

OSOYOO Mecanum Wheel Robotic Car Kit V2.1 for Arduino



INTRODUCTION

Mecanum wheels, also known as omni wheels or Ilon wheels, consist of a hub with rollers oriented 45° to the axis of rotation. The mecanum wheels are wheel hubs fitted with integrated rollers that move passively and independently.

Depending on which wheels rotate in which direction, the platform will move forward, backward, sideways, diagonally, or spin in place. This range of maneuverability enables the omni platform to efficiently navigate any space, particularly around tight corners, narrow lanes, and complex pathways.

This Arduino omni direction robot car learning kit is developed our Japan and Canada engineer team. It has all features a traditional Arduino Robot car should have, including remote control by bluetooth, IoT through wifi, line tracking, obstacle avoidance auto driving and object follow. With the help of powerful mecanum wheels, the car can make much more complicated movement such as sideways shifting and diagonally movement controlled by cell phone APP.

The kit comes with OSOYOO Mega2560 board (fully compatible with Arduino Mega2560) and OSOYOO ESP8266 WiFi shield. Besides, we have designed five step by step lessons which help students to learn Arduino robot programming from scratch. If you are an experience DIY player or Arduino programmer, you can also get a lot of knowledge from this kit's open source code and hardware to make interesting DIY project of your own.

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Lesson 1 Basic Robot Car Assembly

INTRODUCTION

Mecanum omni direction wheel is a very interesting wheel which allows robot car make omni-directional movement (e.g. parallel shift to left and right).

In this project, we will show how to use Arduino to control an osoyoo brand mecanum wheel robot car to make some basic movement including go forward, backward, left turn, right turn, parallel left shift, parallel right shift etc.

This lesson also shows you how to install the chassis of this car and connect Arduino control signal wires to model Y board. This installation will be the start point of our other lessons.

PARTS & DEVICES

OSOYOO Mecanum wheels robotic car chassis x1

OSOYOO Wheels and motors x4 (left-wheels x2/right-wheels x2)

OSOYOO Mega2560 board fully compatible with Arduino UNO/Mega2560 x1

OSOYOO Uart Wifi shield x1

OSOYOO Model Y Motor driver board

(it is integrated with two pcs of TB6612 H-Bridge Driver which can control 4 separate channel and 8 PWM output ports.)

OSOYOO Voltage meter x1

OSOYOO Battery box x1

OSOYOO 6pin male to female jumper wire x2

OSOYOO 3pin female to female jumper wire x1

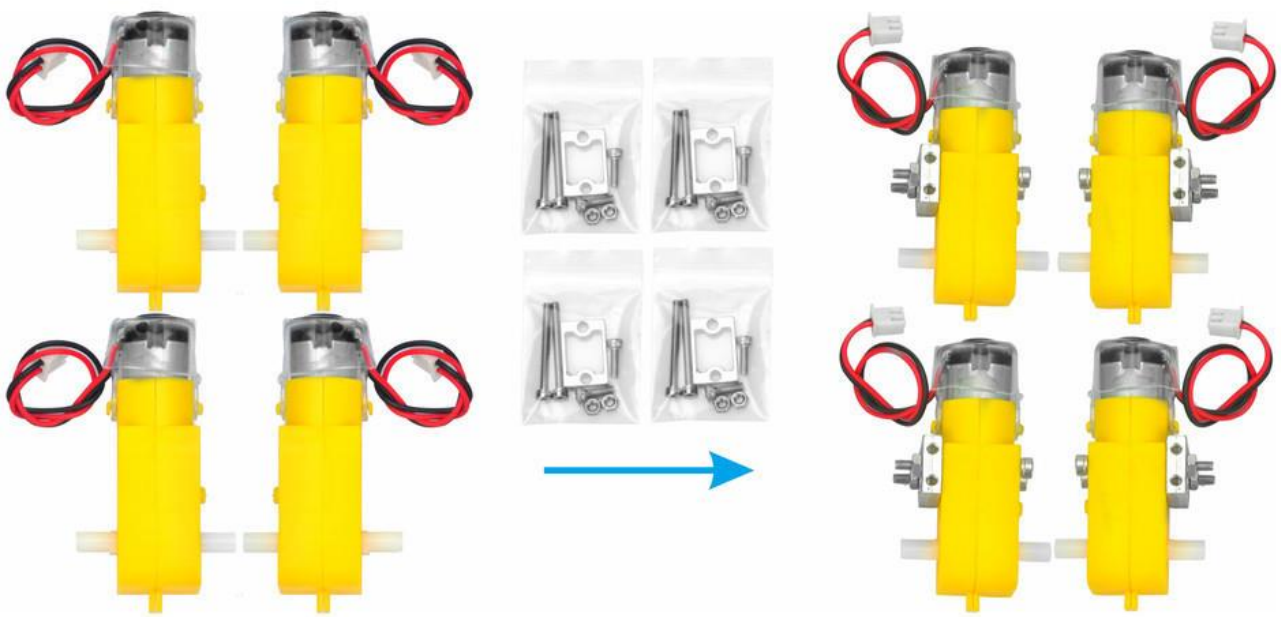
OSOYOO 2 pin PnP female to female x1

18650 Batteries(3.7V) x2

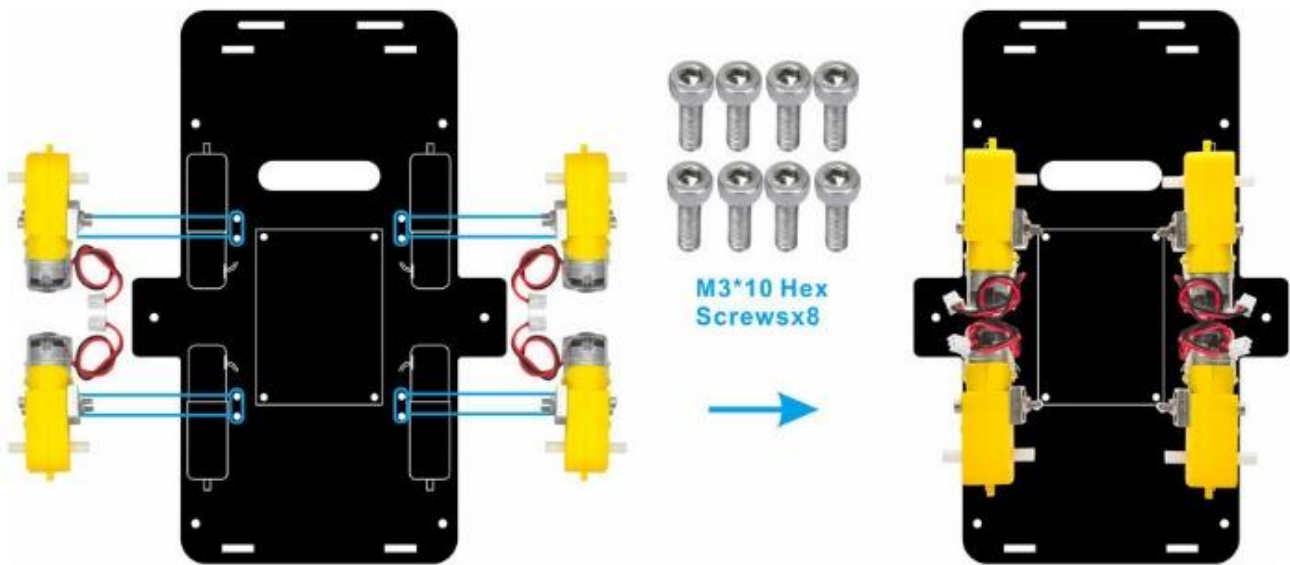
Battery charger x1

HARDWARE INSTALLATION

1) Fix 4 motors with metal motor holders as follows. (Please check the motor direction before installing metal motor holders.)

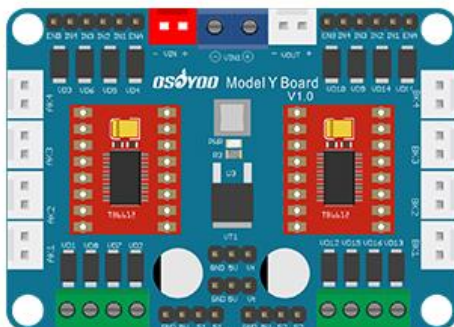


2) Fix 4 motors on lower car chassis with M3*10 hex screws via hex screwdriver. (screws for this step are in metal motor holder package.)



3) Insert TB6612 module onto OSOYOO model Y driver board.

If you receive the model Y driver board V2.0 as follows, please skip over the step 3).

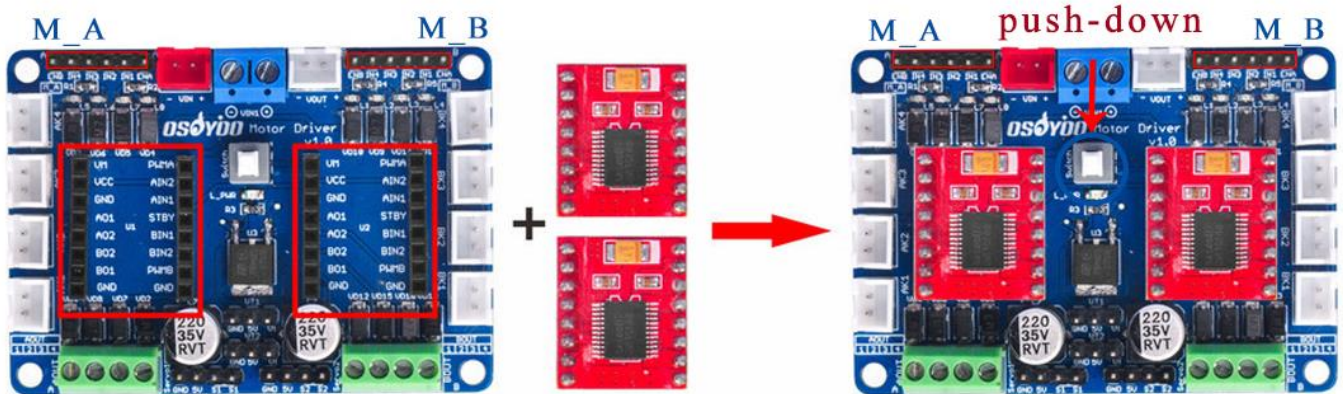


Model Y board V1.0



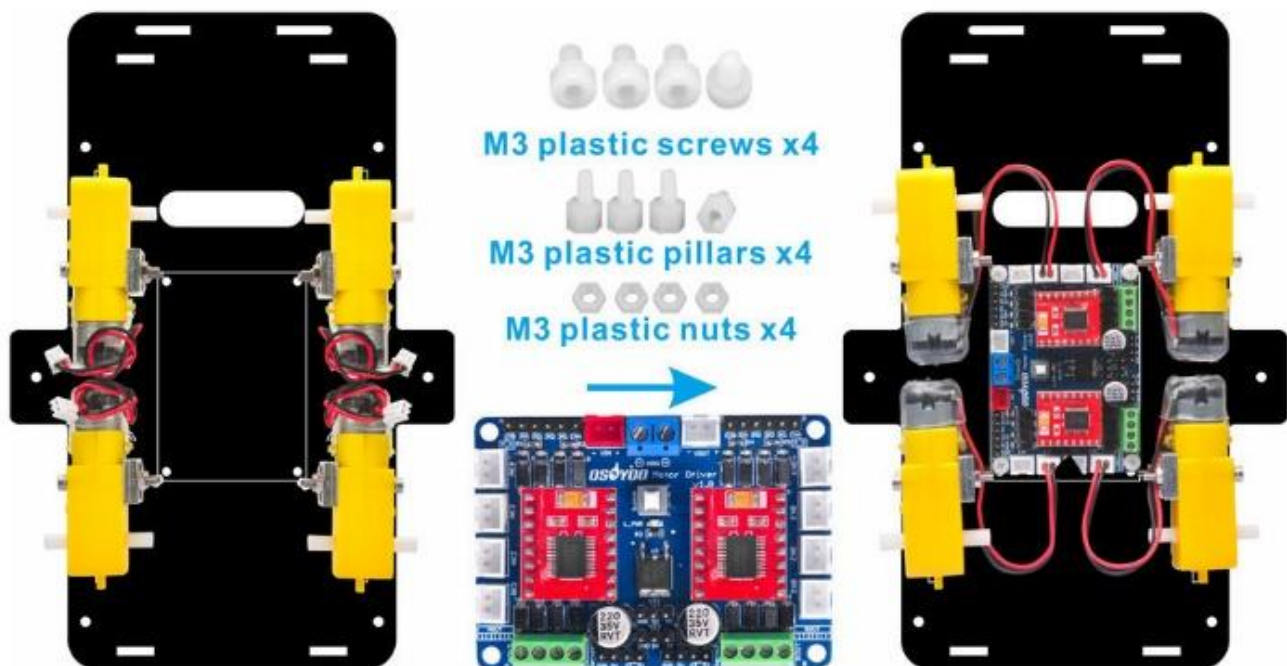
Model Y board V2.0

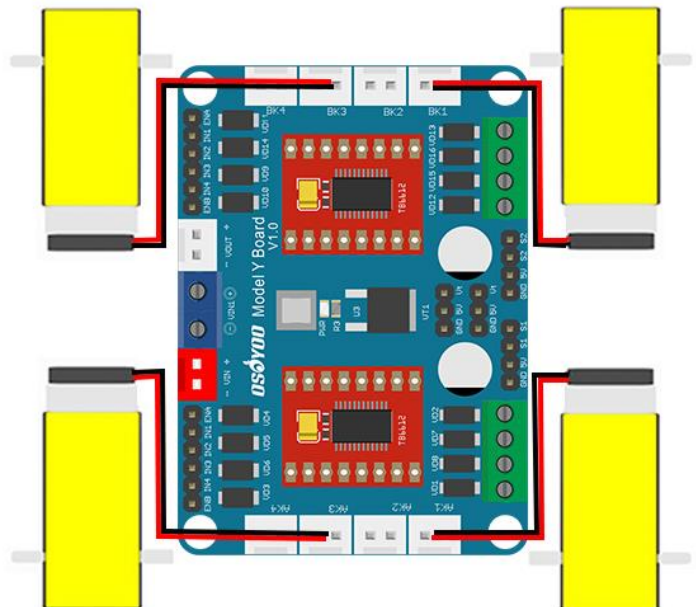
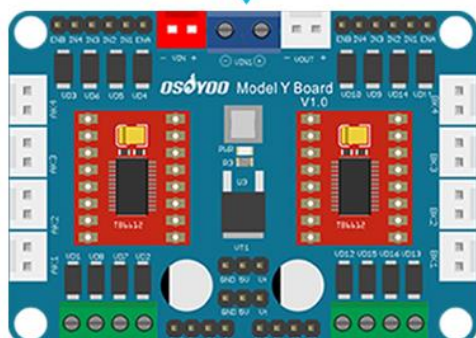
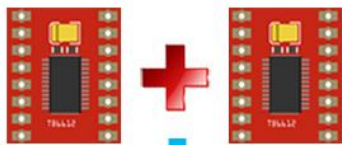
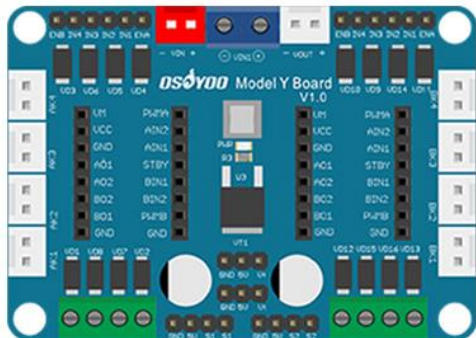
Note: The white button has two status, PUSH-DOWN and POP-UP and **make sure the button is in PUSH-DOWN position.**



4) Install OSOYUO model Y driver board to lower car chassis with 4pcs M3 plastic screws, plastic pillars and plastic nuts. And connect 4 motors to Model Y motor board K1 and K3 sockets as per following graph.

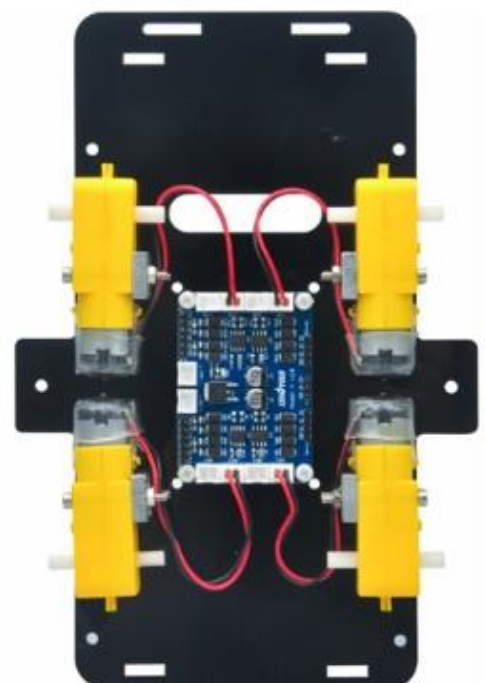
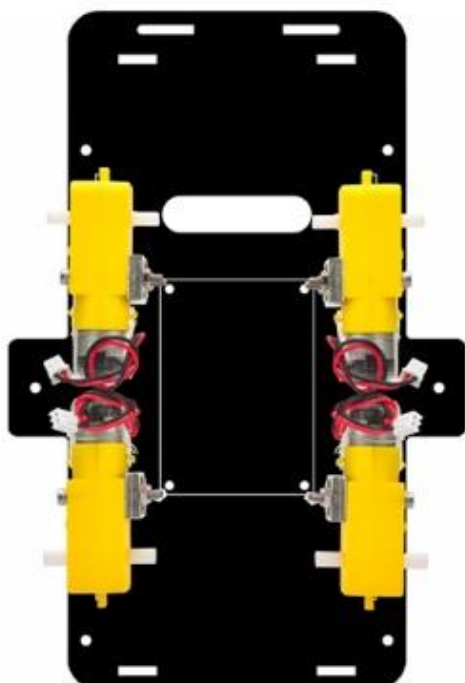
(Please make sure you install the OSOYUO model Y driver board in correct direction.)



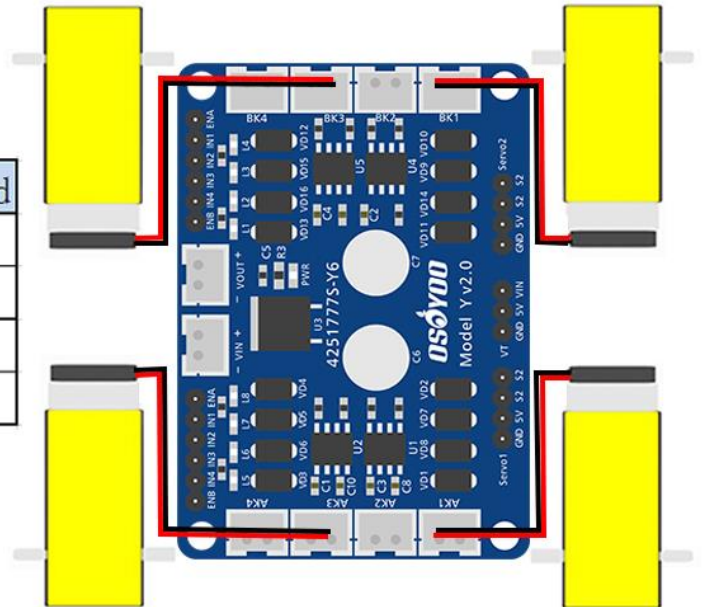


Wheel Motor	Model Y board
Front-right wheel motor	K1
Front-left wheel motor	K3
Rear-right wheel motor	K1
Rear-left wheel motor	K3

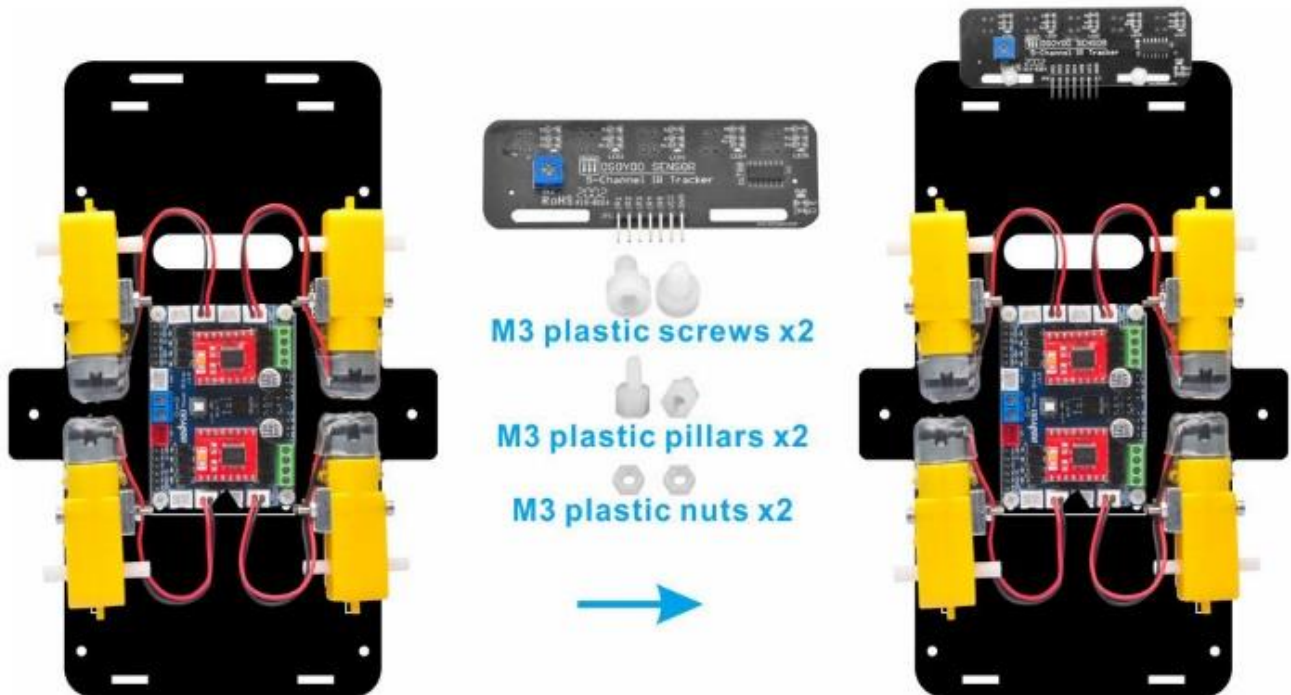
If you receive the updated model Y driver board V2.0, please install it as follows.



