

STM32InitByKeil

Keil创建STM32项目并烧录使用

1、软件准备

- 创建软件：[STM32CubeIDE](#) 和 [STM32CubeMX](#)
 - 选择合适的型号直接下载最新版即可
- 编译软件：[Keil](#)
 - 一定要选择 MDK-Arm 下载
- 烧录软件：[J-Link](#)
 - 选择合适的型号直接下载即可

2、操作步骤

2.1、软件下载安装

为以防万一加的，原则上来讲，顺着官网流程走，不太可能会出错

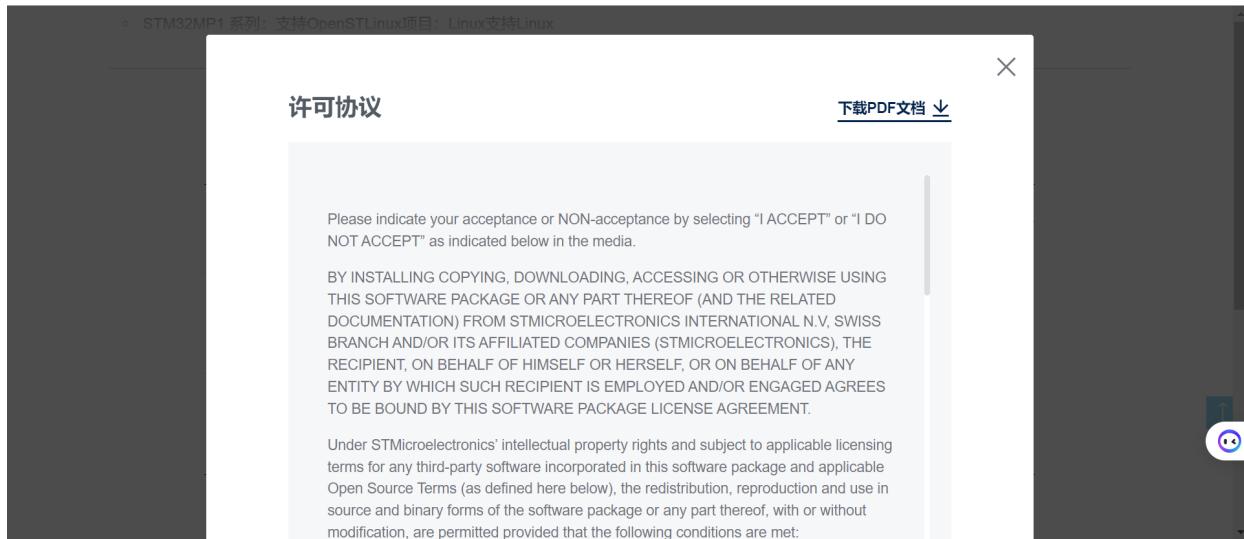
2.1.1、[STM32CubeIDE](#) 和 [STM32CubeMX](#) 下载安装

以前者为例，后者一个流程，就是界面有些区别

- 点击标题（那是个超链接，会直接跳转到网站），下翻会出现如下界面

产品型号	一般描述	最新版本	供应商	下载	所有版本
STM32CubeIDE-DEB	STM32CubeIDE Debian Linux Installer	1.15.1	ST	获取最新版本	选择版本
STM32CubeIDE-Lnx	STM32CubeIDE Generic Linux Installer	1.15.1	ST	获取最新版本	选择版本
STM32CubeIDE-Mac	STM32CubeIDE macOS Installer	1.15.1	ST	获取最新版本	选择版本
STM32CubeIDE-RPM	STM32CubeIDE RPM Linux Installer	1.15.1	ST	获取最新版本	选择版本
STM32CubeIDE-Win	STM32CubeIDE Windows Installer	1.15.1	ST	获取最新版本	选择版本

- 根据电脑操作系统（Windows、Linux……）选择后，点击 [下载最新版本](#)



- 下翻接受即可自动下载（如果没有登录，会弹出注册/登录界面，注册登录即可）
- 下载后是一个压缩包（前者 1G 大小，后者 500M），解压后里面是安装包，打开后一直同意就好

2.1.2、Keil 下载安装

- 点击标题（那是个超链接，会直接跳转到网站），会出现如下界面

Privacy Policy Update
Arm's Privacy Policy has been updated. By continuing to use our site, you consent to our Privacy Policy and Terms of Use. Please see our Privacy Policy to learn more about our collection, use and transfers of your data.

Accept and hide this message

Important information
This site uses cookies to store information on your computer. By continuing to use our site, you consent to our cookies.

Don't show this message again Change Settings

MDK-Arm Version 5.40 (May 2024)
Development environment for Cortex and Arm devices.

C51 Version 9.61 (December 2022)
Development tools for all 8051 devices.

C251 Version 5.60 (May 2018)
Development tools for all 80251 devices.

C166 Version 7.57 (May 2018)
Development tools for C166, XC166, & XC2000 MCUs.

Maintenance Status and Previous Versions
Enter a valid Product Serial Number (PSN) or License Code (LIC) to get access to all product versions available to you, or to check the status of your support and maintenance agreement.

PSN or LIC: Submit

- 点击 MDK-Arm，弹出的界面内容随意填写，下翻点击 Submit

Problems were detected with the information submitted. Please correct these issues and re-submit the form.

- Please select your country/region.

Enter Your Contact Information Below

First Name: Xin

Last Name: Wen

E-mail: zxw3180716935@163.com

Company: Inu

Job Title: student

Country/Region: China

State/Province: -- United States --

Phone: 15942536512

Send me e-mail when there is a new update.

NOTICE:

If you select this check box, you will receive an e-mail message from Keil whenever a new update is available. If you don't wish to receive an e-mail notification, don't check this box.

Which device are you using?
(eg, STM32)

Arm will process your information in accordance with the Evaluation section of our [Privacy Policy](#).

Please keep me updated on products, services and other relevant offerings from Arm. You can change your mind and unsubscribe at any time.

Submit

Reset

- 点击 xxx.EXE 即可下载安装包

Product Information

Software & Hardware Products

- [Arm Development Tools](#)

- [C166 Development Tools](#)

- [C51 Development Tools](#)

- [C251 Development Tools](#)

- [Debug Adapters](#)

- [Evaluation Boards](#)

Product Brochures

Newsletters

Device Database®

Device List

Compliance Testing

ISO/ANSI Compliance

Validation and Verification

Distributors

Overview

[Home](#) / Product Downloads

MDK-ARM

MDK-ARM Version 5.40

Version 5.40

- Review the [hardware requirements](#) before installing this software.
- Note the [limitations of the evaluation tools](#).
- [Further installation instructions for MDK5](#)

(MD5:5e41b1488de2d622dbf2ce046d4583b9)

To install the MDK-ARM Software...

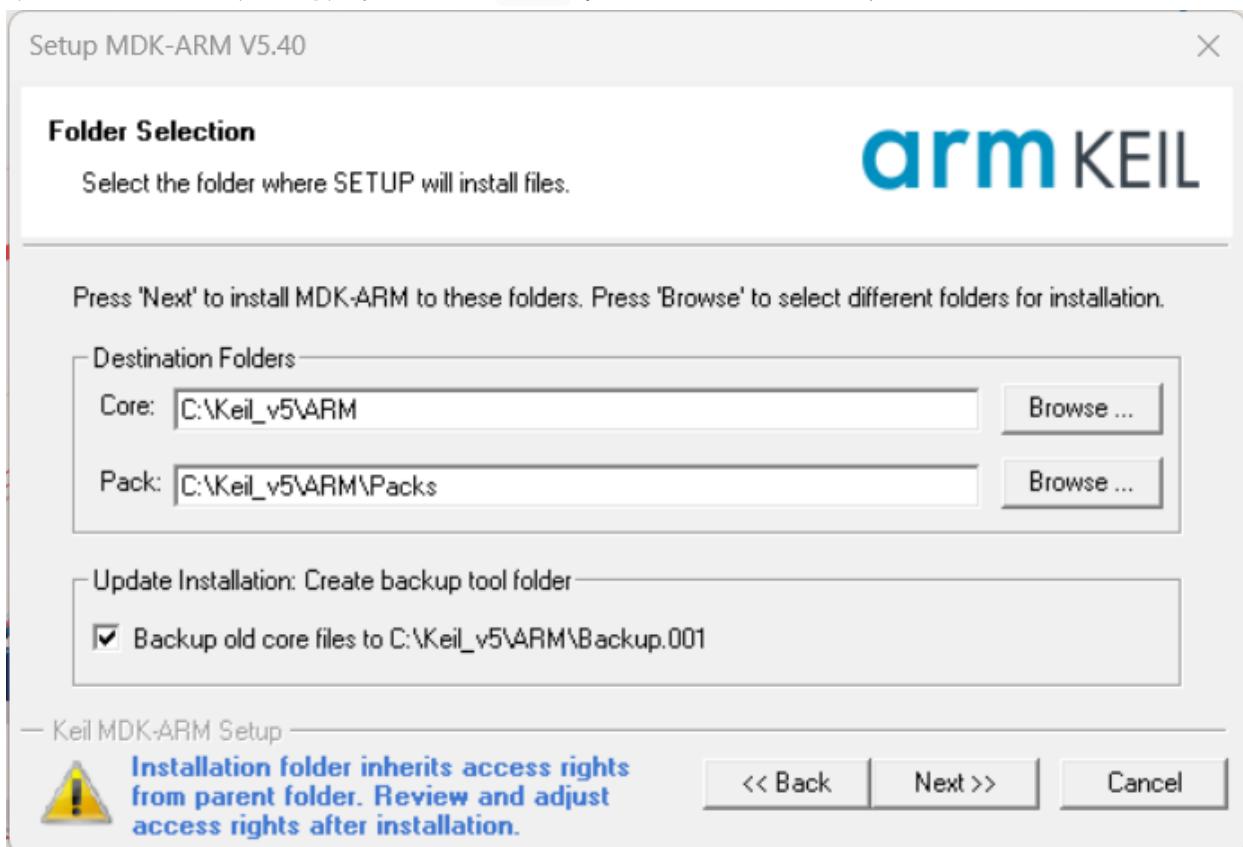
- Right-click on **MDK540.EXE** and save it to your computer.
- PDF files may be opened with Acrobat Reader.
- ZIP files may be opened with PKZIP or WINZIP.

