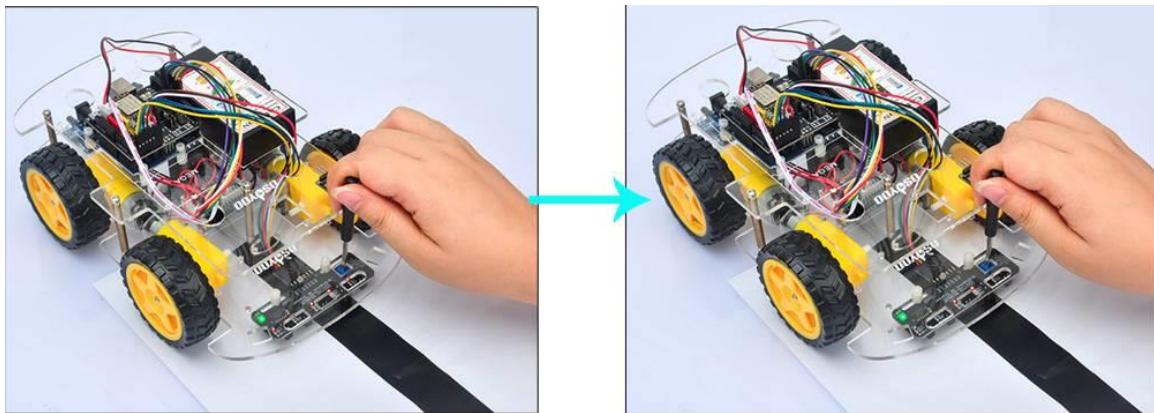


Step 4: Choose corresponding board/port for your project, upload the sketch to the board.



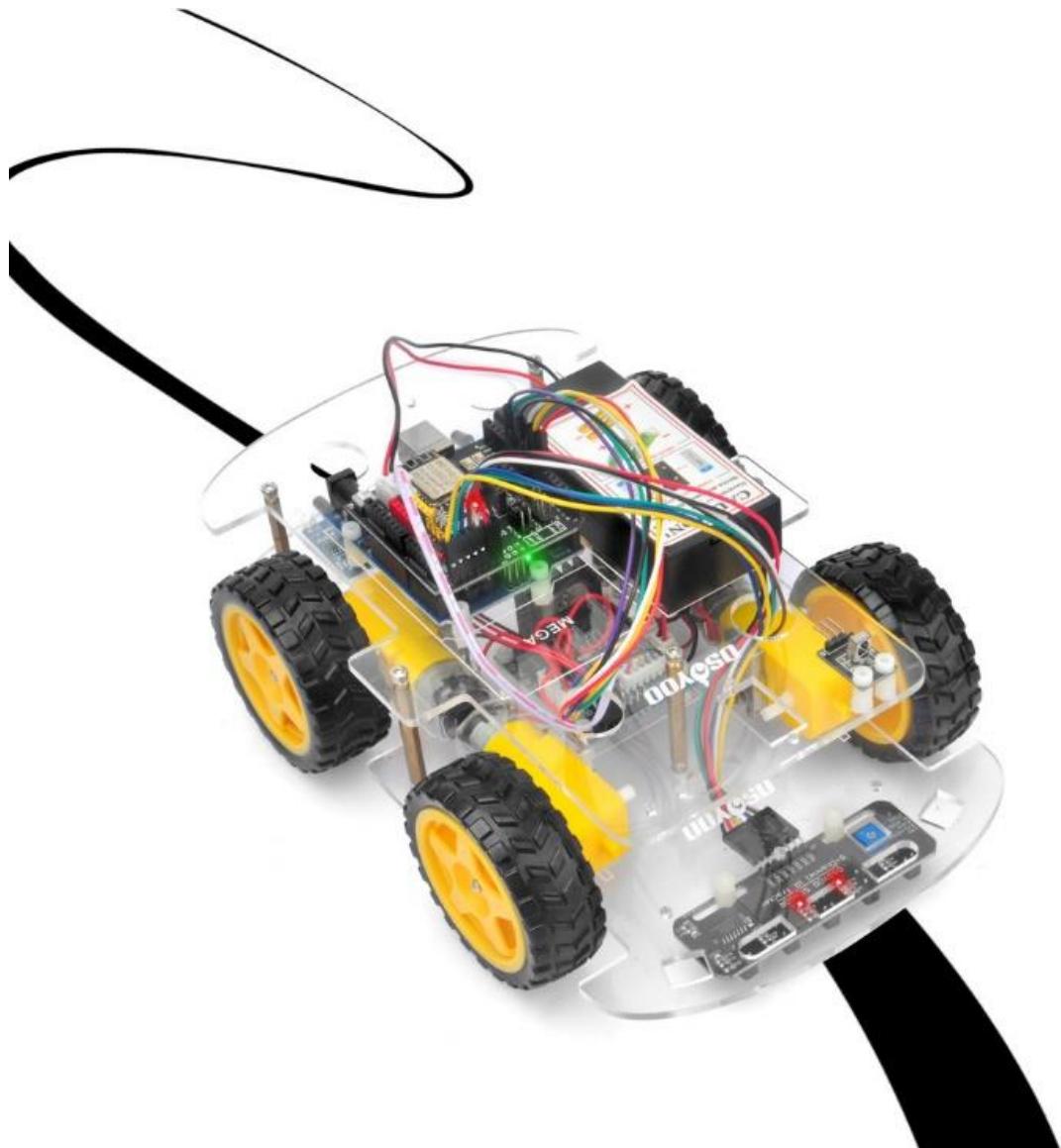
Adjust the sensitivity of tracking sensor modules

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

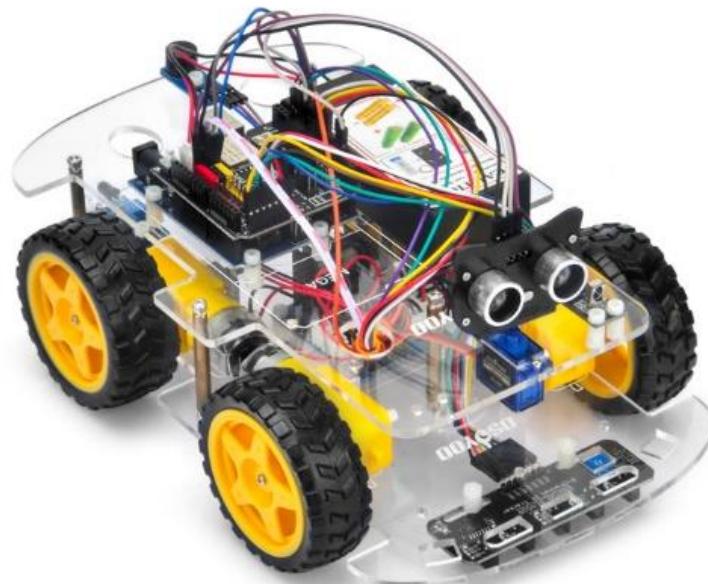


Prepare a black track (the width of the black track is more than 20mm and less than 30mm) in white ground. Please note, the bend angle of track can't be larger than 90 degree. If the angle is too large, the car will move out of the track.

Turn on the car and put the middle of tracking sensor module facing over black track, and then the car will move along the black track.



OSOYOO V2.1 Robot car kit Lesson 5: Obstacle Avoidance Robot Car



Objective

In this lesson, we will add a servo motor, an ultrasonic module and a buzzer onto Lesson 1 framework. With these new devices, the car can “see” obstacle through ultrasonic sensor and measure the distance. If the distance is less than predefined threshold value, the buzzer will beep and the car will turn around from the obstacle automatically.

You must complete [lesson 1 \(assembling the car\)](#) before you continue on with this lesson.

Please enter the link to watch the video:

<https://www.youtube.com/watch?v=cHQxxtyltZI&list=PLvCUFipQZCUTstVBU-7gLYCLhl1fRuca3&index=5&t=0s>

Parts and Devices

No.	Picture	Device	Qty.	Data sheet	Buy in Link
-----	---------	--------	------	------------	-------------

1		Ultrasonic Sensor	1	click here	Click here to buy
2		Servo Motor	1	click here	Click here to buy
3		Mount Holder for Ultrasonic Sensor	1		Click here to buy
4		Buzzer Sensor Module	1	click here	Click here to buy
5		Philips screwdriver	1		Click here to buy
6		Hex Screwdriver	1		Click here to buy
7		20Pin jumper wire Male to female 20cm	some		
8		M3 plastic screw	1		

9		M3 plastic pillar	1		
10		M3 plastic nut	1		
11		M2*4 self tapping screw	1		
12		M2.2*8 self tapping screw	2		
13		M1.4*8 screw and nut	4		

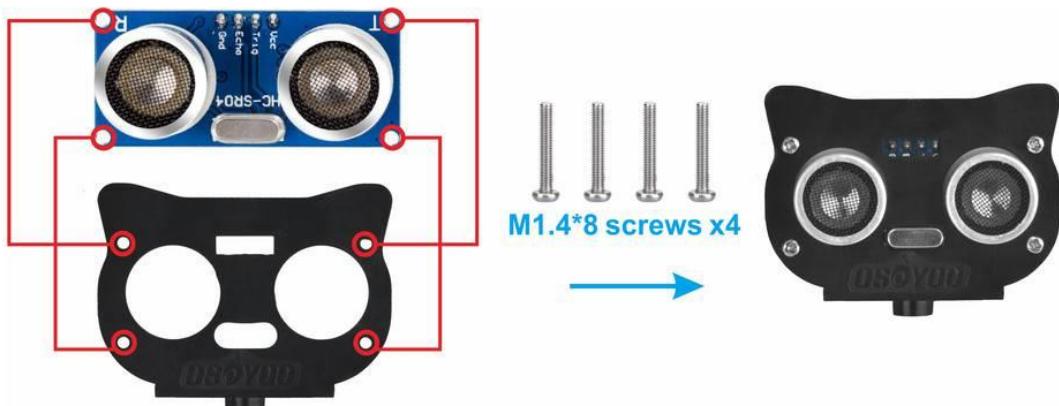
Hardware Installation

Step 1: Install the smart car basic frame work as per [Smart Car Lesson 1](#) .If you have already completed installation in Lesson 1 , **Everything keep it as is except move ENA from D9 to D3(we need D9 for Servo control)**. If you have installed Lesson 2 or 3, please remove the wires. If you have installed Lesson 4, please keep it.

