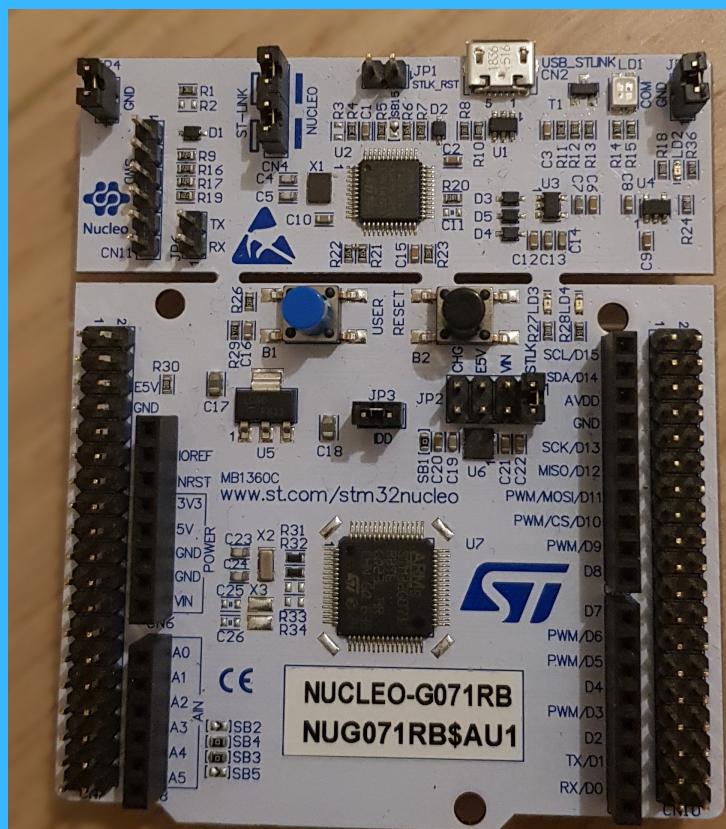


STM32 ESSENTIALS

CubeMX, IDE, GPIOs and
onboard LED

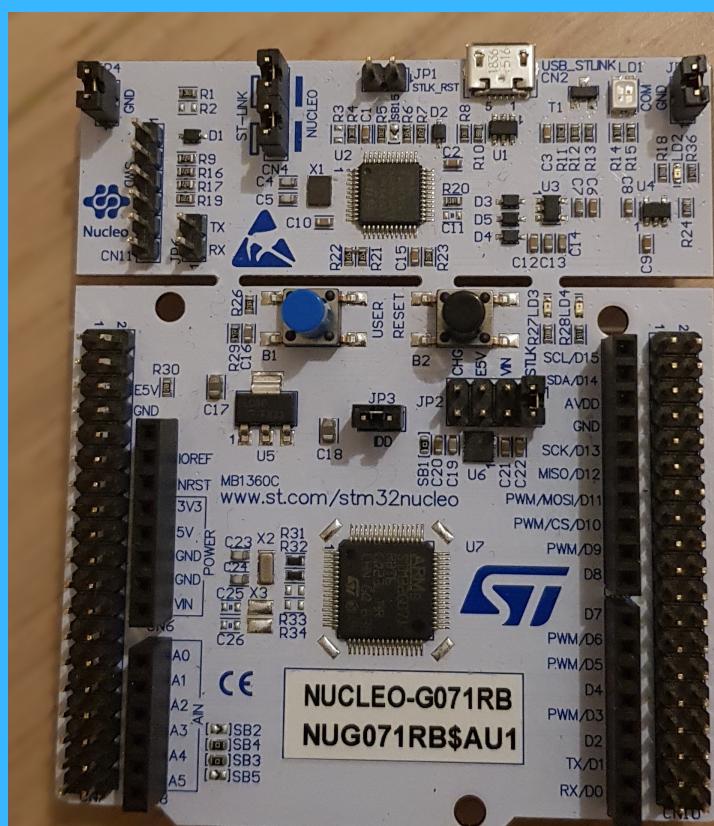
PRE-REQUISITES

- C Programming language
- STM32 Cube MX
- MDK V5 or Atollic TrueSTUDIO IDE
- ANY STM32-based board will do. This series will be based on the STM32G071RB



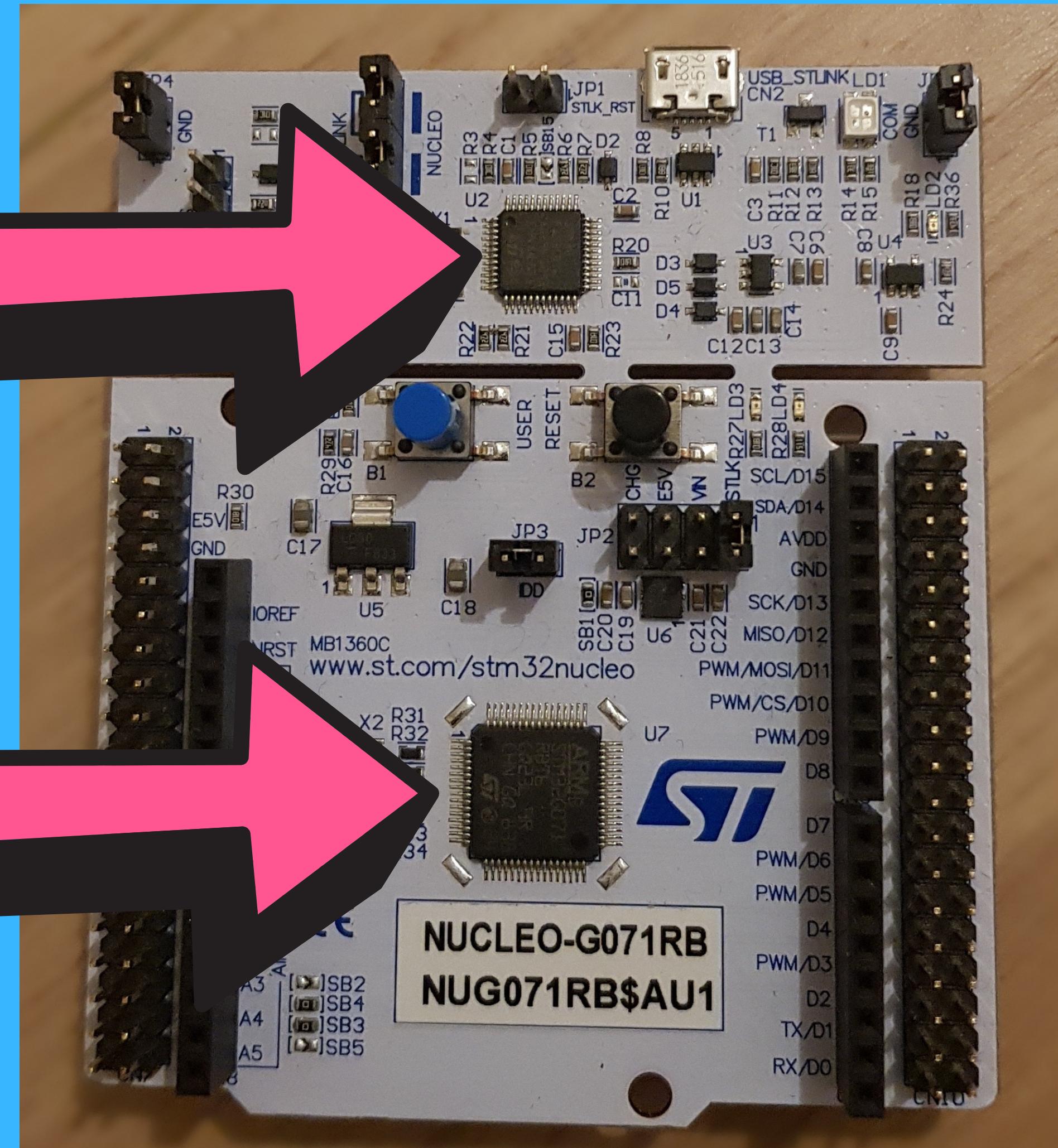
LEARNING OBJECTIVES

- Know your way around CubeMX and create projects
- Learn STM32 HAL
- Configure GPIO Pins and clock speed
- Blink the onboard LED



