Lesson 2-How to use TT Motor and Run the Car

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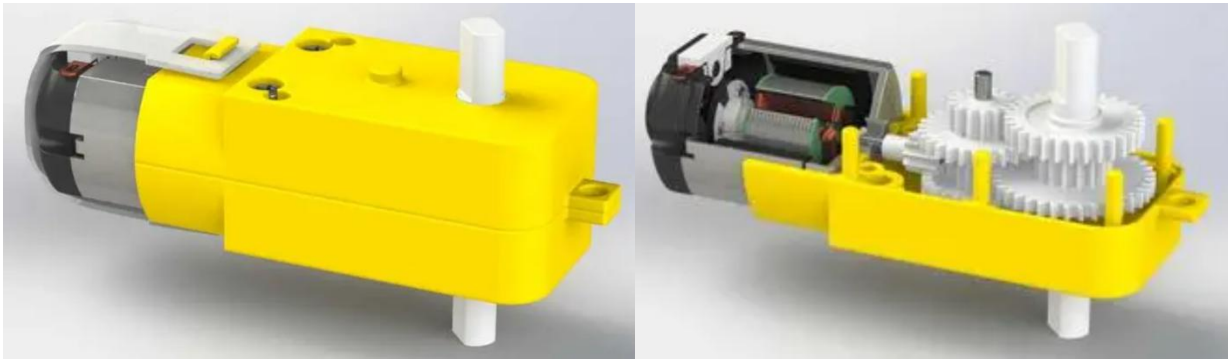
Support : Cokoino@outlook.com

1. Knowledge of the TT Motor

Our products use DC motor as a power device. A DC motor is a device that converts DC electrical energy into mechanical energy. Widely used to drive various equipment, such as electric fans, remote control cars, electric windows, etc. The DC motor is very suitable as the moving mechanism of the trolley.

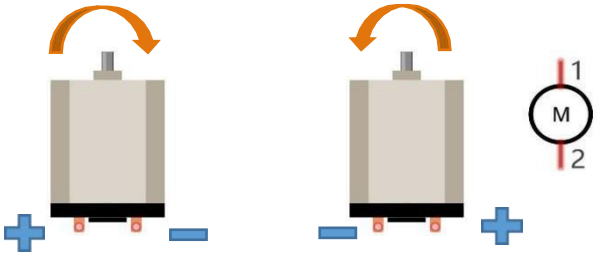
As shown in the figure below, the TT motor consists of a DC motor and related gears, with a yellow outer shell fastened.



DC Motor

When motor is connected to the power supply, it will rotate in one direction. Reverse the polarity of power supply, the motor will rotate in the opposite direction.

And the speed of motor depends on the voltage between two ends. The larger the voltage, the lager the speed.

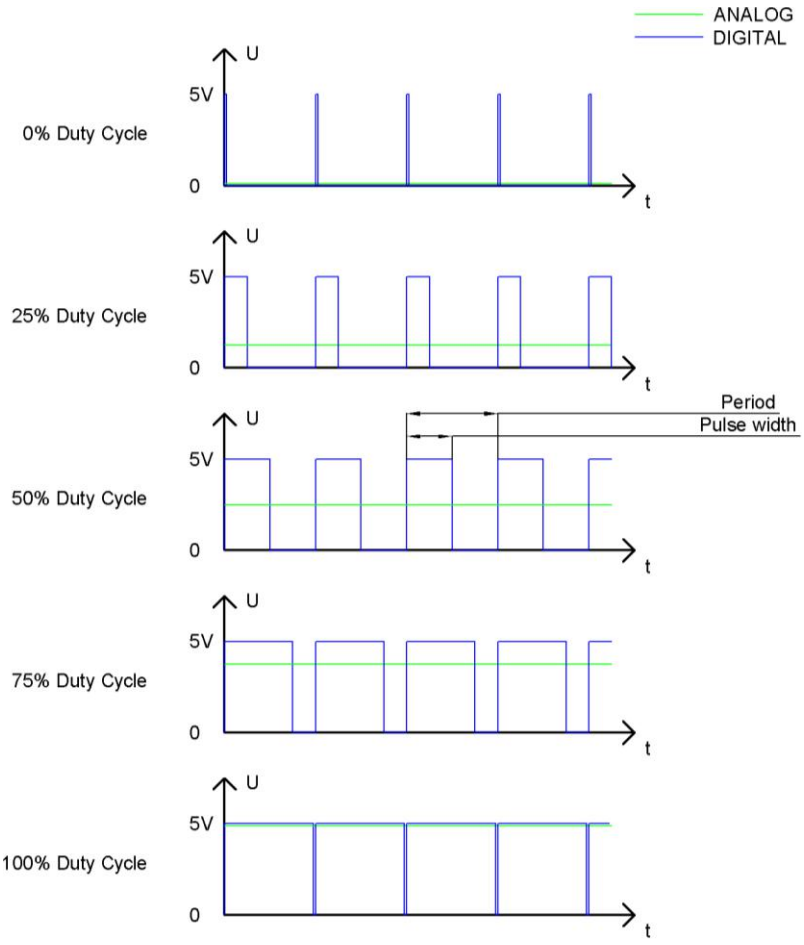


PWM

PWM, Pulse Width Modulation, uses digital pins to send certain frequencies of square waves, that is, the output of high levels and low levels, which alternately last for a

while. The total time for each set of high levels and low levels is generally fixed, which is called the period (the reciprocal of the period is frequency). The time of high level outputs are generally called “pulse width”, and the duty cycle is the percentage of the ratio of pulse duration, or pulse width (PW) to the total period (T) of the waveform.

The longer the output of high levels last, the larger the duty cycle and the higher the corresponding voltage in analog signal will be. The following figures show how the analogs signal voltage vary between 0V-5V (high level is 5V) corresponding to the pulse width 0%-100%:



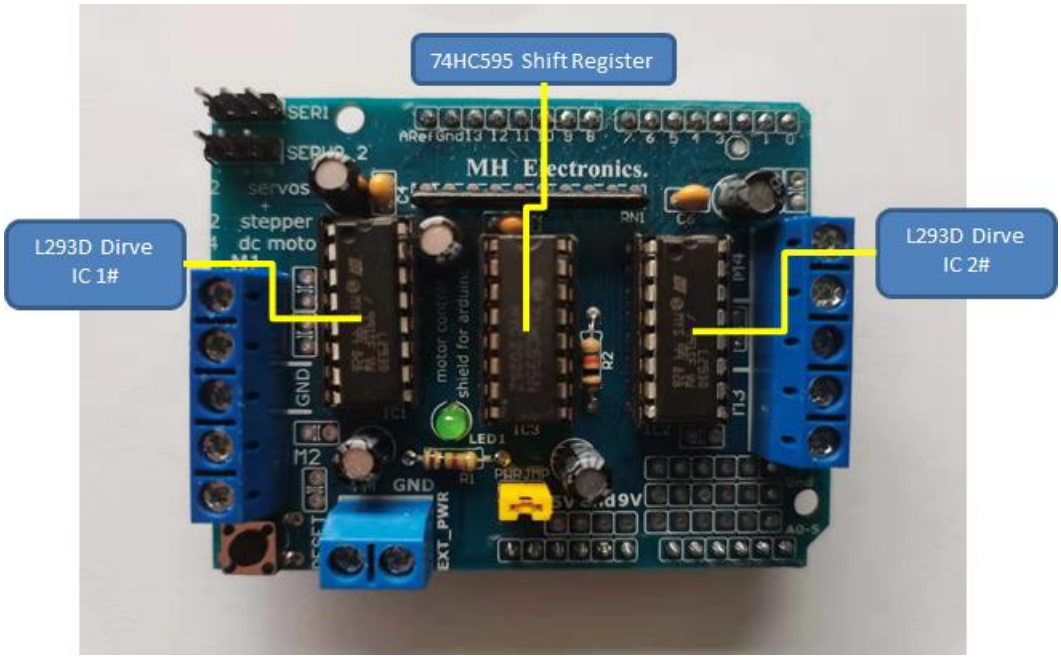
The longer the PWM duty cycle is, the higher the output power will be. Now that we understand this relationship, we can use PWM to control the brightness of an LED or the speed of DC motor and so on.

In this course, a L293D motor control shield will be used with UNO board, which can control the rotation of 4 DC motors at the same time

2. L293D motor control shield introduce

2.1 Structure

The L293D motor control shield is mainly composed of 2 L293D motor driver chips and a 74HC595 shift register. Its structure is as follows



2.2 Functions of L293D motor control shield

L293D is a dual-channel H-bridge motor driver that can drive a pair of DC motors or a single stepper motor.

Since the shield has two L293D motor driver chipsets, which means it can drive up to four DC motors individually, it is ideal for building a four-wheeled robotic platform.

The shield provides a total of 4 H-bridges, each of which can supply up to 0.6A to the motor.

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

The shield has an array of pull-down resistors to keep the motors off during power up.

Onboard LEDs indicate that motor power is OK. If it is not lit, the motor will not run.

The RESET button is the reset button of the UNO board (when the L293D shield is installed on the UNO board).

