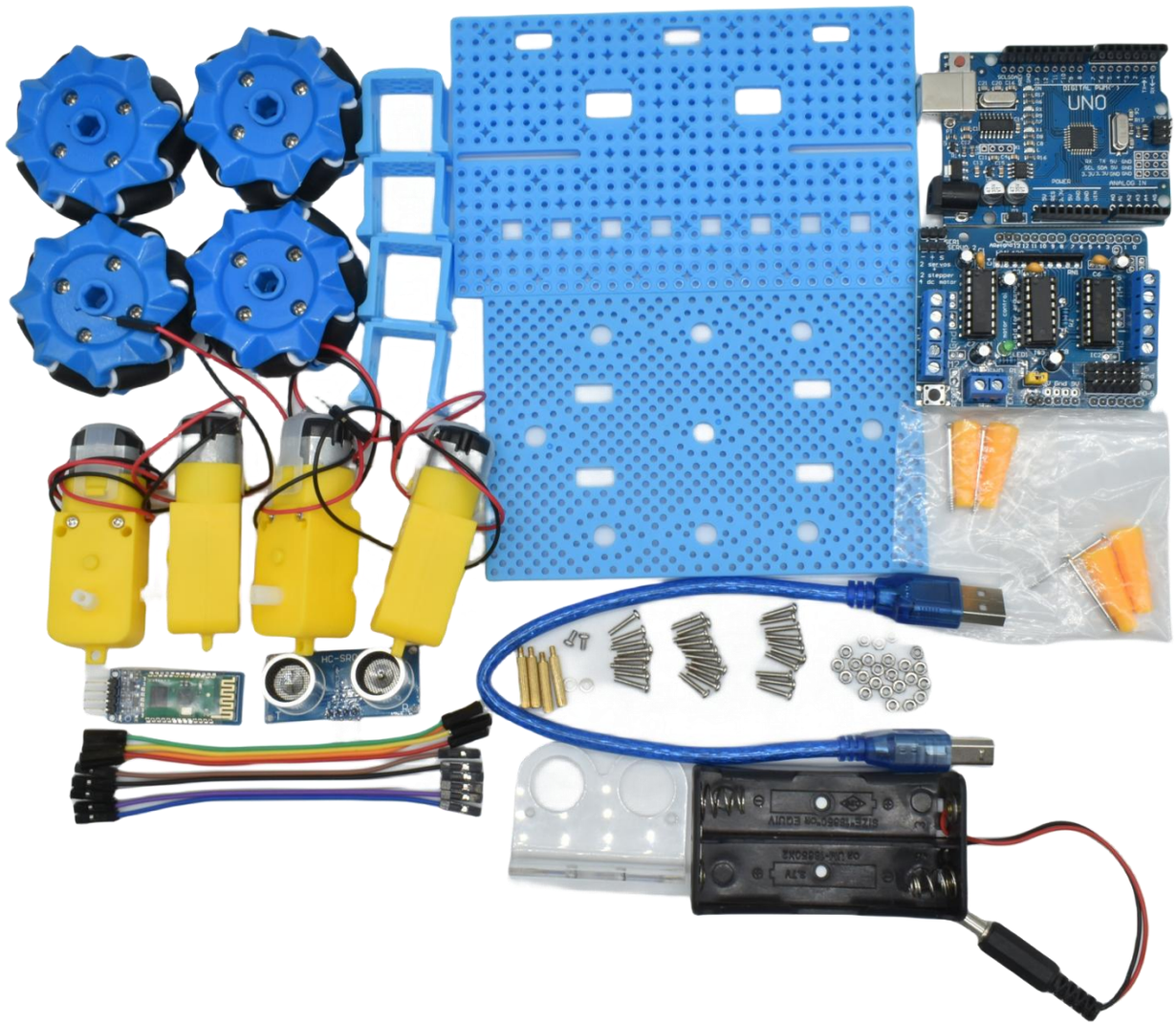
LROBRUYA

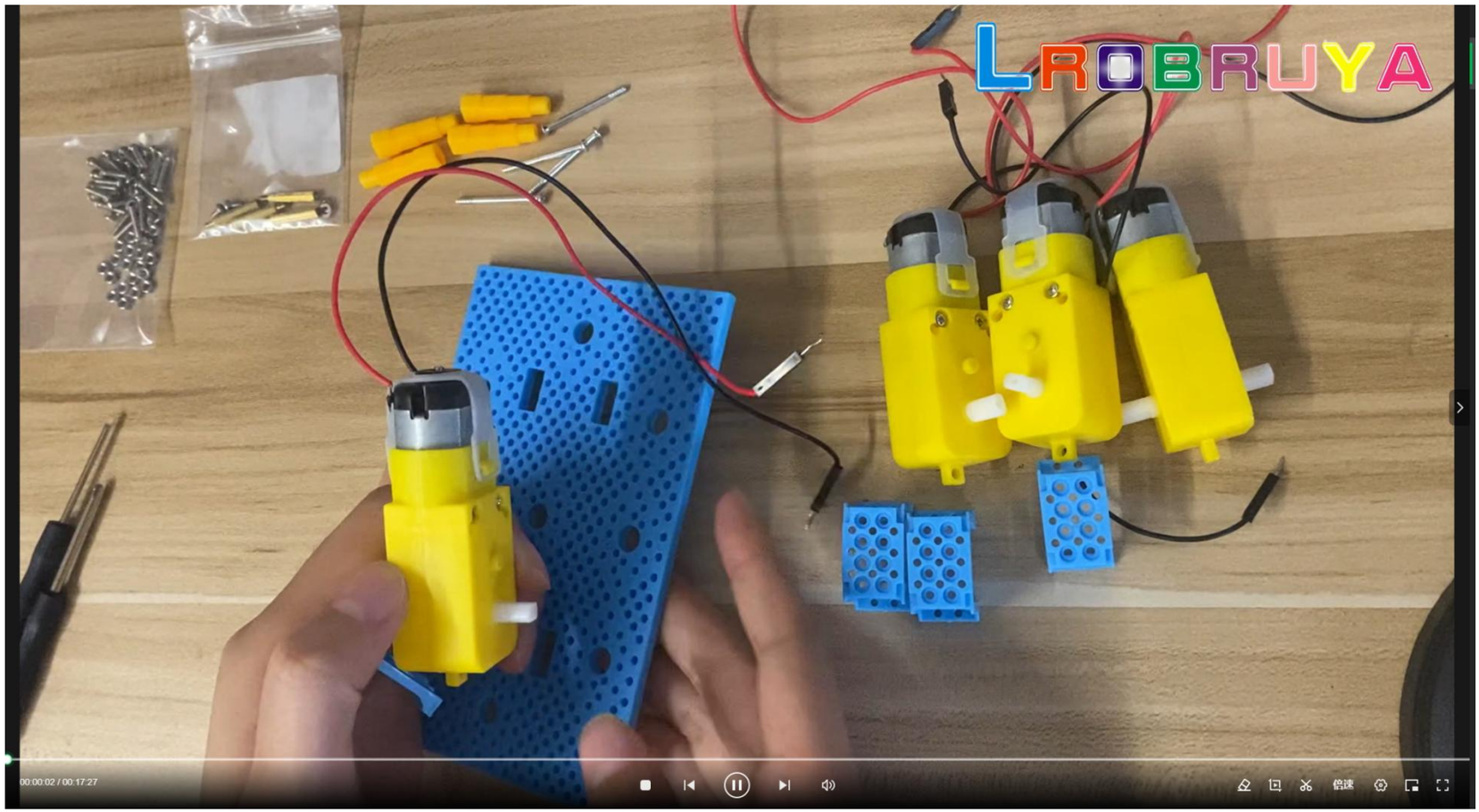
Mecanum Wheels Robot Car Kit


UNO

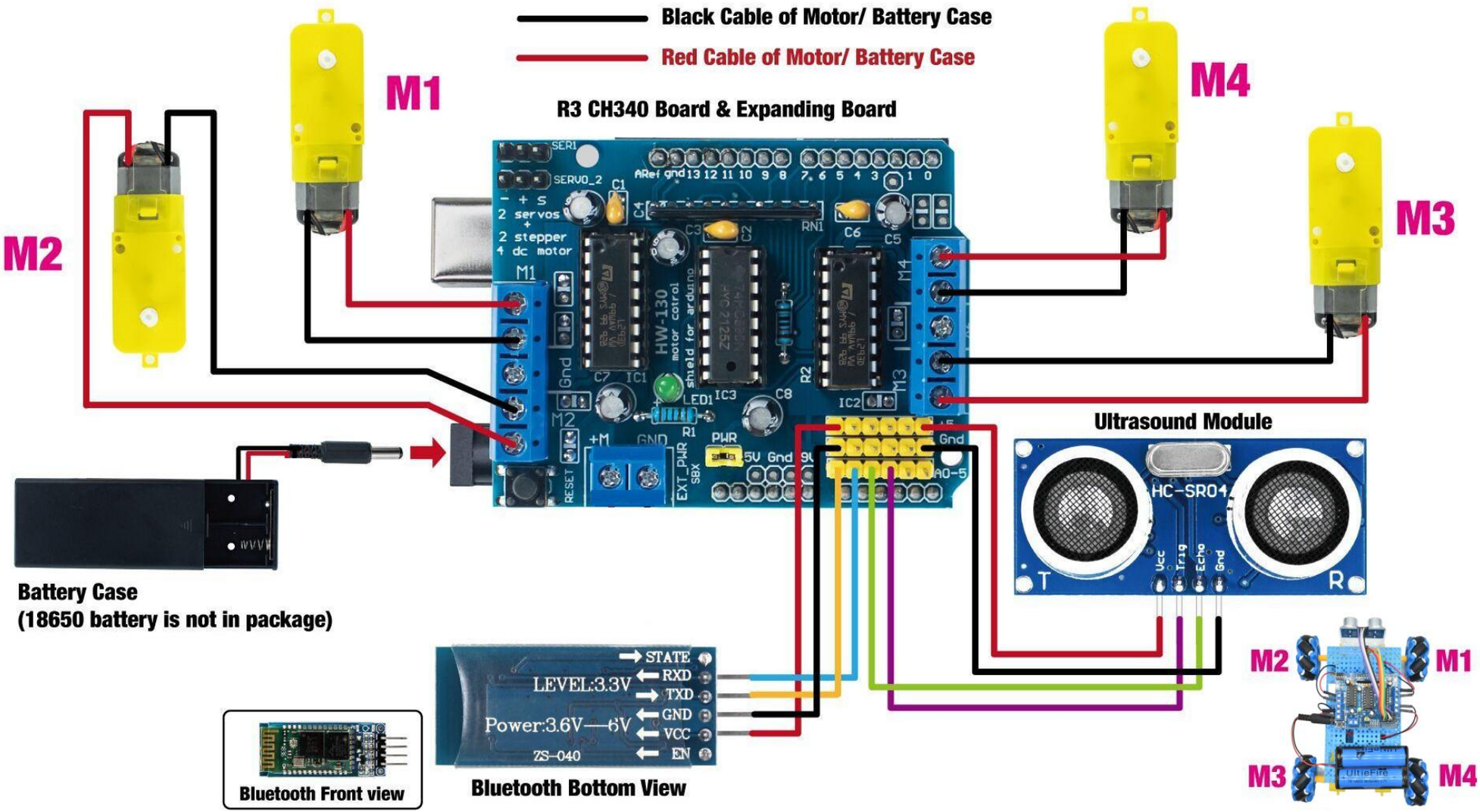
Content

◆ Step 1:Assembly Tutorial

For more details refer to **Assembly Tutorial Video.mp4**

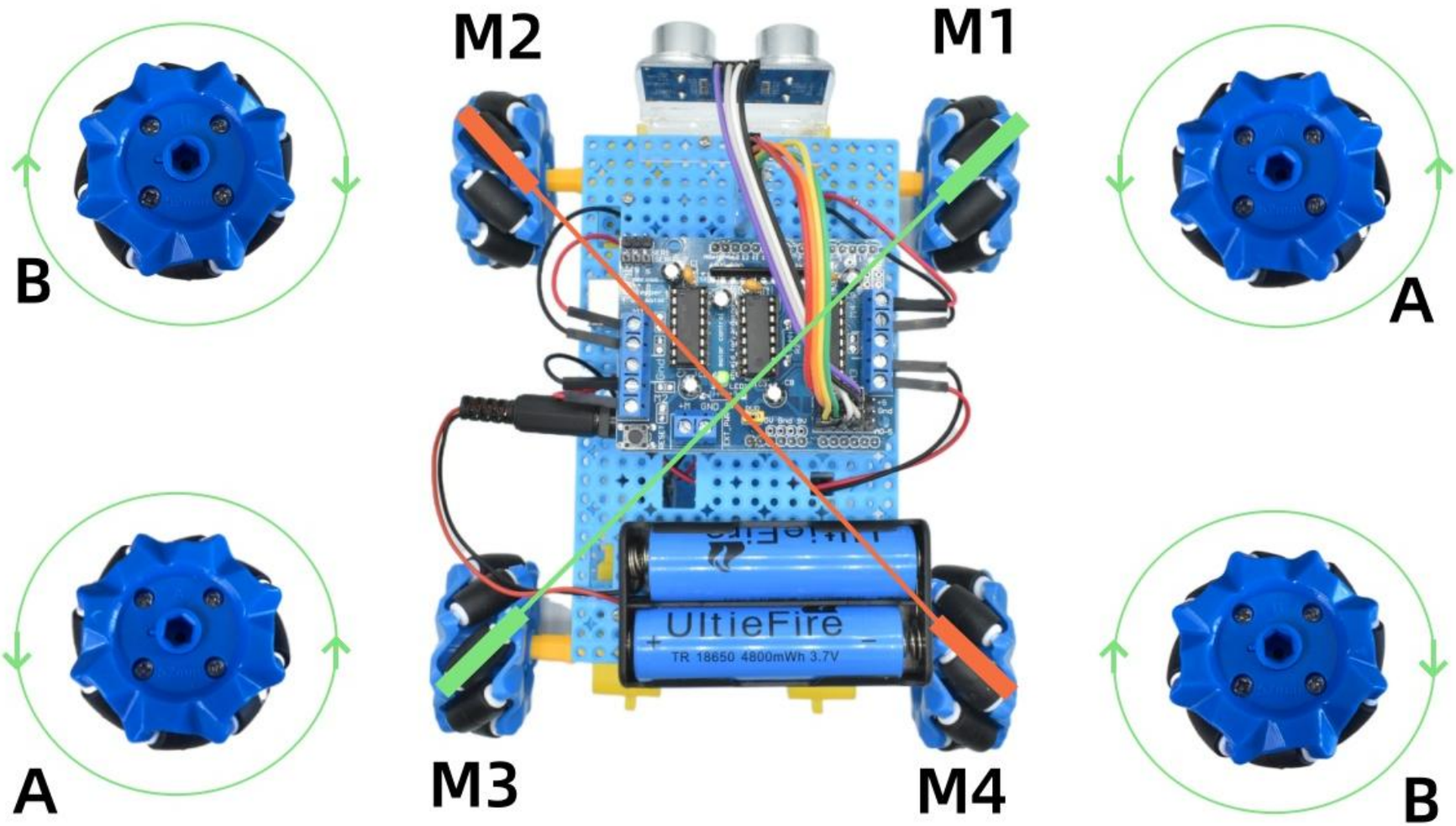


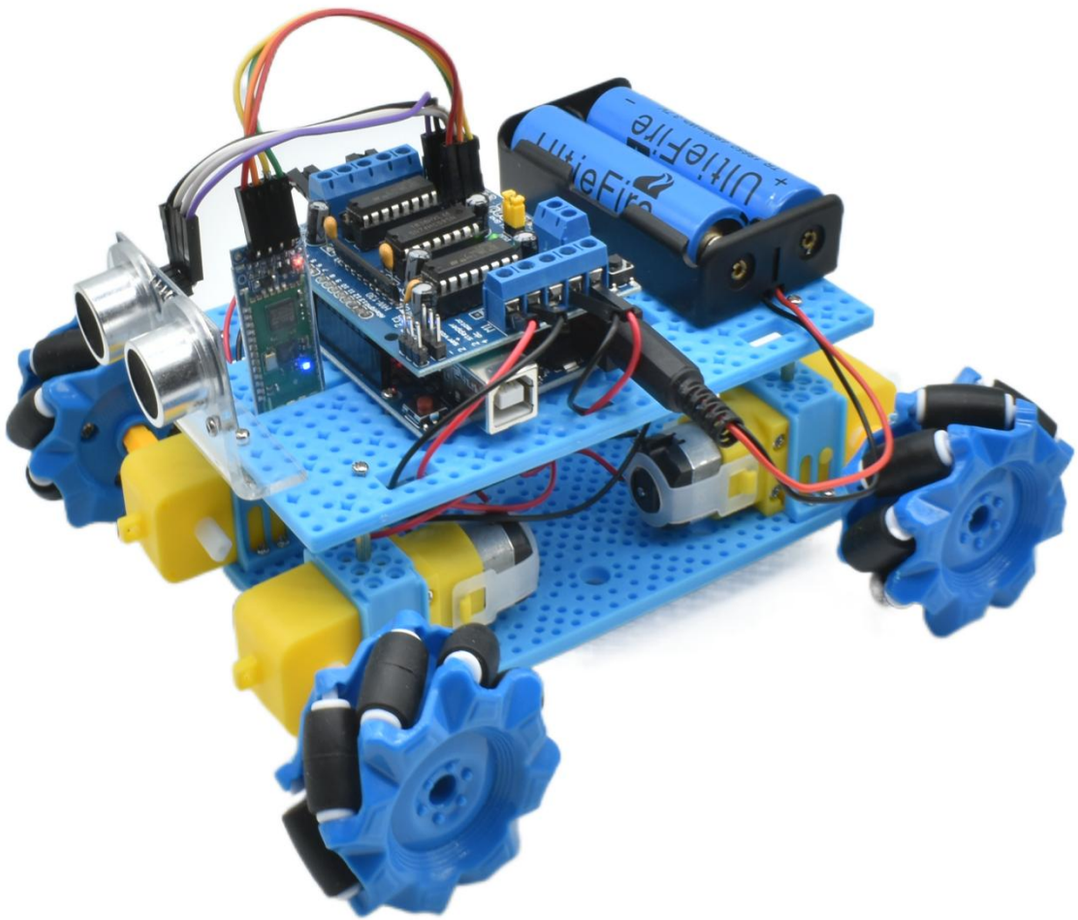
◆ Step 2:Wiring



Tip: ①Pay attention to distinguish the installation sequence of Mecanum wheel

②Pay attention to distinguish the installation orientation of motors M1 M2 M3 M4

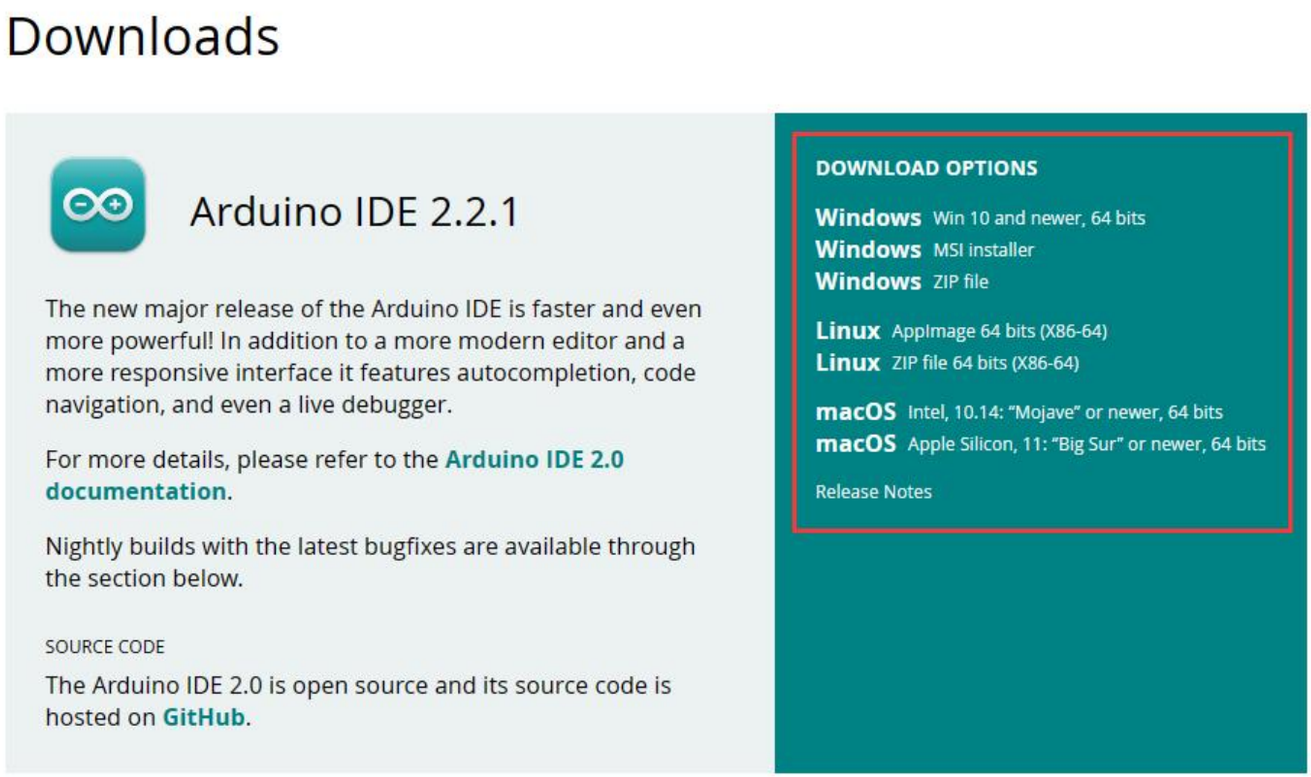




◆ Step 3:Install Arduino IDE

Go to https://www.arduino.cc/en/Main/Software. If you have questions about the installation of Arduino IDE, you can refer to Getting Started with Arduino products.