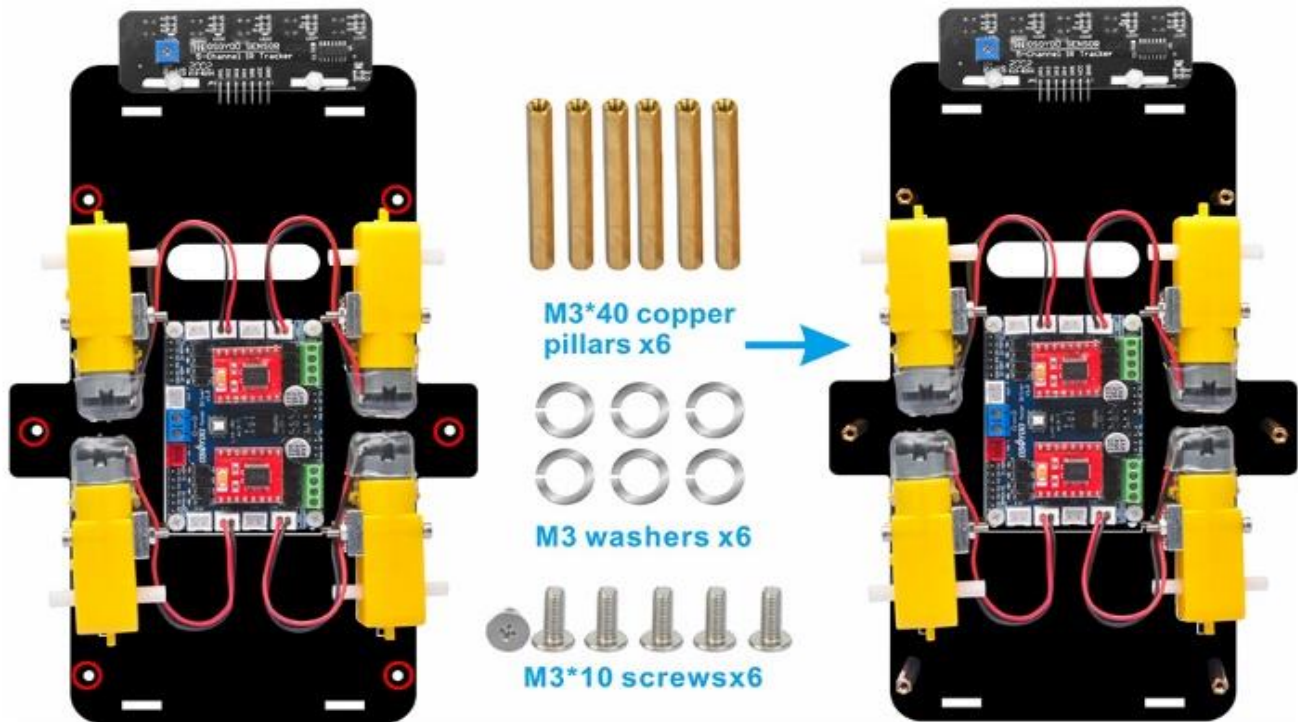
Wheel Motor	Model Y board
Front-right wheel motor	BK1
Front-left wheel motor	BK3
Rear-right wheel motor	AK1
Rear-left wheel motor	AK3



5) Install tracking sensor modules on lower car chassis with 2 pcs M3 plastic screws, M3 plastic pillars and M3 plastic nuts.



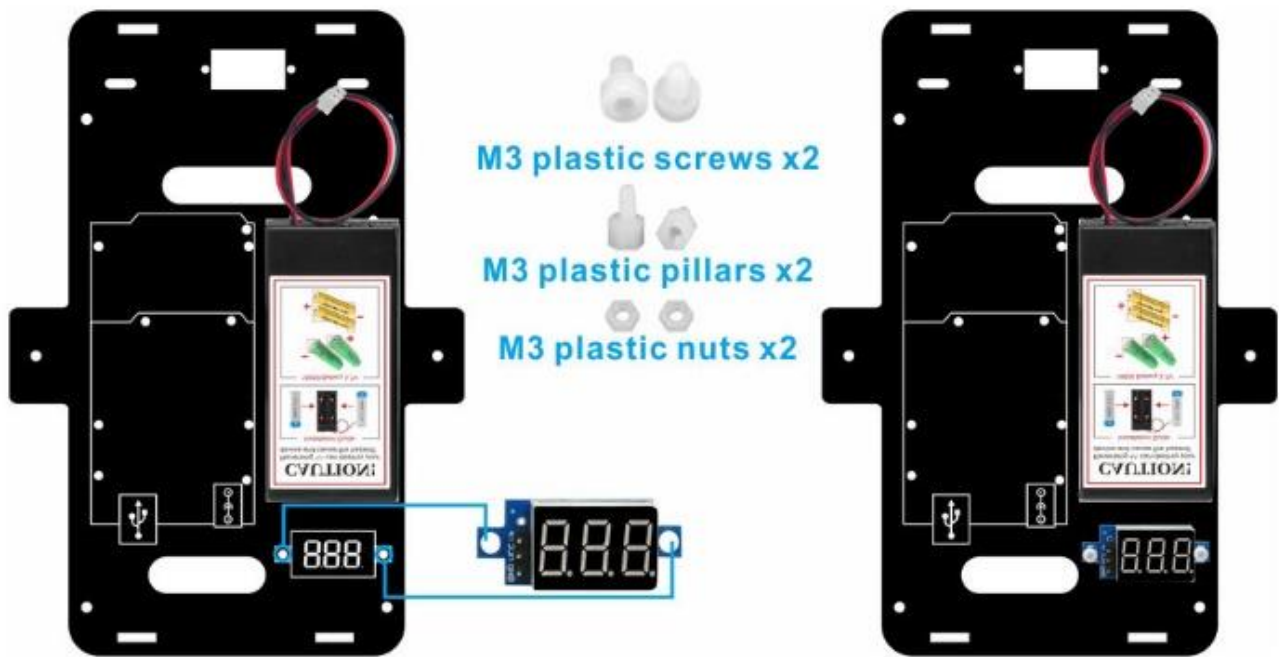
6) Fix copper pillars with 6pcs M3*10 screws and 6pcs washers on lower chassis.



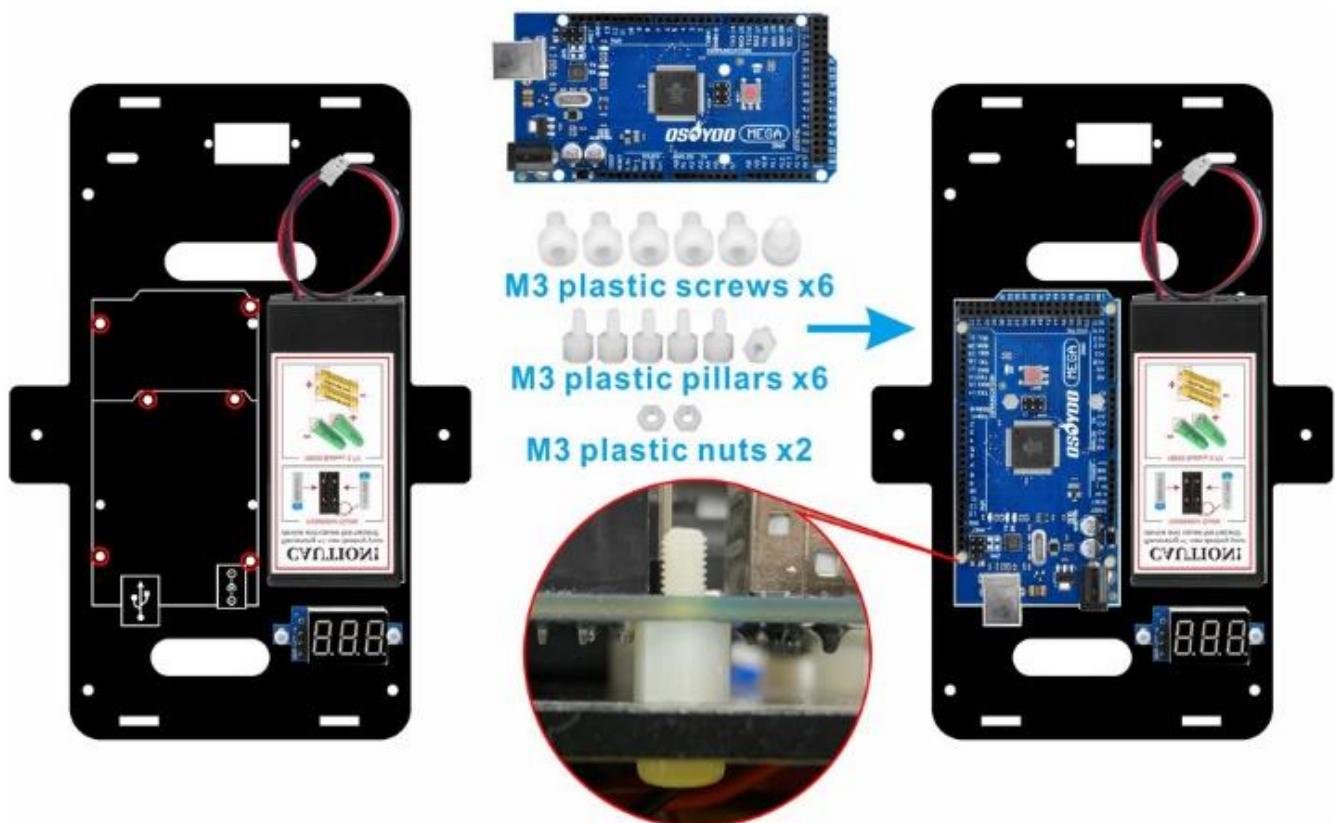
7) Fix this battery box on upper chassis with 4pcs M3 x 10 screws and M3 nuts.



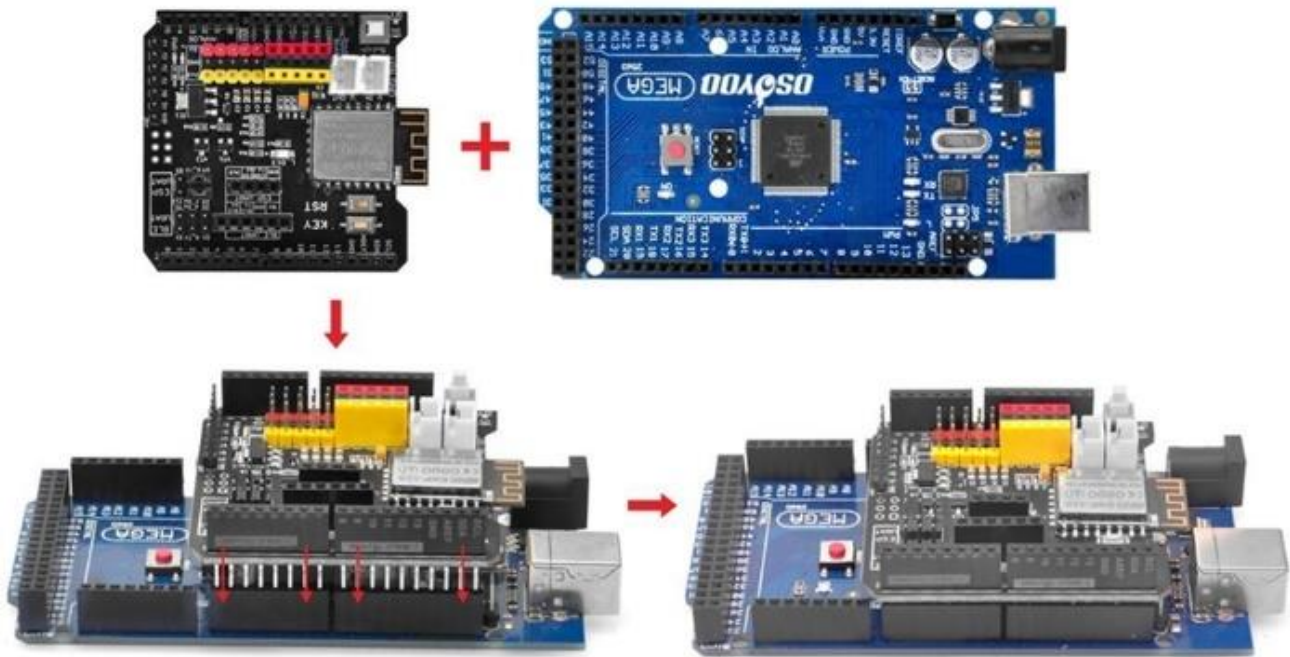
8) Install voltage meter on low car chassis with 2pcs M3 plastic screws, plastic pillars and plastic nuts.



9) Fix OSOYOO Mega2560 board on upper car chassis with 6pcs M3 plastic screws, 6pcs plastic pillars and 2pcs plastic nuts. (Please install mega2560 board at the side with printing.)



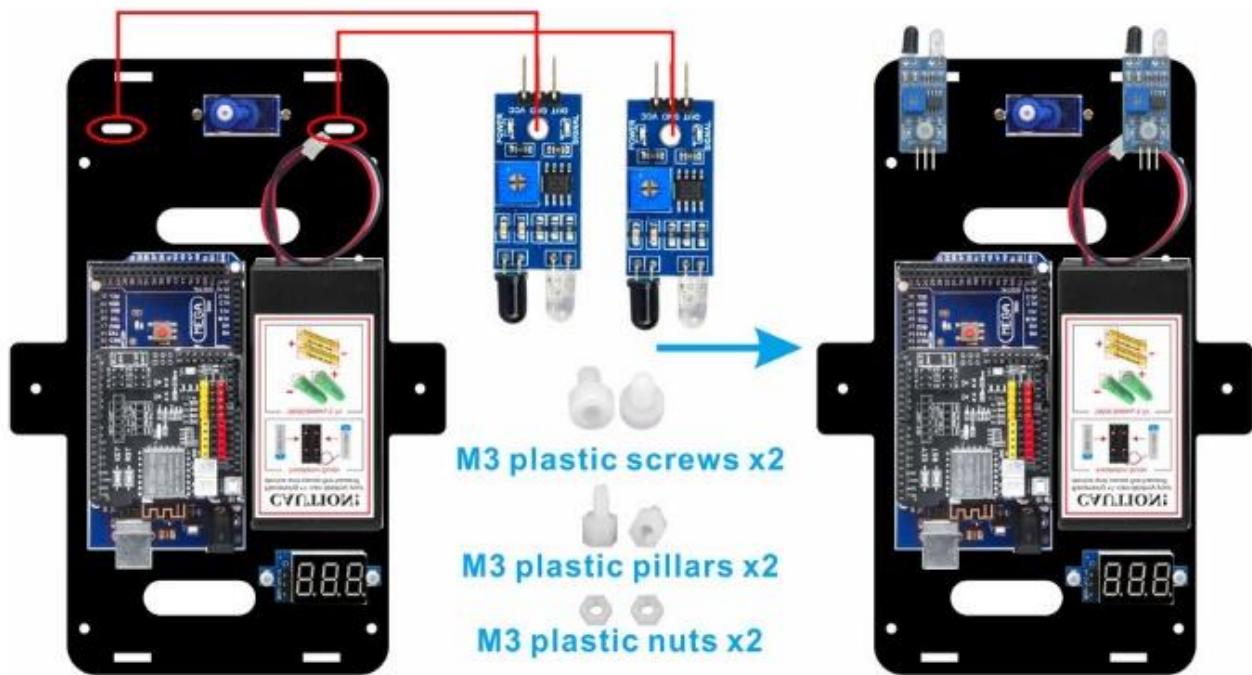
Insert OSOYOO uart WiFi shield onto your mega2560 board.



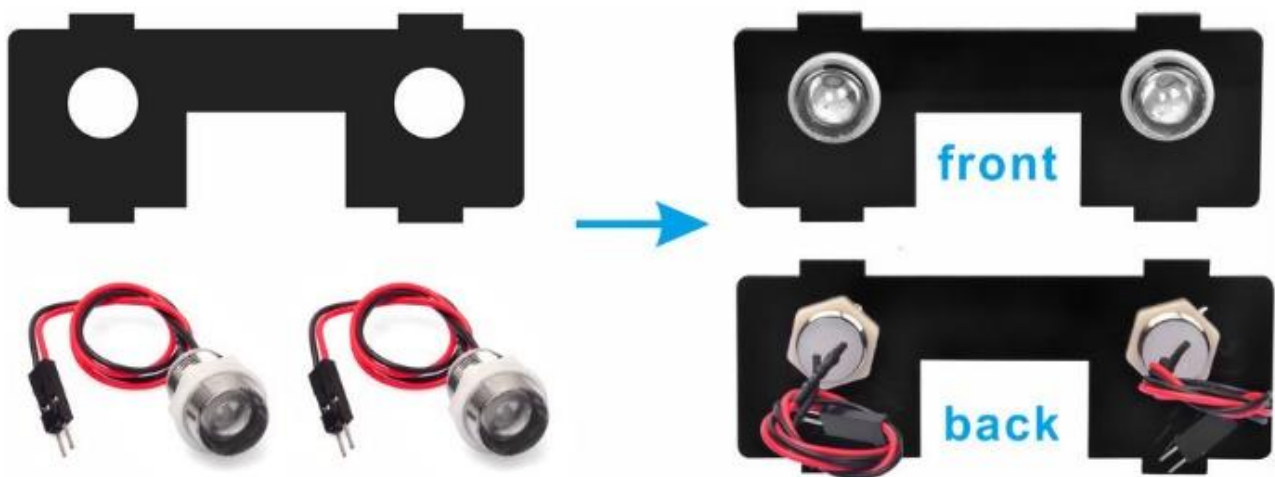
10) Install servo motor at the front of upper car chassis with 2pcs M2.2*8 Self Tapping Screws.



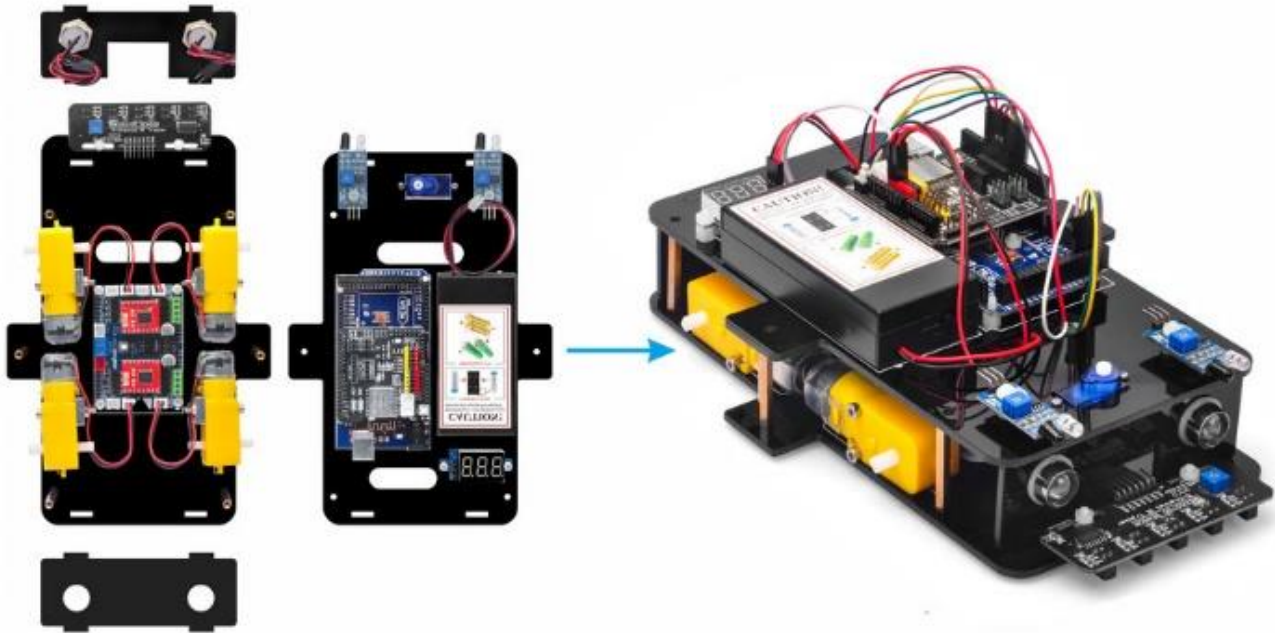
11) Install 2pcs IR distance sensors with 2pcs M3 plastic screws, M3 plastic pillars and M3 plastic nuts at the front of upper car chassis. You can install M3 plastic screws under upper chassis in order to tighten IR distance sensors enough.



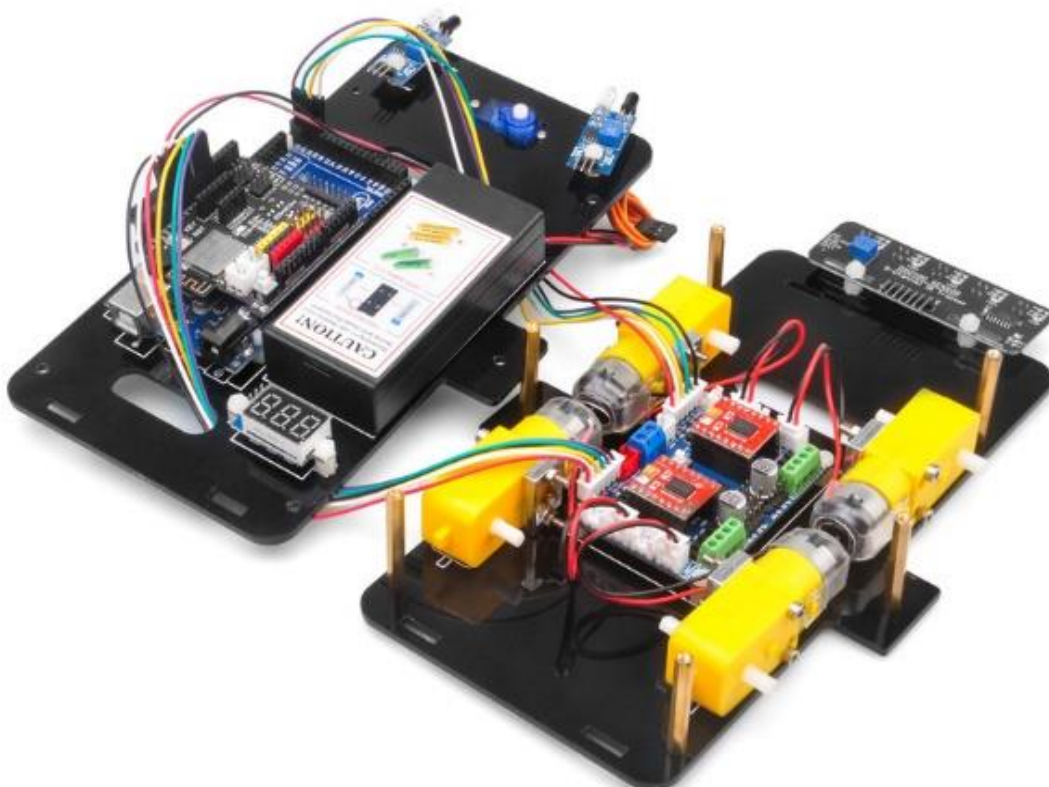
12) Install 2pcs LED light on the front barrier plate as follows.



