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OSOYOO Robot car kit Lesson 5: Obstacle Avoidance Robot Car

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OSOYOO Robot Car Kit V2.0 for Arduino lesson 5: Obstacle Avoidance Robot Car

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- **Objective**
- **Parts and Devices**
- **Hardware Installation**
- **Ultrasonic Sensor Position Alignment**
- **Software Installation:**
- **Testing**

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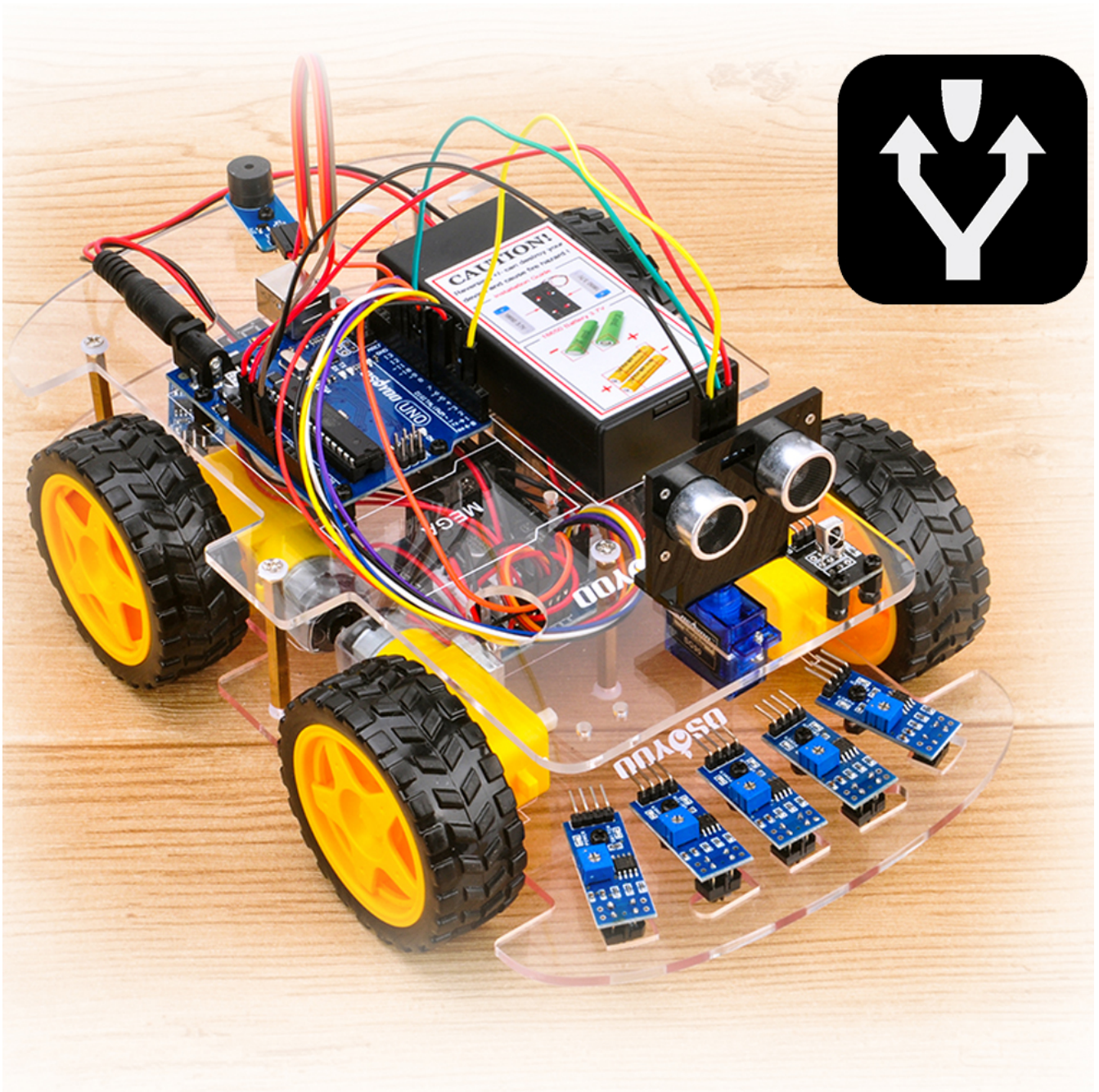
In this lesson, we will add a servo motor, an ultrasonic module and a buzzer onto Lesson 1 framework. With these new devic
car can "see" obstacle through ultrasonic sensor and measure the distance. If the distance is less than predefined threshold
the buzzer will beep and the car will turn around from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

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

Parts and Devices

Part List

| NO.	DEVICE	IMAGE	QTY	ACCESSORIES
1	servo motor with blade and screw		1	M2.2*8 Self Tapping Screws x2 M2*4 Self Tapping Screws x1
2	Ultrasonic sensor module		1	M1.4*8 screw x4 M1.4 nut x4
3	Buzzer sensor module		1	M2.5 plastic screw x1 M2.5 plastic Pillar x1 M2.5 plastic nut x1
4	Mount holder for ultrasonic sensor module		1	M1.4*8 screw x4 M1.4 nut x4 M2*4 Self Tapping Screws x1 M1.5*4 Self Tapping Screws
5	20pin Jumper wires (male to female)		some	

Screws & Nuts Listing

	M3 *10 Screws		M1.4 *8 Screws		M2.5 Plastic Screws
	M3 Nuts		M1.4 Nuts		M2.5 Plastic Pillars
	M2*10 Screws		M1.5*4 Self Tapping Screws		M2.5 Plastic Nuts
	M2 Nuts		M3 rubber rings		M3*40 Copper Pillars
	M2.2*8 Self Tapping Screws		M2*4 Self Tapping Screws		Phillips Screwdriver

Hardware Installation

Step 1: Install the smart car basic frame work as per Smart Car Lesson 1 .If you have already completed installation in Less Everything keep it as is except move ENA from D9 to D3(we need D9 for Servo control).