2.3 L293D motor control shield principle

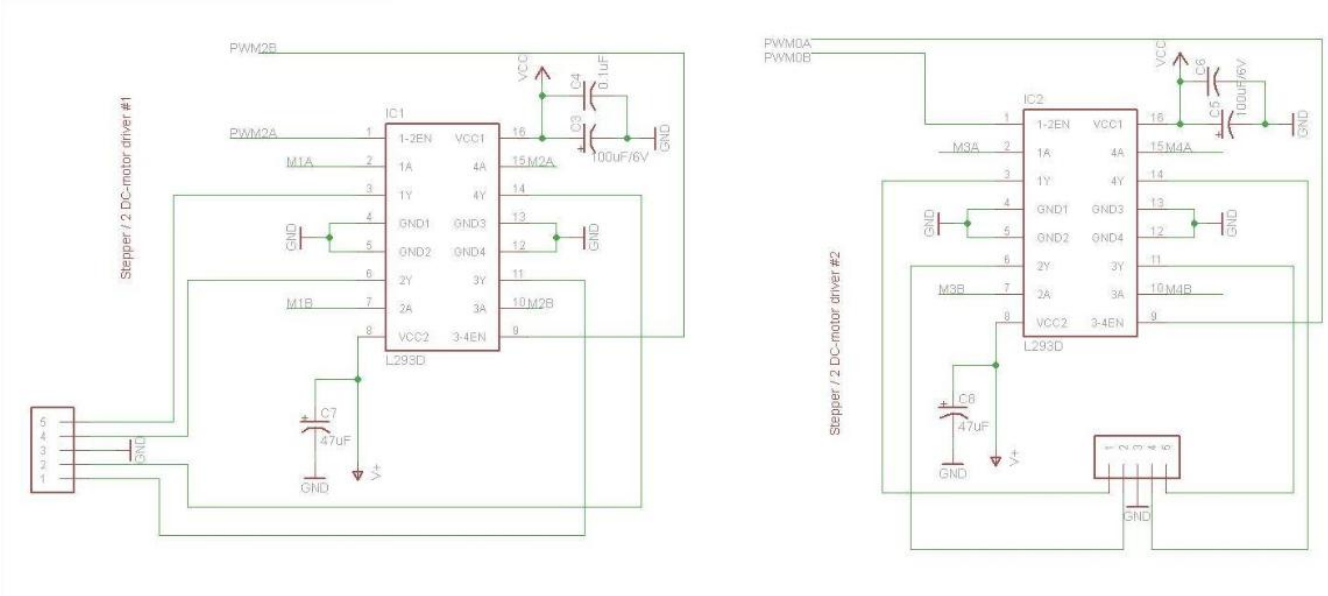
Using L293D to drive the motor, there is a 74HC595 chip in the middle that converts

serial signals into parallel signals. This module is designed for Arduino, which has fewer I/O ports and requires 12 pins to control 4 DC motors. Using 74HC595 can reduce the use of 4 pins

74HC595

74HC595 is an 8-bit serial input and parallel output displacement buffer: parallel output is a three state output. On the rising edge of SCK, serial data is input from SDL to the internal 8-bit displacement buffer and output from Q7 ', while parallel output stores the data from the 8-bit displacement buffer to the 8-bit parallel output buffer on the rising edge of LCK. When the control signal of the serial data input end OE is low enabled, the output value of the parallel output end is equal to the value stored in the parallel output buffer. Simply put, first set pin 7 of the module to 0, and then pin 4 of the module (clock end for data input of 74HC595 chip) receives a rising edge. Move the 8-bit data in the chip to the left by one bit, leaving the low bit to write the 0 or 1 signal of pin 8 (serial data input of 74HC595 chip) to the low bit. After writing eight times, write the 8-bit signal that controls four motors to the 74HC595 chip (M3M4M3M2M1M2M4), Then, by giving a rising edge to pin 12, the data in the chip is output to the pins of the chip (Q0~Q7)

2.4 L293D motor control shield schematic diagram



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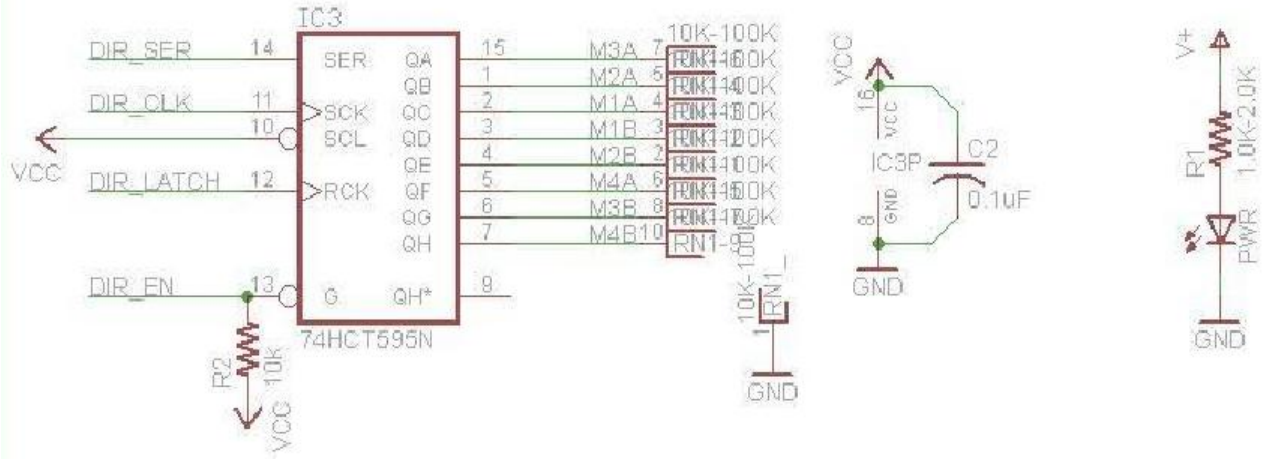
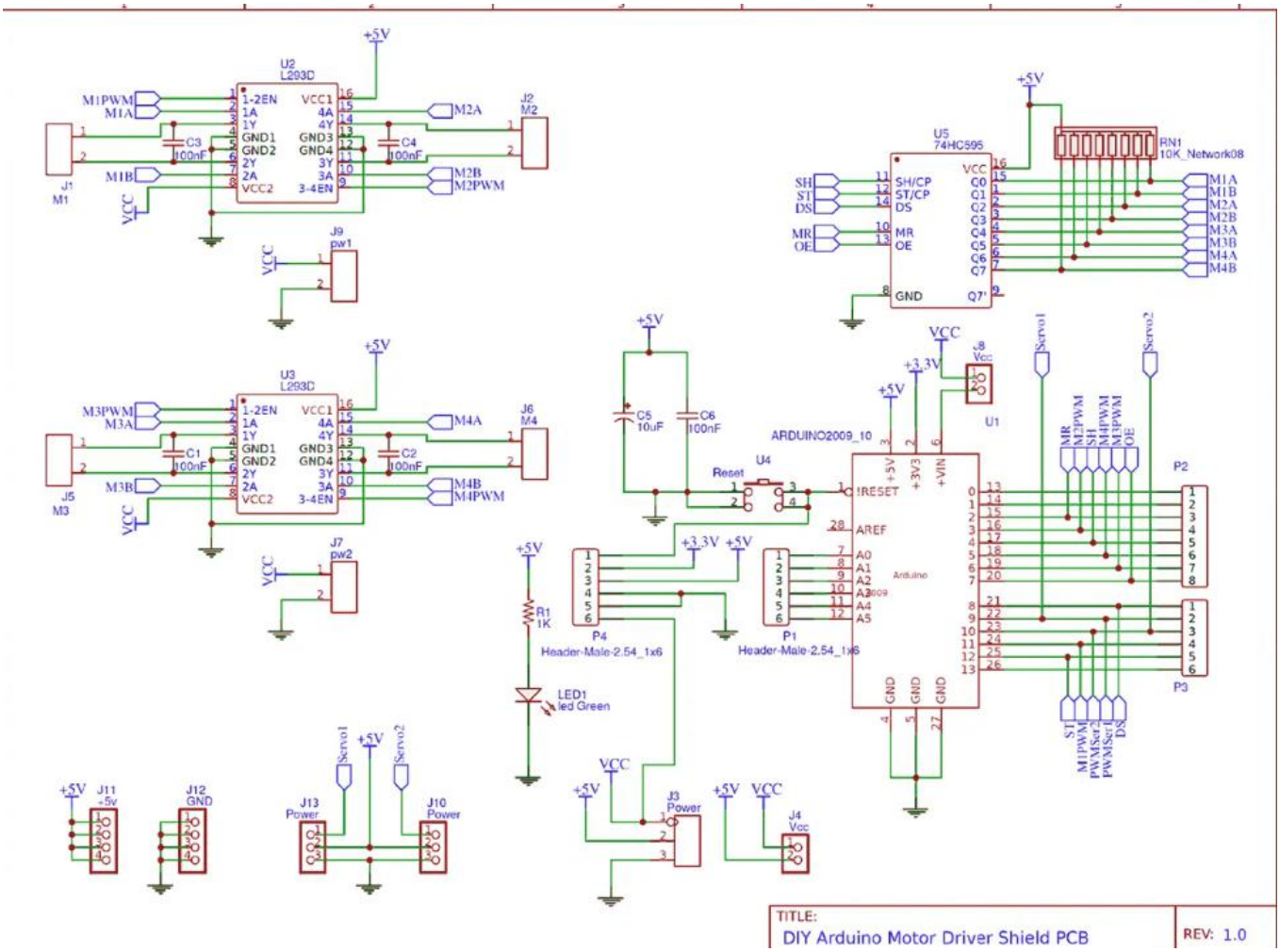


Support : Cokoino@outlook.com



L293D motor control shield occupies Arduino pin corresponding table

L293D motor control shield	Arduino UNOR3(for example)
L293D Driver IC1#1-2EN	D11
L293D Driver IC1#3-4EN	D3
L293D Driver IC2#1-2EN	D5
L293D Driver IC2#3-4EN	D6
74HC595 DIR-SER	D8
74HC595 DIR-CLK	D4
74HC595 DIR-LATCH	D12
74HC595 DIR-EN	D7
SER1	D10
SERVO_2	D9
N/A	D2
N/A	D13

