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

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NOTE: ALL OSOYOO PRODUCTS FOR ARDUINO ARE THIRD PARTY BOARD WHICH IS FULLY COMPATIBLE WITH ARDUINO

OSOYOO V2.1 Robot Car for Arduino Lesson 5 : Obstacle avoidance



Authorized Online Retailers

Where to buy the set with 18650 batteries and USB charger

Buy from OSOYOO	Buy from US	Buy from UK	Buy from DE	Buy from IT	Buy from FR	Buy from ES	Buy from E
OSOYOO Store	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW

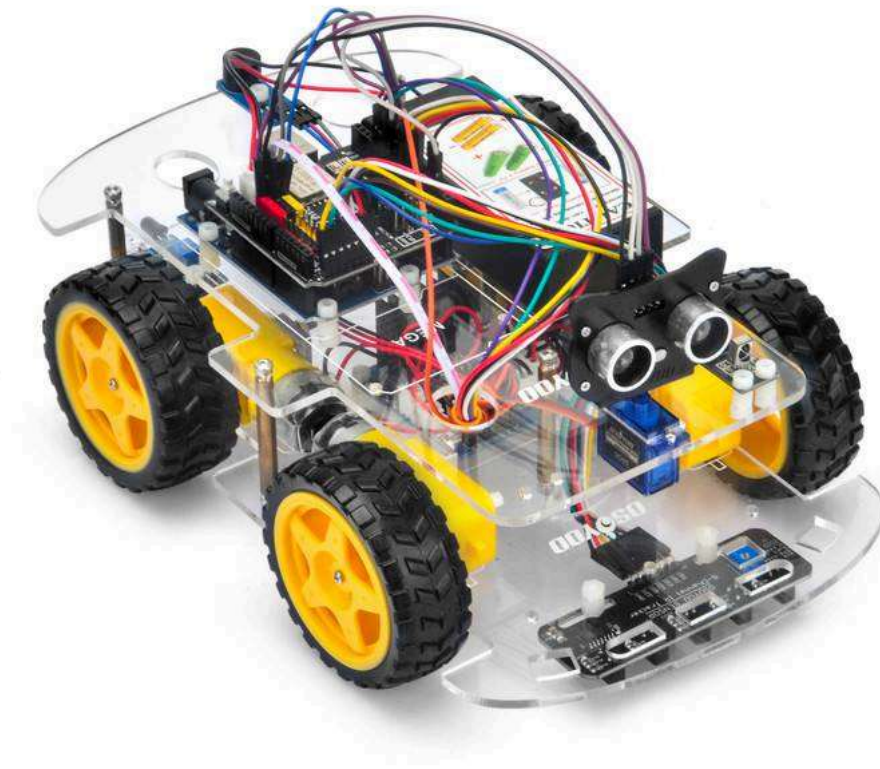
Buy the V2.1 Robot car without Battery and charger:

Buy from OSOYOO	Buy from US	Buy from UK	Buy from DE	Buy from IT	Buy from FR	Buy from ES	Buy from E
OSOYOO Store	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW	a BUY NOW

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

- **Trouble Shooting**



Objective









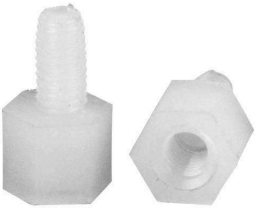
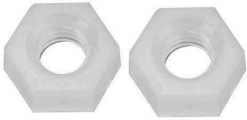
In this lesson, we will add a servo motor, an ultrasonic module and a buzzer onto Lesson 1 framework. With these new devices, the car can “see” obstacle through ultrasonic sensor and measure the distance. If the distance is less than predefined threshold, the buzzer will beep and the car will turn around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

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

Parts and Devices

No.	Picture	Device	Qty.	Accessories	Link
1		Ultrasonic Sensor	1	M1.4*8 Screw x 4 M1.4 Nut x 4	Click here to buy
2		Servo Motor	1	M2.2*8 Self Tapping Screw x 2 M2*4 Self Tapping Screw x 1	Click here to buy