Before starting this installation procedure, make sure you have the latest version of the Arduino IDE installed in your computer. If you don't, uninstall it and install it again. Otherwise, it may not work.



◆ Step 4:Install CH340 Driver

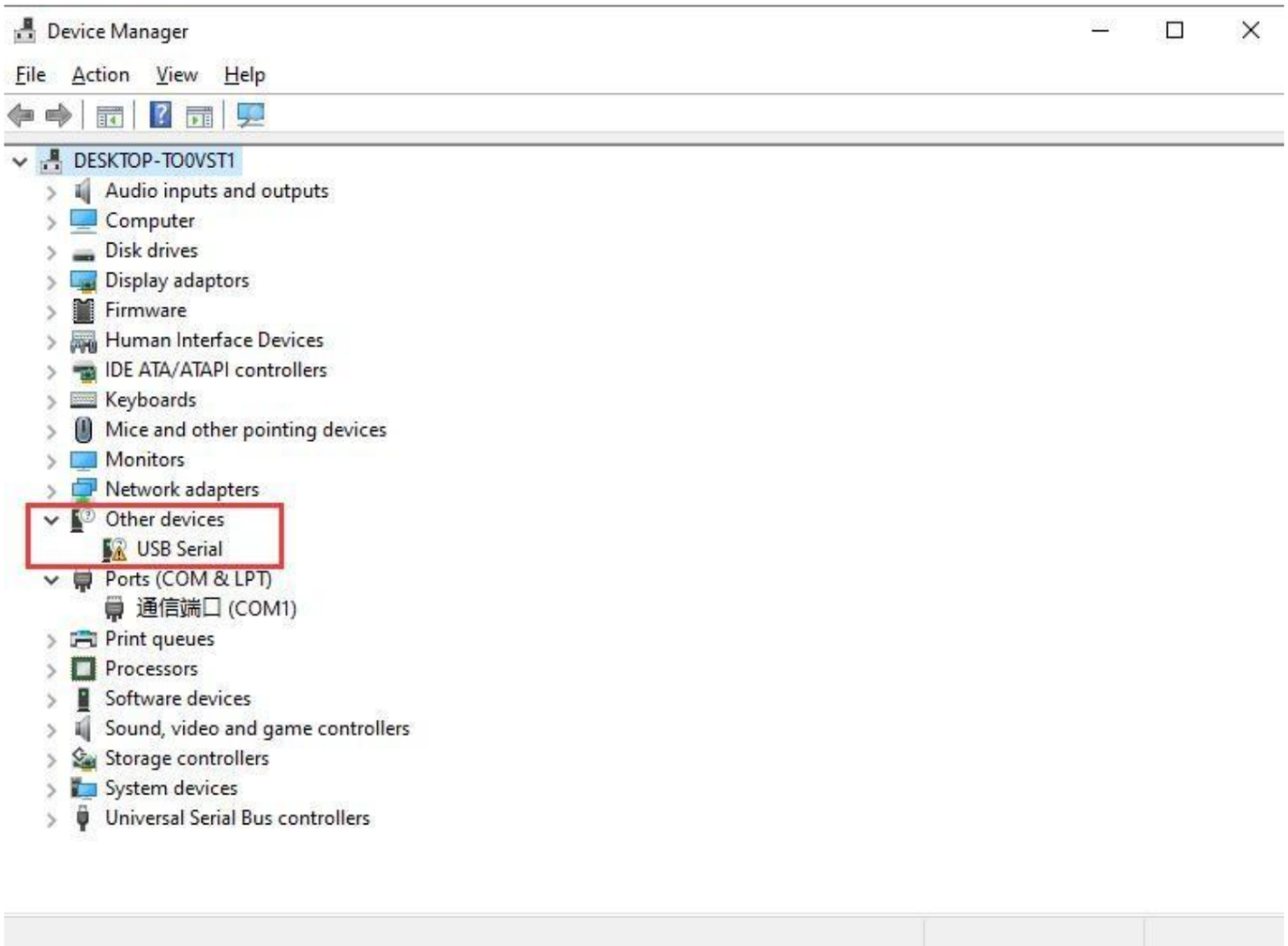
What is CH340 Driver?

CH340 is a TTL (serial) to USB converter and vice versa. This chip has been used in some boards such as A rduino boards, ESP8266, etc. The boards using the CH340 chip,need a programmer in order to access the processor or to program them.But there is a downside. An extra driver must be installed before starting to w ork with boards having this IC.

So before uploading the code, you need to install the CH340 driver. Otherwise you won't be able to find the correct COM port in the Arduino IDE.If your computer has already installed the CH340 driver, you can skip this step.

If you connect your board to the computer before installing the driver, your computer will not recognize the board correctly and you will see following image in Device Manager.

To open Device Manager, search for it in the Windows Start menu.



Follow the steps below to install the CH340 driver:

①: Downloading the driver

First, download the CH340 driver from the this link.

Windows CH340 Driver

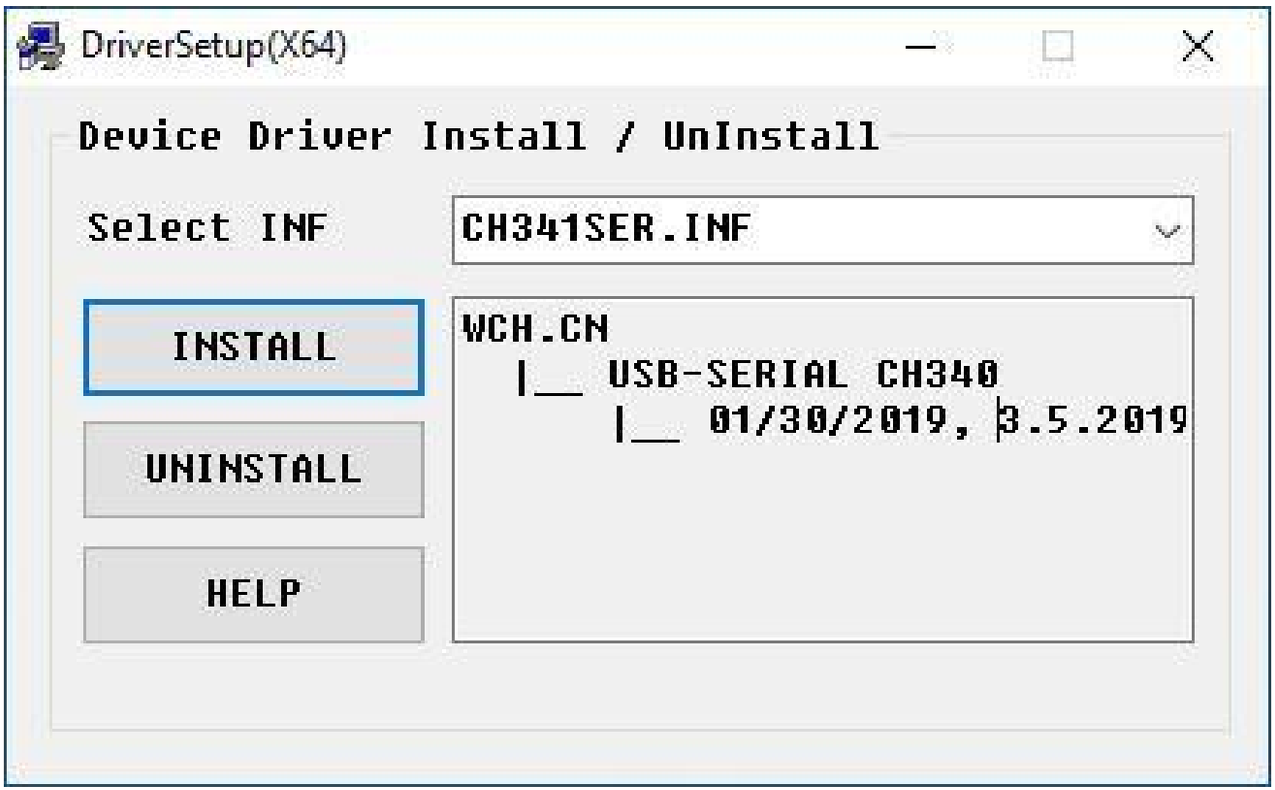
You can also download the latest version of the driver directly from the manufacturer's site google link

file name	file content
CH341SER.ZIP	CH340/CH341 USB to serial port Windows driver, supports Windows XP/Vista/7/8/8.1/10/11/ SERVER 2003/2008/2012/2016/2019/2022 -32/64bit, Microsoft WHQL Certified, supports USB to 3-line and 9-line serial port.
CH341SER_LINUX.ZIP	CH340/CH341 USB to serial port LINUX driver, supports 32/64-bit operation system.
CH341SER_MAC.ZIP	CH340/CH341 USB to serial port MAC OS driver, supports 32/64-bit operation system, contains instructions for use.

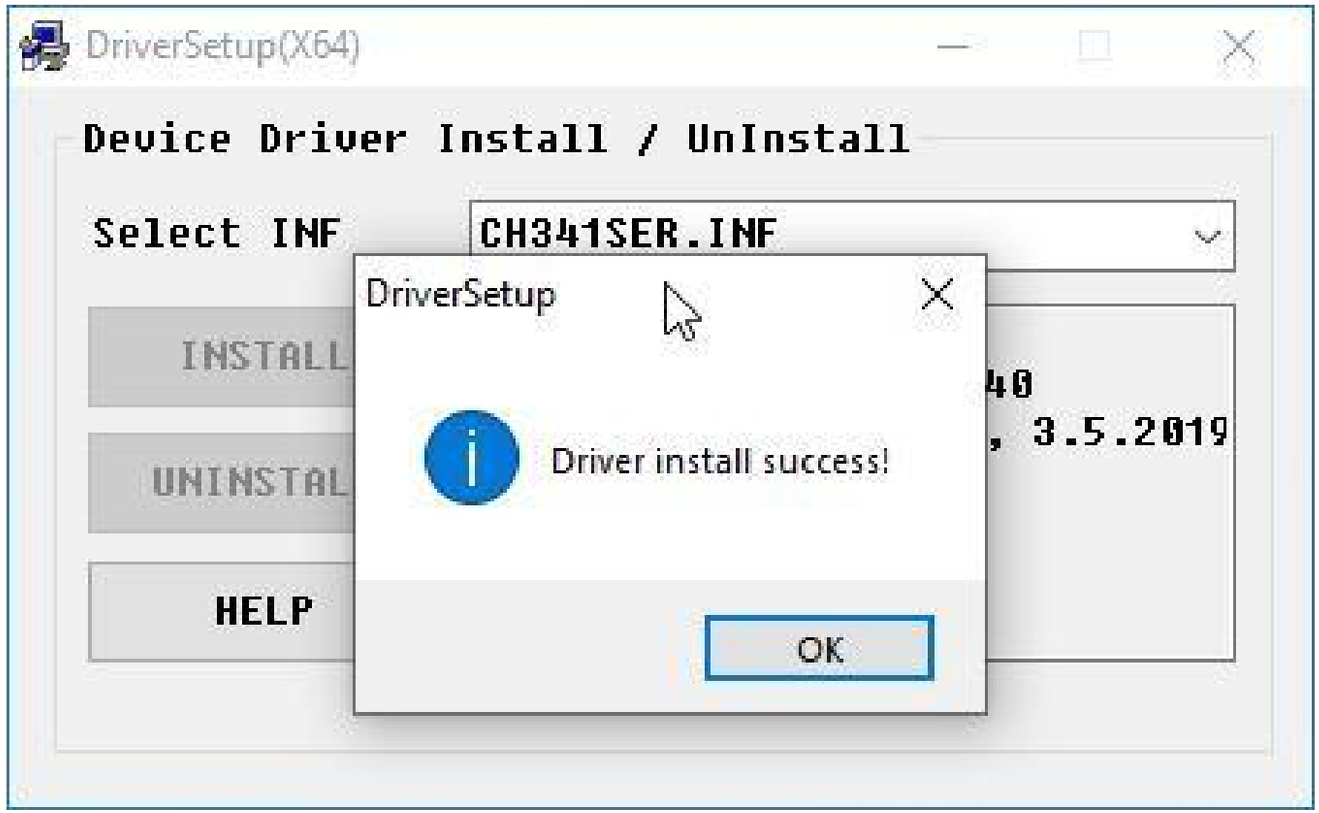
②: Installing the driver

After downloading the driver, open it and click Install.

Tip: Before installing the driver software, you must connect the Arduino board to your computer with a USB cable



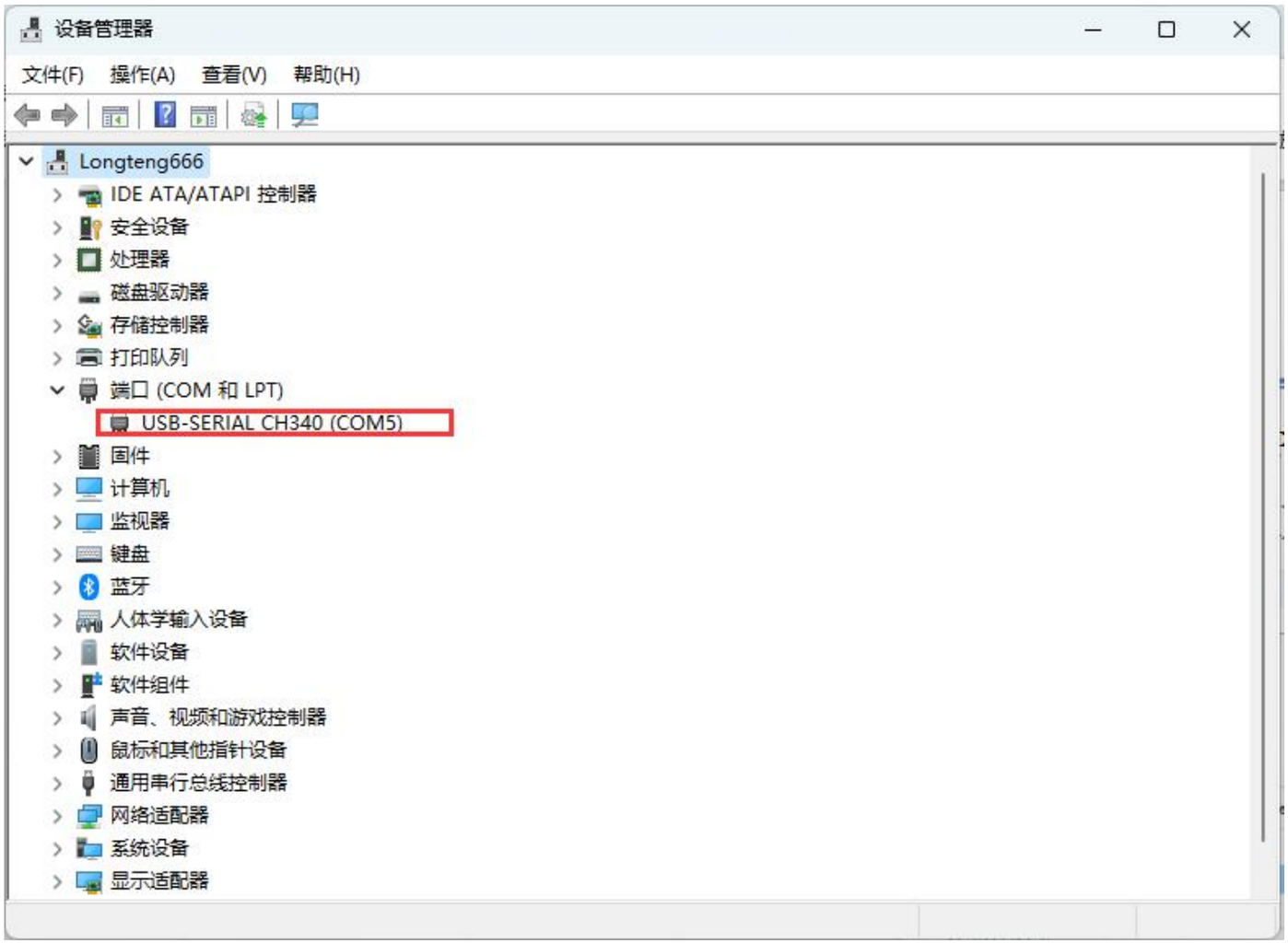
After successful installation you should see this message



Note： In some cases, you may need to reset Windows after the driver installation is complete.

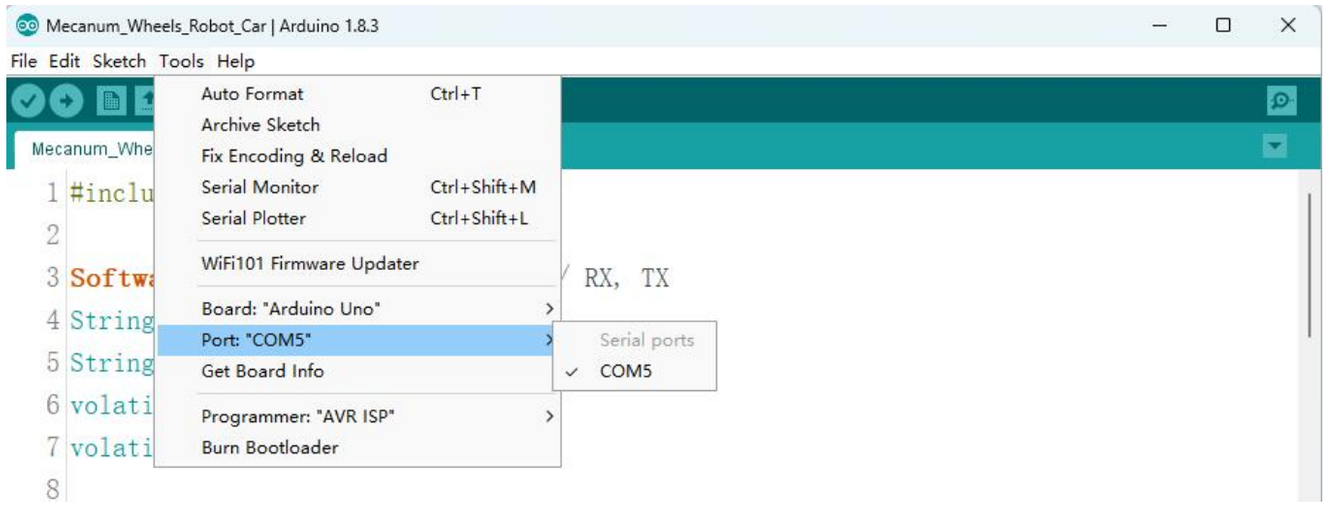
③: Checking Correct Driver Installation in Device Manager

If your driver has been installed correctly, and if you connect your board to a computer, then you can see its name and port number in the Port section. For example, my Arduino board is connected to COM5.