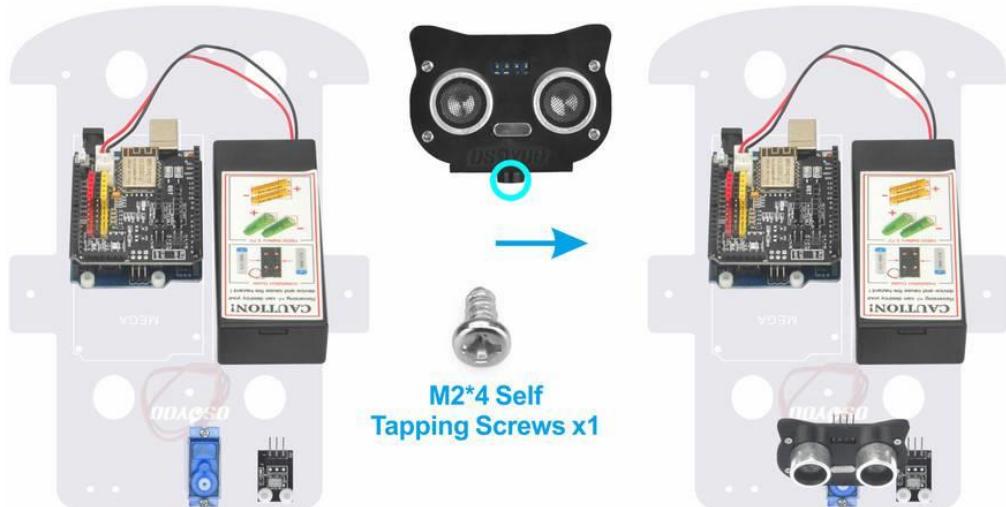
Step 2: Install servo motor at the front of upper car chassis with 2pcs M2.2*8 Self Tapping Screws



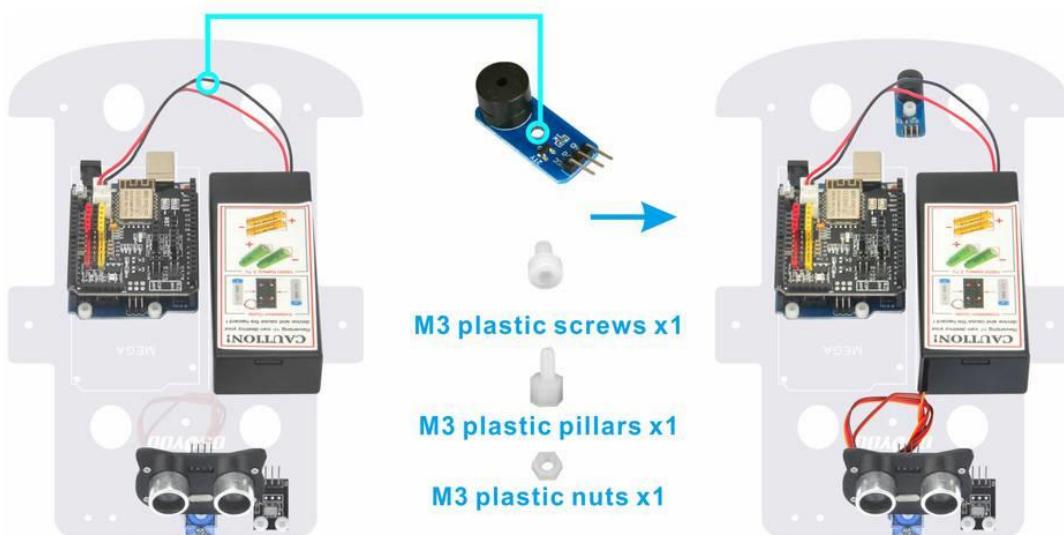
Step 3: Install Ultrasonic Module to mount holder with 4pcs M1.4*8 screw and M1.4 nuts



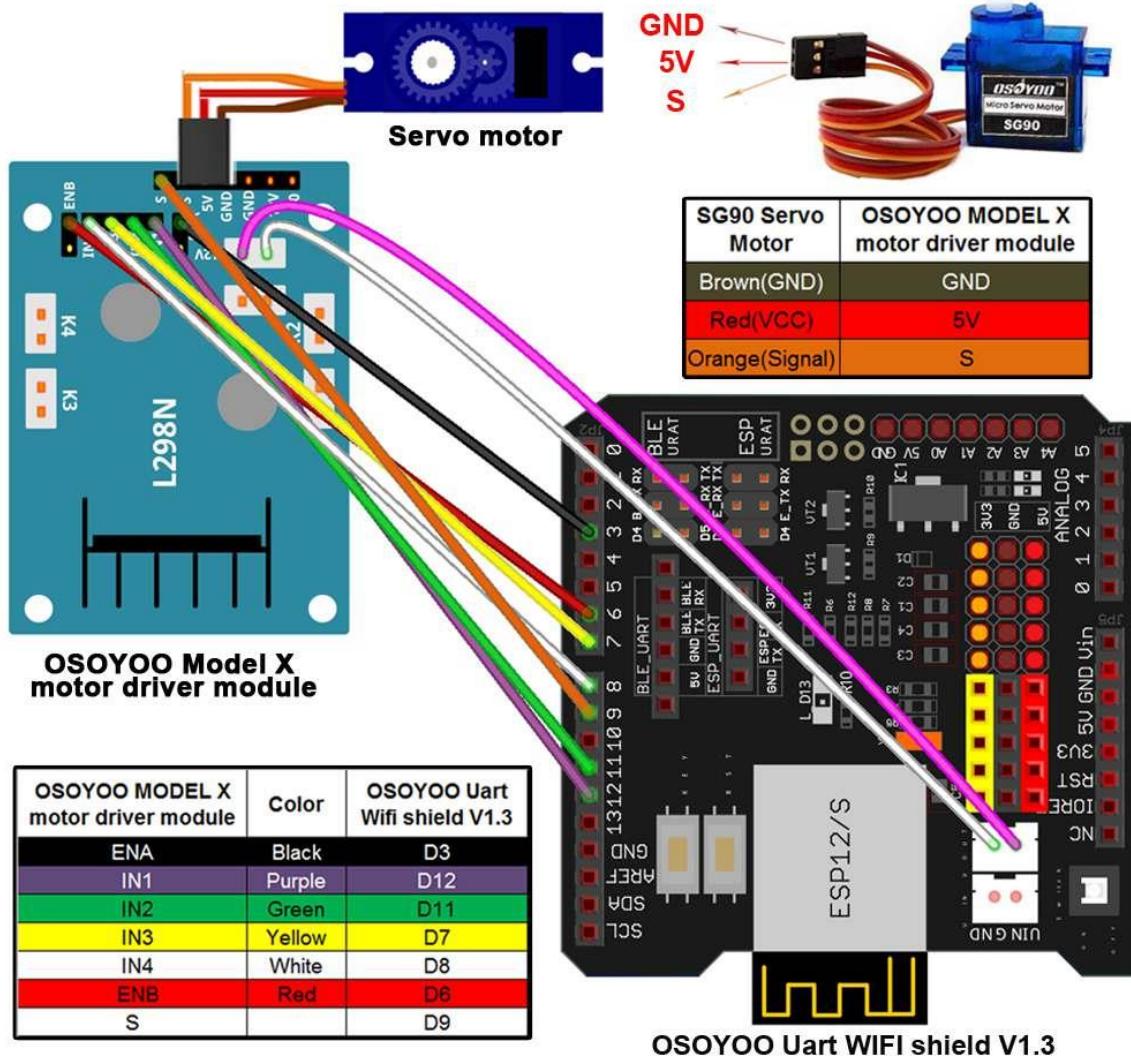
Step 4: Install mount holder for Ultrasonic Module on servo motor with M2*4 Self Tapping screw



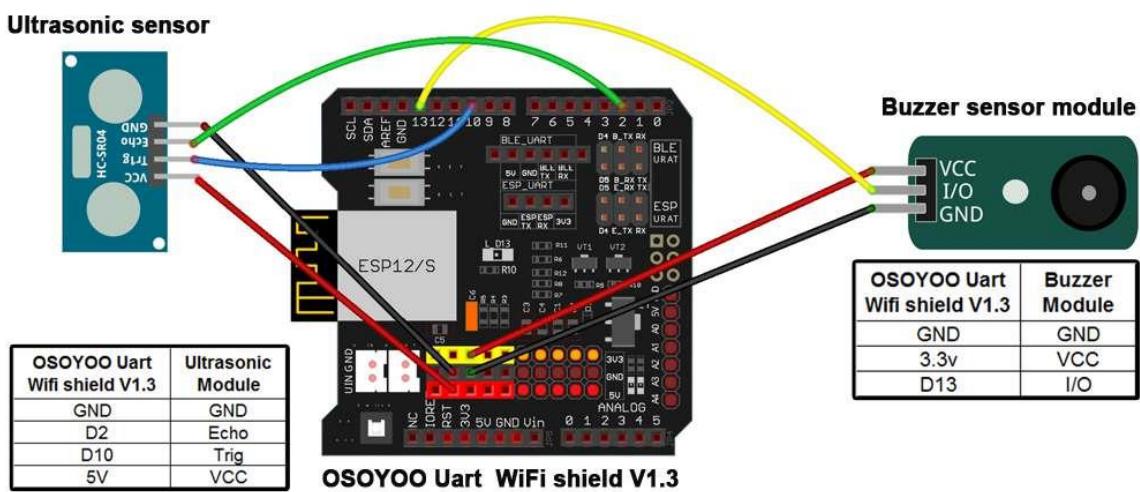
Step 5: Install Speaker module at the back of upper chassis with 1pc M2 plastic screw, M2 plastic pillar and M2 plastic nut



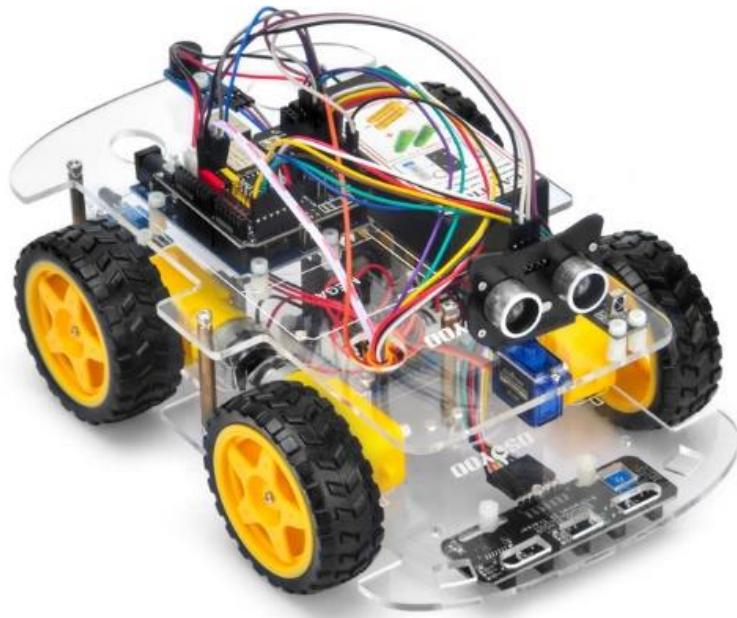
Step 6: Connect SG90 servo motor, OSOYOO MODEL X motor driver module and OSOYOO Uart WiFi shield V1.3 as following graph



Step 7: Connect ultrasonic module, Buzzer module with OSOYOO Uart WiFi shield V1.3 as below connection diagram



Step 8: Fix the screws on copper pillars to connect upper chassis to lower chassis if you remove these.



