

### 5.3 CarRun

#### 1. Learning goal:

Control the car to move in different directions.

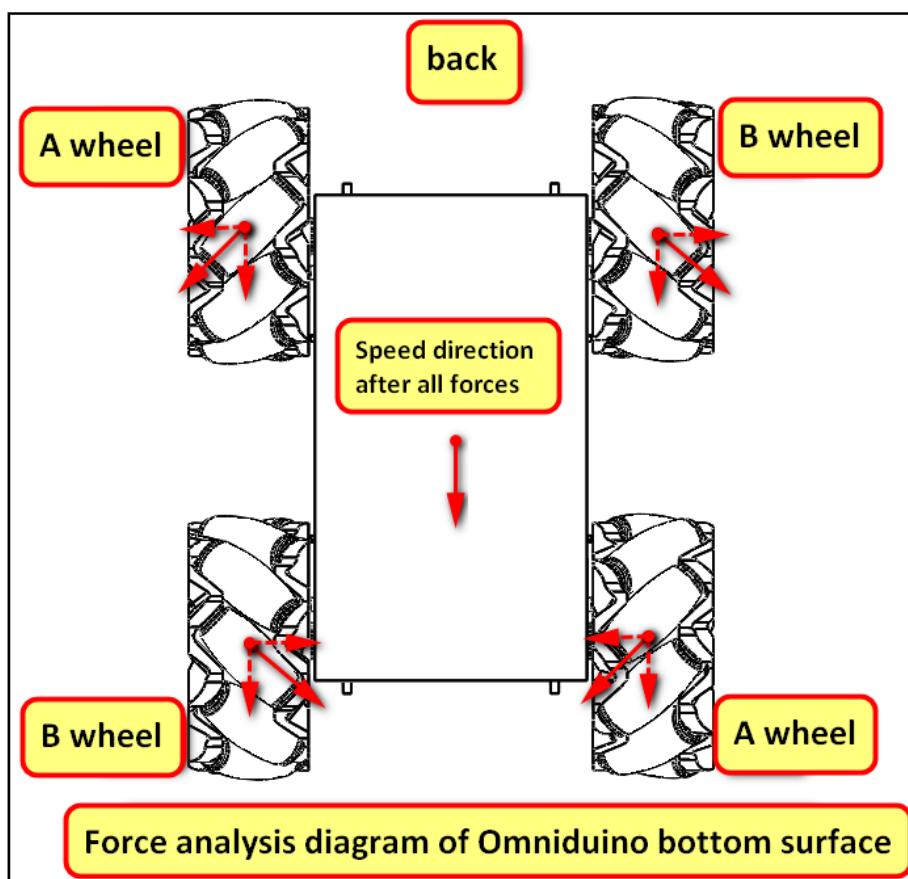
#### 2. Experimental phenomena:

After we open the power of switch, press the button(K1) to start the program. The car will shifts to the right for 1 second, then moves down for 1 second, then shifts to the left for 1 second, and moves up for 1 second and then stops for 0.5 seconds. The movement of the car is similar to a rectangle.

Then spin left for 2 seconds, stop for 0.5 seconds, then spin right for 2 seconds, and stop.

