

# Embedded system using Arm Cortex M4

- 1- open the ST microtronics website.

[https://www.st.com/content/st\\_com/en.html](https://www.st.com/content/st_com/en.html)

- 2- search for nucleo uh f411 abode

The screenshot shows the STMicroelectronics website with a search bar containing 'nucleo f411 board'. The search results are filtered under 'Tools & Software (1)'. A table lists one result: 'NUCLEO-F411RE', which is an 'ACTIVE' 'Evaluation Tools' product. The description states it is an 'STM32 Nucleo-64 development board with STM32F411RE MCU connectivity'.

Part Number	Status	Type	Category	Description
NUCLEO-F411RE	ACTIVE	Evaluation Tools	Product Evaluation Tools	STM32 Nucleo-64 development board with STM32F411RE MCU connectivity

The screenshot shows the product page for 'NUCLEO-F411RE'. The page title is 'NUCLEO-F411RE' with a status of 'ACTIVE'. The description is 'STM32 Nucleo-64 development board with STM32F411RE MCU, supports Arduino and ST morpho connectivity'. There is a 'Download databrief' button. The navigation bar includes 'Overview', 'Sample & Buy', 'Documentation', 'CAD Resources', 'Tools & Software', and 'Quality & Reliability'.

Quick links

[Product Specifications](#)

[Presentations](#)

[License Agreement](#)

[Technical Notes & Articles](#)

[Flyers](#)

[Evaluation Board Terms of Use](#)

[User Manuals](#)

[Product Certifications](#)

Search documents by title

File type

Latest update

Reset

## All resources

[Expand all categories](#)

CareersSample & BuySupport & Community

ST

life.augmented

Products

Tools & Software

Applications

Solutions

STM32 Developer Zone

Evaluation Tools > Product Evaluation Tools > MCU & MPU Eval Tools > STM32 MCU & MPU Eval Tools > STM32 Nucleo Boards > NUCLEO-F411RE >

NUCLEO-F411RE

ACTIVE

Save to MyST

STM32 Nucleo-64 development board with STM32F411RE MCU, supports Arduino and ST morpho connectivity

Download databrief

OverviewSample & BuyDocumentationCAD ResourcesTools & SoftwareQuality & Reliability

Quick links

BoardsDevelopment ToolsMCU & MPU Embedded Software  
Product Evaluation ToolsSoftware Development Tools

Search Tools & Software by name or descriptionServed country/regionOFF Show only products supplied by STReset

### All tools & software

#### Boards

Part number	Status	Description	Type	Supplier
		netSHIELD industrial ethernet protocols expansion board for		
			Evaluation Boards from	

CareersSample & BuySupport & Community

ST

life.augmented

Products

Tools & Software

Applications

Solutions

STM32 Developer Zone

Quick links

BoardsDevelopment ToolsMCU & MPU Embedded Software

Product Evaluation ToolsSoftware Development Tools

Search Tools & Software by name or descriptionServed country/regionOFF Show only products supplied by STReset

winIDEA Open

ACTIVE

IDE, iTAG Debuggers for Cortex-M microcontrollers

Software Development Tools from Partners

iSYSTEM

MCU & MPU Embedded Software

Part numberStatusDescriptionTypeSupplier

STM32CubeF4

ACTIVE

STM32Cube MCU Package for STM32F4 series (HAL, Low-Layer APIs and CMSIS, USB, TCP/IP, File system, RTOS, Graphic - and examples running on ST boards)

STM32Cube MCU & MPU Packages

ST

STSW-STM32154

ACTIVE

Maximizing power efficiency using STM32F411 Batch Acquisition Mode (AN4515)

STM32 Standard Peripheral Library Expansion

ST

X-CUBE-AZRTOS-F4

ACTIVE

Azure RTOS software expansion for STM32Cube for STM32F4 series

STM32Cube Expansion Packages

ST

X-CUBE-TIMCOOKER

ACTIVE

Applicative examples for STM32 general-purpose timers software expansion for STM32Cube (AN4776)

STM32Cube Expansion Packages

ST

Product Evaluation Tools

## All features

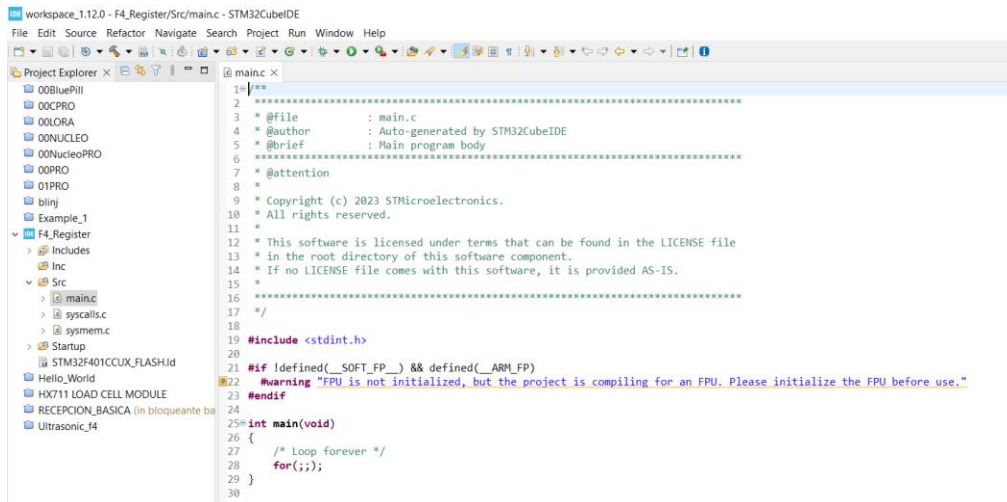
- Consistent and complete embedded software offer that frees the user from dependency issues
- Maximized portability between all STM32 Series supported by STM32Cube
- Hundreds of examples for easy understanding
- High quality HAL and low-layer API drivers using CodeSonar® static analysis tool