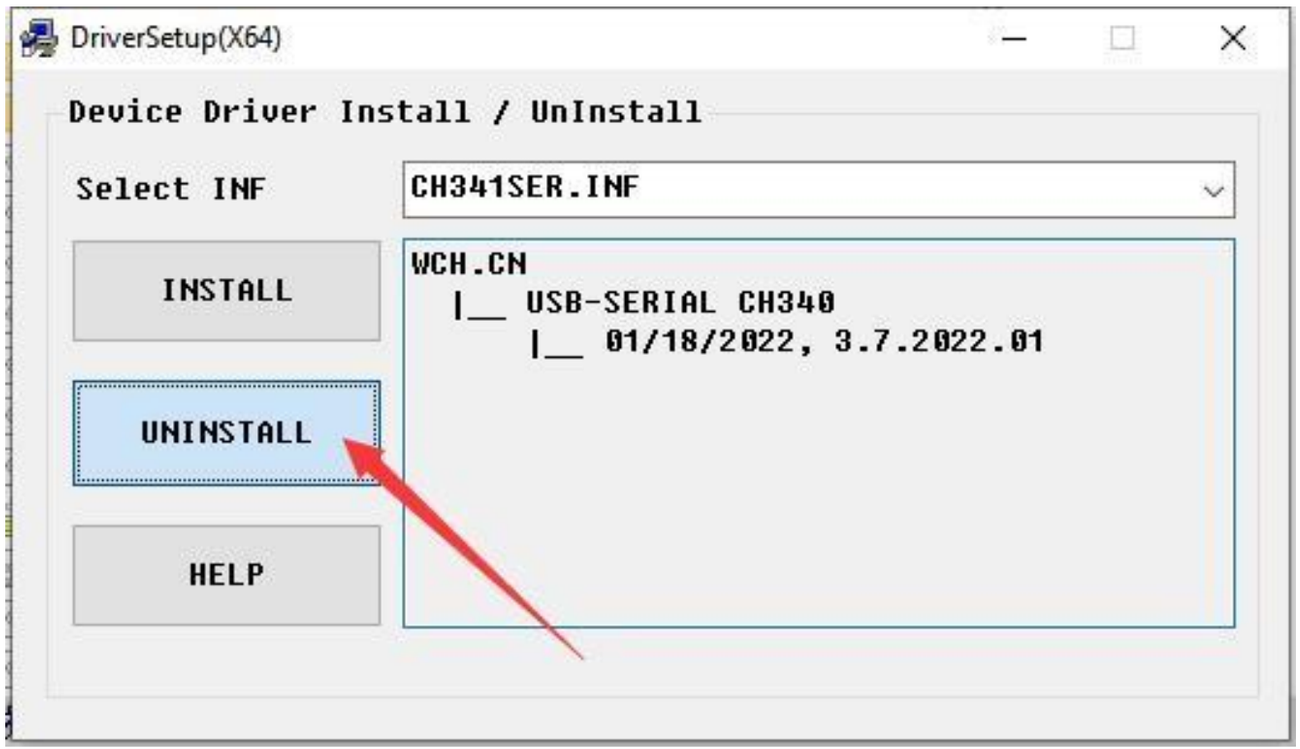


④: Checking Correct Driver Installation in Arduino IDE

Open the Arduino IDE software. Go to the Tools menu and from the Port section, select the port number app ropriate port that your board is connected to. Note that this port number must be the same as the number you saw in the previous step.



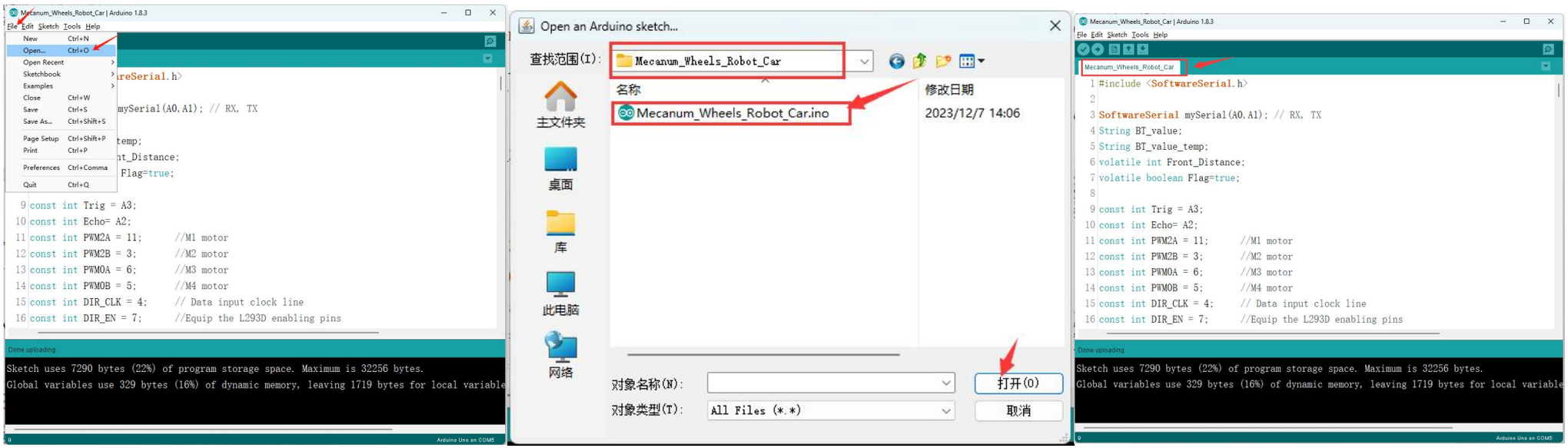
If you don't find the Arduino CH340 device in your computer's device manager or Arduino IDE, it means you didn't install the driver successfully. You can try uninstall the driver, restarting your computer, and then repeating the above steps.



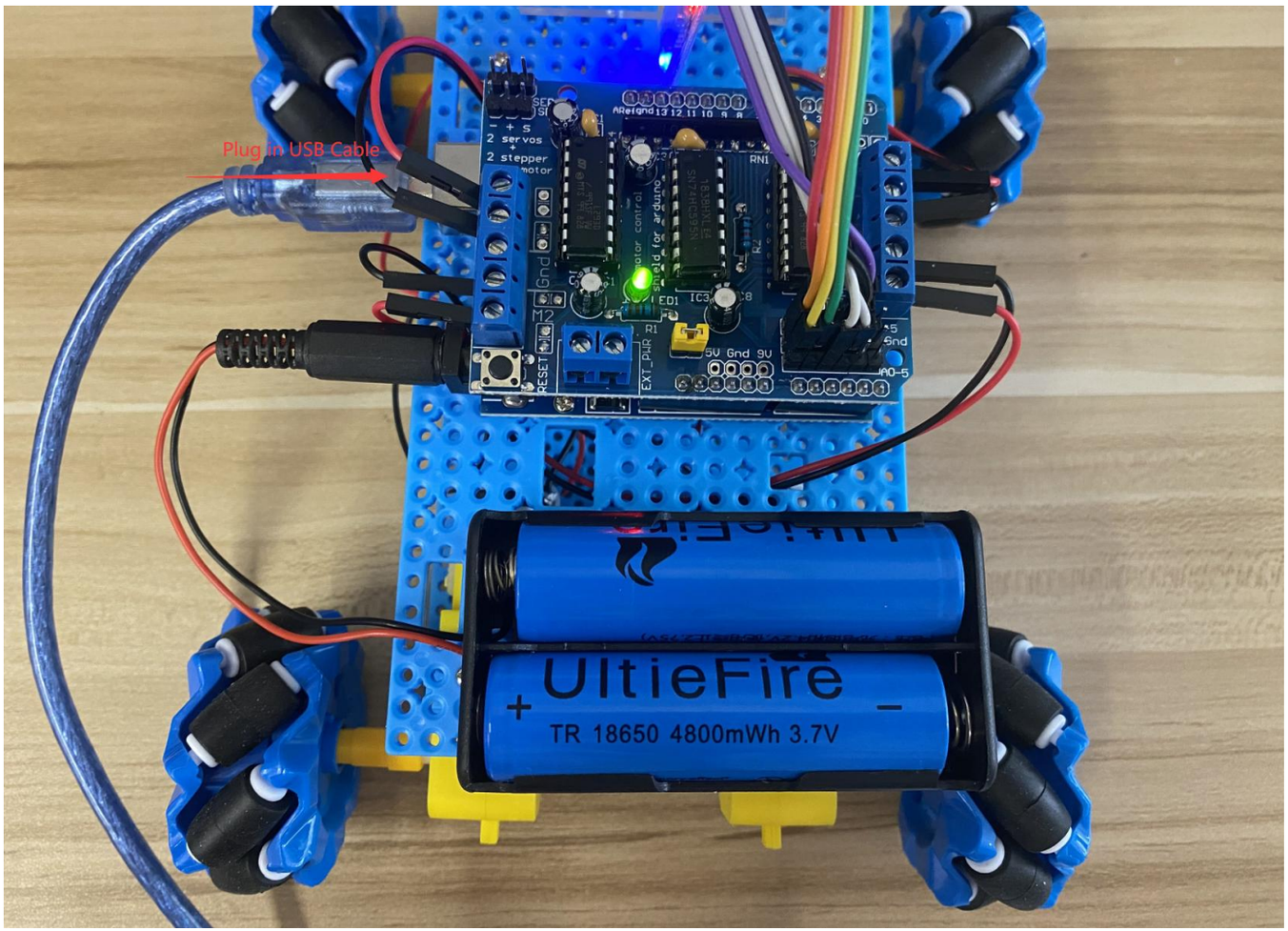
◆ Step 5:Upload Arduino UNO Main Code

①Start Arduino IDE, open the code in

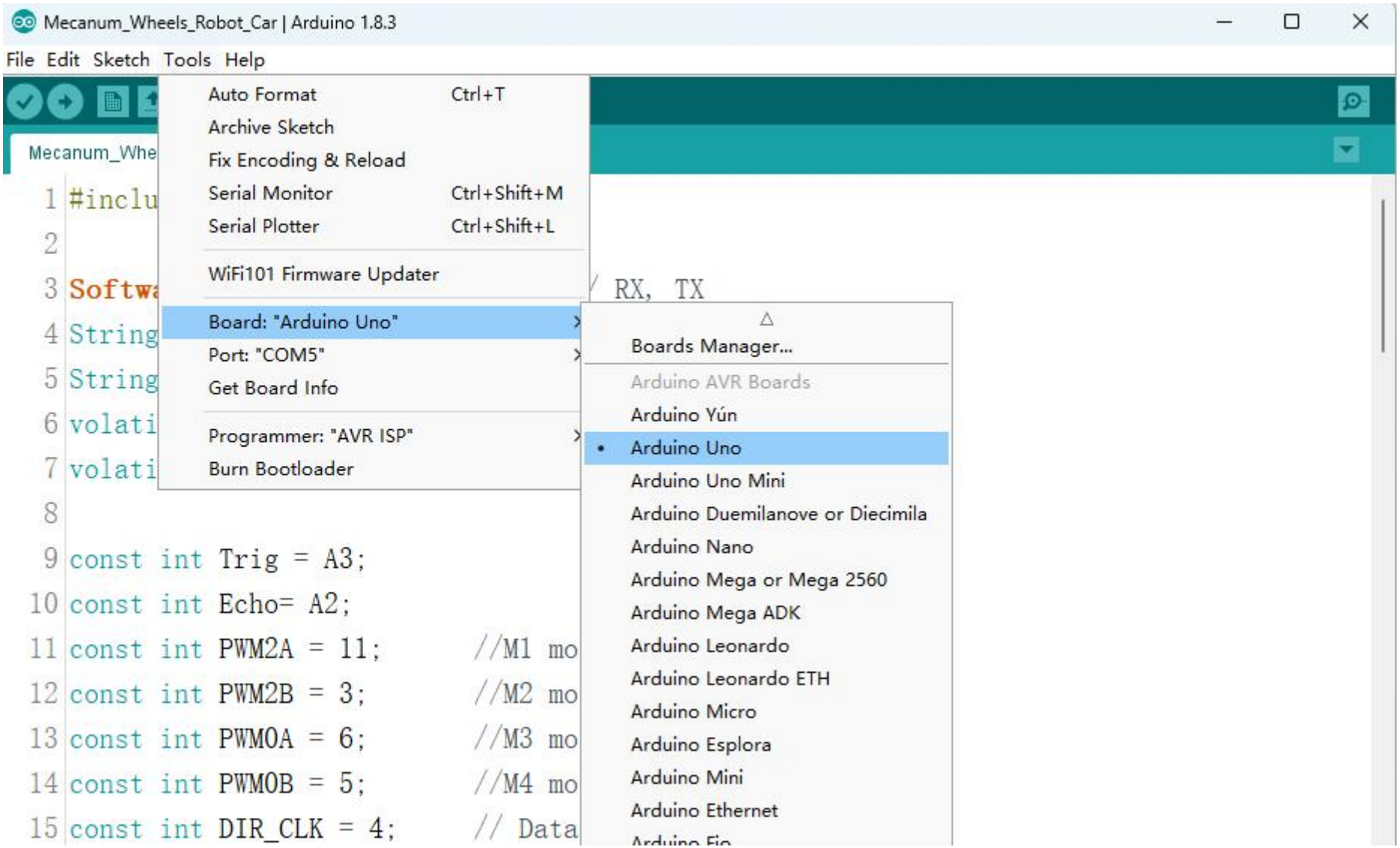
File->Open...->Mecanum Wheels Robot Car Kit>Main Code>Mecanum_Wheels_Robot_Car.ino



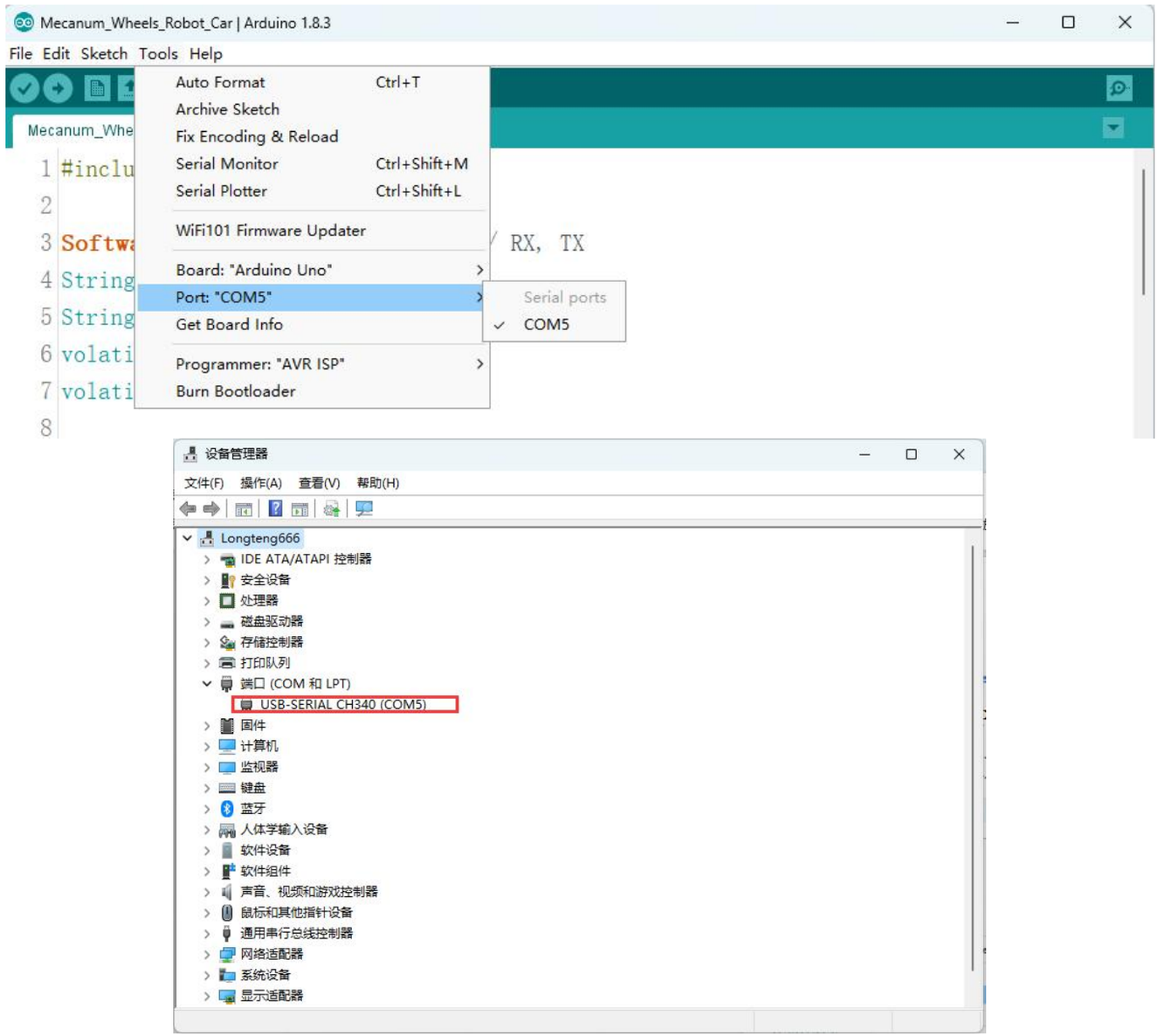
②Use USB cable to connect the Arduino UNO board to the computer.(It may be that the power supply of the USB interface of the computer is insufficient, you can turn on the power switch of the robot car at the same time.)



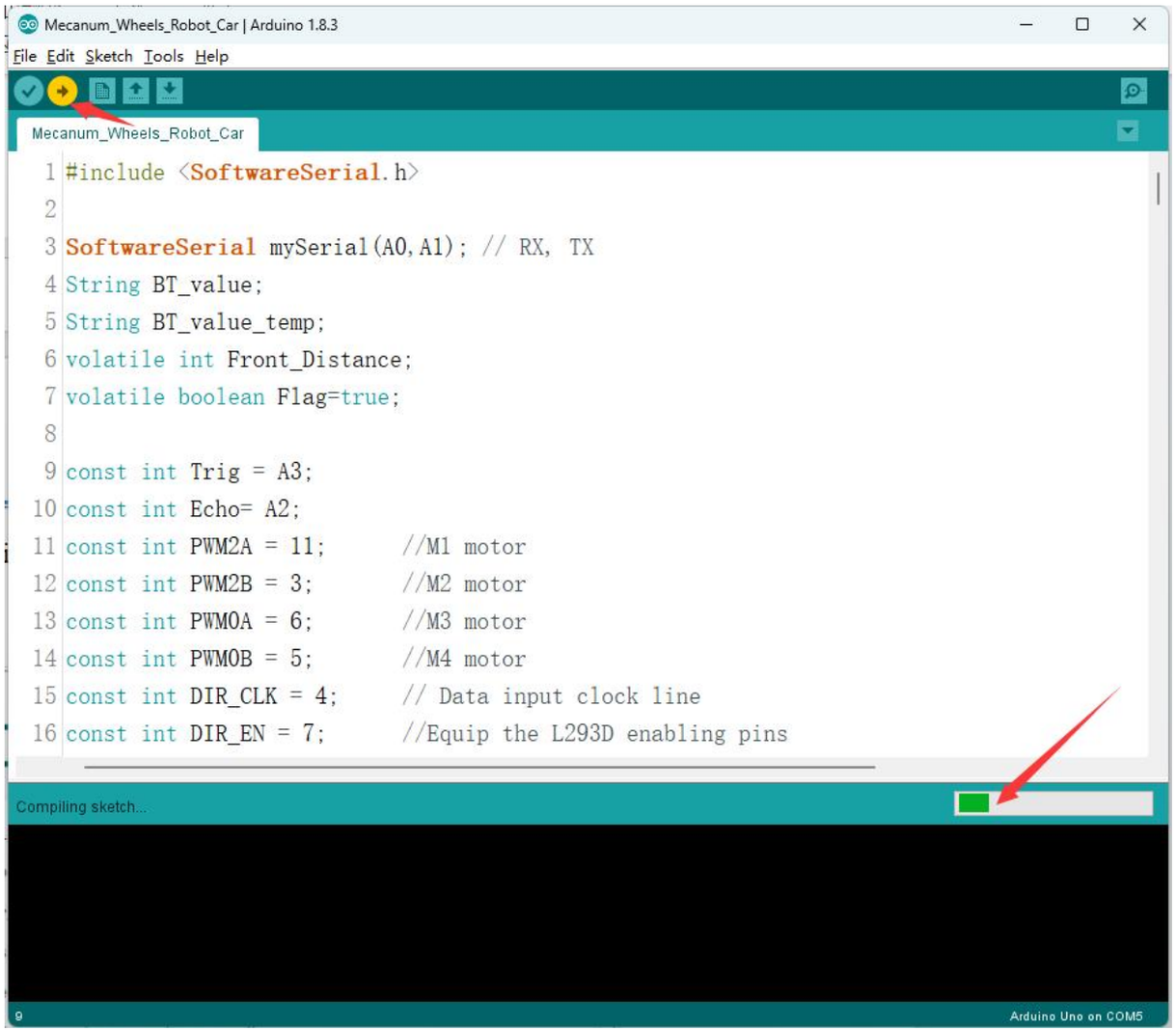
③Select your Board in **Tools >Arduino Uno**



④Select the Port (if you don’t see the COM Port in your Arduino IDE, you need to Install the Arduino UNO Drivers)

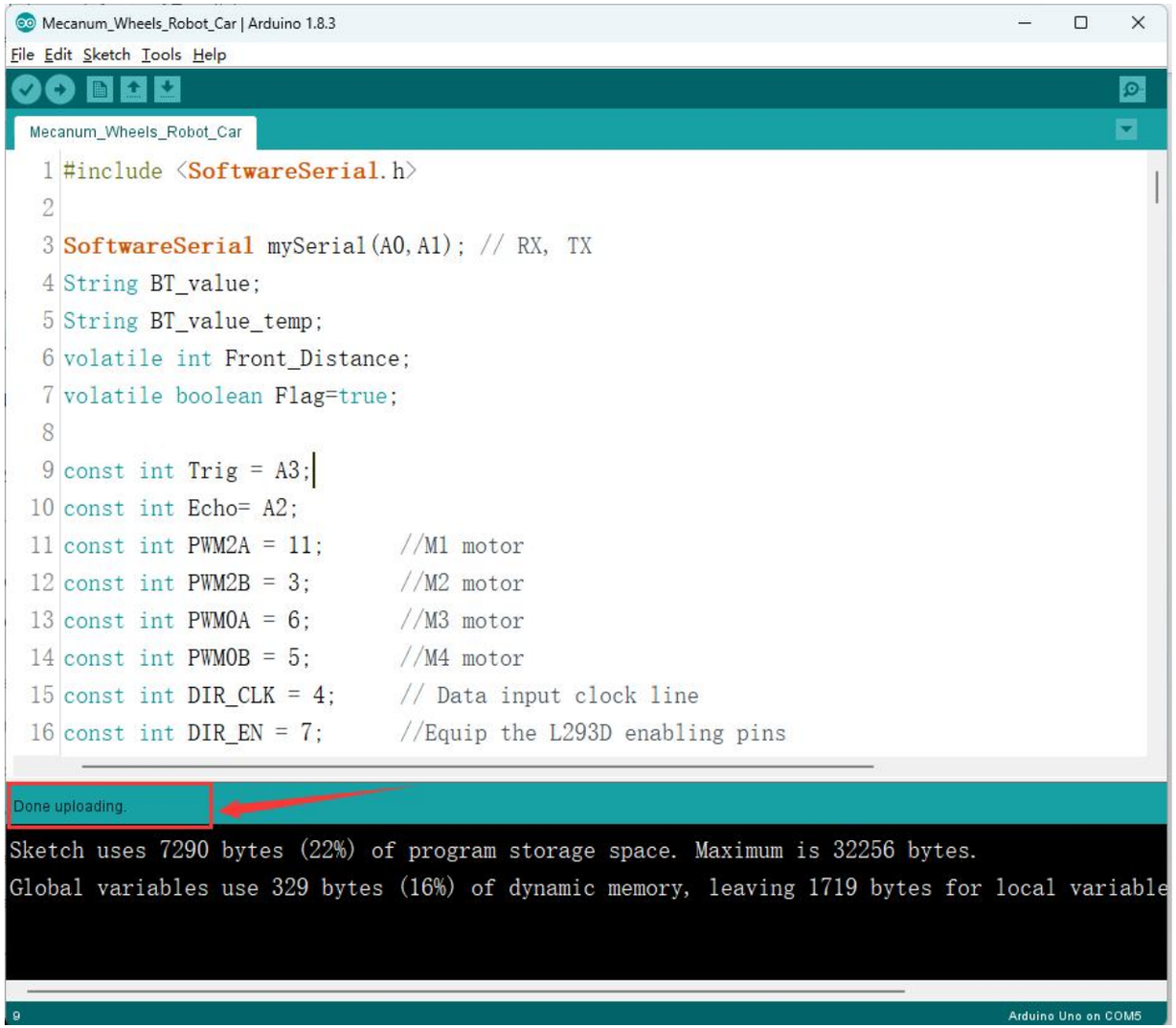


⑤Click the **Upload** button in the Arduino IDE. Wait a few seconds while the code compiles and uploads to your board.



