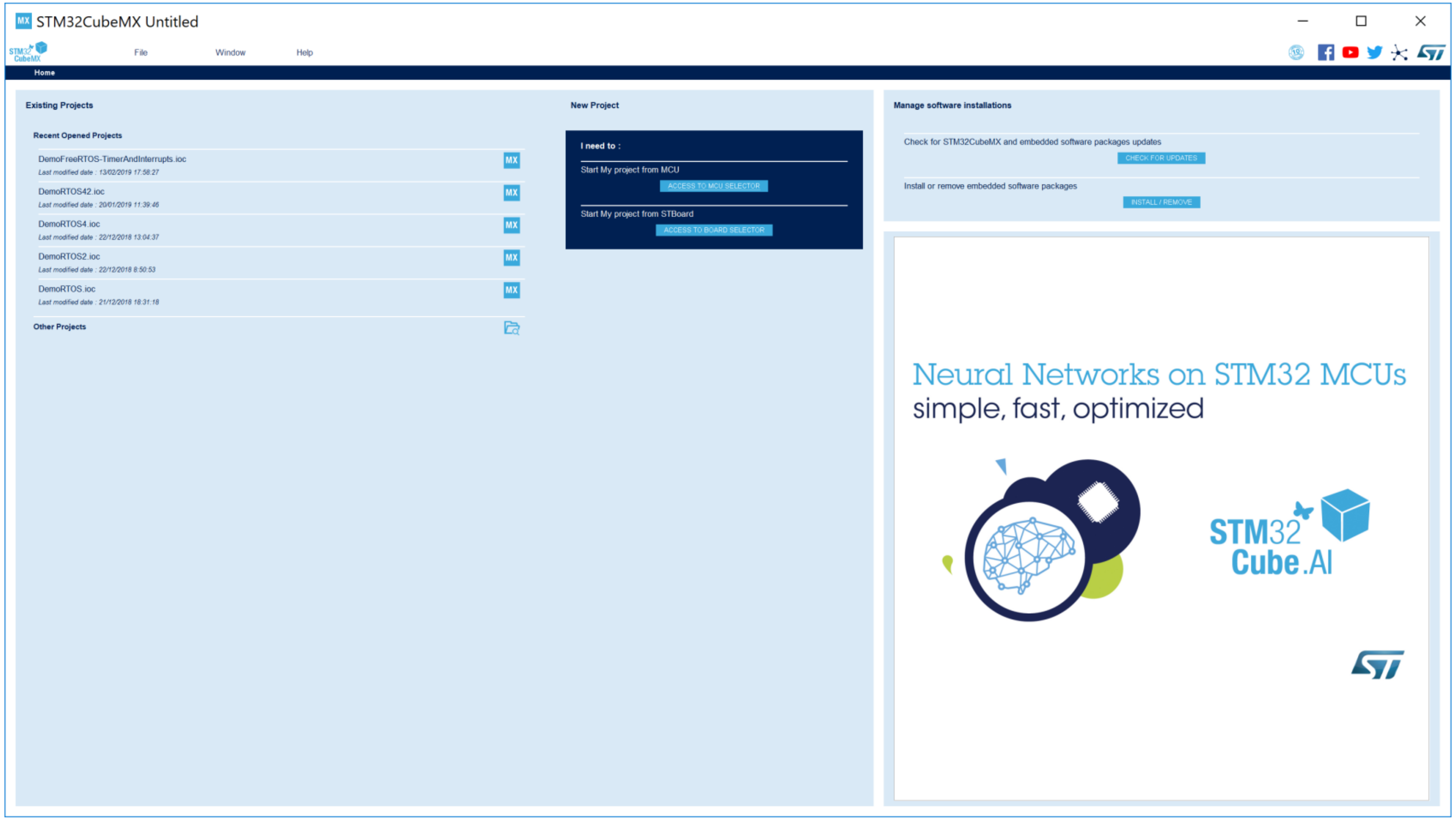
USCD Embedded C Assignment 4

By
Norman McEntire

Norman.mcentire@gmail.com

Step 1. Startup STM32CubeMX



Existing Projects

Recent Opened Projects

DemoFreeRTOS-TimerAndInterrupts.ioc
Last modified date : 13/02/2019 17:58:27

DemoRTOS42.ioc
Last modified date : 20/01/2019 11:39:46

DemoRTOS4.ioc
Last modified date : 22/12/2018 13:04:37

DemoRTOS2.ioc
Last modified date : 22/12/2018 8:50:53

DemoRTOS.ioc
Last modified date : 21/12/2018 18:31:18

Other Projects

New Project

I need to :