Step 2: Remove screws on copper pillars and install servo motor at the front of upper car chassis with 2pcs M2.2*8 Self Tap Screws


M2. 2*8 self tapping
screws x2
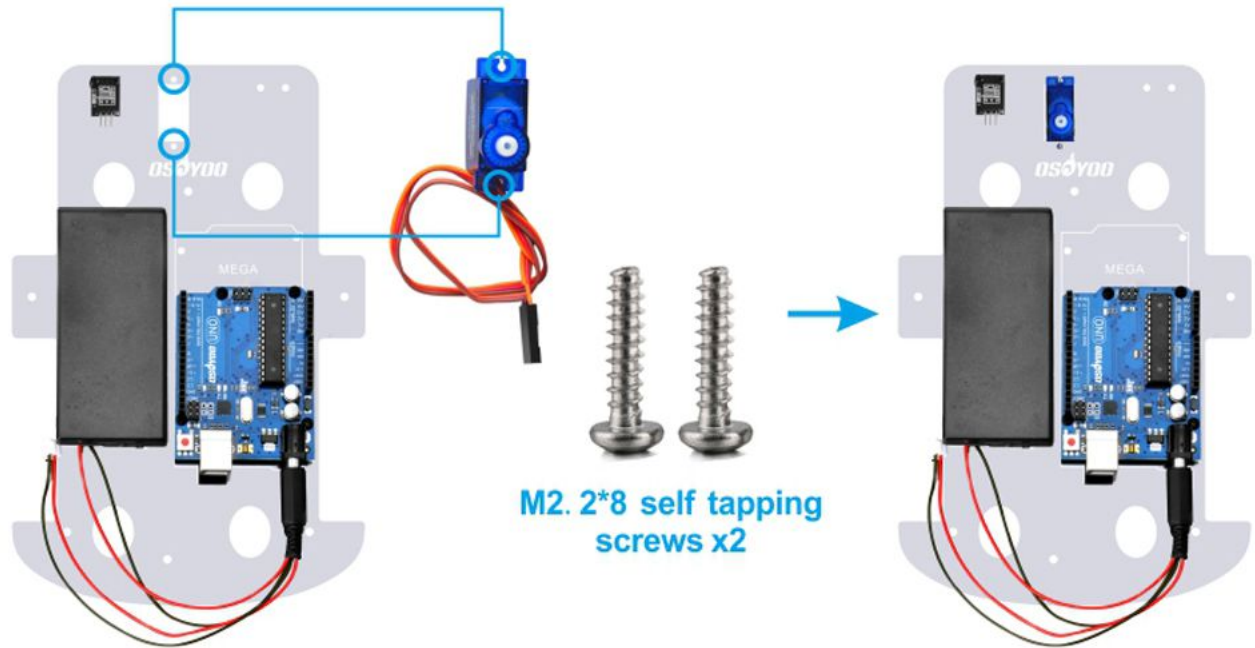
Step 3: Install bracket (from servo motor package) on mount holder for Ultrasonic Module with 2pcs M1.5*4 Self Tapping Scr