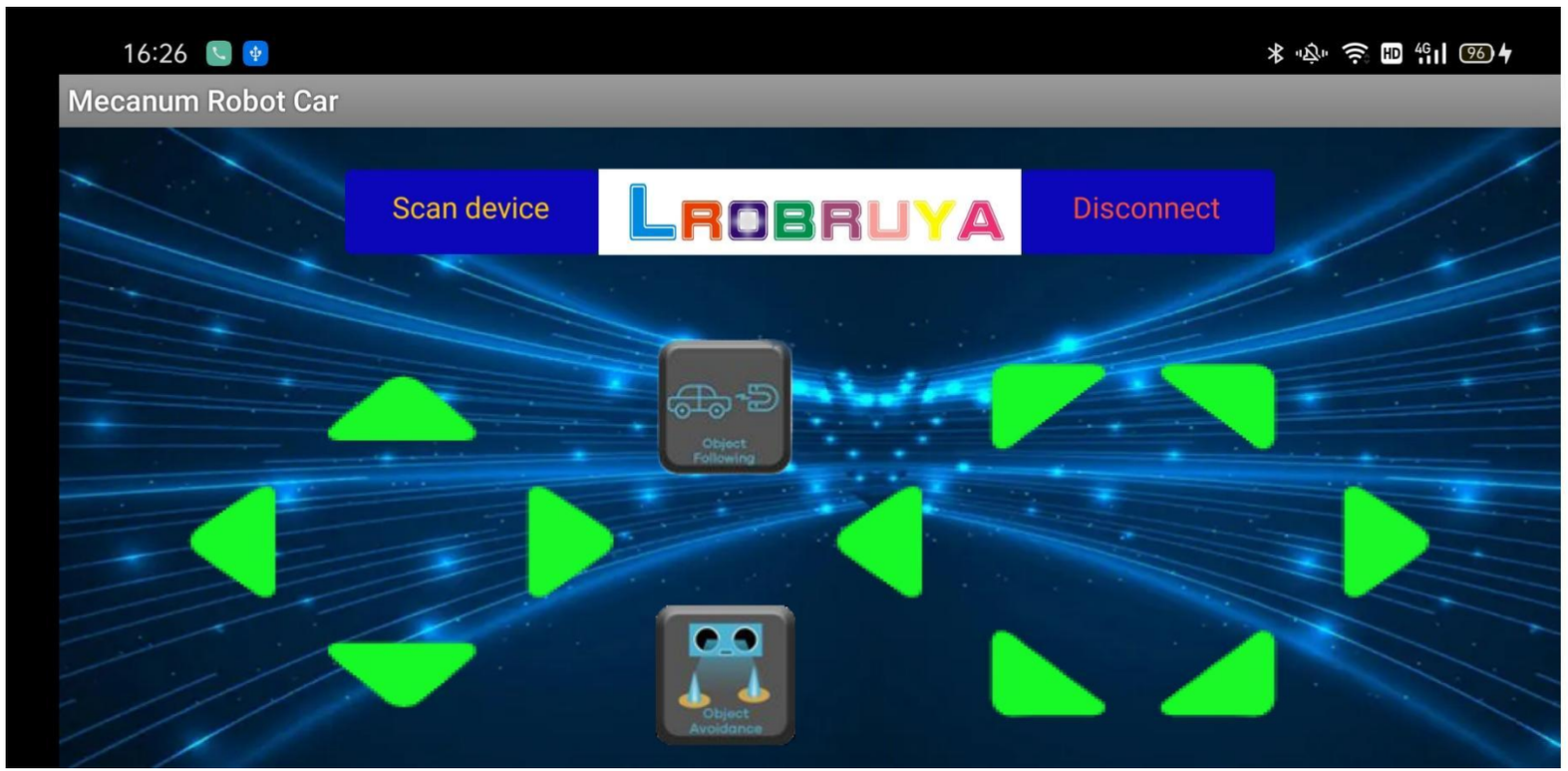
If everything went as expected, you should see a "**Done uploading**." message.If the Arduino IDE reports errors maybe you missed some steps. Arduino getting started guide is as follows

Upload a sketch in Arduino IDE Errors when uploading a sketch Getting Started with Arduino products

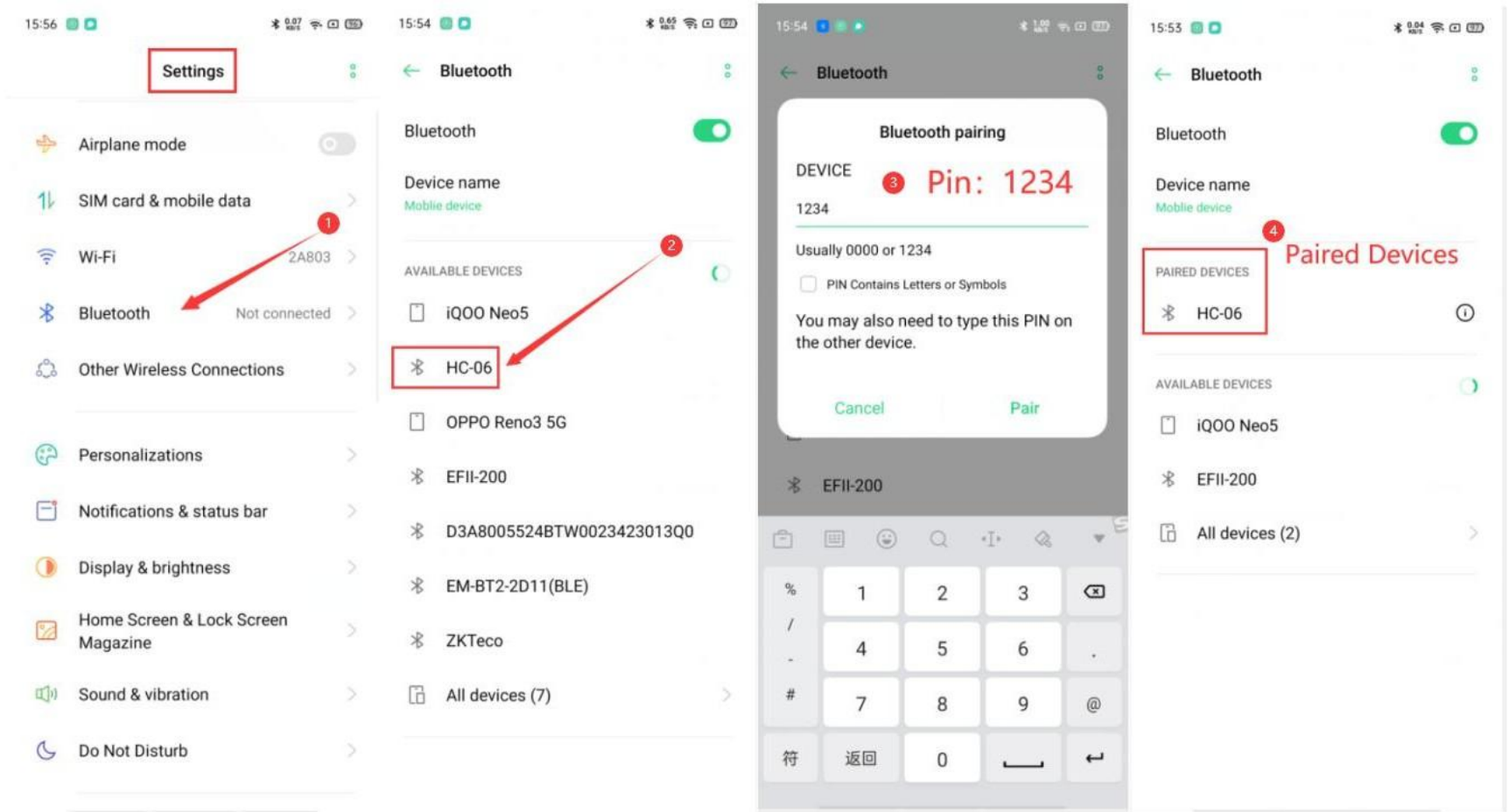


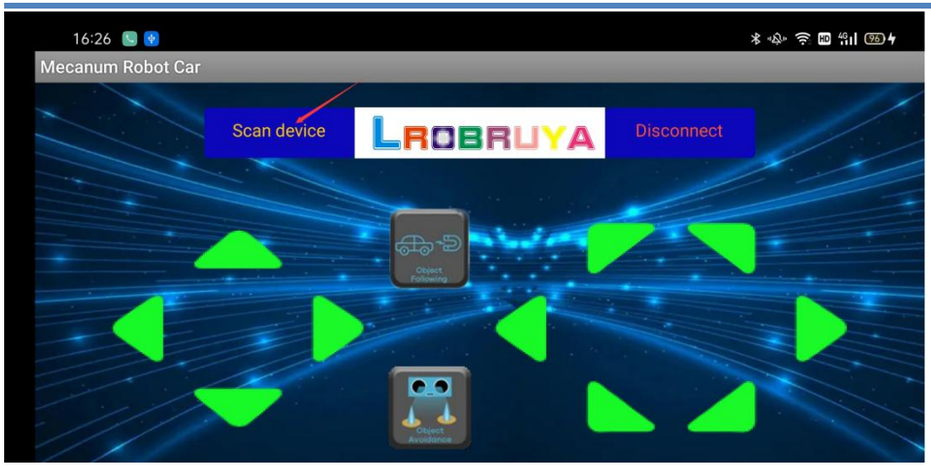
◆ Step 6:APP Connects to the Bluetooth Module

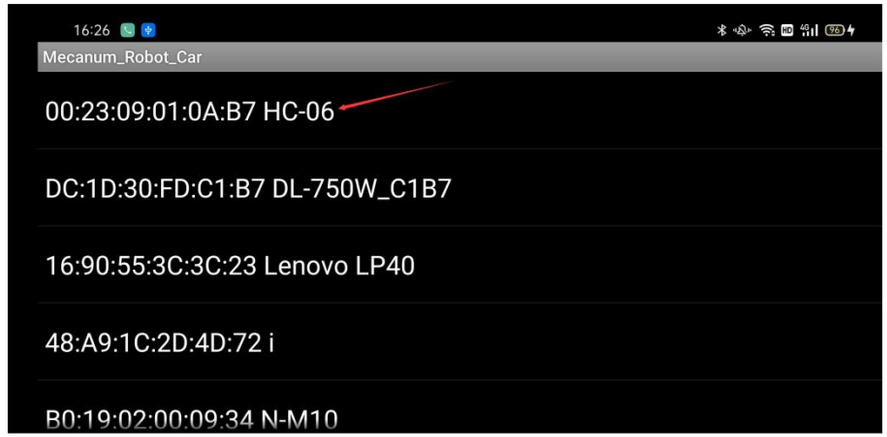
①Install the .apk file to your phone(Only supports Android system)

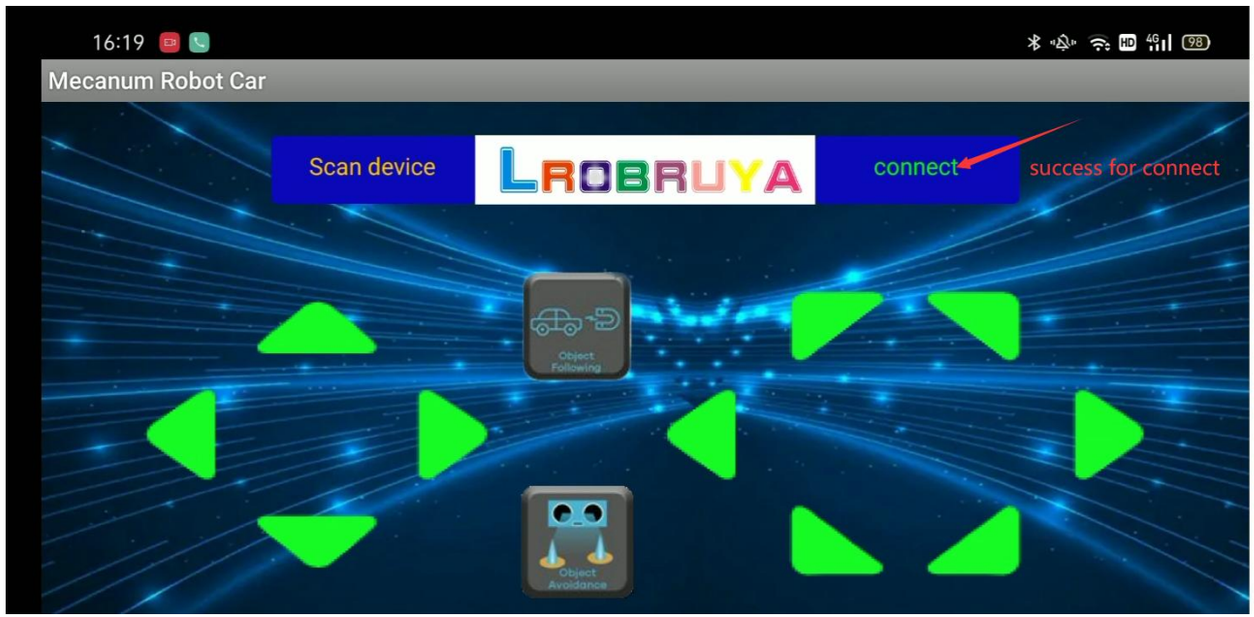


②Turn on Bluetooth on your phone and pair it



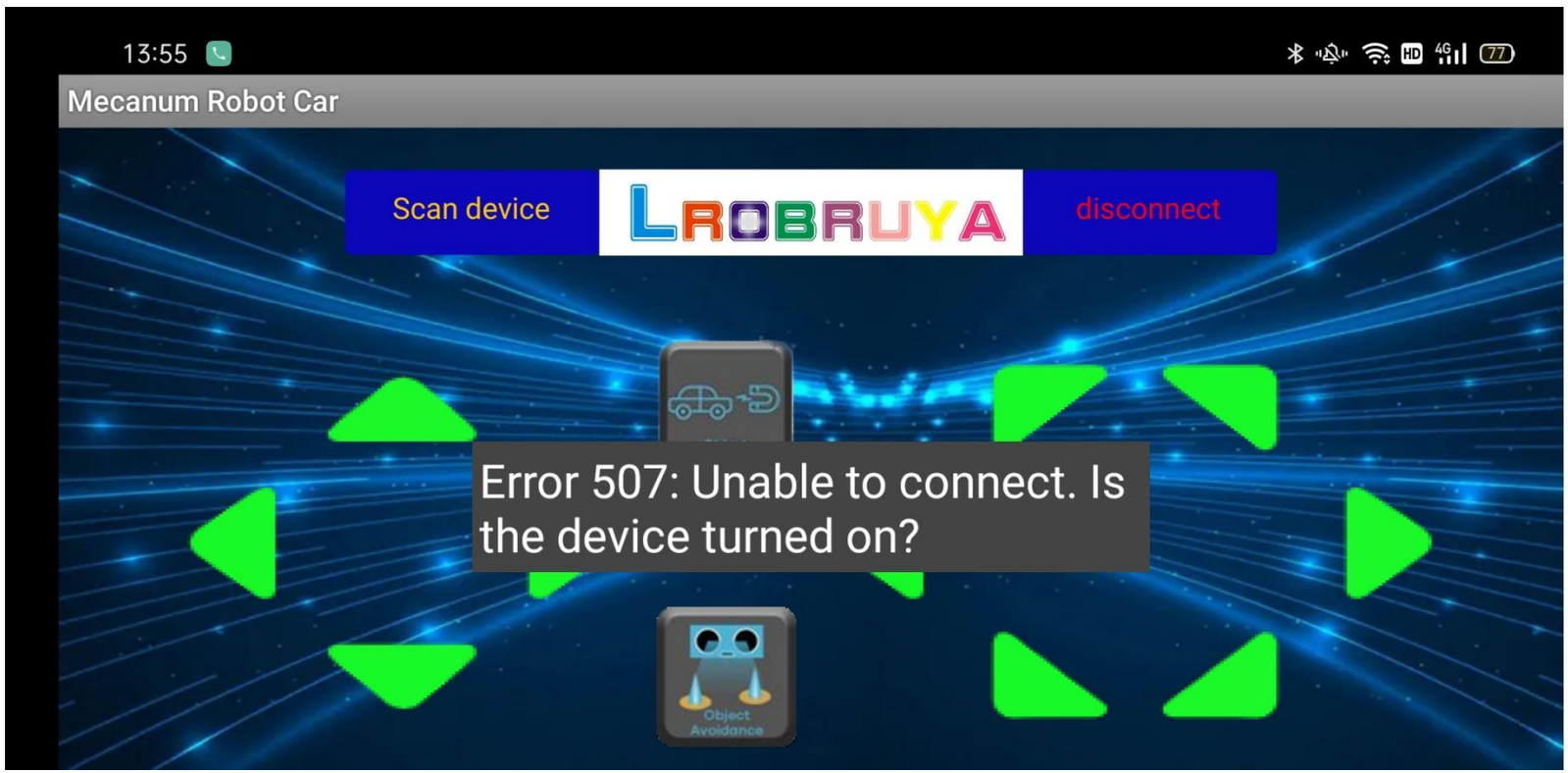

16:26
Mecanum Robot Car
Scan device
LROBRUYA
Disconnect
Object Following
Object Avoidance


16:26
Mecanum_Robot_Car
00:23:09:01:0A:B7 HC-06
DC:1D:30:FD:C1:B7 DL-750W_C1B7
16:90:55:3C:3C:23 Lenovo LP40
48:A9:1C:2D:4D:72 i
B0:19:02:00:09:34 N-M10


16:19
Mecanum Robot Car
Scan device
LROBRUYA
connect
success for connect
Object Following
Object Avoidance

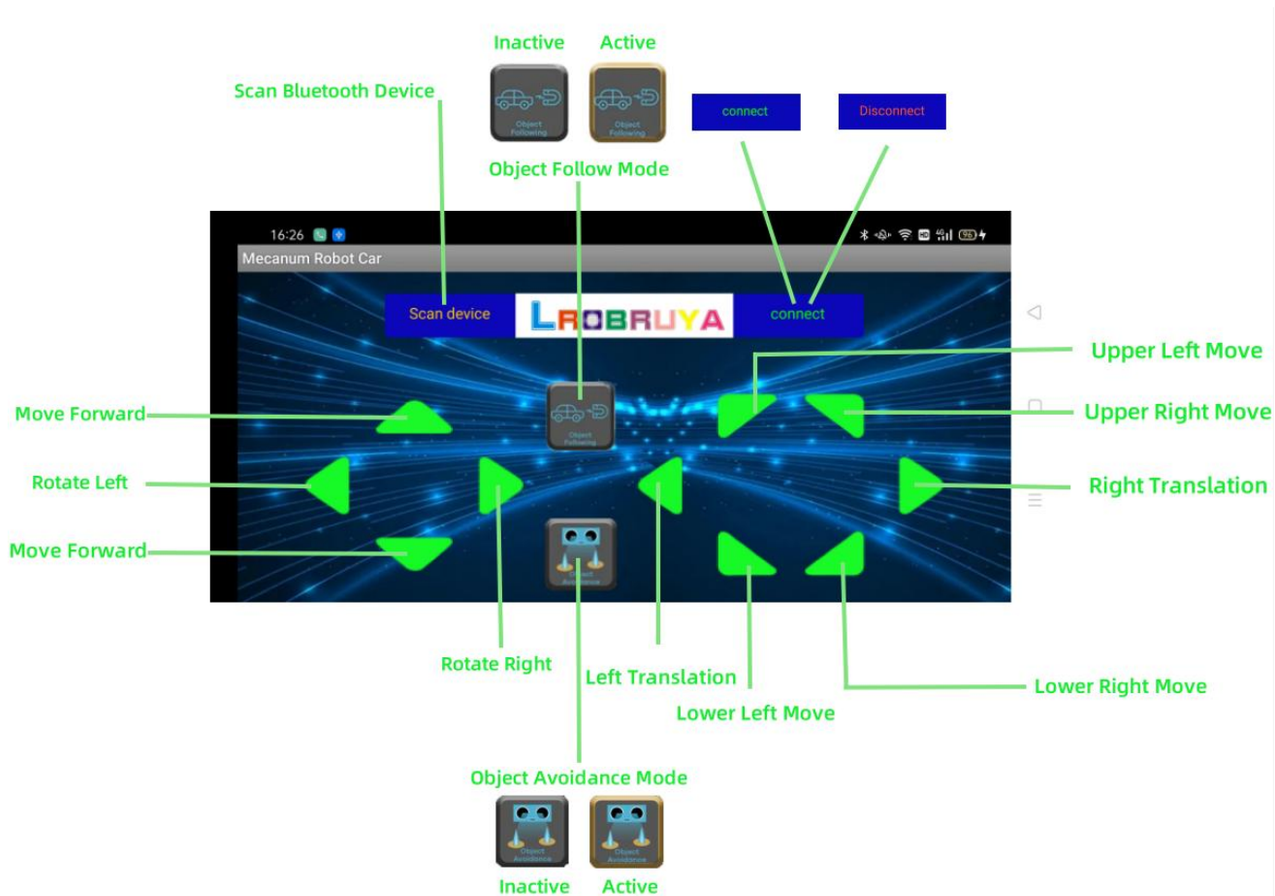
Tip:If it reports Error 507: Unable to connect.Is the device turned on?