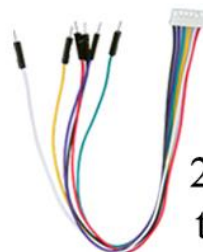
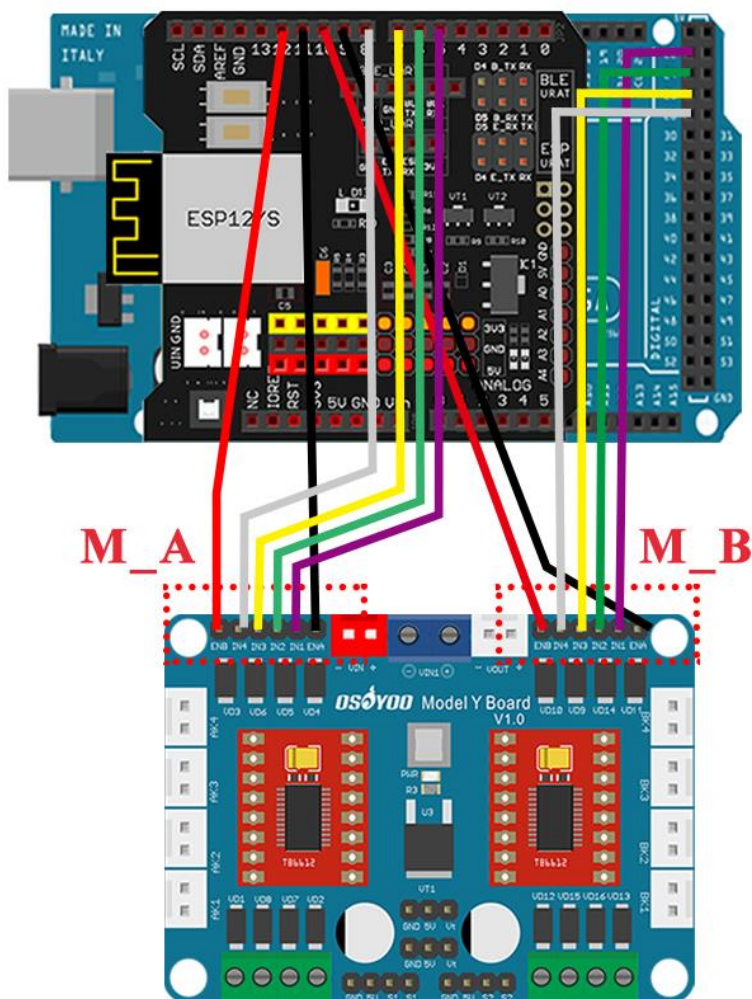
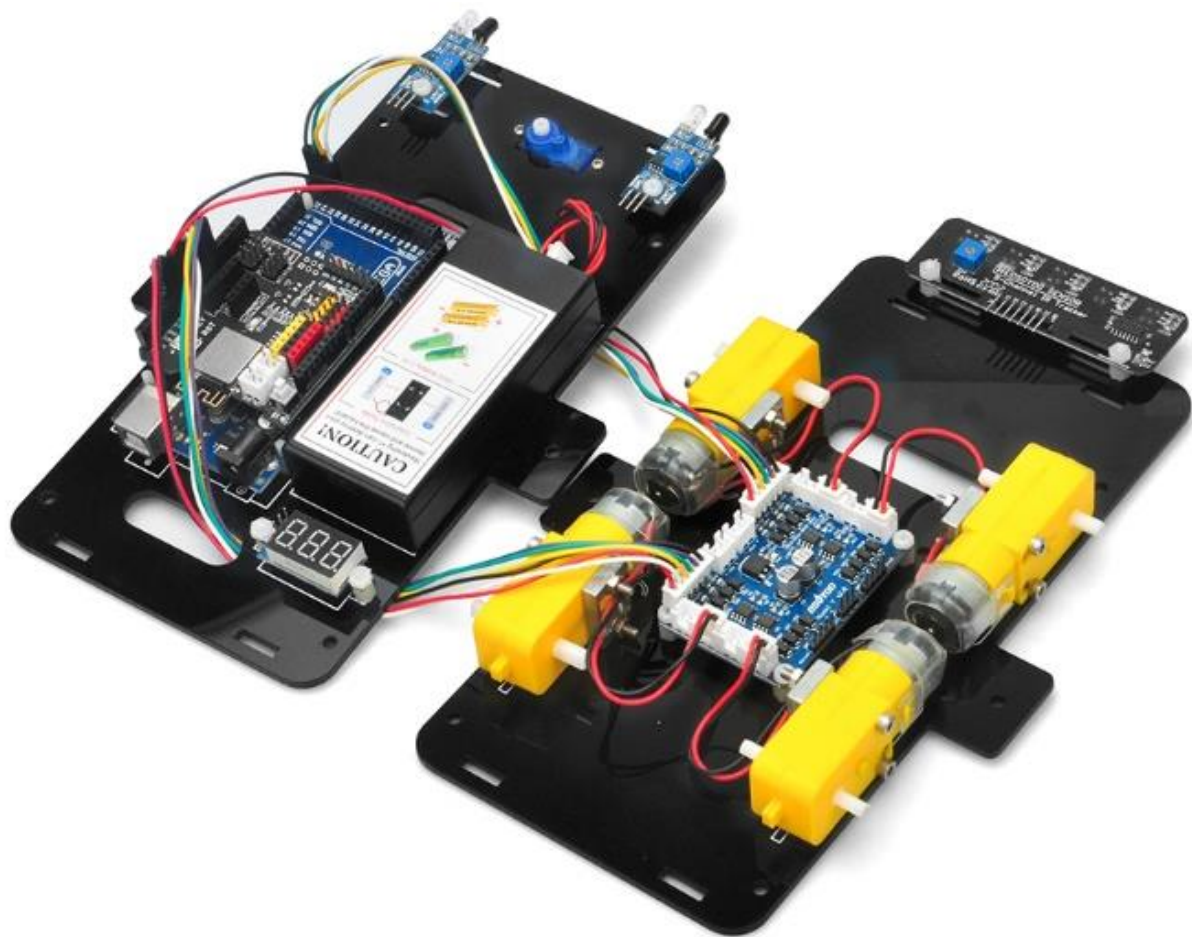
13) Before combine upper and lower chassis into one, it need the circuit connection.



14) Connect OSOYOO model Y board to OSOYOO Uart WiFi shield with 2pcs 6pin male to female jumper wires as follows. The 6-pin wires in Area M_B need to go through the hole near SG90 servo, the other 6-pin wires in Area M_A need to go through the hole near voltage meter.



If you receive the updated model Y driver board V2.0, please install it as follows.



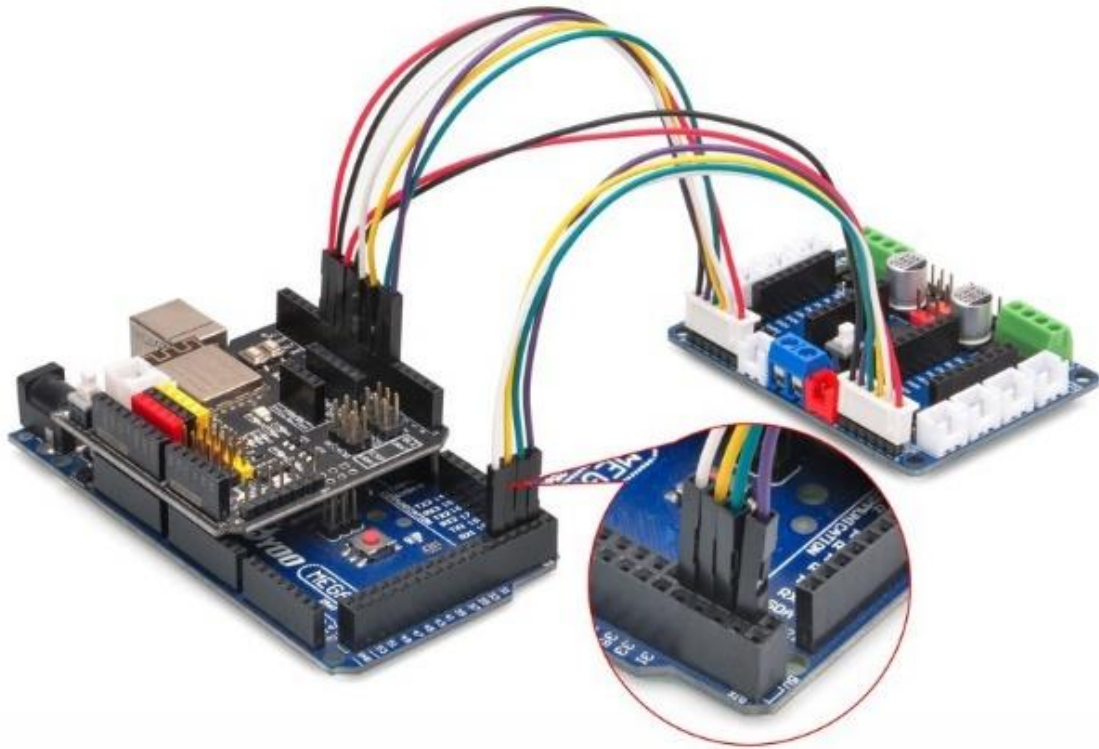
2pcs 6pin male to female wires

Model Y board	Uart Wifi Shield
M_A ENA	D11
M_A IN1	D5
M_A IN2	D6
M_A IN3	D7
M_A IN4	D8
M_A ENB	D12

Model Y board	Uart Wifi Shield
M_B ENA	D9
M_B IN1	D22
M_B IN2	D24
M_B IN3	D26
M_B IN4	D28
M_B ENB	D10

Caution:

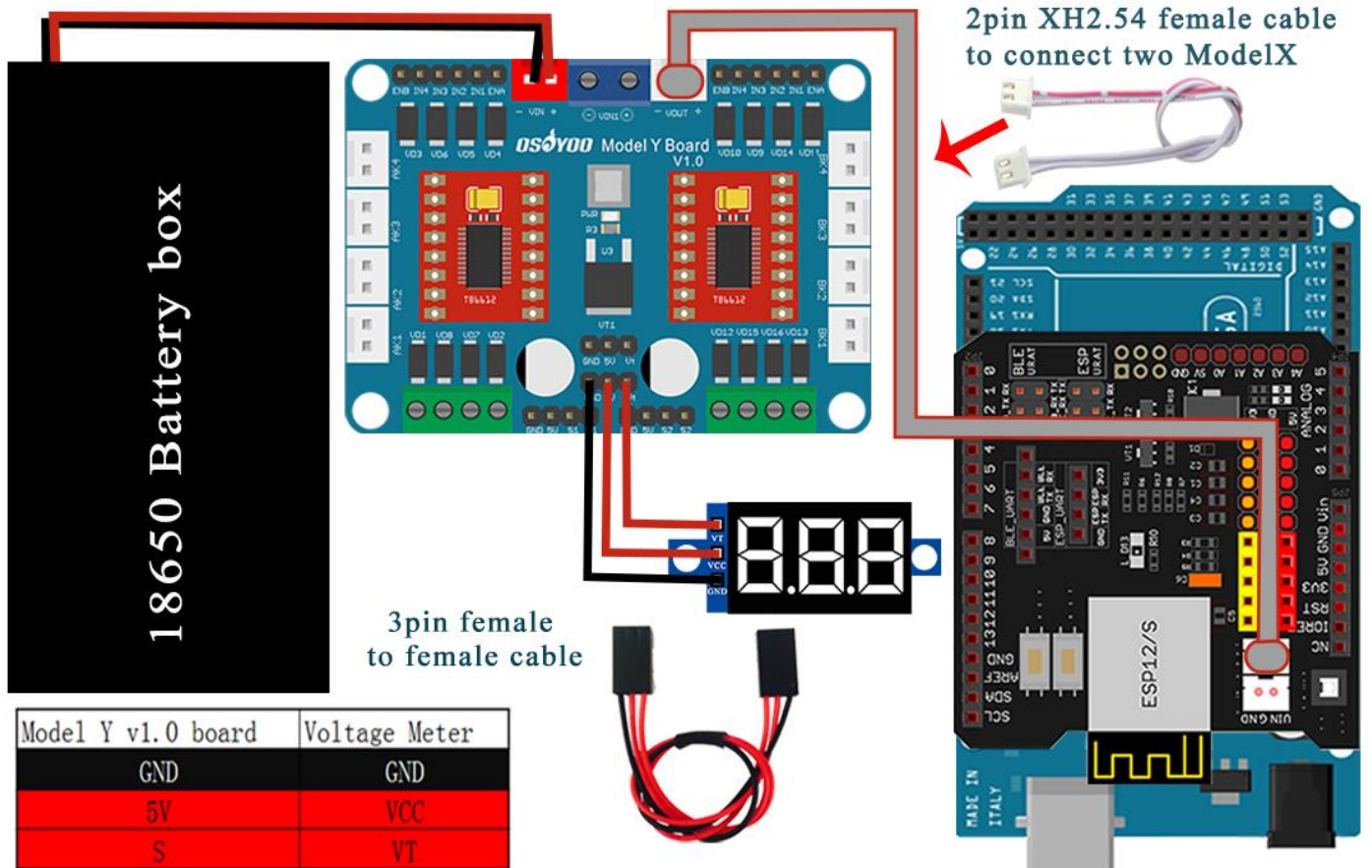
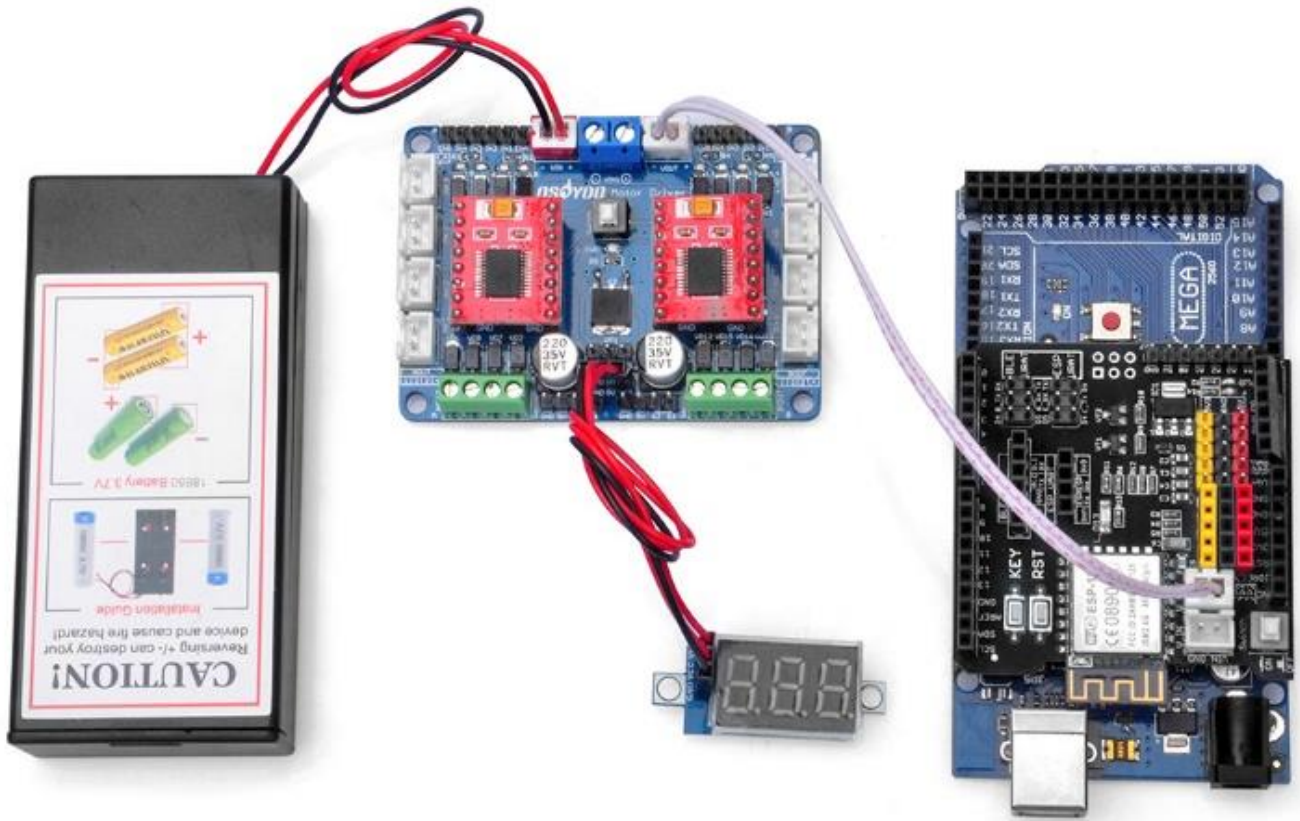
When insert/remove this 6-pin plug into Model Y 6-pin male socket, please hold the plastic pin-holder to do operation. Never drag the wires to pull the plug out of the socket, otherwise it will damage the wires.



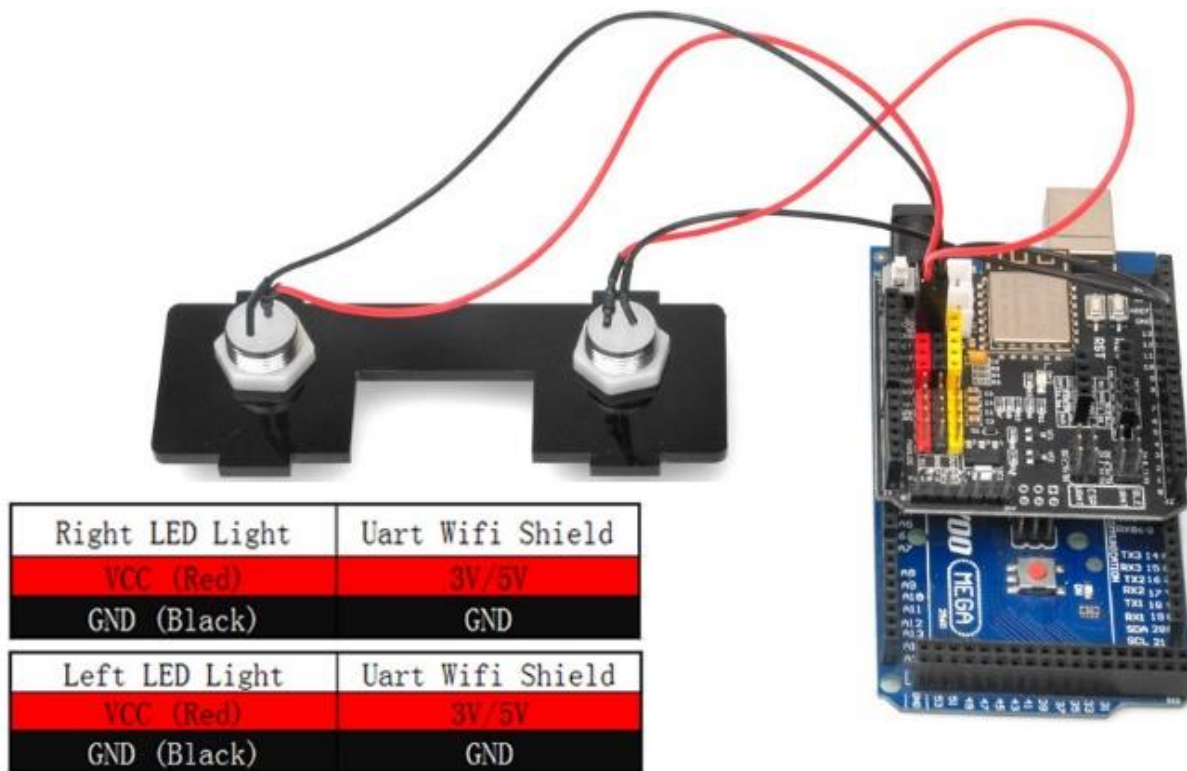
15) Connect voltage meter to OSOYOO model Y board with 3pin female to female jumper wire as below connection diagram.

Connect OSOYOO model Y board 12V-GND socket to VIN-GND socket with OSOYOO 2pin PnP cable 20cm as per following graph.

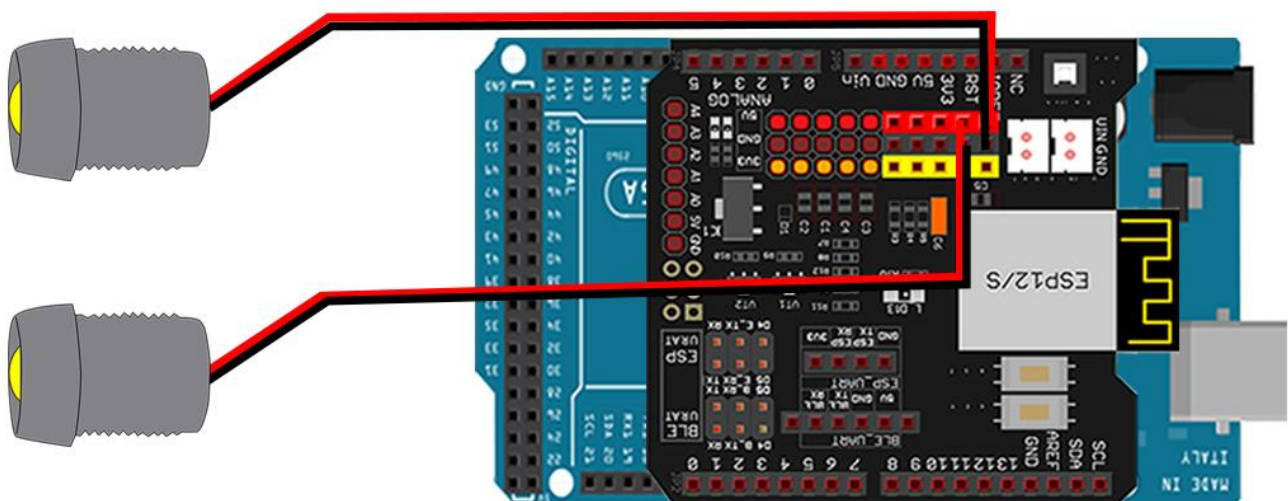
Connect battery box to VIN-GND socket of OSOYOO Uart WiFi shield according below connection diagram.