M1.5*4 Self
tapping screwsx2

front   back

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

front   back
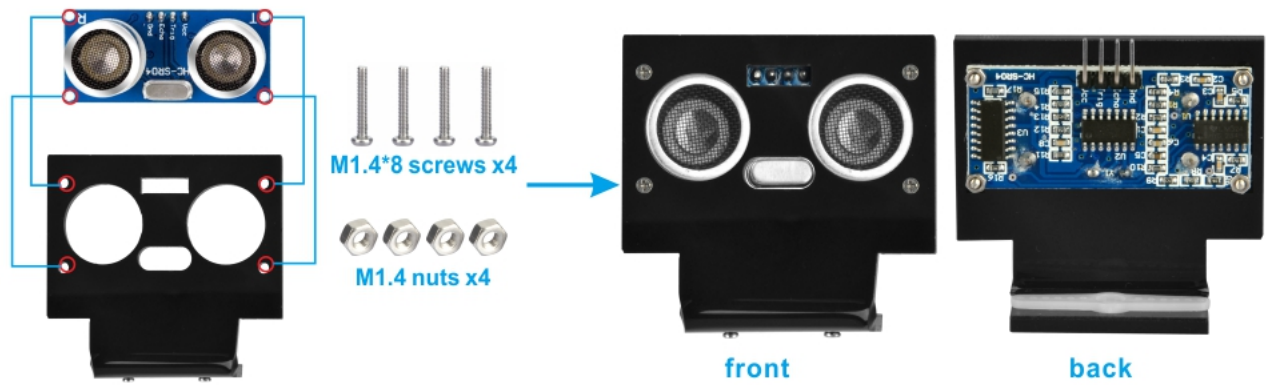
Step 5: Install mount holder for Ultrasonic Module on servo motor with M2*4 Self Tapping screw (Please note: please upload adjust servo motor direction before fixing this screw)
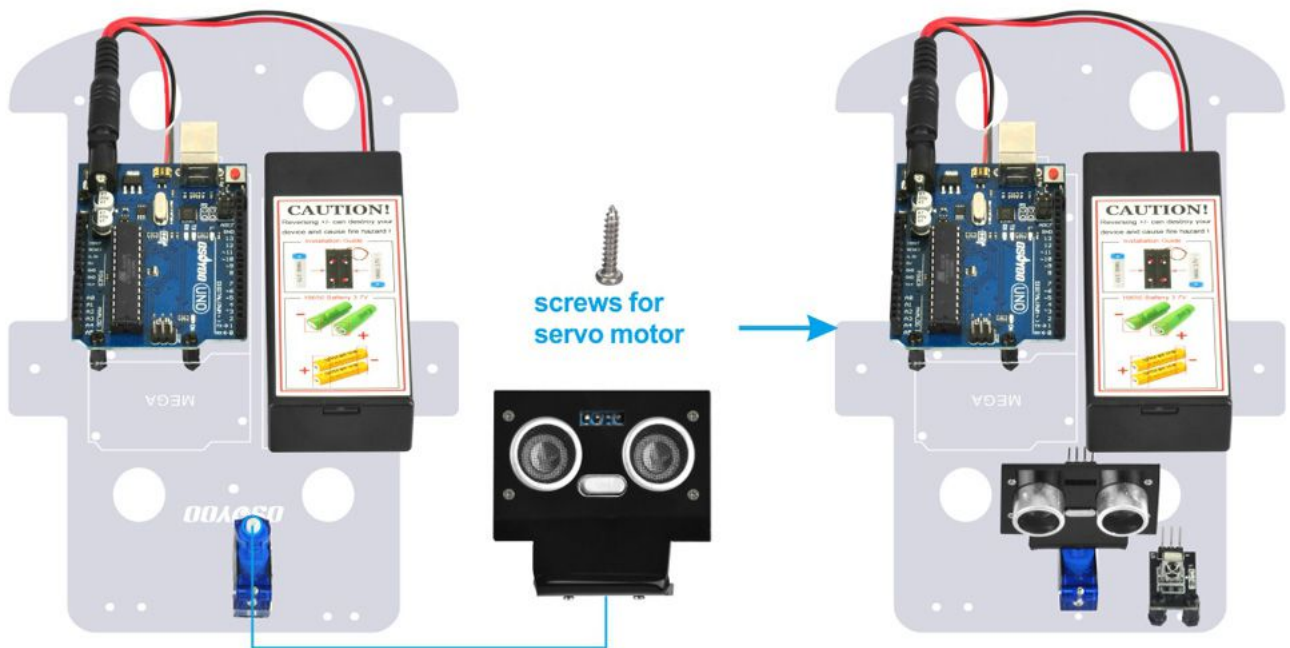
Step 6: Install Buzzer module at the back of upper chassis with 1pc M2.5 plastic screw, M2.5 plastic pillar and M2.5 plastic r