[Read more](#)

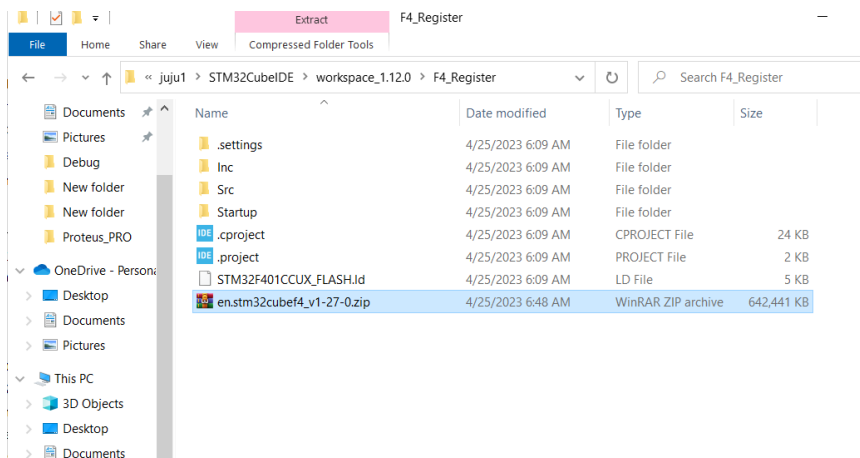
## Get Software

Part Number	General Description	Supplier	Download	All versions
Patch_CubeF4	Patch for STM32CubeF4	ST	<a href="#">Get latest</a>	<a href="#">Select version</a>
STM32CubeF4	STM32Cube MCU Package for STM32F4 series	ST	<a href="#">Get latest</a> <a href="#">Get from GitHub</a>	<a href="#">Select version</a>

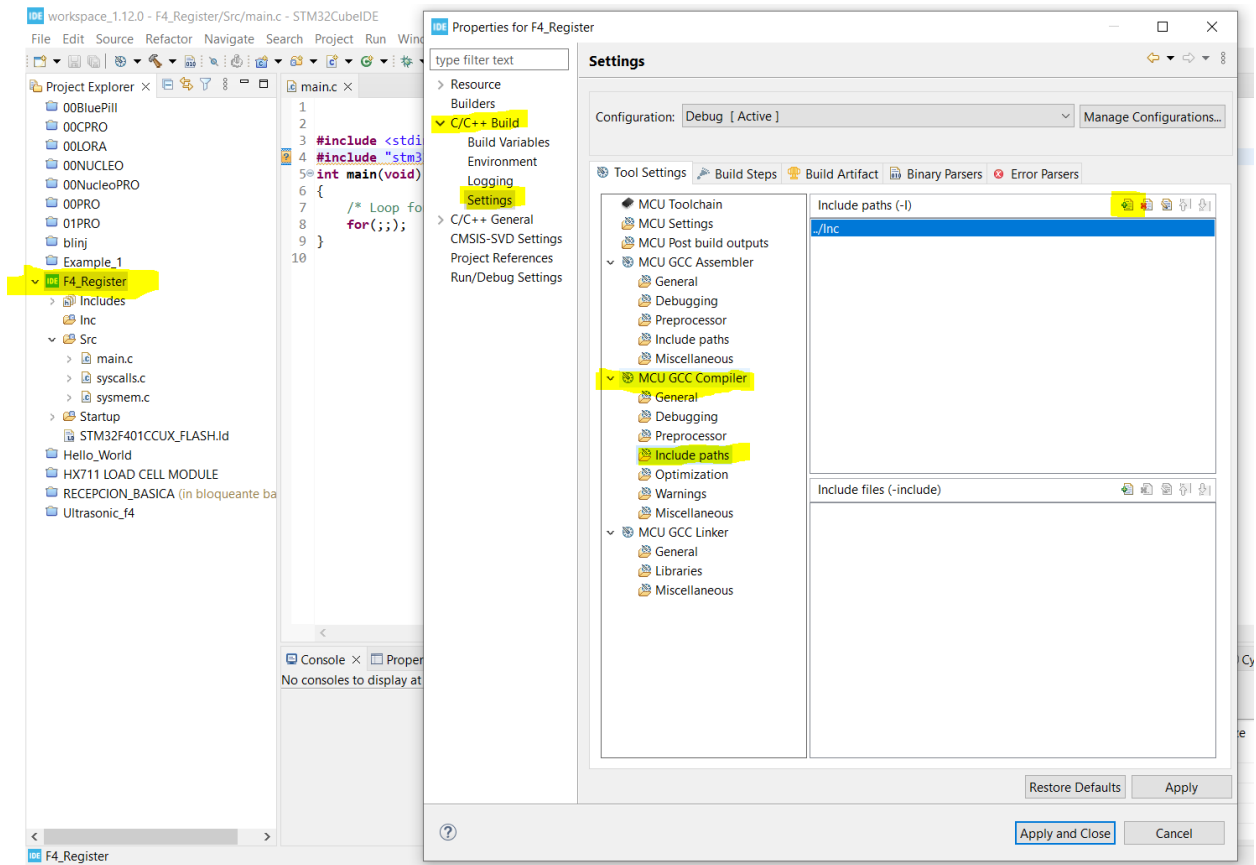
- 3- create a new stm32 project then choose the project type as **empty**.



- 4- After downloads just copy then paste in project folder.