DEBUGGER

MCU





life.augmented

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Support 8

[Development Tools](#) > [Software Development Tools](#) > [STM32 Software Development Tools](#) > [STM32 Configurators and Code Generators](#) > [STM32CubeMX](#) >

STM32CubeMX

ACTIVITIES



Print



Save to MyST

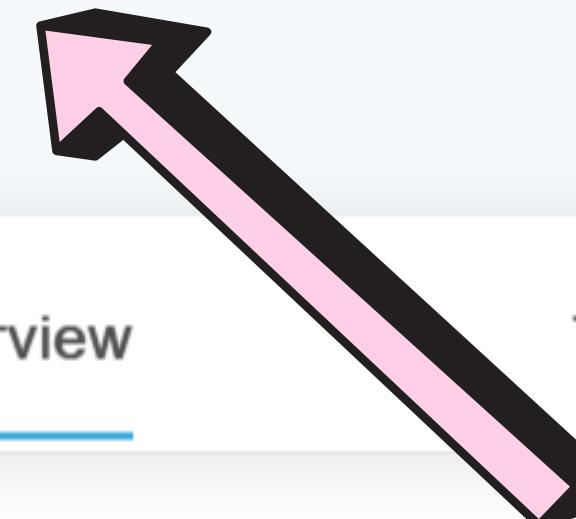


STM32Cube initialization code generator

Get Software



[Download databrief](#)



Overview

Tools & Software

Resources

STM32CubeMX is a graphical tool that allows a very easy configuration of STM32 microcontrollers and microprocessors, as well as the generation of the corresponding initialization C code for the Arm® Cortex®



Product Information

Product Overview

Supported Microcontrollers

has been and Seminars

to use our

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Product Manuals

Notes

Discussion Forum

Software Downloads

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computer. By

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Embedded Development Tools



ULINKplus

Debug adapter for power optimization and test automation

arm DESIGNSTATION



[Downloads](#)

[\\$ Request a Quote](#)

arm KEIL MDK

Best tools for STM32F0, STM32G0, and STM32L0 available for free!



MDK Microcontroller Development

Keil MDK is the complete software development environment for a wide range of Arm Cortex-M based microcontroller devices. MDK includes the **μVision IDE** and debugger, Arm C/C++ compiler, and essential **middleware** components. It supports all silicon vendors with **more than 5,500 devices** and is easy to learn and use.

A screenshot of a video player interface. At the top left is a circular "arm" logo. The main title is "arm Multi-core simultaneous debugging with MDK". Below the title are two smaller video thumbnails showing different views of the software interface. On the right side of the player are three control buttons: a play/pause button, a "Watch later" button, and a "Share" button.

News

- Arm FuSa RTS available now
- MDK editions for Holtek devices
- embedded world 2019 Retrospective

Updates

- MDK-ARM V5.28a
- C51 V9.60a



File

Window

Help



Existing Projects

Recent Opened Projects

G0_LPUART.ioc

MX

Last modified date : 05/08/2019 18:13:21

G0_UART_MORSE.ioc

MX

Last modified date : 04/08/2019 14:08:39

G0_Mwape.ioc

MX

Last modified date : 26/07/2019 12:37:05

STM32_OSC.ioc

MX

Last modified date : 08/03/2019 17:00:09

STM32_OSC.ioc

MX

Last modified date : 08/03/2019 16:53:54

Other Projects



New Project

I need to :

Start My project from MC...

ACCESS TO MCU SELECTOR

Start My project from STB...

ACCESS TO BOARD SELECTOR

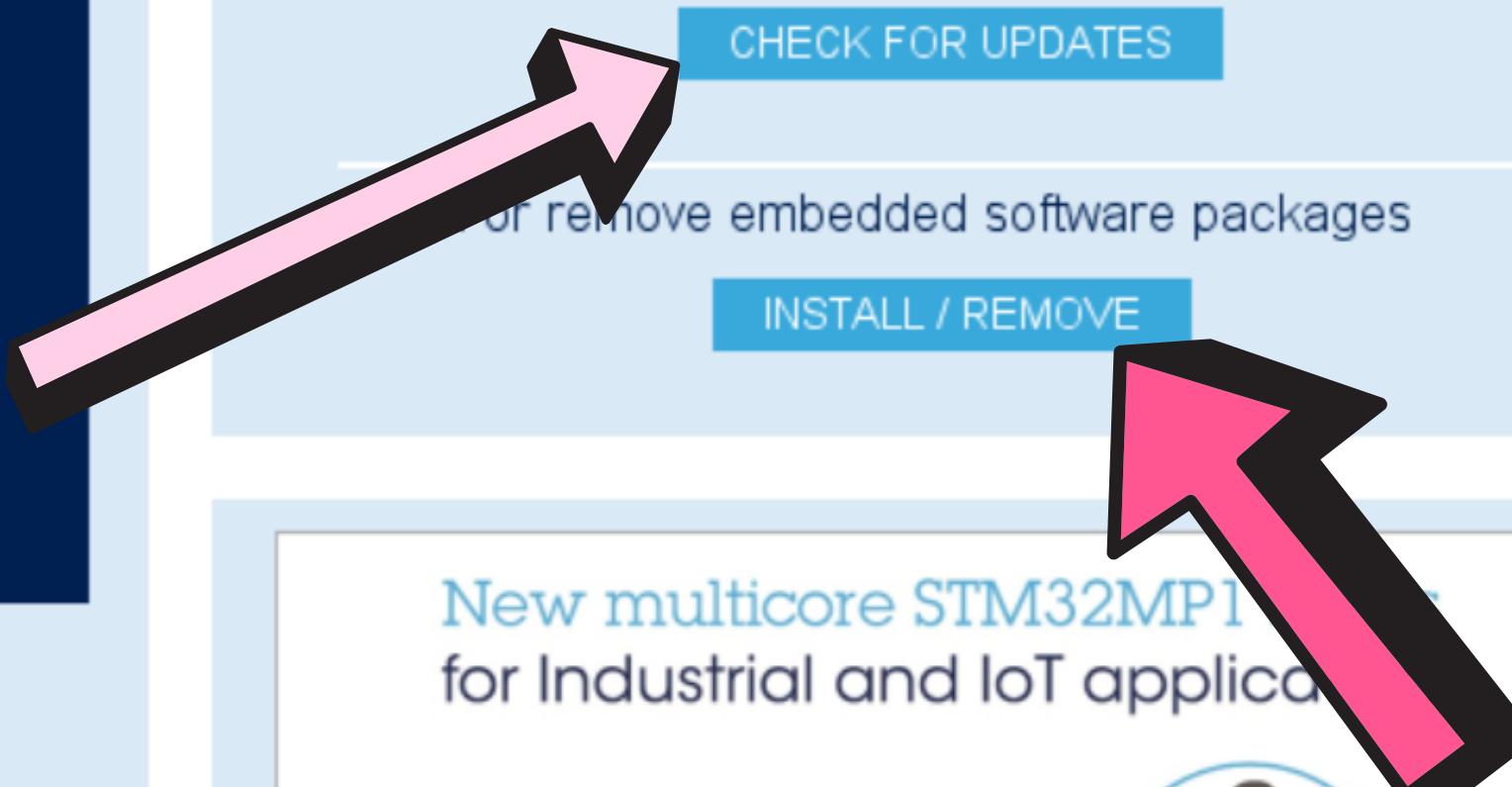
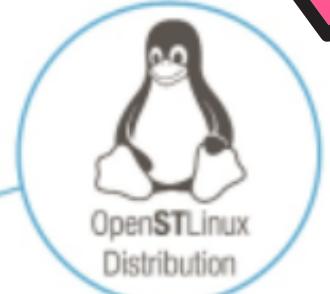
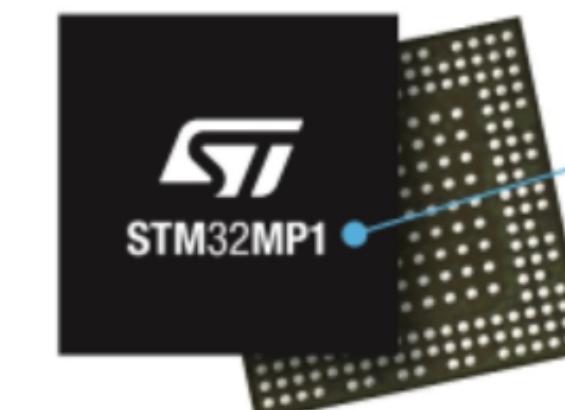
Manage software installations

Check for STM32CubeMX and embedded software

CHECK FOR UPDATES

or remove embedded software packages

INSTALL / REMOVE

New multicore STM32MP1
for Industrial and IoT applica...