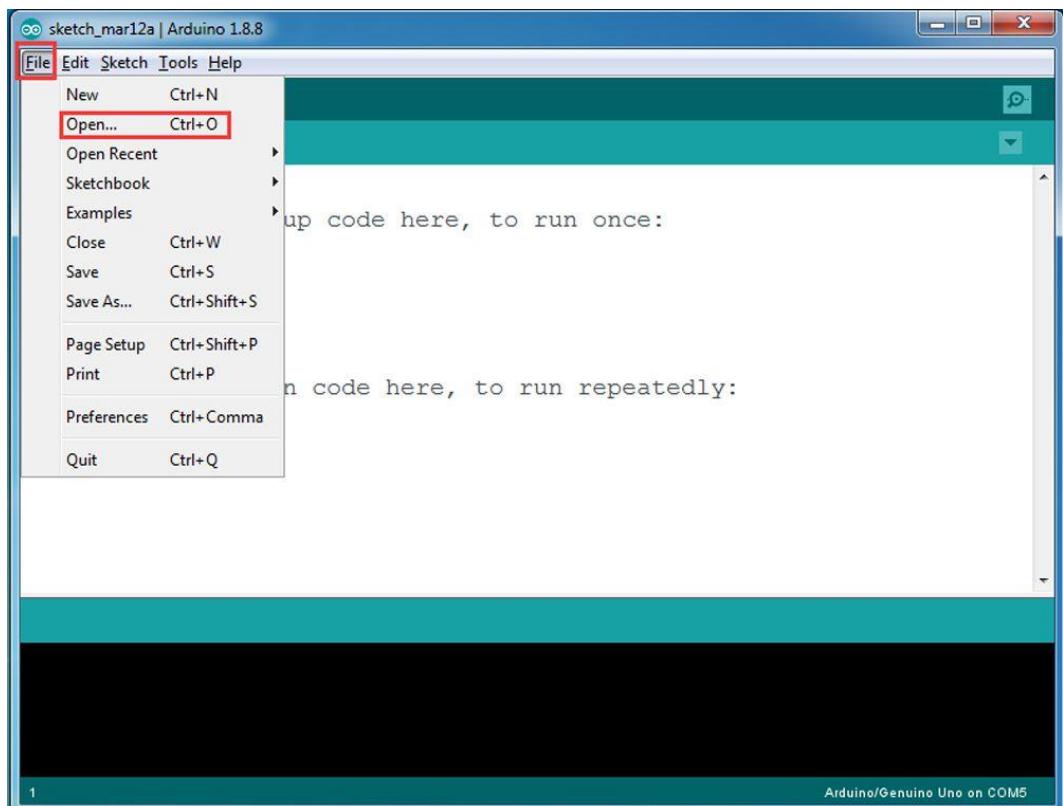
Software Installation

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/

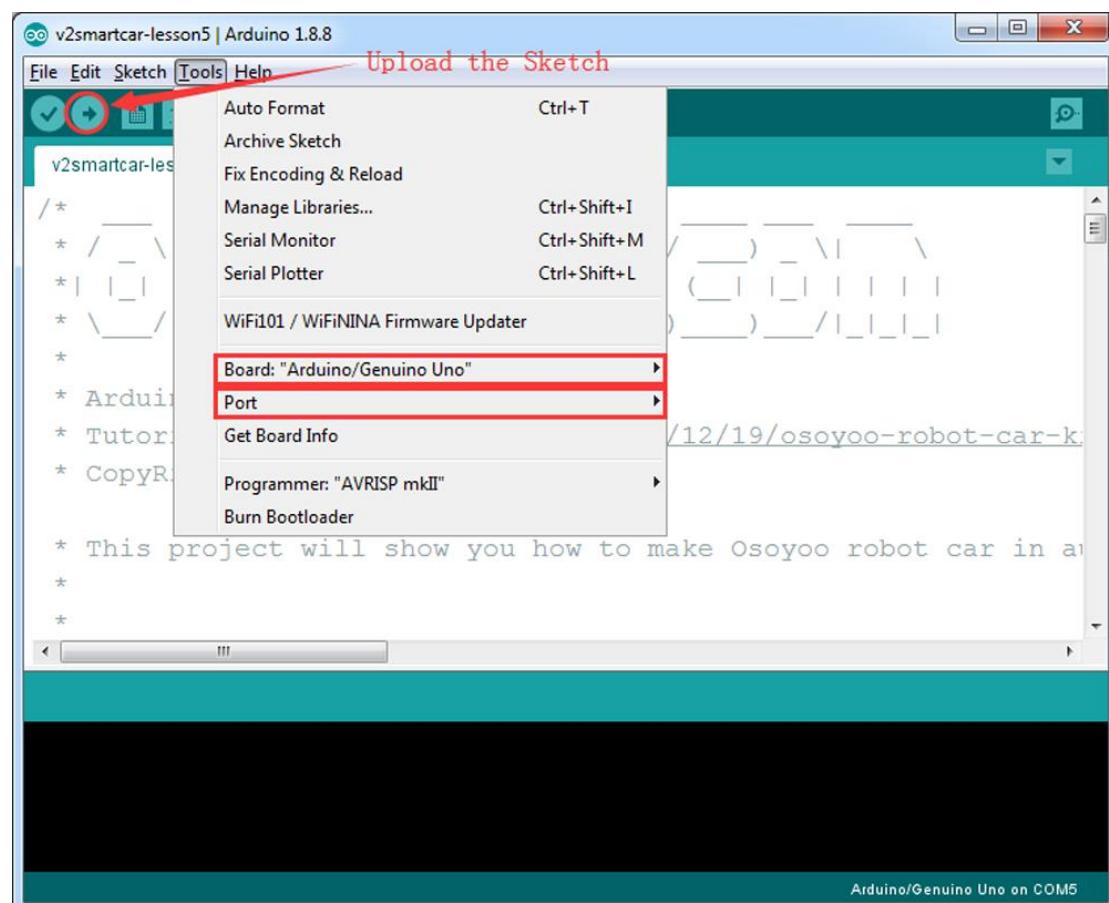
Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step). Download Arduino IDE from <https://www.arduino.cc/en/Main/Software?setlang=en>, then install the software.

Step 2: Download sample code from <https://osoyoo.com/driver/v2smartcar-lesson5.zip> , unzip the download zip file smartcar-lesson5.zip, you will see a folder called v2smartcar-lesson5.

Step 3: Connect Arduino UNO to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code “v2smartcar-lesson5.ino” in smartcar-lesson5 folder, load the code into arduino.



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



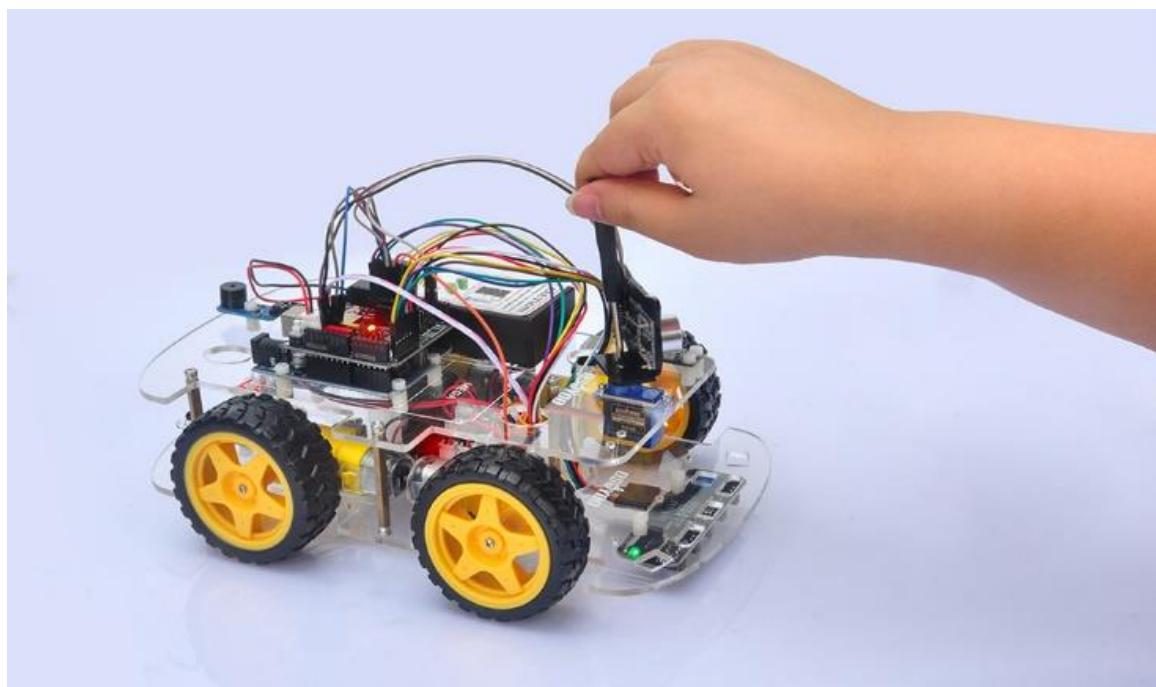
Ultrasonic sensor servo initial direction alignment

After turning on the battery, you will hear a long beep sound, then the servo will make some movement and finally stops at a direction for 5 seconds.

During this first 5 seconds, you must make sure the Ultrasonic sensor (two eyes) is facing straight forward.

If it is not straight forward, you should turn off battery 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.

After adjusting sensor direction, turn on battery again. After hearing the long beep, the sensor should face front same as following picture. If its direction is not straight forward, turn off battery and do direction alignment again.



Final Testing

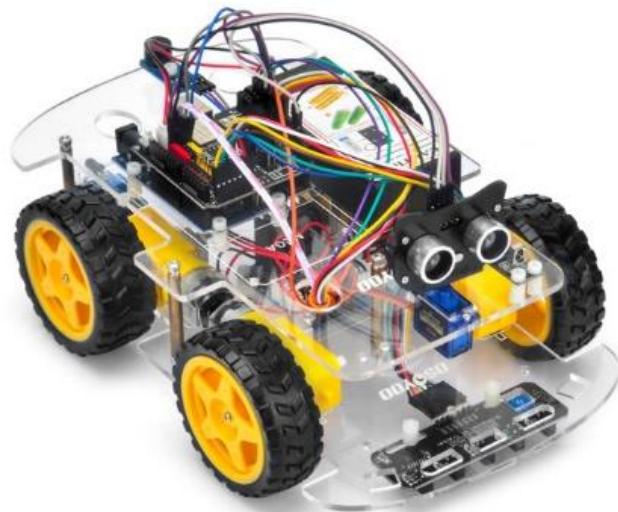
After turning on the battery switch on the battery box, if the ultrasonic module turn to front view position, that means you no need adjust sensor position anymore. Just wait 5 seconds. If no obstacle is detected, the car will go forward. If any obstacles is detected, the car will stop, the ultrasonic 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](#)



Osoyoo V2.1 Robot Car Lesson 6: Use Wifi to control an IoT Robot Car



Objective

In this project we will connect Robot Car to Wifi and Use an APP to control the car through Internet. This is a typical Internet of Things(IoT) Application.

You must complete lesson 5 before you continue on with this lesson.