MDK540.EXE (868,978K)

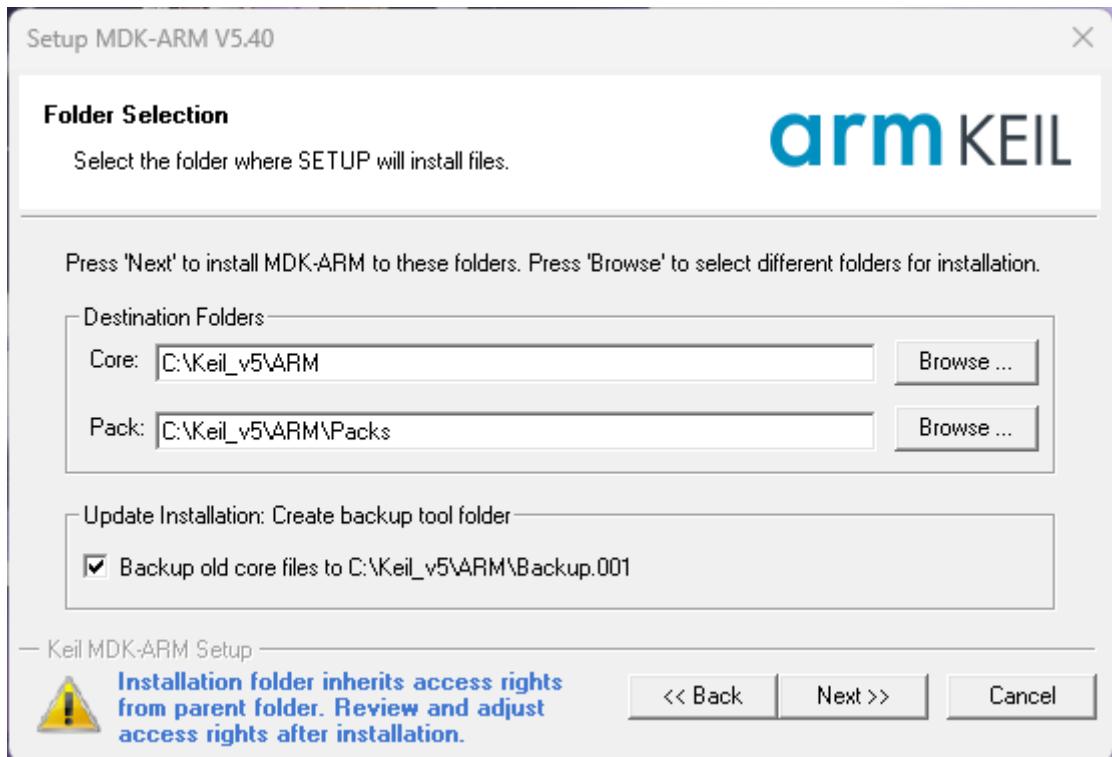
Monday, May 27, 2024

- If you are evaluating the tools, be sure to [request a quote](#) for the full version of the tools.

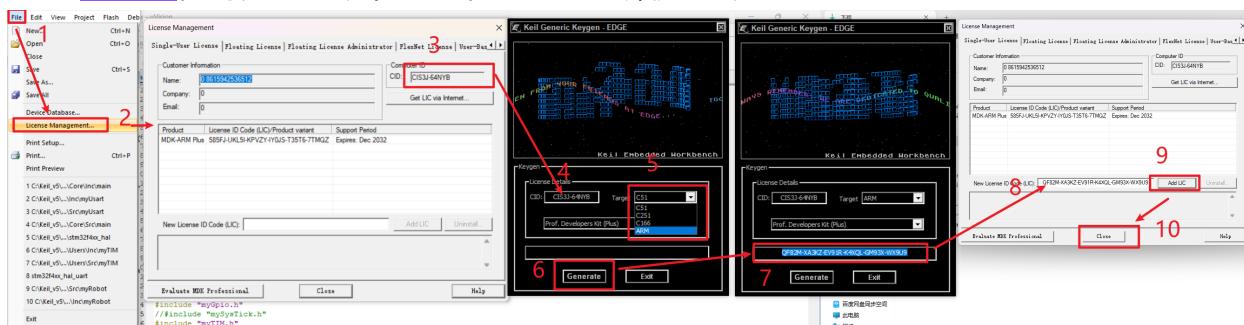
- 双击下载好的安装包打开，一直选 next 和同意直到下面这个页面



- 上面的两个路径一定要选择在一个自己可以找到的地方（默认的路径是一个隐藏文件夹），因为一旦电脑里还有 Keil 的 C51 版本，有可能二者之一会找不到，然后无法打开对应项目。不过，无论是 C51 还是 MDK，安装后的软件本体都是在各自 UV4 文件夹下面的那个叫 UV4 的 EXE 文件



- 之后依旧是选 next 和同意，出现需要填写的地方会有提示，随便填即可
- 下载 [注册机](#)，打开注册机和软件，按下面的顺序行动



2.1.3、[J-Link](#) 下载安装

- 点击标题（那是个超链接，会直接跳转到网站），会出现如下界面

	Version	
J-Link Software and Documentation pack	V7.96j	Windows 64-bit Installer 32-bit Installer

- 下翻选择合适的版本点击，弹出弹窗，点击 DownLoad

J-Link Software and Documentation pack

	Version	
J-Link Software and Documentation pack	V7.96 [2024-05-29]	Windows ↳ 64-bit Installer ↳ 32-bit Installer
All-in-one debugging solution Can be downloaded and used free of charge by any owner of a SEGGER J-Link, J-Trace or Flasher model. Not all features of it may be available on all J-Link / J-Trace / Flasher models.		Windows ARM
Updated frequently Release Notes More information		

J-Link Software and Documentation pack for Windows, installer, 64-bit

Installing the software will automatically install the J-Link USB drivers and offers to update applications which use the J-Link DLL.

Multiple versions of the J-Link software can be installed on the same PC without problems; they will co-exist in different directores.

Download JLink_Windows_V796_x86_64.exe [54,440 KB]

Digital signature: Download emSecure Digital Signature
MD5 checksum: 623904f47d65f1a6182c6d37cf924ae

macOS
↳ 64-bit Installer
↳ Universal Installer

Linux
↳ 32-bit DEB Installer
↳ 32-bit RPM Installer
↳ 32-bit TGZ Archive

↳ 32-bit DEB Installer
↳ 32-bit TGZ Archive

↳ 64-bit Apple Silicon Installer

https://www.segger.com/downloads/jlink/JLink_Windows_V796_x86_64.exe

- 进入新界面，下翻点击 I accept these Terms of Use，点击 Download

Products ▾ Downloads ▾ Purchase ▾ Support ▾ About Us ▾

↳ Contact Us Forum Wiki Web Shop Newsletter RSS

↳ 64-bit Installer
↳ Universal Installer

1) You agree that you will not use the Software or Material for any purpose that is unlawful or illegal.
2) You agree to use the Software only in accordance with the license regulations included in the Software.
3) You acknowledge that the Software and Material is provided by SEGGER on "as is" basis without any express or implied warranty of any kind.
4) You confirm that you are not a person, entity or organization designated by the European Community as a terrorist, terror organization or entity pursuant to the applicable European Council Regulations.
5) You confirm that you are not located in a prohibited or embargoed country and confirm that you will not ship, distribute, transfer and/or export our Software or Material to any prohibited or embargoed country as mentioned in any such European Union law or regulation.