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Existing Projects

Recent Opened Projects

G0_LPUART.ioc

Last modified date : 05/08/2019

G0_UART_MORSE.ioc

Last modified date : 04/08/2019

G0_Mwape.ioc

Last modified date : 26/07/2019

STM32_OSC.ioc

Last modified date : 08/03/2019

STM32_OSC.ioc

Last modified date : 08/03/2019

Other Projects

File Window Help

MX Embedded Software Packages Manager

STM32Cube MCU Packages and embedded software packs releases

Releases Information was last refreshed 4 days ago.

STM32Cube MCU Packages STMMicroelectronics

	Description	Installed Version	Available Version
▶	STM32F7		
▼	STM32G0		
■	STM32Cube MCU Package for STM32G0 Series	1.0.0	1.0.0
▶	STM32H7		
▶	STM32L0		
▶	STM32L4		

Details

From Local ... From Url ... Refresh Install Now Remove Now Close



X

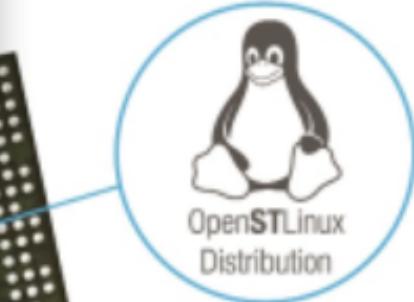
+

-

UPDATES

software packages

REMOVE

STM32MP1 Series
IoT applications



- Click on "Access to MCU selector"



File

Window

Help



Existing Projects

Recent Opened Projects

G0_LPUART.ioc



Last modified date : 05/08/2019 18:13:21

G0_UART_MORSE.ioc



Last modified date : 04/08/2019 14:08:39

G0_Mwape.ioc



Last modified date : 26/07/2019 12:30

STM32_OSC.ioc



Last modified date : 08/03/2019 17:00:09

STM32_OSC.ioc



Last modified date : 08/03/2019 16:53:54

Other Projects



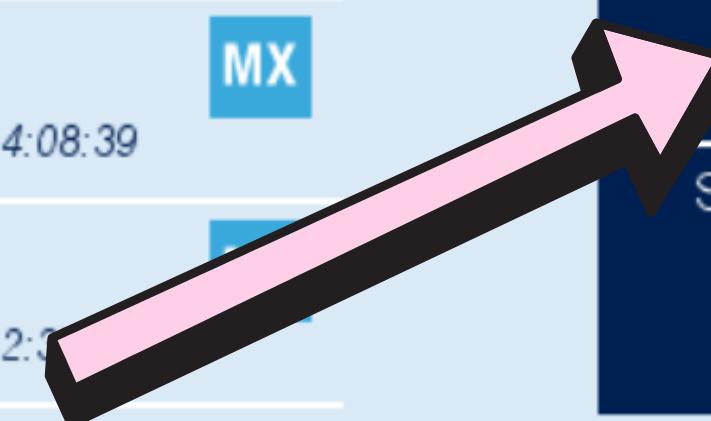
New Project

I need to :

Start My project from MC...

[ACCESS TO MCU SELECTOR](#)

Start My project from STB...

[ACCESS TO BOARD SELECTOR](#)

Manage software installations

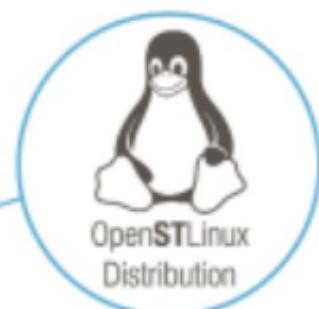
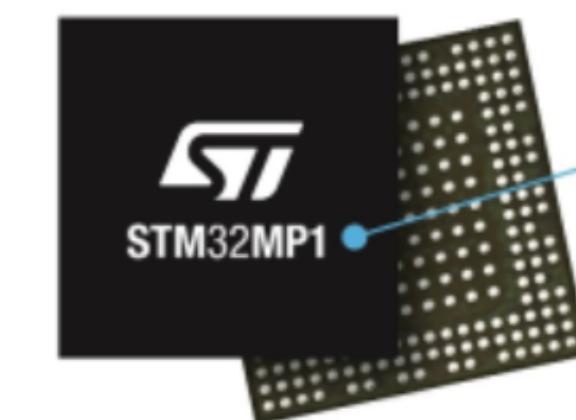
Check for STM32CubeMX and embedded software

[CHECK FOR UPDATES](#)

Install or remove embedded software packages

[INSTALL / REMOVE](#)

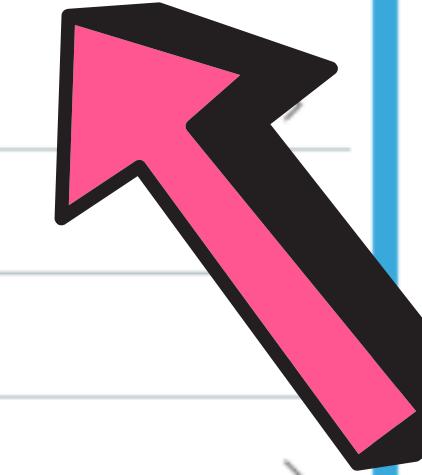
New multicore STM32MP1 Series
for Industrial and IoT applications



MCU Filters



Part Number Search

 stm32g071rb


Core

Series

Line

Package

Other

Price From 0.0 to 1.49

 0.0 1.49

IO = 60

Eeprom = 0 (Bytes)

Flash = 128 (kBytes)

Ram = 36 (kBytes)

Freq. = 64 (MHz)

Features

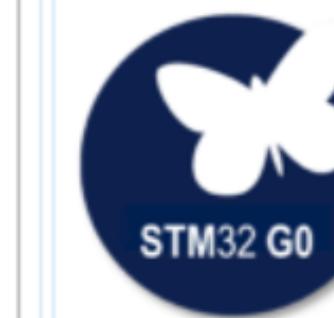
Block Diagram

Docs & Resources

Datasheet

Buy

STM32G071RB



Mainstream Arm Cortex-M0+ MCU with 128 Kbytes of Flash memory, 36 Kbytes RAM, 64 USART, timers, ADC, DAC, comm. I/F, 1.65-3.6V

ACTIVE

Active

Product is in mass production

Unit Price for 10kU (US\$): **1.49**Boards: [NUCLEO-G071RB](#) - [STM32G071B-DISCO](#)

LQFP64

The STM32G071x8 STM32G071xB mainstream microcontrollers are based on high-performance Arm® Cortex®-M0+ 32-bit RISC up to 64 MHz frequency. Offering a high level of integration, they are suitable for a wide range of applications in consumer, industrial domains and ready for the Internet of Things (IoT) solutions.

The devices incorporate a memory protection unit (MPU), high-speed embedded memories (up to 128 Kbytes of Flash program memory, up to 36 Kbytes of SRAM), DMA and an extensive range of system functions, enhanced I/Os and peripherals. The devices offer standard communication interfaces (two I2Cs, two SPIs / one I2S, one HDMI CEC and four USARTs), one 12-bit ADC (2.5 MSps) with up to 19 channels, one 12-bit DAC, two comparators, an internal voltage reference buffer, a low-power RTC, an advanced control PWM timer running at up to double the CPU frequency, five general-purpose 16-bit timers with one running at up to double the CPU frequency, a 32-bit general-purpose timer, two basic and two low-power 16-bit timers, two watchdog timers, and a SysTick timer. The STM32G071x8 STM32G071xB devices provide a USB Type-C Power Delivery controller.