The possible reason is that you have selected the wrong bluetooth device, or the HC-06 is not in available status. Try restarting the power supply, when the HC-06 module's onboard LED light flashes rapidly (Available status).Repeat the above steps.



◆ Step 7:APP Remote Control Multi-function Mode

- ➢ Direction Control Mode
- ➢ Object Avoidance Mode
- ➢ Object Follow Mode



The robot car is not moving? There may be the following reasons:

① It must be powered by batteries with a voltage >7.4V. Turn on the battery power switch.Only 5V USB power supply cannot drive the motor. Due to air transportation, the battery may not be included in the kit, you need to buy the battery yourself.

② The code upload failed or an incorrect code was uploaded

If none of the above is the case, it may be a fault with the L293D Motor Control Shield. You can upload test codes to detect whether the motor drive circuit is faulty.

The motor is running, but the robot car is moving in the wrong direction?

①The connection interface of the motor is wrong. Pay attention to the installation orientation of motors M1, M2, M3 and M4.

②The wiring of the motor is wrong. Pay attention to identify the red wire and black wire.

➢ Object Follow Mode

The car will enter the object-following mode when pressing key  of the APP remote control. If there are obstacles in the 20 CM ahead of the Ultrasonic Sensor Module, the car will automatically move following the obstacle.When pressing the key  of the APP remote control or other keys,it will exit the object-avoidance mode.

➢ Object Avoidance Mode

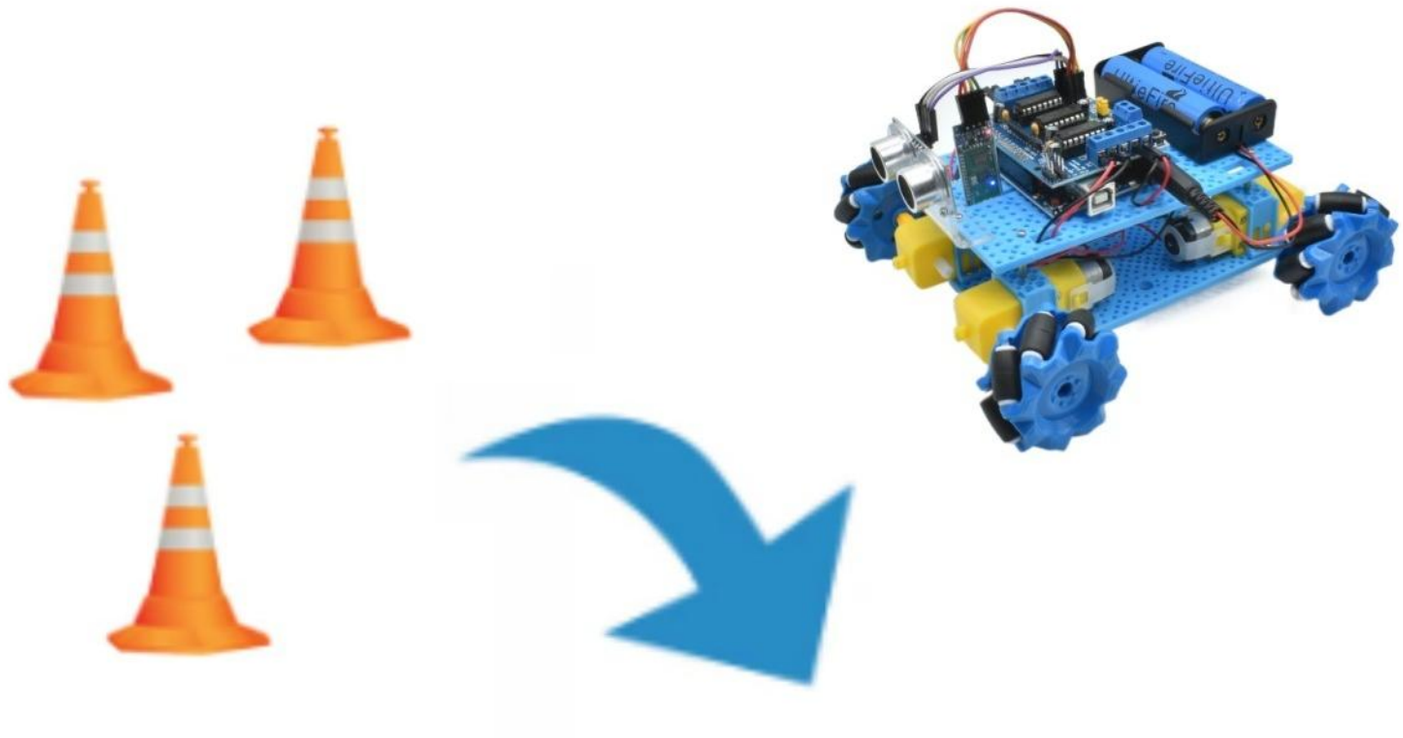
The car will enter the object-avoidance mode when pressing  key of the APP remote control.The car will move forward automatically until encountering obstacles.And it will automatically turn to the direction without obstacles to continue moving forwards when encountering obstacles.When pressing the  key of the APP remote control or other keys,it will exit the object-avoidance mode.

Tip:

①It is recommended that the height of the obstacle is greater than 15cm. If the height of the obstacles is too small, it may not be accurately monitored by the ultrasonic sensor.

②Can't work correctly? Try to restart the battery power.Or test the ultrasonic sensor module separately.

Avoidance



L293D Motor Control Shield for Arduino

This shield is based on the L293D IC and can drive 4 bi-directional DC motors , 2 stepper motors and 2 servo motors. It is mainly compatible with the Arduino UNO and MEGA boards.

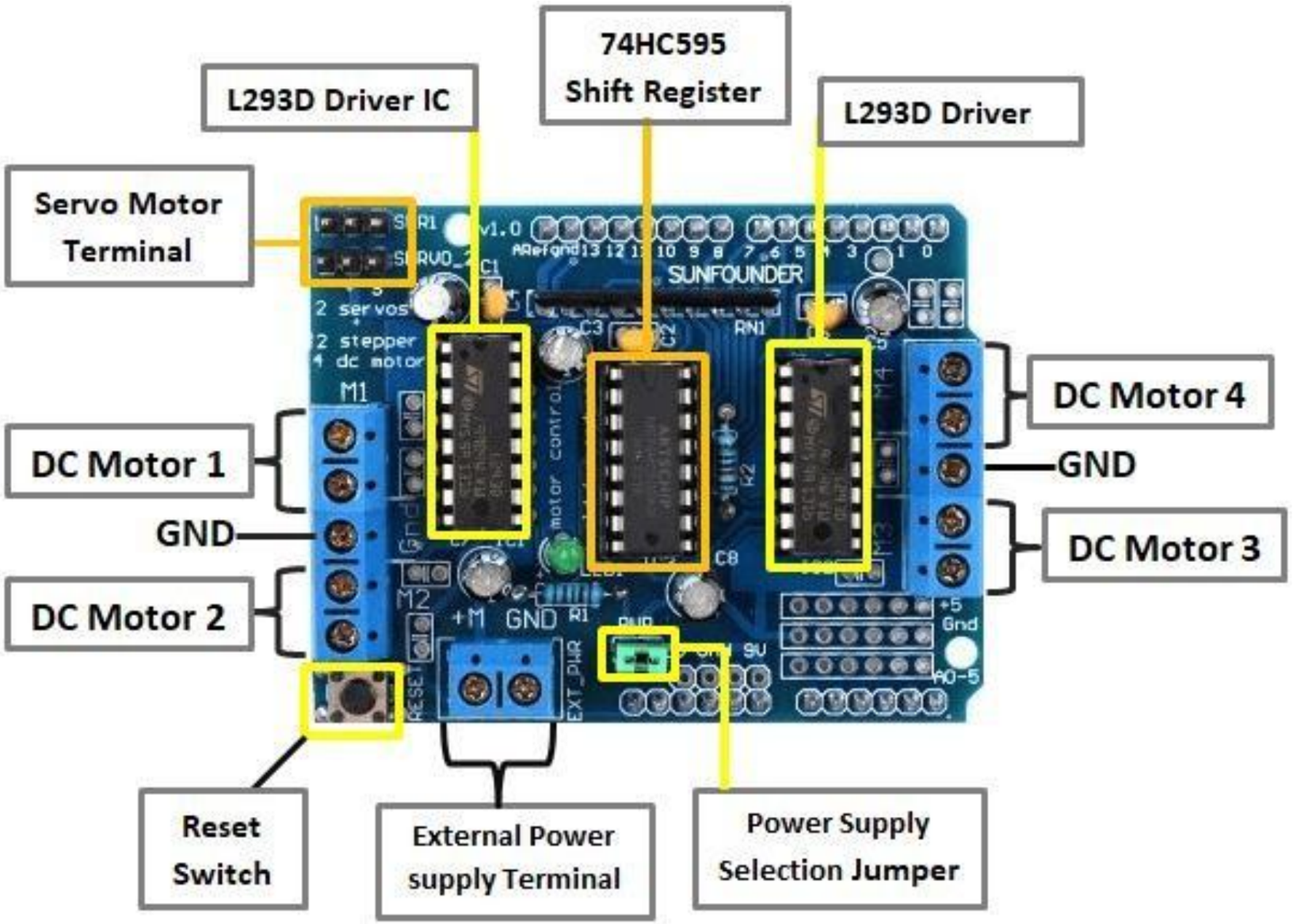
Take note that each channel of this module has the maximum current of 1.2A and doesn't work if the voltage is more than 25v or less than 4.5v.

The L293D is a dual-channel H-Bridge motor driver capable of driving a pair of DC motors or single stepper motor. This shield offers total four H-Bridges and each H-bridge can deliver up to 0.6A to the motor.

The shield also comes with a 74HC595 shift register that extends 4 digital pins of the Arduino to the 8 direction control pins of two L293D chips.

More about : "74HC595 shift register" controls the rotation direction of four motors

Pinout


74HC595
Shift Register
L293D Driver IC
L293D Driver
Servo Motor
Terminal
DC Motor 4
GND
DC Motor 1
GND
DC Motor 3
DC Motor 2
Reset
Switch
External Power
supply Terminal
Power Supply
Selection Jumper
SUNFOUNDER
2 servos
2 stepper
4 dc motor
M1
M2
M3
M4
+M
GND
+5
Gnd
A0-5
EXT_PWR
RESET
PWR
SV

①The on-board LED indicates that the motor power supply is working properly. The motors will not run if it is not lit.

②The RESET button is nothing but Arduino's reset button. It has been brought to the top for easy access.

③Six analog pins (A0 to A5), as well as 5V and ground connections, are provided in the bottom right corner. You can populate these with headers, making them useful for connecting various sensors.

④For DC and stepper motor control, the shield makes use of pins D3, D4, D5, D6, D7, D8, D11, and D12.

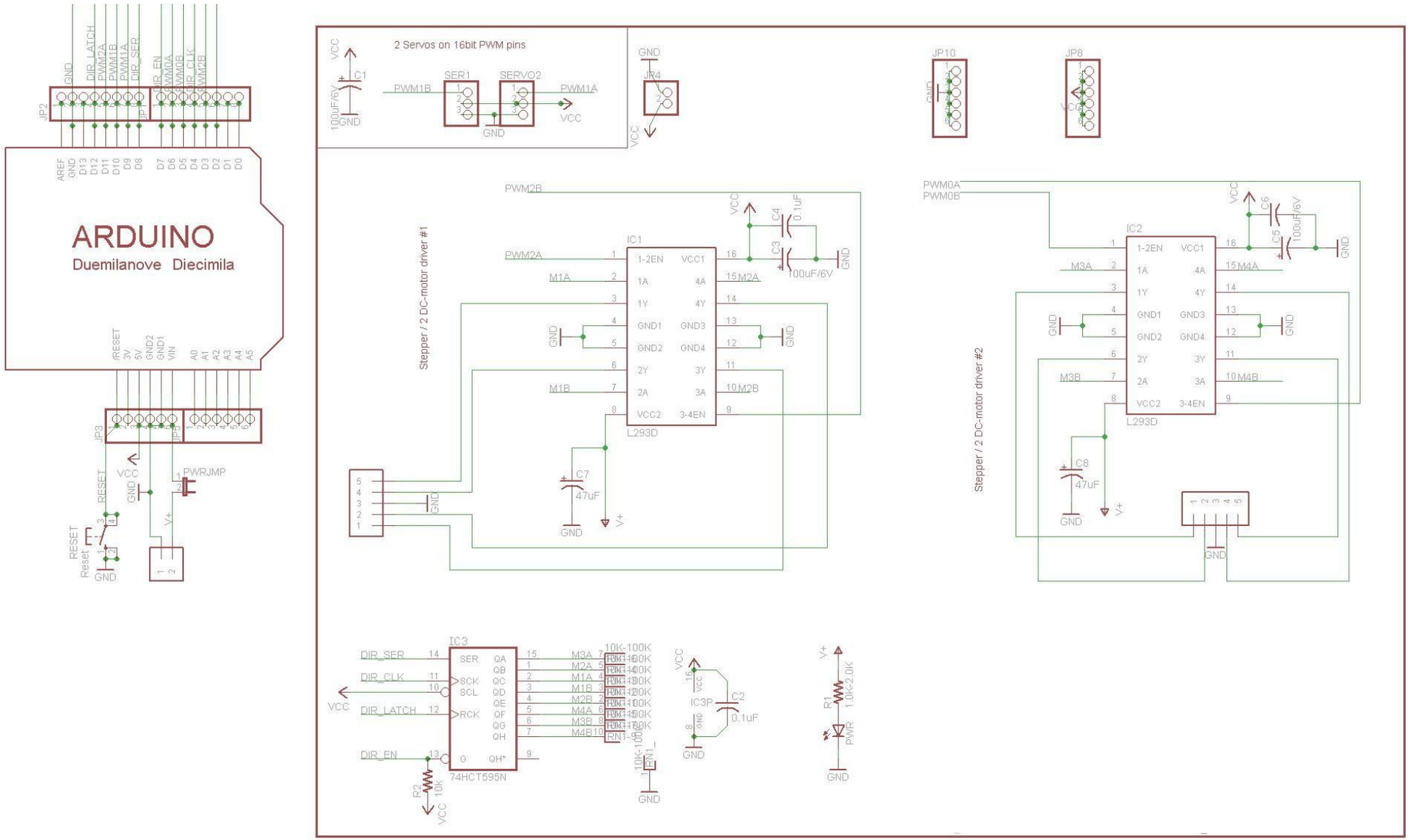
⑤D9 and D10 are used to control the servo motors. D10 is connected to Servo 1, while D9 is connected to Servo 2.

⑥Please note that the shield does not use the D2 or D13 pins.

Define PWM pins and chip pins

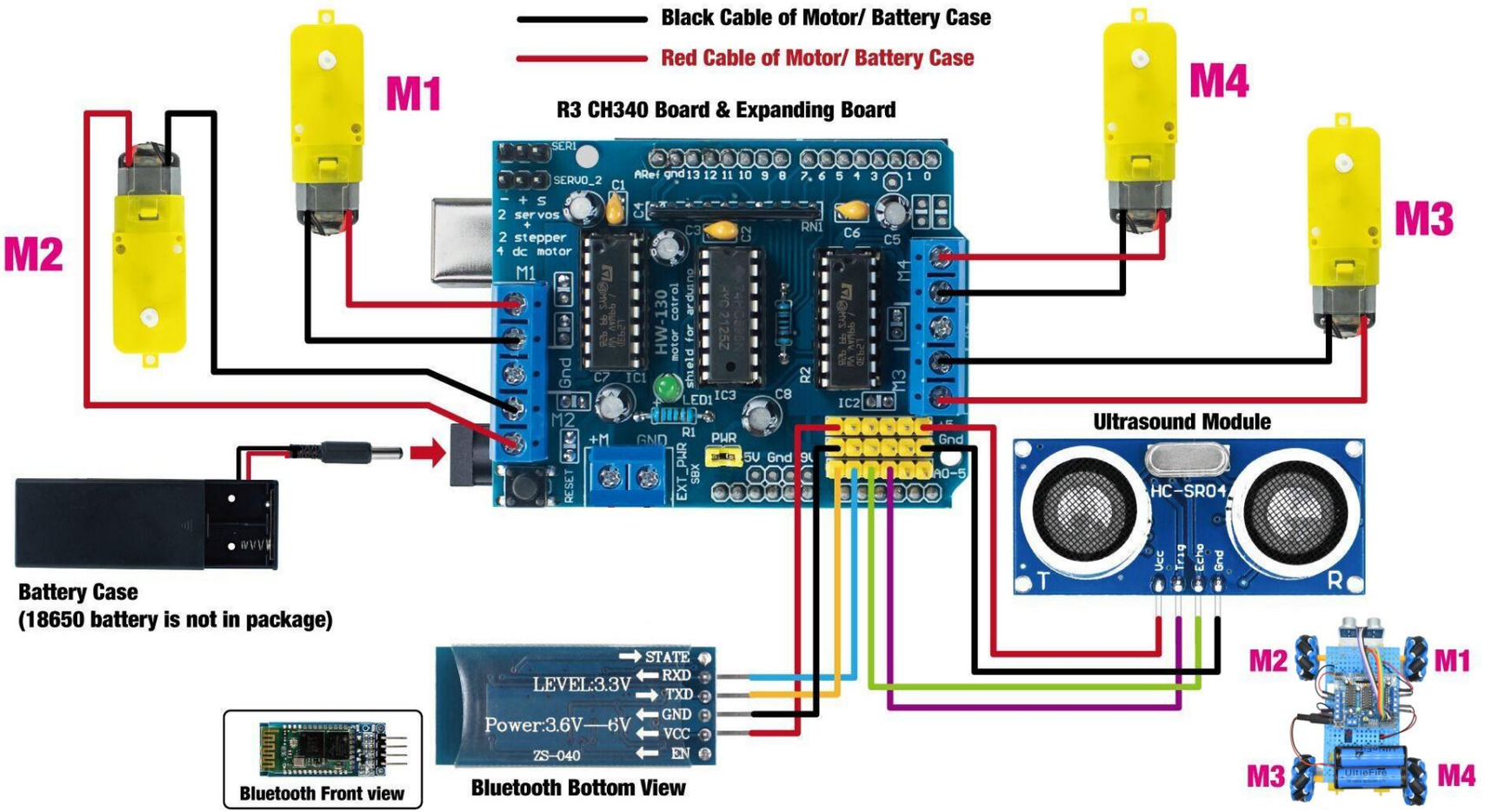
```
const int PWM2A = 11;    //M1 motor PWM signal pin
const int PWM2B = 3;     //M2 motor PWM signal pin
const int PWM0A = 6;     //M3 motor PWM signal pin
const int PWM0B = 5;     //M4 motor PWM signal pin
const int DIR_CLK = 4;    // Data input clock line
const int DIR_EN = 7;    //Equip the L293D enabling pins
const int DATA = 8;       // USB cable
const int DIR_LATCH = 12;  // Output memory latch clock
```