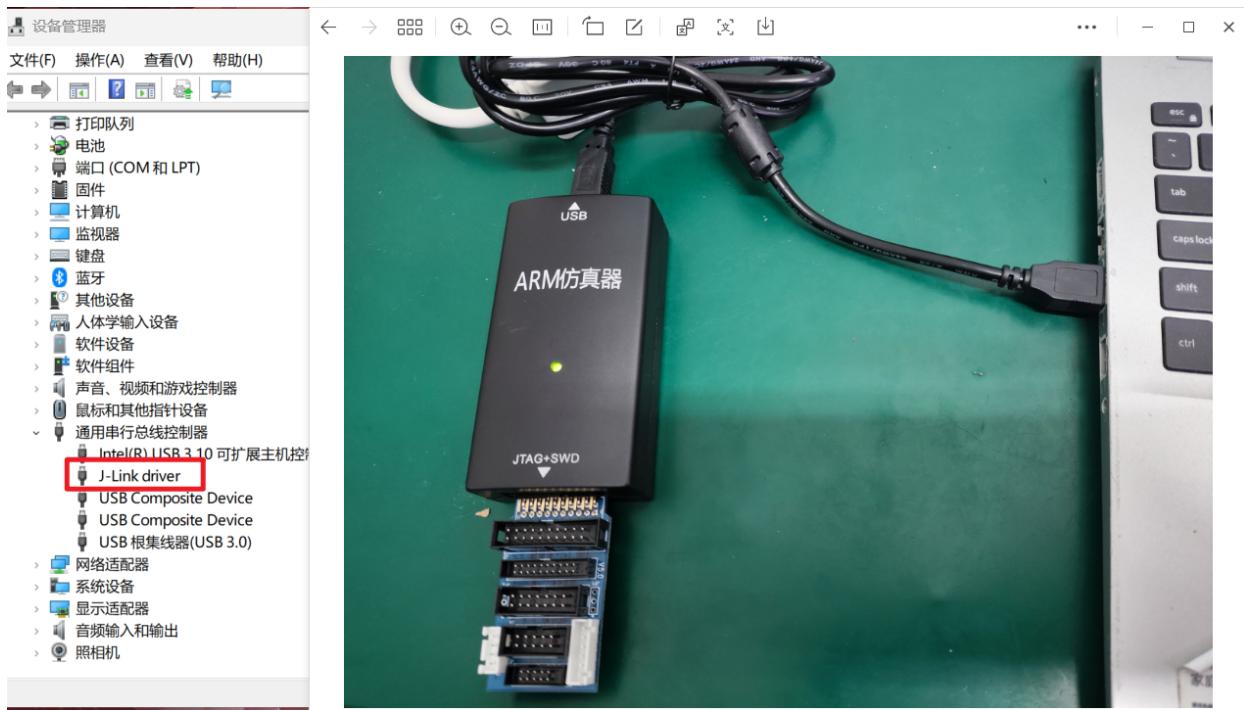
Further information with regard to the listed persons, entities and organizations can be obtained from the official EU website. If there is any doubt if you are on this list it is strongly recommended to review such lists or get in touch with SEGGER prior download of any Software or Material.

Copyright (c) SEGGER Microcontroller GmbH

I accept these Terms of Use.

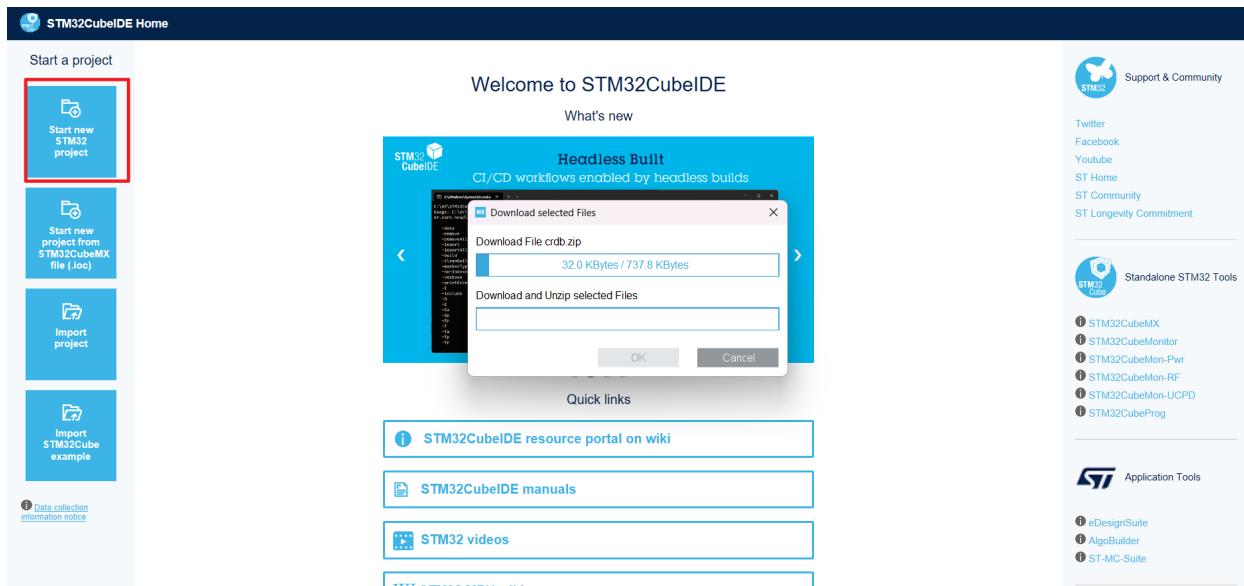
Download software Back

- 打开安装包后一直选 next 和同意即可
- 之后将开发板和 J-Link 和电脑连接起来即可在设备管理器看到

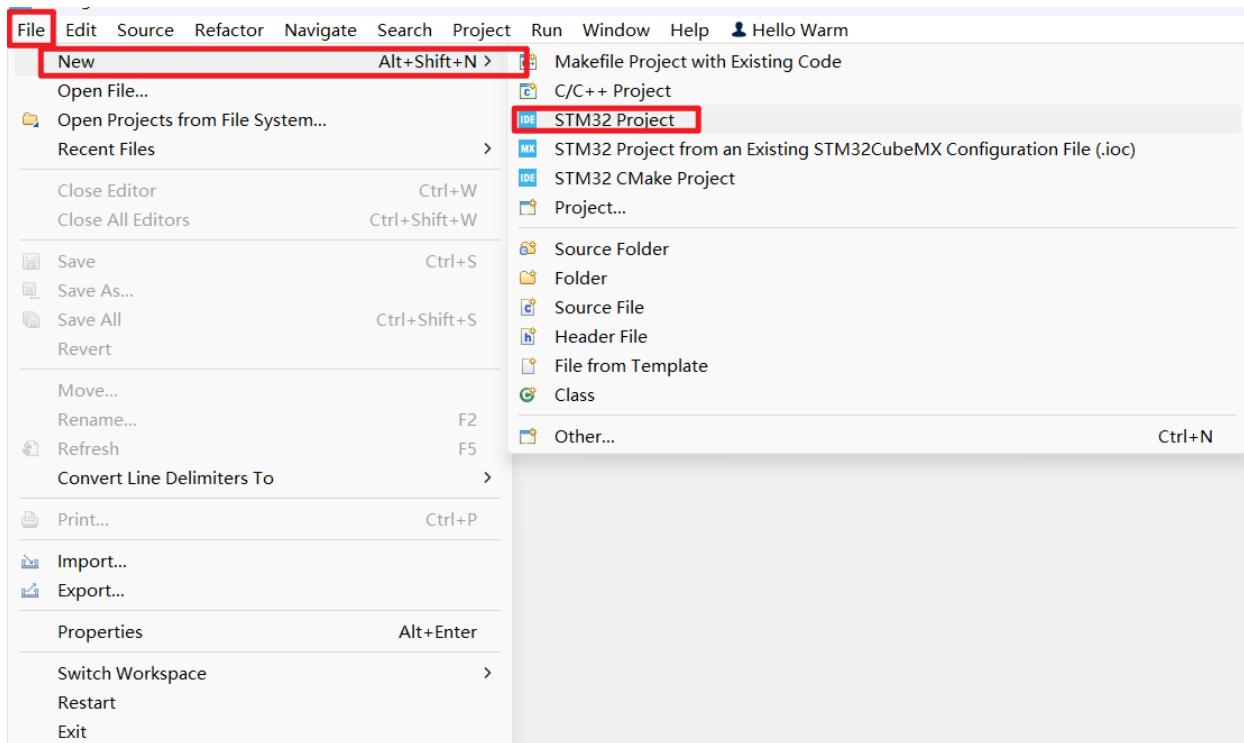


2.2、项目创建

- 打开安装好的 STM32CubeIDE，点击屏幕左侧的 Start new STM32 project (首次使用会自动下载需要的东西)