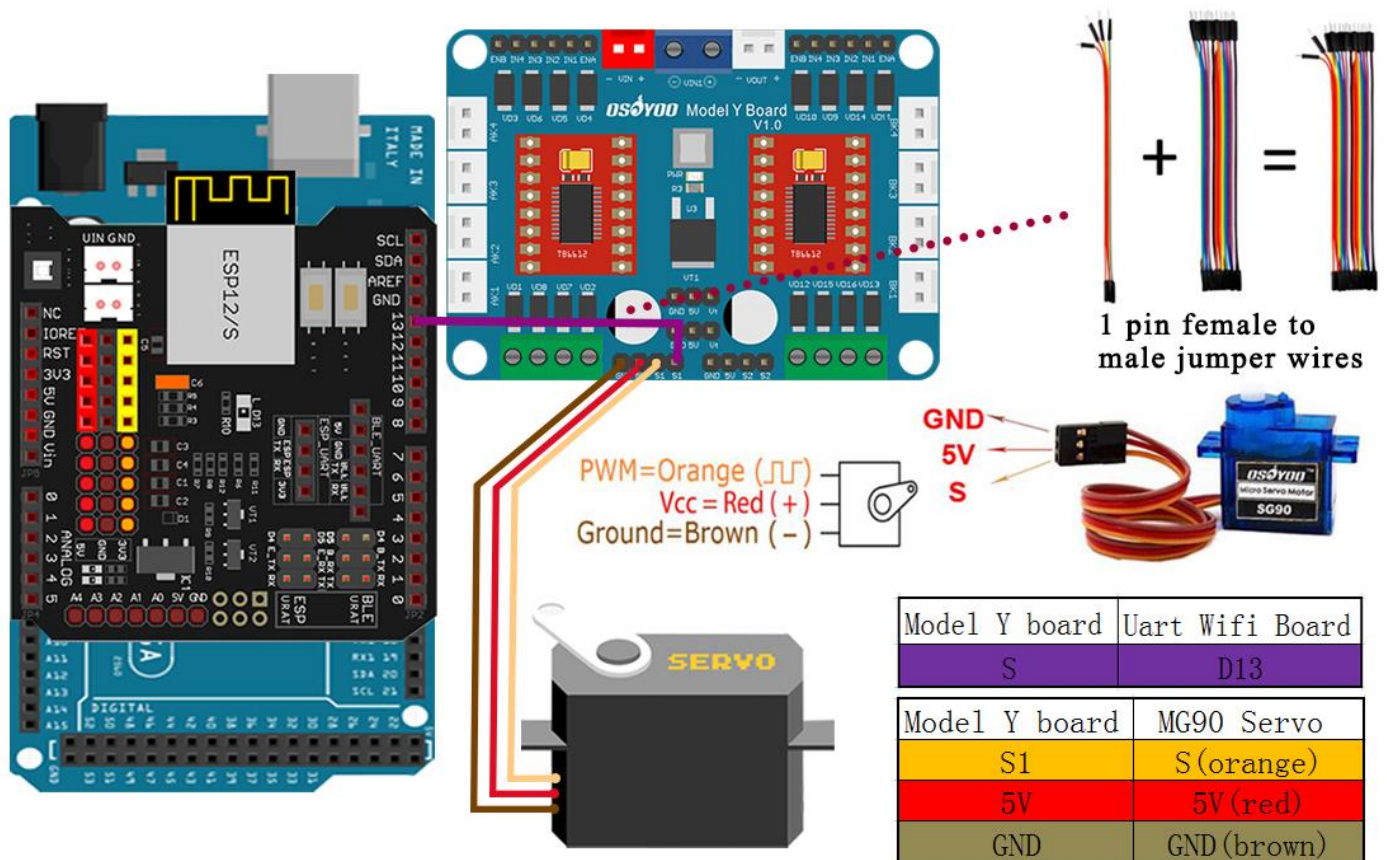
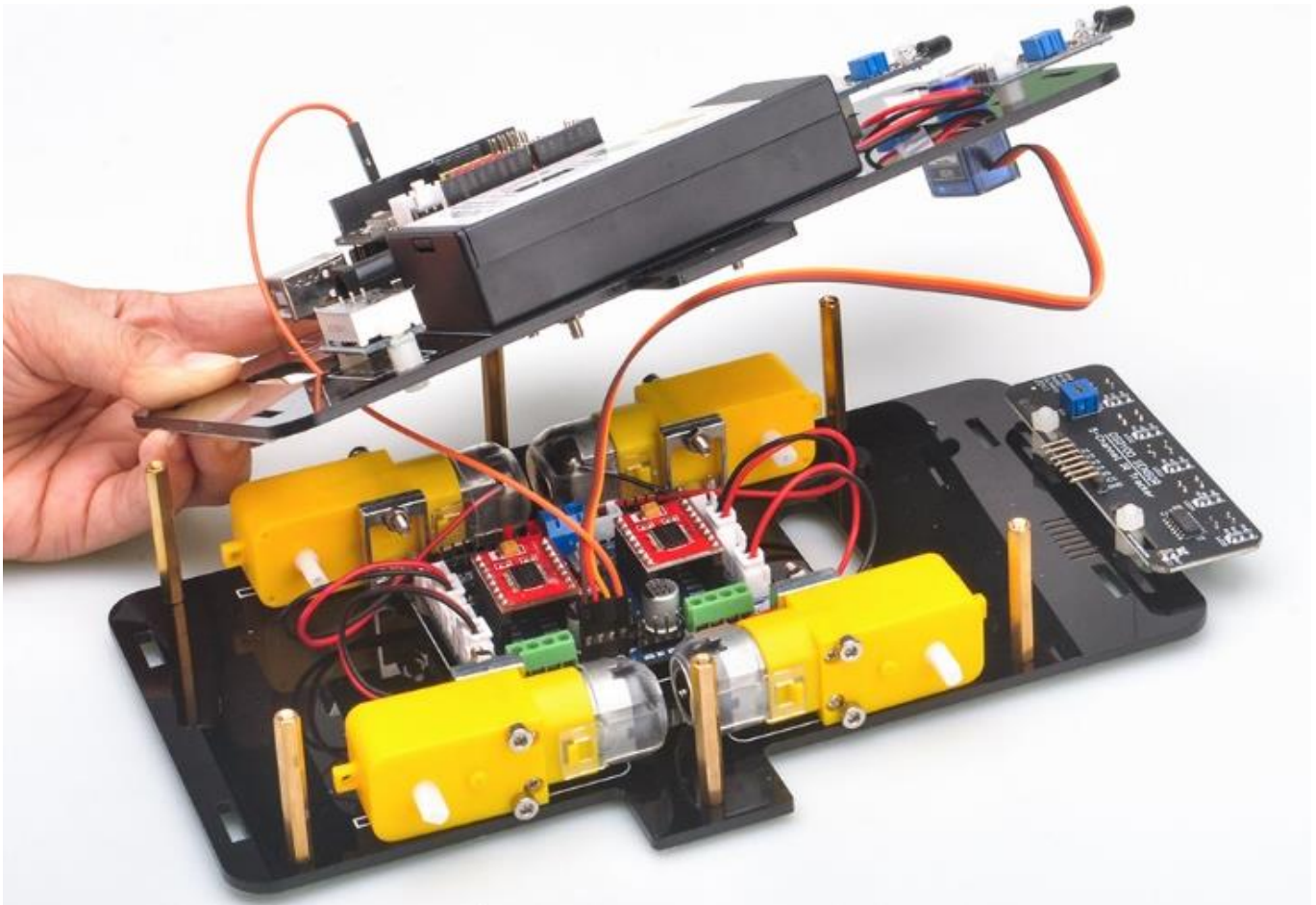
16) Install 2pcs LED Lights on the front transverse diaphragm as follows.



Connect the LED light to OSOY00 Uart WiFi shield as follows.

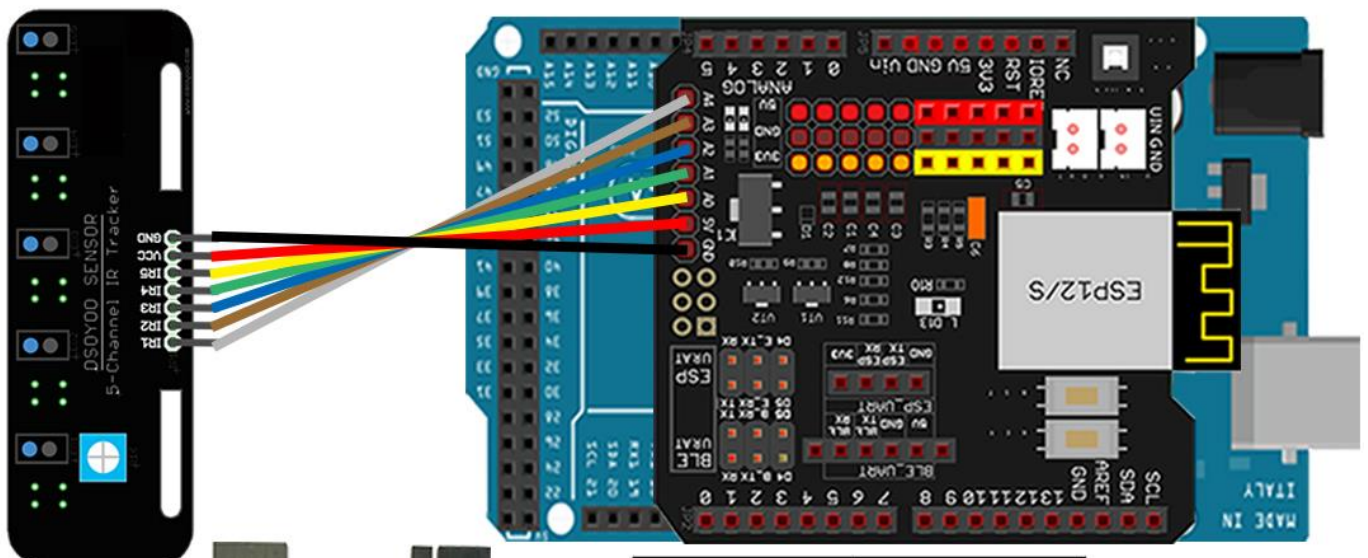
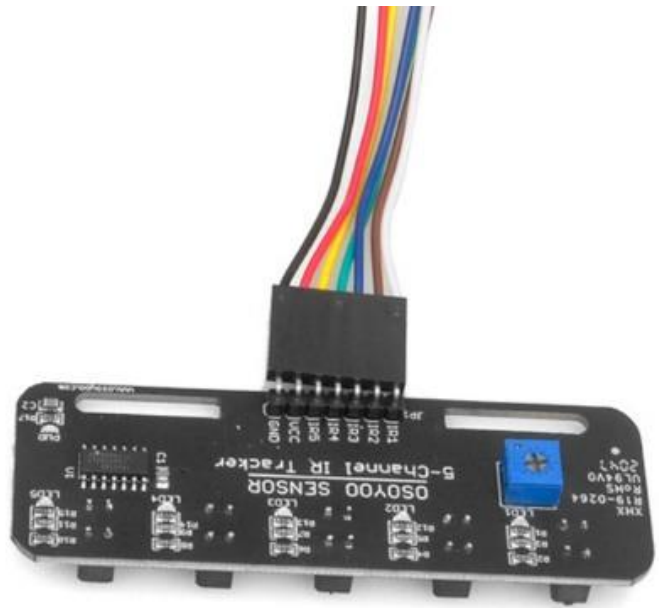


17) Connect SG90 servo motor, OSOY00 model Y board and OSOY00 Uart WiFi shield as following diagram.

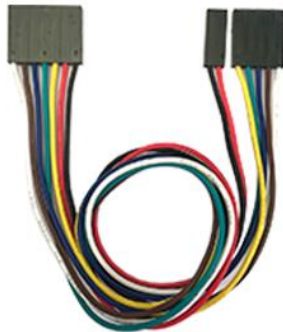


18) Connect GND-VCC pin of tracking sensor module to GND-5V of OSOYOO Uart WiFi shield V1.3; connect IR1, IR2, IR3, IR4, IR5 pins to A4, A3, A2, A3, A1 with 7pin 25cm female

to female cable as the following photo shows.



7pin female to female wire



Uart Wifi Board	5-Point Tracking Sensor
A0	IR5
A1	IR4
A2	IR3
A3	IR2
A4	IR1
5V	VCC
GND	GND

19) Fix upper chassis to lower chassis with 6pcs M3*10 hex screws.



20) Install 4 wheels onto the motors with 4pcs M2.2×22 screws.

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



Note: There are two types and to arrange them so the rollers point toward center of car when viewed from above.



SOFTWARE INSTALLATION

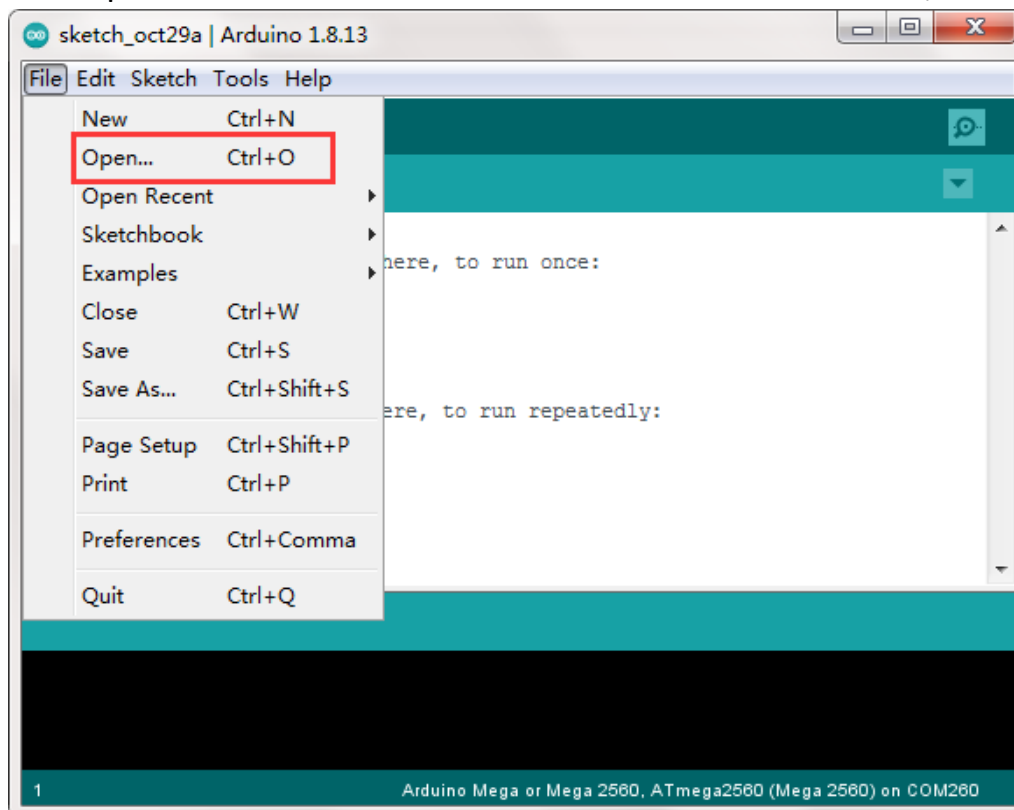
Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/

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 https://osoyoo.com/driver/mecanum_acrylic_chassis_v2/mc-lesson1.zip, unzip the download zip file mc-lesson1.zip, you will see a folder called mc-lesson1.zip.

Step 3: Connect mega2560 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code “mc-lesson1.ino” in lesson1 folder, load the code into arduino.



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

screwdriver without taking top and bottom apart.

HOW TO PLAY

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 Forward→Backward→Left turn→Right turn→

Right Parallel Shift→Left Parallel Shift→

Down Left Diagonal→ Up Right Diagonal→

Up Left Diagonal → Down Right Diagonal, then stop.

Lesson 2 Obstacle Avoidance Robot Car

INTRODUCTION

In this lesson, we will do an obstacle avoidance auto-driving project. We use an ultrasonic module to “see” obstacle, and the car will turn around from the obstacle automatically.

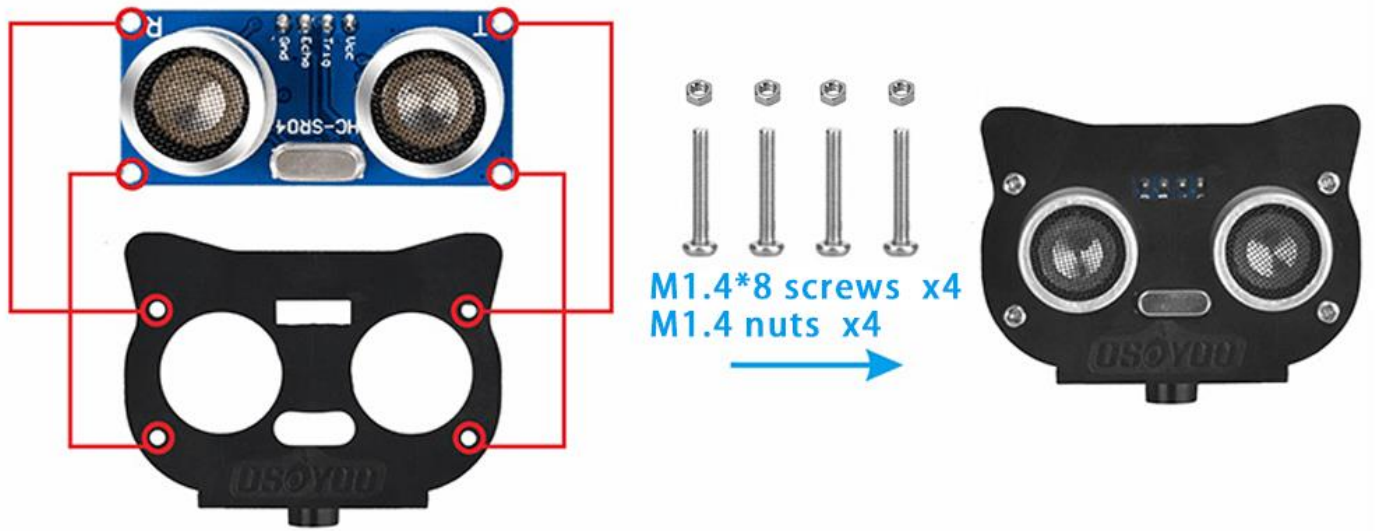
You must complete lesson 1 before you continue on with this lesson.

PARTS & DEVICES

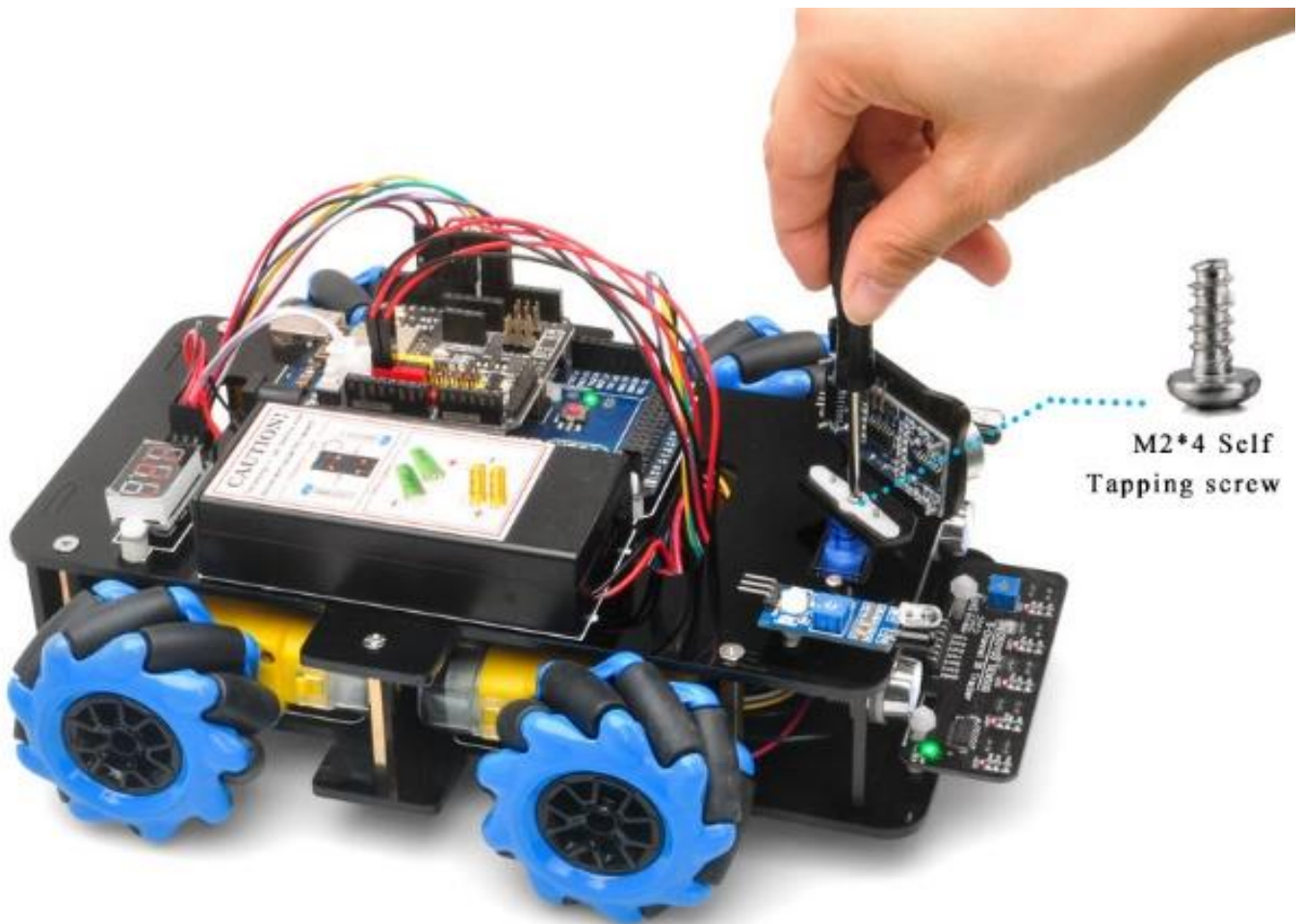
OSOYOO Mecanum wheels robotic car chassis x1
OSOYOO Wheels and motors x4 (left-wheels x2/right-wheels x2)
OSOYOO Mega2560 board fully compatible with Arduino UNO/Mega2560 x1
OSOYOO Uart Wifi shield x1
OSOYOO Model Y driver board x1
OSOYOO Voltage meter x1
OSOYOO MG90 servo motor x 1
OSOYOO Ultrasonic sensor module x1
OSOYOO Mount holder x1
OSOYOO Battery box x1
OSOYOO 3pin female to female jumper wire x1
OSOYOO 6pin male to female jumper wire x2
OSOYOO 10pin male to female jumper wire x1
OSOYOO 2 pin XH.25 female to female x1
18650 Batteries(3.7V) x2
Battery charger x1

HARDWARE INSTALLATION

1) Install Ultrasonic Module to mount holder with 4pcs M1.4*8 screw and M1.4 nuts.