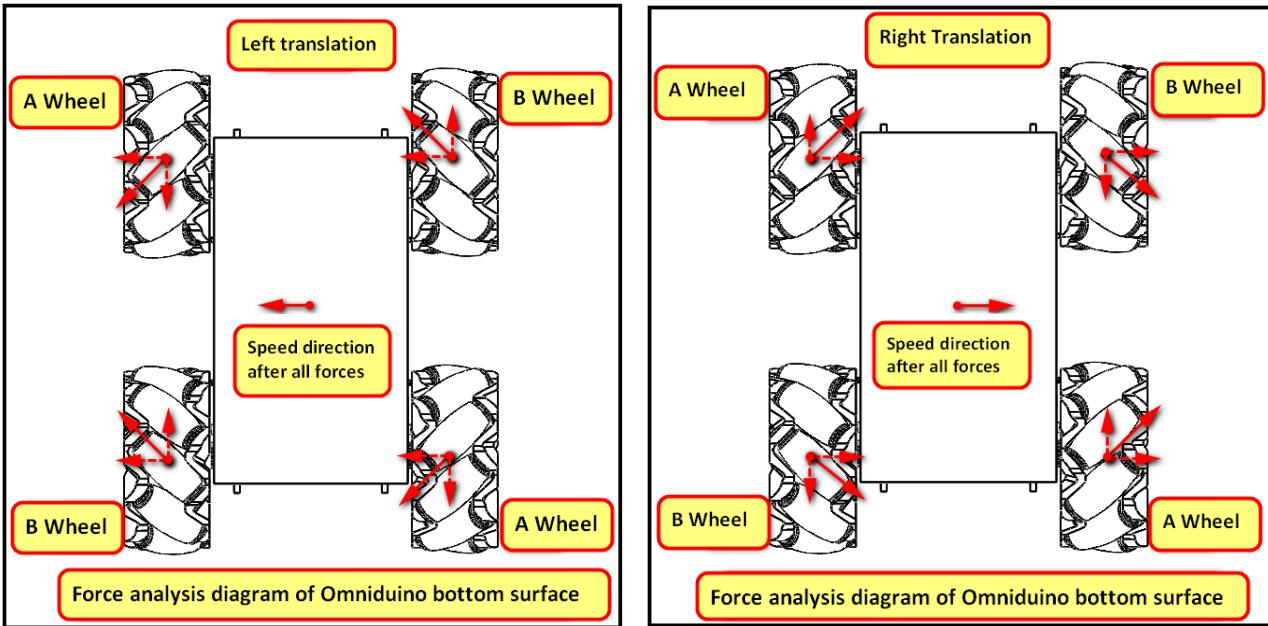
#### 3. Force Analysis:

3.1 According to the characteristics of the Mecanum wheel, if the omniduino car back, the four wheels must rotate reserve. The force analysis diagram is shown below:



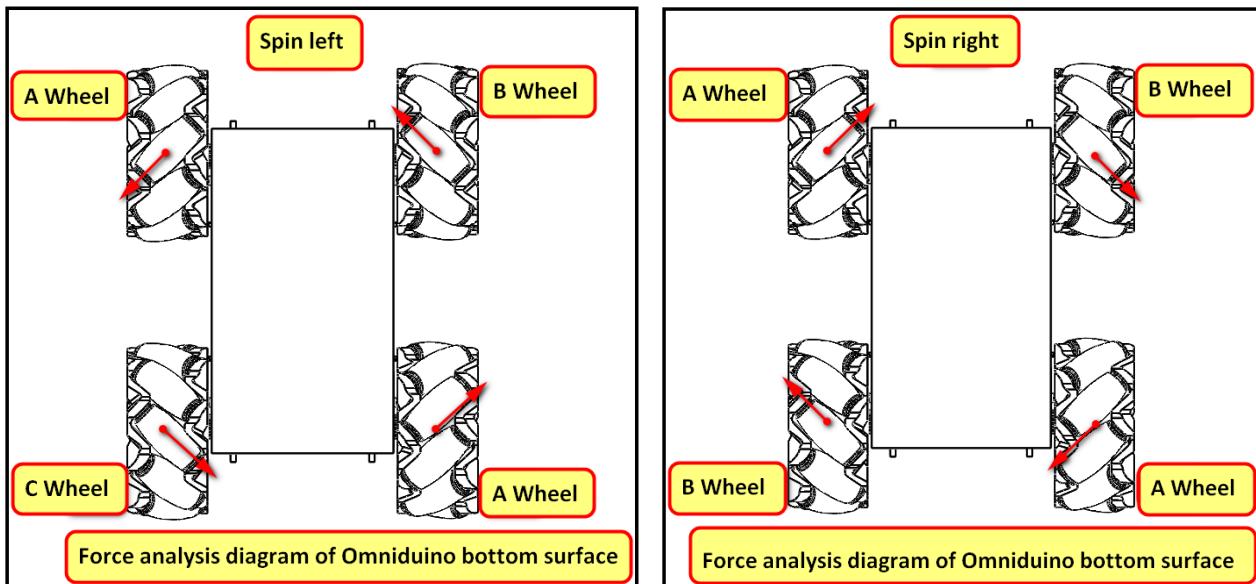
3.2 When A wheel reserve and B wheel forward, car left translation.