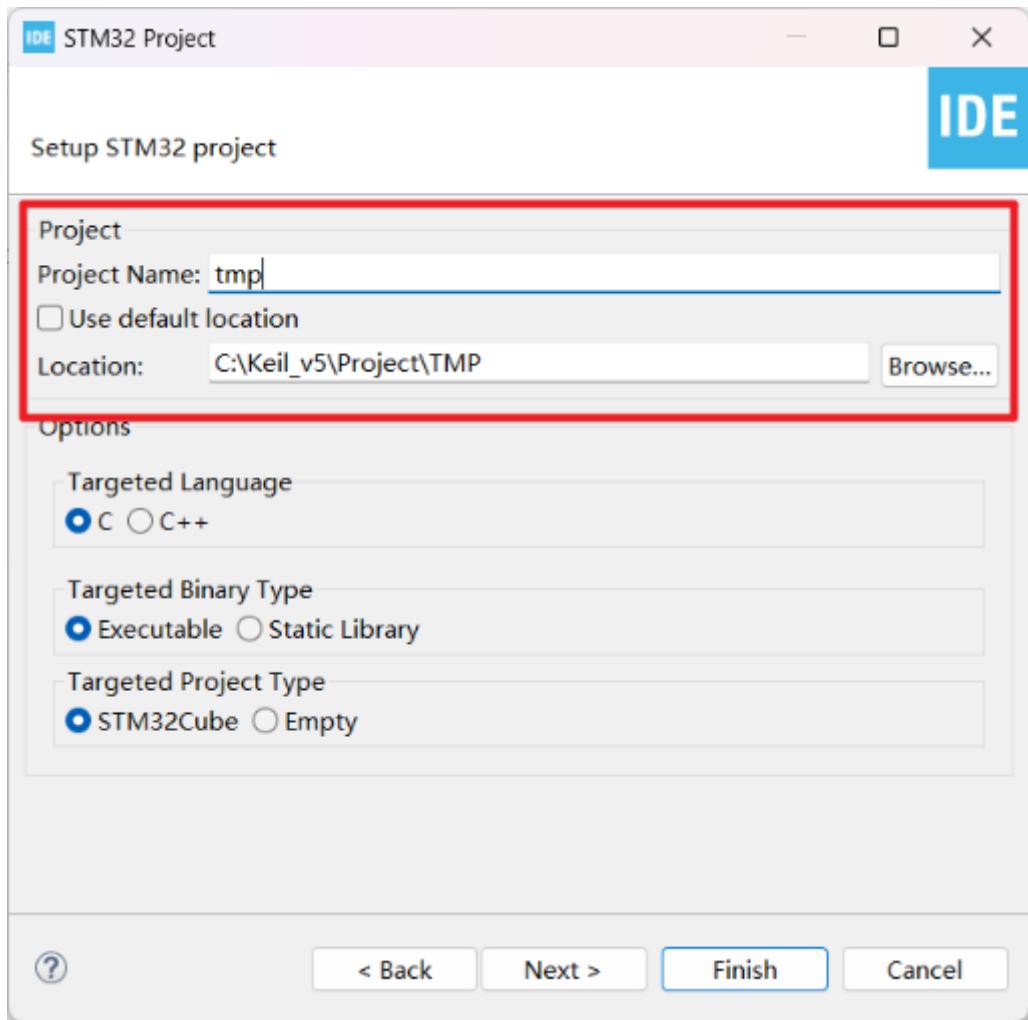
- 或如果已经进入项目了，就从这里创建



- 选择开发板为所需开发板（我们使用的是 STM32F446RCT6）

The screenshot shows the 'Board Selector' tab of the STM32CubeMX software. On the left, there is a 'MCU/MPU Filters' panel with a search bar containing 'STM32F446RCT6' (highlighted with a red box). Below it are sections for 'PRODUCT INFO' (Segment, Series, Line, Marketing Status, Price, Package, Core, Coprocessor) and 'MEMORY' (Flash = 256 (kBytes), 256). In the center, the 'STM32F4 Series' is selected, showing a large image of the STM32F446RCT6 chip, its description ('High-performance foundation line, Arm Cortex-M4 core with DSP and FPU, 256 Kbytes of Flash memory, 180 MHz CPU, ART Accelerator, Dual QSPI'), and its unit price (\$3.2593). To the right, a table lists 'MCUs/MPUs List: 2 items' with columns for Com., Part No., Reference, Market, Unit P., Board, Package, Flash, RAM, I/O, Frequency, and Freq. Both rows in the table are highlighted with a red box. At the bottom, there are buttons for '?', '< Back', 'Next >' (highlighted with a red box), 'Finish', and 'Cancel'.

- 创建项目，记得选择合适的路径



- 加载过程中会弹出一个弹窗（手太快了，没截到），选择 Yes，会自动打开 .ioc 文件，方便接下来配置
- 进行一些配置，并保存（叉掉会自动弹出是否保存）

tmp.ioc - Pinout & Configuration >

Pinout & Configuration

Clock Configuration

Software Packs

Pinout

Mode

High Speed Clock (HSE) Crystal/Ceramic Resonator
Low Speed Clock (LSE) Crystal/Ceramic Resonator

Master Clock Output 1
Master Clock Output 2
Audio Clock Input (I2S_CKIN)

Categories: A-Z

System Core

DMA
GPIO
IWDG
NVIC
RCC
SYS
WWDG

tmp.ioc - Pinout & Configuration >

Pinout & Configuration

Clock Configuration

Software Packs

Mode

Debug Serial Wire
System Wake-Up 0
System Wake-Up 1
Timebase Source

Categories: A-Z

System Core

DMA
GPIO
IWDG
NVIC
RCC
SYS
WWDG

tmp.ioc - Project Manager >

Pinout & Configuration **Clock Configuration** **Project Manager** **Tools**

Project

- STM32Cube MCU packages and embedded software packs
- Copy all used libraries into the project folder
- Copy only the necessary libraries
- Add necessary library files as reference in the toolchain project configuration file

Code Generator

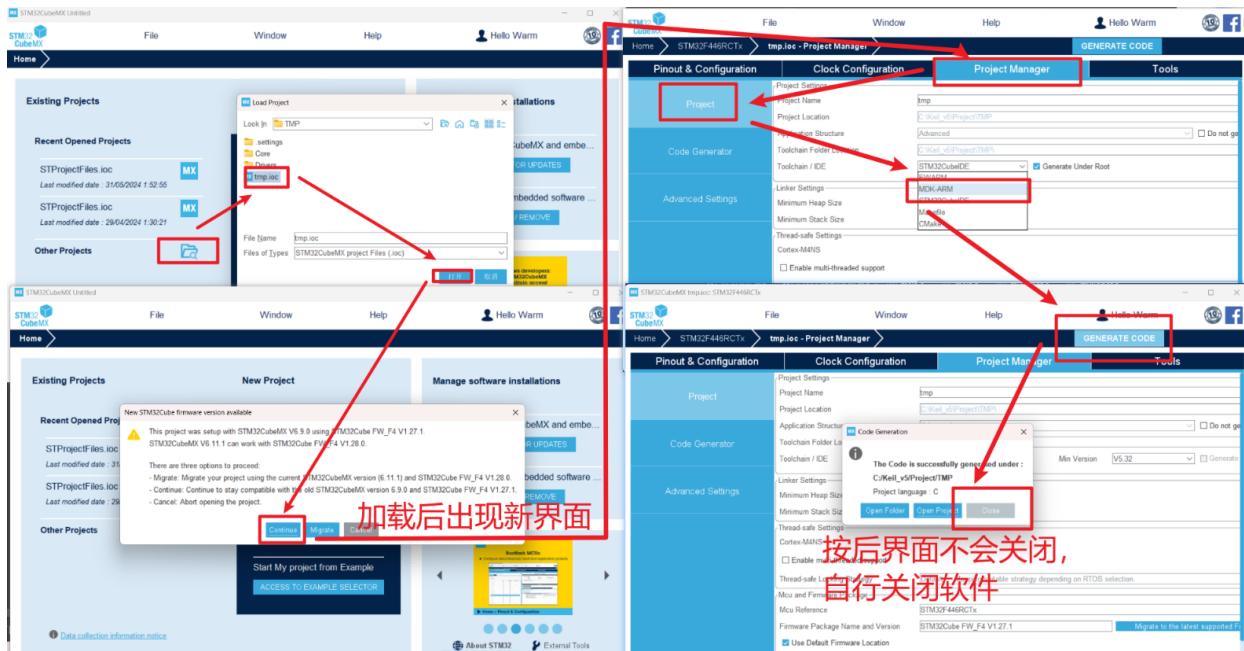
Generated files:

- Generate peripheral initialization as a pair of '.c/.h' files per peripheral
- Backup previously generated files when re-generating
- Keep User Code when re-generating
- Delete previously generated files when not re-generated