N/A	A0
N/A	A1
N/A	A2
N/A	A3
N/A	A4
N/A	A5

2.5 Power the motors through the control shield

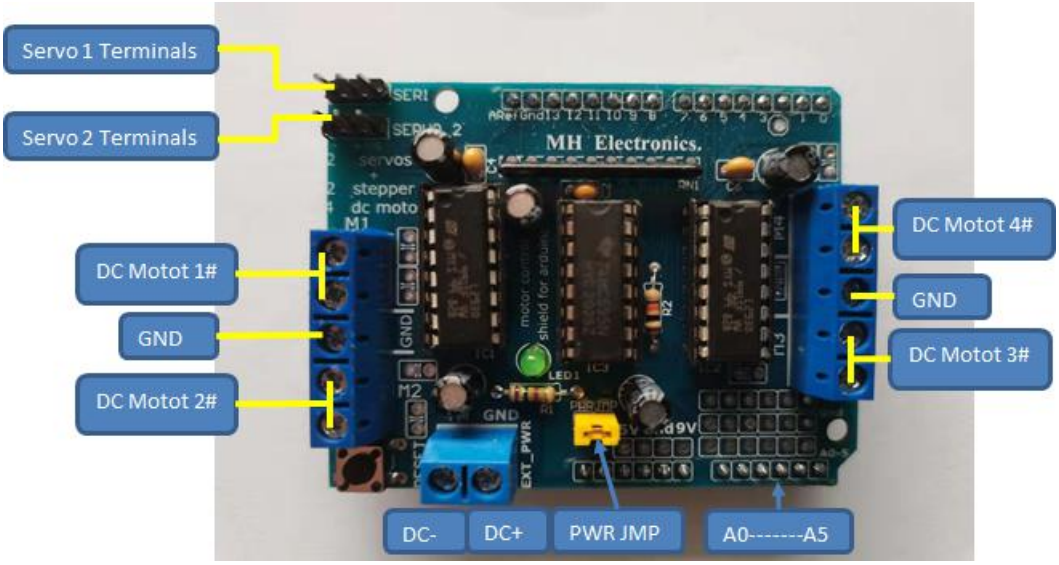
Use a single DC power supply to power both the UNO board and the control shield board, just plug the DC power supply into the DC jack of the UNO board or the 2 pin EXT_PWR on the control shield board.

Please keep the power jumper of the control shield on the board, it can only be used when the working voltage of the motor is less than 9V.

Note：

Do not supply more than 9V at the EXT_PWR input when the jumper is in place, or you may damage the Arduino UNO Board!

2.6 Output/input terminal of the L293D motor control shield



The output channels of the two L293D chips output M1, M2, M3 and M4 through two

5-pin screw terminals. These terminals support DC motors with operating voltages between 4.5 and 25V.

Each channel on the module can supply up to 600mA to the DC motor. However, the amount of current supplied to the motor depends on the power supply to the system.

You can also connect two stepper motors to the output terminals. One stepper motor is connected to motor ports M1-M2 and the other is connected to M3-M4.

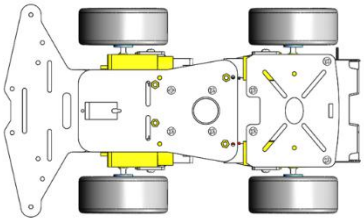
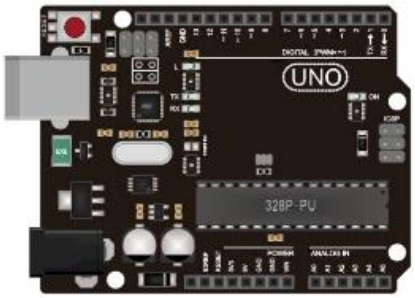
If it is a unipolar stepper motor, connect the center tap of the unipolar stepper motor to the GND terminal.

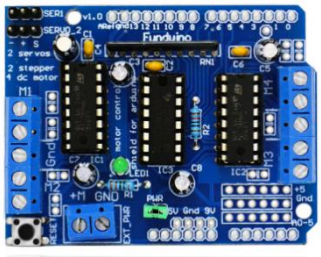
Two servos can be connected by pulling the 16-bit PWM output lines out to two 3 pin connectors.

2.7 Unused pins on L293D motor control shield

Mount the shield on the UNO board, it does not occupy the digital pins #2, #13 and analog pins A0-A5 of the UNO board. If you want to use these pins, you can connect some headers to the corresponding places.

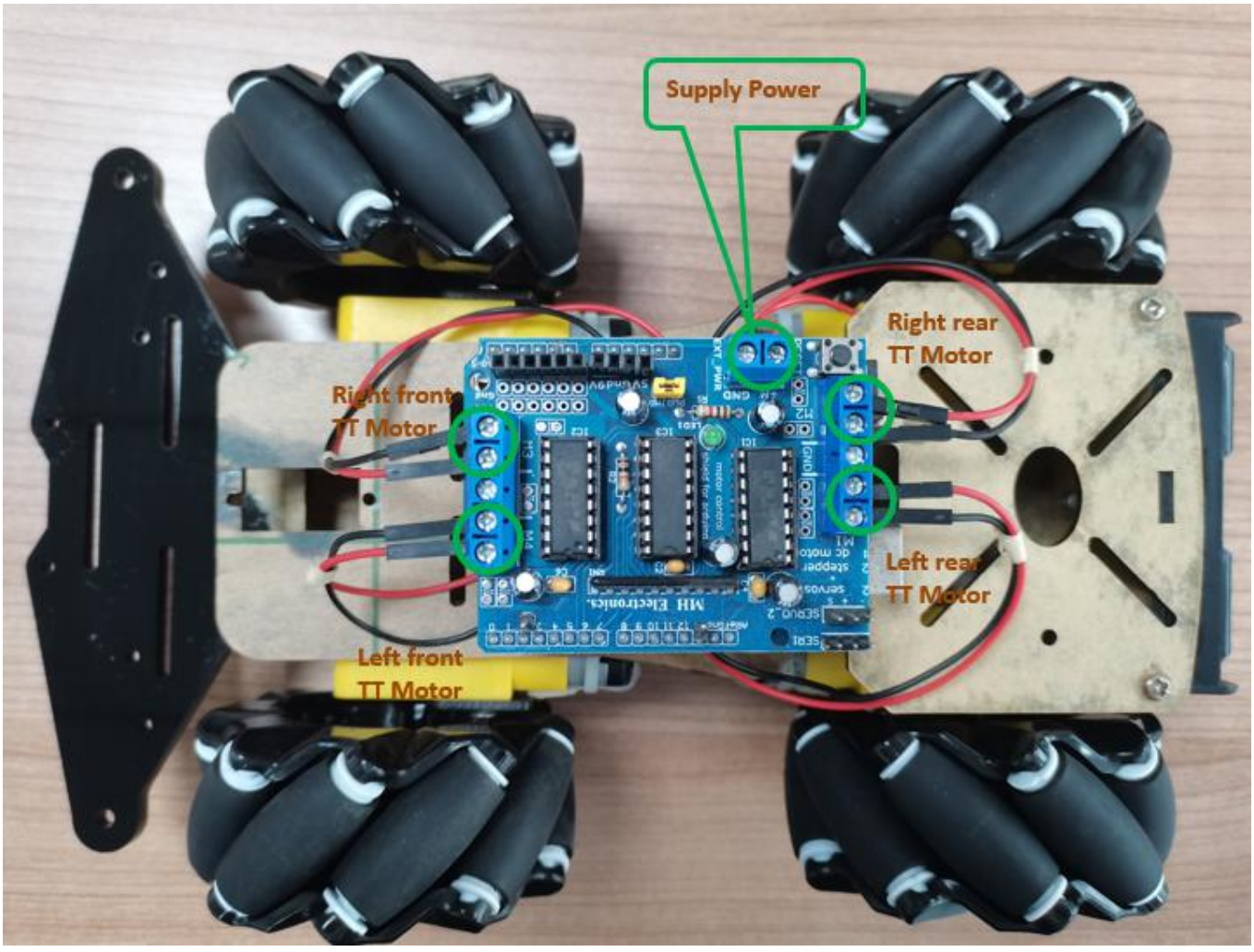
3. Component/Module List

Component/Module	QTY	Picture	Remark
4WD Mecanum Wheel Car Chassis	1		Provided by the 4WD Mecanum Wheel Car Chassis Kit,you need assembled by yourself
UNO R3 Board	1		You need to prepare these by yourself.These just as an example,you can DIY what is you want and prepared

L293D Motor control shield	1		

4. Circuit connection

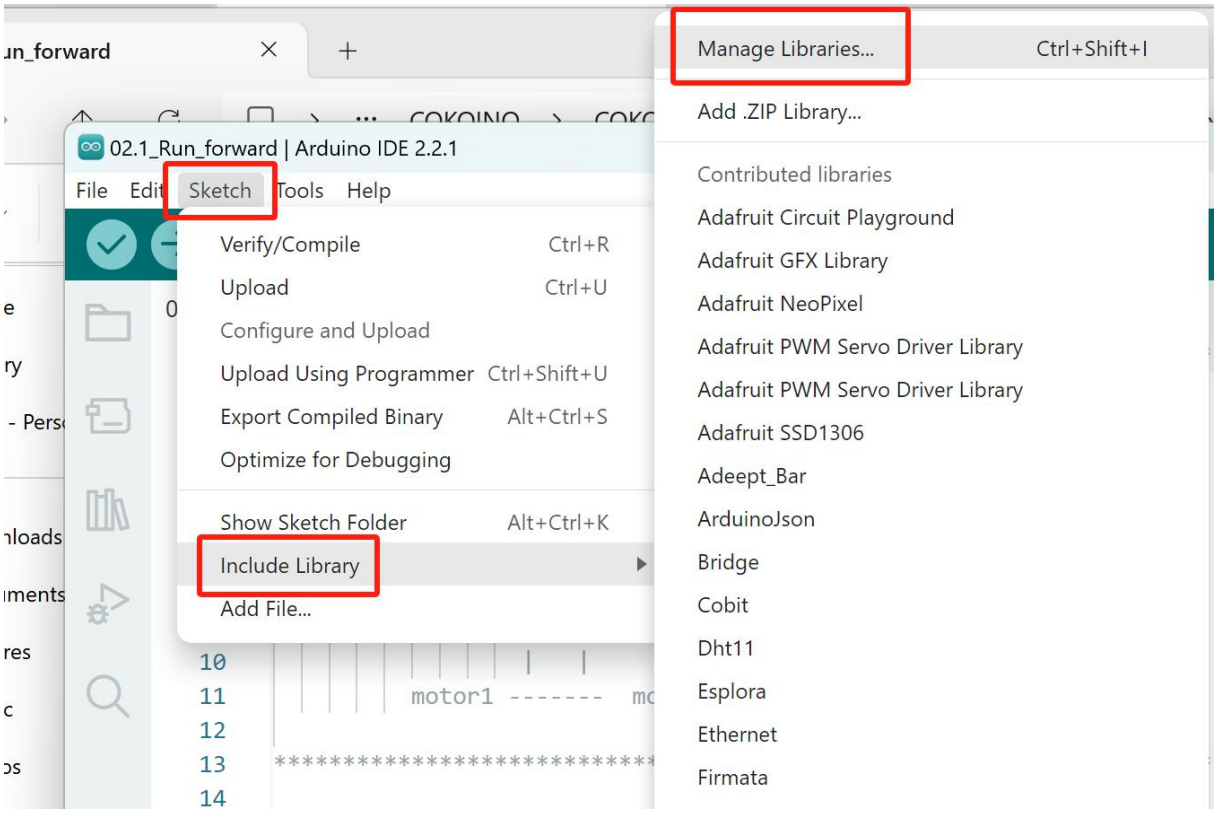
First fix the UNO board on the 4WD car body, install the L293D motor control shield on the UNO board, and then connect the 4 TT motors to the L293D expansion board as shown in the figure below, and connect the power wire of the 18650 battery box to the EXT_PWR terminal of the control shield, note that the positive and negative poles cannot be connected wrongly.