Start My project from MCU

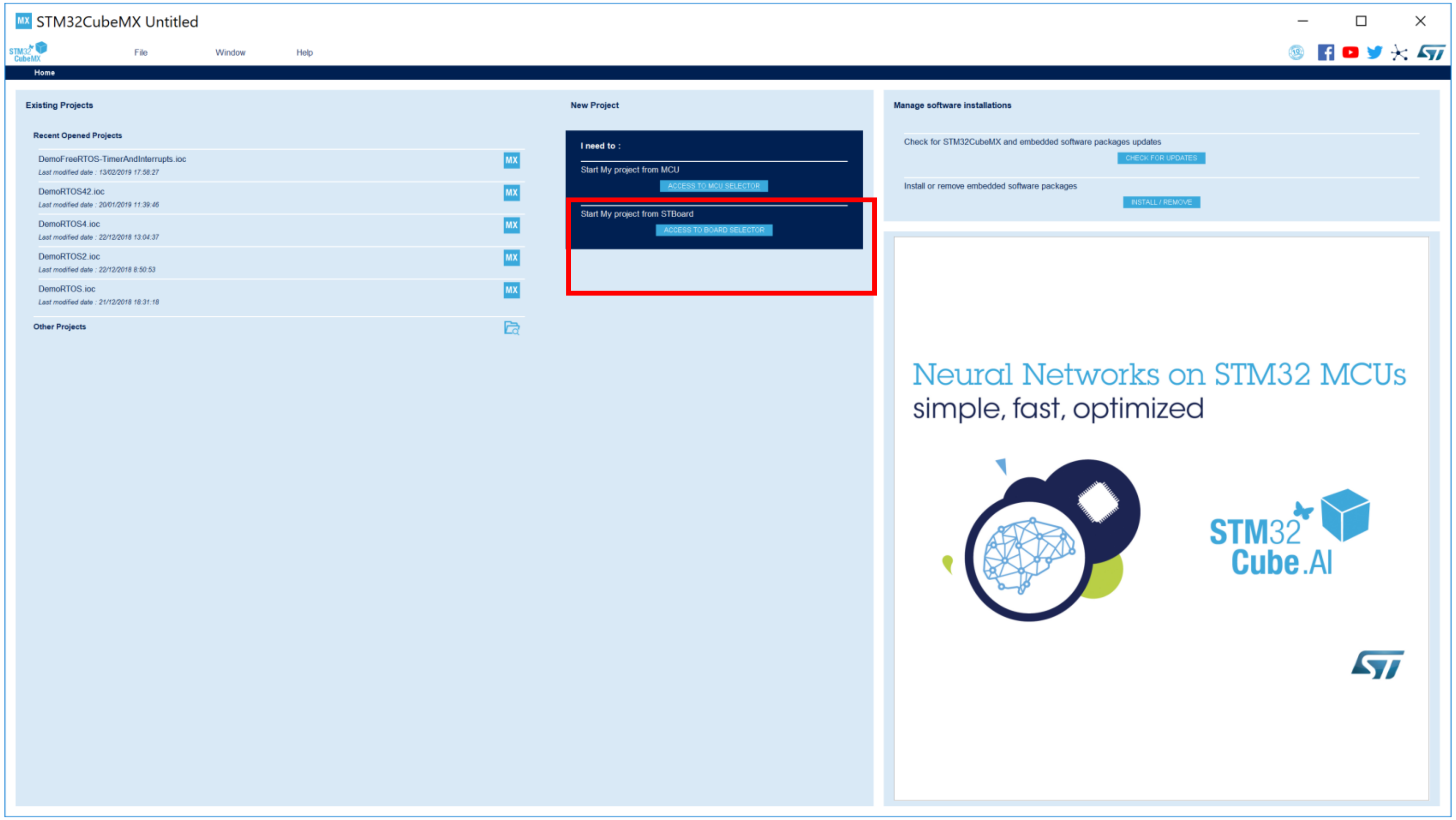
Start My project from STBoard

Manage software installations

Check for STM32CubeMX and embedded software packages updates

Install or remove embedded software packages

Step 2. Access Board Selector



Existing Projects

Recent Opened Projects

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Last modified date : 13/02/2019 17:58:27

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Last modified date : 22/12/2018 13:04:37

DemoRTOS2.ioc
Last modified date : 22/12/2018 8:50:53

DemoRTOS.ioc
Last modified date : 21/12/2018 18:31:18

Other Projects

New Project

I need to :