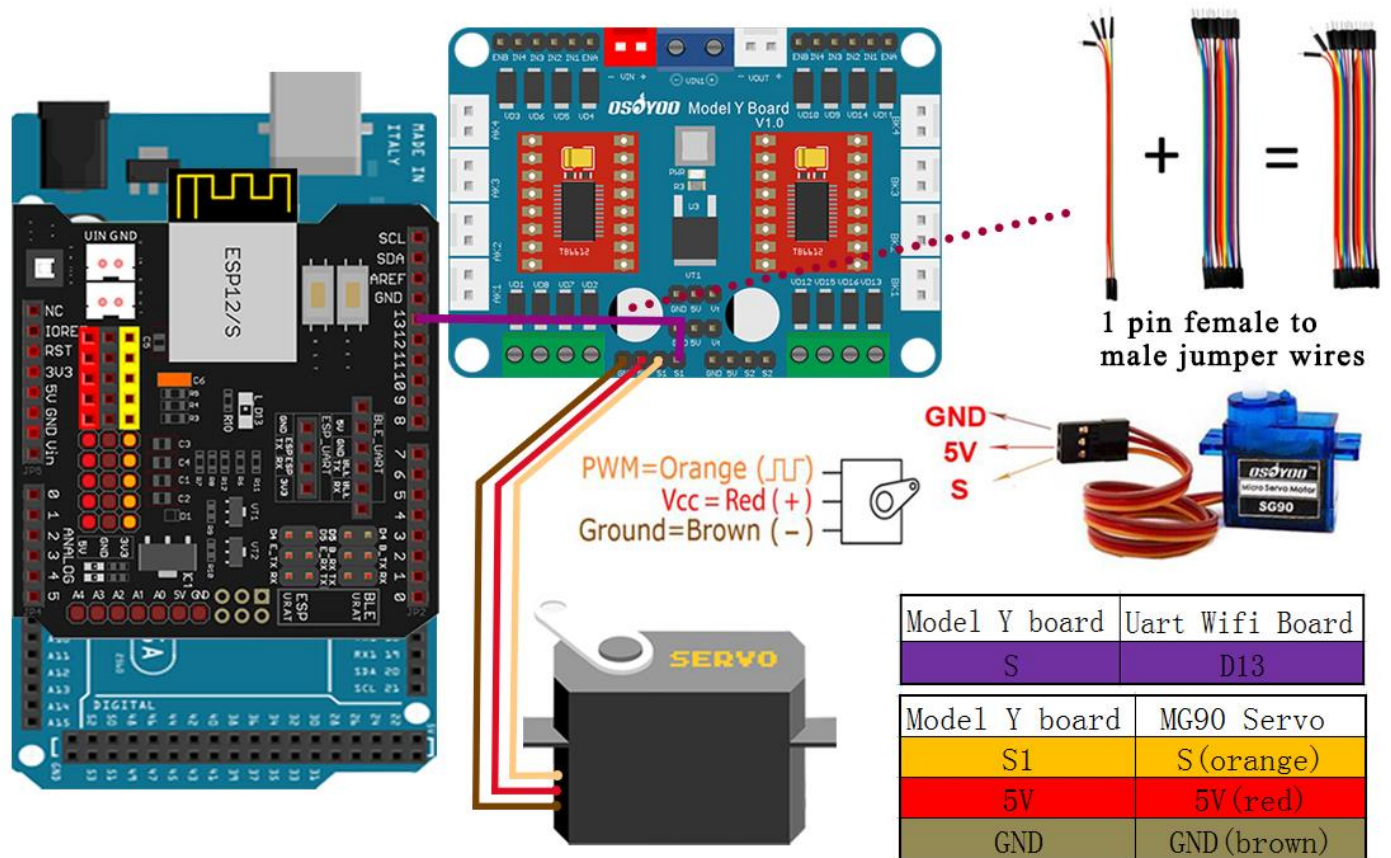
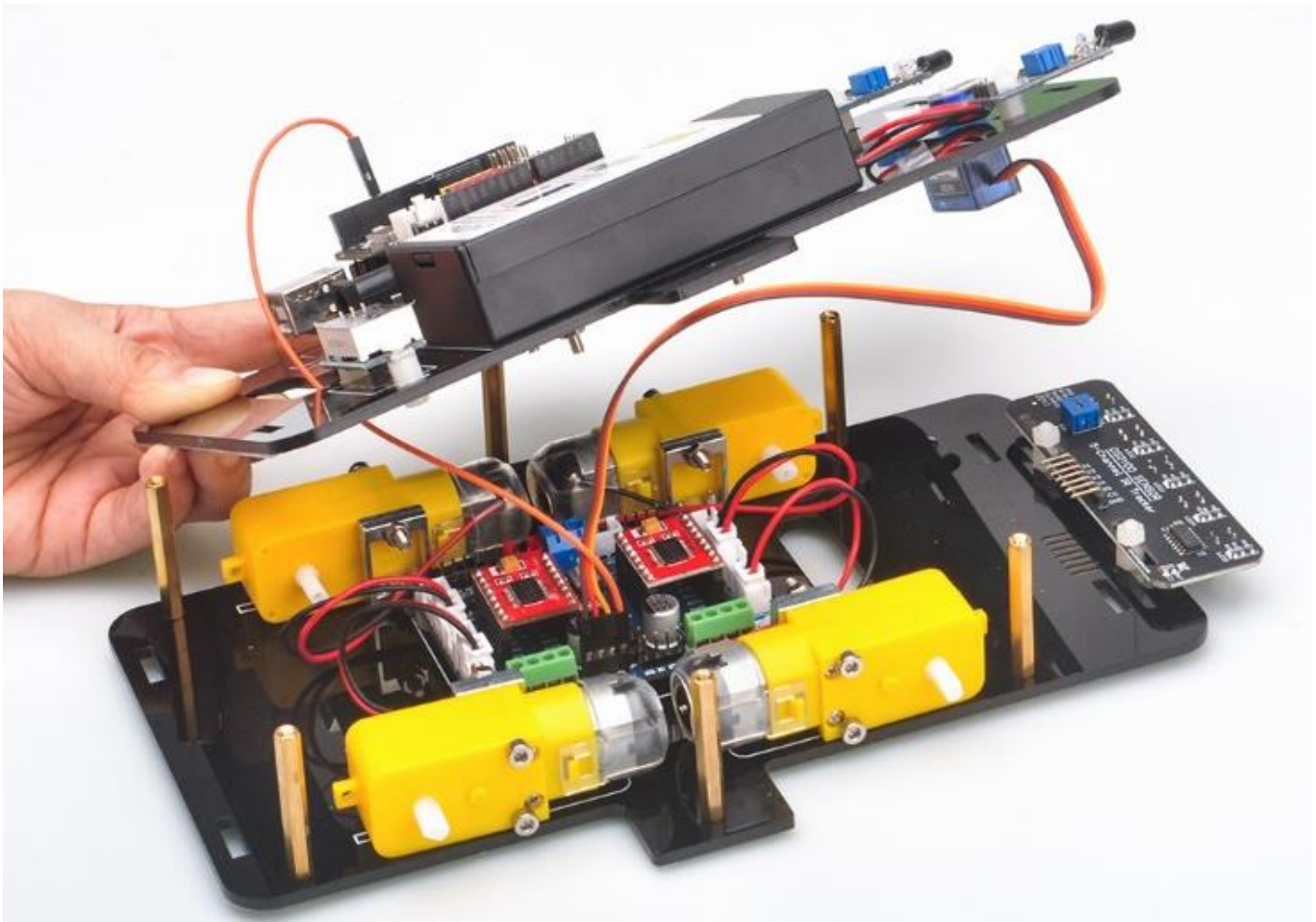
2) Install mount holder for Ultrasonic Module on servo motor with M2*4 Self Tapping screw.



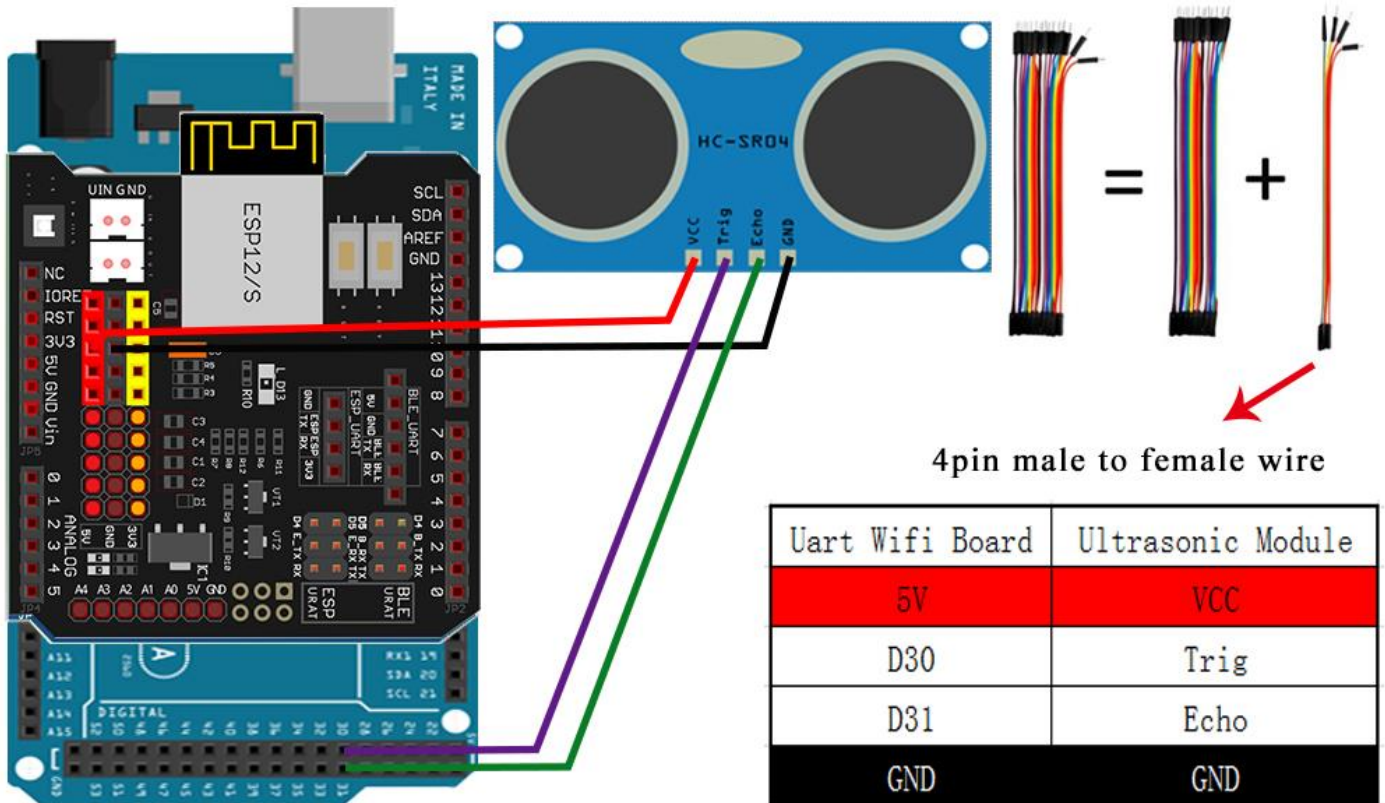
3) Please keep all lesson 1 connections same as it is. Before connecting wires, make sure that you have connect SG90 servo motor to model Y board and OSOYOO uart wifi shield as follows.

(Note: You need split 1 pcs of male-to-female jumper wires from our 10-pc jumper wire bundle. Any color from the bundle will be ok. The rest of wires are as spare parts for

potential broken or damaged wires.)



4) Connect ultrasonic module with OSOYOO Uart WiFi shield as follows.



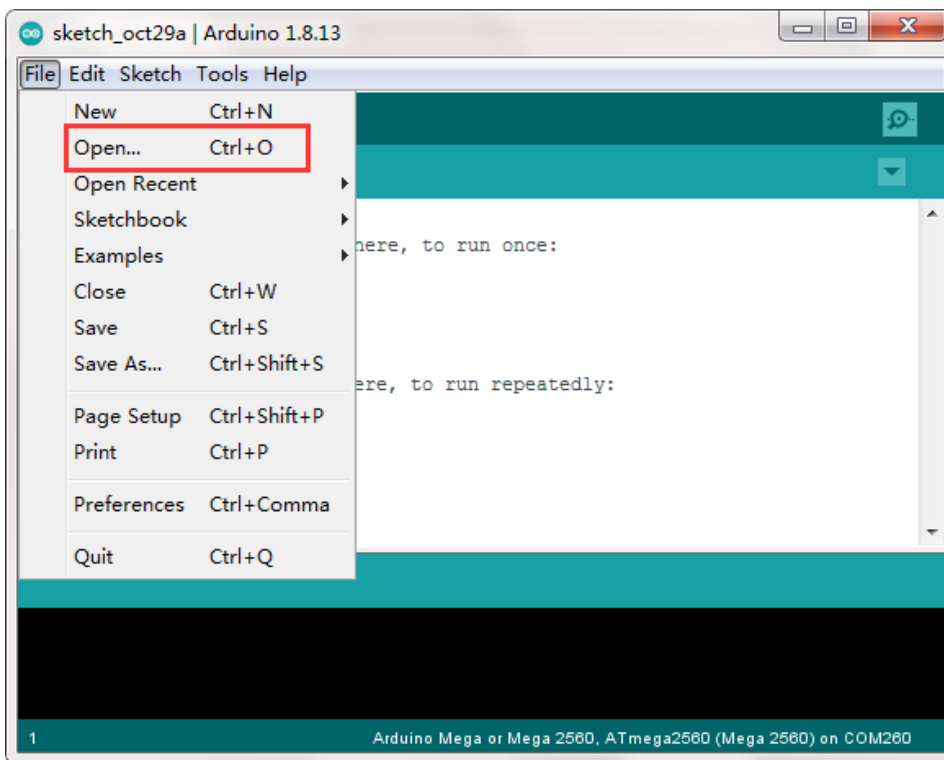
SOFTWARE INSTALLATION

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/

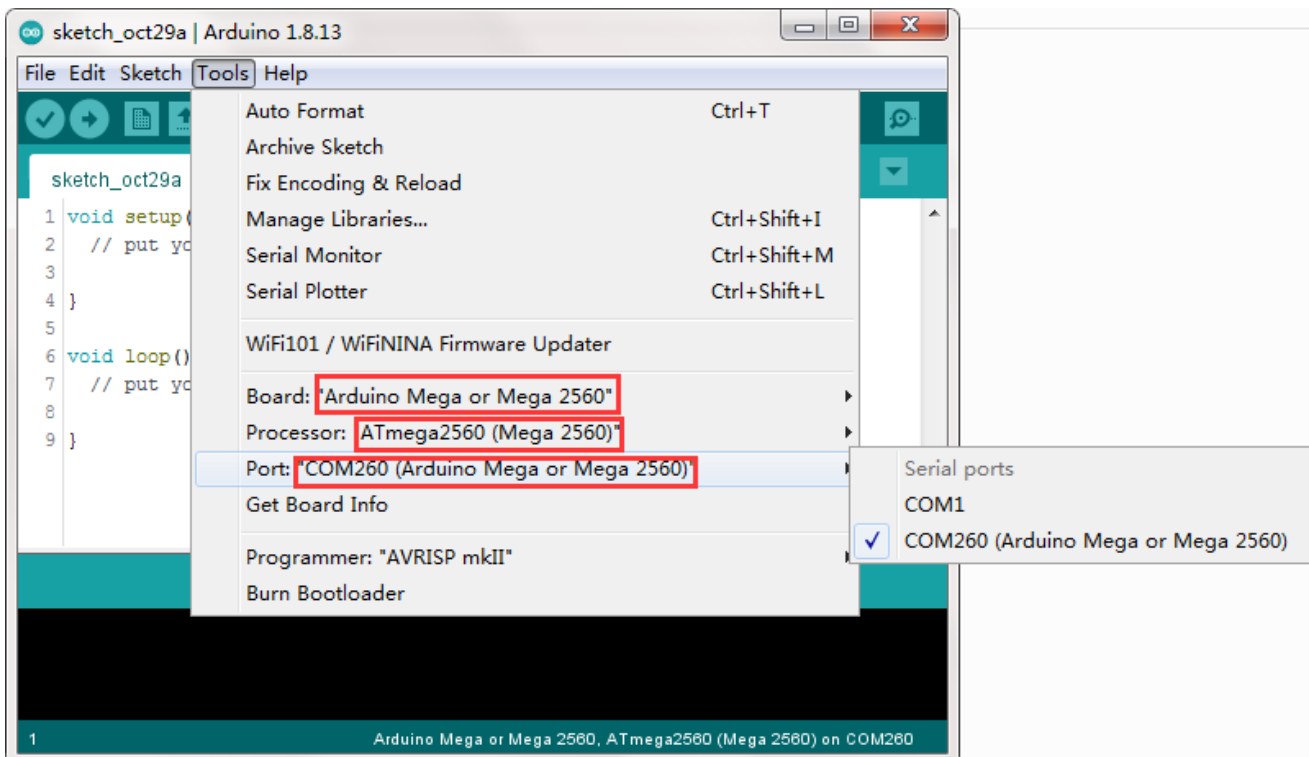
Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step). Download Arduino IDE from <https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

Step 2: Download https://osoyoo.com/driver/mecanum_acrylic_chassis_v2/mc-lesson2.zip, unzip the download zip file mc-lesson2.zip, you will see a folder called mc-lesson2.zip.

Step 3: Connect mega2560 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "lesson2.ino" in lesson2 folder, load the code into arduino.



Step 4: Choose MEGA2560 board as the board type and correct port for your project as following picture, upload the sketch to the board.



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, 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 3 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 obstacles. 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.

Lesson 3 Tracking Line Robot Car

INTRODUCTION

In this lesson, we will do a line-tracking auto-driving project. We will add a 5-Point tracking sensor module to the robotic car built in Lesson 1. The software in this lesson will read data from the 5-Point Tracking sensor module and automatically guide the smart car to move along the black track line in the white ground.

Lesson 1 must be completed before doing this line-tracking project.

PARTS & DEVICES

OSOYOO Mecanum wheels robotic car chassis x1
OSOYOO Wheels and motors x4 (left-wheels x2/right-wheels x2)
OSOYOO Mega2560 board fully compatible with Arduino UNO/Mega2560 x1
OSOYOO Uart Wifi shield x1
OSOYOO Model Y driver board x1
OSOYOO Voltage meter x1
OSOYOO 5-point tracking sensor module x1
OSOYOO Battery box x1
OSOYOO 3pin female to female jumper wire x1
OSOYOO 6pin male to female jumper wire x2
OSOYOO 7pin female to female jumper wire x1
OSOYOO 2 pin XH.25 female to female x1
18650 Batteries(3.7V) x2
Battery charger x1

HARDWARE INSTALLATION

- 1) Please keep all lesson 1 connections same as it is.(Remember : DO NOT remove any existing wires installed in Lesson 1).
- 2) 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 A4, A3, A2, A2, A1 with 7pin 25cm female to female cable as the following photo shows.