L293D Motor Control Shield Schematic diagram



L293D Motor Control Shield Test Code

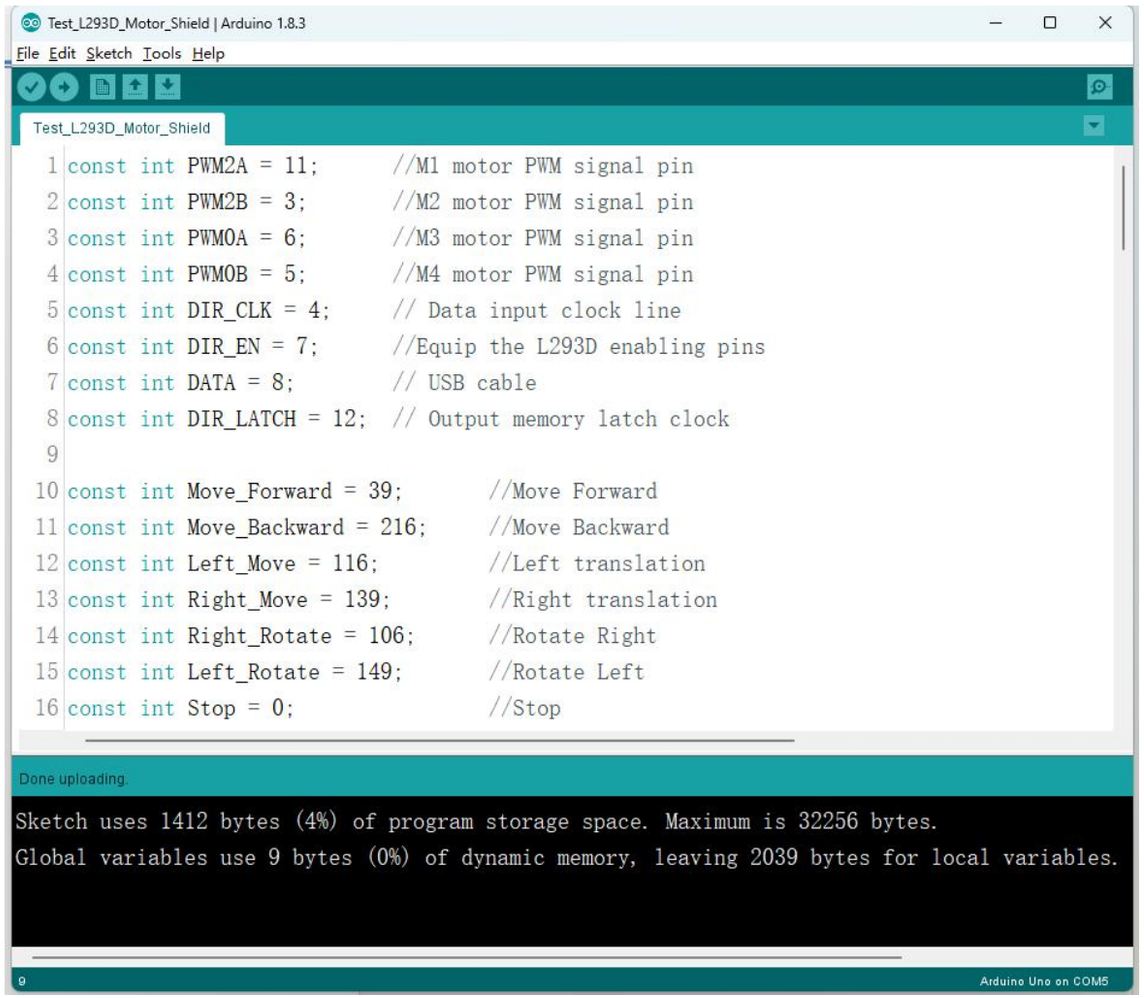
① Wring



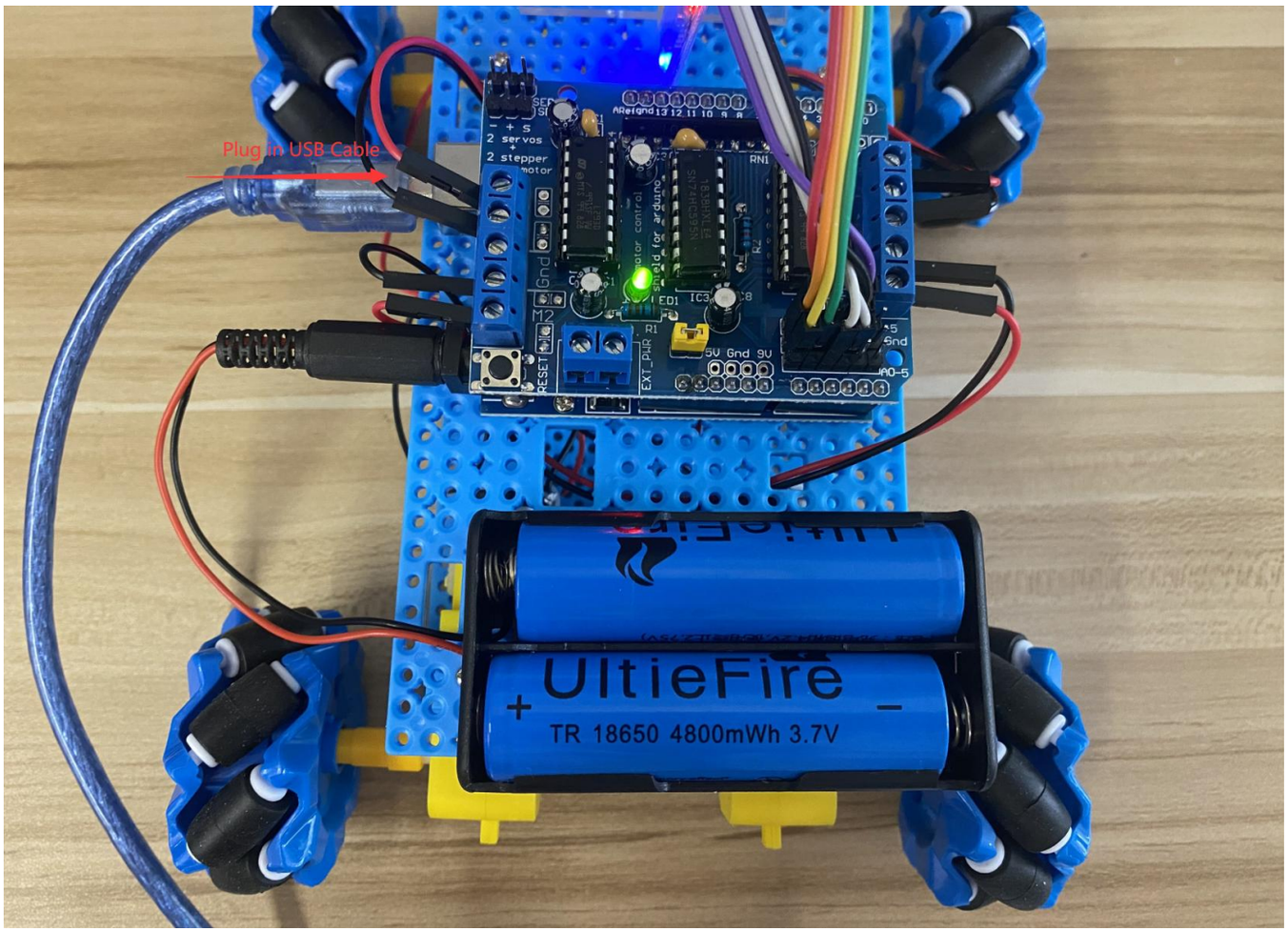
② Open Test Code

Start Arduino IDE, open the code in

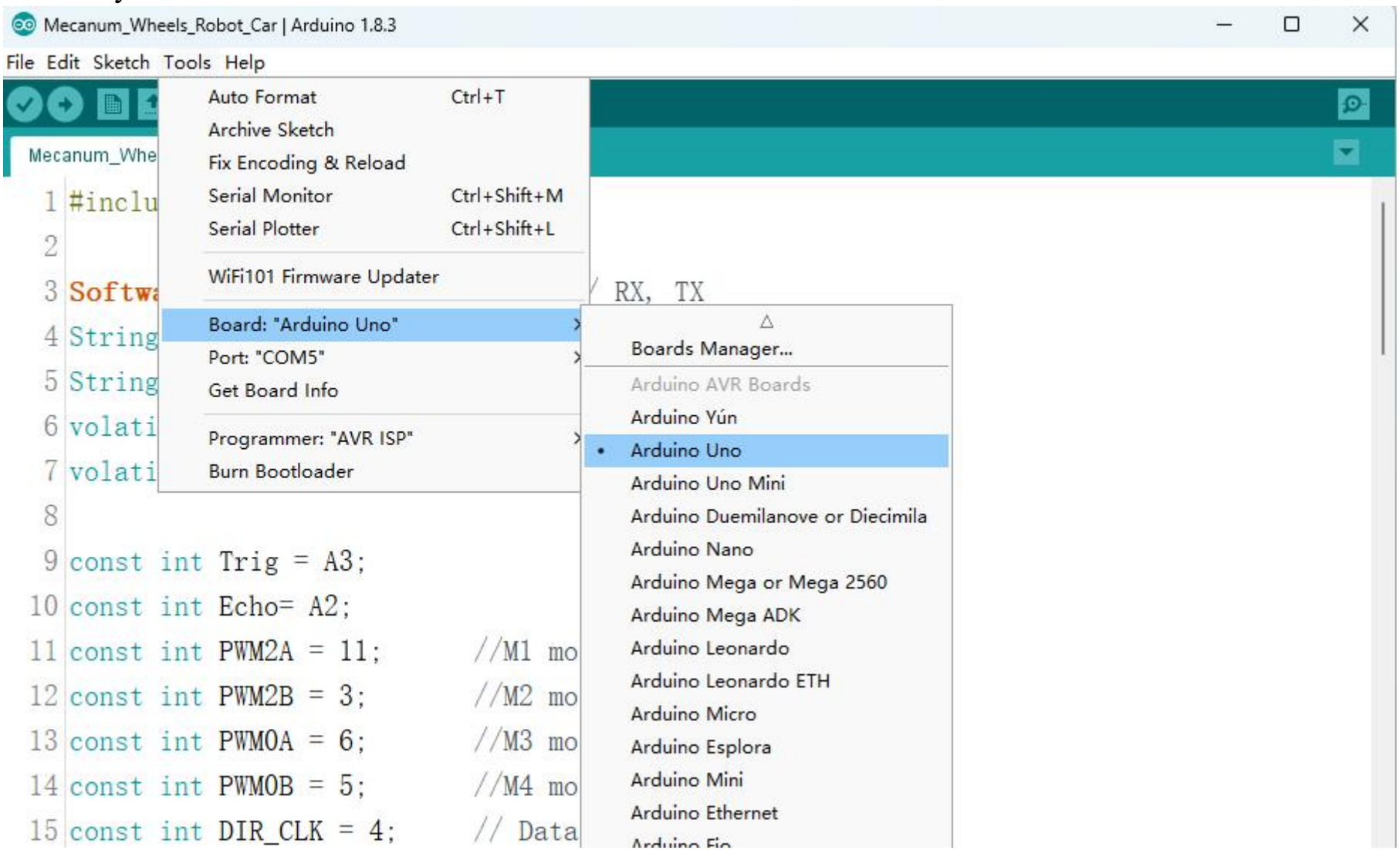
File->Open...->Mecanum Wheels Robot Car Kit->Test Code->Test_L293D_Motor_Shield.ino



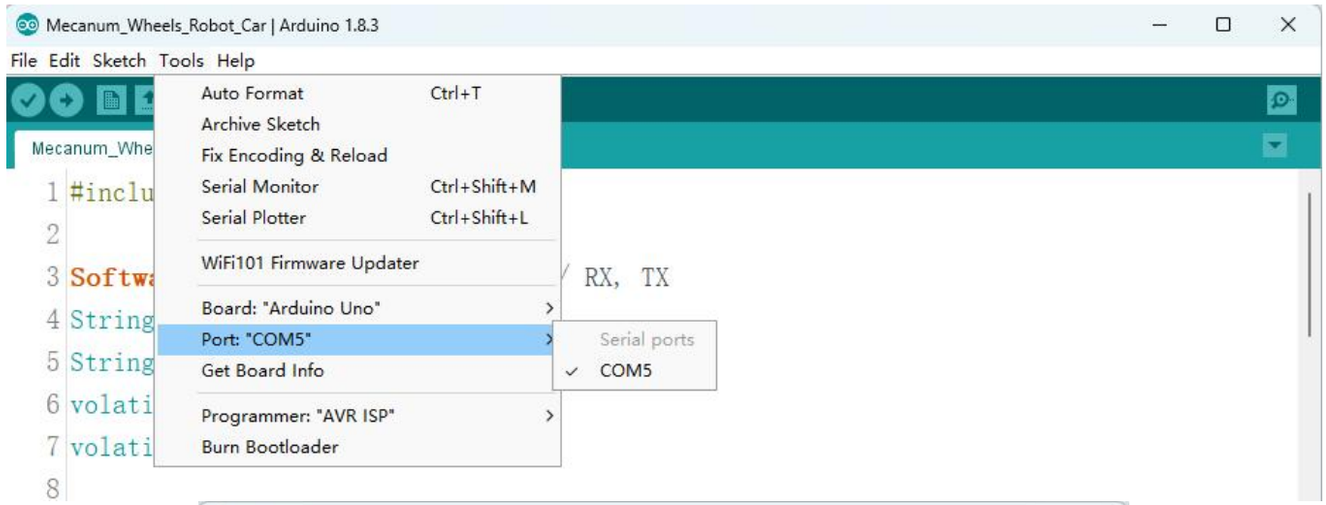
③Use USB cable to connect the Arduino UNO board to the computer.(It may be that the power supply of the USB interface of the computer is insufficient, you can turn on the power switch of the robot car at the same time.)

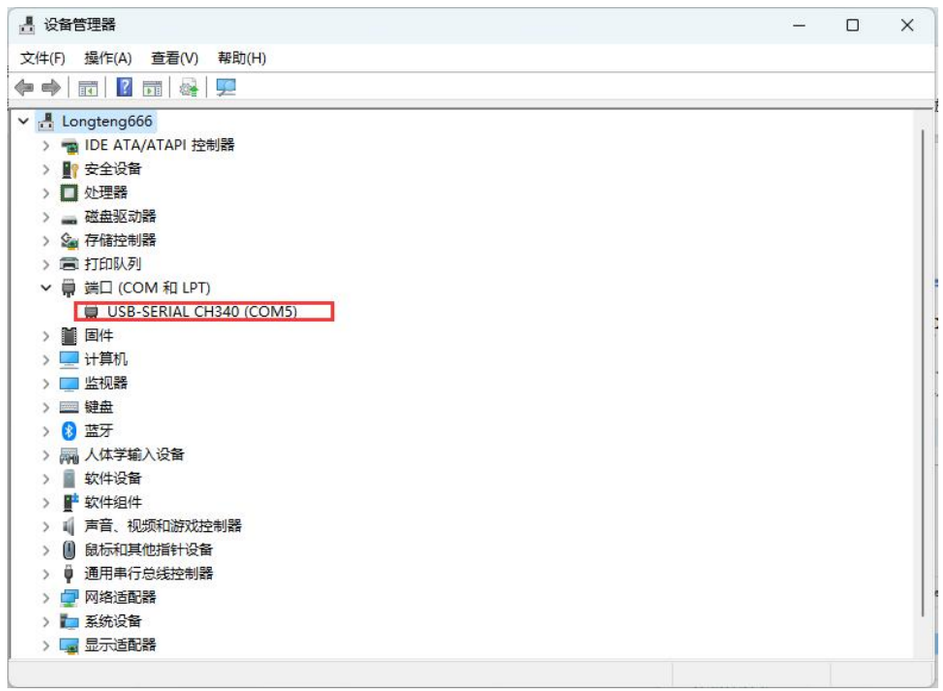


④Select your Board in **Tools > Arduino Uno**

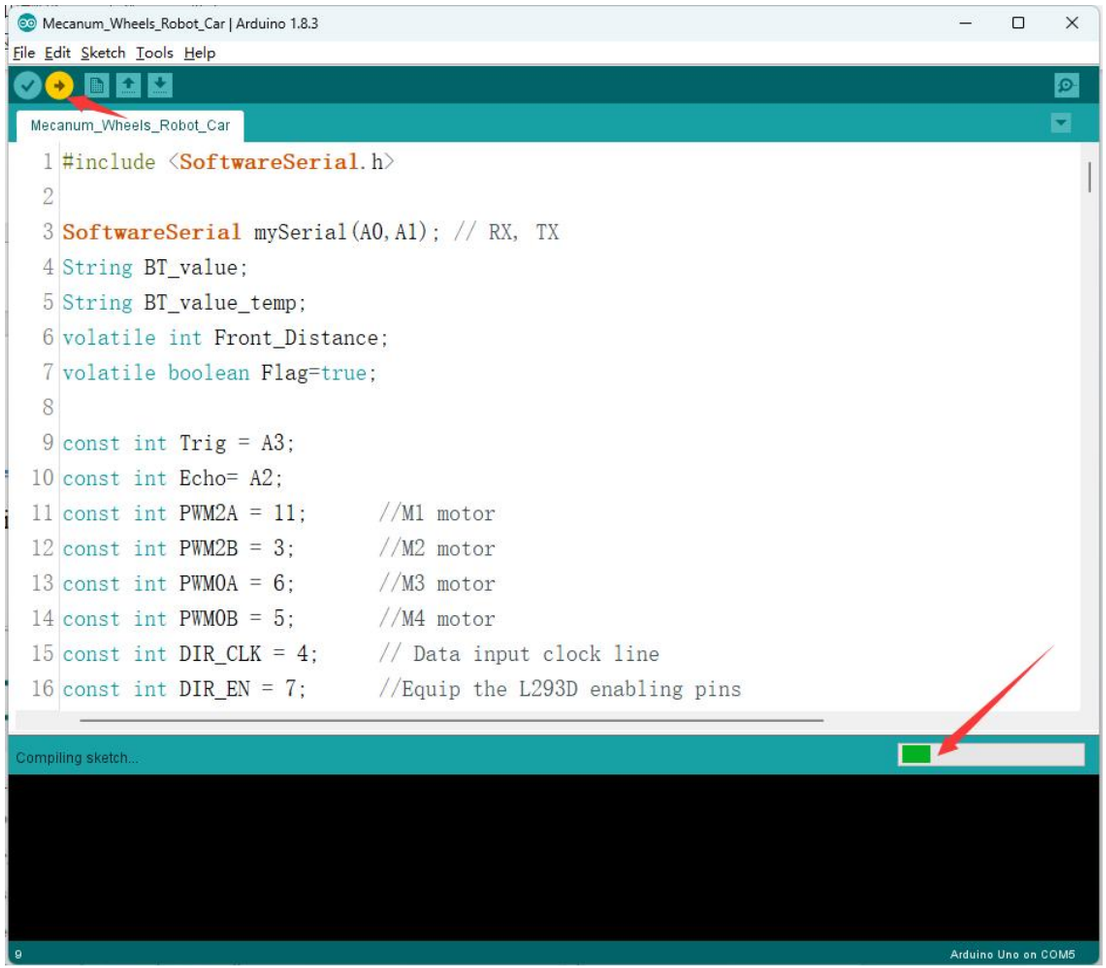


⑤Select the Port (if you don’t see the COM Port in your Arduino IDE, you need to Install the Arduino UNO Drivers)





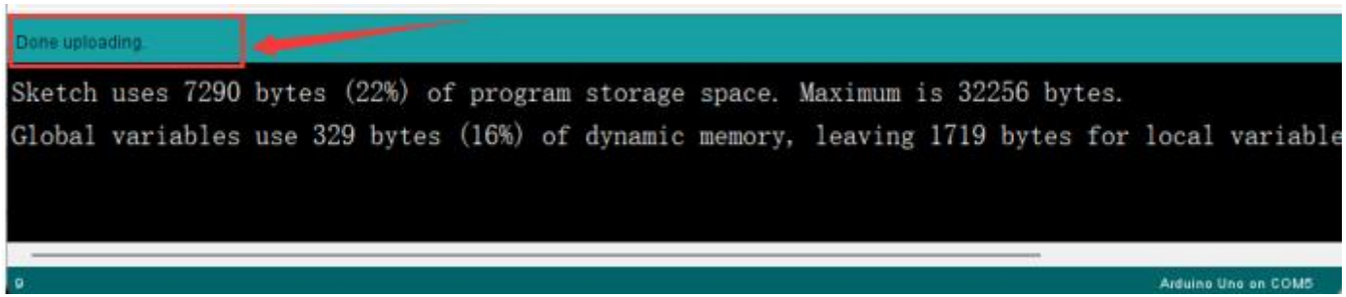
⑥Click the **Upload** button in the Arduino IDE. Wait a few seconds while the code compiles and uploads to your board.