The devices operate within ambient temperatures from -40 to 105 °C. They can operate with supply voltages from 1.7 V to 3.6 V. On-chip oscillators provide fast start-up times.

MCUs List: 2 items

Display similar items

*	Part No	Reference	Marketing St...	Unit Price	Board	Package	Flash	RAM	IO
★	STM32G071RB	STM32G071RBlx		0.0		UFBGA64	128 kBytes	36 kBytes	60
★		STM32G071RBTxActive		1.49	NUCLEO-G071RB	STM32G071B-DISCO	LQFP64	128 kBytes	36 kBytes



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/ STM32G071RBTx

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GENERATE CODE

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Pinout

Options



Categories

A-Z

System Core >

Analog >

Timers >

Connectivity >

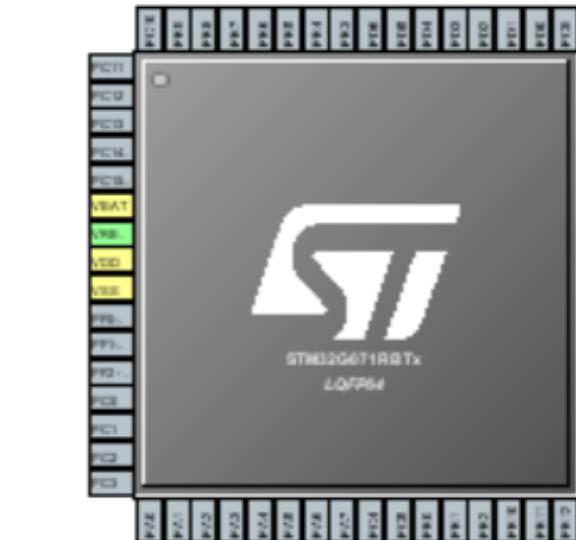
Multimedia >

Computing >

Middleware >

Pinout view

System view



MCUs Selection

Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RBlx	UFBGA64	None
<input checked="" type="checkbox"/> STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None



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Categories A-Z

System Core >

Analog >

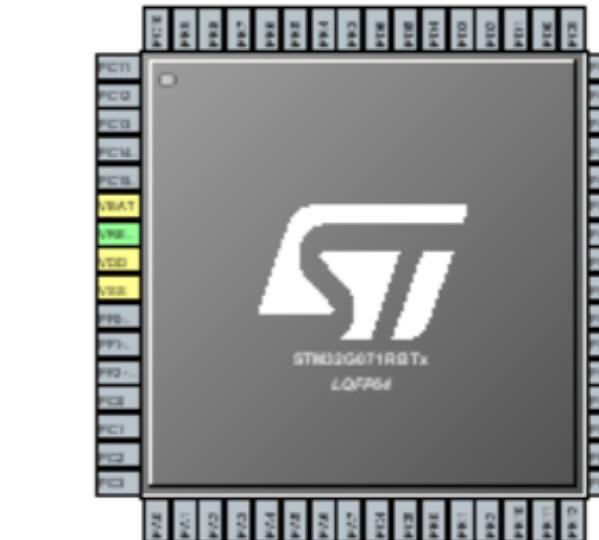
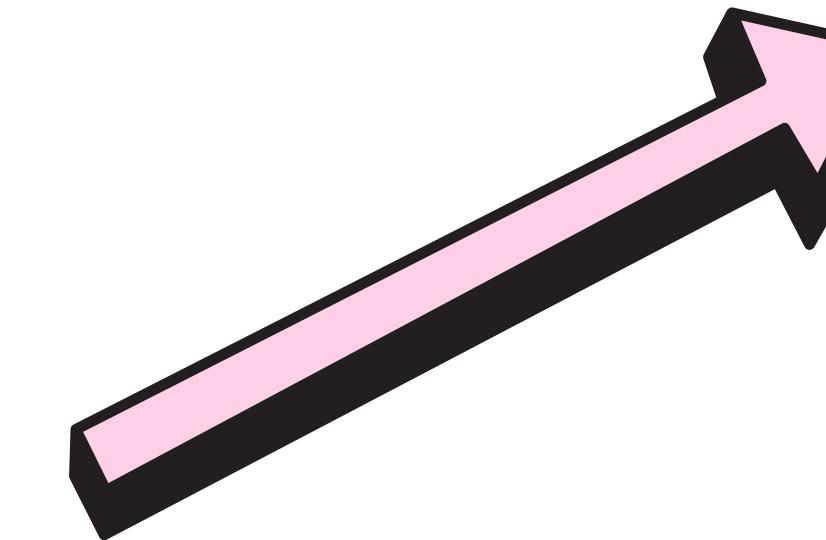
Timers >

Connectivity >

Multimedia >

Computing >

Middleware >



MCUs Selection Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RBlx	UFBGA64	None
<input checked="" type="checkbox"/> STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None



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Analog >

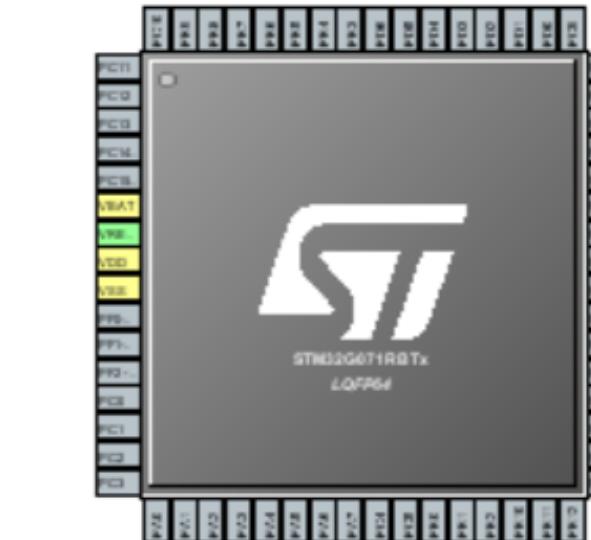
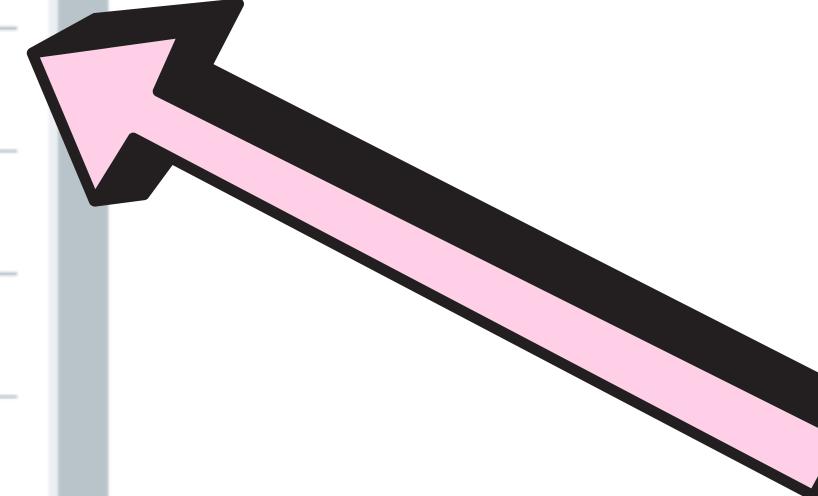
Timers >

Connectivity >

Multimedia >

Computing >

Middleware >



MCUs Selection Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RBlx	UFBGA64	None
<input checked="" type="checkbox"/> STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None