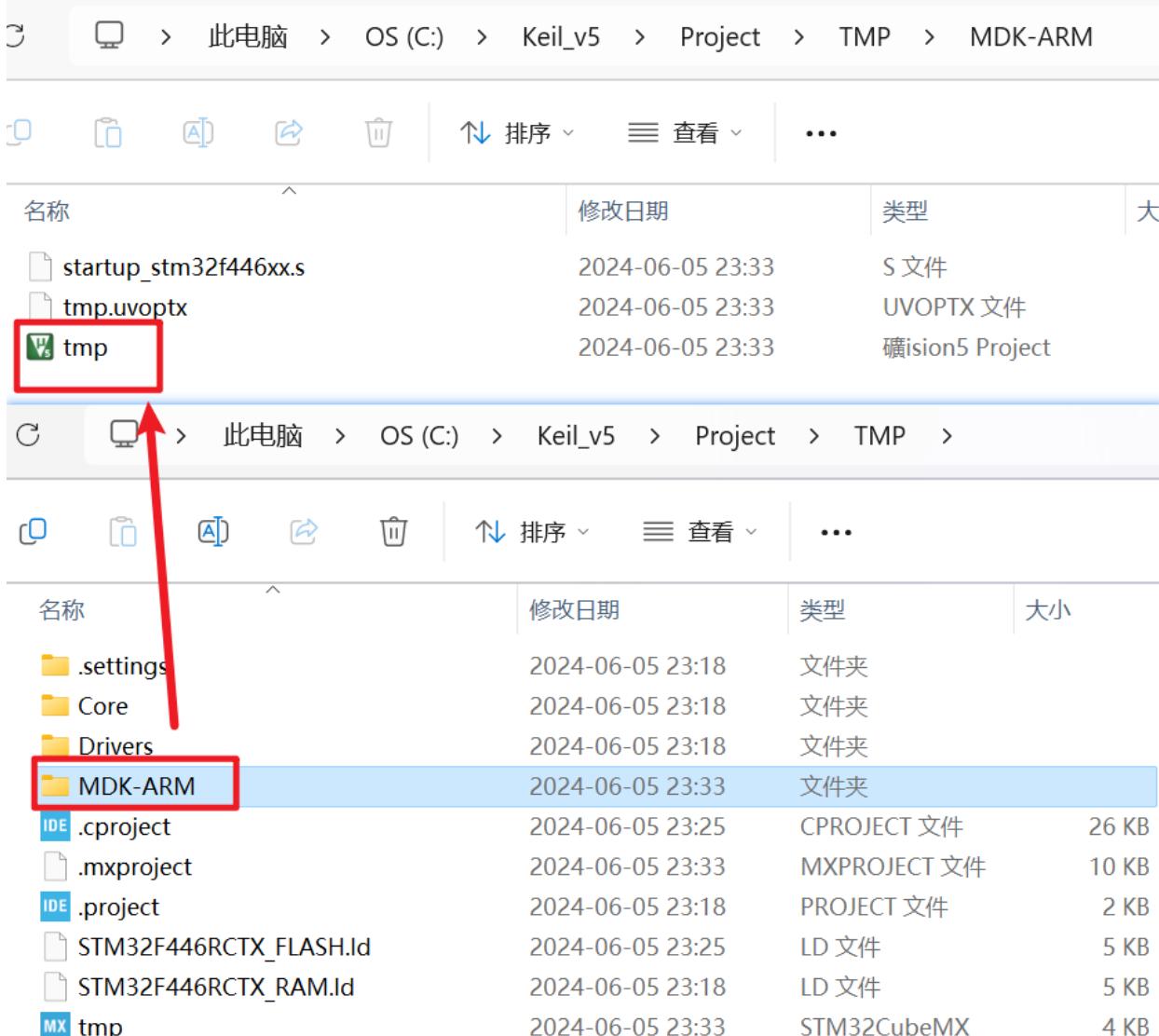
Advanced Settings

HAL Settings

- 打开 STM32CubeMX，选择刚才建立的项目的 .ioc 文件并配置

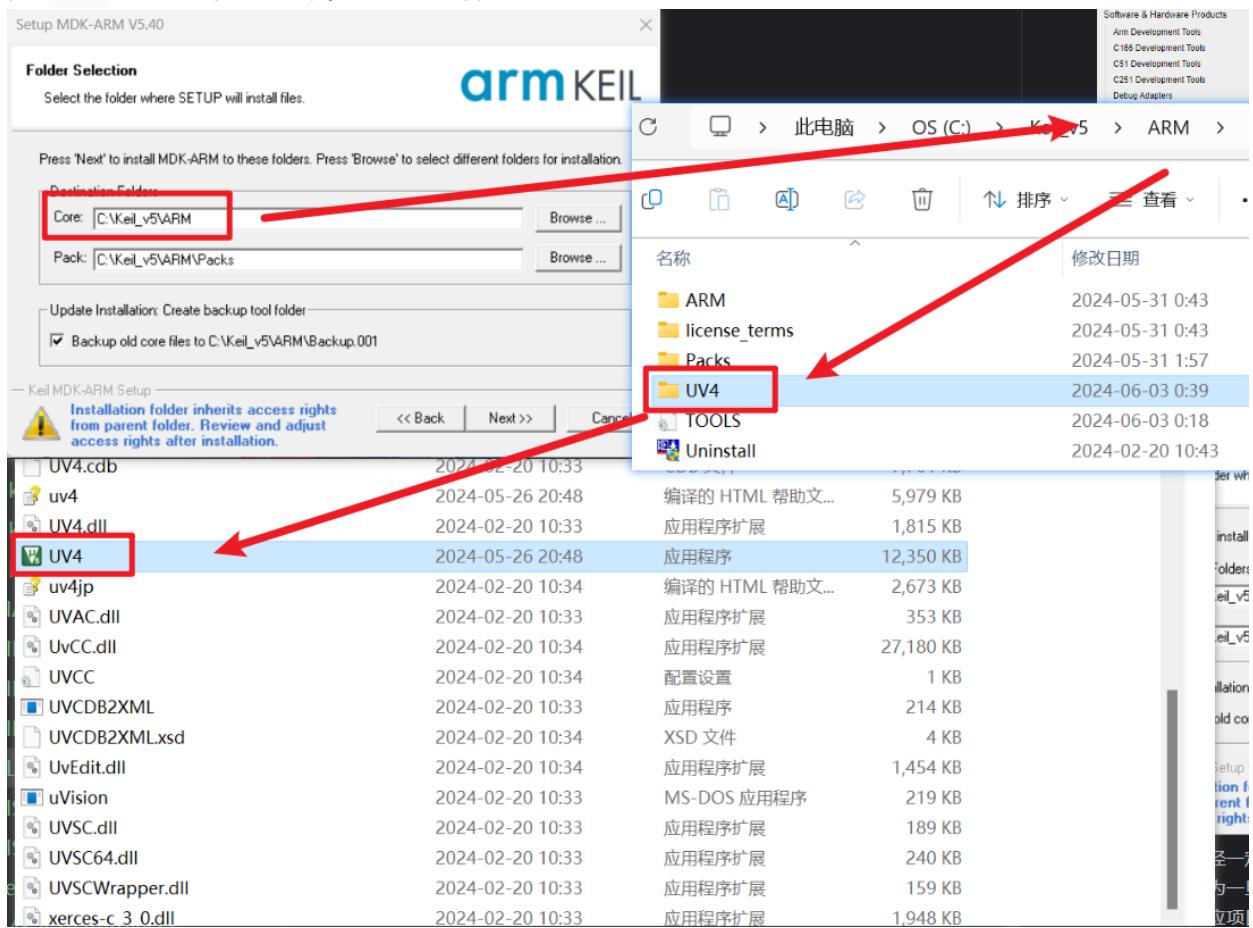


- 这时打开自己的项目文件夹，将发现多出来一个 MDK-ARM 的文件夹，里面存放着 Keil 项目文件

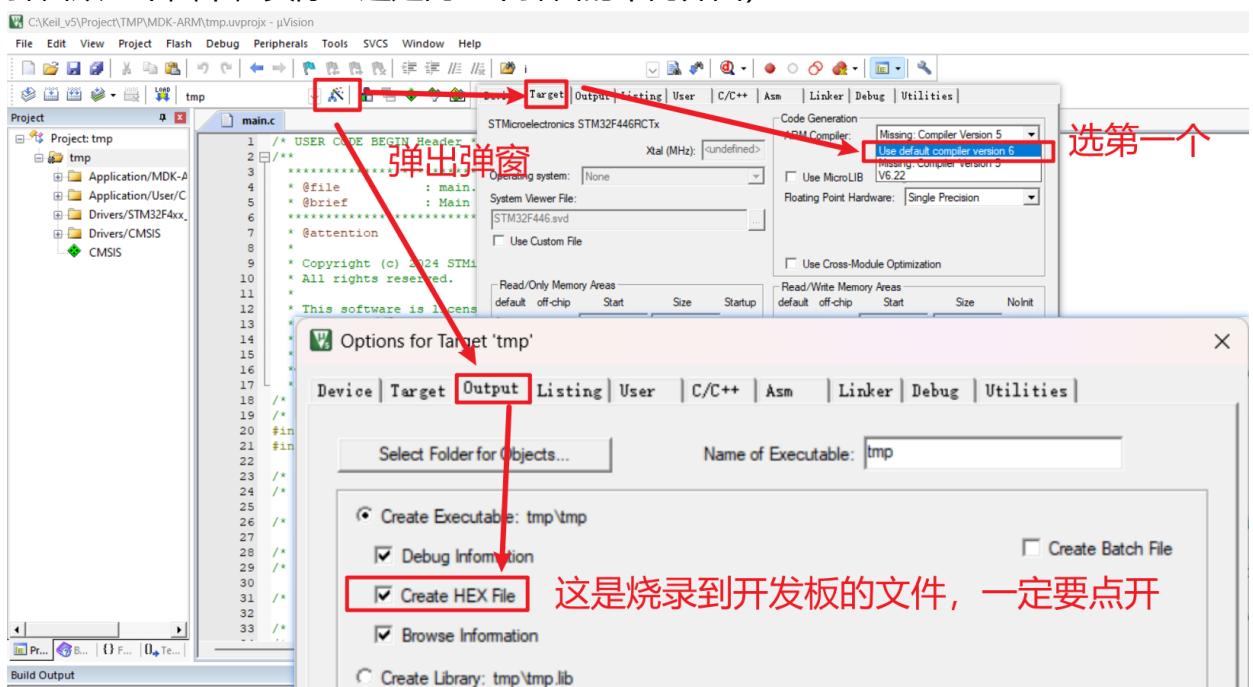


2.3、KEIL 配置环境

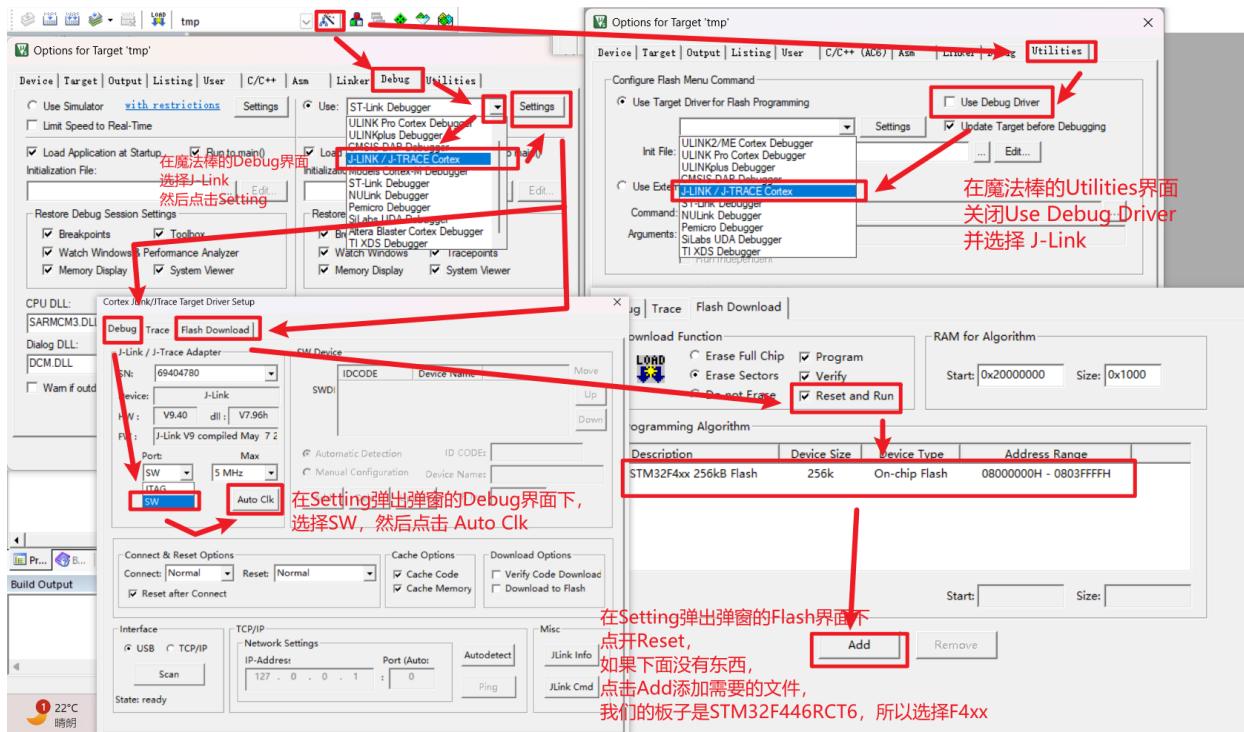