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



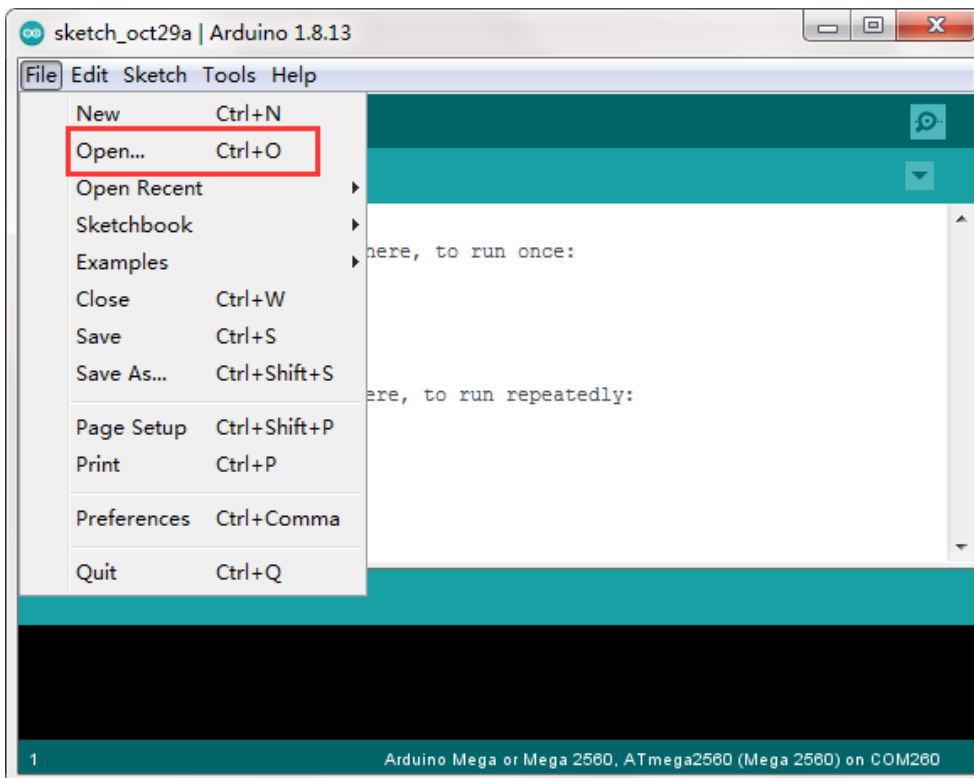
Download 7zip here for free
<https://www.7-zip.org/>

Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step). Download Arduino IDE from

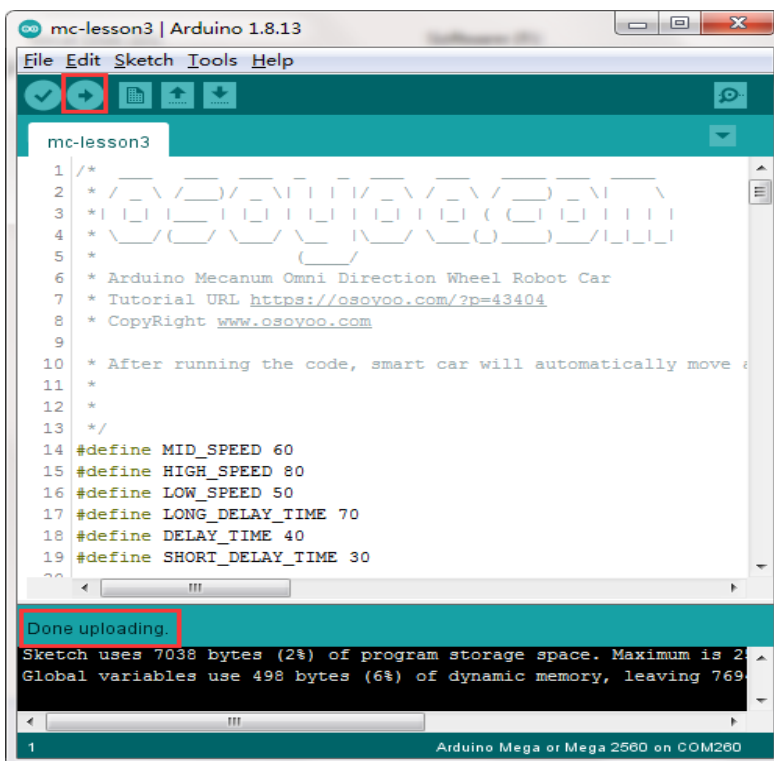
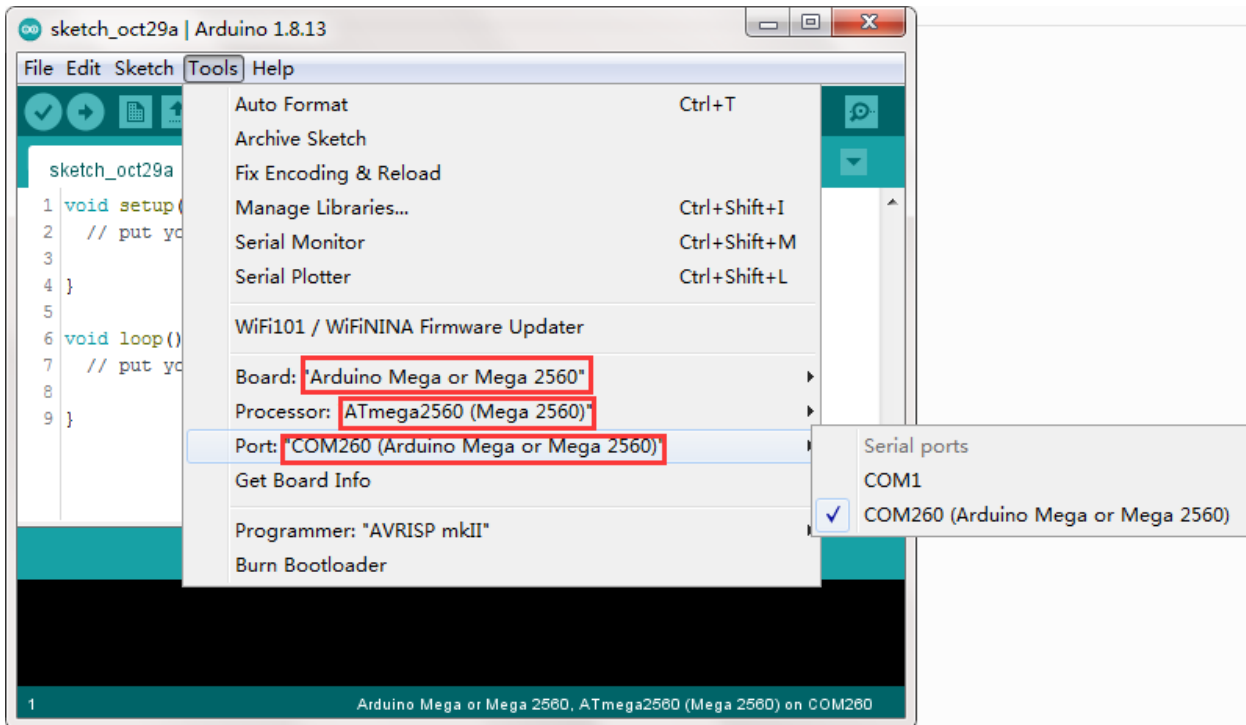
<https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

Step 2: Download https://osoyoo.com/driver/mecanum_acrylic_chassis_V2/mc-lesson3.zip, unzip the download zip file mc-lesson3.zip, you will see a folder called mc-lesson3.zip.

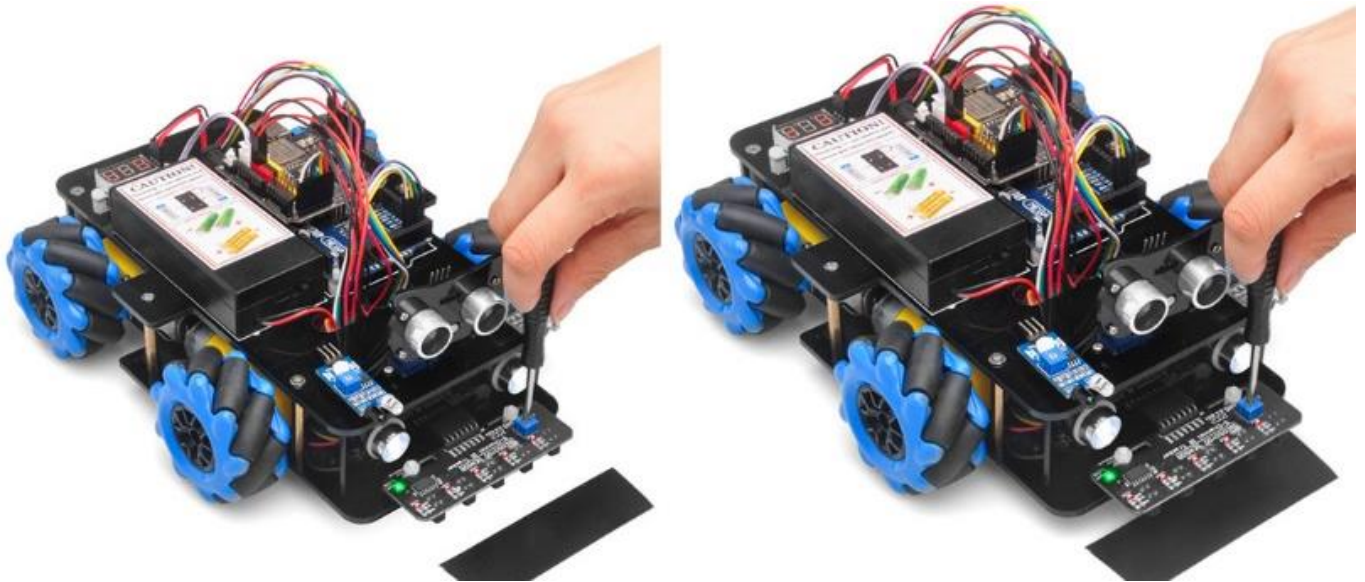
Step 3: Connect mega2560 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "lesson3.ino" in lesson3 folder, load the code into arduino.



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



Adjust the sensitivity of 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.



Final Testing:

Prepare a black track (the width of the black track is more than 20mm and less than 30mm) in white ground. Please note, the turning angle of track can't be too sharp, otherwise 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.

Lesson 4 Object follow Robot car

OBJECTIVE

In this lesson, we will install 2pcs IR distance sensors on robot car and program the car to follow object movements. The car receives the signal from the IR distance sensors, and then the program will drive the car to take actions.

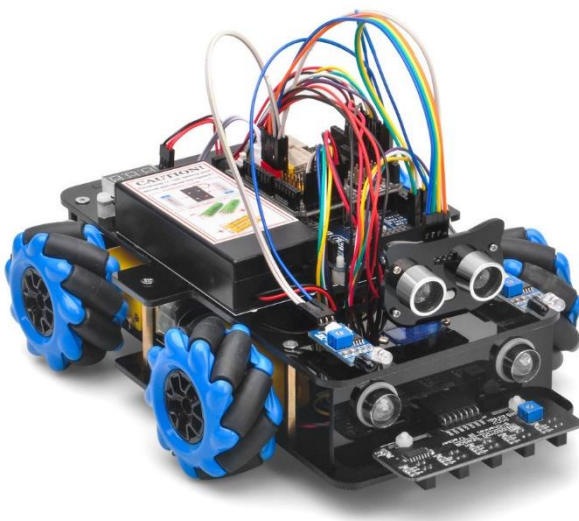
You must complete lesson 1 (assembling the car) before you start this lesson.

PARTS & DEVICES

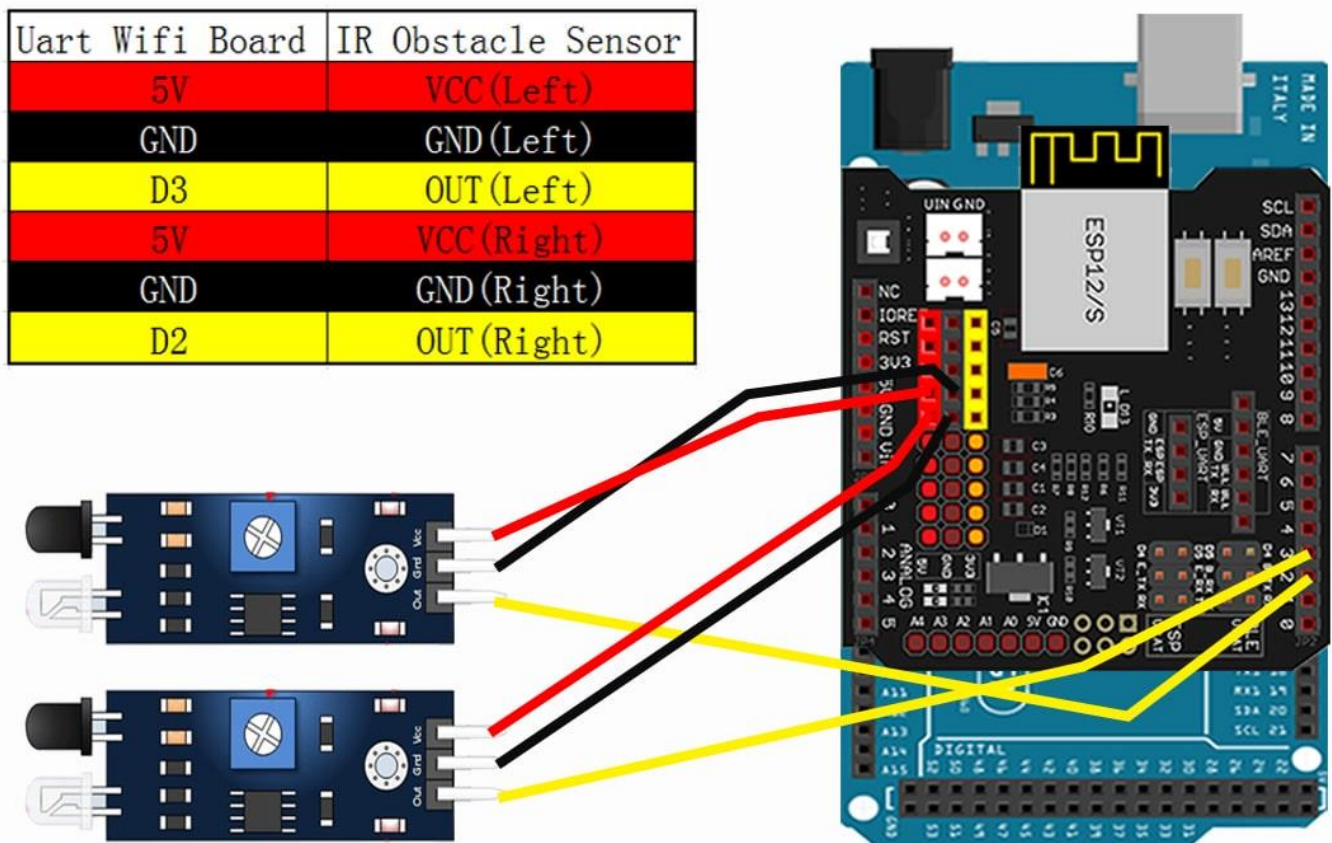
- OSOYOO Mecanum wheels robotic car chassis x1
- OSOYOO Wheels and motors x4 (left-wheels x2/right-wheels x2)
- OSOYOO Mega2560 board fully compatible with Arduino UNO/Mega2560 x1
- OSOYOO Uart Wifi shield x1
- OSOYOO Model Y driver board x1
- OSOYOO Voltage meter x1
- OSOYOO IR distance sensors x2
- OSOYOO Battery box x1
- OSOYOO 3pin female to female jumper wire x1
- OSOYOO 6pin male to female jumper wire x2
- OSOYOO 10pin male to female jumper wire x1
- OSOYOO 2 pin XH.25 female to female x1
- 18650 Batteries(3.7V) x2
- Battery charger x1

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: Connect 2pcs IR distance sensors modules as below connection diagram.
(Remember : DO NOT remove any existing wires installed in Lesson 1).



SOFTWARE INSTALLATION

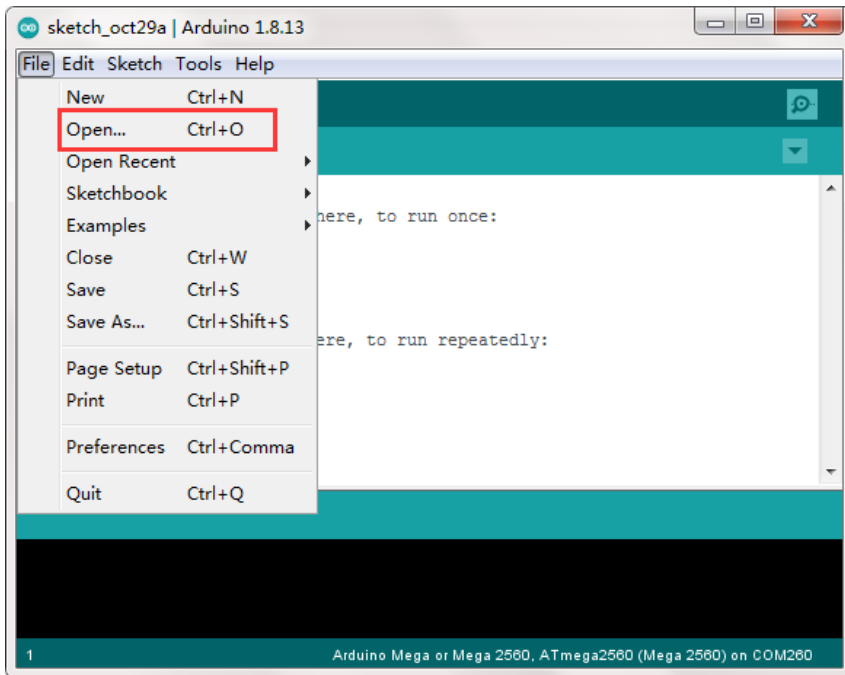
Open-source Arduino Software(IDE)		Download Arduino IDE here: https://www.arduino.cc/en/Main/Software?setlang=en
7 zip is a free zip utility that un-zips zip files		Download 7zip here for free https://www.7-zip.org/

Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step). Download Arduino IDE from

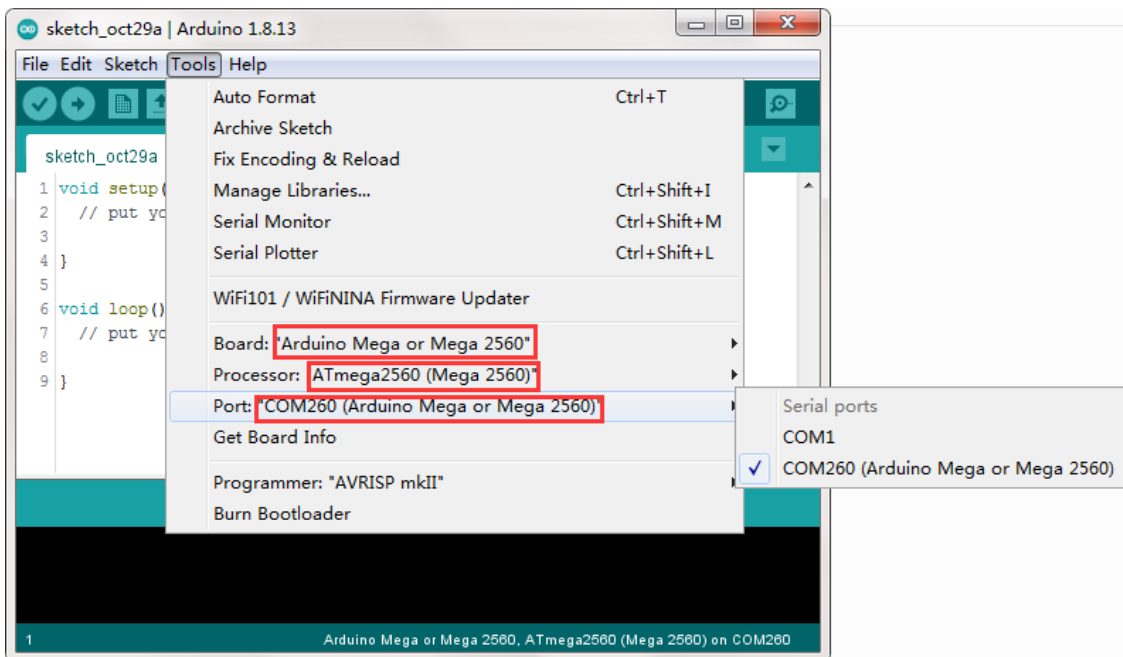
<https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

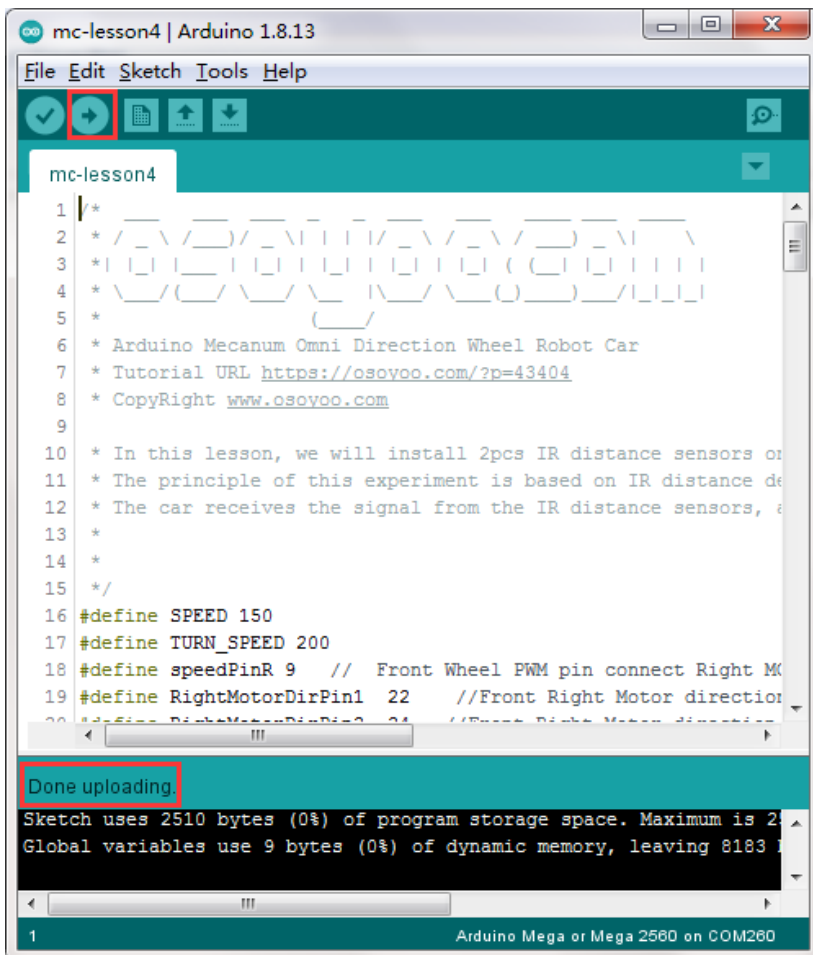
Step 2: Download https://osoyoo.com/driver/mecanum_acrylic_chassis_v2/mc-lesson4.zip, unzip the download zip file mc-lesson4.zip, you will see a folder called mc-lesson4.zip.

Step 3: Connect mega2560 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "lesson4.ino" in lesson4 folder, load the code into arduino.



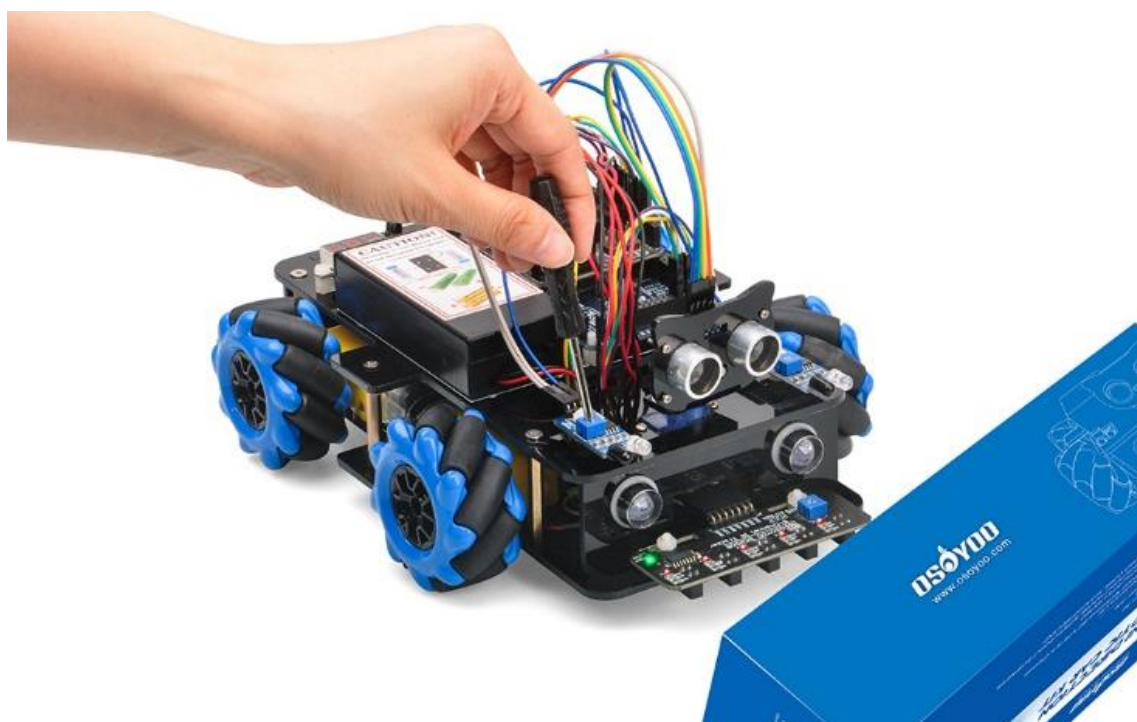
Step 4: Choose corresponding board/port for your project,upload the sketch to the board.