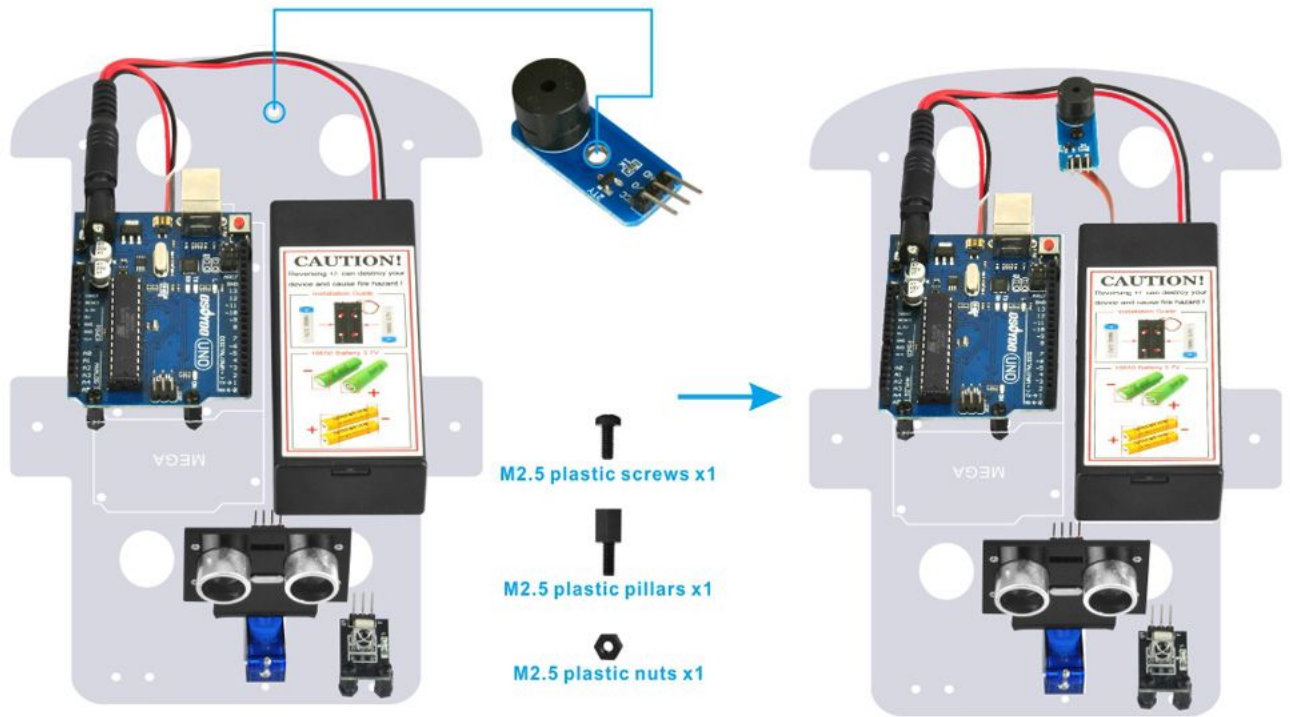
Step 7: Connect SG90 servo motor, OSOYOO MODEL X motor driver module and OSOYOO UNO board as following graph
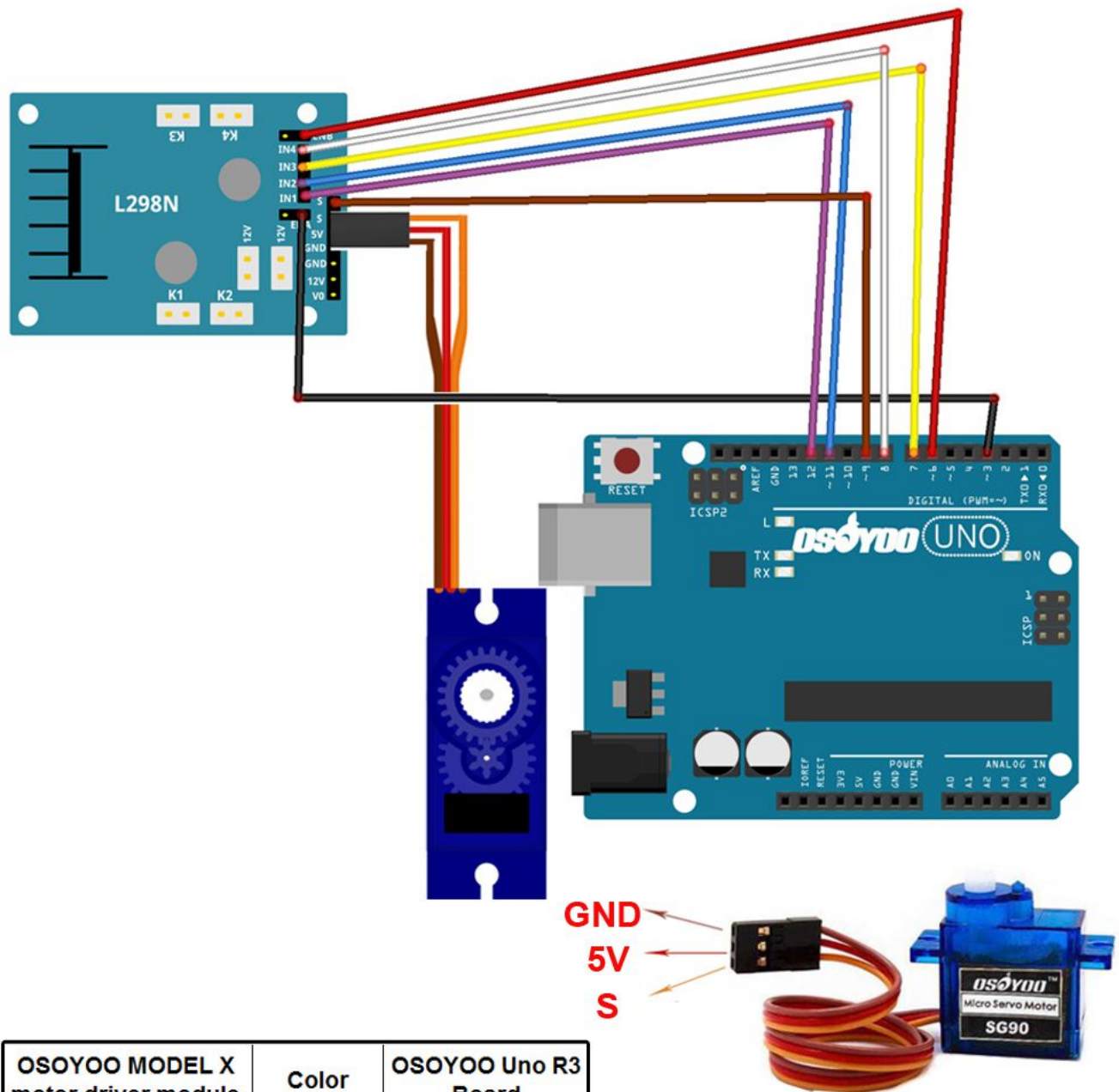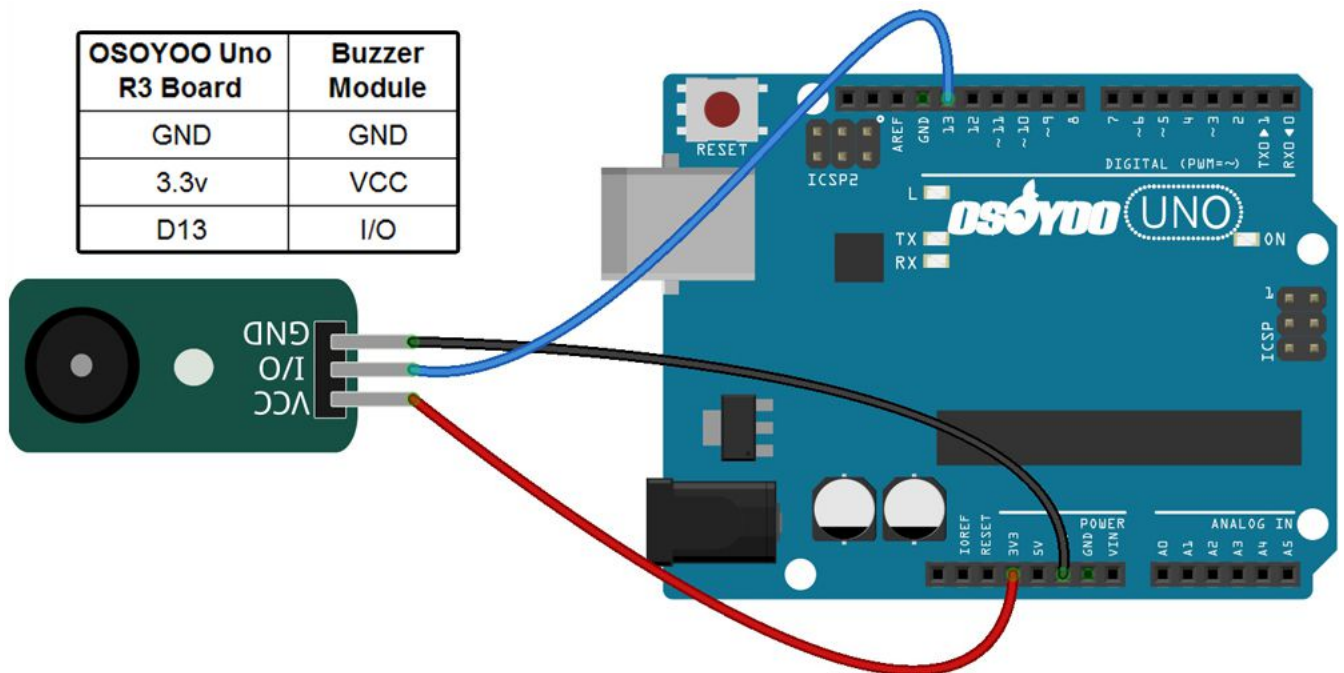
OSOYOO MODEL X motor driver module	Color	OSOYOO Uno R3 Board
ENA	Black	D3
IN1	Purple	D12
IN2	Blue	D11
IN3	Yellow	D7
IN4	White	D8
ENB	Red	D6
S		D9