3		Mount Holder for Ultrasonic Sensor	1	M1.4*8 Screw x 4 M1.4 Nut x 4 M2*4 Self Tapping Screw x 1	Click here to buy
4		Buzzer Sensor Module	1	M3 Plastic Screw x 1 M3 Plastic Nut x 1 M3 Plastic Pillar x 1	Click here to buy
5		20Pin jumper wire Male to female 20cm	some		Click here to buy
6		Philips screwdriver	1		Click here to buy
7		Hex Screwdriver	1		Click here to buy
8		M2*4 self tapping screw	1		
9		M2.2*8 self tapping screw	2		

10		M1.4*8 screw and nut	4		
11		M3 plastic screw	1		
12		M3 plastic pillar	1		
13		M3 plastic nut	1		

Hardware Installation

Step 1: Install the smart car basic frame work as per [Smart Car Lesson 1](#) .If you have already completed installation in L [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 have to remove the wires. If you have installed Lesson 4, you can 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 M1.5*8 screw and M1.5 nuts

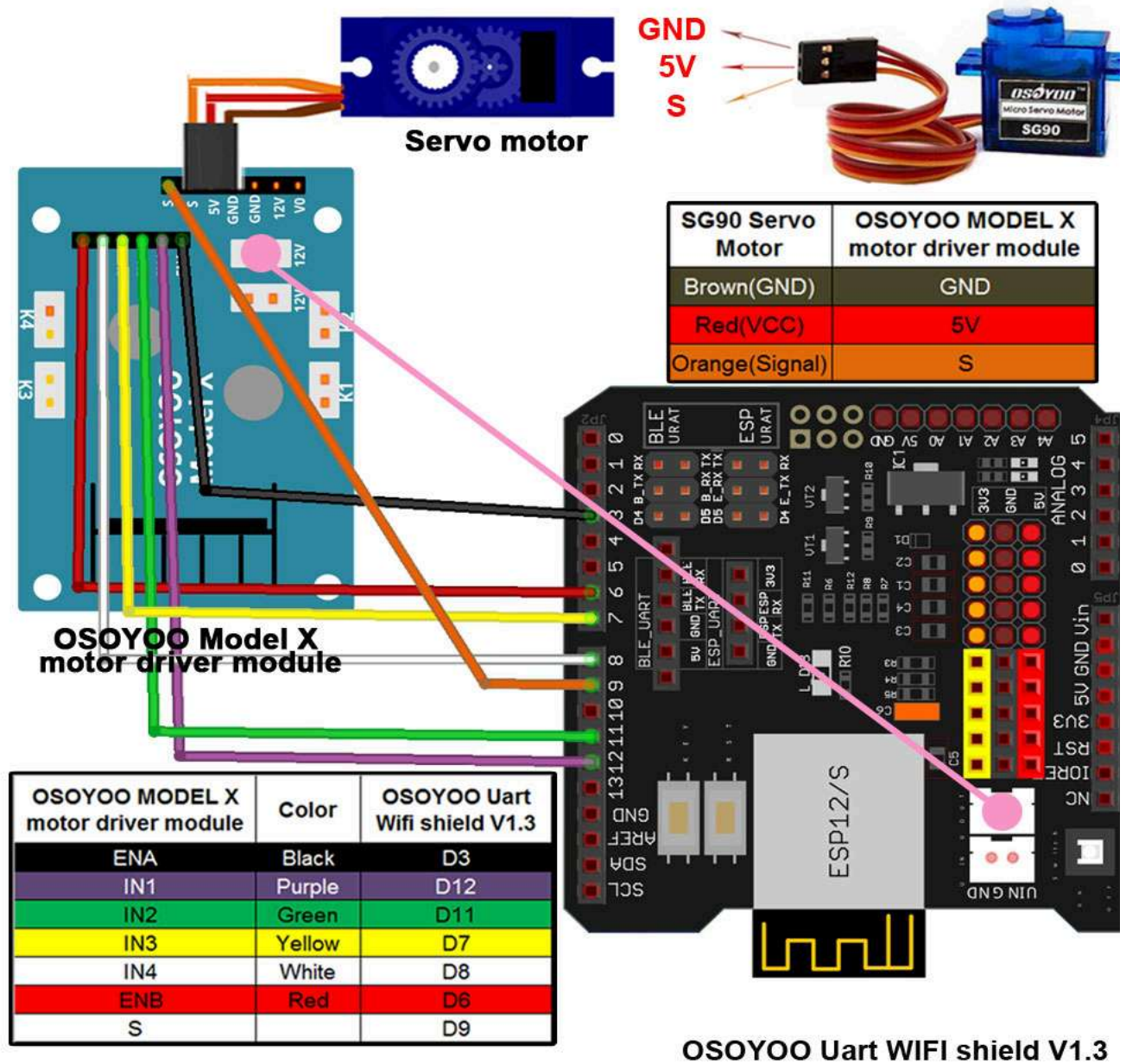


Step 4: Install mount holder for Ultrasonic Module on servo motor with M2*4 Self Tapping screw

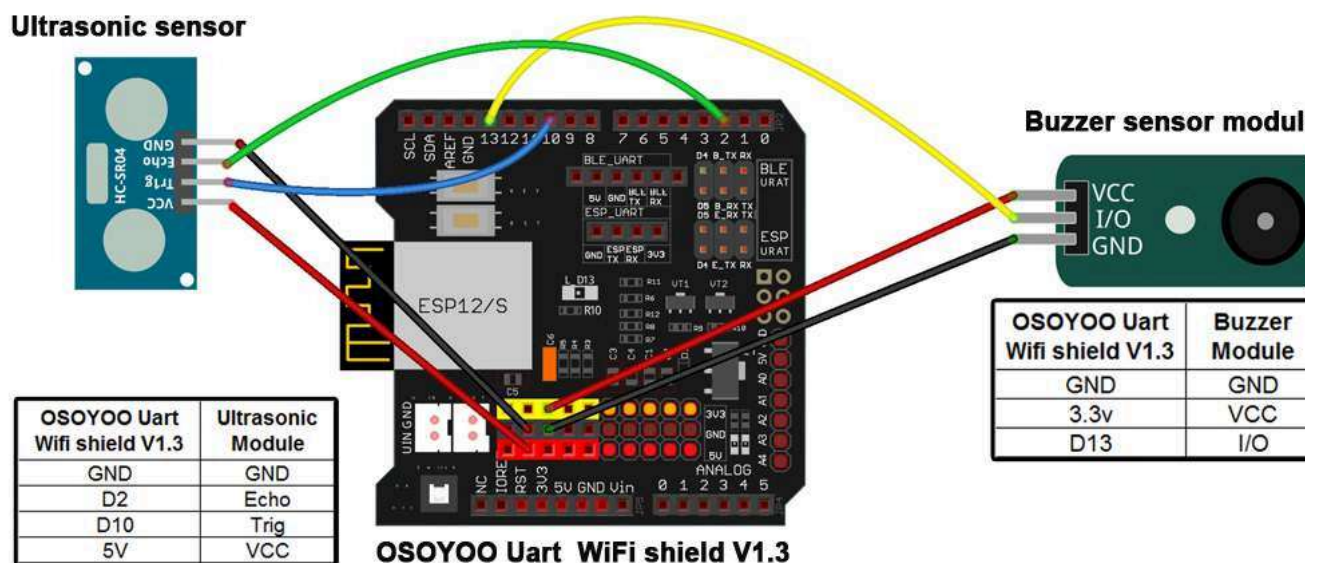
Step 5: Install Buzzer module at the back of upper chassis with 1pc M3 plastic screw, M3 plastic pillar and M3 plastic nut.