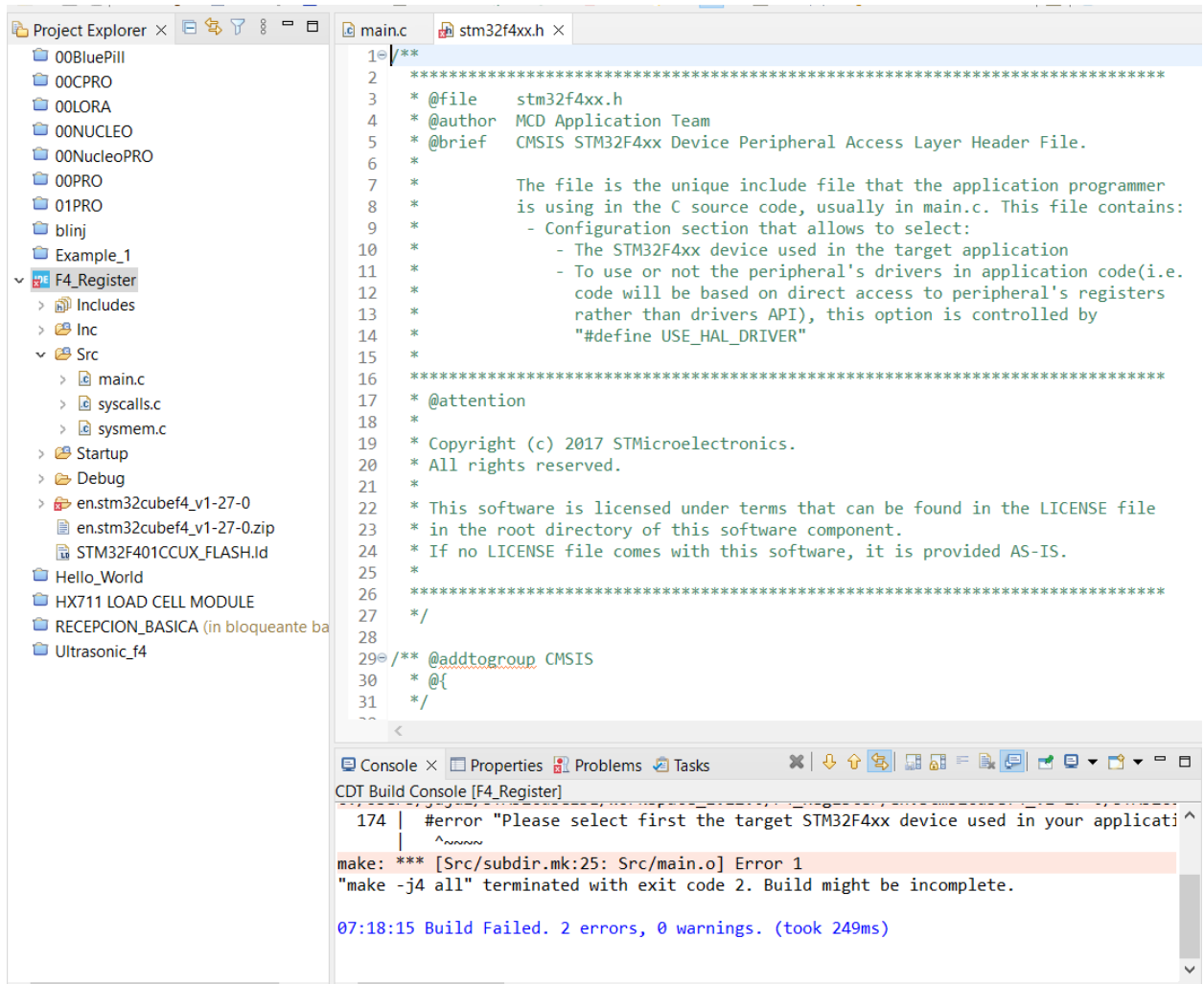


- 5- right click go for right click go for properties >> c/c++ build >> click settings >> click MCU GCC compiler go for the include paths.