SG90 Servo Motor	OSOYOO MODEL X motor driver module
Brown(GND)	GND
Red(VCC)	5V
Orange(Signal)	S

Step 8: Connect ultrasonic module with OSOYOO UNO board as below connection diagram

OSOYOO Uno R3 Board	Ultrasonic Module
GND	GND
D2	Echo
D10	Tr1g
5V	VCC
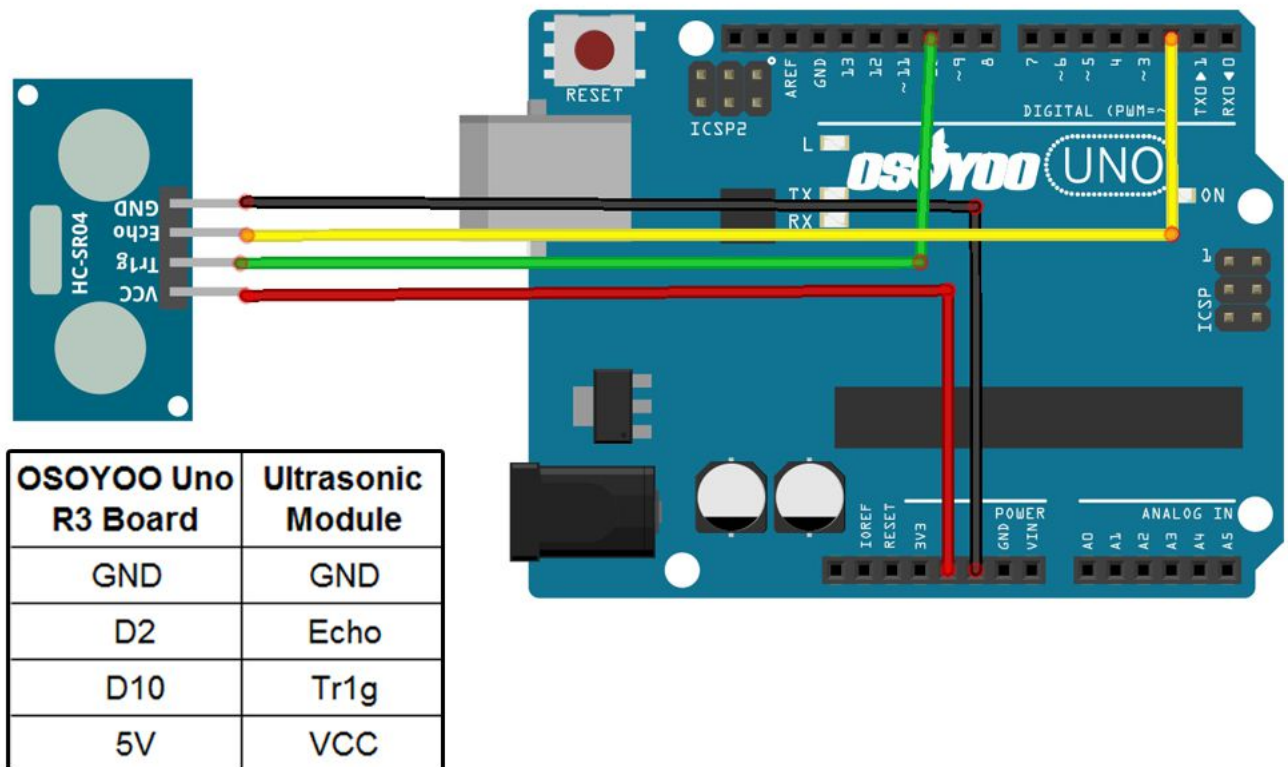
Step 9: Connect Buzzer module with OSOYOO UNO board as below connection diagram

OSOYOO Uno R3 Board	Buzzer Module
GND	GND
3.3v	VCC
D13	I/O

Step 10: Fix the screws on copper pillars to connect upper chassis to lower chassis.
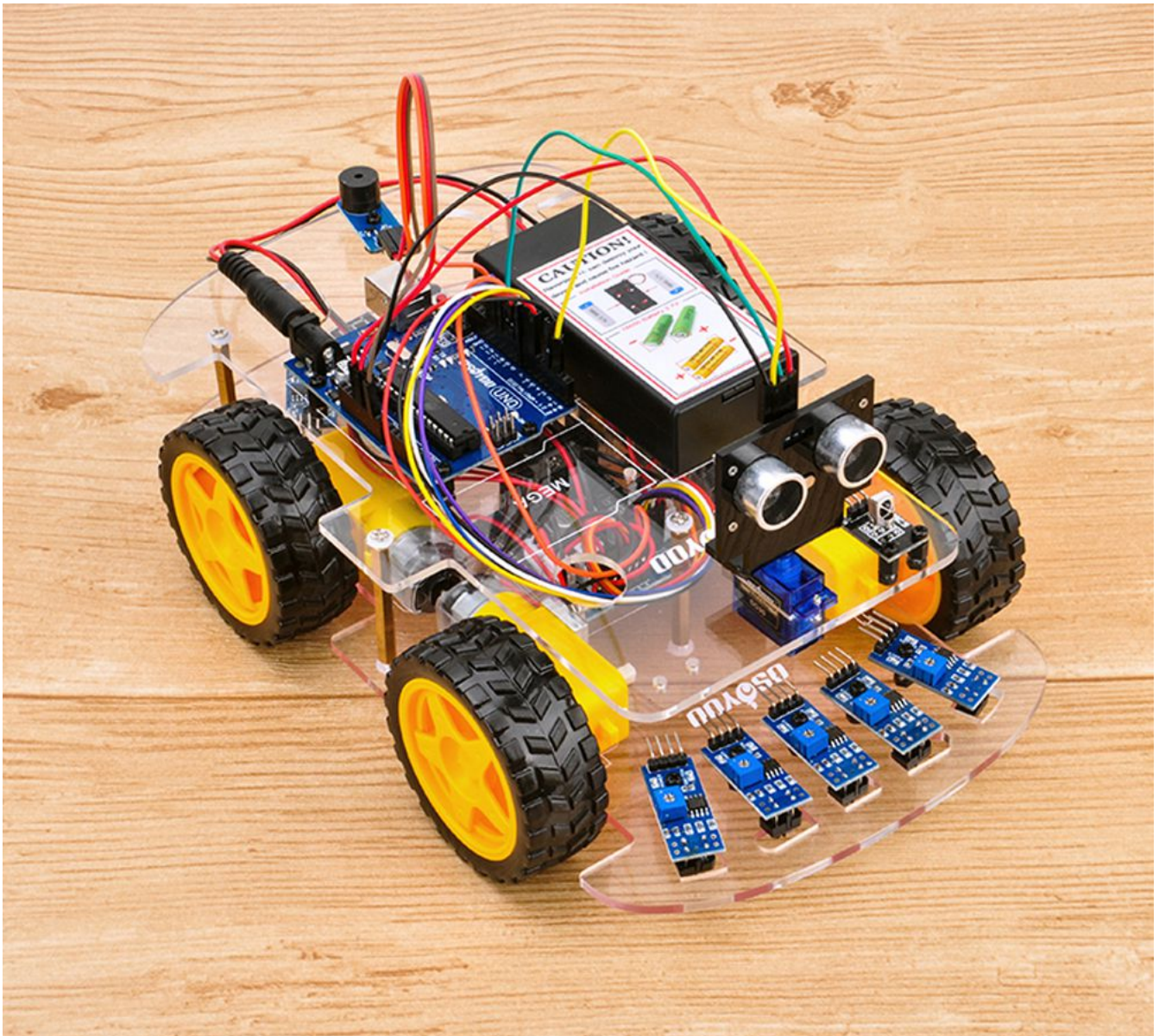
Software Installation:

|		
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	7ZIP	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 fromhttps://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 smartcar-lesson5 folder, load the code into arduino.
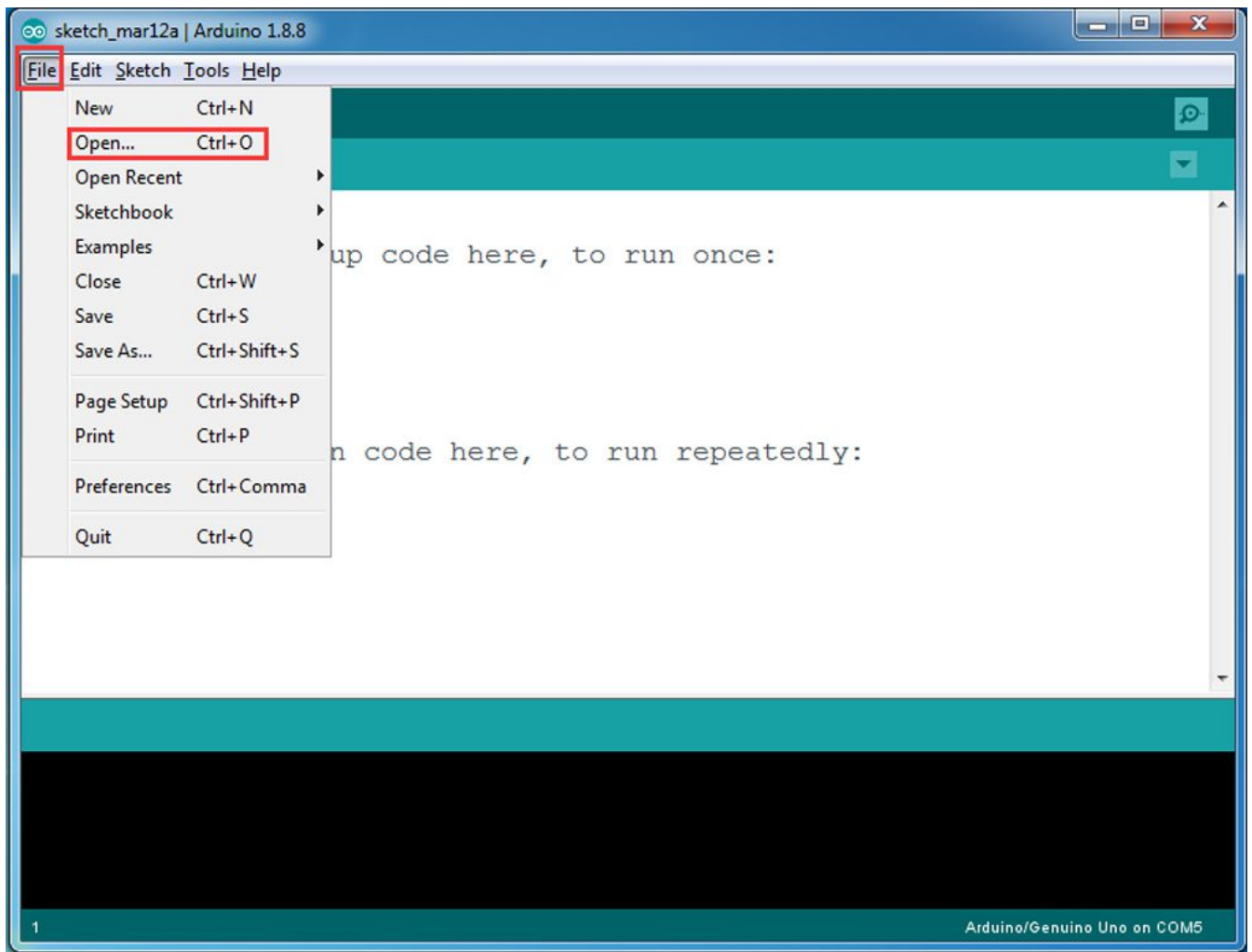
Step 4: Choose corresponding board/port for your project,upload the sketch to the board.
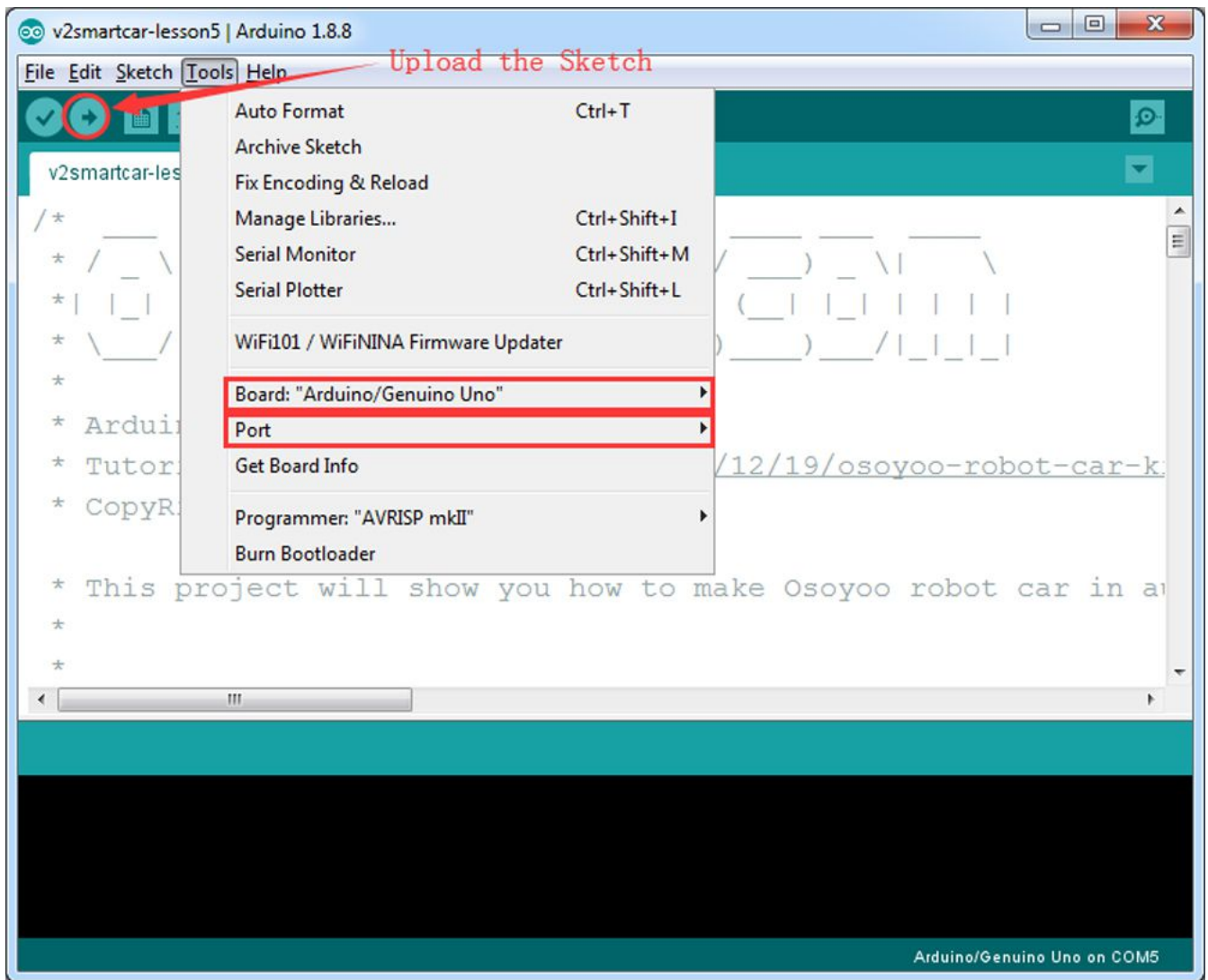
Step 5: Ultrasonic sensor servo initial direction alignment