Please enter the link to watch the video:

<https://www.youtube.com/watch?v=lWbFD8pTgl0&list=PLvCUFipQZCUTstVBU-7gLYCLhl1fRuca3&index=6&t=0s>

Parts and Devices

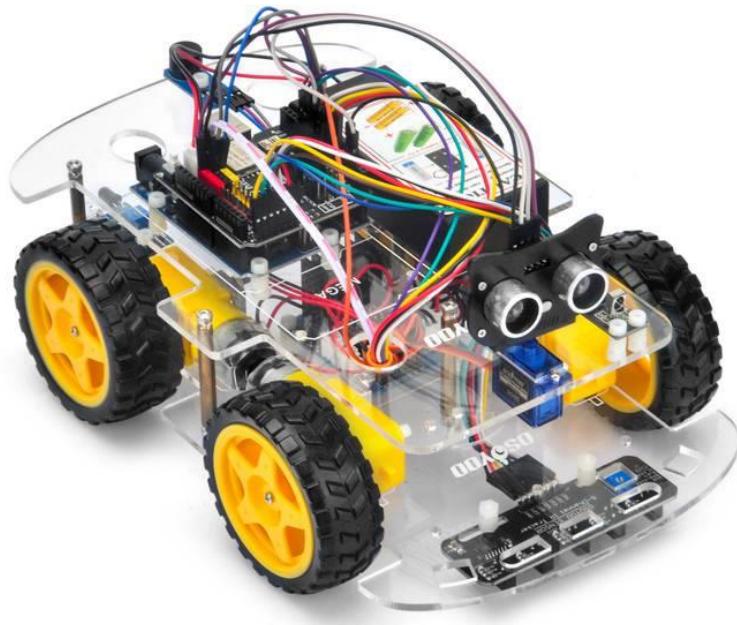
No.	Picture	Device	Qty.	Data sheet	Buy in Link
1		Tracking sensor module	1		Click here to buy

2		7pin 25cm Female to Female Cable	1		Click here to buy
3		Ultrasonic Sensor	1	click here	Click here to buy
4		Servo Motor	1	click here	Click here to buy
5		Mount Holder for Ultrasonic Sensor	1		Click here to buy
6		Buzzer Sensor Module	1	click here	Click here to buy
7		Philips screwdriver	1		Click here to buy
8		Hex Screwdriver	1		Click here to buy
9		20Pin jumper wire Male to female 20cm	some		

10		M3 plastic screw	3		
11		M3 plastic pillar	3		
12		M3 plastic nut	3		
13		M2*4 self tapping screw	1		
14		M2.2*8 self tapping screw	2		
15		M1.4*8 screw and nut	4		

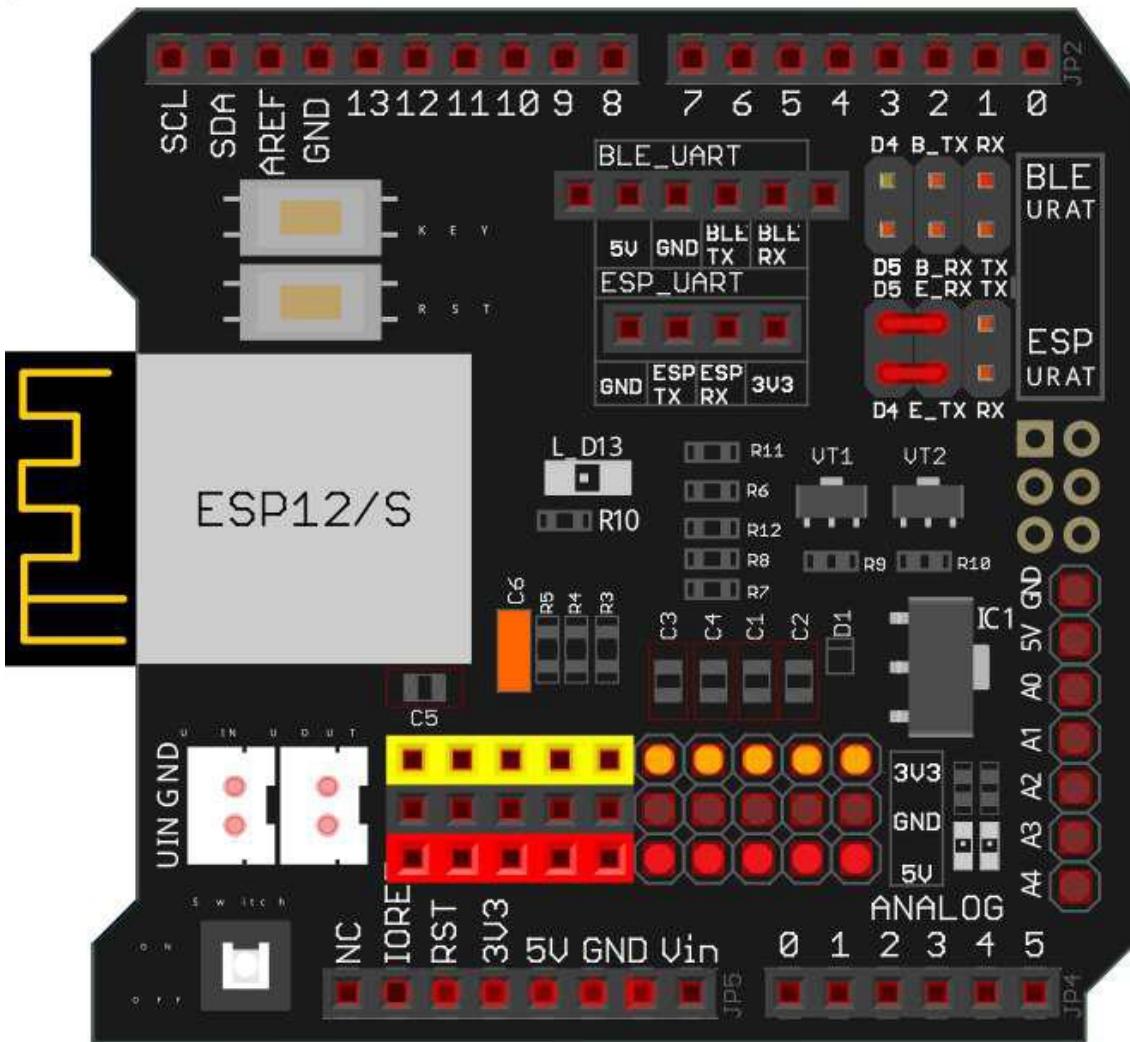
Hardware Installation

Step 1: Install the smart car basic frame work as per [lesson 5](#). If you don't install tracking sensor module, please completed installation in [Lesson 4](#).

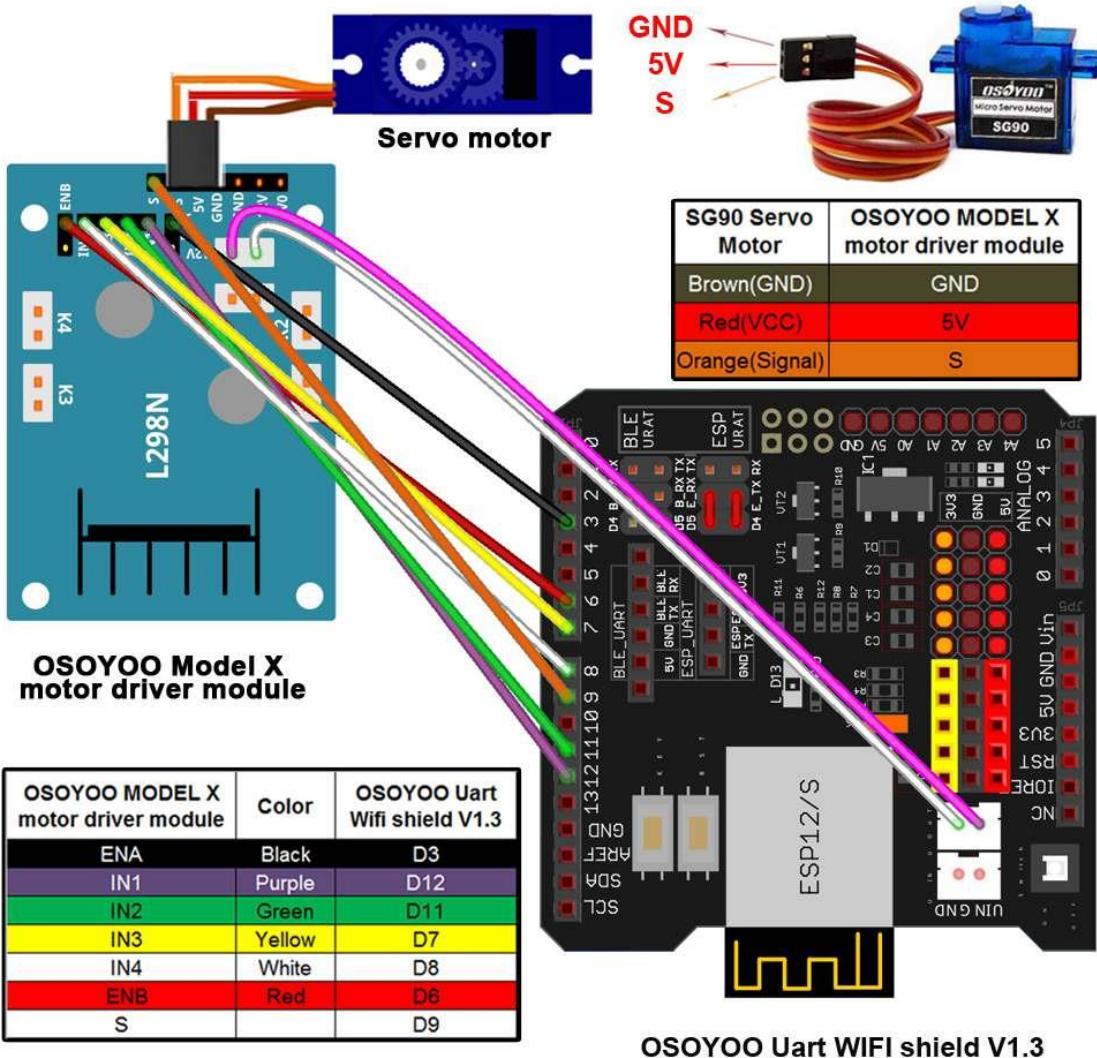


Step 2: Connect E_TX (Esp8266 TX) pin to Arduino D5(UNO soft serial RX) and E_RX(ESP8266_RX) pin to D4(UNO software serial TX) as per following picture