Start My project from MCU

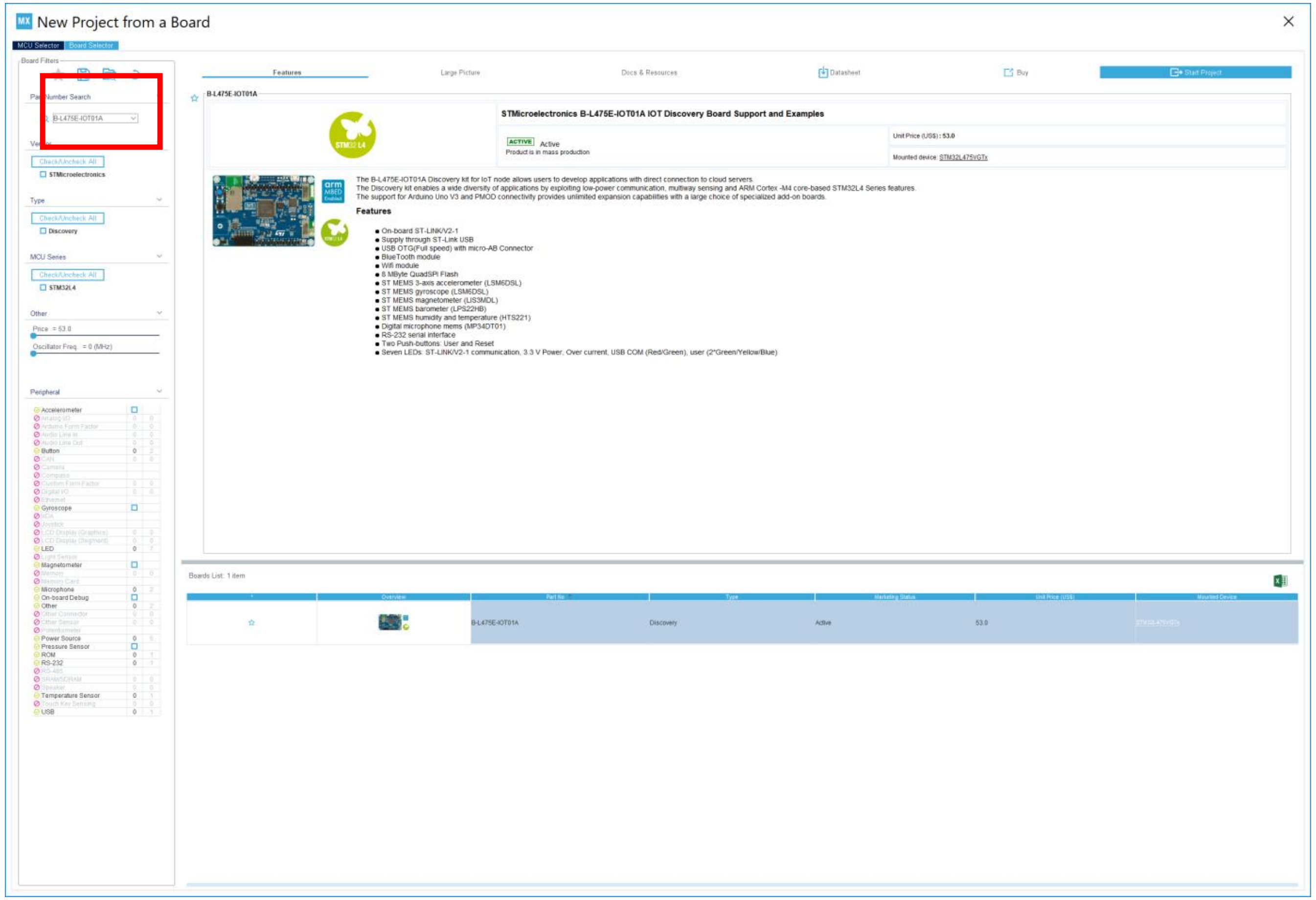
Start My project from STBoard

Manage software installations

Check for STM32CubeMX and embedded software packages updates

Install or remove embedded software packages

Step 3. Enter “B-L475E-IOT01A” Board



Part Number Search: B-L475E-IOT01A

Vendor
Check/Uncheck All
□ STMicroelectronics

Type
Check/Uncheck All
□ Discovery

MCU Series
Check/Uncheck All
□ STM32L4

Other
Price = 53.0
Oscillator Freq. = 0 (MHz)

Peripheral

Accelerometer	□	
Analog I/O	0	0
Arduino Form Factor	0	0
Audio Line In	0	0
Audio Line Out	0	0
Button	0	2
CAN	0	0
Camera		
Compass		
Custom Form Factor	0	0
Digital I/O	0	0
Ethernet		
Gyroscope	□	
IrDA		
Joystick		
LCD Display (Graphics)	0	0
LCD Display (Segment)	0	0
LED	0	7
Light Sensor		
Magnetometer	□	
Memory	0	0
Memory Card		
Microphone	0	2
On-board Debug	□	
Other	0	2
Other Connector	0	0
Other Sensor	0	0
Potentiometer		
Power Source	0	5
Pressure Sensor	□	
ROM	0	1
RS-232	0	1
RS-485		
SRAM/SDRAM	0	0
Speaker	0	0
Temperature Sensor	0	1
Touch Key Sensing	0	0
USB	0	1

B-L475E-IOT01A

STMicroelectronics B-L475E-IOT01A IOT Discovery Board Support and Examples

ACTIVE Active
Product is in mass production

Unit Price (US$) : 53.0
Mounted device: STM32L475VGTx

The B-L475E-IOT01A Discovery kit for IoT node allows users to develop applications with direct connection to cloud servers.
The Discovery kit enables a wide diversity of applications by exploiting low-power communication, multiway sensing and ARM Cortex -M4 core-based STM32L4 Series features.
The support for Arduino Uno V3 and PMOD connectivity provides unlimited expansion capabilities with a large choice of specialized add-on boards.