After turning on the battery, you will hear a long beep sound, then the servo will make some movement and finally stops at a 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 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 follc picture. If its direction is not straight forward, turn off battery and do direction alignment again.
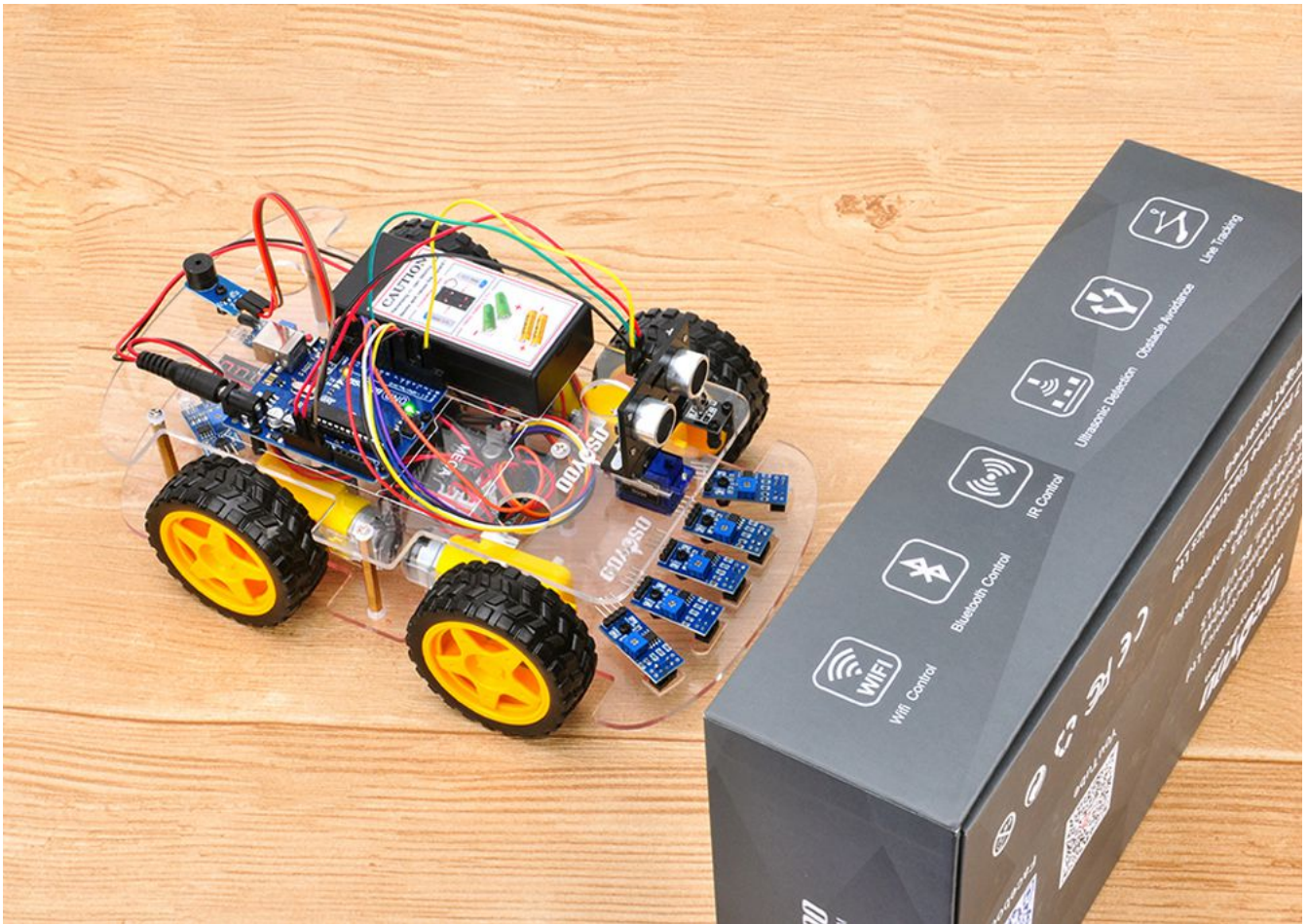
Final Testing :