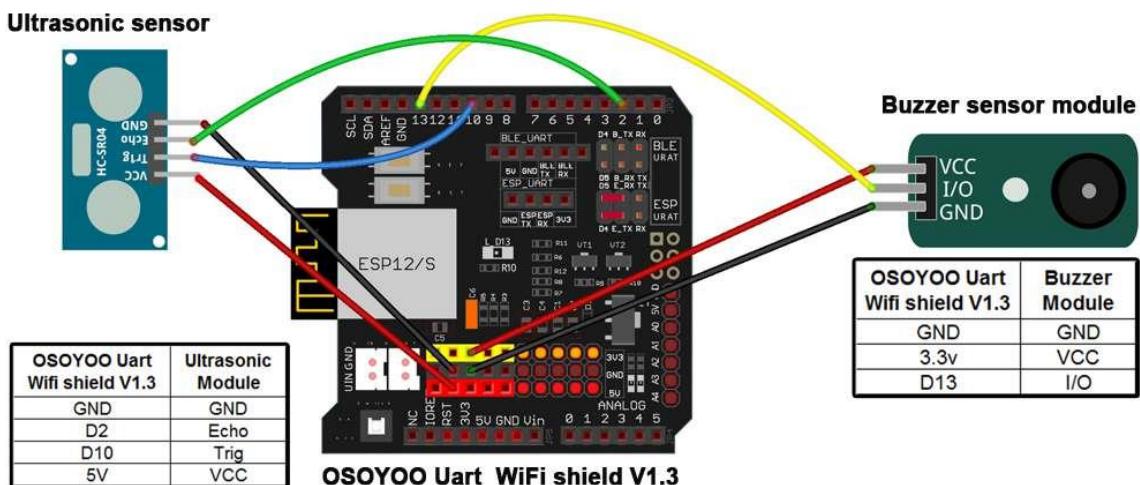
(**Note:** Our OSOYOO Uart WiFi shield V1.3 are connected BLE URAT TX/RX ports to D4,D5 with jumper caps by default. If you find the BLE URAT TX/RX ports are connected, you need remove these jumper caps and change to connect ESP URAT E-TX to D4 and E-RX to D5)



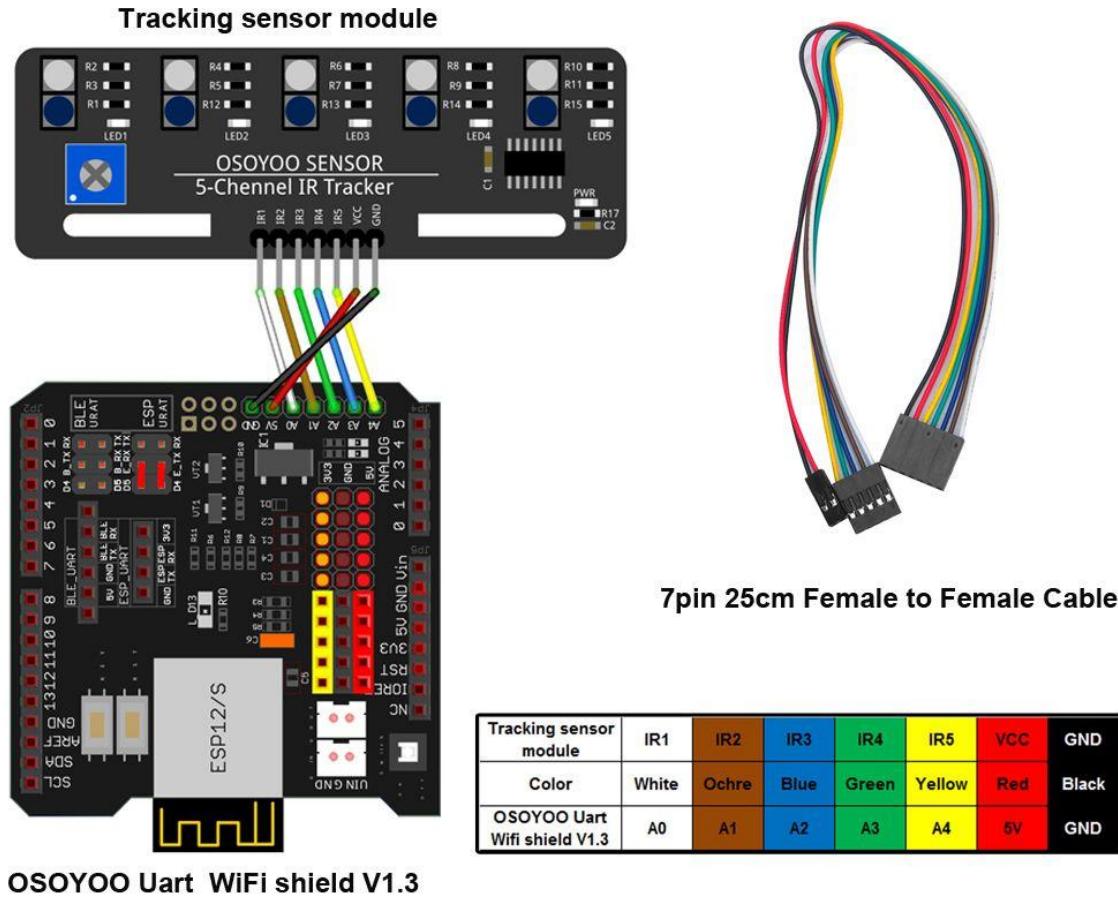
Step 3: Connect SG90 servo motor, OSOYOO MODEL X motor driver module and OSOYOO Uart WiFi shield V1.3 as following graph (**If you complete wires in lesson 5, please skip this step**) :



Step 4: Connect ultrasonic module, buzzer module with OSOYOO Uart WiFi shield V1.3 as below connection diagram (If you complete wires in lesson 5, please skip this step)



Step 5: Connect tracking sensor module with OSOYOO Uart WiFi shield V1.3 as below connection diagram (If you complete wires in lesson 4, please skip this step)



Note:

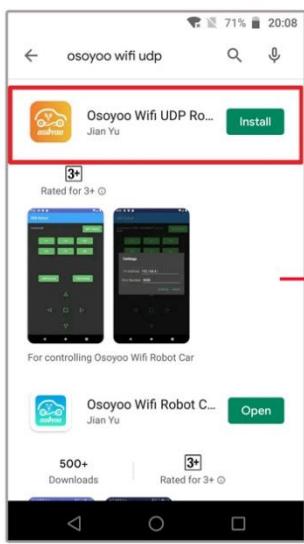
- 1) Please remember to adjust the sensitivity of tracking sensor modules as per lesson 4
- 2) Please remember to do Ultrasonic sensor direction alignment as per lesson 5

Software Installation

Open-source Arduino Software(IDE)		Download Arduino IDE here: https://wwwarduino.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 Wifi Robot APP		search “Osoyoo Wifi Robot APP” in Google Play or Apple Store

Step 1) APP installation: you need search “Osoyoo Wifi Robot APP” in Google Play or Apple Store, and then install this APP

Download APP



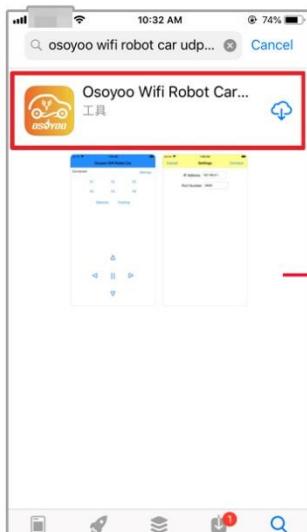
Install APP



Set APP



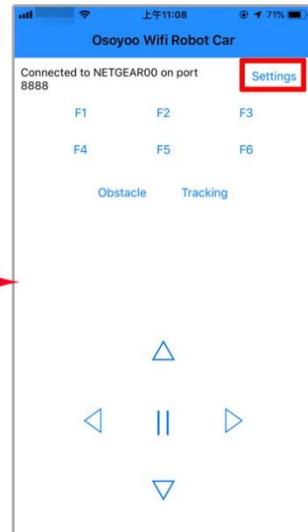
Download APP



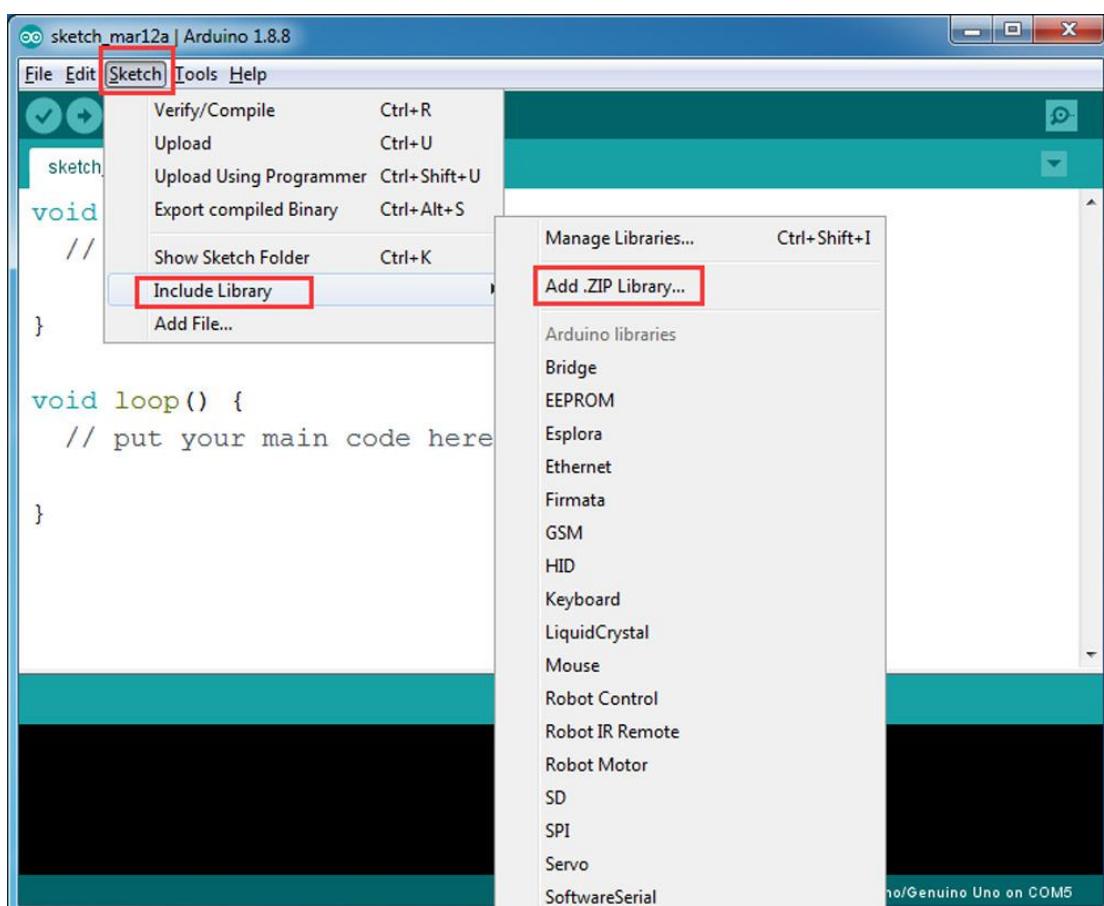
Install APP



Set APP



Step 2) Please download the 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:

OSOYOO V2 Robot Car can work in two Wifi modes: STA mode and AP

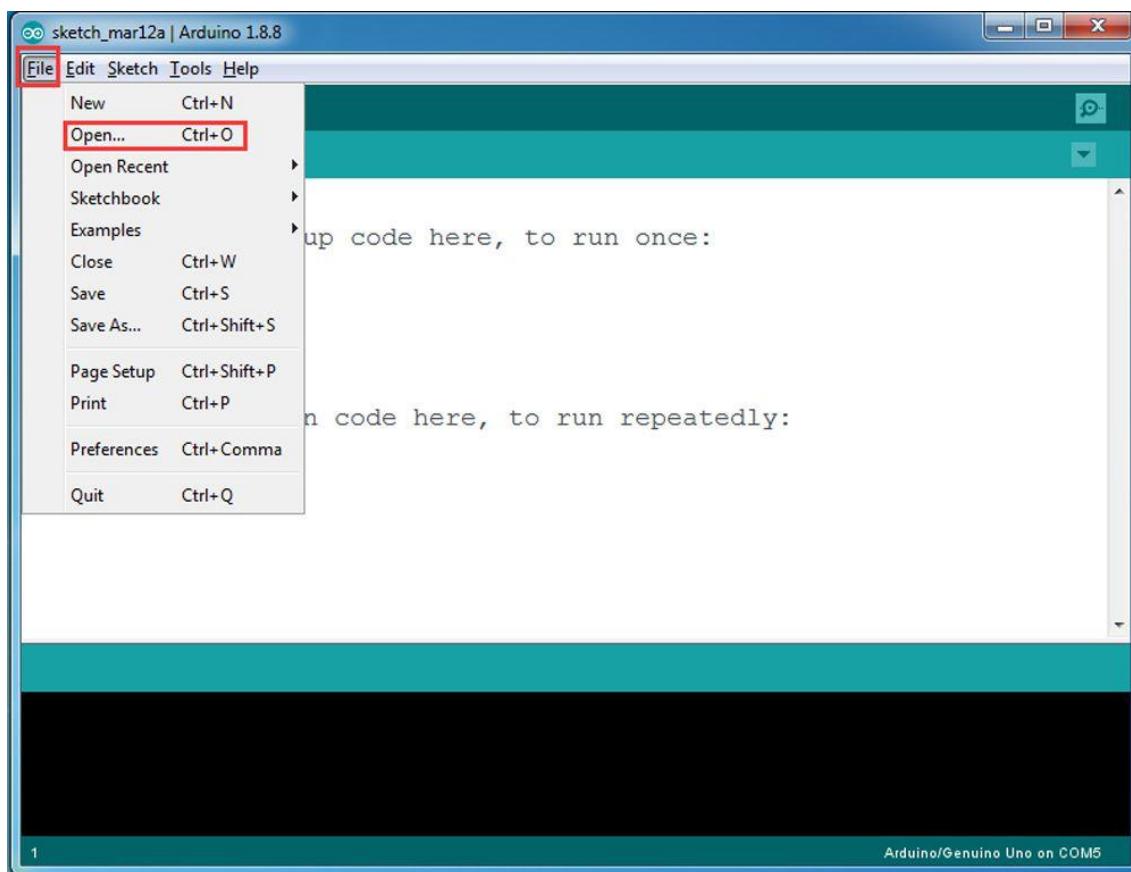
mode. The Arduino sketches for these two modes are different. Let's explain these two modes one by one

A) STA mode

In STA mode, V2 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 http://osoyoo.com/picture/V2.1_Arduino_Robot_Car/code/v2smartcar-lesson6A.zip. Unzip the file, you will see a folder “v2smartcar-lesson6A”. Open Arduino IDE -> click file -> click Open -> choose code “v2smartcar-lesson6A.ino” in v2smartcar-lesson6A folder, load the code into Arduino



- 2) You need change the code Line 104 and Line 105 :

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

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

```
[WiFiEsp] Initializing ESP module
[WiFiEsp] Initialization successful - 1.5.4
Attempting to connect to WPA SSID: [REDACTED]
[WiFiEsp] Connected to [REDACTED]

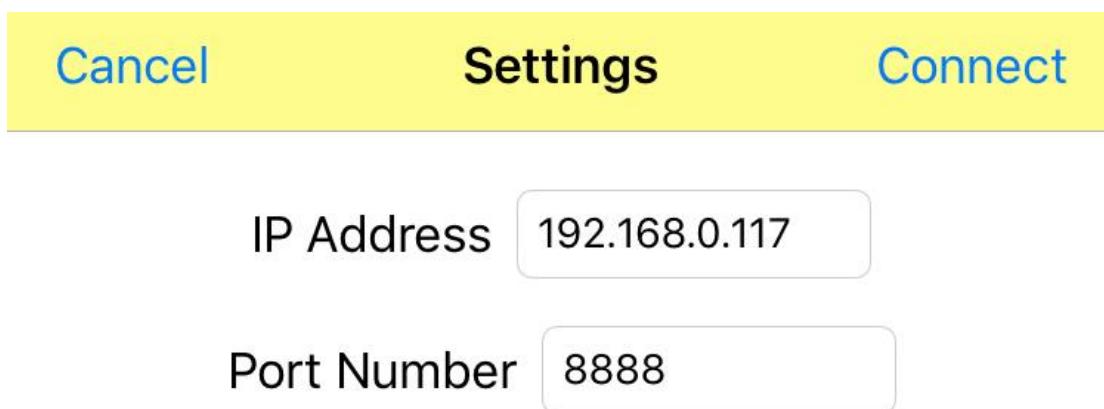
OK

You're connected to the network

SSID: [REDACTED]
BSSID: 50:BD:5F:14:DA:FD
Signal strength (RSSI): -49
IP Address: 192.168.0.117
MAC address: 3C:71:BF:2E:61:EA
```

The IP Address: 192.168.0.117 is highlighted with a red box.

4) In this mode, your 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 (no need change default port 80 in APP).



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 80 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 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.

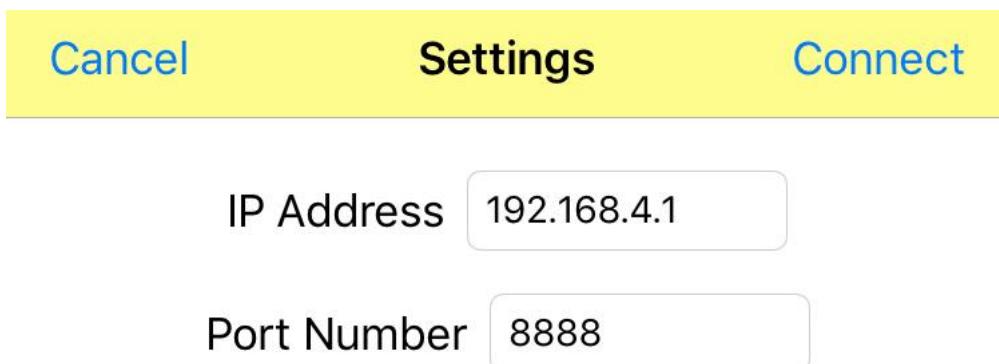
Our cell phone can connect to Robot Car as its wifi client. The IP address of Robot is fixed as 192.168.4.1 and It is not connected to WAN.

1) Please download sketch from following

link: http://osoyoo.com/picture/V2.1_Arduino_Robot_Car/code/v2smartcar-lesson6B.zip. Unzip the file, you will see a folder “v2smartcar-lesson6B”. Open Arduino IDE -> click file -> click Open -> choose code “v2smartcar-lesson6B.ino” in v2smartcar-lesson6B 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” 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

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

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.

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 < > ^ v direction keys to make the car move. Use || pause key to stop the car movement.

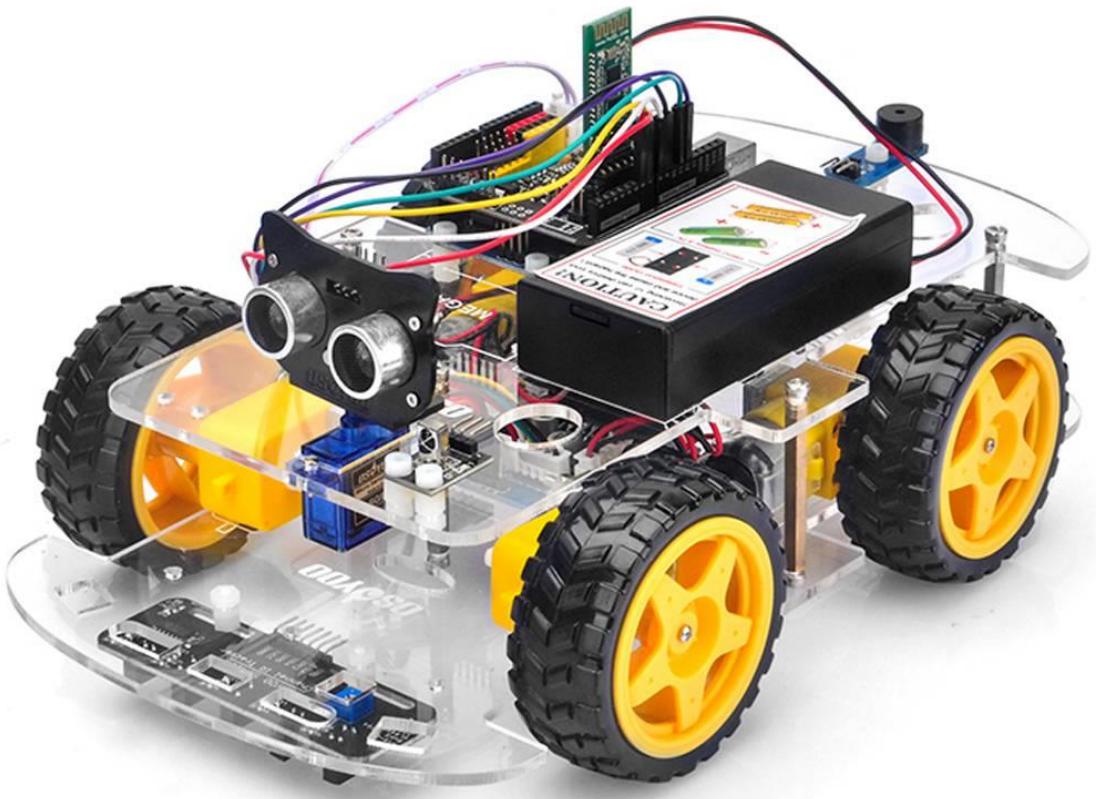
If you click Obstacle key, the car will do obstacle avoidance auto driving similar to [Lesson 5](#)

If you click Tracking key, the car will do link tracking auto driving similar to [lesson 4](#)

Note: F1~F6 are further development functions in the future.



Osoyoo V2.1 Robot Car Lesson 7: Imitation Driving with Bluetooth APP



Objective

In this lesson, we will use Mobile to control our robot car and make an imitation driving. Since it 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 1 (assembling the car)** before you continue on with this lesson.