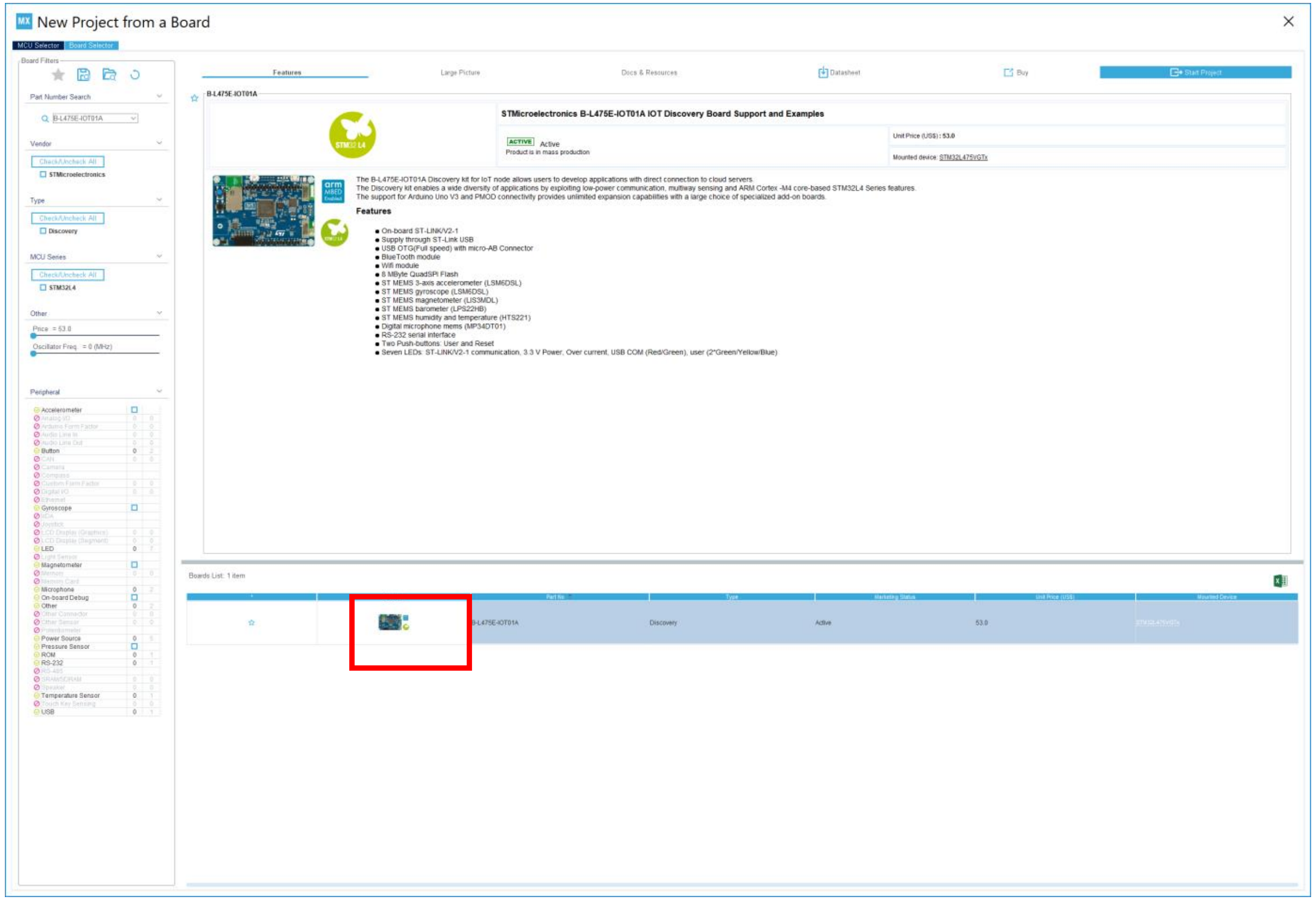
Features

- On-board ST-LINK/V2-1
- Supply through ST-Link USB
- USB OTG(Full speed) with micro-AB Connector
- BlueTooth module
- Wifi module
- 8 MByte QuadSPI Flash
- ST MEMS 3-axis accelerometer (LSM6DSL)
- ST MEMS gyroscope (LSM6DSL)
- ST MEMS magnetometer (LIS3MDL)
- ST MEMS barometer (LPS22HB)
- ST MEMS humidity and temperature (HTS221)
- Digital microphone mems (MP34DT01)
- RS-232 serial interface
- Two Push-buttons: User and Reset
- Seven LEDs: ST-LINK/V2-1 communication, 3.3 V Power, Over current, USB COM (Red/Green), user (2*Green/Yellow/Blue)