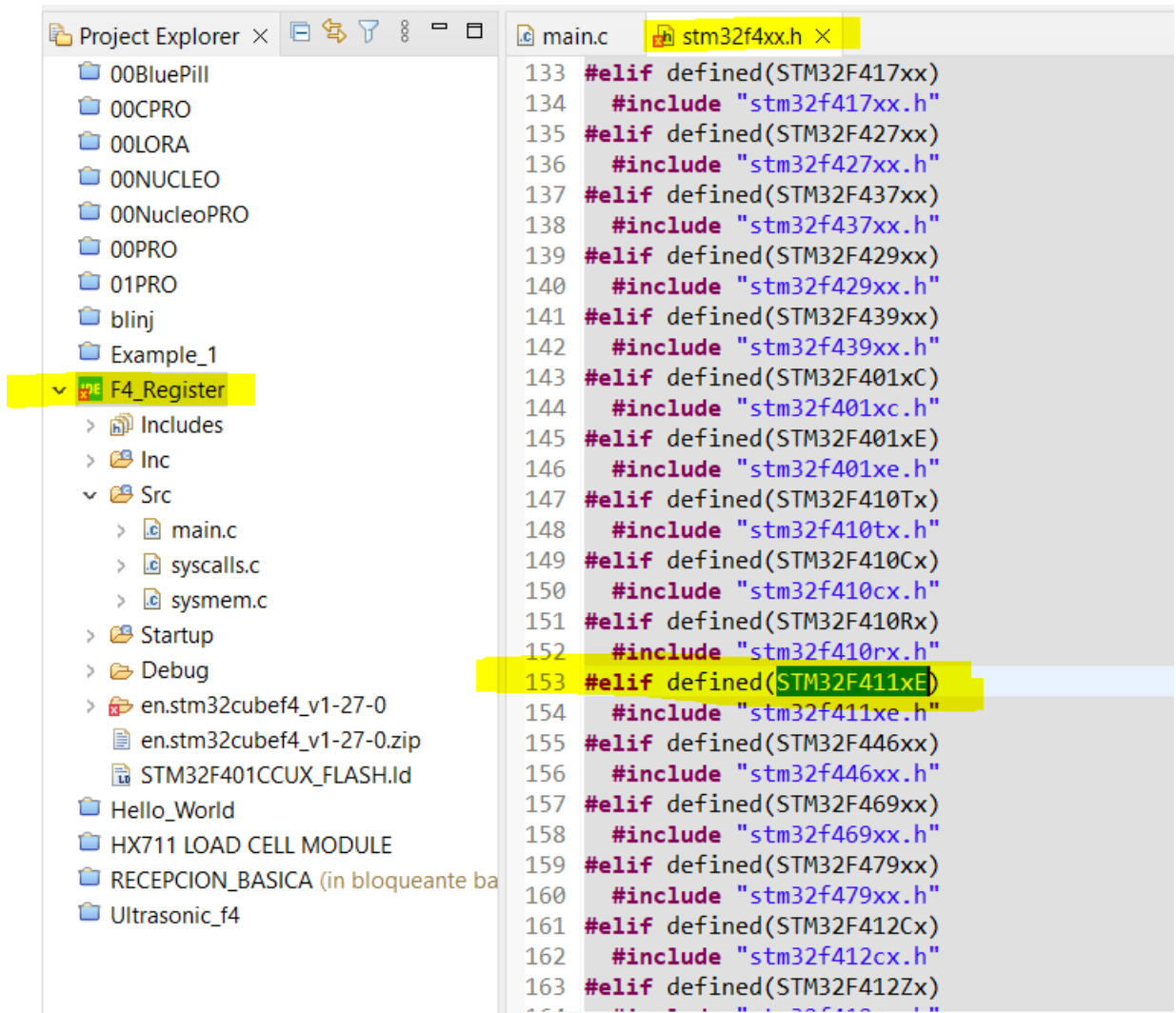


- 6- Add include Path [  
C:\Users\juju1\STM32CubeIDE\workspace\_1.12.0\F4\_Register\en.stm32cubef4\_v1-27-0\STM32  
Cube\_FW\_F4\_V1.27.0\Drivers\CMSIS\Device\ST\STM32F4xx\Include]

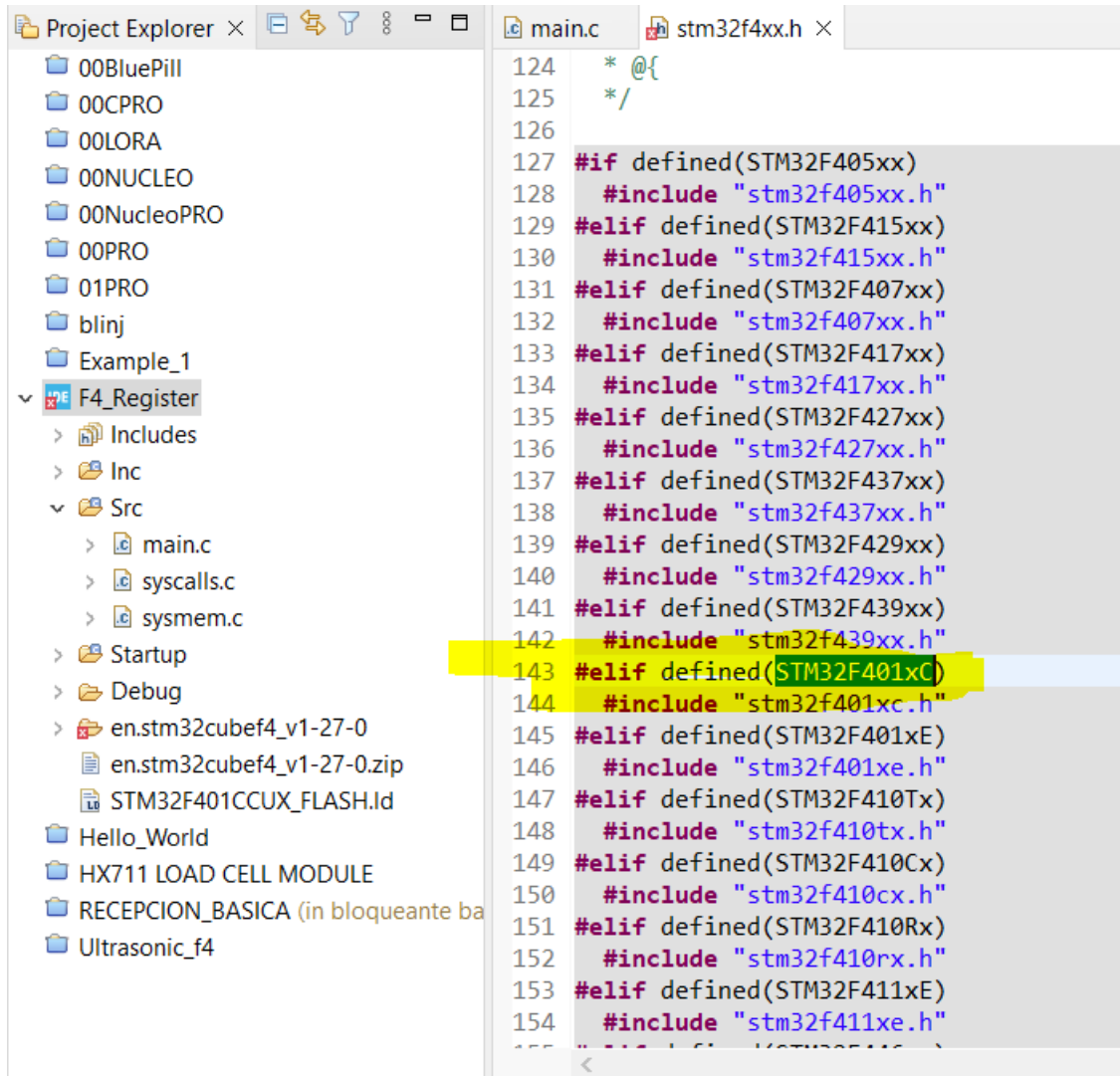




9- copy this symbol



Select the symbol you need .