- 使用 Keil 打开刚才的项目文件，注意：一定要用安装 Keil 时为 Core 选择的路径下的名为 UV4 的文件夹下的那个 Keil 打开



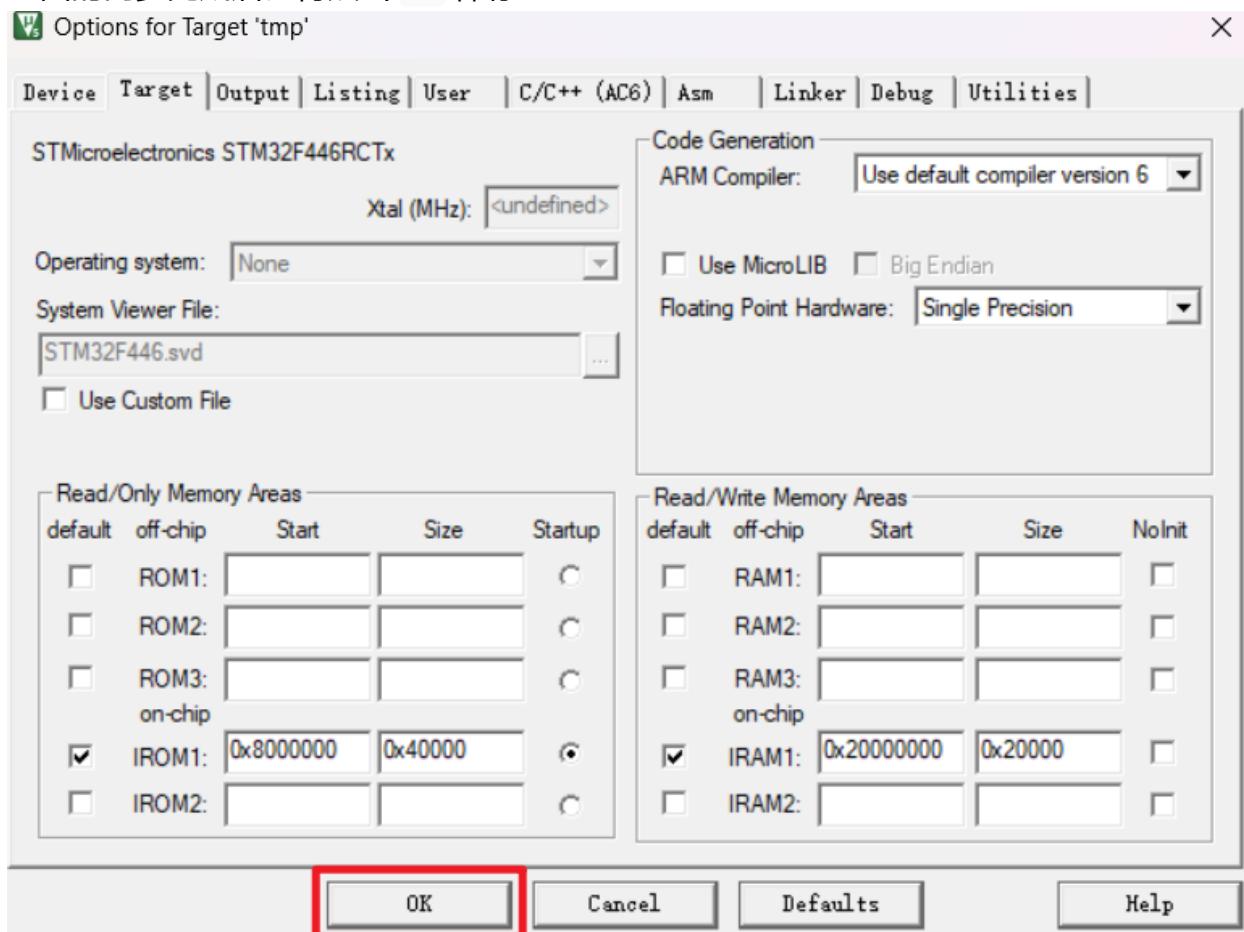
- 打开后进行配置（点击魔法棒，在弹窗的对应界面进行选择，图中只是为了方便才把俩弹窗放一个图中，实际上还是同一个弹窗的不同界面）



- 电脑连接 J-Link 并继续配置（还是点击魔法棒进行配置）



- 上面的两步完成后记得点击 OK 保存



2.4、烧录

- Build 测试 (测试代码在下面)