Boards List: 1 item

*	Overview	Part No	Type	Marketing Status	Unit Price (US$)	Mounted Device
☆		B-L475E-IOT01A	Discovery	Active	53.0	STM32L475VGTx

Step 4. Select Board Photo



Part Number Search: B-L475E-IOT01A

Vendor: □ STMicroelectronics

Type: □ Discovery

MCU Series: □ STM32L4

Price = 53.0

Oscillator Freq. = 0 (MHz)

Peripheral		
Accelerometer	□	
Analog I/O	0	0
Arduino Form Factor	0	0
Audio Line In	0	0
Audio Line Out	0	0
Button	0	2
CAN	0	0
Camera		
Compass		
Custom Form Factor	0	0
Digital I/O	0	0
Ethernet		
Gyroscope	□	
IrDA		
Joystick		
LCD Display (Graphics)	0	0
LCD Display (Segment)	0	0
LED	0	7
Light Sensor		
Magnetometer	□	
Memory	0	0
Memory Card		
Microphone	0	2
On-board Debug	□	
Other	0	2
Other Connector	0	0
Other Sensor	0	0
Potentiometer		
Power Source	0	5
Pressure Sensor	□	
ROM	0	1
RS-232	0	1
RS-485		
SRAM/SDRAM	0	0
Speaker	0	0
Temperature Sensor	0	1
Touch Key Sensing	0	0
USB	0	1

B-L475E-IOT01A

STMicroelectronics B-L475E-IOT01A IOT Discovery Board Support and Examples

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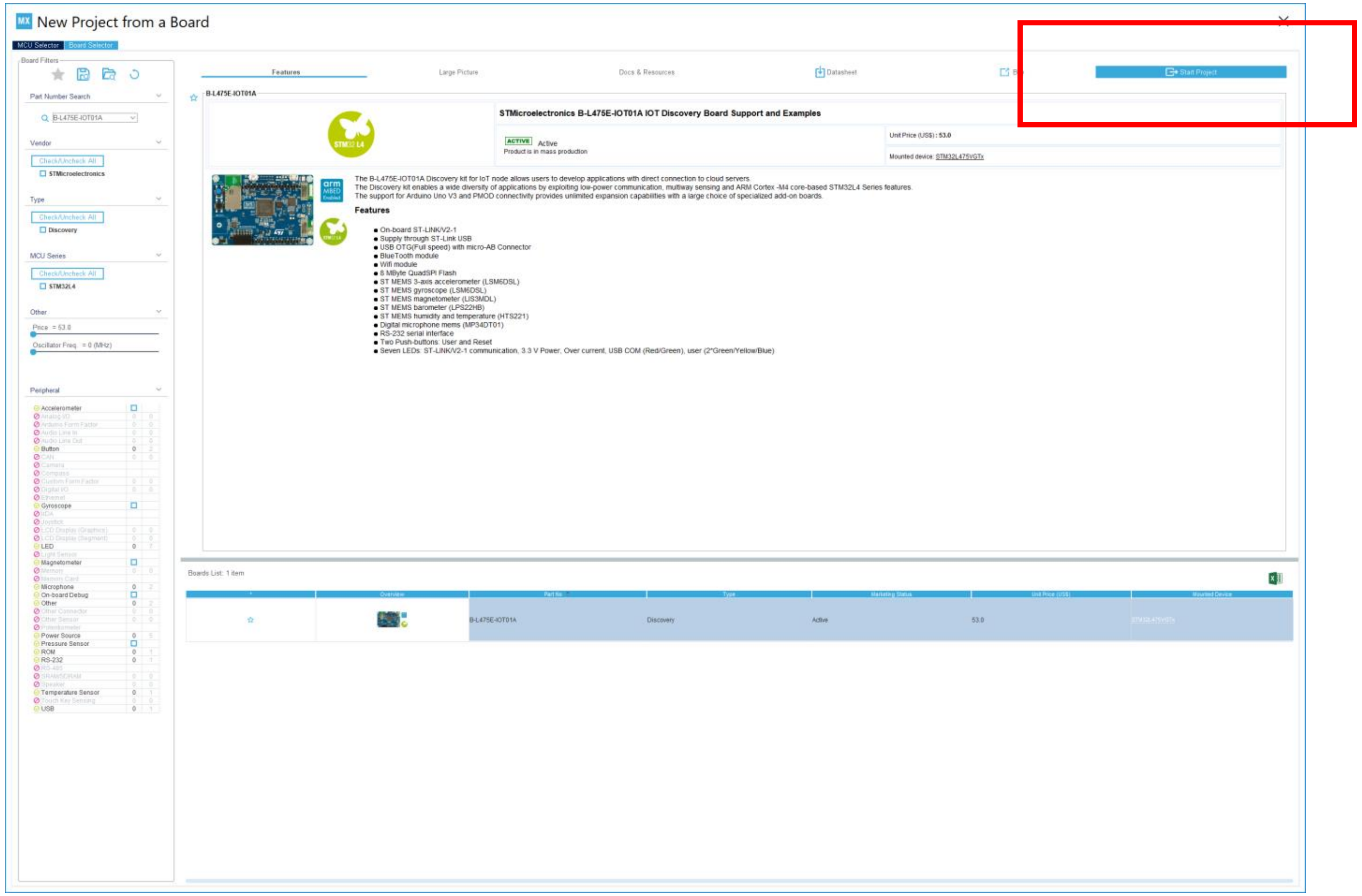
☆		B-L475E-IOT01A	Discovery	Active	53.0	STM32L475VGTx