After Turning on the battery switch on the battery box, if the ultrasonic module turn to front view position, that means you no
adjust sensor position anymore. Just wait 5 seconds. If no obstacle is detected, the car will go forward. If any obstacles is de
the car will stop, the ultrasonic module will turn from right to left to detect surrounding obstacle. The robot car will decide to m
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 senso
direction alignment again as per link Ultrasonic sensor servo initial direction alignment
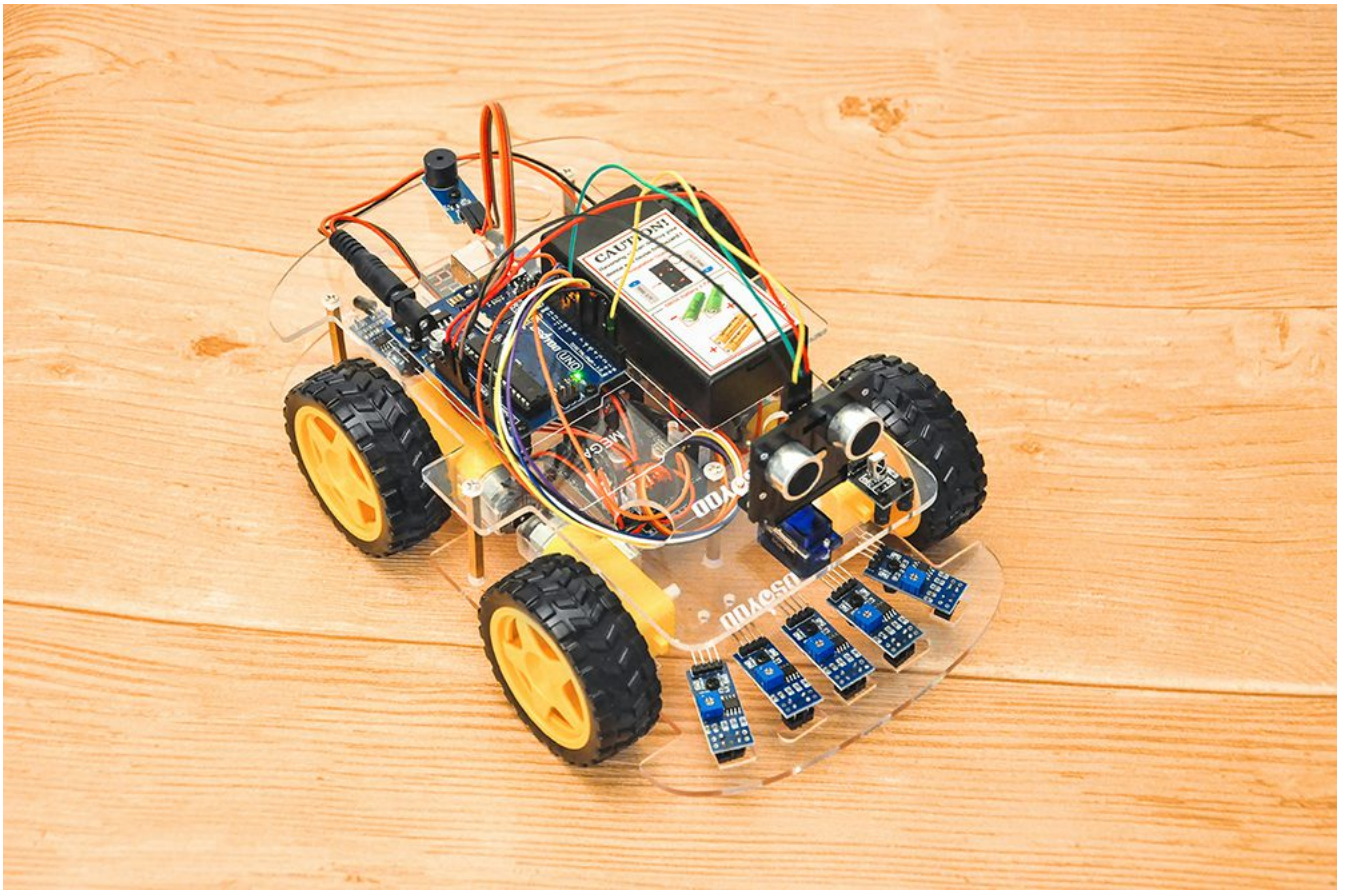
PREVIOUS LESSON **ROBOT CAR V2 HOME** **NEXT LESSON**

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