Please enter the link to watch the video:

<https://www.youtube.com/watch?v=uRat79tvHUE&list=PLvCUFipQZCUTstVBU-7gLYCLhl1fRuca3&index=8&t=0s>

Parts and Devices

No.	Picture	Device	Qty.	Data sheet	Buy in Link
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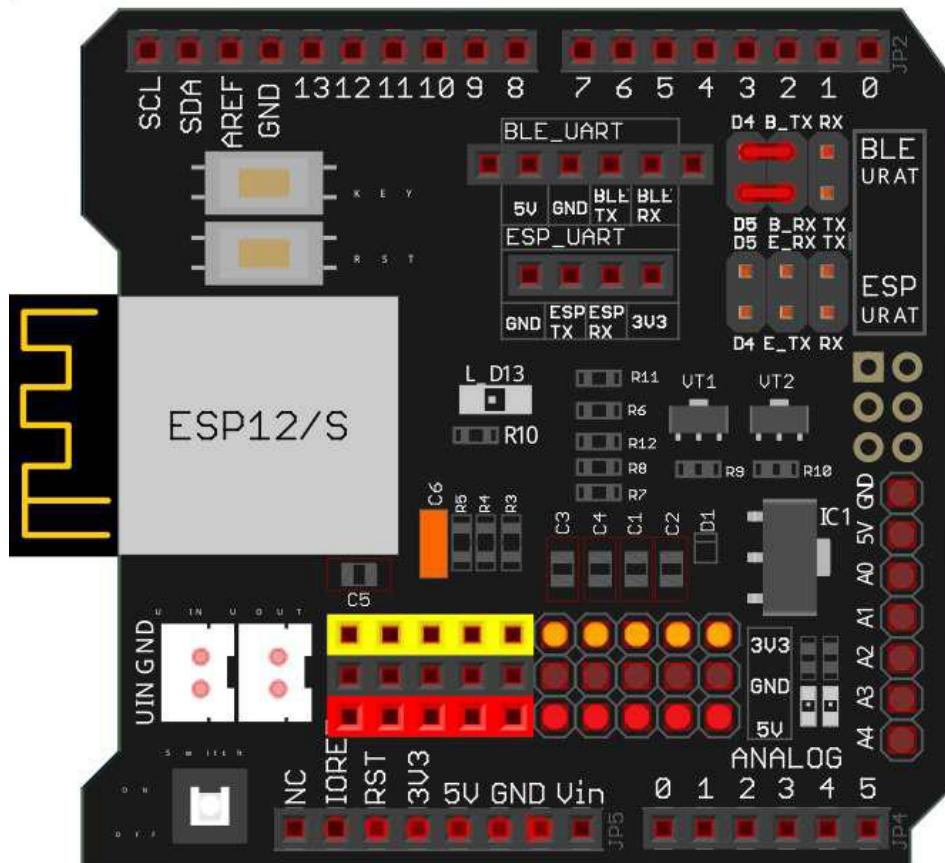
1		HC module	1	click here	Click here to buy
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Hardware Installation

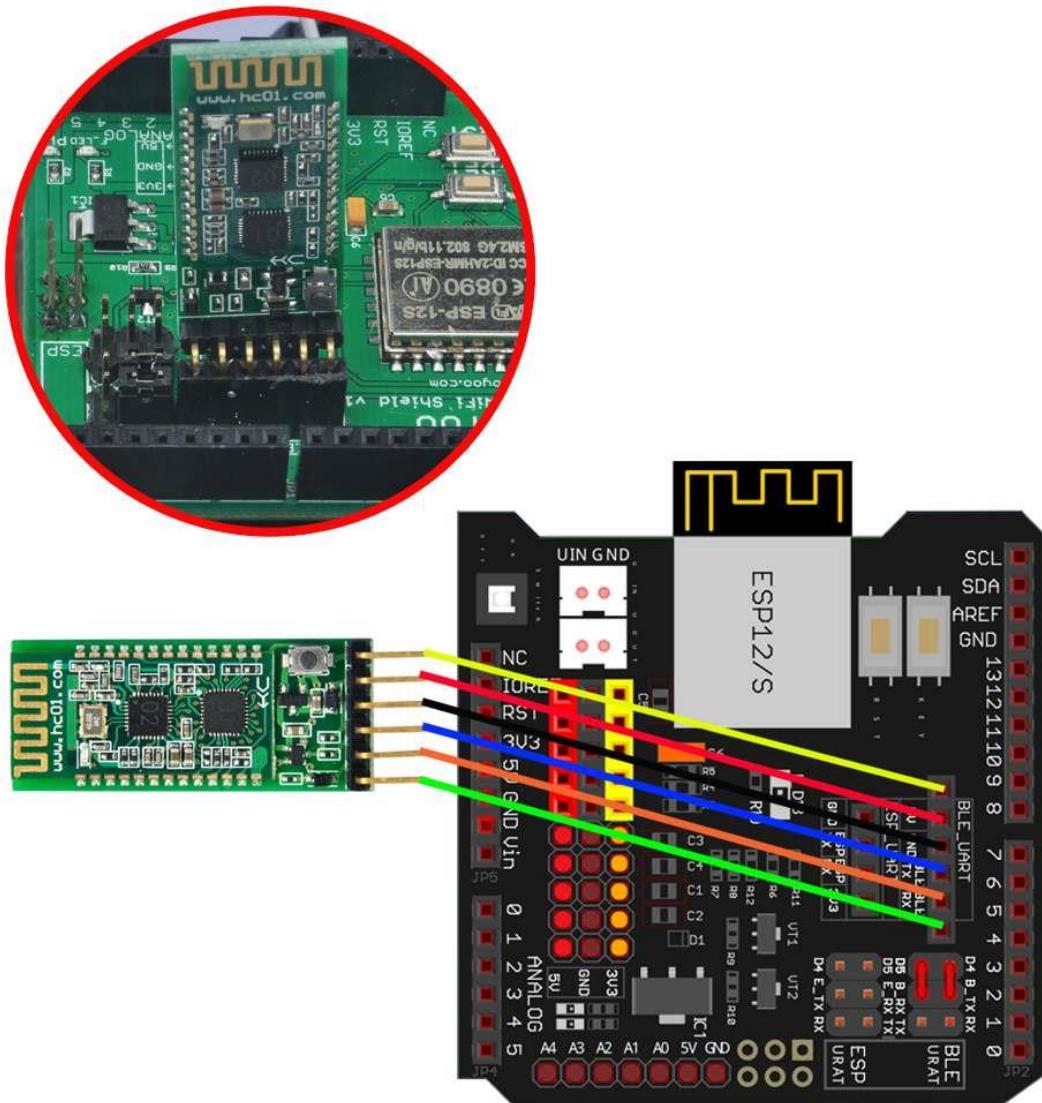
Step 1: Install the smart car basic frame work as per [Smart Car Lesson 1](#) . If you have already completed installation in Lesson 1 , please remove all wires on Osoyoo Uno R3 board

Step 2: Connect Bluetooth TX/RX ports to D4,D5 with jumper caps

Note: Our OSOYOO Uart WiFi shield V1.3 are connected BLE URAT TX/RX ports to D4,D5 with jumper caps by default. If you find the Bluetooth TX/RX ports is not connected to D4,D5, you need use a jumper cap or jumper wire to connect B-TX to D4 and B-RX to D5



Step 4: Insert Bluetooth Module into OSOYOO Uart WiFi shield V1.3 Bluetooth slot as following graph:



Step 3: Connect OSOYOO MODEL X motor driver module and OSOYOO Uart WiFi shield V1.3 as following graph:

Remember following tips restore your motor control system to lesson 1:

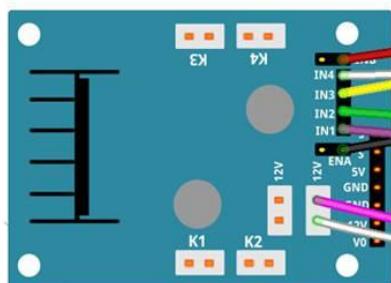
- If your last project is lesson 1,2,3,4, your motor control system is same as Lesson 1, no need do anything.
- If your last project is lesson 5,6, you need change ENA wire from D3 to D9, keep wiring in D6,D7,D8,D11,D12 at same position and remove all other wires in OSOYOO Uart WiFi shield V1.3.

I suggest you run the sketch code in Lesson 1 and make sure motor connection is correct. This is very important for next steps.

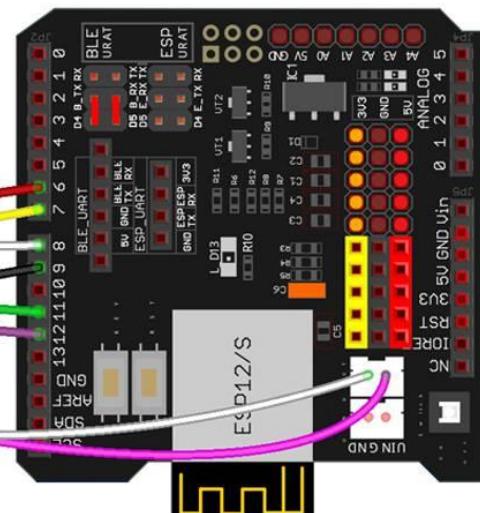


OSOYOO MODEL X motor driver module		Color	OSOYOO Uart Wifi shield V1.3
ENA	Black	D9	
IN1	Purple	D12	
IN2	Green	D11	
IN3	Yellow	D7	
IN4	White	D8	
ENB	Red	D6	

6pin female to 6pin male Jumper wire

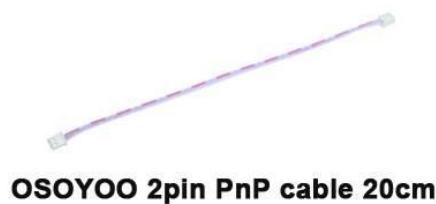


OSOYOO Model X motor
driver module



OSOYOO Uart WIFI shield V1.3

OSOYOO MODEL X motor driver module	OSOYOO Uart WiFi shield V1.3
12V	VIN
GND	GND



OSOYOO 2pin PnP cable 20cm

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
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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>.