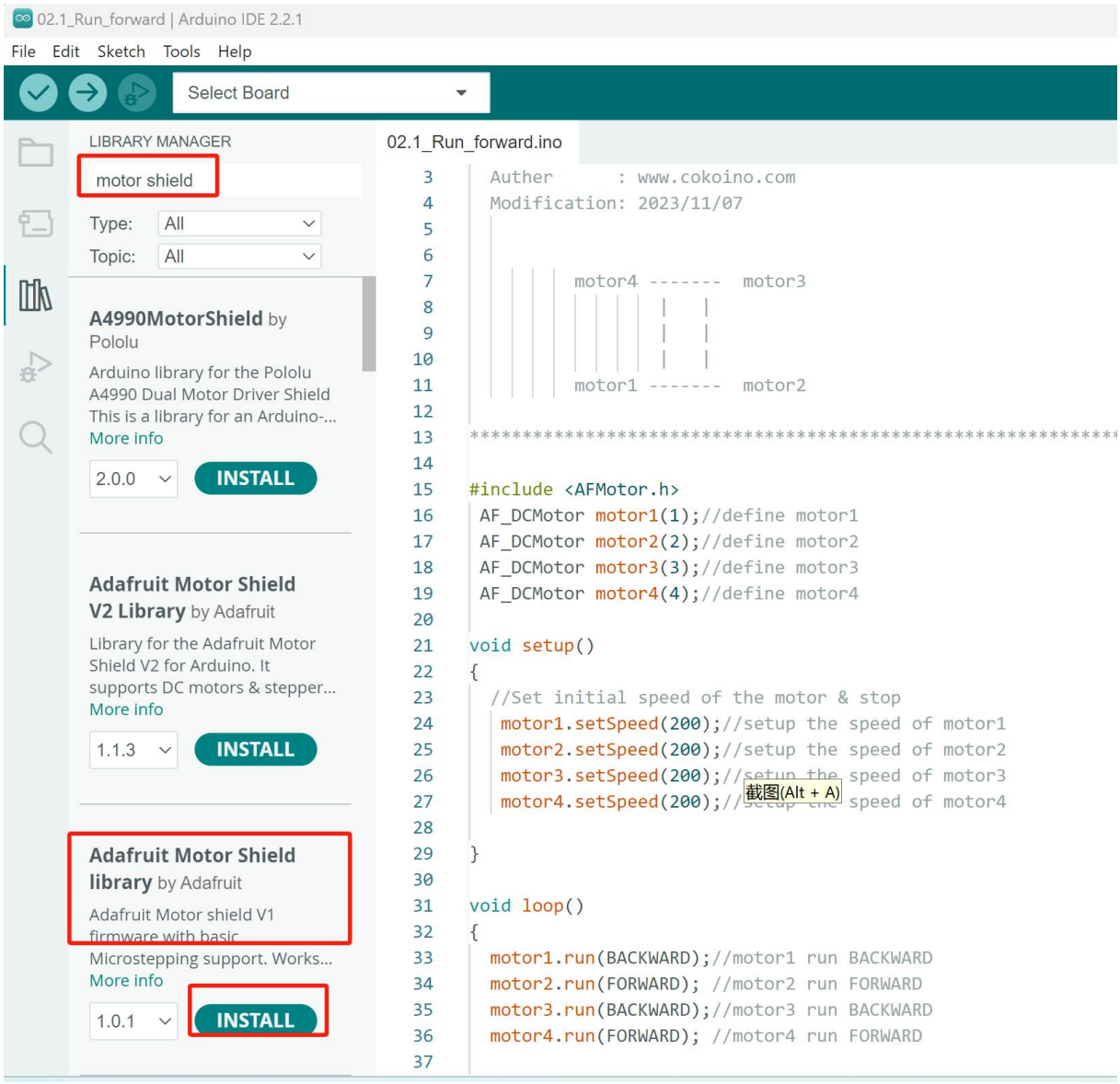
5. Install AFMotor Library

In order to establish communication with the L293D motor control shield, we need to install the **AFMotor.h** library first so that it can issue commands to control DC, stepper and servo motors.

Click to open Arduino IDE， then click “Sketch”>“Include library”>“Manage Libraries...”， Wait for the library manager to download the library index and update the list of installed libraries.



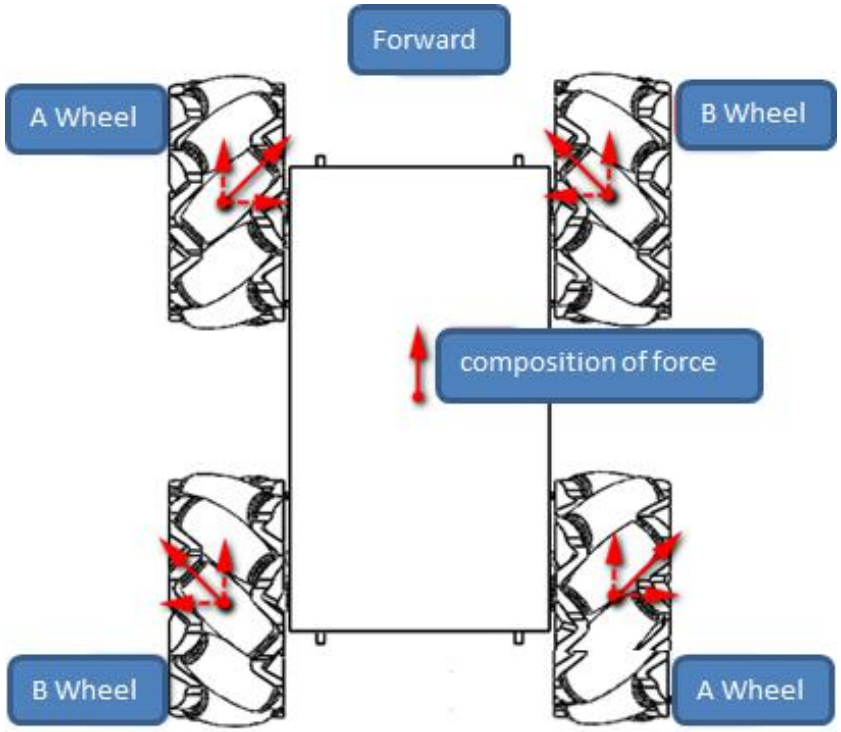
Type " motor shield " to filter your search. Look for the Adafruit Motor Shield library (Version 1) provided by Adafruit. Click the entry and select Install.


02.1_Run_forward | Arduino IDE 2.2.1
File Edit Sketch Tools Help
Select Board
LIBRARY MANAGER
motor shield
Type: All
Topic: All
A4990MotorShield by Pololu
Arduino library for the Pololu A4990 Dual Motor Driver Shield This is a library for an Arduino-...
More info
2.0.0
INSTALL
Adafruit Motor Shield V2 Library by Adafruit
Library for the Adafruit Motor Shield V2 for Arduino. It supports DC motors & stepper...
More info
1.1.3
INSTALL
Adafruit Motor Shield library by Adafruit
Adafruit Motor shield V1 firmware with basic Microstepping support. Works...
More info
1.0.1
INSTALL
02.1_Run_forward.ino
Auther : www.cokoino.com
Modification: 2023/11/07
motor4 ------- motor3
motor1 ------- motor2
#include <AFMotor.h>
AF_DCMotor motor1(1);//define motor1
AF_DCMotor motor2(2);//define motor2
AF_DCMotor motor3(3);//define motor3
AF_DCMotor motor4(4);//define motor4
void setup()
{
//Set initial speed of the motor & stop
motor1.setSpeed(200);//setup the speed of motor1
motor2.setSpeed(200);//setup the speed of motor2
motor3.setSpeed(200);//setup the speed of motor3
motor4.setSpeed(200);//setup the speed of motor4
}
void loop()
{
motor1.run(BACKWARD);//motor1 run BACKWARD
motor2.run(FORWARD); //motor2 run FORWARD
motor3.run(BACKWARD);//motor3 run BACKWARD
motor4.run(FORWARD); //motor4 run FORWARD
截图(Alt + A)

6. Upload code and run the Mecanum wheel car

6.1Run forward

Forward: （A/B wheel can offset each other's axial speed, positive : up along the roller axis; Reverse: down the roller axis）



Click "File"---"Open" in the IDE interface, and select the code under the path of "CKK0015-main\Tutorial\Arduino\Sketches\02.1_Run_forward".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run forward.