If the Arduino IDE reports errors maybe you missed some steps. Arduino getting started guide is as follows

Upload a sketch in Arduino IDE Errors when uploading a sketch Getting Started with Arduino products

If everything went as expected, you should see a "**Done uploading**." message.



The robot car will rotate right for 2 seconds and left for 2 seconds.

The robot car is not moving? There may be the following reasons:

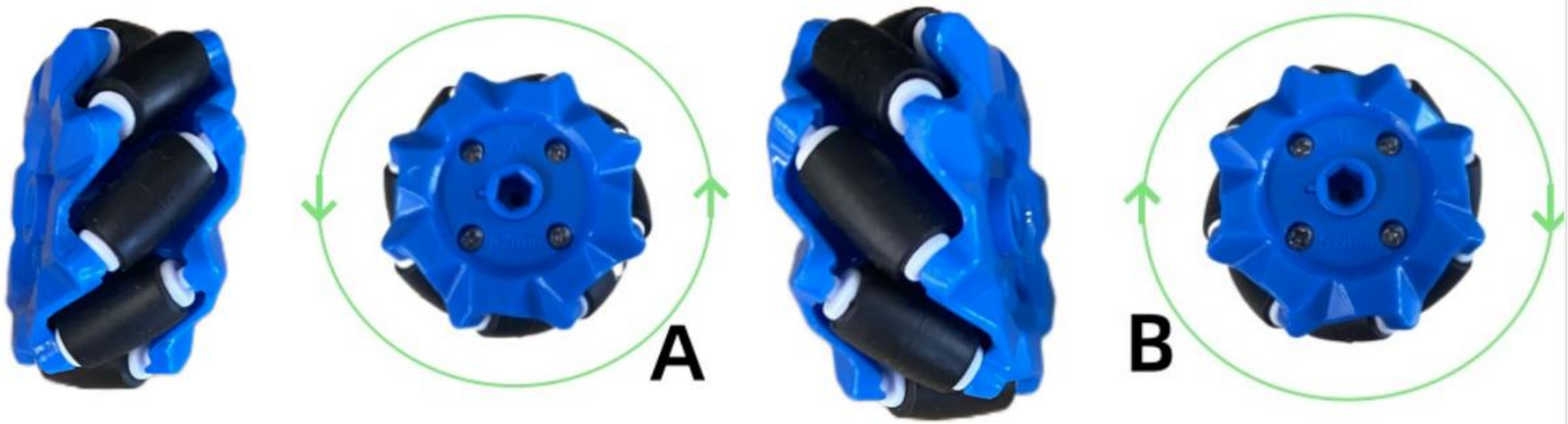
① It must be powered by batteries with a voltage >7.4V. Turn on the battery power switch.Only 5V USB power supply cannot drive the motor.

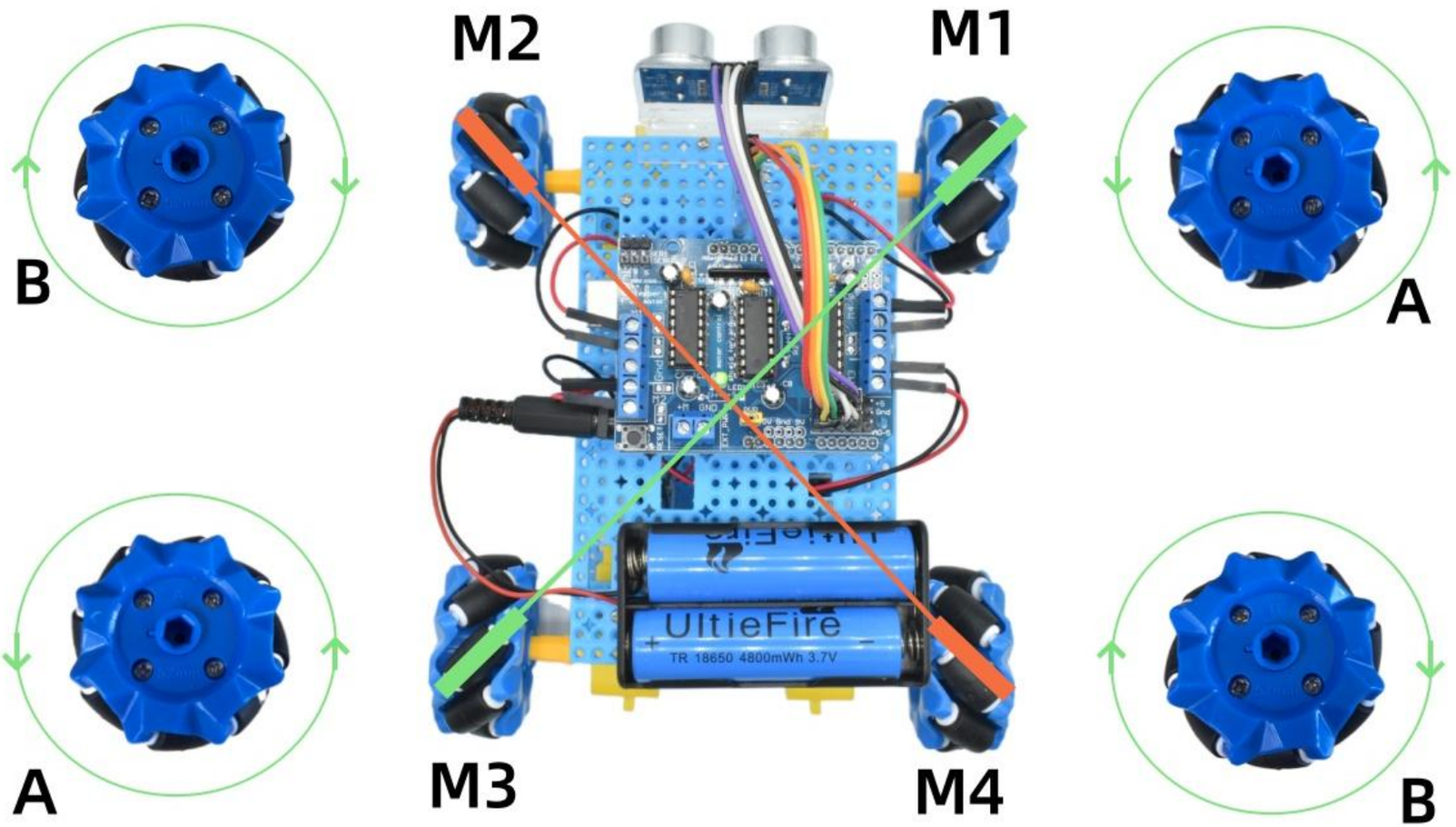
②Motor wiring is loose

③L293D Motor Shield hardware circuit is damaged

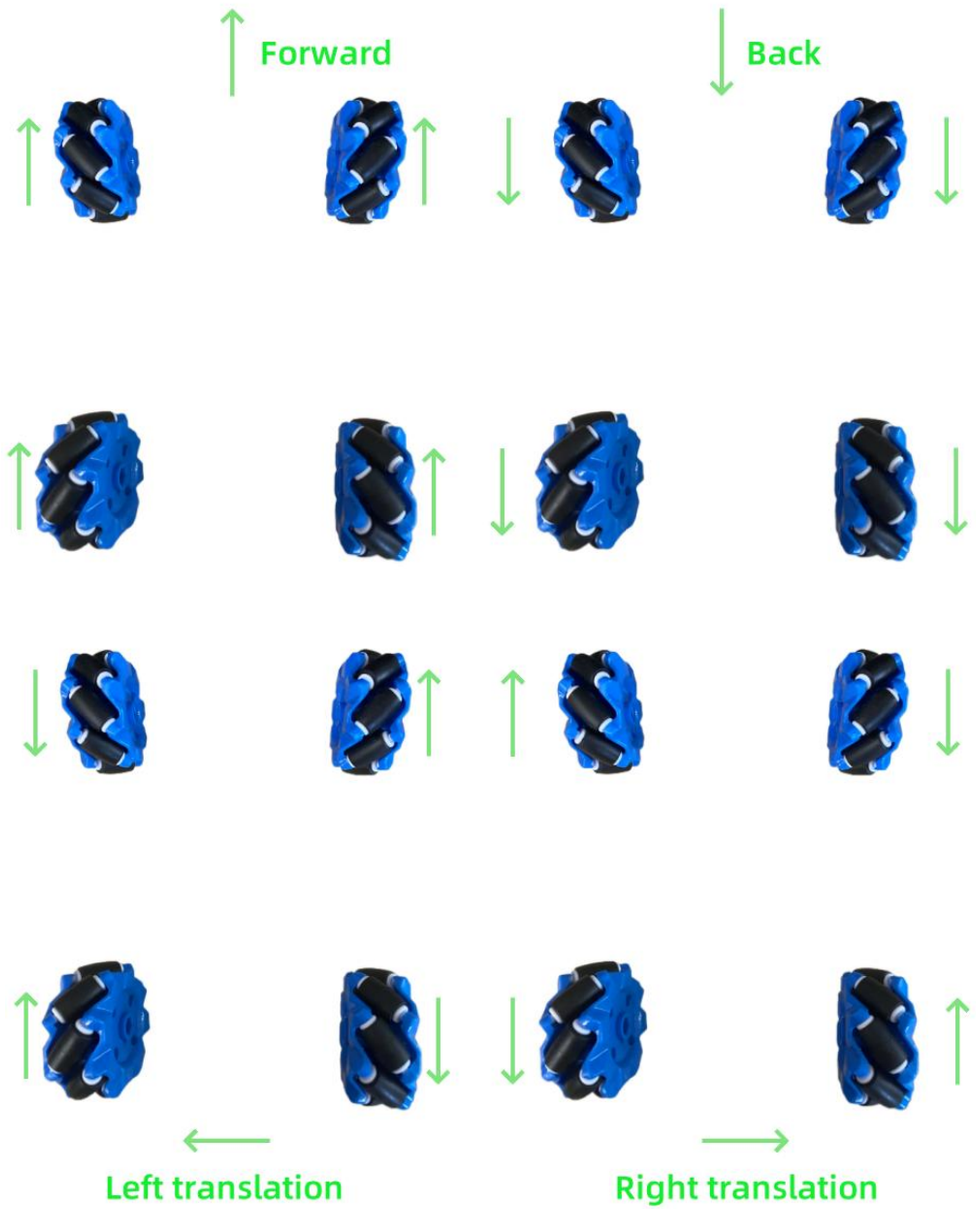
Mecanum Wheel

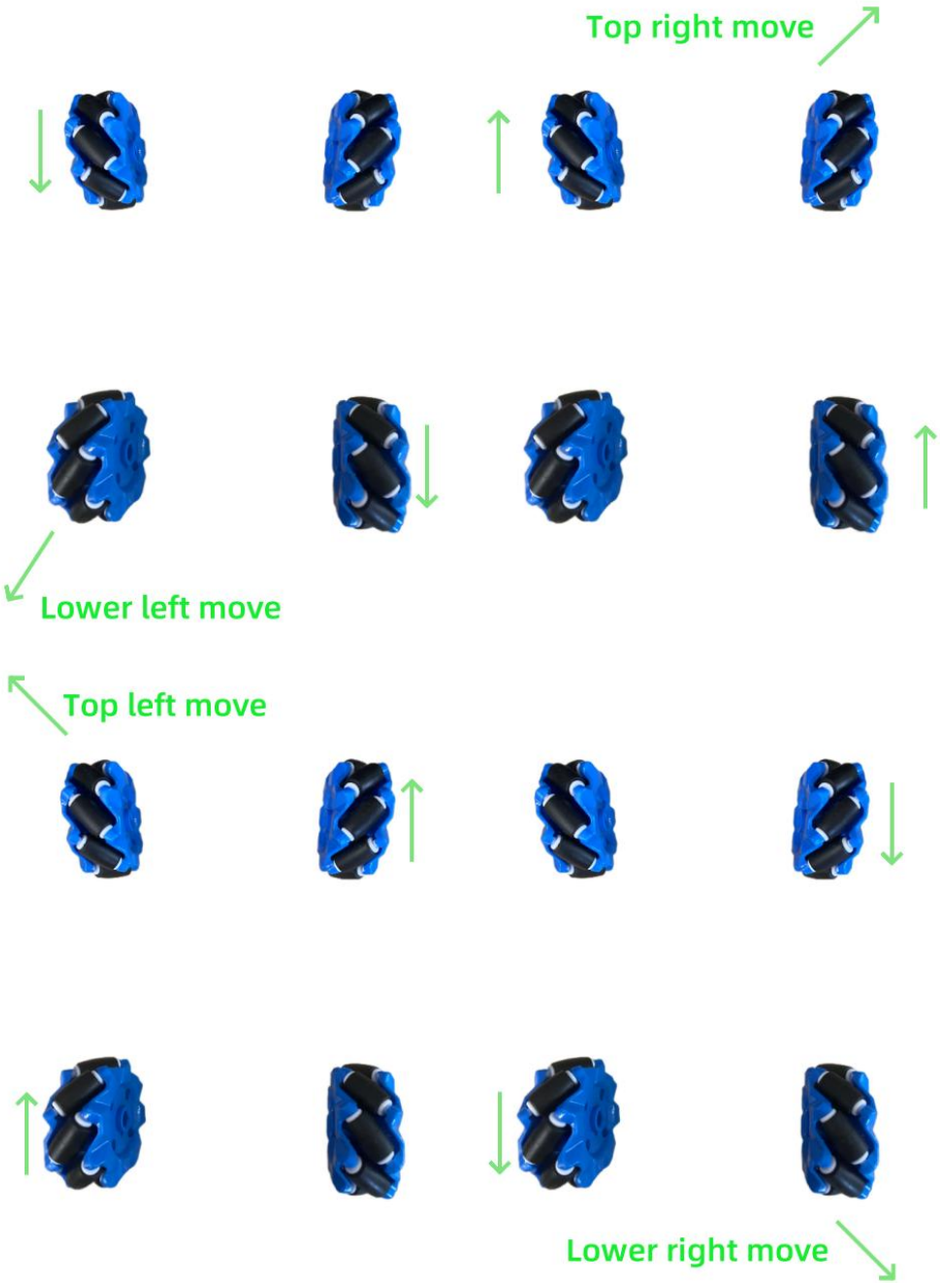
The mecanum wheel is a form of tireless wheel, with a series of rubberized external rollers obliquely attached to the whole c ircumference of its rim. These rollers typically each have an axis of rotation at 45° to the wheel plane and at 45° to the axle l ine. Each Mecanum wheel is an independent non-steering drive wheel with its own powertrain, and when spinning generate s a propelling force perpendicular to the roller axle, which can be vectored into a longitudinal and a transverse component in relation to the vehicle.

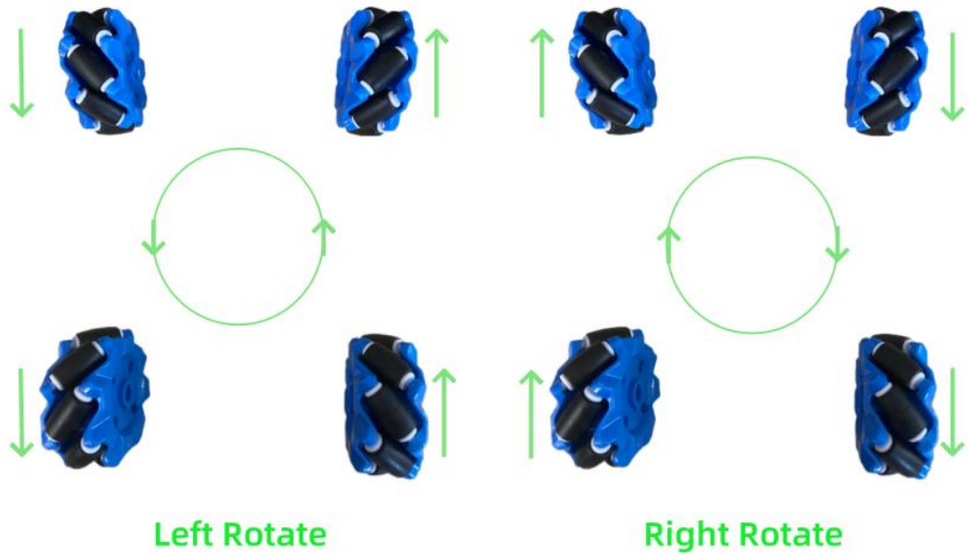



M2
M1
B
A
A
B
M3
M4
UltieFire
TR 18650 4800mWh 3.7V

Motor drive and motion principle:

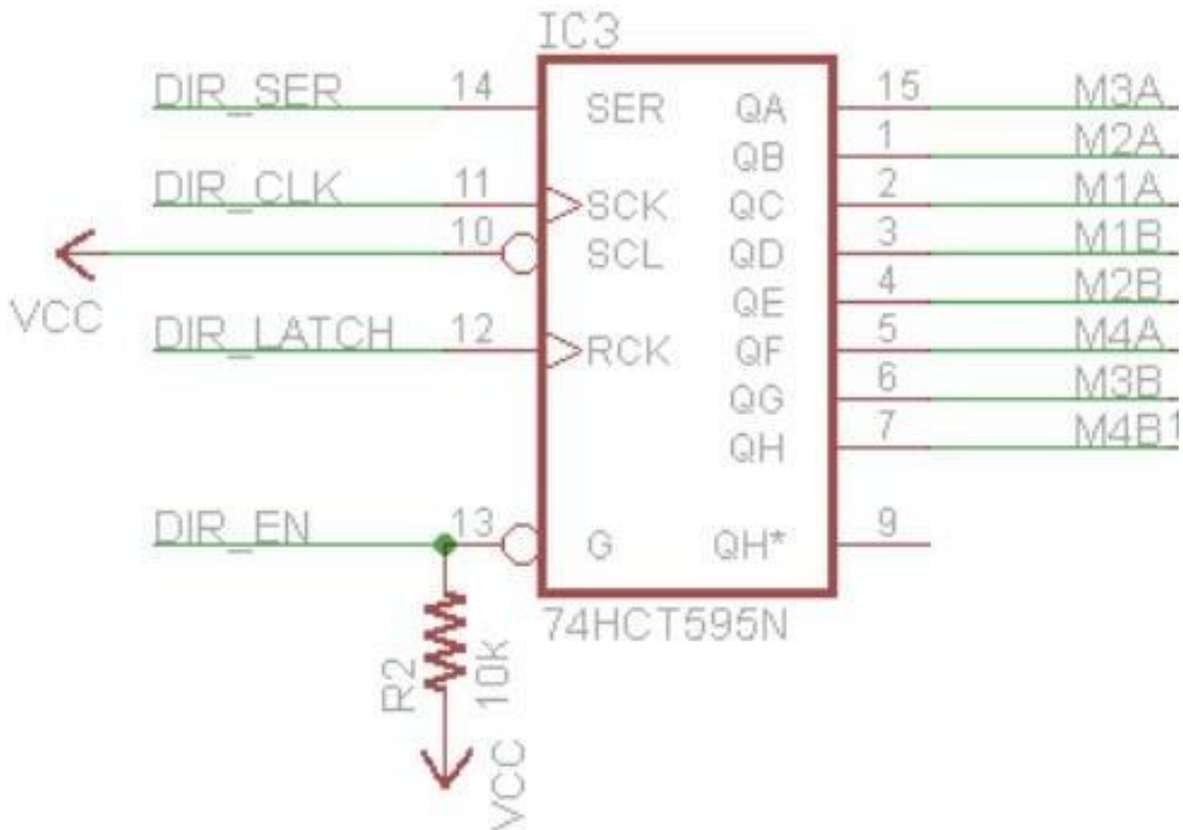



Top right move
Lower left move
Top left move
Lower right move


Left Rotate
Right Rotate

Coding Value Table Corresponding to Different Motion States

The PWM pin controls the power (speed) of the wheel, and then controls the rotation direction of each motor through the 74HC595 chip pin.



The `shiftOut()` function of Arduino mainly acts on the 74HC595 chip.

```
shiftOut(DATA, DIR_CLK, MSBFIRST, Dir);
```

The high and low levels of each pin are controlled by the decimal numbers 0 to 255 for 8-bit binary numbers.

The shiftOut function has a total of four parameters, and the first three parameters are defined and configured at the beginning, we only need to modify the value of value.At this time, the system will convert the decimal numbers into 8-bit binary numbers to control the high and low levels.

For example, if you want the car to move forward, you must keep the four wheels rotating forward. The corresponding 8-bit code is 00100111, which converted to decimal value is 39.