10- right click go for right click go for properties >> c/c++ build >> click settings >> click MCU GCC compiler >> preprocessor >> then add your symbol.



workspace\_1.12.0 - F4\_Register/en.stm32cube4\_v1-27-0/STM32Cube\_FW\_F4\_V

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer

- 00BluePill
- 00CPRO
- 00LORA
- 00NUCLEO
- 00NucleoPRO
- 00PRO
- 01PRO
- blinj
- Example\_1
- F4\_Register**
- Includes
- Inc
- Src
  - main.c
  - syscalls.c
  - sysmem.c
- Startup
- Debug
- en.stm32cube4\_v1-27-0
  - en.stm32cube4\_v1-27-0.zip
  - STM32F401CCUX\_FLASH.ld
- Hello\_World
- HX711\_LOAD\_CELL\_MODULE
- RECEPCION\_BASICA (in bloqueante ba
- Ultrasonic\_f4

main.c

```
124 * @({
125 */
126
127 #if defined(STM32F405)
128 #include "stm32f405
129 #elif defined(STM32F4
130 #include "stm32f415
131 #elif defined(STM32F4
132 #include "stm32f407
133 #elif defined(STM32F4
134 #include "stm32f417
135 #elif defined(STM32F4
136 #include "stm32f427
137 #elif defined(STM32F4
138 #include "stm32f437
139 #elif defined(STM32F4
140 #include "stm32f429
141 #elif defined(STM32F4
142 #include "stm32f439
143 #elif defined(STM32F4
144 #include "stm32f401
145 #elif defined(STM32F4
146 #include "stm32f401
147 #elif defined(STM32F4
148 #include "stm32f410
149 #elif defined(STM32F4
150 #include "stm32f410
151 #elif defined(STM32F4
152 #include "stm32f410
153 #elif defined(STM32F4
154 #include "stm32f411
```

Properties for F4\_Register

type filter text

- Resource
- Builders
- Build Variables
- Environment
- Logging
- Settings**
- C/C++ General
- CMSIS-SVD Settings
- Project References
- Run/Debug Settings

Settings

Configuration: Debug [Active] Manage Configurations...

Tool Settings Build Steps Build Artifact Binary Parsers Error Parsers

MCU Toolchain

- MCU Settings
- MCU Post build outputs
- MCU GCC Assembler
  - General
  - Debugging
  - Preprocessor
  - Include paths
  - Miscellaneous
- MCU GCC Compiler**
  - General
  - Debugging
  - Preprocessor**
  - Include paths
  - Optimization
  - Warnings
  - Miscellaneous
- MCU GCC Linker
  - General
  - Libraries
  - Miscellaneous

Define symbols (-D)

- DEBUG
- STM32F401CCUX
- STM32
- STM32F4

Undefine symbols (-U)

☐ Do not search system directories (-nostdinc)

☐ Preprocess only (-E)