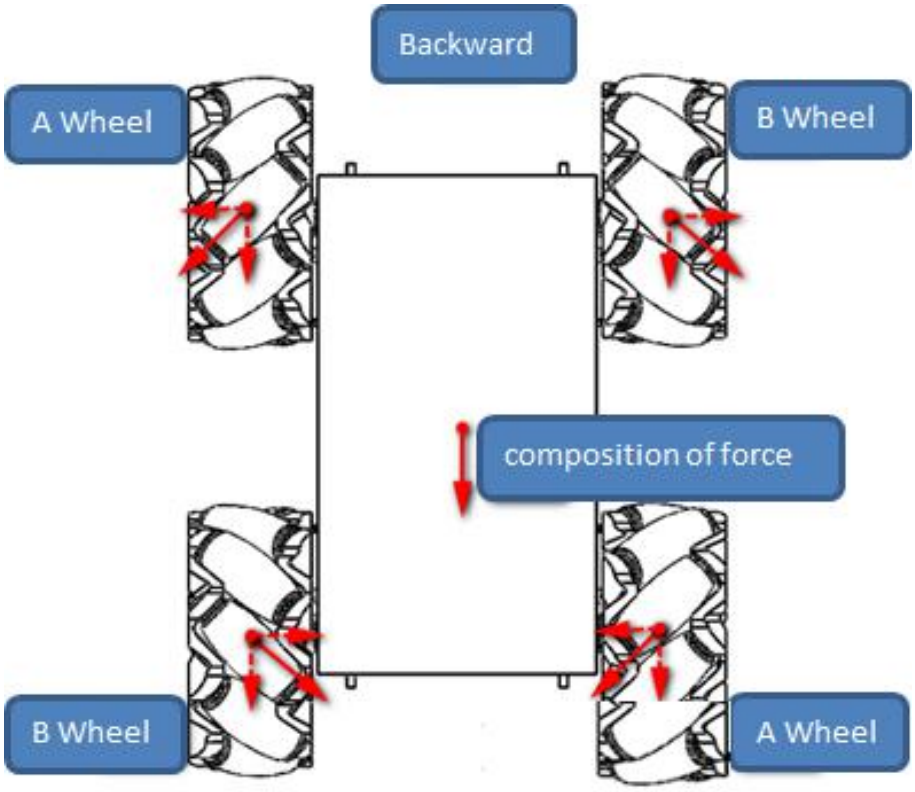
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

```

```
6.          motor4 -------  motor3
7.                      |  |
8.                      |  |
9.                      |  |
10.         motor1 -------  motor2
11. **********************************************************************/
12.
13. #include <AFMotor.h>
14.  AF  DCMotor motor1(1);//define motor1
15.  AF_DCMotor motor2(2);//define motor2
16.  AF_DCMotor motor3(3);//define motor3
17.  AF  DCMotor motor4(4);//define motor4
18.
19. void setup()
20. {
21.   //Set initial speed of the motor & stop
22.    motor1.setSpeed(200);//setup the speed of motor1
23.    motor2.setSpeed(200);//setup the speed of motor2
24.    motor3.setSpeed(200);//setup the speed of motor3
25.    motor4.setSpeed(200);//setup the speed of motor4
26. }
27.
28. void loop()
29. {
30.   motor1.run(BACKWARD);//motor1 run BACKWARD
31.   motor2.run(FORWARD); //motor2 run FORWARD
32.   motor3.run(BACKWARD);//motor3 run BACKWARD
33.   motor4.run(FORWARD); //motor4 run FORWARD
34. }
```

6.2 Run Backward

Backward: （A/B wheel reverse）



Click "File"---"Open" in the IDE interface, and select the code under the path of "CKK0015-main\Tutorial\Arduino\Sketches\02.2_Run_backward".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run backward.

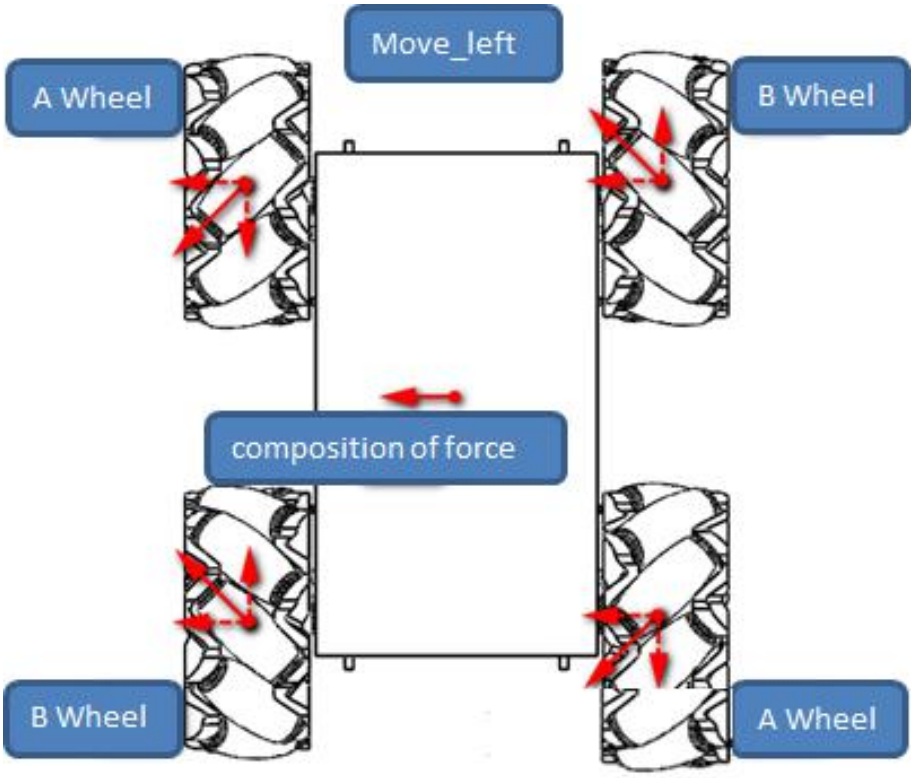
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  |  |
                  |  |
                  |  |
        motor1 -------  motor2

**********************************************************************/

```

```
#include <AFMotor.h>
AF_DCMotor motor1(1);//define motor1
AF_DCMotor motor2(2);//define motor2
AF_DCMotor motor3(3);//define motor3
AF_DCMotor motor4(4);//define motor4

void setup()
{
  //Set initial speed of the motor & stop
   motor1.setSpeed(200);//setup the speed of motor1
   motor2.setSpeed(200);//setup the speed of motor2
   motor3.setSpeed(200);//setup the speed of motor3
   motor4.setSpeed(200);//setup the speed of motor4
}

void loop()
{
  motor1.run(FORWARD); //motor1 run FORWARD
  motor2.run(BACKWARD);//motor2 run BACKWARD
  motor3.run(FORWARD); //motor3 run FORWARD
  motor4.run(BACKWARD);//motor4 run BACKWARD
}
```

6.3 Move to left

Move to left: （Round A wheel reverse, round B wheel forward）



Click "File"---"Open" in the IDE interface, and select the code under the path of " CKK0015-main\Tutorial\Arduino\Sketches\ 02.3_Move_to_left".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run as move to left.

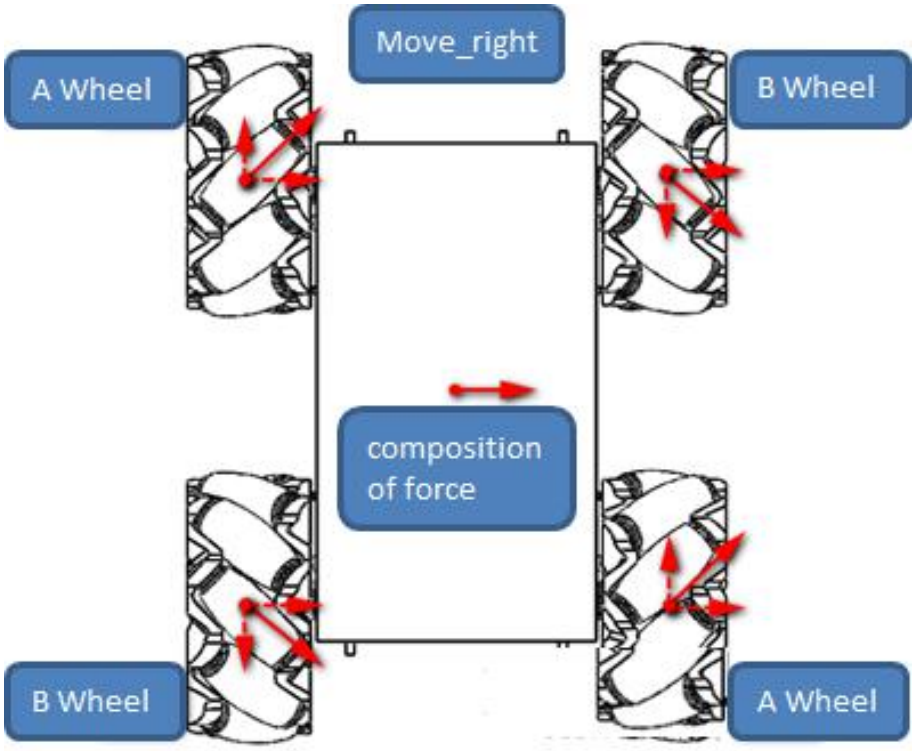
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  | |
                  | |
                  | |
        motor1 -------  motor2