3.3 When A wheel forward and B wheel reserve, car right translation.



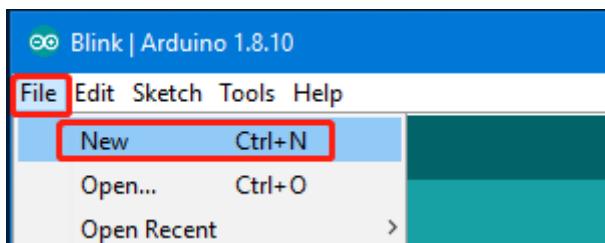
3.4 When left wheel reserve and right wheel forward, car spin left.

3.5 When left wheel forward and right wheel reserve, car spin right.

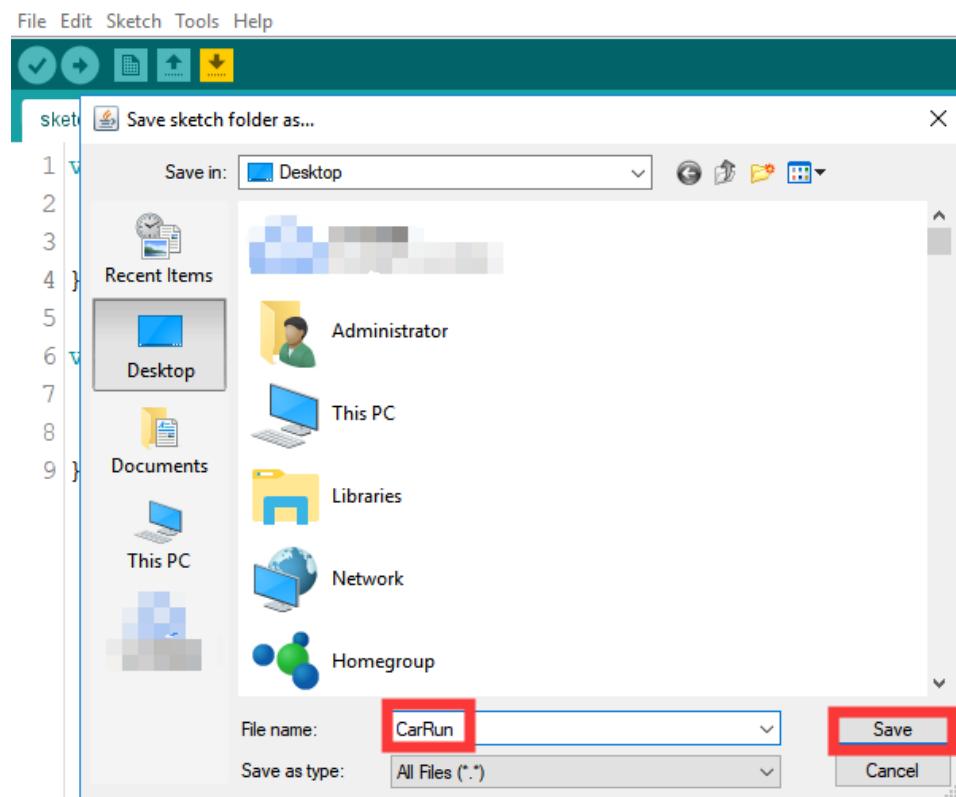


#### 4. Create new project

4.1 Click 【File】-->【New】.



4.2 Press **Ctrl+S** to save and rename CarRun. As shown below.



4.3 We can see that there is a Serial folder with **CarRun01.ino** on the computer desktop.

4.4 We will **CarRun01.ino** as shown below.

```
void setup() {
    // put your setup code here, to run once:
}

void loop() {
    // put your main code here, to run repeatedly:
}
```

The `setup()` function only runs once when the car is turned on or when the reset button is pressed, and the program for initializing the relevant content can be written;

The `loop()` function is the main loop function of the car and most of the data processing and logic processing are done in this function.