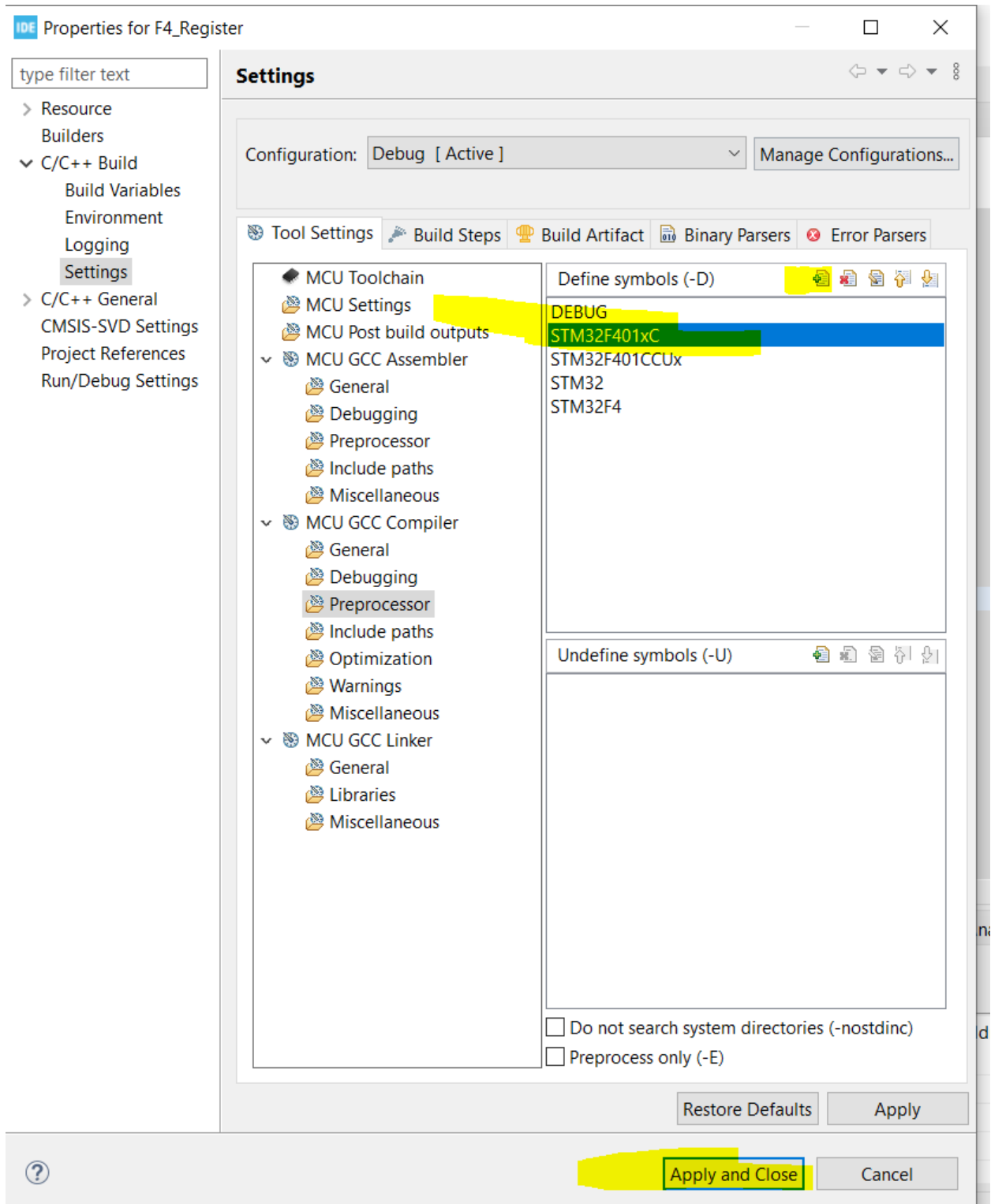
Restore Defaults Apply

Apply and Close Cancel

Console

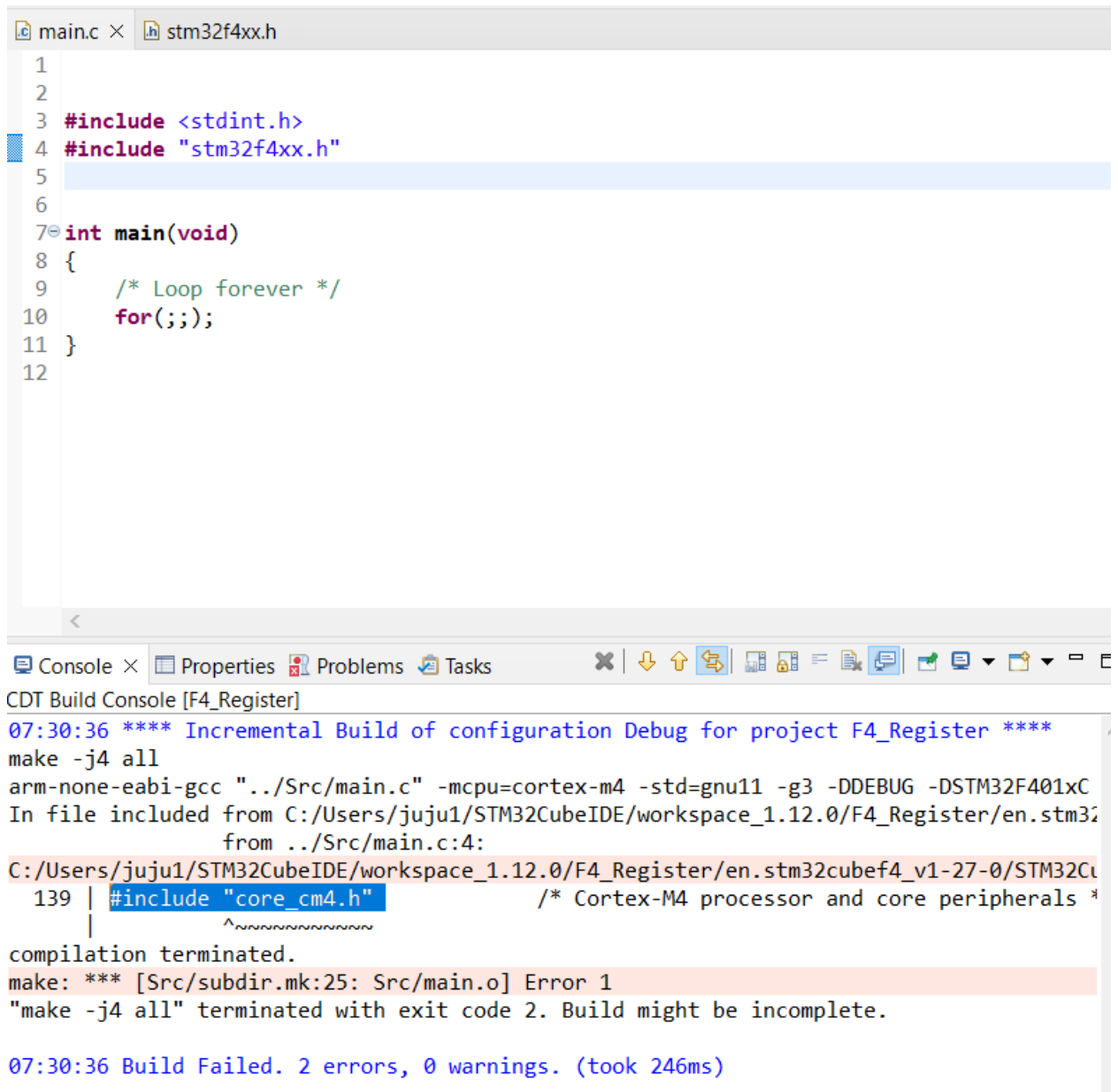
CDT Build Console [F4\_Register]

```
174 | #error "Please sel
make: *** [Src/subdir.mk:25
"make -j4 all" terminated w
07:18:15 Build Failed. 2 er
```



11- click build the project to check .

12- #include "core\_cm4.h"



The screenshot shows an IDE with two tabs: 'main.c' and 'stm32f4xx.h'. The 'main.c' tab is active, displaying a C program with the following code:

```
1
2
3 #include <stdint.h>
4 #include "stm32f4xx.h"
5
6
7 int main(void)
8 {
9     /* Loop forever */
10    for(;;);
11 }
12
```

Below the code editor, there is a 'Console' tab showing the output of a build process. The output is as follows:

```
CDT Build Console [F4_Register]
07:30:36 **** Incremental Build of configuration Debug for project F4_Register ****
make -j4 all
arm-none-eabi-gcc "../Src/main.c" -mcpu=cortex-m4 -std=gnu11 -g3 -DDEBUG -DSTM32F401xC
In file included from C:/Users/juju1/STM32CubeIDE/workspace_1.12.0/F4_Register/en.stm32cubef4_v1-27-0/STM32CubeFW_V1.27.0/Drivers/CMSIS/Include/core_cm4.h:139:
    #include "core_cm4.h"          /* Cortex-M4 processor and core peripherals */
    ~~~~~
compilation terminated.
make: *** [Src/subdir.mk:25: Src/main.o] Error 1
"make -j4 all" terminated with exit code 2. Build might be incomplete.

07:30:36 Build Failed. 2 errors, 0 warnings. (took 246ms)
```