File

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>

Pinout view

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Categories

A-Z

System Core >

Analog >

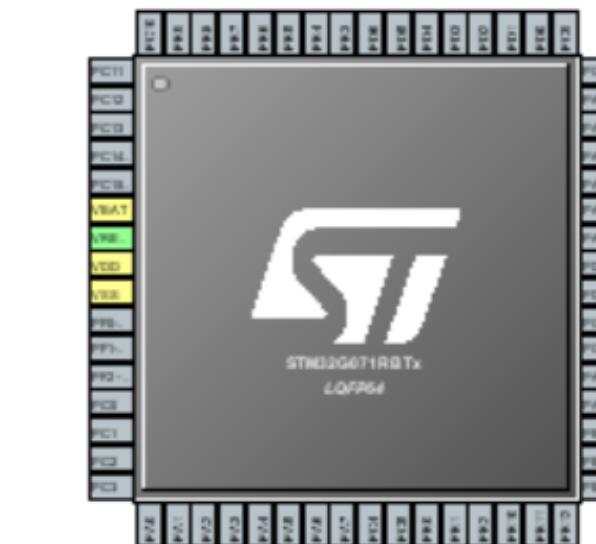
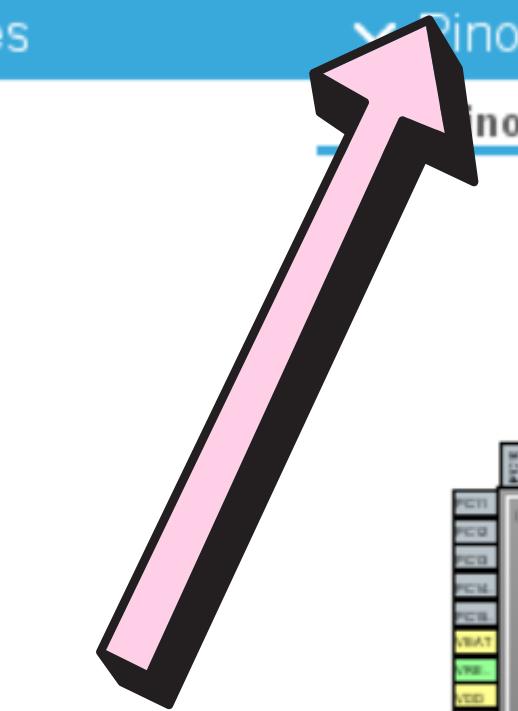
Timers >

Connectivity >

Multimedia >

Computing >

Middleware >



MCUs Selection

Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RBlx	UFBGA64	None
STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None



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PCC

STM32G071RBTx

Series
Line
DatasheetSTM32G0
STM32G0x1
DS12232_Rev0

VDD Selection

T_{Ambient}
V_{DD}

25°C

--Choose--

Battery Selection

Select

Information Notes

Help

▼ Power

Step



Sequence



Sequence Table

Step

Mode

V_{DD}

Range/Scale

Memory

CPU/Bus Freq

Clock Config

Peripherals

Step Current

Duration

Display

Plot: All Steps



MCUs Selection

Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RBlx	UFBGA64	None
<input checked="" type="checkbox"/> STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None





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Analog >

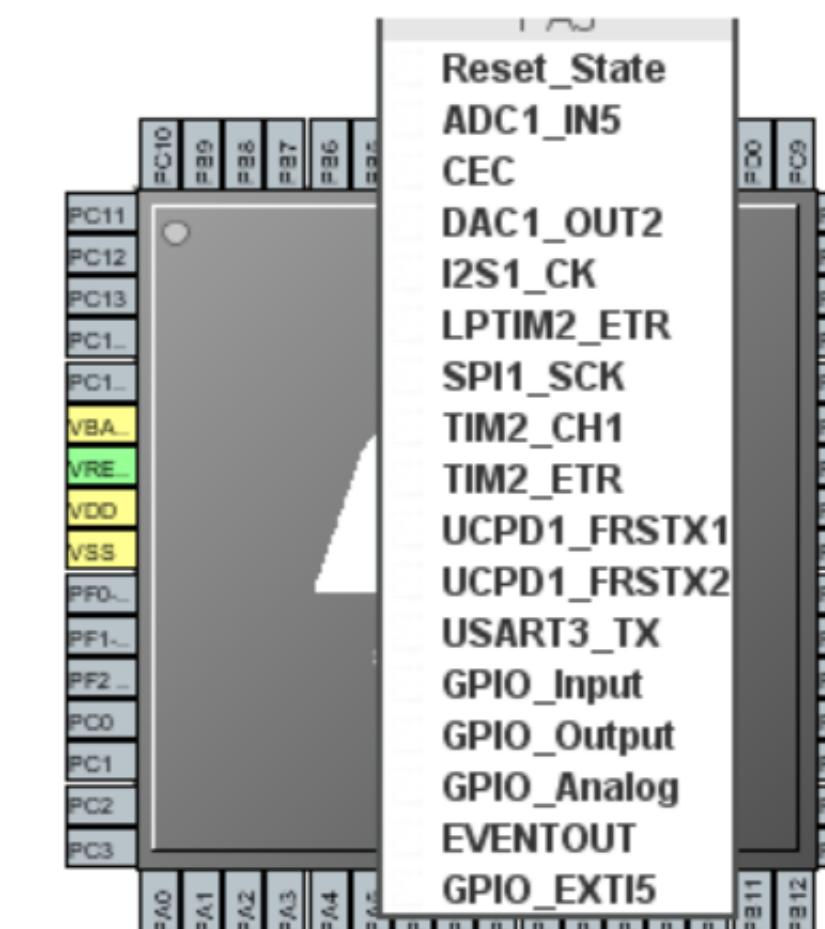
Timers >

Connectivity >

Multimedia >

Computing >

Middleware >

Pinout view System view 

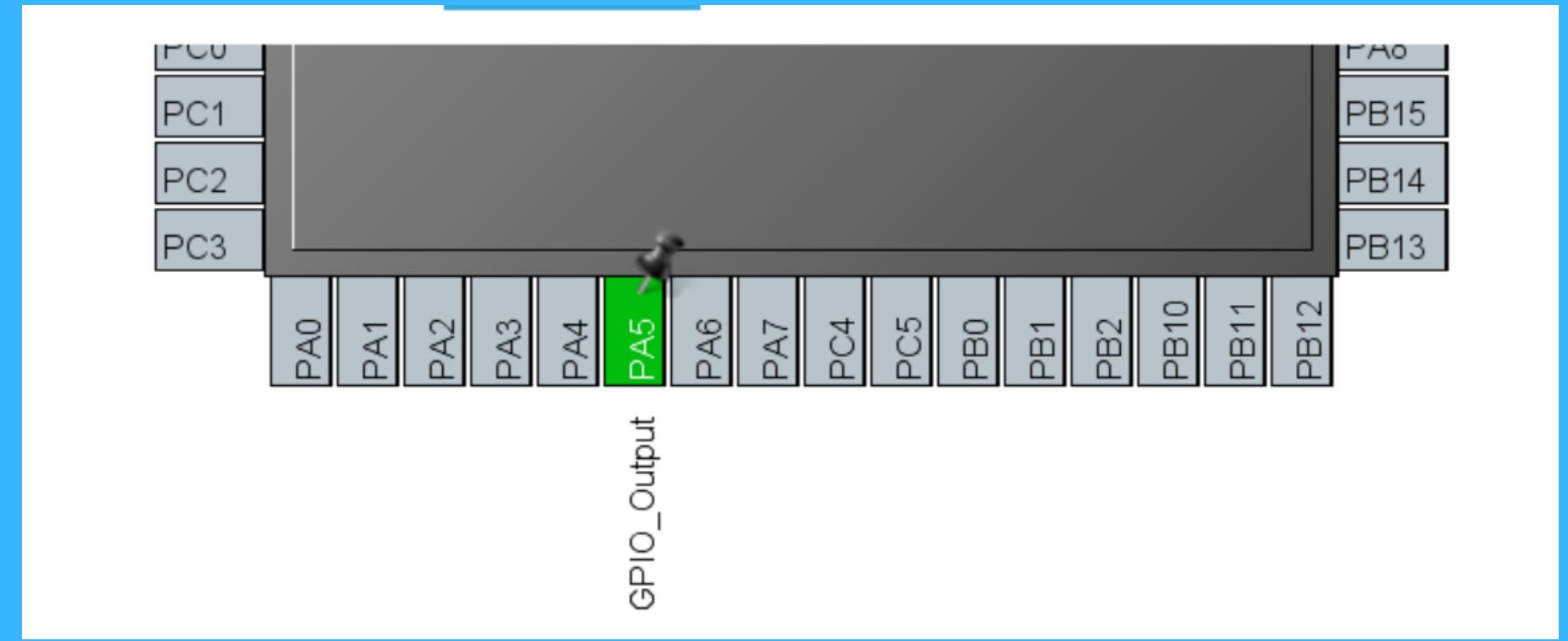
▼

MCUs Selection

Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RB1x	UFBGA64	None
<input checked="" type="checkbox"/> STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None

- Set it as GPIO_Output.
- The pin should turn green.
- Next we will change the clock speed
- Click on the clock configuration tab and change HLCK to run at 64Mhz
- Click ok on the prompt that follows.