Step 5: Turn on the car, put object about 10cm ahead of each IR distance sensors and adjust potentiometer on IR distance sensors to detect object or your hand.

Note: When these IR modules detect objects, both the power indicator and signal indicator are on. When No object is detected, only power indicator is on, signal indicator is off. If the signal indicator is always on even though there is no obstacle in front of the sensor, you need to adjust the potentiometer.



Turn on the car, place your hand ahead of the car, then the car will move towards your hand as if you pull it. It goes forward when both IR Obstacle Avoidance modules detect your hand; it turns right if only the right IR Obstacle Avoidance module detects object; it turns left if only the left IR distance sensor detects object. when your hand is over 10cm ahead, it will stop.

Lesson 5-Imitation Driving with Bluetooth

INTRODUCTION

In this lesson, we will use a mobile APP 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.

PARTS & DEVICES

OSOYOO Mecanum wheels robotic car chassis x1
OSOYOO Wheels and motors x4 (left-wheels x2/right-wheels x2)
OSOYOO Mega2560 board fully compatible with Arduino UNO/Mega2560 x1
OSOYOO Uart Wifi shield x1
OSOYOO Model Y driver board x1
OSOYOO Voltage meter x1
OSOYOO Bluetooth modules x1
OSOYOO Battery box x1
OSOYOO 3pin female to female jumper wire x1
OSOYOO 6pin male to female jumper wire x2
OSOYOO 10pin male to female jumper wire x1
OSOYOO 2 pin XH.25 female to female x1
18650 Batteries(3.7V) x2
Battery charger x1

HARDWARE INSTALLATION

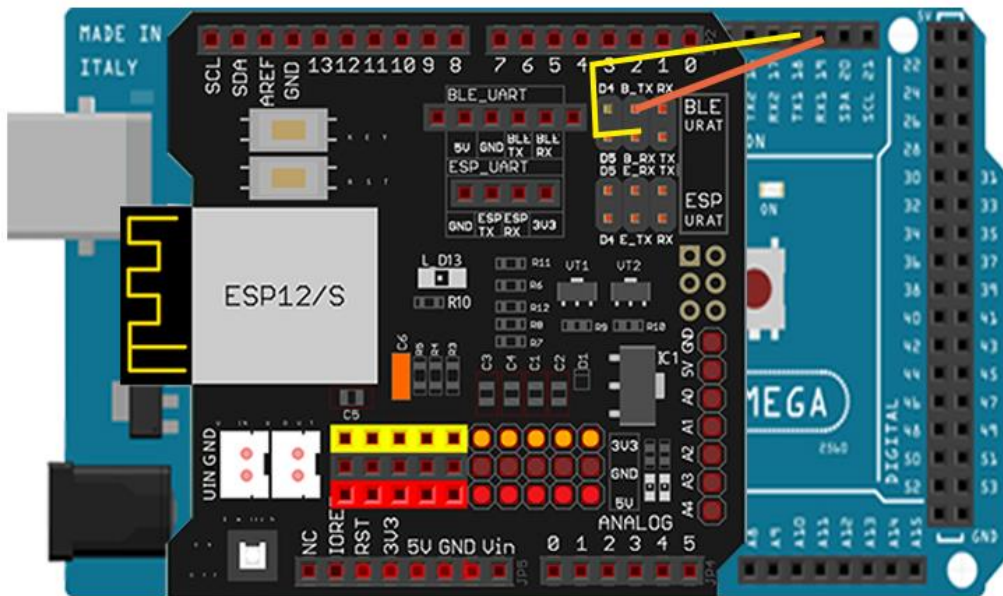
Step 1: You must complete lesson 1 (assembling the car) before you continue on with this lesson.

Step 2: Connect Bluetooth TX/RX ports to D19,D18 with jumper wires.

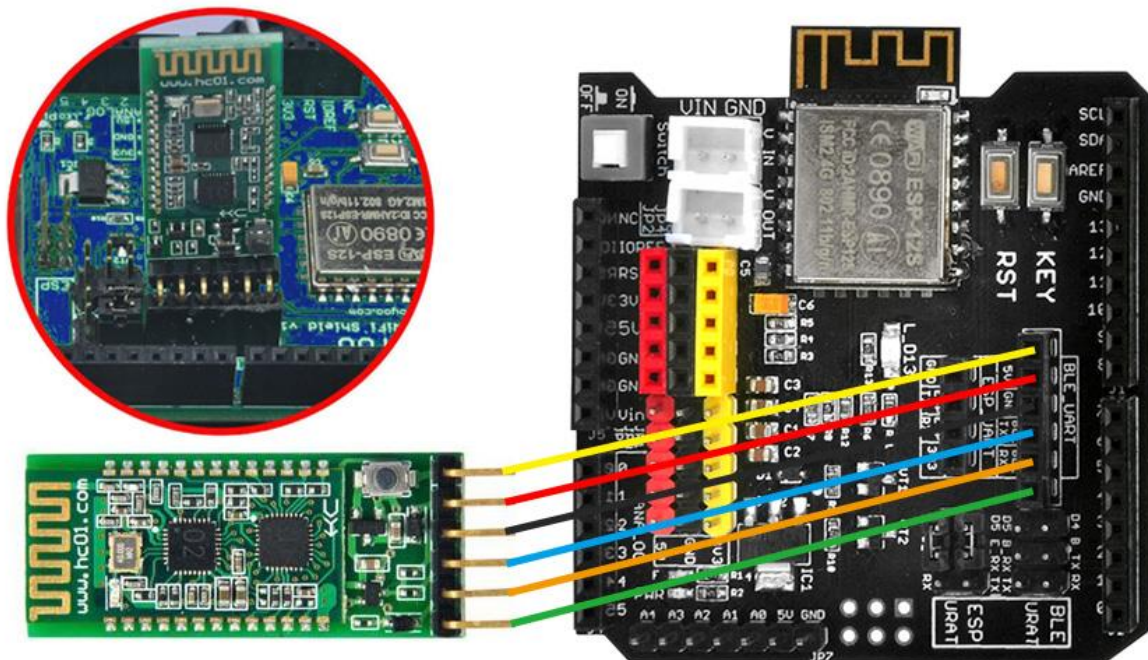
(Note: You need split 2 pcs of male-to-female jumper wires from our 10-pc jumper wire bundle. Any color from the bundle will be ok. The rest of 8 pcs wires are as spare parts for potential broken or damaged wires.)

Uart Wifi Board	Arduino mega2560
B_TX	D19
B_RX	D18

2pin male to female wire



Step 3: Bluetooth Module should be inserted into bluetooth 6-pin slot in OSOYOO Wifi Board.

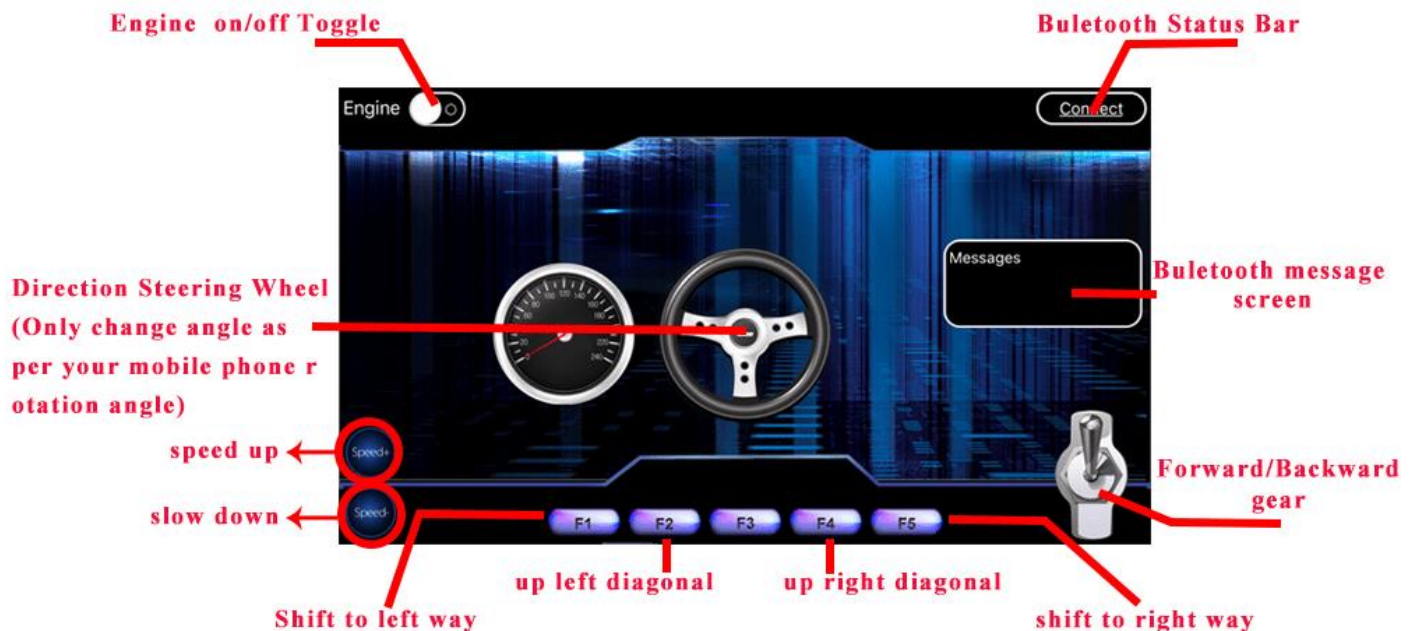


Step 4: Mobile APP:

Go to your Google Play or Apple APP store and search APP name “OSOYOO imitation driving”, Download the APP as following and install it in your smart phone.



Display interface



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/

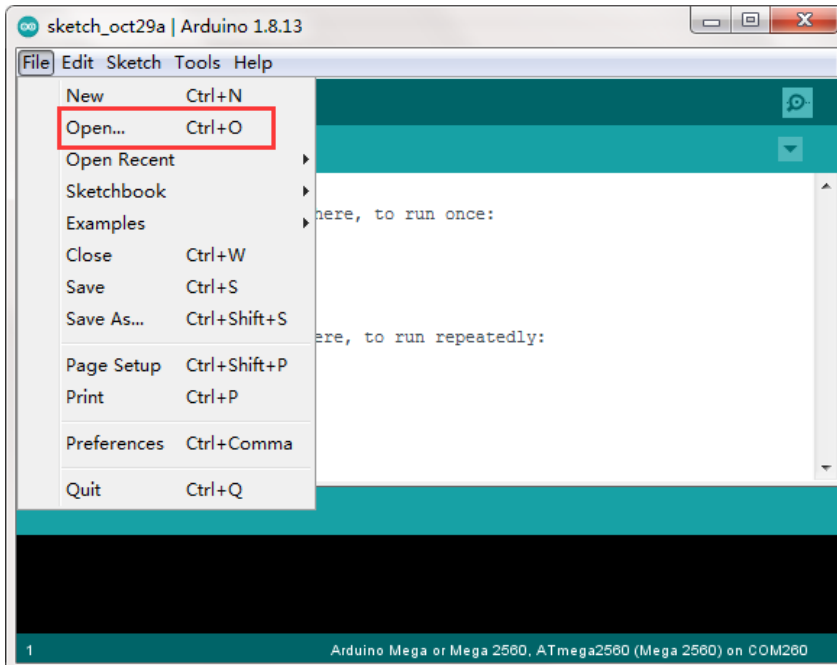
Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip

this step). Download Arduino IDE from

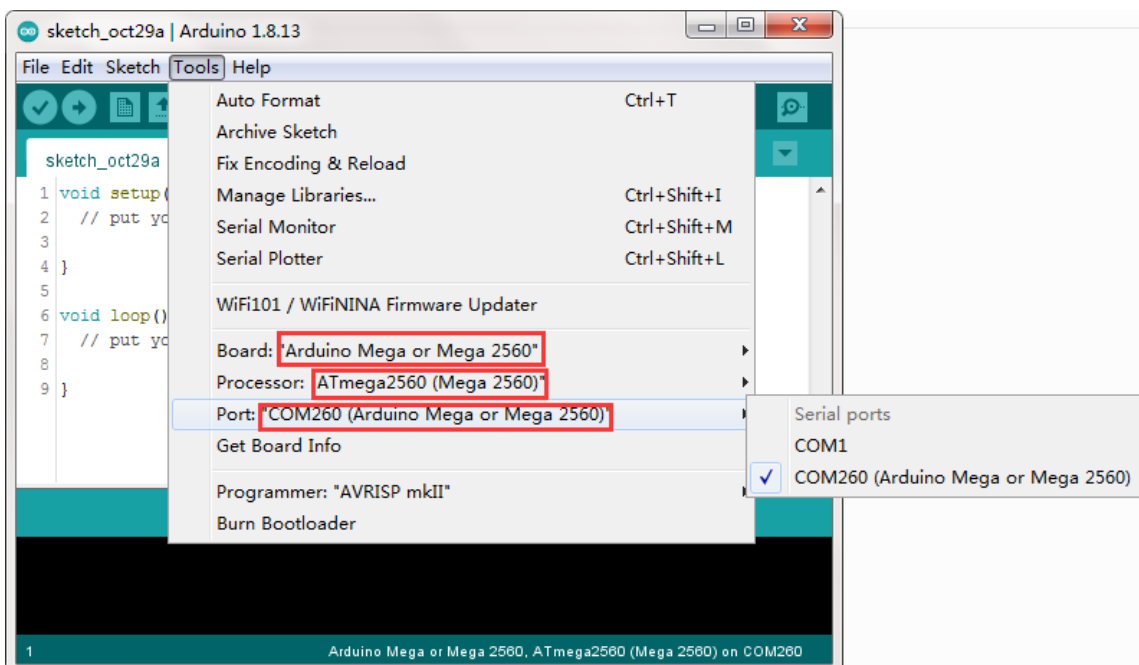
<https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

Step 2: Download https://osoyoo.com/driver/mecanum_acrylic_chassis_v2/mc-lesson5.zip, unzip the download zip file mc-lesson5.zip, you will see a folder called mc-lesson5.zip.

Step 3: Connect mega2560 board to PC with USB cable, Open Arduino IDE -> click file -> click Open -> choose code "lesson5.ino" in lesson5 folder, load the code into arduino.



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



Lesson 6 WiFi IoT Controlled Robot Car

INTRODUCTION

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

Lesson 1 , Lesson 2, Lesson 3 must be completed before doing this lesson.

PARTS & DEVICES

OSOYOO Mecanum wheels robotic car chassis x1
OSOYOO Wheels and motors x4 (left-wheels x2/right-wheels x2)
OSOYOO Mega2560 board fully compatible with Arduino UNO/Mega2560 x1
OSOYOO Uart Wifi shield x1
OSOYOO Model Y driver board x1
OSOYOO Voltage meter x1
OSOYOO Battery box x1
OSOYOO 3pin female to female jumper wire x1
OSOYOO 6pin male to female jumper wire x2
OSOYOO 10pin male to female jumper wire x1
OSOYOO 2 pin XH.25 female to female x1
18650 Batteries(3.7V) x2
Battery charger x1

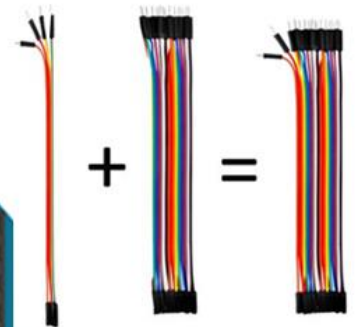
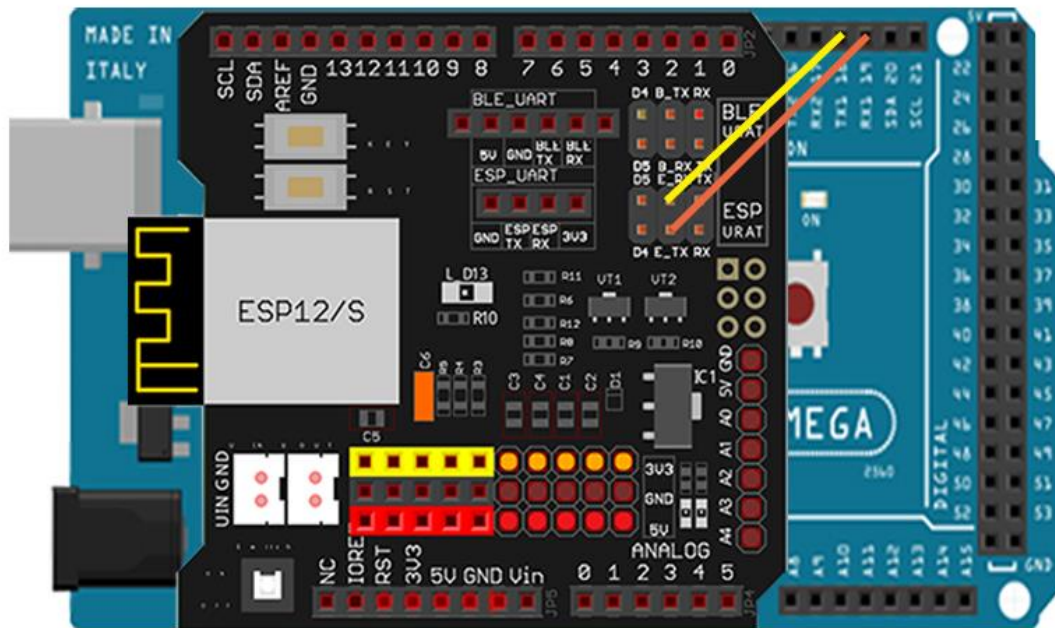
HARDWARE INSTALLATION

If you just finishes all lesson 1-3 and lesson 5(bluetooth imitation driver), please keep all lesson connections same as is. Then unplug bluetooth from Wifi Shield.

Step 1. Remove the connection B_TX to D18 and B_RX to D19.

Step 2. Connect E_RX to D18(TX1) and E_TX to D19(RX1).

Uart Wifi Board	Arduino mega2560
E_TX	D19
E_RX	D18



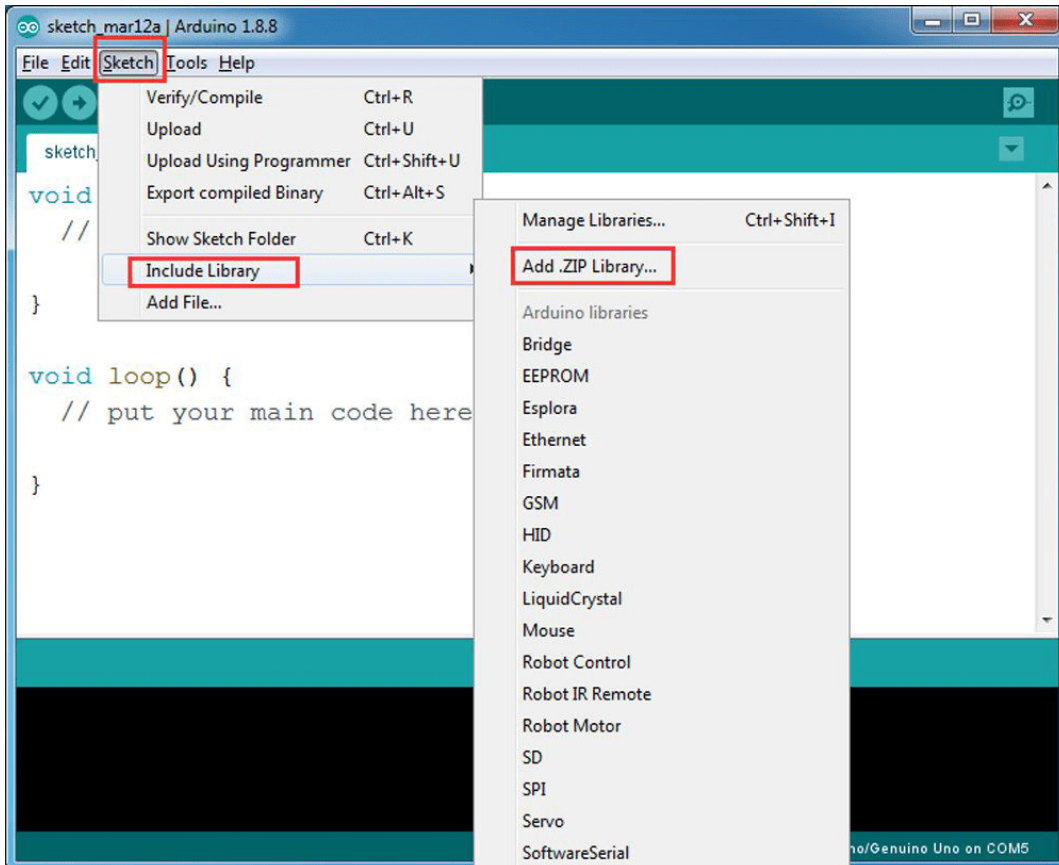
2pin 20cm male
to female wire

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: Please download the library zip file from WiFiEsp-master.zip .Open Arduino IDE ->click Sketch ->Include Library ->Add .ZIP library , then load above zip file into Arduino.