### 13- Add path

[C:\Users\juju1\STM32CubeIDE\workspace\_1.12.0\F4\_Register\en.stm32cubef4\_v1-27-0\STM32Cube\_FW\_F4\_V1.27.0\Drivers\CMSIS\Include]

<div> <div> <div>←</div> <div>→</div> <div>⌵</div> <div>⬆</div> </div> <div> <div>« STM32Cube_FW_F4_V1.27.0 »</div> <div>Drivers</div> <div>CMSIS</div> <div>Include</div> </div> <div> <div>⌵</div> <div>↺</div> </div> </div> <div> <div>🔍</div> <div>Search Include</div> </div>					
<div> <div>📁 Documents</div> <div>🖼️ Pictures</div> <div>📁 Debug</div> <div>📁 New folder</div> <div>📁 New folder</div> <div>📁 Proteus_PRO</div> <div>📁 OneDrive - Person</div> <div>🖼️ Desktop</div> <div>📁 Documents</div> <div>🖼️ Pictures</div> <div>🖼️ This PC</div> <div>📁 3D Objects</div> <div>🖼️ Desktop</div> <div>📁 Documents</div> <div>⬇ Downloads</div> <div>🖼️ Galaxy J4</div> <div>🎵 Music</div> <div>🖼️ Pictures</div> <div>🎬 Videos</div> <div>🖼️ Local Disk (C:)</div> </div>	Name	Date modified	Type	Size	
	📄 cmsis_armcc.h	2/10/2022 3:57 AM	C Header Source F...	28	
	📄 cmsis_armclang.h	2/10/2022 3:57 AM	C Header Source F...	56	
	📄 cmsis_compiler.h	2/10/2022 3:57 AM	C Header Source F...	9	
	📄 cmsis_gcc.h	2/10/2022 3:57 AM	C Header Source F...	61	
	📄 cmsis_iccarm.h	2/10/2022 3:57 AM	C Header Source F...	28	
	📄 cmsis_version.h	2/10/2022 3:57 AM	C Header Source F...	2	
	📄 core_armv8mbl.h	2/10/2022 3:57 AM	C Header Source F...	96	
	📄 core_armv8mml.h	2/10/2022 3:57 AM	C Header Source F...	165	
	📄 core_cm0.h	2/10/2022 3:57 AM	C Header Source F...	42	
	📄 core_cm0plus.h	2/10/2022 3:57 AM	C Header Source F...	50	
	📄 core_cm1.h	2/10/2022 3:57 AM	C Header Source F...	43	
	📄 core_cm3.h	2/10/2022 3:57 AM	C Header Source F...	110	
	📄 core_cm4.h	2/10/2022 3:57 AM	C Header Source F...	121	
	📄 core_cm7.h	2/10/2022 3:57 AM	C Header Source F...	146	
	📄 core_cm23.h	2/10/2022 3:57 AM	C Header Source F...	103	
	📄 core_cm33.h	2/10/2022 3:57 AM	C Header Source F...	172	
	📄 core_sc000.h	2/10/2022 3:57 AM	C Header Source F...	47	
	📄 core_sc300.h	2/10/2022 3:57 AM	C Header Source F...	108	
	📄 mpu_armv7.h	2/10/2022 3:57 AM	C Header Source F...	12	
	📄 mpu_armv8.h	2/10/2022 3:57 AM	C Header Source F...	11	
	📄 tz_context.h	2/10/2022 3:57 AM	C Header Source F...	3	

workspace\_1.12.0 - F4\_Register/Src/main.c - STM32CubeIDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer

- 00BluePill
- 00CPRO
- 00LORA
- 00NUCLEO
- 00NucleoPRO
- 00PRO
- 01PRO
- blinj
- Example\_1
- F4\_Register**
  - Includes
  - Inc
  - Src
    - main.c
    - syscalls.c
    - system.c
  - Startup
  - Debug
  - en.stm32cubef4\_v1-27-0
  - en.stm32cubef4\_v1-27-0.zip
  - STM32F401CCUX\_FLASH.ld
  - Hello\_World
  - HX711 LOAD CELL MODULE
  - RECEPCION\_BASICA (in bloqueante ba
  - Ultrasonic\_f4

main.c

```
1
2
3 #include <stdint.h>
4 #include "stm32f4xx.h"
5
6
7 int main(void)
8 {
9     /* Loop forever */
10    for(;;);
11 }
12
```

stm32f4xx.h

Console

CDT Build Console [F4\_Register]

```
07:30:36 **** Incremental B
make -j4 all
arm-none-eabi-gcc "../Src/m
In file included from C:/Us
from ../Sr
C:/Users/juju1/STM32CubeIDE
139 | #include "core_cm4.
compilation terminated.
make: *** [Src/subdir.mk:25
"make -j4 all" terminated w
07:30:36 Build Failed. 2 er
```

Properties for F4\_Register

type filter text

- Resource
- Builders
- C/C++ Build**
  - Build Variables
  - Environment
  - Logging
  - Settings**
    - C/C++ General
    - CMSIS-SVD Settings
    - Project References
    - Run/Debug Settings

Settings

Configuration: Debug [Active] Manage Configurations...