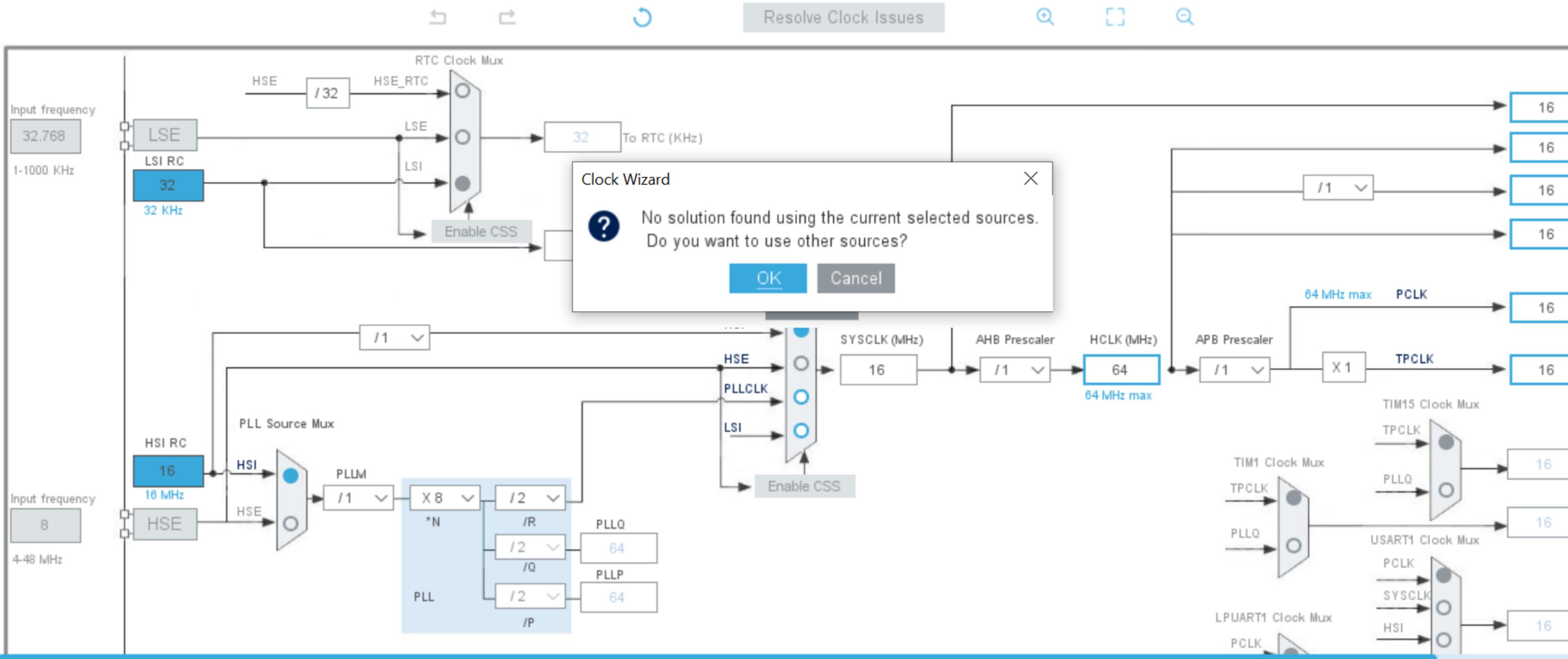


Pinout & Configuration

Clock Configuration

Project Manager

Tools



Pinout & Configuration

Clock Configuration

Project Manager

Tools

Project

Project Settings

Project Name

Blinker

Project Location

C:\Users\Mwape\workspace\STM32\

Browse

Application Structure

Basic

 Do not generate the main()

Toolchain Folder Location

C:\Users\Mwape\workspace\STM32\Blinker\

Toolchain / IDE

MDK-ARM V5

 Generate Under Root

Linker Settings

Minimum Heap Size

0x200

Minimum Stack Size

0x400

Code Generator

Advanced Settings

MCUs Selection | Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RBix	UFBGA64	None
<input checked="" type="radio"/> STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None

Pinout & Configuration

Clock Configuration

Project Manager

Tools

Mcu and Firmware Package

Mcu Reference

STM32G071RBTx

Firmware Package Name and Version

STM32Cube FW_G0 V1.0.0

 Use Default Firmware Location

MX Code Generation

X

C:/Users/Mwape/STM32Cube/R



The Code is successfully generated under C:/Users/Mwape/workspace/STM32/Blinker

[Open Folder](#)[Open Project](#)

Close



MCUs Selection | Output

Series	Lines	Mcu	Package	Required Peripherals
STM32G0	STM32G0x1	STM32G071RBIdx	UFBGA64	None
<input checked="" type="checkbox"/> STM32G0	STM32G0x1	STM32G071RBTx	LQFP64	None



File Edit View Project Flash Debug Peripherals Tools SVCS Window Help



Blinker



Project

- Project: Blinker
- Blinker



Build Output

ST-Link Debugger

CAP NUM SCRL C
07:22

File Packs Window Help

Device: STMicroelectronics - STM32G071RBTx

Devices Boards

Search: X [-]

Device

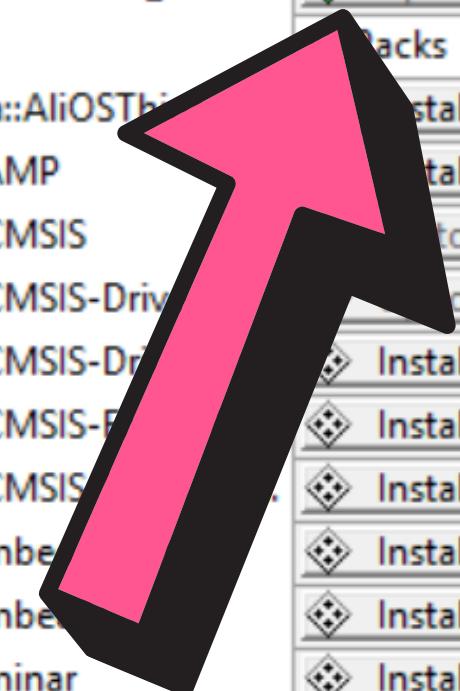
Summary

STM32G071R...	ARM Cortex-M0+, 64 MHz, 36 kB RAM, 32 kB ROM
STM32G071R...	ARM Cortex-M0+, 64 MHz, 36 kB RAM, 64 kB ROM
STM32G071R...	ARM Cortex-M0+, 64 MHz, 36 kB RAM, 128 kB ROM
STM32G071R...	ARM Cortex-M0+, 64 MHz, 36 kB RAM, 128 kB ROM
+ STM32G081	11 Devices
+ STM32G4 Series	118 Devices
+ STM32H7 Series	72 Devices
+ STM32L0 Series	152 Devices
+ STM32L1 Series	81 Devices
+ STM32L4 Series	190 Devices
+ STM32MP1 Series	8 Devices
+ STM32W1 Series	5 Devices
+ STM32WB Series	9 Devices
+ Texas Instruments	350 Devices
+ Toshiba	232 Devices
+ Unisoc	1 Device
+ Zilog	7 Devices