For example, if you want the car to move forward, you must keep the four wheels rotating backwards. The corresponding 8-bit code is 11011000, which converted to decimal value is 216.

Coding value table corresponding to different motion states										
State of the wheel	M3 wheel backward	M4 wheel backward	M3 wheel forward	M2 wheel backward	M1 wheel backward	M1 wheel forward	M2 wheel forward	M4 wheel forward	8 bit binary	decimal system
Move_Forward	0	0	1	0	0	1	1	1	**00100111**	39
Move_Backward	1	1	0	1	1	0	0	0	**11011000**	216
Left translation	0	1	1	1	0	1	0	0	**01110100**	116
Right translation	1	0	0	0	1	0	1	1	**10001011**	139
Right_Rotate	0	1	1	0	1	0	1	0	**01101010**	106
Left_Rotate	1	0	0	1	0	1	0	1	**10010101**	149
Upper Left Move	0	0	1	0	0	1	0	0	**00100100**	36
Upper Right Move	0	0	0	0	0	0	1	1	**00000011**	3

Lower Left Move	0	1	0	1	0	0	0	0	**01010000**	80
Lower Right Move	1	0	0	0	1	0	0	0	**10001000**	136
Drift on Left	0	0	0	1	0	1	0	0	**00010100**	20
Drift on Right	0	0	0	0	1	0	1	0	**00001010**	10

Set the variable that stores the hexadecimal coded value corresponding to the motion state of the car

```
const int Move_Forward = 39;       //Move Forward
const int Move_Backward = 216;     //Move Backward
const int Left_Move = 116;         //Left translation
const int Right_Move = 139;        //Right translation
const int Right_Rotate = 106;      //Rotate Right
const int Left_Rotate = 149;       //Rotate Left
const int Stop = 0;                //Stop
const int Upper_Left_Move = 36;    //Upper Left Move
const int Upper_Right_Move = 3;    //Upper Right Move
const int Lower_Left_Move = 80;    //Lower Left Move
const int Lower_Right_Move = 136;  //Lower Right Move
const int Drift_Left = 20;         //Drift on Left
const int Drift_Right = 10;        //Drift on Right
```

Ultrasonic Sensor Module

If the obstacle avoidance function cannot work correctly, you can test the ultrasonic sensor module separately. (In order not to be affected by other factors, you need to disconnect the connection of other modules. For example, Bluetooth Module,TT Motor)

Description

The HC-SR04 ultrasonic sensor uses sonar to determine the distance to an object. This sensor reads from 2cm to 400cm (0.8inch to 157inch) with an accuracy of 0.3cm (0.1inches), which is good for most hobbyist projects. In addition, this particular module comes with ultrasonic transmitter and receiver modules.

The following picture shows the HC-SR04 ultrasonic sensor

Features

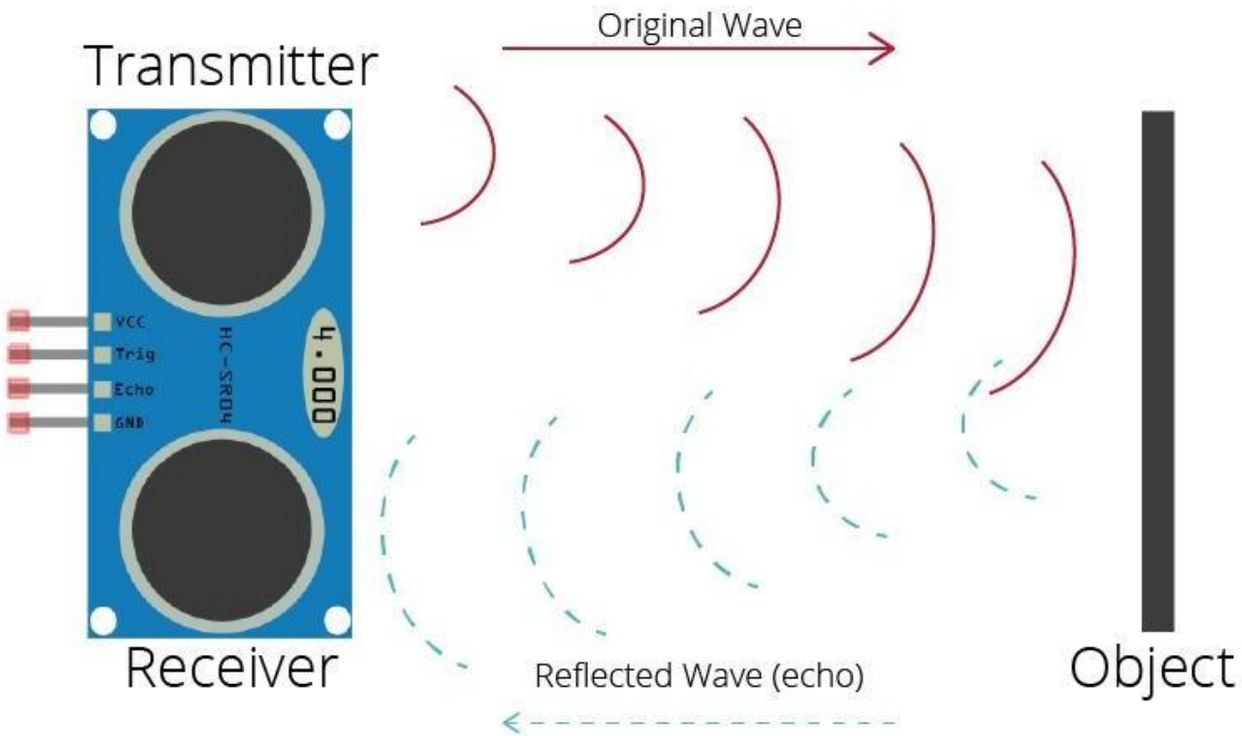
Here's a list of some of the HC-SR04 ultrasonic sensor features and specs:

- Power Supply :+5V DC
- Quiescent Current : <2mA
- Working Current: 15mA
- Effectual Angle: <15°
- Ranging Distance : 2cm – 400 cm/1″ – 13ft
- Resolution : 0.3 cm
- Measuring Angle: 30 degree
- Trigger Input Pulse width: 10uS TTL pulse
- Echo Output Signal: TTL pulse proportional to the distance range
- Dimension: 45mm x 20mm x 15mm

How Does it Work?

The ultrasonic sensor uses sonar to determine the distance to an object. Here's what happens:

1. The ultrasound transmitter (trig pin) emits a high-frequency sound (40 kHz).
2. The sound travels through the air. If it finds an object, it bounces back to the module.
3. The ultrasound receiver (echo pin) receives the reflected sound (echo).



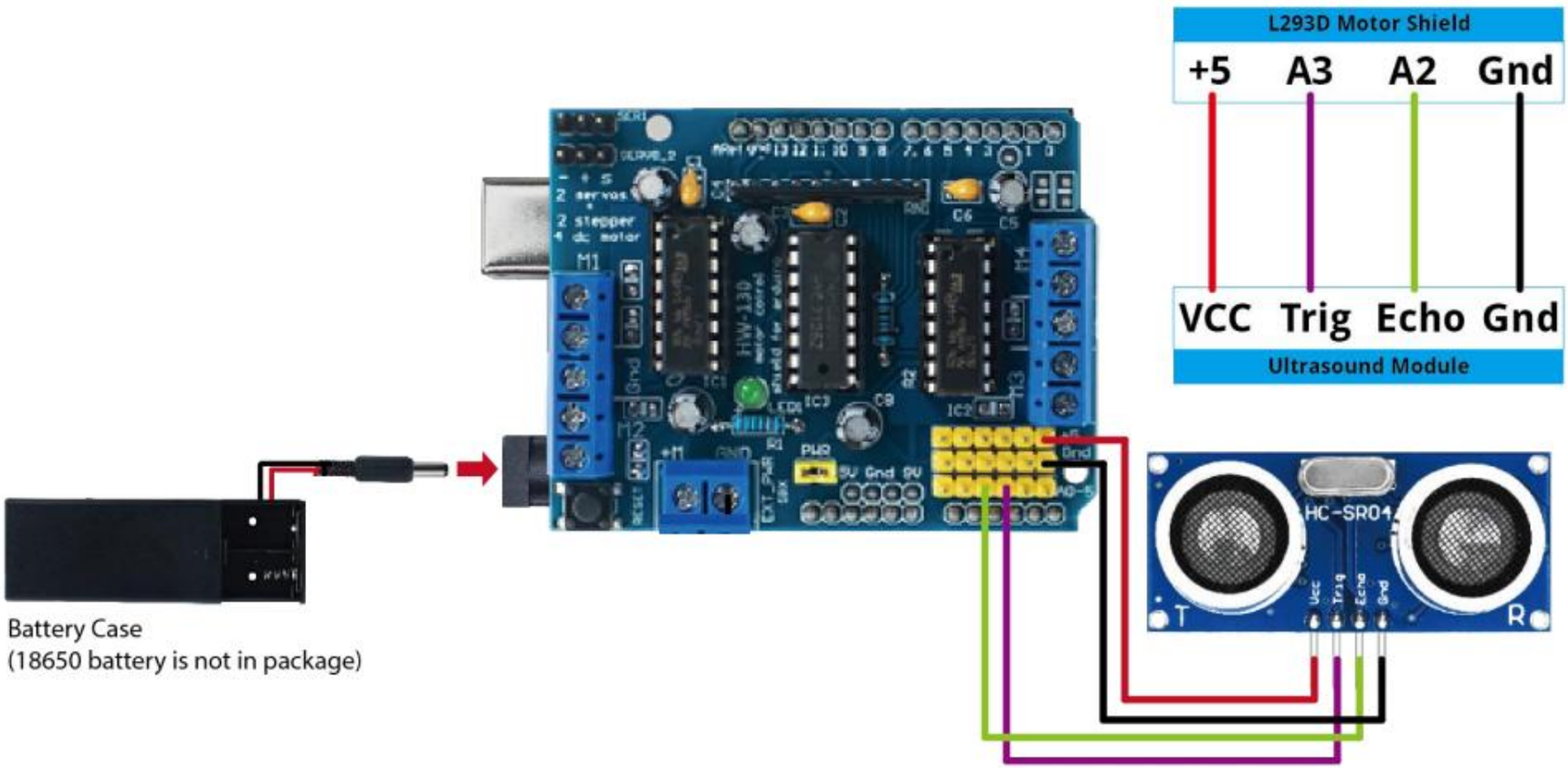
The time between the transmission and reception of the signal allows us to calculate the distance to an object. This is possible because we know the sound's velocity in the air. Here's the formula:

distance = (traveltime/2) x speed of sound

The speed of sound is: 343m/s = 0.0343 cm/uS = 1/29.1 cm/uS

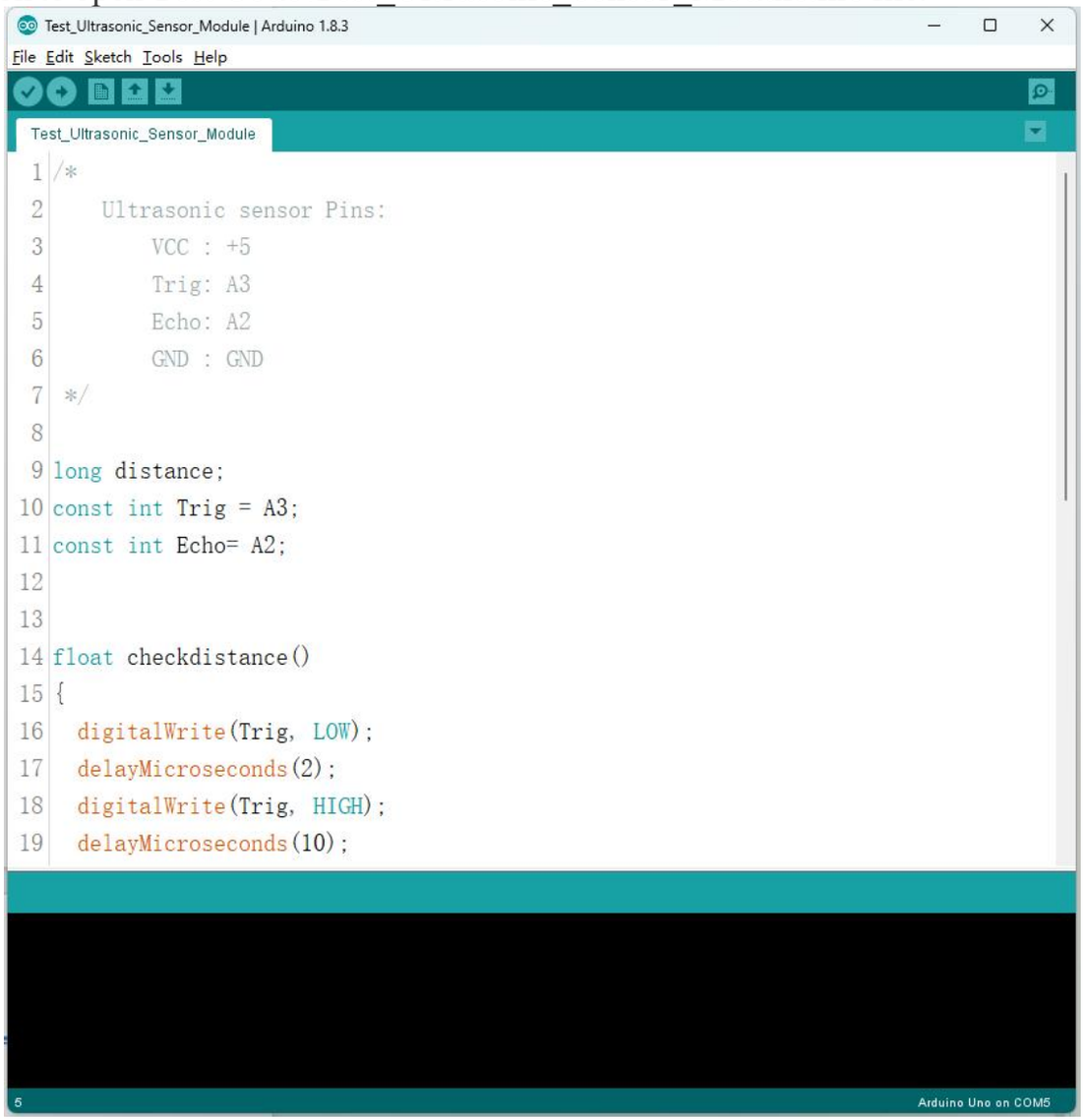
speed of sound in the air at 20ºC (68ºF) = 343m/s

Wiring

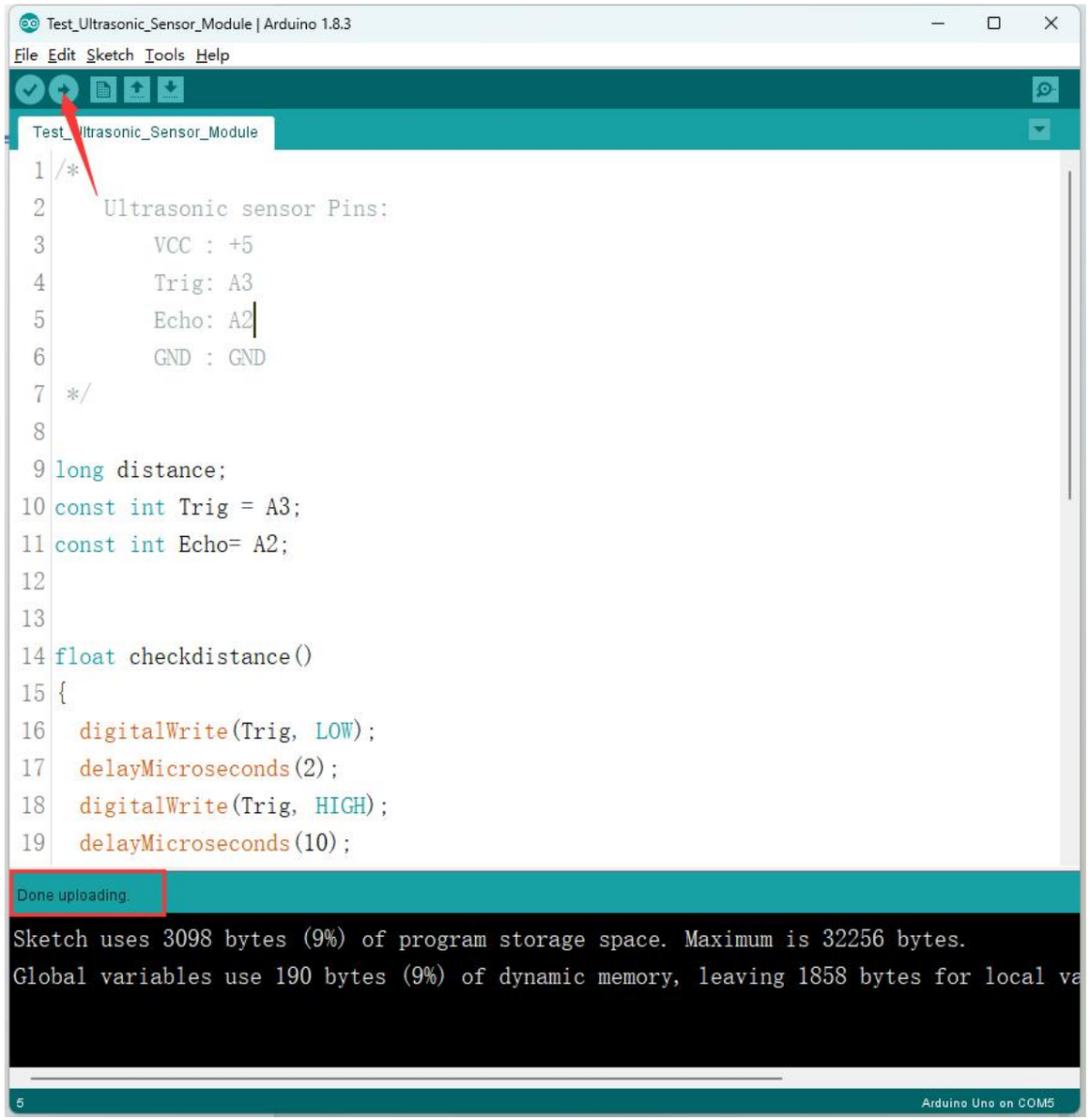

L293D Motor Shield
+5
A3
A2
Gnd
VCC
Trig
Echo
Gnd
Ultrasound Module
HC-SR04
T
R
Battery Case
(18650 battery is not in package)

Code

Click the **File>>Open** icon to open **Test Code\Test_Ultrasonic_Sensor_Module.ino** file.

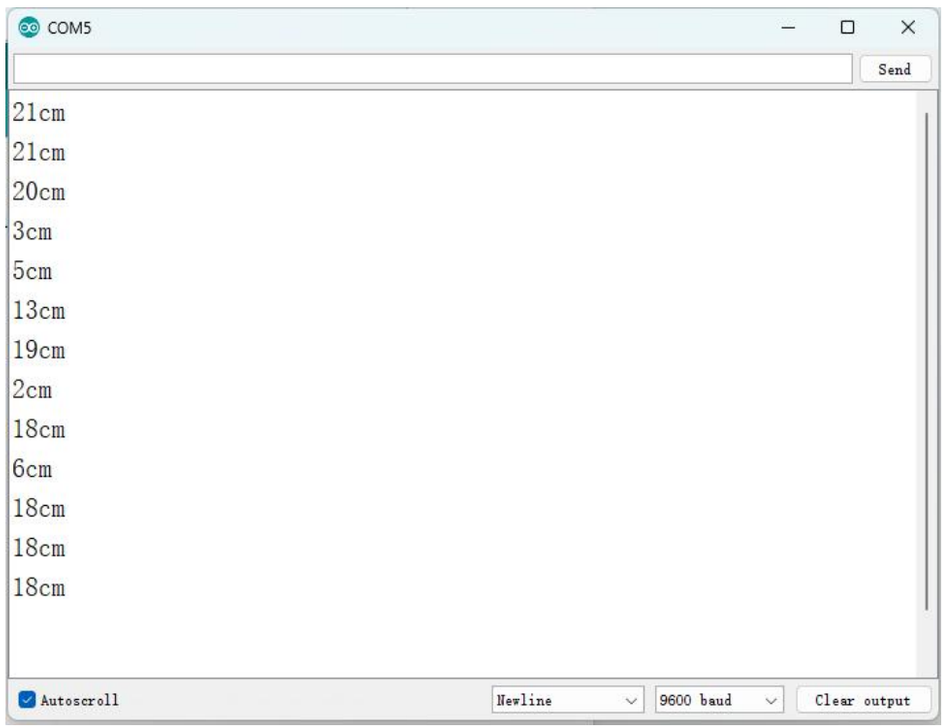


Click , Upload the sketch to Arduino UNO.



Then Click  ,open the Serial Monitor at a baud rate of 9600.

The distance to the nearest object is printed in the Serial Monitor window.When the object moves, the distance of the monitor printed will change.



Tip: If the printing value is 0cm, the reason for the error may be:

①Wrong wiring.

②The voltage provided by the USB data cable is insufficient, and you need to use the battery to supply power at the same time.