Project: tmp

```

41 /* 
42 void MX_GPIO_Init(void)
43 {
44     /* GPIO Ports Clock Enable */
45     __HAL_RCC_GPIOC_CLK_ENABLE();
46     __HAL_RCC_GPIOH_CLK_ENABLE();
47     __HAL_RCC_GPIOA_CLK_ENABLE();
48 }
49
50 GPIO_InitTypeDef GPIO_InitStruct = {0};
51
52 /*Configure GPIO pin Output Level */
53 HAL_GPIO_WritePin(GPIOC, GPIO_PIN_14 | GPIO_PIN_0, GPIO_PIN_RESET);
54
55 /*Configure GPIO pin : PtPin */
56 GPIO_InitStruct.Pin = GPIO_PIN_14 | GPIO_PIN_0;
57 GPIO_InitStruct.Mode = GPIO_MODE_OUTPUT_PP;
58 GPIO_InitStruct.Pull = GPIO_NOPULL;
59 GPIO_InitStruct.Speed = GPIO_SPEED_FREQ_LOW;
60 HAL_GPIO_Init(GPIOC, &GPIO_InitStruct);
61
62 }
63
64 /* USER CODE BEGIN 2 */

```

C:\Keil_v5\Project\TMP\MDK-ARM\tmp.uvproj - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

build按键

添加的代码

build成功标志语句

```

82 /* USER CODE BEGIN SysInit */
83
84 /* USER CODE END SysInit */
85
86 /* Initialize all configured peripherals */
87 MX_GPIO_Init();
88 /* USER CODE BEGIN 2 */
89 HAL_GPIO_WritePin(GPIOC,GPIO_PIN_14,GPIO_PIN_SET);
90 /* USER CODE END 2 */
91
92 /* Infinite loop */
93 /* USER CODE BEGIN WHILE */
94 while (1)
95 {
96     /* USER CODE END WHILE */
97     HAL_GPIO_WritePin(GPIOC,GPIO_PIN_0,GPIO_PIN_RESET);
98     HAL_Delay(1000);
99     HAL_GPIO_WritePin(GPIOC,GPIO_PIN_0,GPIO_PIN_SET);
100    HAL_Delay(1000);
101    /* USER CODE BEGIN 3 */
102 }
103 /* USER CODE END 3 */
104
105

```

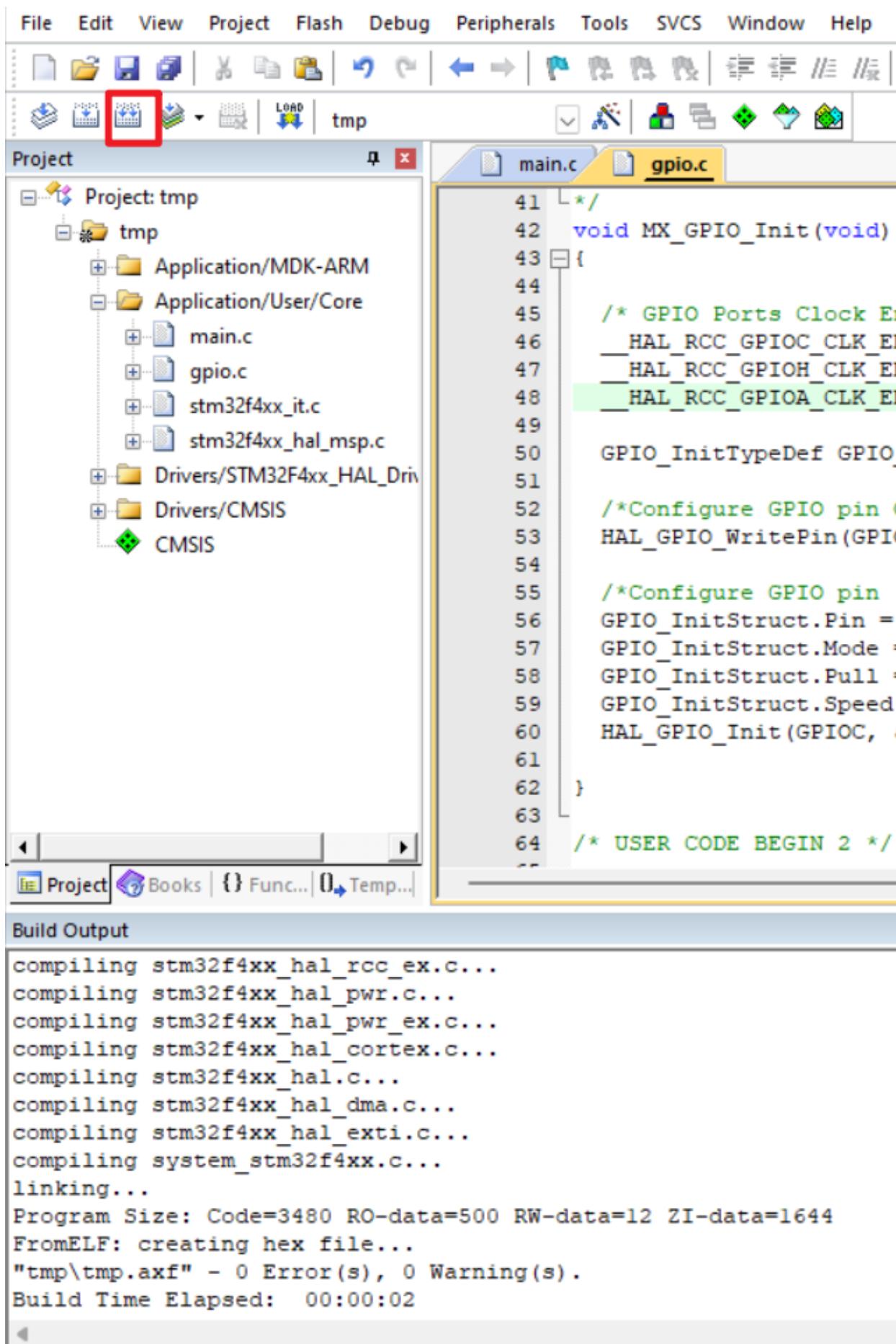
Build Output

```

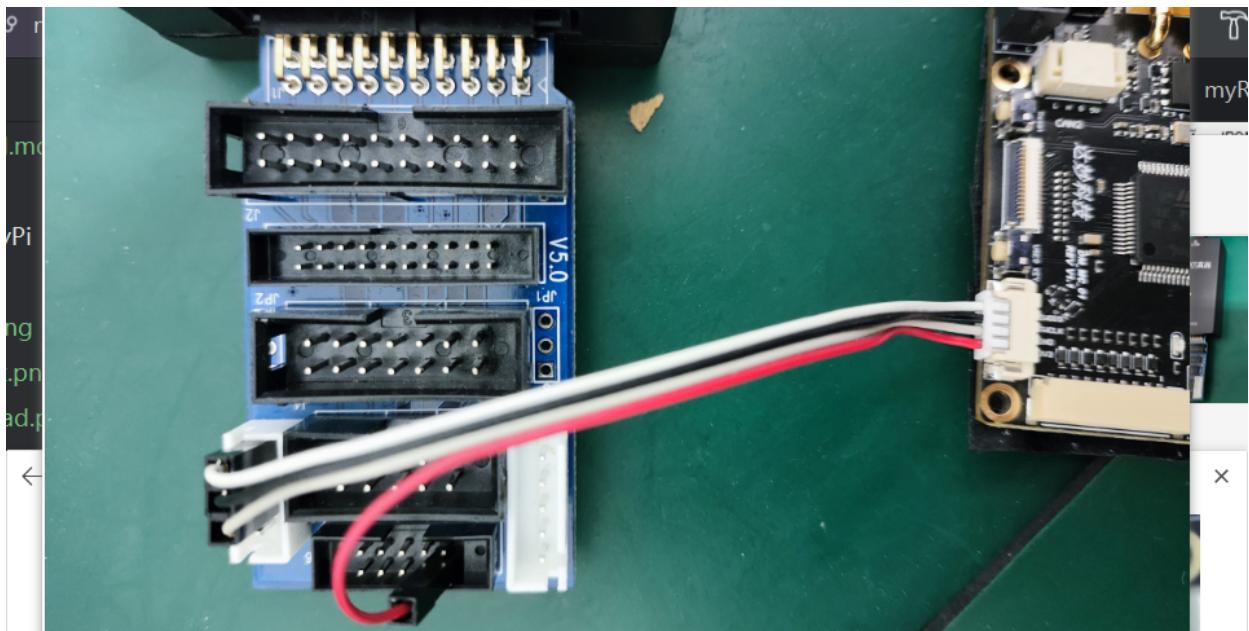
compiling stm32f4xx_hal_rcc_ex.c...
compiling stm32f4xx_hal_pwr_ex.c...
compiling stm32f4xx_hal.c...
compiling stm32f4xx_hal_pwr.c...
compiling stm32f4xx_hal_cortex.c...
compiling stm32f4xx_hal_dma.c...
compiling stm32f4xx_hal_exti.c...
compiling system_stm32f4xx.c...
linking...
Program Size: Code=3400 RO_data=500 RW_data=12 ZI_data=1644
FromELF: creating hex file...
tmp\mp.axf = 0 Error(s), 0 warning(s).
Build Time Elapsed: 00:00:02

```

- Build 要是不好使，就点一下 ReBuild



- 烧录测试，下面的图依次是：开发板连线图、烧录正常情况图（keil 显示）



开发板——J-Link

SWCLK - SWCLK

SWDIO - SWDIO

GND - GND

3V3 - 3.3V

只是把二者的同名引脚连接起来

The screenshot shows the MDK-ARM IDE interface. The top menu bar includes File, Edit, View, Project, Flash, Debug, Peripherals, Tools, SVCS, Window, and Help. The toolbar has icons for file operations like Open, Save, and Build. A red box highlights the 'LOAD' button in the toolbar.