Step 5. Select “Start Project”



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Vendor
Check/Uncheck All
□ STMicroelectronics

Type
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MCU Series
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Other
Price = 53.0
Oscillator Freq. = 0 (MHz)

Peripheral

Accelerometer	□	
Analog I/O	0	0
Arduino Form Factor	0	0
Audio Line In	0	0
Audio Line Out	0	0
Button	0	2
CAN	0	0
Camera		
Compass		
Custom Form Factor	0	0
Digital I/O	0	0
Ethernet		
Gyroscope	□	
IrDA		
Joystick		
LCD Display (Graphics)	0	0
LCD Display (Segment)	0	0
LED	0	7
Light Sensor		
Magnetometer	□	
Memory	0	0
Memory Card		
Microphone	0	2
On-board Debug	□	
Other	0	2
Other Connector	0	0
Other Sensor	0	0
Potentiometer		
Power Source	0	5
Pressure Sensor	□	
ROM	0	1
RS-232	0	1
RS-485		
SRAM/SDRAM	0	0
Speaker	0	0
Temperature Sensor	0	1
Touch Key Sensing	0	0
USB	0	1

B-L475E-IOT01A

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Mounted device: STM32L475VGTx

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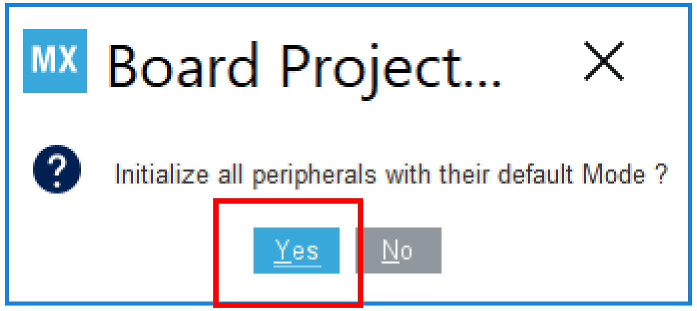
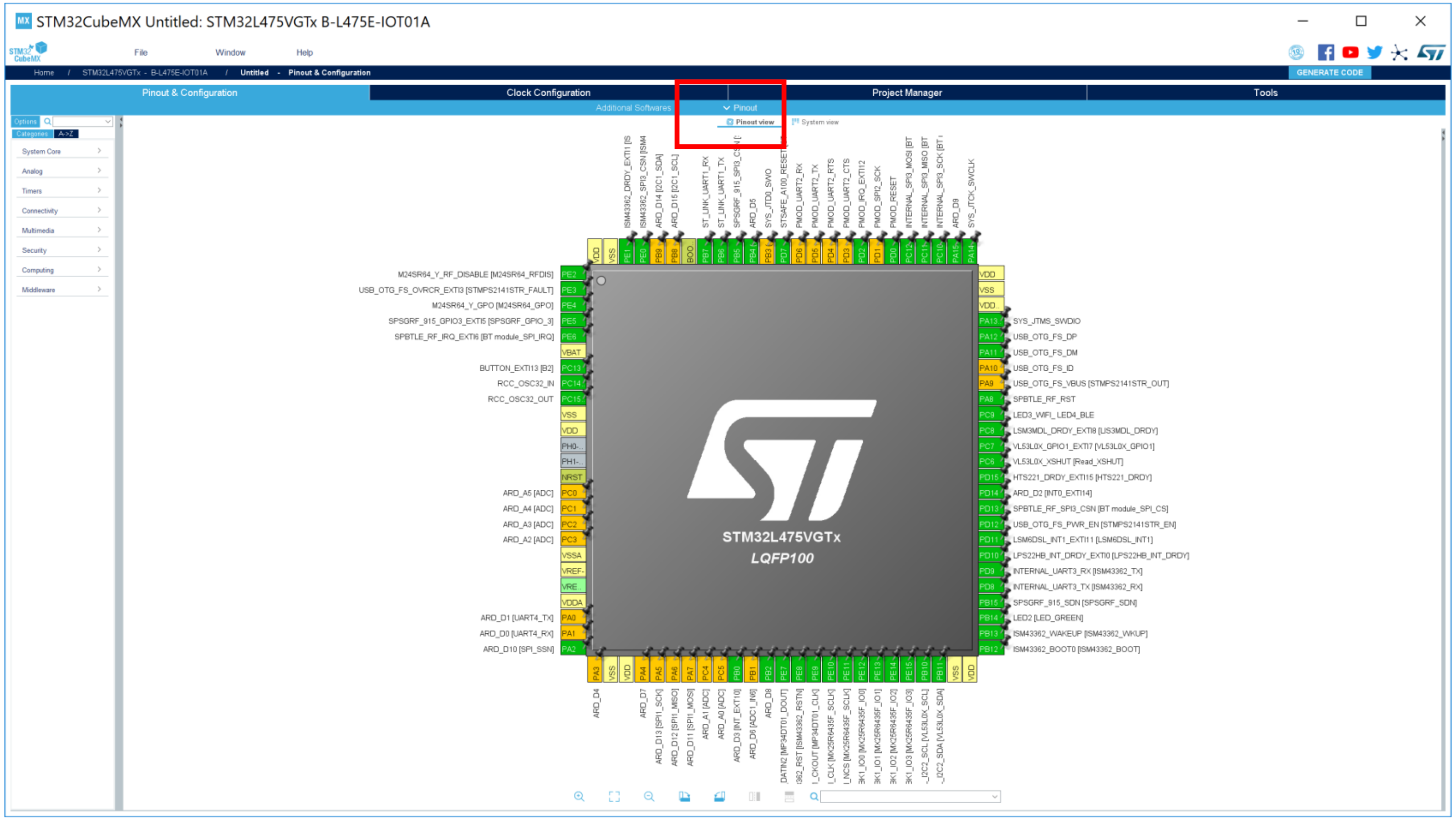
☆		B-L475E-IOT01A	Discovery	Active	53.0	STM32L475VGTx