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

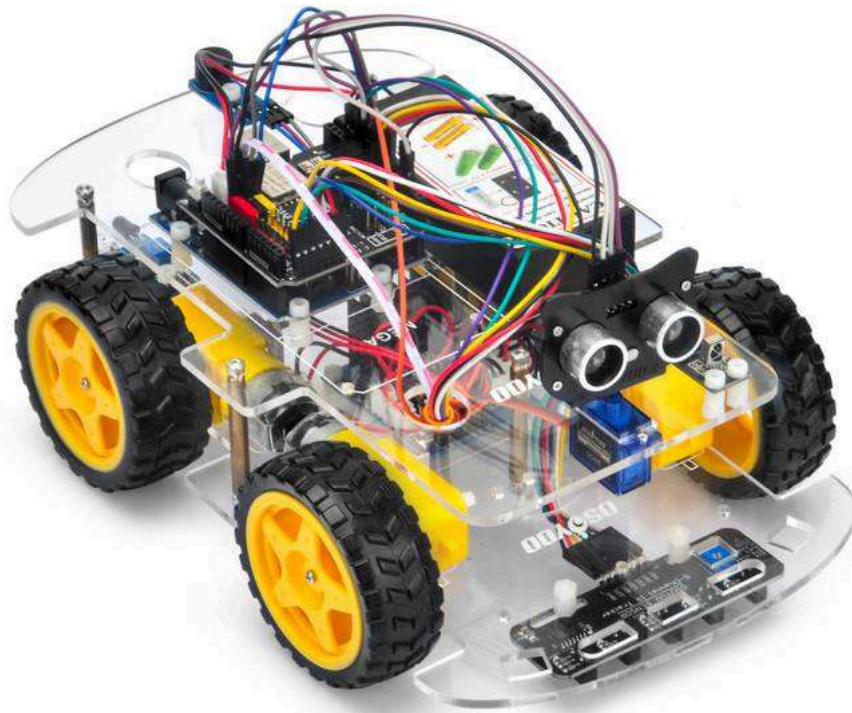
Note: As the limited Digital signal pins, you need to remove some wires of previous lessons. If you have already completed installation in Lesson 1, Everything keep it as is except move ENA from D9 to D3 (we need D9 for Servo control). If you have installed Lesson 2 or 3, you have to remove the wires.



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.



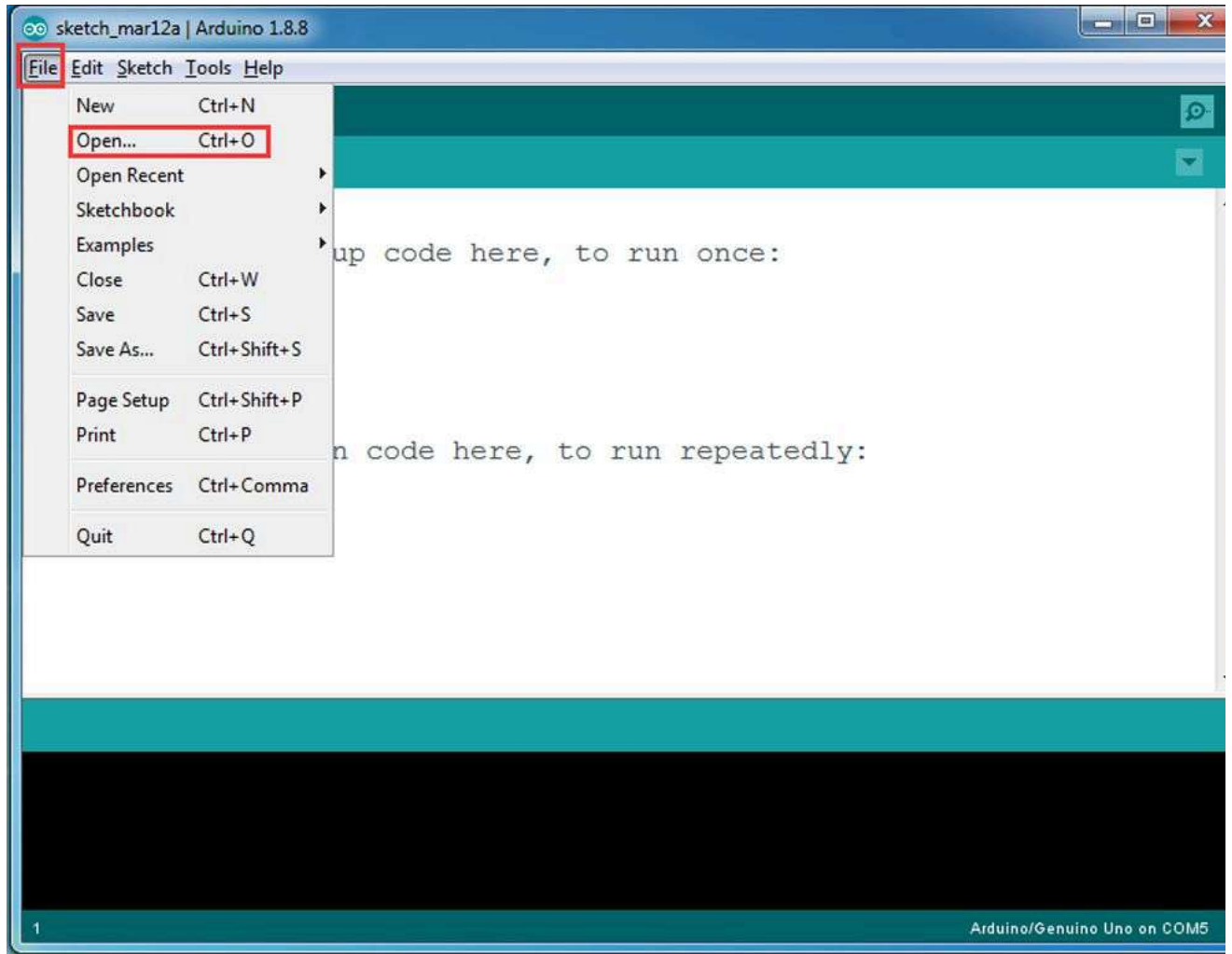
Software Installation:

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/

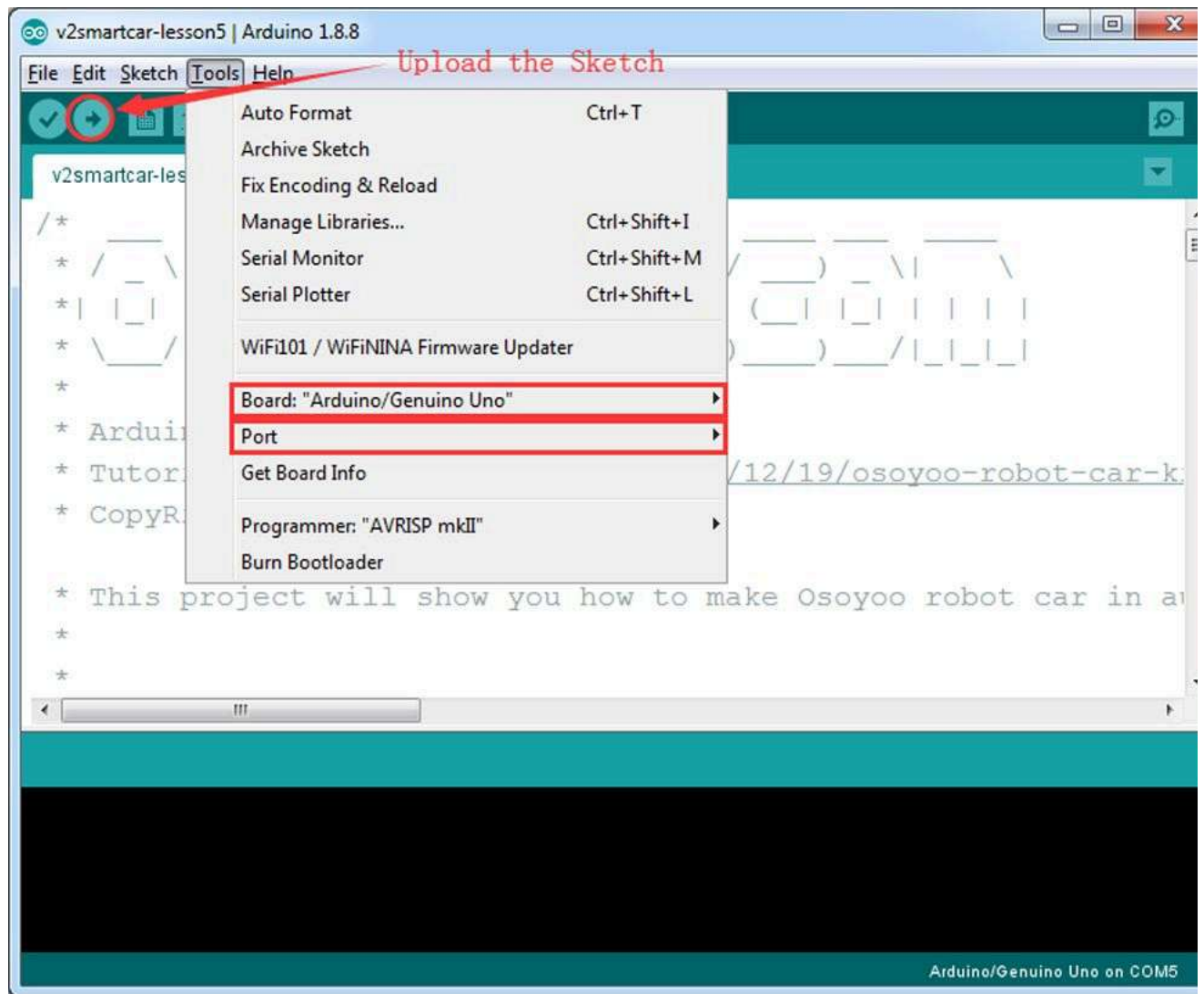
Step 1: Install latest Arduino IDE (If you have Arduino IDE version after 1.1.16, please skip this step). Download Arduino IDE from <https://www.arduino.cc/en/Main/Software?setlang=en> , then install the software.