Packs Examples

Pack

- Device Specific	1 Pack	STM32G071RBTx selected
+ Keil::STM32G0xx_DFP	Up to date	STMicroelectronics STM32G0 Series Device Support
- Generic	Packs	
+ Alibaba::AliOSThing	Install	AliOS Things software pack
+ ARM::AMP	Install	Software components for inter processor communication
+ ARM::CMSIS	Up to date	CMSIS (Cortex Microcontroller Software Interface Standard)
+ ARM::CMSIS-Driver	Up to date	CMSIS Drivers for external devices
+ ARM::CMSIS-Driver	Install	CMSIS-Driver Validation
+ ARM::CMSIS-F	Install	Bundle of FreeRTOS for Cortex-M and Cortex-A
+ ARM::CMSIS	Install	CMSIS-RTOS Validation
+ ARM::mbed	Install	ARM mbed Client for Cortex-M devices
+ ARM::mbed	Install	ARM mbed Cryptographic and SSL/TLS library for Cortex-M
+ ARM::minar	Install	mbed OS Scheduler for Cortex-M devices
+ ARM::TFM	Install	Trusted Firmware-M (TF-M) is the reference implementation
+ EmbeddedOffice::Flex...	Install	Flexible Safety RTOS
+ Keil::ARM_Compiler	Up to date	Keil ARM Compiler extensions for ARM Compiler 5 and 6
+ Keil::iMXRT105x_MWP	Install+	NXP i.MX RT 105x MDK-Middleware examples and CMSIS
+ Keil::Jansson	Install	Jansson is a C library for encoding, decoding and manipulating JSON
+ Keil::MDK-Middleware	Up to date	Middleware for Keil MDK-Professional and MDK-Plus
+ lwIP::lwIP	Install	lwIP is a light-weight implementation of the TCP/IP protocol



Output

Refresh Pack descriptions

Update available for Keil::STM32F4xx_DFP (installed: 2.13.0, available: 2.14.0)

Refresh Pack descriptions

Update available for Keil::STM32F4xx_DFP (installed: 2.13.0, available: 2.14.0)

Ready



LOAD



Blinker



Project



main.c



main.c



stm32g0x



stm32g0x



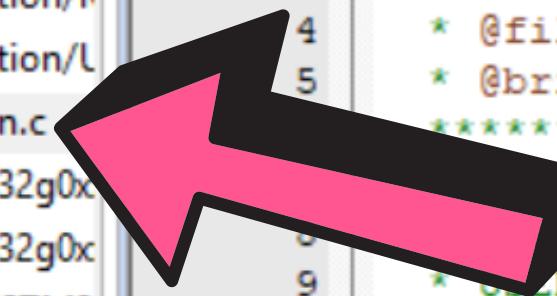
Drivers/STM3



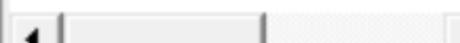
Drivers/CMSI



CMSIS



```
1  /* USER CODE BEGIN Header */
2  /**
3   * @file          : main.c
4   * @brief         : Main program body
5   *
6   * This notice applies to any and all portions of this file
7   * which are not between comment pairs USER CODE BEGIN and
8   * USER CODE END. Other portions of this file, whether
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11  *
12  *
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25  *
```



<

Build Output



LOAD

Blinker

▼



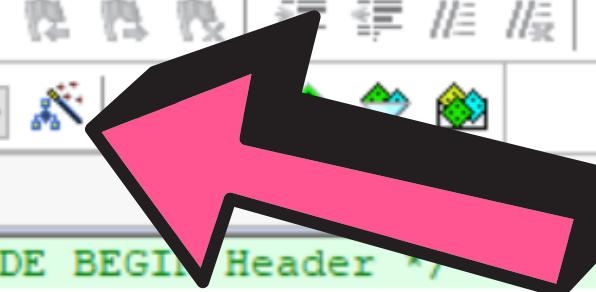
Project

Project: Blinker

- Blinker
- Application/M
- Application/L
 - main.c
 - stm32g0x
 - stm32g0x
- Drivers/STM3
- Drivers/CMSI
- CMSIS

main.c

```
1  /* USER CODE BEGIN Header */
2  /**
3   * @file           : main.c
4   * @brief          : Main program body
5   * @note           : This notice applies to any and all portions of this file
6   *                   that are not between comment pairs USER CODE BEGIN and
7   *                   USER CODE END. Other portions of this file, whether
8   *                   inserted by the user or by software development tools
9   *                   are owned by their respective copyright owners.
10  *
11  * COPYRIGHT(c) 2019 STMicroelectronics
12  *
13  * Redistribution and use in source and binary forms, with or without modification,
14  * are permitted provided that the following conditions are met:
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16  *      this list of conditions and the following disclaimer.
17  *   2. Redistributions in binary form must reproduce the above copyright notice,
18  *      this list of conditions and the following disclaimer in the documentation
19  *      and/or other materials provided with the distribution.
20  *   3. Neither the name of STMicroelectronics nor the names of its contributors
21  *      may be used to endorse or promote products derived from this software
22  *      without specific prior written permission.
23  *
24  */
25 
```



Build Output



Project

Project: Blinker
Blinker
Application/M
Application/L
main.c
stm32g0x
stm32g0x
Drivers/STM3
Drivers/CMSI
CMSIS

main.c

```
103
104  /* USER CODE */
105
106  /* USER CODE */
107
108  /* Initialization File */
109  MX_GPIO_
110  /* USER CODE */
111
112  /* USER CODE */
113
114  /* Infini */
115  /* USER CODE */
116  while (1)
117  {
118      /* USER CODE */
119
120      /* USER CODE */
121  }
122  /* USER CODE */
123
124  */
125  /**
126  * @brief
127  * @retva
128  */
```

Options for Target 'Blinker'

Device | Target | Output | Listing | User | C/C++ | Asm | Linker | **Debug** | Utilities

Use Simulator [with restrictions](#)

Use: ST-Link Debugger

Limit Speed to Real-Time

Load Application at Startup Run to main()

Initialization File:

Restore Debug Session Settings

Breakpoints Toolbox

Watch Windows & Performance Analyzer System Viewer

CPU DLL: Parameter: SARMCM3.DLL -REMAP

Dialog DLL: Parameter: DARMCM1.DLL -pCM0+

Warn if outdated Executable is loaded

Driver DLL: Parameter: SARMCM3.DLL

Dialog DLL: Parameter: TARMCM1.DLL -pCM0+

Warn if outdated Executable is loaded

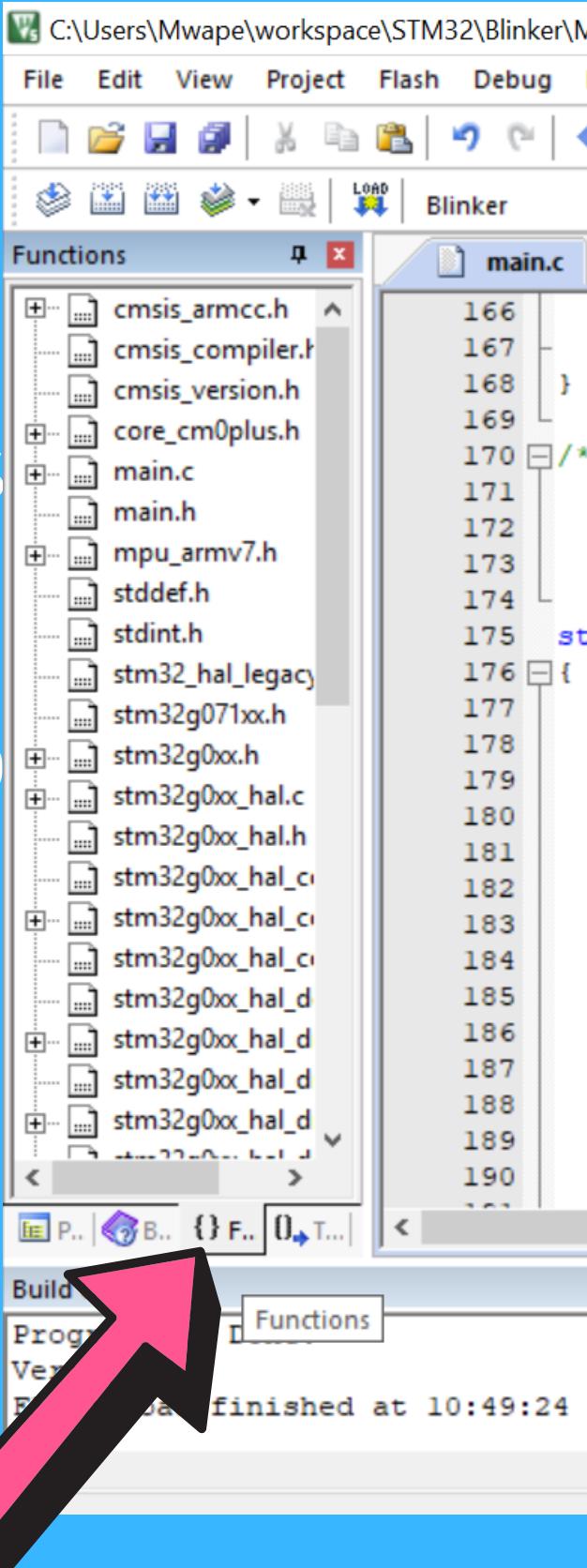
OK

Cancel

Defaults

Help

Build Output



- A list of functions you can use are listed on this panel.
- We will use the HAL_GPIO_TogglePin function to toggle an LED on or off.

```
/* USER CODE BEGIN SysInit */

/* USER CODE END SysInit */

/* Initialize all configured peripherals */
MX_GPIO_Init();
/* USER CODE BEGIN 2 */

/* USER CODE END 2 */

/* Infinite loop */
/* USER CODE BEGIN WHILE */
while (1)
{
    HAL_GPIO_TogglePin(GPIOA, GPIO_PIN_5);
    HAL_Delay(100);
    /* USER CODE END WHILE */

    /* USER CODE BEGIN 3 */
}

/* USER CODE END 3 */

**
```

- The HAL_GPIO_TogglePin takes in a port (which is defined through CubeMX):

```
static void MX_GPIO_Init(void)
{
    GPIO_InitTypeDef GPIO_InitStruct = {0};

    /* GPIO Ports Clock Enable */
    __HAL_RCC_GPIOA_CLK_ENABLE();

    /*Configure GPIO pin Output Level */
    HAL_GPIO_WritePin(GPIOA, GPIO_PIN_5, GPIO_PIN_RESET);
```

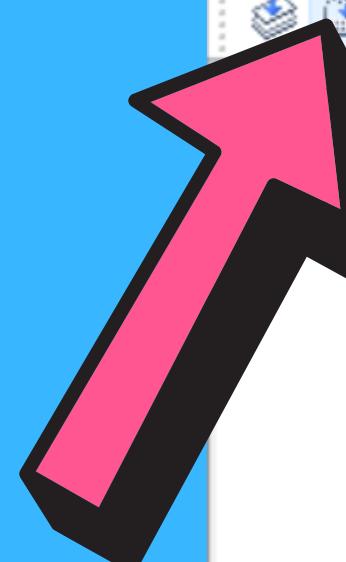
- And the pin that you want to toggle

```
static void MX_GPIO_Init(void)
{
    GPIO_InitTypeDef GPIO_InitStruct = {0};

    /* GPIO Ports Clock Enable */
    __HAL_RCC_GPIOA_CLK_ENABLE();

    /*Configure GPIO pin Output Level */
    HAL_GPIO_WritePin(GPIOA, GPIO_PIN_5, GPIO_PIN_RESET);
```

- A delay is added so you can visually see the changes.
`(HAL_Delay(100);`
- Now build the project:



C:\Users\Mwape\workspace\STM32\Blinker\MDK-ARM\Blinker.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

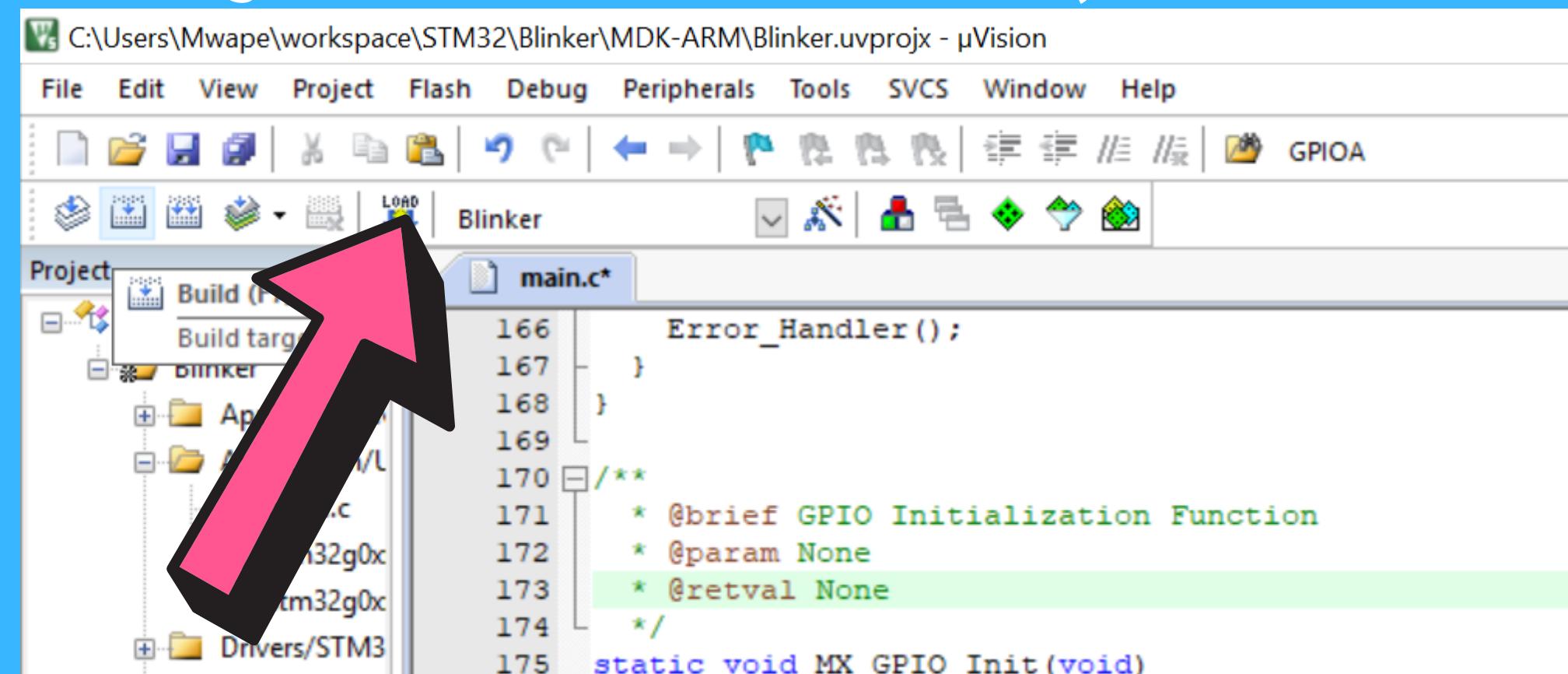
Build (F7) Build target files

Blinker Application/M Application/L main.c stm32g0x stm32g0x Drivers/STM3

main.c*

```
166     Error_Handler();  
167 }  
168 }  
169  
170 /**  
171 * @brief GPIO Initialization Function  
172 * @param None  
173 * @retval None  
174 */  
175 static void MX_GPIO_Init(void)
```

- Once that's done, upload to the flash
- Click the reset button on your MCU once its done
- If the LED blinks, Congrats! You are done ;)



C:\Users\Mwape\workspace\STM32\Blinker\MDK-ARM\Blinker.uvprojx - µVision

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GPIOA

Project main.c*

```
166     Error_Handler();  
167 }  
168 }  
169  
170 /**  
171 * @brief GPIO Initialization Function  
172 * @param None  
173 * @retval None  
174 */  
175 static void MX_GPIO_Init(void)
```