Step 6. Select **YES** (initialize all peripherals with the default mode)

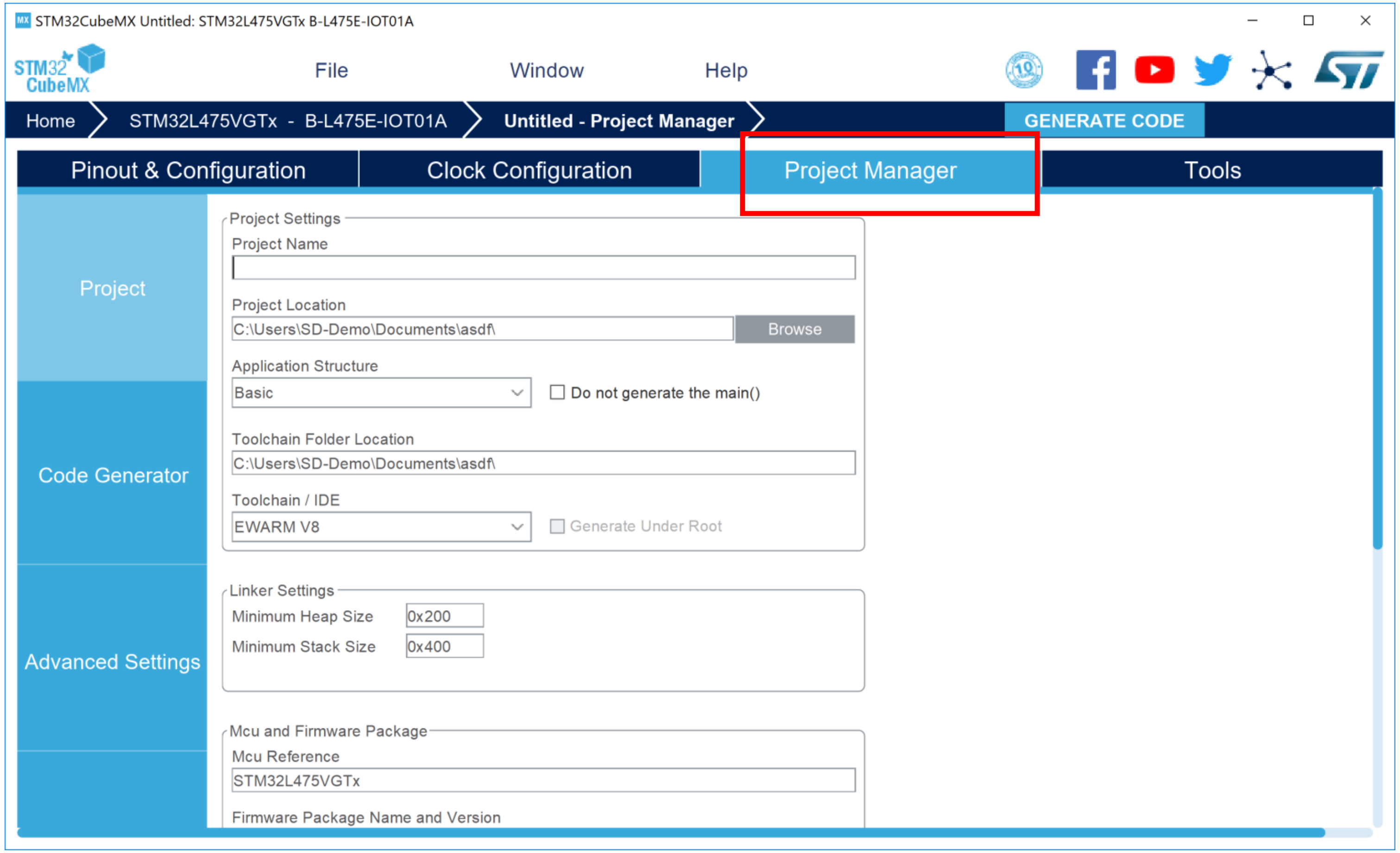


Initialize all peripherals with their default Mode ?

Step 7. Observe Results (Pinout View)


STM32CubeMX Untitled: STM32L475VGTx B-L475E-IOT01A
File
Window
Help
Home / STM32L475VGTx - B-L475E-IOT01A / Untitled - Pinout & Configuration
GENERATE CODE
Pinout & Configuration
Clock Configuration
Project Manager
Tools
Additional Softwares
Pinout
Pinout view
System view
Options
Categories
A->Z
System Core
Analog
Timers
Connectivity
Multimedia
Security
Computing
Middleware
M24SR64_Y_RF_DISABLE [M24SR64_RFDIS]
USB_OTG_FS_OVRCR_EXTI3 [STMPS2141STR_FAULT]
M24SR64_Y_GPO [M24SR64_GPO]
SPSGRF_915_GPIO3_EXTI5 [SPSGRF_GPIO_3]
SPBTLE_RF_IRQ_EXTI6 [BT module_SPI_IRQ]
BUTTON_EXTI13 [B2]
RCC_OSC32_IN
RCC_OSC32_OUT
ARD_A5 [ADC]
ARD_A4 [ADC]
ARD_A3 [ADC]
ARD_A2 [ADC]
ARD_D1 [UART4_TX]
ARD_D0 [UART4_RX]
ARD_D10 [SPI_SSN]
SYS_JTMS_SWDIO
USB_OTG_FS_DP
USB_OTG_FS_DM
USB_OTG_FS_ID
USB_OTG_FS_VBUS [STMPS2141STR_OUT]
SPBTLE_RF_RST
LED3_WIFI_ LED4_BLE