## 5. Programming

5.1 New create back() function, when 4 motors reserve, car back.

```

void back(int Speed)
{
    Speed = map(Speed, 0, 160, 0, 2560);
    pwm.setPWM(10, 0, 0);
    pwm.setPWM(11, 0, Speed);      //Right front reserve
    pwm.setPWM(8, 0, 0);
    pwm.setPWM(9, 0, Speed);      //Right rear reserve

    pwm.setPWM(13, 0, 0);
    pwm.setPWM(12, 0, Speed);      //Left front reserve
    pwm.setPWM(15, 0, 0);
    pwm.setPWM(14, 0, Speed);      //Left front reserve
}

```

5.2 New create left() function, when A wheel reserve and B wheel forward, car left translation.

```

void left(int Speed)
{
    Speed = map(Speed, 0, 160, 0, 2560);
    pwm.setPWM(10, 0, Speed);      //Right re
    pwm.setPWM(11, 0, 0);
    pwm.setPWM(8, 0, 0);
    pwm.setPWM(9, 0, Speed);      //Right fr

    pwm.setPWM(13, 0, 0);
    pwm.setPWM(12, 0, Speed);      //Left rea
    pwm.setPWM(15, 0, Speed);      //Left fro
    pwm.setPWM(14, 0, 0);
}

```

5.3 New create right() function, when A wheel forward and B wheel reserve, car left translation.

```

void right(int Speed)
{
    Speed = map(Speed, 0, 160, 0, 2560);
    pwm.setPWM(10, 0, 0);
    pwm.setPWM(11, 0, Speed);      //Right fron
    pwm.setPWM(8, 0, Speed);      //Right rear
    pwm.setPWM(9, 0, 0);

    pwm.setPWM(13, 0, Speed);      //Left front
    pwm.setPWM(12, 0, 0);
    pwm.setPWM(15, 0, 0);
    pwm.setPWM(14, 0, Speed);      //Left rear
}

```

5.4 New create spin\_left() function, when left wheel reserve and right wheel forward, car spin left.

```

void spin_left(int Speed)
{
    Speed = map(Speed, 0, 160, 0, 2560);
    pwm.setPWM(10, 0, Speed); //Right front wheel Forward
    pwm.setPWM(11, 0, 0);
    pwm.setPWM(8, 0, Speed); //Right rear wheel Forward
    pwm.setPWM(9, 0, 0);

    pwm.setPWM(13, 0, 0);
    pwm.setPWM(12, 0, Speed); //Left front wheel Reserve
    pwm.setPWM(15, 0, 0);
    pwm.setPWM(14, 0, Speed); //Left rear wheel Reserve
}

```

5.5 New create spin\_right() function, when left wheel forward and B wheel reserve, car spin right.

```

void spin_right(int Speed)
{
    Speed = map(Speed, 0, 160, 0, 2560);
    pwm.setPWM(10, 0, 0);
    pwm.setPWM(11, 0, Speed); //Right front wheel Reserve
    pwm.setPWM(8, 0, 0);
    pwm.setPWM(9, 0, Speed); //Right rear wheel Reserve

    pwm.setPWM(13, 0, Speed); //Left front wheel Forward
    pwm.setPWM(12, 0, 0);
    pwm.setPWM(15, 0, Speed); //Left rear wheel Forward
    pwm.setPWM(14, 0, 0);
}

```

5.6 New carRun01() function, which can realize the function of car movement, the car right translation for 1 second, then back for 1 second, left translation for 1 second, then advance for 1 second, stops for 0.5 seconds, spin left for 2 seconds, spin right for 2 seconds and stop.

```

void carRun01()
{
    right(CarSpeedControl);
    delay(1000);
    back(CarSpeedControl);
    delay(1000);
    left(CarSpeedControl);
    delay(1000);
    run(CarSpeedControl);
    delay(1000);
    brake();
    delay(500);
    spin_left(CarSpeedControl);
    delay(2000);
    brake();
    delay(500);
    spin_right(CarSpeedControl);
    delay(2000);
    brake();
}