Step 2:Download sample code from <https://osoyoo.com/driver/v2smartcar-lesson5.zip> , unzip the download zip file smart 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” smartcar-lesson5 folder, load the code into arduino. **(Notice: Please turn off battery power when your Robot is connected to Computer or Laptop via USB cable)**



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 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 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 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 adjust sensor position anymore. Just wait 5 seconds. If no obstacle is detected, the car will go forward. If any obstacles is the car will stop, the ultrasonic module will turn from right to left to detect surrounding obstacle. The robot car will decide if 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](#)

Trouble Shooting

Is there an easy way to align my Ultrasonic sensor to make it facing front?

Step 1) Download https://osoyoo.com/driver/arduino_servo_car/servo.zip

Step 2) Unzip above file and run the servo.ino file in your car.

Your servo will move from left to right and finally stop to center position. If your ultrason sensor is not facing to front direct release your ultrasonic sensor from servo head, re-position its direction to front , then fasten the sensor screw to fix its dir video from 7:4 to 8:10

Step 3) After you have changed the sensor direction, please run v2smartcar-lesson5.ino sketch again. Your car will begin obstacle avoidance driving.

[PREVIOUS LESSON](#)[ROBOT CAR V2 HOME](#)[NEXT LESSON](#)

DownLoad Url :

osoyoo.com

25 Comments



jadenyubel95 says:
February 2, 2021 at 12:09 pm

How to make the bot move faster instead of stopping every second?

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elaine says:
February 2, 2021 at 3:27 pm

You can change the following code to adjust the speed:

```
#define BUZZ_PIN 13
#define FAST_SPEED 250 //both sides of the motor speed
#define SPEED 120 //both sides of the motor speed
#define TURN_SPEED 200 //both sides of the motor speed
#define BACK_SPEED1 255 //back speed
#define BACK_SPEED2 90 //back speed
```

Elaine

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jadenyubel95 says:
February 14, 2021 at 2:54 pm

How to make the car not to stop every LPT cycle and let it move continuously. I delete every stop_Stop function from the watchsurround function but it still does it? Please I need help. Thanks

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david says:
February 20, 2021 at 3:13 pm

After the robot car is stopped, it detects whether there are obstacles in different directions through the servo and ultrasonic sensors, so that the robot can bypass the obstacles on its v

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david says:
February 20, 2021 at 3:30 pm

I don't know what your code looks like, and I don't quite understand your purpose of doing this. Can you post your code?

[Log in to Reply](#)



jadenyubel95 says:
February 14, 2021 at 2:59 pm

It is normal for the Model X motor driver to flash when only Uno's board is powered?

[Log in to Reply](#)



david says:
February 20, 2021 at 3:17 pm

Please check the wiring and then check the battery status of the robot

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0Z3R0 says:
October 19, 2021 at 3:45 am

Hi, when I want to move the black wire from D9 to D3, I see that D3 is taken by another wire, specifically the Out (left) wire of the IR Obstacle Avoidance Module from lesson 3. Where should I wire?