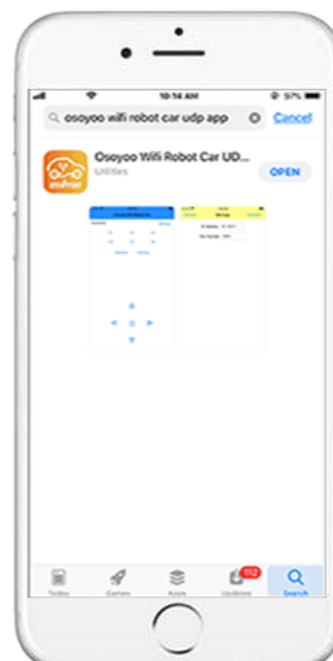
Step 3: Download https://osoyoo.com/driver/mecanum_acrylic_chassis_v2/mc-lesson6.zip, unzip the download zip file mc-lesson6.zip, you will see a folder called mc-lesson6.

Step 4: APP installation-you need search “OSOYOO Wifi UDP Robot Car Controller” in Google Play or Apple Store, and then install this APP.

Android Phone



Apple iOS



Step 5: Arduino Sketch code Installation:

Unzip the downloaded file, enter the mc-lesson6 folder, you will see two sub-folder :mc-lesson6A and mc-lesson6B.

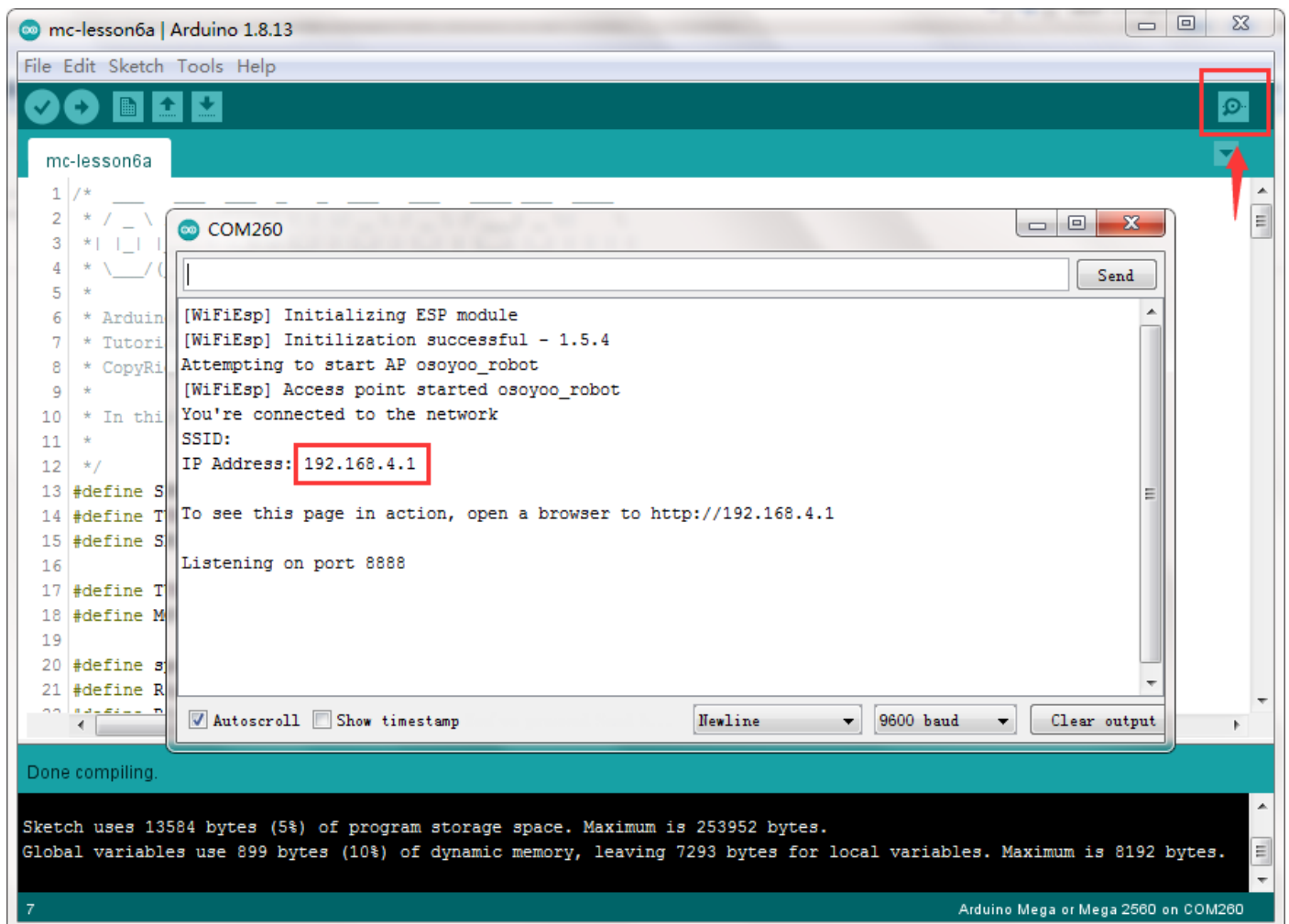
These two folders have program for two Wifi modes: AP mode and STA mode. The Arduino sketches for these two modes are different. Let's explain these two modes one by one.

AP MODE

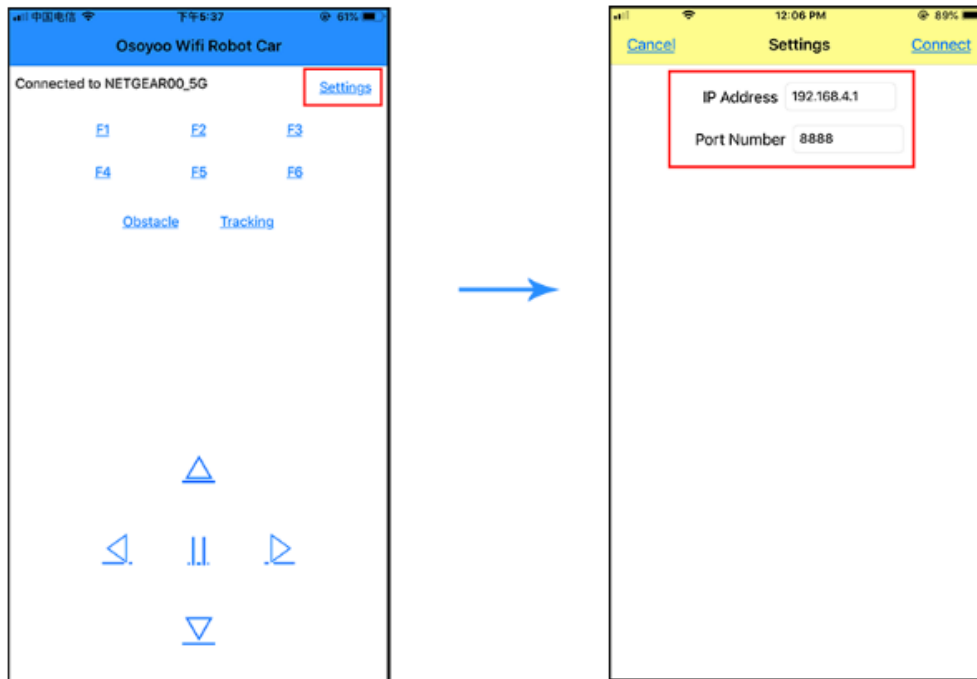
When working in AP mode, our robot car itself will become a Wifi Hot Spot. Our cell phone can connect to Robot Car as its wifi client. The IP address of Robot is fixed as 192.168.4.1 and It is not connected to WAN.

(1) Unzip the mc-lesson6.zip file and you will see a folder named mc-lesson6A, upload the code into Arduino.

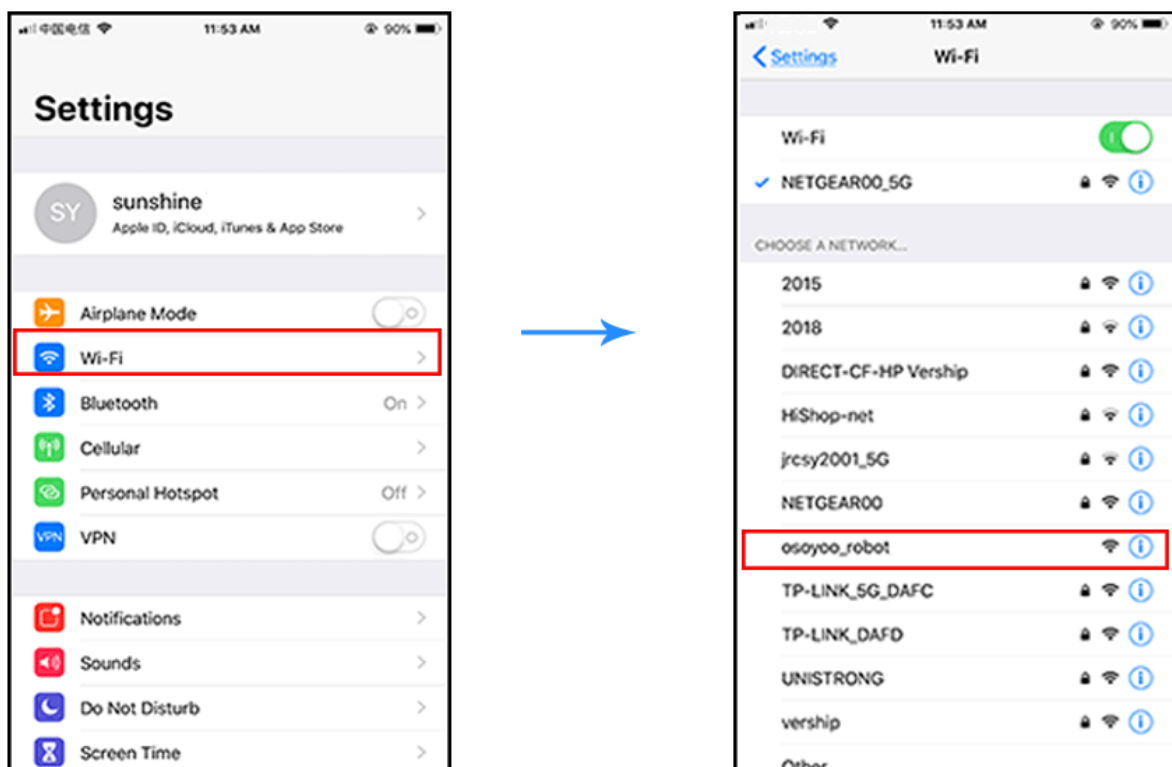
(2) Open your Arduino Serial monitor, and you will see a similar result as AP mode. A new Wifi SSID "osoyoo robot" with IP address 192.168.4.1 will show up in the window. This means your Robot car has a Wifi Hot Spot name "osoyoo_robot" , its IP address is 192.168.4.1



(3) Now your Robot car becomes a Wifi Hot Spot and set IP address as "192.168.4.1" to your APP Setting section.



(4) Connect your cell phone to “osoyoo_robot” wifi hot_spot, and you can use Mobile phone control the robot car.



(5) You can click the ◀ ▶ ▲ ▼ direction keys to make the car move. Use “||” pause key to stop the car movement.

Click Obstacle to shift left side, Click Tracking to shift right side.

Click F1 to make upper-left diagonal movement, Click F3 to make upper-right diagonal movement

Click F4 to make back-left diagonal movement, Click F6 to make back-right diagonal movement.

— STA MODE —

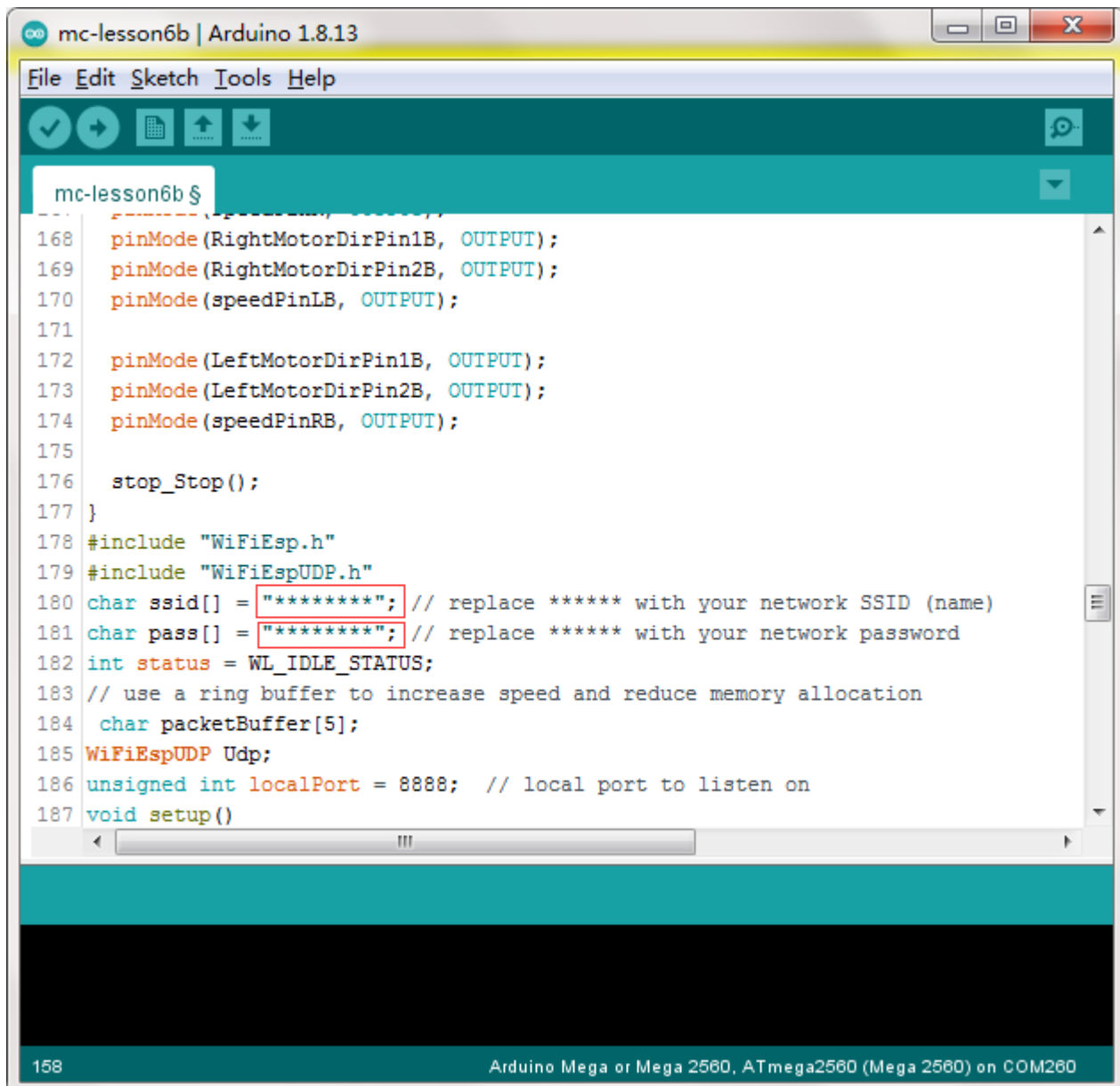
In STA mode, robot car does not work as a wifi hotspot. Instead, it will become an internet node in your LAN. You need tell Arduino sketch what is your local router's Wifi SSID and password, then Arduino talks to router and get its own LAN IP address from DHCP server. You can use Mobile APP to access the robot car's IP address and control its movement.

(1) Unzip the mc-lesson6 file and you will see a folder named mc-lesson6b, then load the mc-lesson6b.ino code into Arduino.

(2) You need change the code Line 180 and Line 181 :

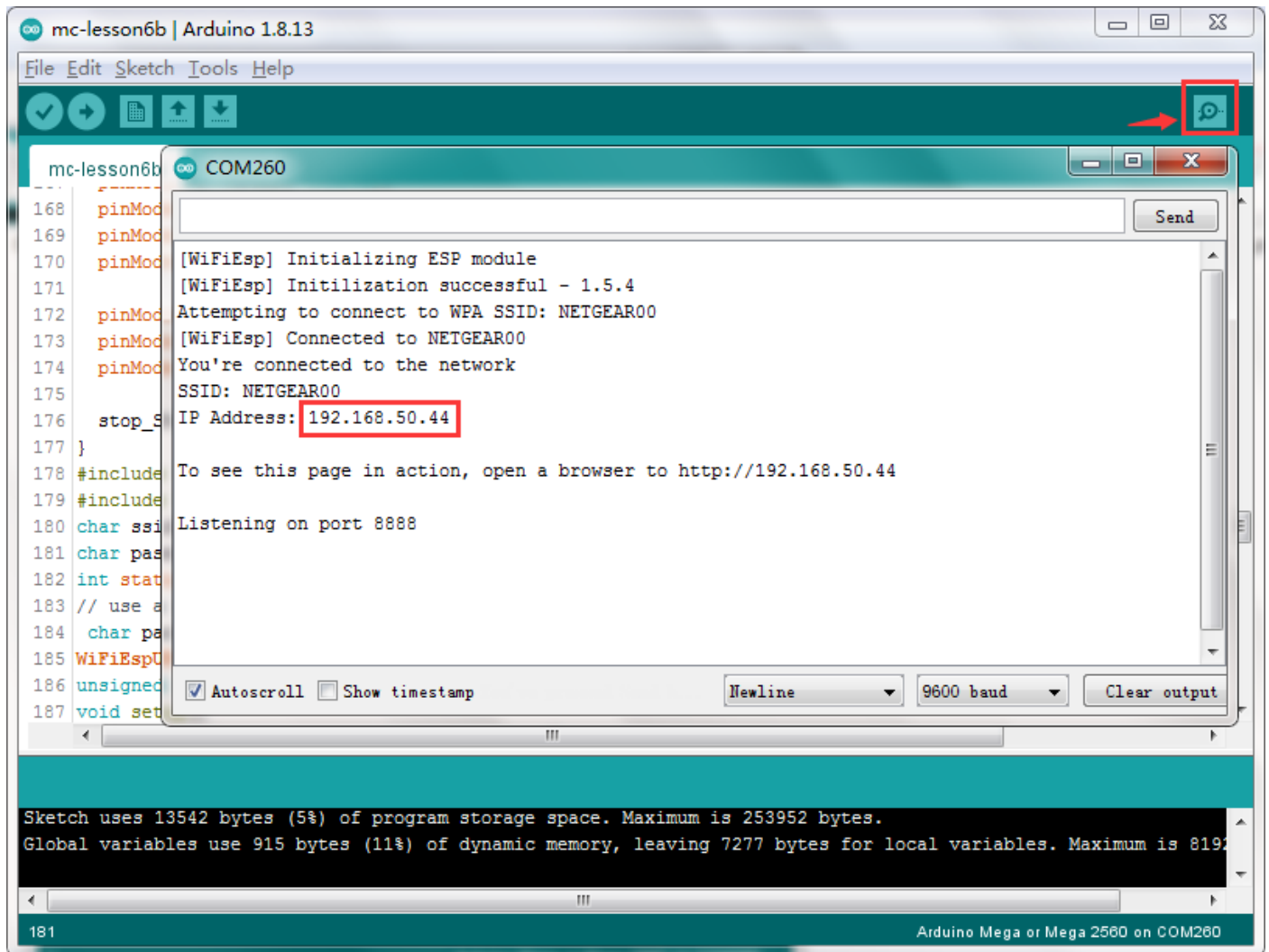
char ssid[] = "YOUR_ROUTER_SSID"; // replace this with your router wifi SSID

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



```
mc-lesson6b | Arduino 1.8.13
File Edit Sketch Tools Help
mc-lesson6b $
168 pinMode(RightMotorDirPin1B, OUTPUT);
169 pinMode(RightMotorDirPin2B, OUTPUT);
170 pinMode(speedPinLB, OUTPUT);
171
172 pinMode(LeftMotorDirPin1B, OUTPUT);
173 pinMode(LeftMotorDirPin2B, OUTPUT);
174 pinMode(speedPinRB, OUTPUT);
175
176 stop_Stop();
177 }
178 #include "WiFiEsp.h"
179 #include "WiFiEspUDP.h"
180 char ssid[] = "*****"; // replace ***** with your network SSID (name)
181 char pass[] = "*****"; // replace ***** with your network password
182 int status = WL_IDLE_STATUS;
183 // use a ring buffer to increase speed and reduce memory allocation
184 char packetBuffer[5];
185 WiFiEspUDP Udp;
186 unsigned int localPort = 8888; // local port to listen on
187 void setup()
158 Arduino Mega or Mega 2560, ATmega2560 (Mega 2560) on COM260
```

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



(4) 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 192.168.50.44 and click Setting to set up robot IP address and set this IP address 192.168.50.44 to your APP Setting section (no need change default port 8888 in APP).



(5) 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

(6) You can click the ◀ ▶ ▲ ▼ direction keys to make the car move. Use “||” pause key to stop the car movement.

Click Obstacle to shift left side, Click Tracking to shift right side.

Click F1 to make upper-left diagonal movement, Click F3 to make upper-right diagonal movement.

Click F4 to make back-left diagonal movement, Click F6 to make back-right diagonal movement.

FAQ about the Wifi UDP APP and sketch Code:

Q1)How to tune the robot car speed?

A: If you want change the speed performance of the robot car, please following parameters in line 11 to 13:

```
#define SPEED 85
```

```
#define TURN_SPEED 90
```

```
#define SHIFT_SPEED 130
```

SPEED value determines forward moving speed

TURN_SPEED value determines turning speed

SHIFT_SPEED value determines parallel shifting speed

Q 2) What happened when you press buttons in OSOYOO WiFi UDP Robot Car APP ?

A: When you press a button of the APP, APP will send a single-letter message through UDP protocol to target device (in this example, our Arduino Wifi Shield)

Q3)How does Arduino handle the UDP command?

Line 230 to line 245 in mecanum-2560-lesson5A.ino file are the codes which react to Cell phone command. For example, when ▲ is pressed, according to Q1 table, a letter “A” command was sent from Cell phone to Arduino. Line 233 case ‘A’ statement will make the car make car moving forward.

```
char c=packetBuffer[0];
switch (c) //serial control instructions
{
case 'A':go_advance(SPEED);break;
case 'L':left_turn(TURN_SPEED);break;
case 'R':right_turn(TURN_SPEED);break;
case 'B':go_back(SPEED);break;
case 'E':stop_Stop();break;
case 'F':left_shift(0,150,0,150);break; //left ahead
case 'H':right_shift(180,0,150,0);break; //right ahead
case 'I':left_shift(150,0,150,0); break;//left back
case 'K':right_shift(0,130,0,130); break;//right back
case 'O':left_shift(200,150,150,200); break;//left shift
case 'T':right_shift(200,200,200,200); break;//left shift
default:break;
}
```