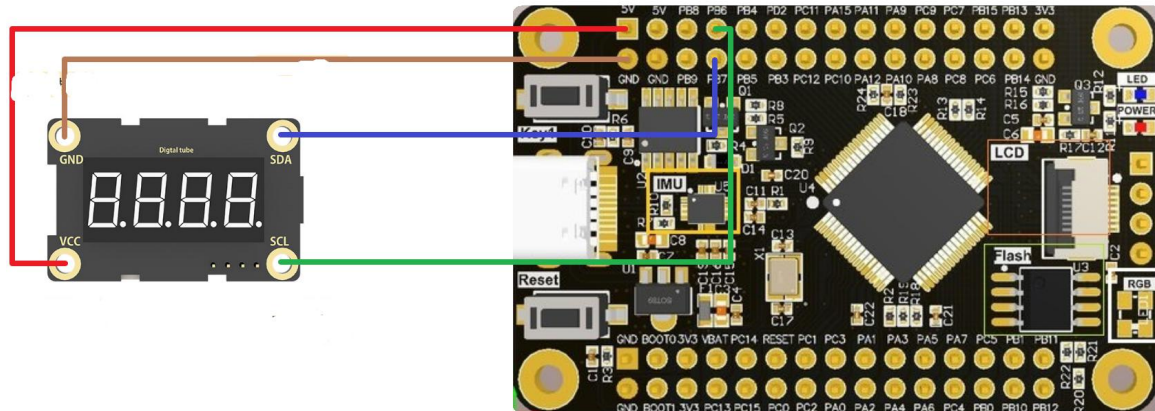# Digital tube debugging

Learning objectives

By learning to use STM32F103RCT6 and the Nixie tube module, the digital tube can display the number you need.

Prepare before class

Connect the STM32 chip to the Nixie tube module for wiring diagrams:

Project files

1. Programmatic

keil programming: first of all, we will use st-link as a downloader, we need to press the four connectors of st-link to connect the corresponding pin above STM32F103RCT6, then open keil, click the magic wand to select debug and select the corresponding downloader such as st-link, and then click settings to appear This interface can be downloaded normally.
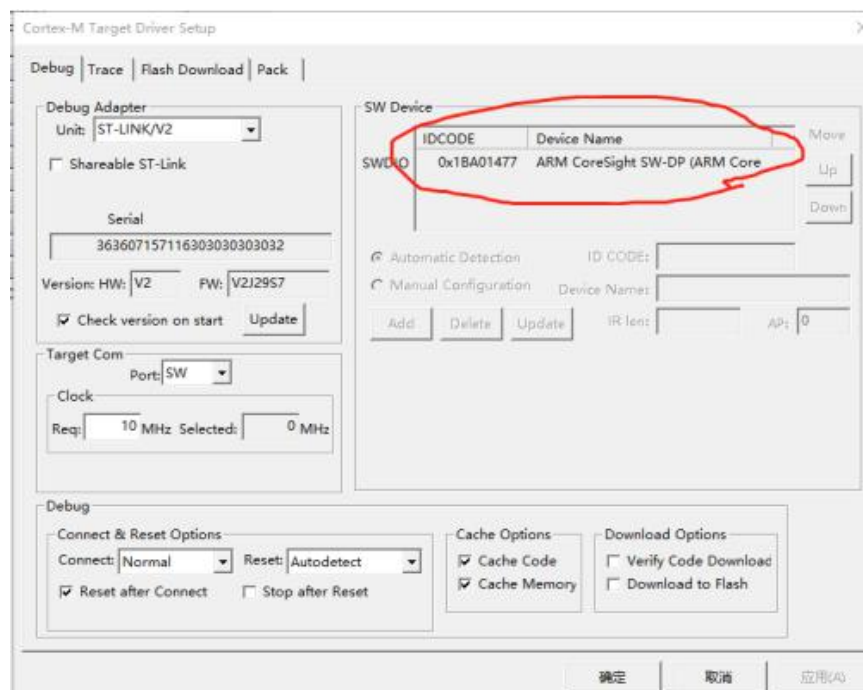
1. initialize

IIC initialize

```
void IIC_Init(void)
{
    GPIO_InitTypeDef GPIO_InitStructure;
    RCC_APB2PeriphClockCmd(IIC_SCL_CLK | IIC_SDA_CLK, ENABLE);

    GPIO_InitStructure.GPIO_Pin = IIC_SCL_PIN;
    GPIO_InitStructure.GPIO_Speed = GPIO_Speed_50MHz;
    GPIO_InitStructure.GPIO_Mode = GPIO_Mode_Out_PP;
    GPIO_Init(IIC_SCL_PORT, &GPIO_InitStructure);

    GPIO_InitStructure.GPIO_Pin = IIC_SDA_PIN;
    GPIO_Init(IIC_SDA_PORT, &GPIO_InitStructure);

    IIC_Stop();                    // 给一个停止信号，复位I2C总线上的所有设
}

#define IIC_SCL_0()         GPIO_ResetBits(IIC_SCL_PORT, IIC_SCL_PIN)
#define IIC_SCL_1()         GPIO_SetBits(IIC_SCL_PORT, IIC_SCL_PIN)
#define IIC_SDA_0()         GPIO_ResetBits(IIC_SDA_PORT, IIC_SDA_PIN)
#define IIC_SDA_1()         GPIO_SetBits(IIC_SDA_PORT, IIC_SDA_PIN)
#define IIC_SDA_READ()      GPIO_ReadInputDataBit(IIC_SDA_PORT, IIC_SDA_PIN)
```

It mainly initializes the IIC interface of the Nixie tube module. There is also a display function

```
void TM1650_SetNumber(u8 index, u8 mode, u8 num)
{
    u8 indexAddr = 0;
    u8 numValue = 0;

    if(index == 1)
    {
        indexAddr = 0x68;
    }
    else if(index == 2)
    {
        indexAddr = 0x6A;
    }
    else if(index == 3)
    {
        indexAddr = 0x6C;
    }
    else if(index == 4)
    {
        indexAddr = 0x6E;
    }

    if(mode == 7)                                               // 7段
    {
        numValue = s_7number[num];
    }
    else if(mode == 8)                          // 8段显示方式
    {
        numValue = s_8number[num];
    }

    printf("index:%02x, num:%02x\n", indexAddr, numValue);
    TM1650_Write(indexAddr, numValue);
}
```

5. Main function

```c
int main()
  {
      IIC_Init();
      USART_Config();

  while(1)
  {
      TM1650_SetDisplay(3, 8, 1);
      TM1650_SetNumber(1, 7, 1);
      TM1650_SetNumber(2, 7, 0);
      TM1650_SetNumber(3, 8, 4);
      TM1650_SetNumber(4, 7, 3);
  }

  }
```

Experimental phenomenon

After the program runs successfully, when we connect the cable, we can see that 104.3 is displayed on the digital tube.