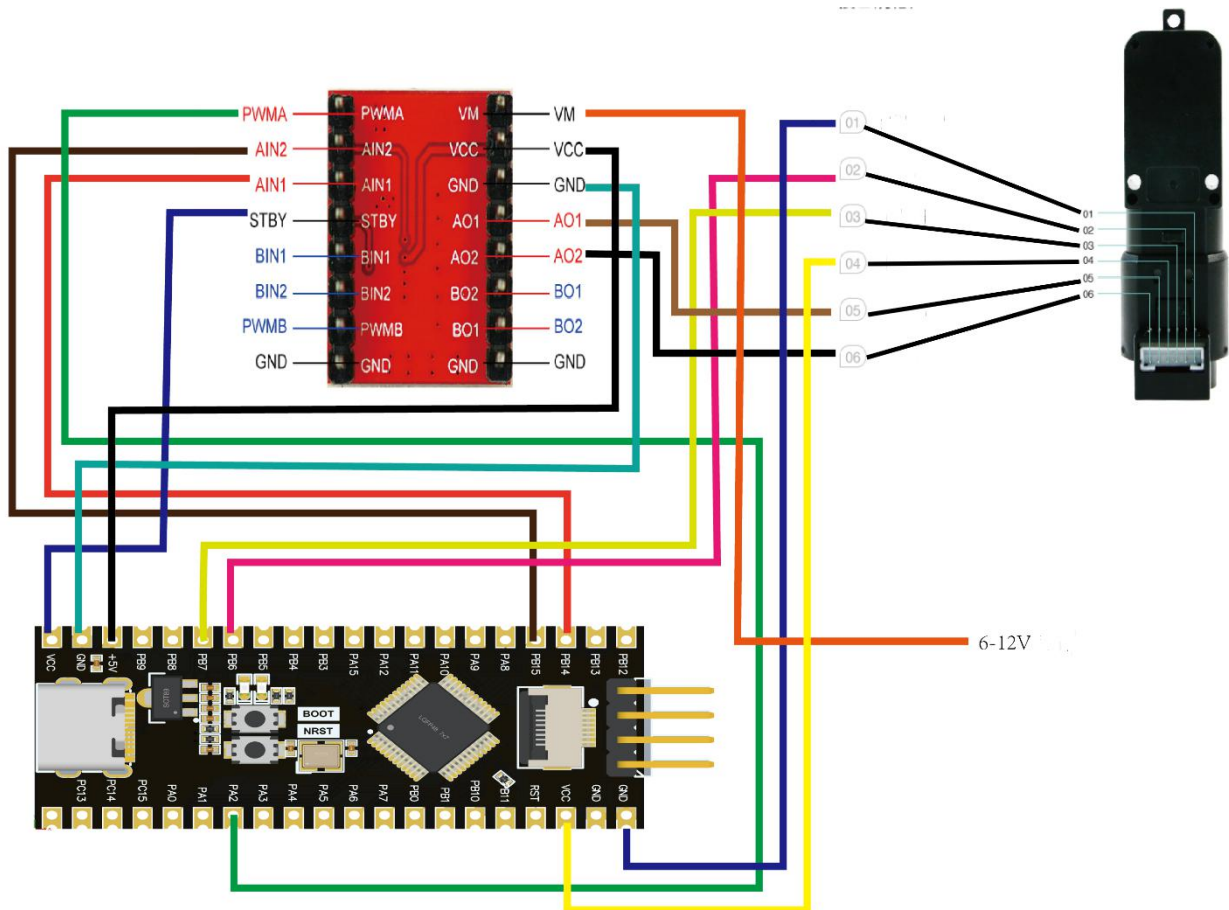# TT motor with encoder

## 1. Learning objectives

In this course, we mainly learn to use STM32F103RCT to drive TT code disc motor speed measurement.

## 2. Prepare before class

In the example, we use the TB6612 motor drive module, or we can use other motor drive modules to drive the motor function only.



The hardware wiring diagram shows the STM32F103C8T6 wiring diagram, STM32F103RCT6 all wiring is the same, according to the corresponding pin connection.

·Hardware wiring：

    TB6612 module AIN1 ----> PB14

    TB6612 module AIN2 ----> PB15

    TB661 module PWMA ----> PA2

    TB6612 module STBY ----> STM32 5V

    TB6612 module VCC ----> STM32 5V

    TB6612 module VM ----> 6-12V power

    TB6612 module GND ----> STM32 GND

    TB6612 module AO1 ----> Motor M+

    TB6612 module AO2 ----> Motor M-

    TT Motor encoders A □----> PB6

    TT Motor encoders B □----> PB7

TT Motor encoders VCC----> STM32 5V

TT Motor encoders GND----> STM32 5V

TTL Motor encoders TX ----> PB11 (STM32 RX)

TTL Motor encoders RX ----> PB10 (STM32 TX)

## 3. Code

Initialize timers, pins, interrupts, etc.

```
GPIO_PinRemapConfig(GPIO_Remap_SWJ_Disable,ENABLE);
GPIO_PinRemapConfig(GPIO_Remap_SWJ_JTAGDisable,ENABLE);//禁用JTAG 启用 SWD

MY_NVIC_PriorityGroupConfig(2); //=====设置中断分组

delay_init();              //=====延时函数初始化
MOTOR_Init();
usart3_init(9600);         //=====串口3初始化  蓝牙 发送调试信息

Encoder_Init_TIM2();       //=====初始化编码器1接口
Encoder_Init_TIM4();       //=====初始化编码器2接口

TIM3_Int_Init(50-1,7200-1);  //=====定时器初始化 5ms一次中断
```

Drive the motor forward and print the speed value

```
while(1)
{
    MOTOR_forward();
    printf("RPM=%d\r\n",leftSpeedNow);
    delay_ms(15);
}
```

The program did two code disc speed measurement, respectively used T4 and T2 timers, in the main cycle only printed the T4 timer (revolver) speed measurement results, and arduino program, the speed test uses the current value minus the previous value to achieve forward and reverse judgment, here 20, 4.601 is the best ratio obtained after multiple actual speed tests.

```
/*******************************************************************
函数功能：计算左右轮速
入口参数：int *leftSpeed,int *rightSpeed
返回  值：无
*******************************************************************/
void Get_Motor_Speed(int *leftSpeed,int *rightSpeed)
{
    static int leftWheelEncoderNow    = 0;
    static int rightWheelEncoderNow   = 0;
    static int leftWheelEncoderLast   = 0;
    static int rightWheelEncoderLast  = 0;

    //记录本次左右编码器数据
    leftWheelEncoderNow += getTIMx_DetaCnt(TIM4);
    rightWheelEncoderNow+= getTIMx_DetaCnt(TIM2);

    //5ms测速
    *leftSpeed  = (leftWheelEncoderNow - leftWheelEncoderLast)*20;  //4.601
    *rightSpeed = (rightWheelEncoderNow - rightWheelEncoderLast)*4.601;

    //记录上次编码器数据
    leftWheelEncoderLast  = leftWheelEncoderNow;
    rightWheelEncoderLast = rightWheelEncoderNow;
}
```

## 4. Experimental phenomenon

After the program is downloaded, run, the motor rotates, using the TTL level translation module,

the baud rate is set to 9600, you can, check the corresponding motor speed on the computer.