Tool Settings Build Steps Build Artifact Binary Parsers Error Parsers

MCU Toolchain

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- MCU Post build outputs
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  - Warnings
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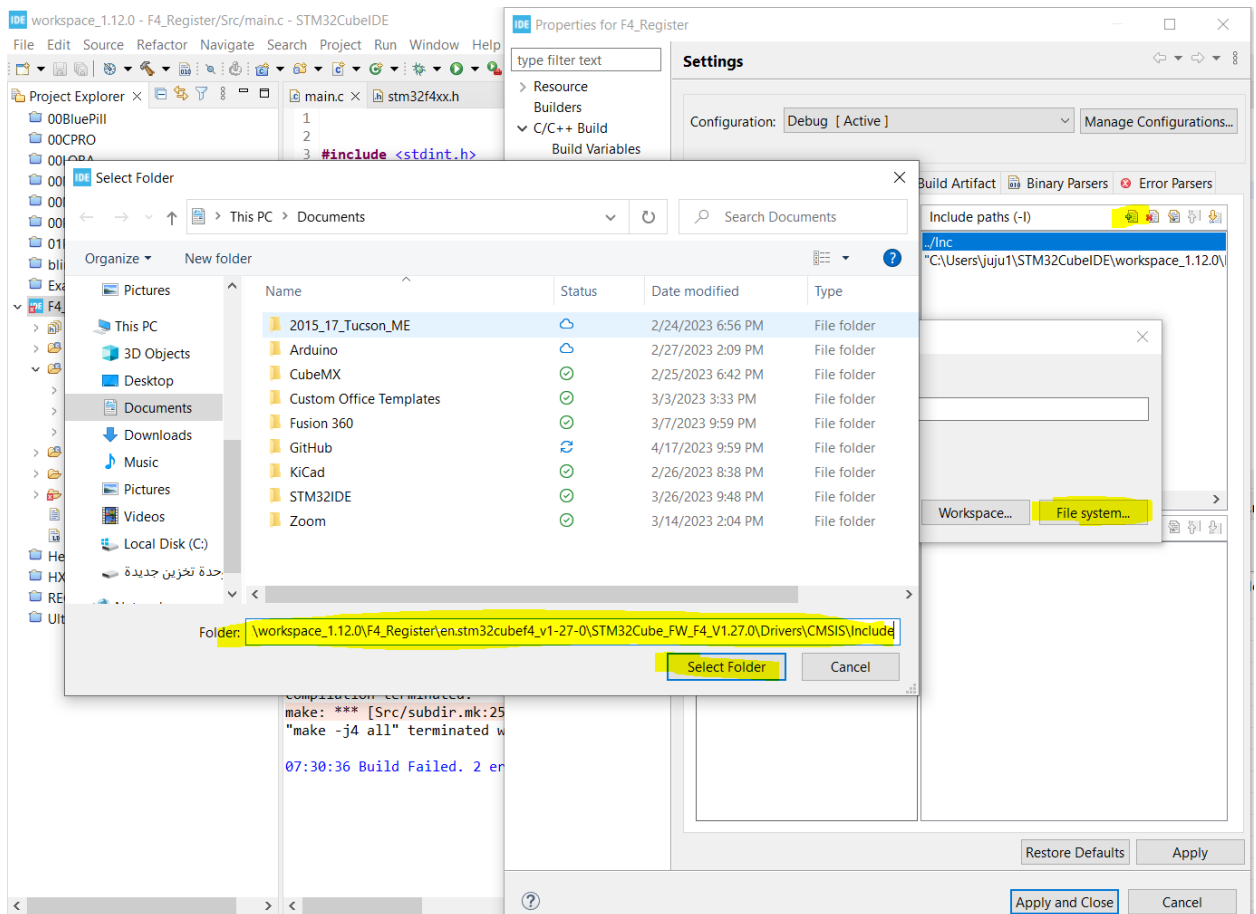
Include paths (-I)

- ../Inc
- "C:/Users/juju1/STM32CubeIDE/workspace\_1.12.0\

Include files (-include)

Restore Defaults Apply

Apply and Close Cancel



14- click build the project to check .

The screenshot shows an IDE interface with a Project Explorer on the left, a source code editor in the center, and a Console window at the bottom.

**Project Explorer:** The project 'F4\_Register' is expanded, showing the following structure:

- Binaries
- Includes
- Inc
- Src
  - main.c
  - syscalls.c
  - systemem.c
- Startup
- Debug
- en.stm32cubef4\_v1-27-0
  - en.stm32cubef4\_v1-27-0.zip
  - STM32F401CCUX\_FLASH.ld
- Hello\_World
- HX711 LOAD CELL MODULE
- RECEPCION\_BASICA (in bloqueante ba
- Ultrasonic\_f4

**Source Code Editor:** The file 'main.c' is open, showing the following code:

```
1
2
3 #include <stdint.h>
4 #include "stm32f4xx.h"
5
6
7 int main(void)
8 {
9     /* Loop forever */
10    for(;;);
11 }
12
```

**Console:** The console shows the build output for the 'F4\_Register' project:

```
CDT Build Console [F4_Register]
07:38:34 **** Incremental Build of configuration Debug for project F4_Register
make -j4 all
arm-none-eabi-gcc "../Src/main.c" -mcpu=cortex-m4 -std=gnu11 -g3 -DDEBUG -DSTM
arm-none-eabi-gcc "../Src/syscalls.c" -mcpu=cortex-m4 -std=gnu11 -g3 -DDEBUG -
arm-none-eabi-gcc "../Src/systemem.c" -mcpu=cortex-m4 -std=gnu11 -g3 -DDEBUG -DS
arm-none-eabi-gcc -o "F4_Register.elf" @"objects.list" -mcpu=cortex-m4 -T"C:
Finished building target: F4_Register.elf

arm-none-eabi-size F4_Register.elf
arm-none-eabi-objdump -h -S F4_Register.elf > "F4_Register.list"
      text    data     bss     dec     hex filename
      656      8    1568    2232    8b8 F4_Register.elf
Finished building: default.size.stdout

Finished building: F4_Register.list

07:38:36 Build Finished. 0 errors, 0 warnings. (took 1s.504ms)
```