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elaine says:
October 19, 2021 at 10:17 am

Hi, you need to remove the wires of lesson2 and lesson3, when you test the lesson 4 and 5.

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tacchan says:

January 6, 2022 at 9:43 pm

Can someone explain to me what this part of the code in the watch() function means?

```
digitalWrite(Trig_PIN,LOW);
delayMicroseconds(5);
digitalWrite(Trig_PIN,HIGH);
delayMicroseconds(15);
digitalWrite(Trig_PIN,LOW);
echo_distance=pulseIn(Echo_PIN,HIGH);
```

I think we need to measure the delay of the pulse to know the distance, but it looks like just measuring the pulse width which is fixed to be 15 µs.

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James Robb says:

December 4, 2022 at 2:36 am

Hi Elaine,

Lesson 5. I have removed wires from Lessons 2 & 3.

The robot only moves 3 or 4cms at a time but does not run when well away fro object. I have reduced te distance in the code to 10 but this has not made any difference. What is my problem? Jim,

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admin says:

December 4, 2022 at 9:40 am

hi, James,

What do you mean "The robot only moves 3 or 4cms at a time but does not run when well away fro object" ? Can you send a short video about your current running result. our support support@osoyoo.info

Thanks

John @osoyoo support team

[Log in to Reply](#)



James Robb says:

December 5, 2022 at 7:32 pm

Hi John,

I have been trying for several days to send you a short video but I am unable to make it short enough to be accepted by the email service. So I will try to explain what is hap
When switched on in an open space in a room , minimum of one meter from an obstacle. The robot will do a scan of with the distance scanner then move forward about 4cm: 3/4 turn of the wheels then move back slightly, turn slightly to right or left , then do the same again. More or less stayiong within the same square. I have reduced the minimur the code to 10cms but this has made no difference. I would expect the robot , when switched on to move forward until it sees an object 10cms away, stop do a scan, back up and do another scan then proceed to go forward again etc. Am I expecting wrong?

[Log in to Reply](#)



James Robb says:

December 6, 2022 at 8:33 pm

Hi John,

I have been trying for several days to send you a short video but I am unable to make it short enough to be accepted by the email servrice. So I will try to explain wh
happening.

When switched on in an open space in a room , minimum of one meter from an obstacle. The robot will do a scan of with the distance scanner then move forward al
that is about 3/4 turn of the wheels then move back slightly, turn slightly to right or left , then do the same again. More or less stayiong within the same square. I hav
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stop do a scan, back up, turn away and do another scan then proceed to go forward again etc. Am I expecting wrong?

[Log in to Reply](#)



elaine says:

December 8, 2022 at 5:08 pm

Do you have Youtube account? Please upload the video to Youtube and send the link to us.

Do you mean the car will detect the object for long distance?

Please check whether the wires on Ultrasonic sensor? whether the echo and Trig are cross wrong?

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chloehassall says:

[January 8, 2024 at 6:01 am](#)

The M2.2 * 8 screws do not actually attach the motor to the chassis, the chassis's holes are too big so the motor just moves around

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James Robb says:

[July 29, 2024 at 9:46 am](#)

Hi Elaine

I have now reached Lesson 5. It works OK except the buzzer does not make sound. Wiring is OK

Any suggestions?

Regards, James.

[Log in to Reply](#)



admin says:

[July 29, 2024 at 10:02 am](#)

buzzer might be defective. If you want , you can send your order number and address to support@osoyoo.com and ask for a new buzzer replacement. Actually buzzer is not quite imp keep doing other lessons without buzzer and test lesson 5 after you get new buzzer.

[Log in to Reply](#)



James Robb says:

[July 31, 2024 at 2:51 am](#)

Hi Elaine,

Thanks fort your attention. I will not bother with the buzzer. I have now completed all lessons.

Regards, James.

[Log in to Reply](#)



kelvim says:

[September 4, 2024 at 12:21 pm](#)

olá eu montei o carrinho todo mas quando ligo o sensor ultrassonico ele começa a dar um beep constante sem parar o que que eu faço?

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admin says:

[September 4, 2024 at 1:38 pm](#)

you can remove that buzzer. it is not a necessary part.