**********************************************************************/

```

```
#include <AFMotor.h>
AF_DCMotor motor1(1);//define motor1
AF_DCMotor motor2(2);//define motor2
AF_DCMotor motor3(3);//define motor3
AF_DCMotor motor4(4);//define motor4

void setup()
{
  //Set initial speed of the motor & stop
   motor1.setSpeed(200);//setup the speed of motor1
   motor2.setSpeed(200);//setup the speed of motor2
   motor3.setSpeed(200);//setup the speed of motor3
   motor4.setSpeed(200);//setup the speed of motor4
}

void loop()
{
  motor1.run(BACKWARD);// motor1 run BACKWARD
  motor2.run(BACKWARD);// motor2 run BACKWARD
  motor3.run(BACKWARD);// motor3 run BACKWARD
  motor4.run(BACKWARD);// motor4 run BACKWARD
}
```

6.4 Move to right

Move to right： （Round B wheel reverse, round A wheel forward）



Click "File"---"Open" in the IDE interface, and select the code under the path of "CKK0015-main\Tutorial\Arduino\Sketches\02.4_Move_to_right".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run as move to right.

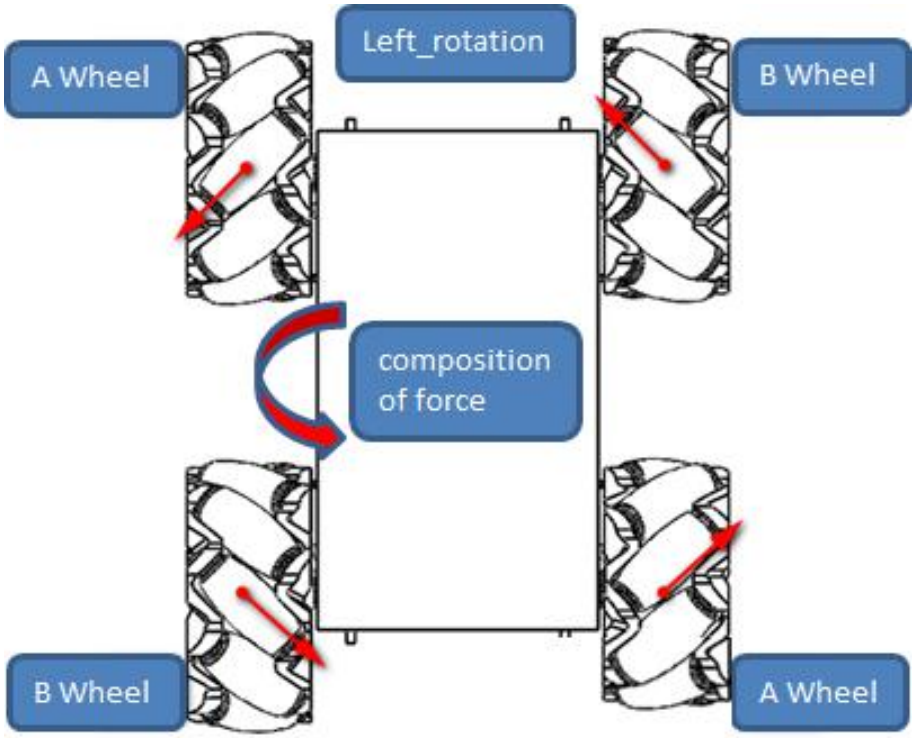
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  | |
                  | |
                  | |
        motor1 -------  motor2

**********************************************************************/
```

```
13.
14. #include <AFMotor.h>
15.  AF  DCMotor motor1(1);//define motor1
16.  AF  DCMotor motor2(2);//define motor2
17.  AF_DCMotor motor3(3);//define motor3
18.  AF_DCMotor motor4(4);//define motor4
19.
20. void setup()
21. {
22.   //Set initial speed of the motor & stop
23.    motor1.setSpeed(200);//setup the speed of motor1
24.    motor2.setSpeed(200);//setup the speed of motor2
25.    motor3.setSpeed(200);//setup the speed of motor3
26.    motor4.setSpeed(200);//setup the speed of motor4
27. }
28.
29. void loop()
30. {
31.   motor1.run(FORWARD);// motor1 run FORWARD
32.   motor2.run(FORWARD);// motor2 run FORWARD
33.   motor3.run(FORWARD);// motor3 run FORWARD
34.   motor4.run(FORWARD);// motor4 run FORWARD
35. }
```

6.5 Run left rotation

Left_rotation: （Left front wheel reverse; Right front wheel forward; Left rear wheel reverse; Right rear wheel forward）



Click "File"---"Open" in the IDE interface, and select the code under the path of " CKK0015-main\Tutorial\Arduino\Sketches\ 02.5_Run_Left_rotation".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run as left rotation.

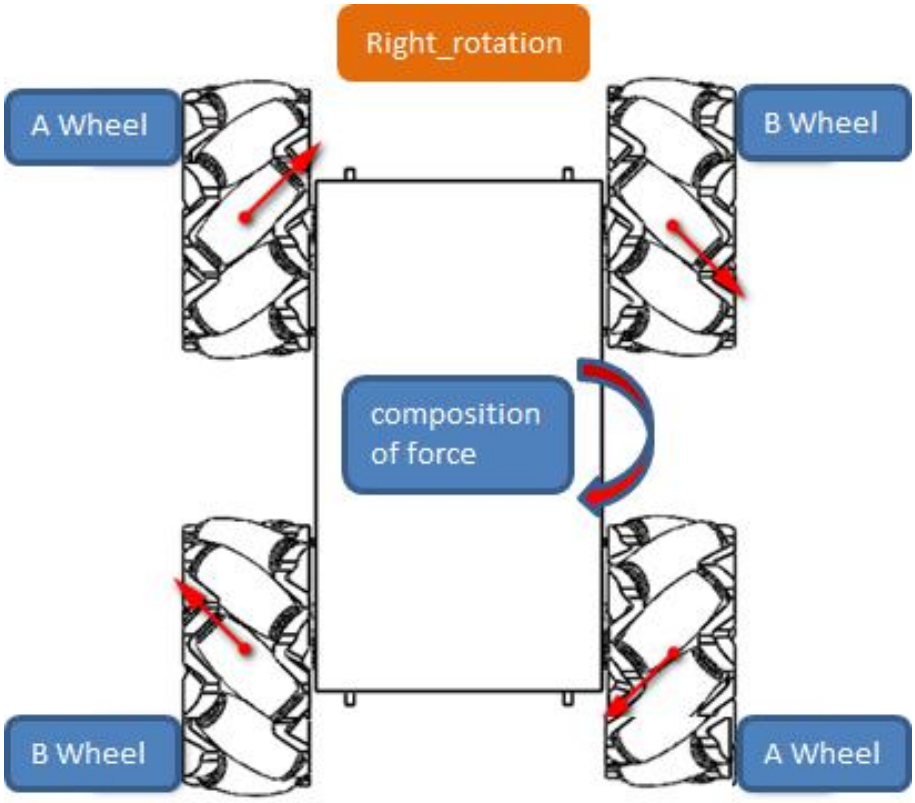
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  |  |
                  |  |
                  |  |
        motor1 -------  motor2

**********************************************************************/

#include <AFMotor.h>
```

```
15.  AF_DCMotor motor1(1);//define motor1
16.  AF_DCMotor motor2(2);//define motor2
17.  AF  DCMotor motor3(3);//define motor3
18.  AF  DCMotor motor4(4);//define motor4
19.
20. void setup()
21. {
22.   //Set initial speed of the motor & stop
23.    motor1.setSpeed(200);//setup the speed of motor1
24.    motor2.setSpeed(200);//setup the speed of motor2
25.    motor3.setSpeed(200);//setup the speed of motor3
26.    motor4.setSpeed(200);//setup the speed of motor4
27. }
28.
29. void loop()
30. {
31.   motor1.run(FORWARD);  // motor1 run FORWARD
32.   motor2.run(FORWARD);  // motor2 run FORWARD
33.   motor3.run(BACKWARD); // motor3 run BACKWARD
34.   motor4.run(BACKWARD); // motor4 run BACKWARD
35. }
```

6.6 Run right rotation

Right_rotation： （Left front wheel forward rotation; Reverse the right front wheel; Left rear wheel forward rotation; Reverse the right rear wheel.）



Click "File"---"Open" in the IDE interface, and select the code under the path of "CKK0015-main\Tutorial\Arduino\Sketches\02.6_Run_Right_rotation".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run as right rotation.

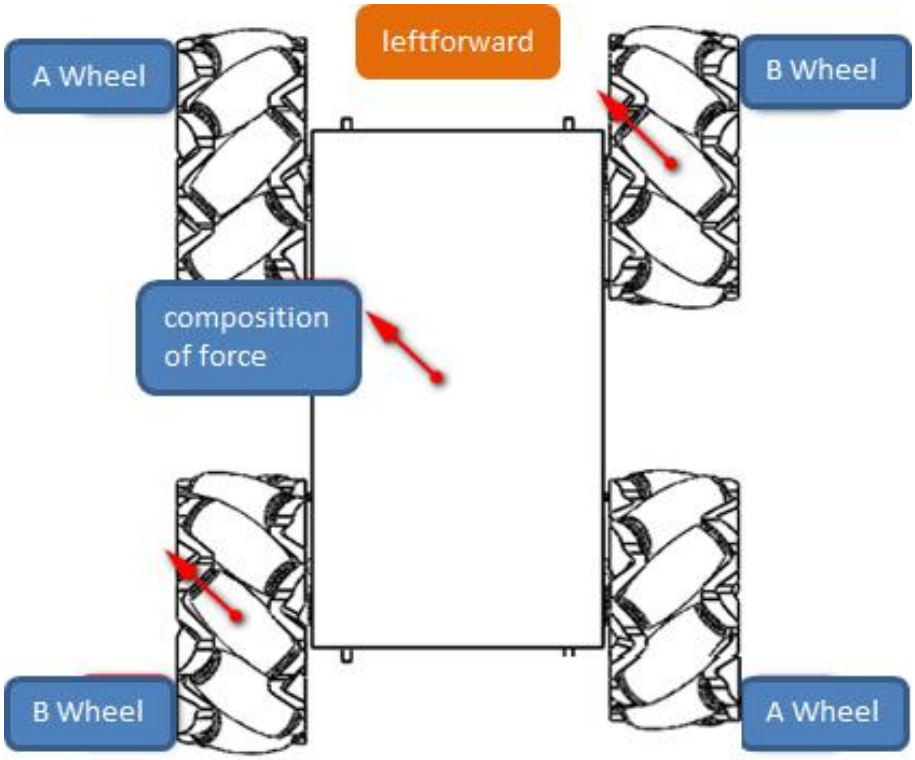
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  |  |
                  |  |
                  |  |
        motor1 -------  motor2

**********************************************************************/
```

```
13.
14. #include <AFMotor.h>
15.  AF  DCMotor motor1(1);//define motor1
16.  AF  DCMotor motor2(2);//define motor2
17.  AF_DCMotor motor3(3);//define motor3
18.  AF_DCMotor motor4(4);//define motor4
19.
20. void setup()
21. {
22.   //Set initial speed of the motor & stop
23.    motor1.setSpeed(200);//setup the speed of motor1
24.    motor2.setSpeed(200);//setup the speed of motor2
25.    motor3.setSpeed(200);//setup the speed of motor3
26.    motor4.setSpeed(200);//setup the speed of motor4
27. }
28.
29. void loop()
30. {
31.   motor1.run(BACKWARD);  // motor1 run BACKWARD
32.   motor2.run(BACKWARD);  // motor2 run BACKWARD
33.   motor3.run(FORWARD);   // motor3 run FORWARD
34.   motor4.run(FORWARD);   // motor4 run FORWARD
35. }
```