The Project Explorer on the left shows a project named 'tmp' with files main.c and gpio.c under the 'Application/User/Core' folder. Other files like stm32f4xx_it.c and stm32f4xx_hal_msp.c are also listed. The 'Drivers/STM32F4xx_HAL_Driver' and 'Drivers/CMSIS' folders are expanded.

The code editor displays 'main.c' and 'gpio.c'. The 'gpio.c' code is shown below:

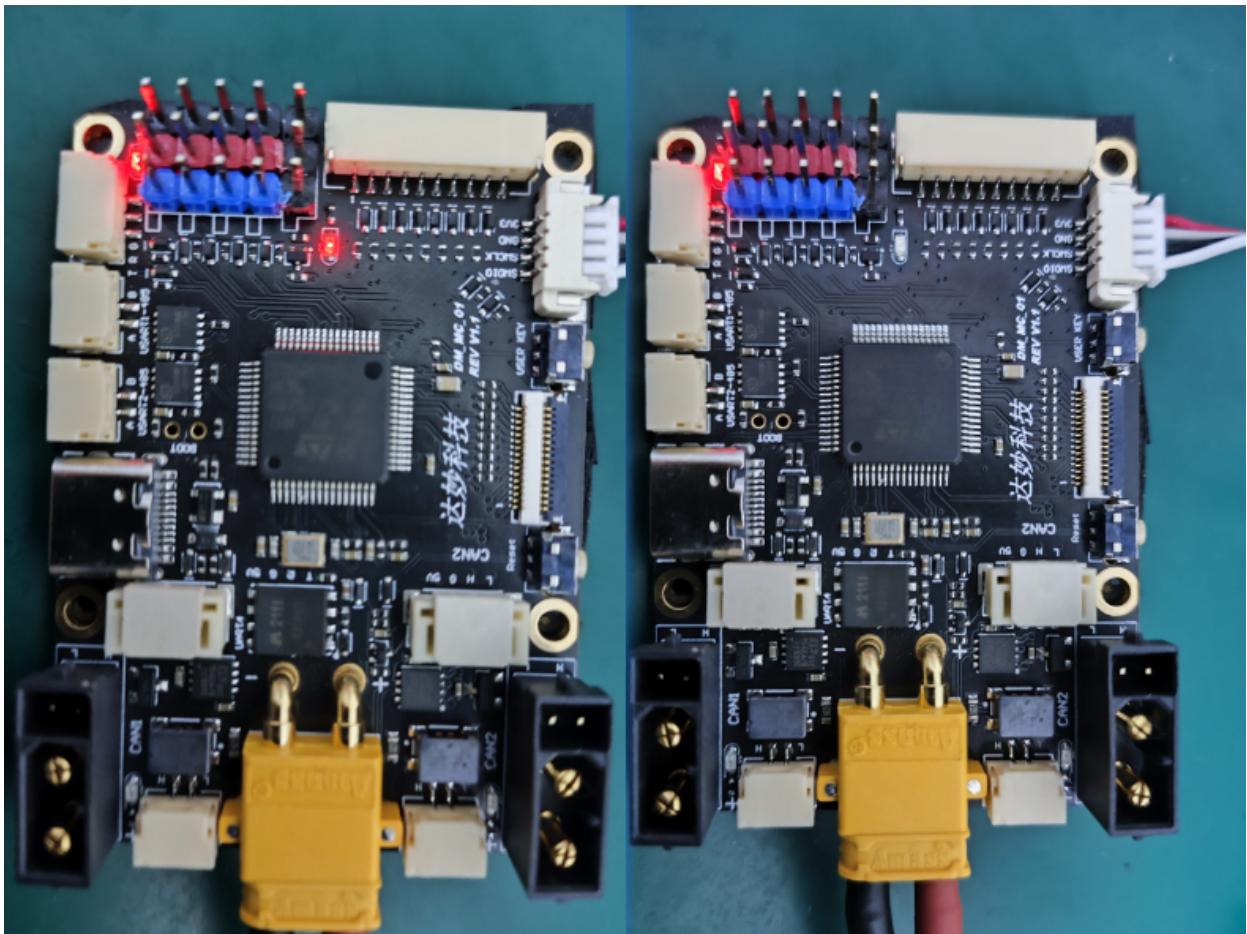
```
41 /* */
42 void MX_GPIO_Init(void)
43 {
44     /* GPIO Ports Clock Enable */
45     __HAL_RCC_GPIOC_CLK_ENABLE();
46     __HAL_RCC_GPIOH_CLK_ENABLE();
47     __HAL_RCC_GPIOA_CLK_ENABLE();
48
49     GPIO_InitTypeDef GPIO_InitStruct = {0};
50
51     /*Configure GPIO pin Output Level*/
52     HAL_GPIO_WritePin(GPIOC, GPIO_PIN_14 | GPIO_PIN_0, GPIO_PIN_RESET);
53
54     /*Configure GPIO pin : PtPin */
55     GPIO_InitStruct.Pin = GPIO_PIN_14 | GPIO_PIN_0;
56     GPIO_InitStruct.Mode = GPIO_MODE_OUTPUT_PP;
57     GPIO_InitStruct.Pull = GPIO_NOPULL;
58     GPIO_InitStruct.Speed = GPIO_SPEED_FREQ_LOW;
59     HAL_GPIO_Init(GPIOC, &GPIO_InitStruct);
60 }
61
62
63
64 /* USER CODE BEGIN 2 */
```

The 'Build Output' window at the bottom shows the following log:

```
* JLink Info: Memory map 'after startup completion point' is active
Erase Done.
Programming Done.
Verify OK.
* JLink Info: Memory map 'before startup completion point' is active
* JLink Info: Reset: Halt core after reset via DEMCR.VC_CORERESTORET.
* JLink Info: Reset: Reset device via AIRCR.SYSRESETREQ.
* JLink Info: Memory map 'after startup completion point' is active
Application running ...
* JLink Info: OnDisconnectTarget() start
* JLink Info: OnDisconnectTarget() end - Took 2.26ms
flash Load finished at 21:44:33
```

A red box highlights the text 'flash Load finished at 21:44:33' in the build output window. The status bar at the bottom shows a temperature of 23°C.

- 烧录成功，结果如下图，左侧小灯常亮，右侧小灯以 2s 为周期闪烁



```
// 测试代码 - 具体位置结合图片
// 以下代码写在 main.c 的 main 函数的 while 外
HAL_GPIO_WritePin(GPIOC, GPIO_PIN_14, GPIO_PIN_SET);
// 以下代码写在 main.c 的 main 函数的 while 里
HAL_GPIO_WritePin(GPIOC, GPIO_PIN_0, GPIO_PIN_RESET);
HAL_Delay(1000);
HAL_GPIO_WritePin(GPIOC, GPIO_PIN_0, GPIO_PIN_SET);
HAL_Delay(1000);
/*****************************************/
// 以下代码补在 gpio.c 的 MX_GPIO_Init 函数已有内容之后
GPIO_InitTypeDef GPIO_InitStruct = { 0 };

/*Configure GPIO pin Output Level */
HAL_GPIO_WritePin(GPIOC, GPIO_PIN_14 | GPIO_PIN_0, GPIO_PIN_RESET);

/*Configure GPIO pin : PtPin */
GPIO_InitStruct.Pin = GPIO_PIN_14 | GPIO_PIN_0;
GPIO_InitStruct.Mode = GPIO_MODE_OUTPUT_PP;
GPIO_InitStruct.Pull = GPIO_NOPULL;
GPIO_InitStruct.Speed = GPIO_SPEED_FREQ_LOW;
HAL_GPIO_Init(GPIOC, &GPIO_InitStruct);
```

3、备注

- 参考资料

- [使用STM32CubeIDE新建工程](#)
- [将STM32CubeIDE工程转为keil MDK工程](#)
- [STM32安装教程和J-link烧录驱动安装教程](#)