[Log in to Reply](#)



Berliner23 says:

[March 26, 2025 at 1:05 am](#)

Hi Elaine,

the car behaves strangely. It measures the distance to an obstacle correctly and shows it in the serial monitor, but it never goes forward. It either runs backwards or turns in circles.

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admin says:

[March 26, 2025 at 1:27 am](#)

How do you know the distance to obstacle showing correctly? If the aar always moving back or turning around, it means the sensor didn't send proper obstacle signal to Arduino. ther way to test your ultrasonic sensor obstacle detection function is good or bad.

1)Run v2smartcar-lesson5.ino, do not turn on the battery, keep the USB cable connecting Arduino board and your computer. The car's ultrasonic sensor will rotate but car won't move.
2)Open Serial monitor , face the car to any direction which as obstacle(for example, your PC screen), then Serial monitor should show something like:
begin str=00100 or begin str=01100 , which tells that in center direction has some obstacles (0 stands for non-obstacle, 1 stands for obstacle , from left to right 5 digits means the obst from far left , left, center, right, far right).

If you face the car to an area which has no obstacle, it should show 00000 which means no obstacles in 5 directions, then car will move forward. However, if you got 11111 even your c obstacles in front, your sensor connection to Arduino must have some problem.

Hope this helps.

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johnbrandob823 says:
July 24, 2025 at 9:39 am

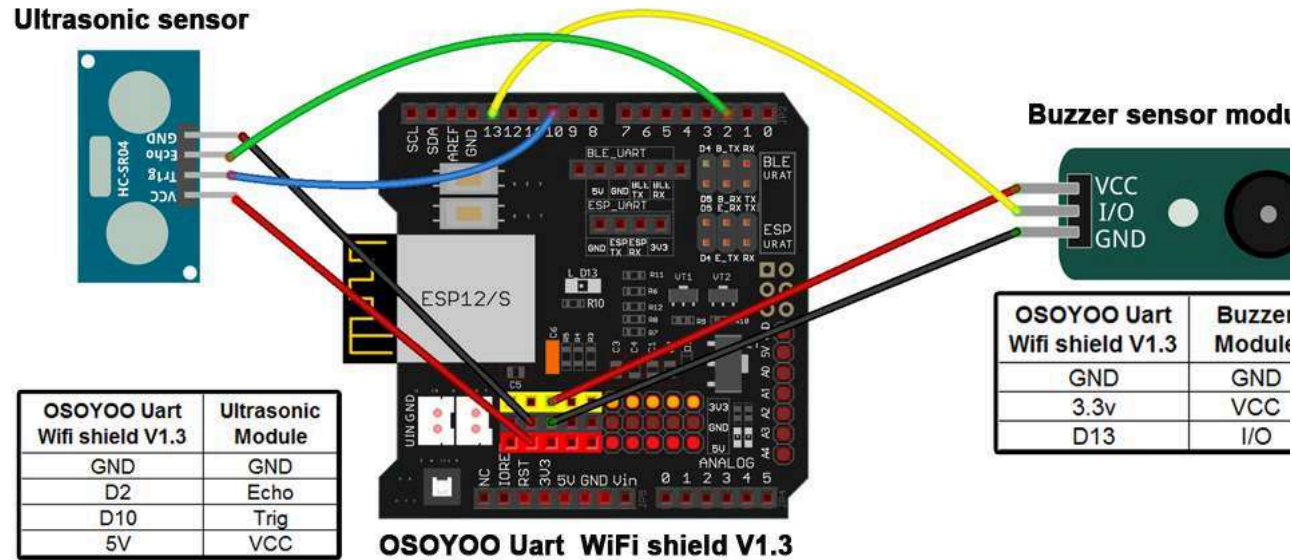
my robot shows an obstacle to the center of it, even if there is not one ther, like 00100

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admin says:
July 24, 2025 at 11:38 pm

one of the 4 wires which connect your obstacle sensor to Arduino UNO board is either broken or wrongly connected, check following picture:



Please use 4 pcs new wires to reconnect the 4 wires in ultrasonic sensor(GND, Echo,Trig,VCC) to Arduino GND,D2,D10,5V again. It will solve your problem.

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Leave a Reply

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