MSPM0 National Competition Chassis Car

1. Experimental preparation

1. Knowledge reserve

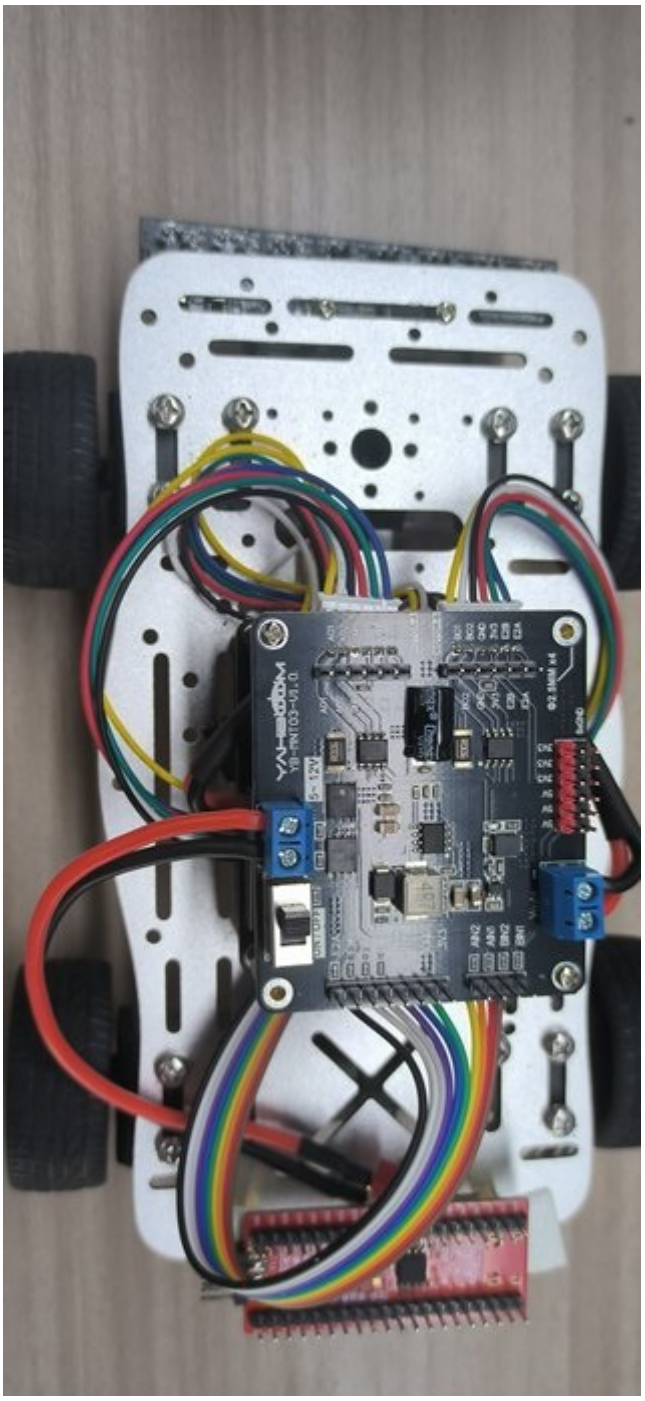
- Have good programming skills (mainly C language)
- Familiar with the architecture of MSPm0

2. Material preparation

- Smart car mini chassis *1
- MSPM0G3507 core board *1
- Yabo version of dual-channel motor driver board *2 (other motor driver boards may not be suitable for the source code provided in this tutorial, you need to transplant them yourself)
- Eight-way tracking module *1
- 310 motor *4
- 7.4V battery *1
- Several Dupont wires
- Several M3 copper pillars and M3 screws

2. Car wiring

After the car is assembled, it is shown as follows



2.1 Wiring of MSPM0 and dual-channel driver board

1. Wiring of MSPM0G3507 and dual motor board (topmost board)

MSPM0G3507	The top dual-circuit motor board
PA13	AIN1
PA12	AIN2
PB6	BIN1
PB7	BIN2
3V3	3V3
GND	GND

MSPM0G3507	The top dual-circuit motor board
PA14	E1A
PA15	E1B
PA8	E2A
PA9	E2B
5V	5V