```

5.7 In the loop() main loop function detection K1 button, when the K1 button is pressed, after 0.5 seconds, car start sport, the car right translation for 1 second, then back for 1 second, left translation for 1 second, then advance for 1 second, stops for 0.5 seconds, spin left for 2 seconds, spin right for 2 seconds and stop. Then, resets button\_press = 0. When the car stops moving, press the K1 button again and the car restarts the exercise program.

```

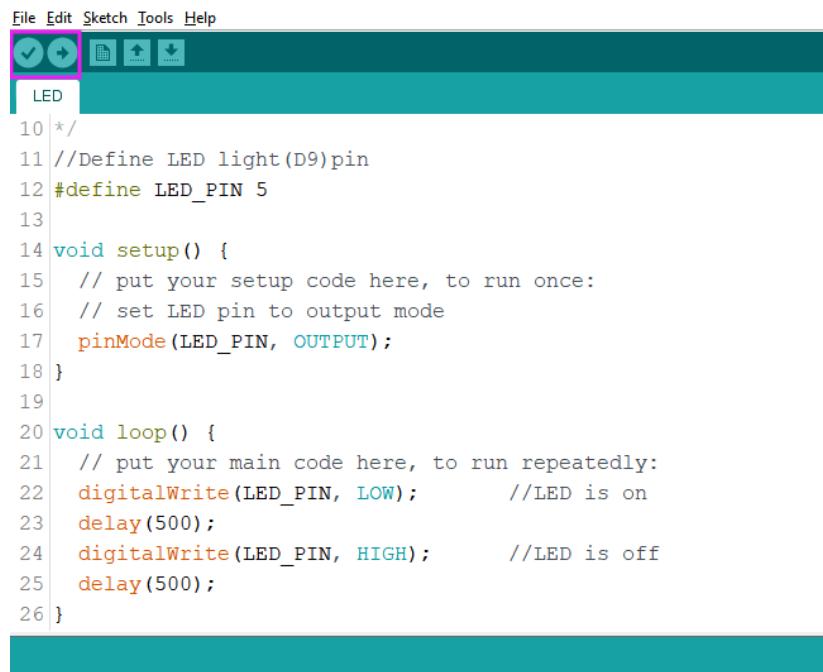
void loop() {
    // put your main code here, to run repeatedly:
    //keyscan
    keyscan();

    if (button_press)      // when button is pressed
    {
        delay(500);
        carRun01();
        button_press = 0;
    }
}

```

## 6. Compiling and downloading code

6.1 After the code is written, press Ctrl+S to save, then click the “√” button to compile. If there is no problem, click “→” to upload (the car must be connected to the computer via the USB cable).

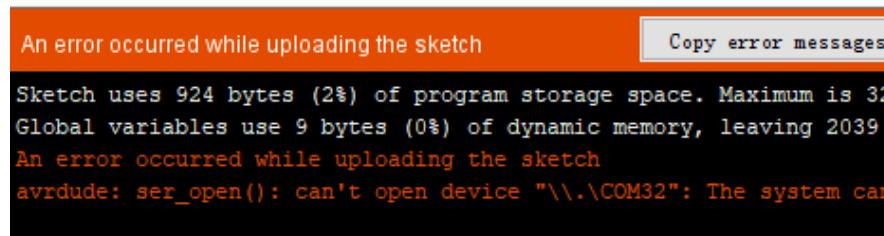


```

File Edit Sketch Tools Help
LED
10 */
11 //Define LED light(D9)pin
12 #define LED_PIN 5
13
14 void setup() {
15   // put your setup code here, to run once:
16   // set LED pin to output mode
17   pinMode(LED_PIN, OUTPUT);
18 }
19
20 void loop() {
21   // put your main code here, to run repeatedly:
22   digitalWrite(LED_PIN, LOW);      //LED is on
23   delay(500);
24   digitalWrite(LED_PIN, HIGH);     //LED is off
25   delay(500);
26 }

```

6.2 If the compilation passes normally, but the following error occurs during uploading, the reason may be that the wrong serial port or the serial port is occupied.



**Solution:** Open the device manager to see if there is a serial port with CH340 tag. If not, please restart the Omniduino car, then, re-plug the USB cable or replace a USB cable; If there is a serial port number, we need to close the other serial port or assistant software, avoid serial port occupation, and then re-select the serial port to ArduinolDE **[Tool]-->[Port]**.

6.3 If there is an error like the following, it means that the library file is missing. Please copy the library file provided by the omniduino omnibus to the library file directory compiled by arduinolDE.

please refer to **【3.Development Environment Construction】----【3.4 Add additional library files】**

```
Adafruit_PWMServoDriver.h: No such file or directory

CarRun:2:10: error: Adafruit_PWMServoDriver.h: No such file or directory
#include <Adafruit_PWMServoDriver.h>
^
compilation terminated.

exit status 1
Adafruit_PWMServoDriver.h: No such file or directory
```