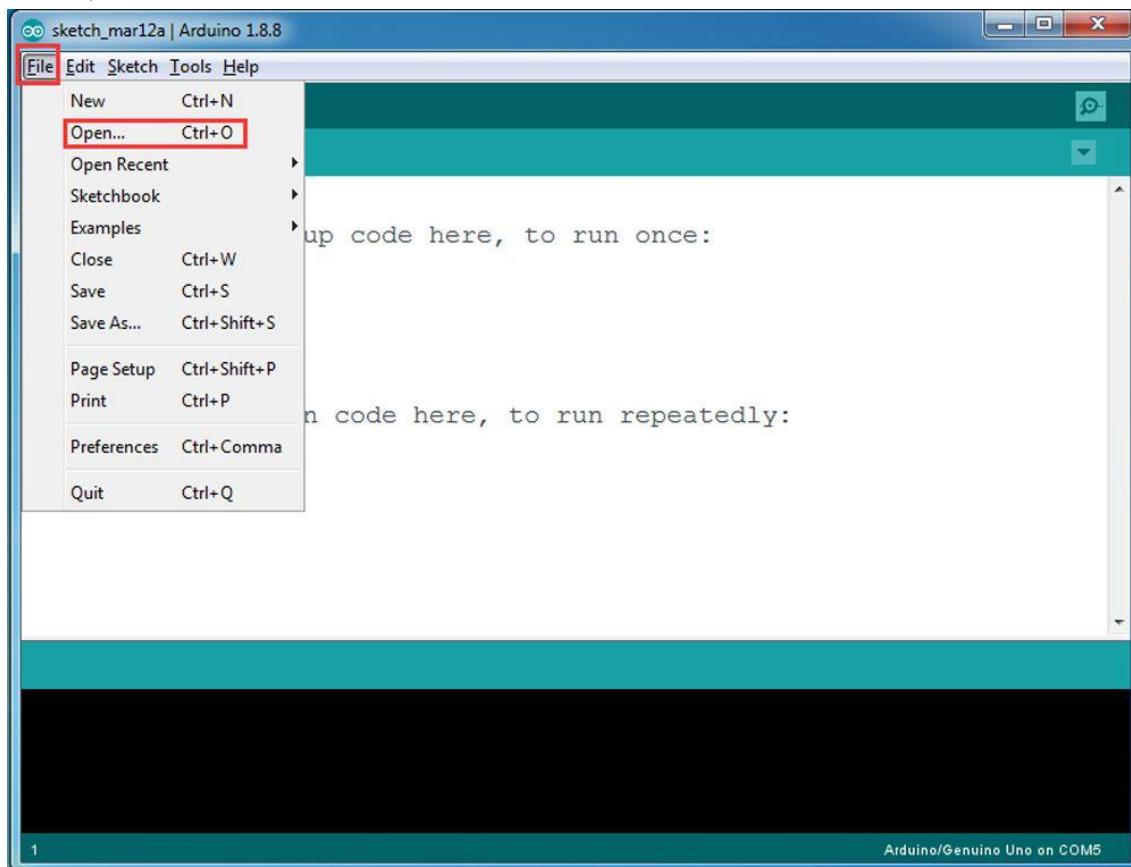


2) Install APP on Apple IOS device as following

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



Step 2: Download and install Arduino sketch code from <https://osoyoo.com/driver/v2smartcar-lesson7.zip>. Unzip this file, and you will see a folder called v2smartcar-lesson7. Open Arduino IDE -> click file -> click Open -> choose code “v2smartcar-lesson7.ino” in v2smartcar-lesson7 folder, load the code into Arduino



Explanation of APP UI



- **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 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.

Drive your Robot Car

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

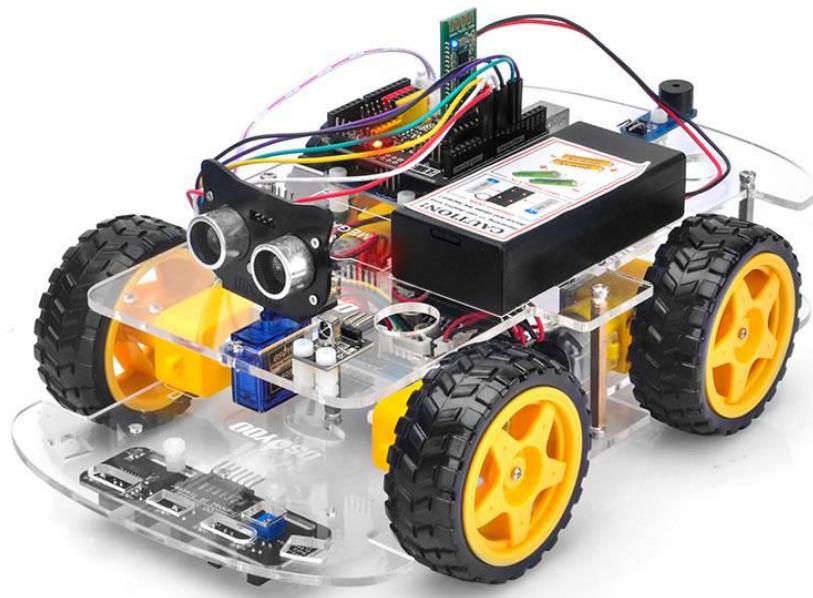
Step 1) put your robot car onto the ground and turn on the battery switch.

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

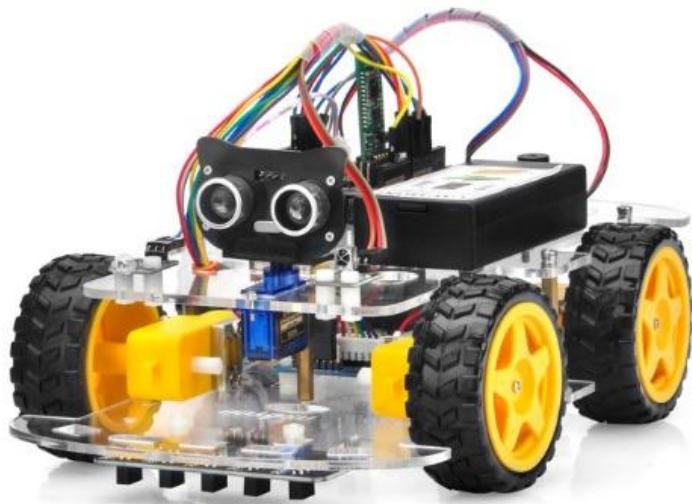
Step 3) Open OSOYOO imitation driving Robot APP, Click BT Search button and find the bluetooth you have paired

Step 4) Turn on Engine toggle, and When you rotate your mobile phone angle, your car will change direction.

Enjoy your driving!



Arduino V2.1 Robot Car Lesson 8: Fighting Game



Objective

In this project, we will make robots dog-fighting game. We need two groups of Osoyoo Robot cars and each group has at least one robot car. Team A robots will Infrared signal as bullet to shoot at Team B robots and vice versa. IR Bullet from Team A will “kill” only Team B robots and no harm to TEAM A. So does Team B bullet.

Players use Mobile APP in [Lesson 7](#) to control their robots to kill enemy team robots as possible. You can complete and run the sketch code in [Lesson 7](#) and make sure motor connection is correct.

Parts and Devices

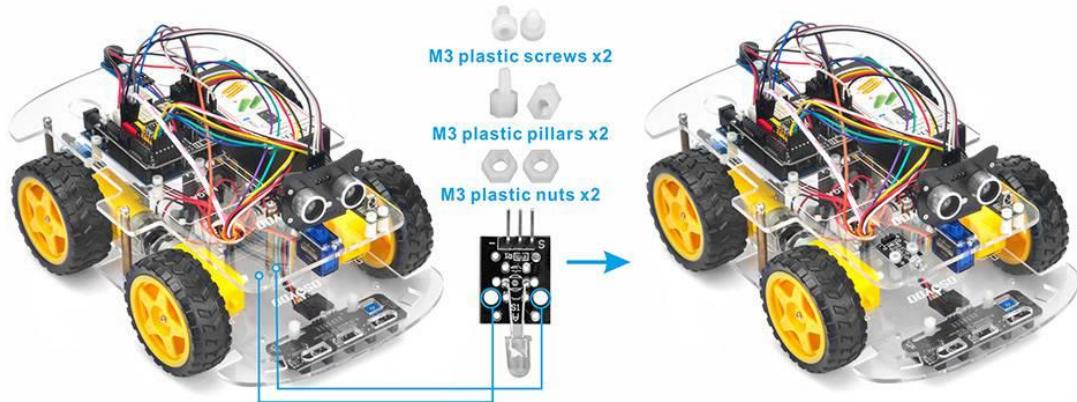
No.	Picture	Device	Qty.	Data sheet	Buy in Link
1		IR receiver	1	click here	Click here to buy

2	A blue printed circuit board with a black cylindrical buzzer attached.	Buzzer Sensor Module	1	click here	Click here to buy
3	A small black rectangular module with four pins and a central infrared emitting diode.	IR transmitter	1		Click here to buy
4	A bundle of 20 individual wires, color-coded, used for connecting components.	20Pin jumper wire Male to female 20cm	some		
5	Two white plastic screws with a hexagonal head and a threaded shank.	M3 plastic screw	5		
6	A white plastic pillar with a hexagonal top and a threaded bottom, used for mounting.	M3 plastic pillar	5		
7	Two white plastic nuts with a hexagonal outer shape and a threaded interior.	M3 plastic nut	5		

Hardware Installation

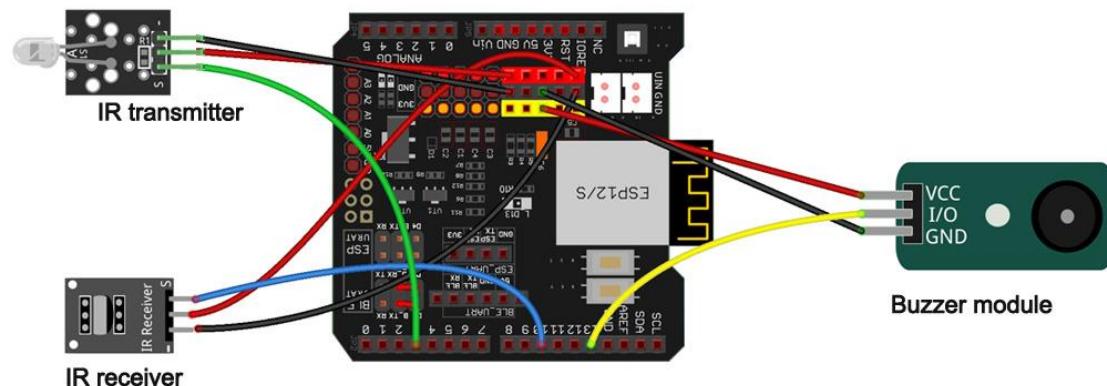
Step 1: This project needs at least two Osoyoo V2 Arduino Robots. In each robot, [Lesson 7](#) hardware installation must have been completed.

Step 2: Install IR receiver ([Lesson 2](#)) and buzzer module ([lesson 5](#)) and add IR transmitter with 2pcs M3 plastic screws, pillars and nuts as following:



Step 3: Connect IR receiver, IR transmitter and buzzer module with OSOYOO Uart WiFi shield V1.3 as following graph

OSOYOO Wifi Shield	IR Transmitter
GND	—/GND
5V	VCC
D3	S



OSOYOO Wifi Shield	IR Receiver
GND	—/GND
5V	VCC
D10	S

OSOYOO Wifi Shield	Buzzer Module
GND	GND
3.3v	VCC
D13	I/O

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: Download and install Arduino sketch code

from <https://osoyoo.com/driver/v2smartcar-lesson8.zip>. Unzip this file, and you will see folders called v2smartcar-lesson8A and v2smartcar-lesson8B

Step 2: Upload code “v2smartcar-lesson8A.ino” in v2smartcar-lesson8A folder for Team A robots and Upload code “v2smartcar-lesson8B.ino” in v2smartcar-lesson8B folder for Team B robots

Step 3: If you have installed APP in Lesson 7, please skip this step.

Otherwise go to Google Play and search the APP name “Osoyoo imitation driving”, and install the APP to your mobile phone.

Step 4: After install the APP, pair the HC-02 bluetooth module to your mobile phone, and then open Osoyoo Imitation driving APP. You will find a BTSearch list, click HC-02 device to connect the bluetooth device on your car.

Play the Fighting Game

In your APP, click Engine Toggle icon, your robot car will start moving. Use your steering wheel, gear to change your car direction. When you find your enemy, click “F1” to trigger bullet against bullet. If your bullet hits enemy car, enemy car will freeze, buzzer and dead. If you are hit by enemy’s bullet, your car will freeze and your APP will show “dead”.