6.7 Run to leftforward

leftforward:(Two B wheels rotate forward, while two A wheels do not rotate)



Click "File"---"Open" in the IDE interface, and select the code under the path of "CKK0015-main\Tutorial\Arduino\Sketches\02.7_Run_to_leftforward".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run to left forward.

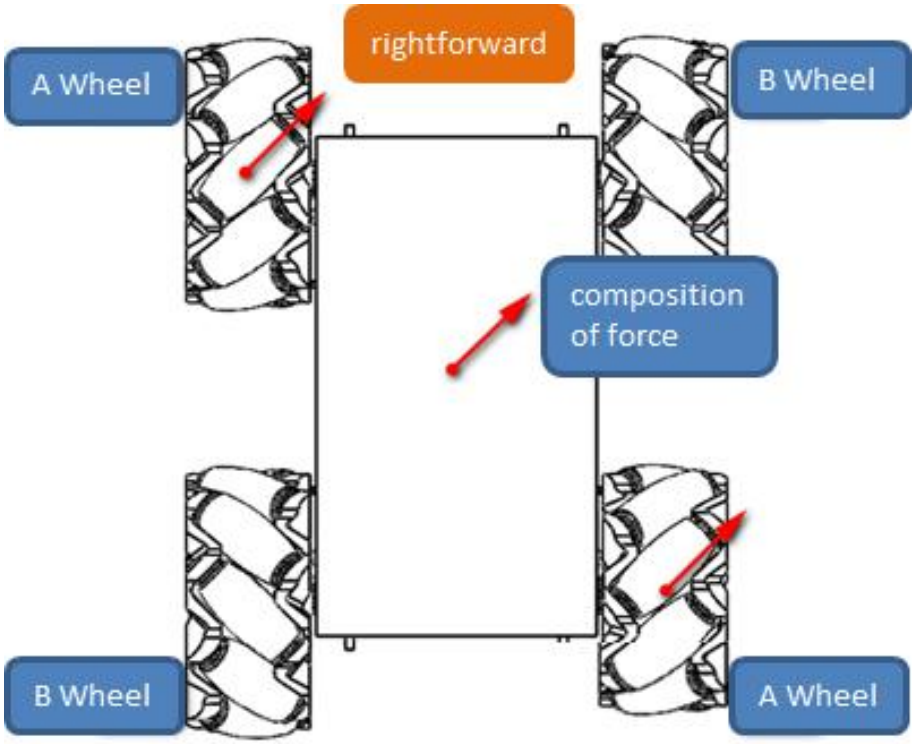
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  | |
                  | |
                  | |
        motor1 -------  motor2

**********************************************************************/
```

```
13.
14. #include <AFMotor.h>
15.  AF  DCMotor motor1(1);//define motor1
16.  //AF  DCMotor motor2(2);//define motor2
17.  AF_DCMotor motor3(3);//define motor3
18.  //AF_DCMotor motor4(4);//define motor4
19.
20. void setup()
21. {
22.   //Set initial speed of the motor & stop
23.    motor1.setSpeed(200);//setup the speed of motor1
24.  //motor2.setSpeed(200);//setup the speed of motor2
25.  //motor3.setSpeed(200);//setup the speed of motor3
26.    motor4.setSpeed(200);//setup the speed of motor4
27. }
28.
29. void loop()
30. {
31.   motor1.run(BACKWARD);    // motor1 run BACKWARD
32.   //motor2.run(BACKWARD);  // motor2 run BACKWARD
33.   motor3.run(BACKWARD);    // motor3 run BACKWARD
34.   //motor4.run(FORWARD);   // motor4 run FORWARD
35. }
```

6.8 Run to rightforward

rightforward:(Two A wheels rotate forward, while two B wheels do not rotate)



Click "File"---"Open" in the IDE interface, and select the code under the path of " CKK0015-main\Tutorial\Arduino\Sketches\ 02.8_Run_to_rightforward".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run to right forward.

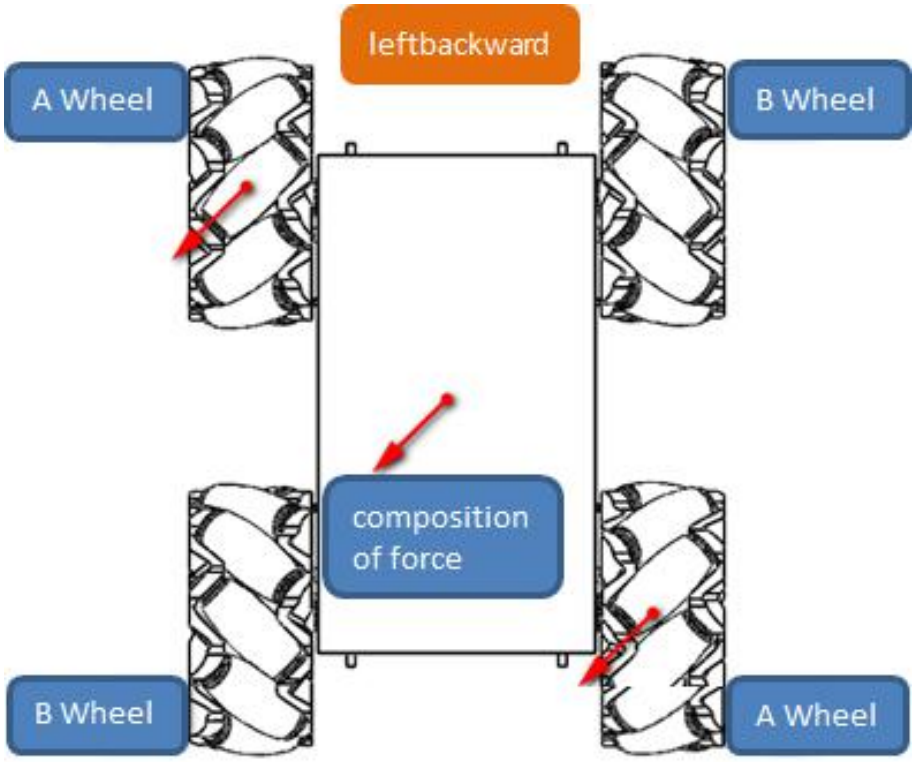
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  | |
                  | |
                  | |
        motor1 -------  motor2

**********************************************************************/

#include <AFMotor.h>
```

```
15.  //AF_DCMotor motor1(1);//define motor1
16.  AF_DCMotor motor2(2);//define motor2
17.  //AF  DCMotor motor3(3);//define motor3
18.  AF  DCMotor motor4(4);//define motor4
19.
20. void setup()
21. {
22.   //Set initial speed of the motor & stop
23.    //motor1.setSpeed(200);//setup the speed of motor1
24.    motor2.setSpeed(200);//setup the speed of motor2
25.    //motor3.setSpeed(200);//setup the speed of motor3
26.    motor4.setSpeed(200);//setup the speed of motor4
27. }
28.
29. void loop()
30. {
31.   //motor1.run(BACKWARD);  // motor1 run BACKWARD
32.    motor2.run(FORWARD);     // motor2 run FORWARD
33.   //motor3.run(FORWARD);   // motor3 run FORWARD
34.    motor4.run(FORWARD);     // motor4 run FORWARD
35. }
```

6.9 Run to leftbackward

Leftbackward:(Two A wheels reverse, while two B wheels do not rotate)



Click "File"---"Open" in the IDE interface, and select the code under the path of "CKK0015-main\Tutorial\Arduino\Sketches\ 02.9_Run_to_Leftbackward".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run to left backward.