2. Wiring of MSPM0G3507 and dual-circuit motor board (bottommost board)

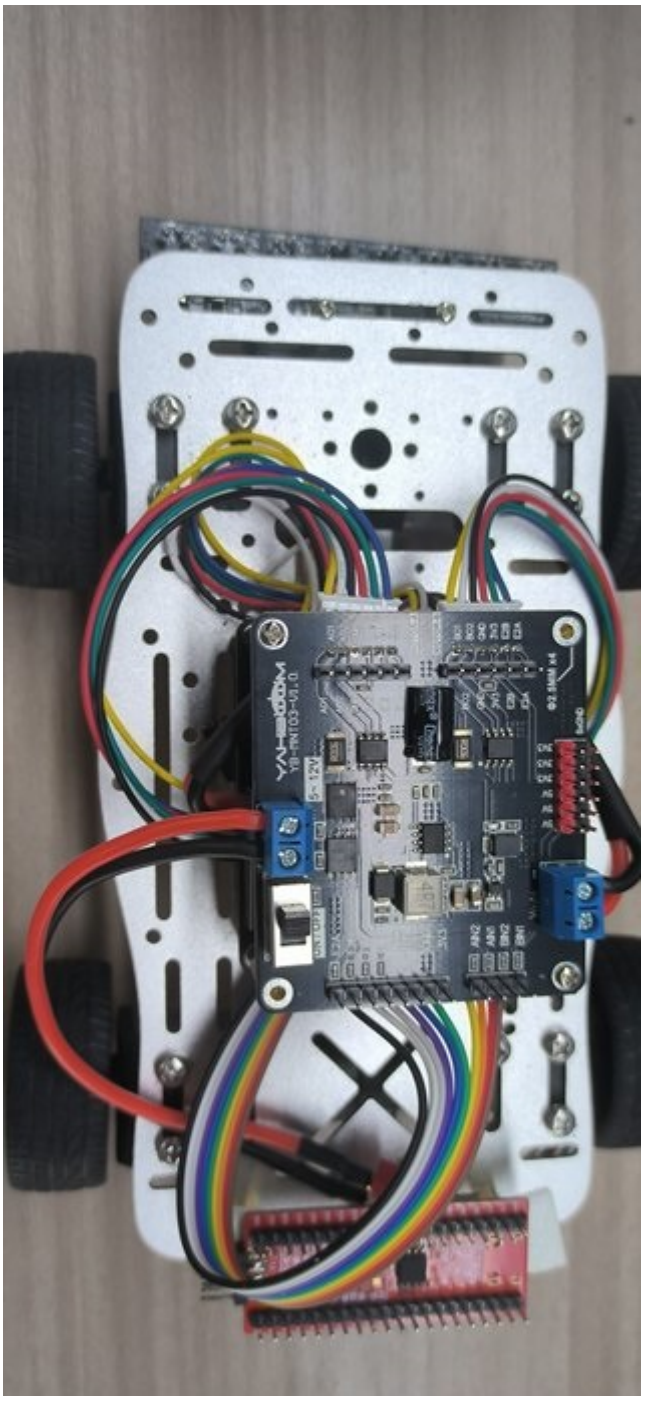
MSPM0G3507	The bottom layer dual-circuit motor board
PA27	AIN1
PA26	AIN2
PB9	BIN1
PB8	BIN2
3V3	3V3
GND	GND
PA24	E1A
PA25	E1B
PA21	E2A
PA22	E2B

3. The top motor driver board is connected to the motors of the two wheels near the infrared sensor (the front motor),

   motorA--->left motor, motorB--->right motor

4. The bottom motor driver board is connected to the motors of the two wheels far from the infrared sensor (the back motor),

   motorA--->left motor, motorB--->right motor



2.2 Wiring of MSPM0G3507 and infrared sensor (this example uses IO communication)

MSPM0G3507	Infrared sensor
PA28	X1
PA31	X2
PA02	X3
PB24	X4
PB20	X5
PB19	X6

MSPM0G3507	Infrared sensor
PB18	X7
PA07	X8
5V	5V
GND	GND

MSPM0 developers need to build the environment before compiling and running the project
Environment building tutorial:
https://wiki.lckfb.com/zh-hans/dmx/beginner/install.html

Main procedures

```
int main(void)
{
    SYSCFG_DL_init();

    Motor_PID_Init();//Motor pid initialization

    //Wait for the infrared module to be normal
    delay_ms(1000);
    delay_ms(1000);
    delay_ms(1000);
    delay_ms(1000);

     //Clear the serial port interrupt flag
    NVIC_ClearPendingIRQ(MYUART_INST_INT_IRQN);
    //Enable serial port interrupt
    NVIC_EnableIRQ(MYUART_INST_INT_IRQN);

    init_motor();//Motor timer on


    while (1)
    {
        //Using io
        LineWalking();//Line patrol pid
    }
}
```

The main function is to perform PID processing for line patrol according to the value of the infrared probe, so that line patrol can be completed on the map with black lines and white background.

In app_irtrackin.c, there is a parameter for adjusting PID line patrol. If you want to increase or decrease the speed and optimize the effect, you can adjust the macro definition value inside.

```
#define IRTrack_Trun_KP (250) //P
#define IRTrack_Trun_KI (0) //I
#define IRTrack_Trun_KD (1) //D

#define IRR_SPEED             400  //Line patrol speed
```

- IRTrack_Trun_KP: P value of pid line patrol
- IRTrack_Trun_KI: I value of pid line patrol
- IRTrack_Trun_KD: D value of pid line patrol
- IRR_SPEED: Speed of line patrol

When checking whether the motor wiring is correct, you can give a positive speed and set the value of line patrol PID to 0. If the wiring is correct, turn on the machine and wait for a while, the car will move forward, and all four motors will move forward.

Experimental phenomenon:

If the 8-way module probe still cannot detect the black and white lines normally, you need to press and hold the reset button of MSPM0, wait for the module to work normally, and then release the reset button

On the premise of ensuring that the wiring and installation are correct, after the 8-way line patrol module is calibrated, (if the same map as the tutorial is used), you need to put the car under the starting point diagram as shown below, turn on the machine and wait for a while, and then you can start patrolling the line.

If the floor is black, you need to put a piece of white paper under our map to cover the black. The main reason is that the material of the map is relatively transparent, which has a greater impact on the 8-way line patrol sensor.