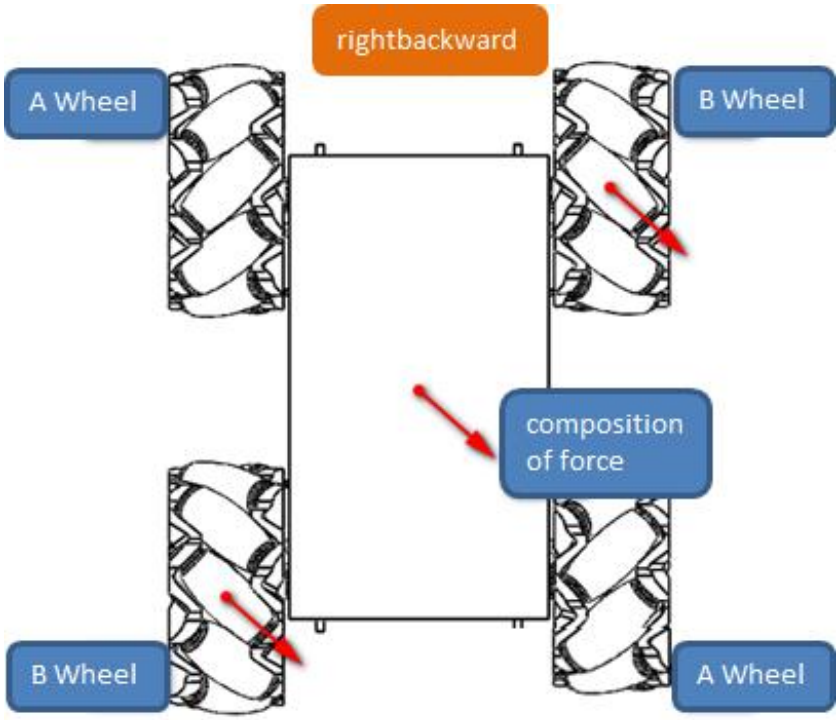
Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  |  |
                  |  |
                  |  |
        motor1 -------  motor2

**********************************************************************/

```

```
#include <AFMotor.h>
 //AF_DCMotor motor1(1);//define motor1
 AF_DCMotor motor2(2);//define motor2
 //AF_DCMotor motor3(3);//define motor3
 AF_DCMotor motor4(4);//define motor4

void setup()
{
  //Set initial speed of the motor & stop
  // motor1.setSpeed(200);//setup the speed of motor1
   motor2.setSpeed(200);  //setup the speed of motor2
  // motor3.setSpeed(200);//setup the speed of motor3
   motor4.setSpeed(200);  //setup the speed of motor4
}

void loop()
{
 // motor1.run(BACKWARD);  // motor1 run BACKWARD
  motor2.run(BACKWARD);    // motor2 run BACKWARD
 // motor3.run(FORWARD);   // motor3 run FORWARD
  motor4.run(BACKWARD);    // motor4 run BACKWARD
}
```

6.10 Run to rightbackward

`Rightbackward:`(Two B wheels reverse, while two A wheels do not rotate)



Click "File"---"Open" in the IDE interface, and select the code under the path of "CKK0015-main\Tutorial\Arduino\Sketches\ 02.10_Run_to_Rightbackward".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run to right backward.

Code:

```
/**********************************************************************
  Product     : Cokoino 4WD Mecanum Car chassis kit
  Auther      : www.cokoino.com
  Modification: 2023/11/07

        motor4 -------  motor3
                  | |
                  | |
                  | |
        motor1 -------  motor2

**********************************************************************/

```

```
#include <AFMotor.h>
AF_DCMotor motor1(1);  //define motor1
//AF  DCMotor motor2(2);//define motor2
AF  DCMotor motor3(3);  //define motor3
//AF_DCMotor motor4(4);//define motor4

void setup()
{
  //Set initial speed of the motor & stop
   motor1.setSpeed(200);  //setup the speed of motor1
  // motor2.setSpeed(200);//setup the speed of motor2
   motor3.setSpeed(200);  //setup the speed of motor3
  // motor4.setSpeed(200);//setup the speed of motor4
}

void loop()
{
  motor1.run(FORWARD);     // motor1 run FORWARD
  //motor2.run(BACKWARD);  // motor2 run BACKWARD
  motor3.run(FORWARD);     // motor3 run FORWARD
  //motor4.run(FORWARD);   // motor4 run FORWARD
}
```

6.11 Move the car chassis comprehensive

Let's combine the various individual actions mentioned above to make the 4WD Mecanum wheel car more interesting to move and deepen our understanding of the Mecanum wheel.

Click "File"---"Open" in the IDE interface, and select the code under the path of " CKK0015-main\Tutorial\Arduino\Sketches\ 02.11_Car_moving".

After the code is compiled successfully, connect the UNO board on the 4WD body to the computer with a USB cable, and upload the program.

After the upload is successful, you can power on,then the car will run as:forward(1.5s)---stop(0.5s)---backward(1.5s)---stop(0.5s)---move to left(1.5s)---stop(0.5s)---move to right(1.5s)---left rotaiton(1.5s)---stop(0.5s)---right rotation(1.5s)---stop(0.5s)---run to leftforward(1.5s)---stop(0.5s)---run to rightforward(1.5s)---stop(0.5s)---run to leftbackward(1.5s)---stop(0.5s)---run to rightbackward(1.5s)---stop(0.5s)

Code:

```
/*****************************************************************
   Product     : Cokoino 4WD Mecanum Car chassis kit
   Auther      : www.cokoino.com
   Modification: 2023/11/07

         motor4 -------  motor3
                    | |
                    | |
                    | |
         motor1 -------  motor2

*****************************************************************/

#include <AFMotor.h>
 AF_DCMotor motor1(1);//define motor1
 AF_DCMotor motor2(2);//define motor2
 AF  DCMotor motor3(3);//define motor3
 AF  DCMotor motor4(4);//define motor4

void setup()
{
  //Set initial speed of the motor & stop
   motor1.setSpeed(200);//setup the speed of motor1
   motor2.setSpeed(200);//setup the speed of motor2
   motor3.setSpeed(200);//setup the speed of motor3
   motor4.setSpeed(200);//setup the speed of motor4

}

void loop()
{
  //Forward
  motor1.run(BACKWARD);//motor1 run BACKWARD
  motor2.run(FORWARD); //motor2 run FORWARD
  motor3.run(BACKWARD);//motor3 run BACKWARD
  motor4.run(FORWARD); //motor4 run FORWARD
  delay(1500);
```

```
38.  motor1.run(RELEASE);// motor1 stop run
39.  motor2.run(RELEASE);
40.  motor3.run(RELEASE);
41.  motor4.run(RELEASE);
42.  delay(500);
43.  //Backward
44.  motor1.run(FORWARD); //motor1 run FORWARD
45.  motor2.run(BACKWARD);//motor2 run BACKWARD
46.  motor3.run(FORWARD); //motor3 run FORWARD
47.  motor4.run(BACKWARD);//motor4 run BACKWARD
48.  delay(1500);
49.  motor1.run(RELEASE);
50.  motor2.run(RELEASE);
51.  motor3.run(RELEASE);
52.  motor4.run(RELEASE);
53.  delay(500);
54.  //Move to left
55.  motor1.run(BACKWARD);// motor1 run BACKWARD
56.  motor2.run(BACKWARD);// motor2 run BACKWARD
57.  motor3.run(BACKWARD);// motor3 run BACKWARD
58.  motor4.run(BACKWARD);// motor4 run BACKWARD
59.  delay(1500);
60.  motor1.run(RELEASE);
61.  motor2.run(RELEASE);
62.  motor3.run(RELEASE);
63.  motor4.run(RELEASE);
64.  delay(500);
65.  //Move to right
66.  motor1.run(FORWARD);// motor1 run FORWARD
67.  motor2.run(FORWARD);// motor2 run FORWARD
68.  motor3.run(FORWARD);// motor3 run FORWARD
69.  motor4.run(FORWARD);// motor4 run FORWARD
70.  delay(1500);
71.  motor1.run(RELEASE);
72.  motor2.run(RELEASE);
73.  motor3.run(RELEASE);
74.  motor4.run(RELEASE);
```

```
75.  delay(500);
76.  //Left rotation
77.  motor1.run(FORWARD);  // motor1 run FORWARD
78.  motor2.run(FORWARD);  // motor2 run FORWARD
79.  motor3.run(BACKWARD); // motor3 run BACKWARD
80.  motor4.run(BACKWARD); // motor4 run BACKWARD
81.  delay(1500);
82.  motor1.run(RELEASE);
83.  motor2.run(RELEASE);
84.  motor3.run(RELEASE);
85.  motor4.run(RELEASE);
86.  delay(500);
87.  //Right rotation
88.  motor1.run(BACKWARD);  // motor1 run BACKWARD
89.  motor2.run(BACKWARD);  // motor2 run BACKWARD
90.  motor3.run(FORWARD);   // motor3 run FORWARD
91.  motor4.run(FORWARD);   // motor4 run FORWARD
92.  delay(1500);
93.  motor1.run(RELEASE);
94.  motor2.run(RELEASE);
95.  motor3.run(RELEASE);
96.  motor4.run(RELEASE);
97.  delay(500);
98.  //Run to leftforward
99.  motor1.run(BACKWARD);    // motor1 run BACKWARD
100.       motor3.run(BACKWARD);    // motor3 run BACKWARD
101.       delay(1500);
102.       motor1.run(RELEASE);
103.       motor3.run(RELEASE);
104.       delay(500);
105.       // Run to rightforward
106.       motor2.run(FORWARD);     // motor2 run FORWARD
107.       motor4.run(FORWARD);     // motor4 run FORWARD
108.       delay(1500);
109.       motor2.run(RELEASE);
110.       motor4.run(RELEASE);
111.       delay(500);
```

```
112.      // Run to leftbackward
113.      motor2.run(BACKWARD);    // motor2 run BACKWARD
114.      motor4.run(BACKWARD);    // motor4 run BACKWARD
115.      delay(1500);
116.      motor2.run(RELEASE);
117.      motor4.run(RELEASE);
118.      delay(500);
119.      // Run to rightbackward
120.      motor1.run(FORWARD);     // motor1 run FORWARD
121.      motor3.run(FORWARD);     // motor3 run FORWARD
122.      delay(1500);
123.      motor1.run(RELEASE);
124.      motor3.run(RELEASE);
125.      delay(500);
126.    }
```

7. Make your suggestion and get support

THANK YOU for participating in this learning experience!

If you find errors, omissions or you have suggestions and/or questions about this lesson, please feel free to contact us: **cokoino@outlook.com**

We will make every effort to make changes and correct errors as soon as feasibly possible and publish a revised version.

If you want to learn more about Arduino, Raspberry Pi, Smart Cars, Robotics and other interesting products in science and technology, please continue to visit our Amazon Store by search for "LK COKOINO" on Amazon. We will continue to launch fun, cost-effective, innovative and exciting products.

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