LSM3MDL_DRDY_EXTI8 [LIS3MDL_DRDY]
VL53L0X_GPIO1_EXTI7 [VL53L0X_GPIO1]
VL53L0X_XSHUT [Read_XSHUT]
HTS221_DRDY_EXTI15 [HTS221_DRDY]
ARD_D2 [INT0_EXTI14]
SPBTLE_RF_SPI3_CSN [BT module_SPI_CS]
USB_OTG_FS_PWR_EN [STMPS2141STR_EN]
LSM6DSL_INT1_EXTI11 [LSM6DSL_INT1]
LPS22HB_INT_DRDY_EXTI0 [LPS22HB_INT_DRDY]
INTERNAL_UART3_RX [ISM43362_TX]
INTERNAL_UART3_TX [ISM43362_RX]
SPSGRF_915_SDN [SPSGRF_SDN]
LED2 [LED_GREEN]
ISM43362_WAKEUP [ISM43362_WKUP]
ISM43362_BOOT0 [ISM43362_BOOT]
ST_LINK_UART1_RX
ST_LINK_UART1_TX
ARD_D5
SYS_JTD0_SWO
PMOD_UART2_RX
PMOD_UART2_TX
PMOD_UART2_RTS
PMOD_UART2_CTS
PMOD_IRQ_EXTI12
PMOD_SPI2_SCK
PMOD_RESET
ARD_D9
SYS_JTCK_SWCLK
ARD_D4
ARD_D7
ARD_A1 [ADC]
ARD_A0 [ADC]
ARD_D8
STM32L475VGTx
LQFP100

Step 8. Select Project Manager Tab



Project Settings

Project Name

Project Location: C:\Users\SD-Demo\Documents\asdf\

Application Structure: Basic

□ Do not generate the main()

Toolchain Folder Location: C:\Users\SD-Demo\Documents\asdf\

Toolchain / IDE: EWARM V8

□ Generate Under Root

Linker Settings

Minimum Heap Size: 0x200

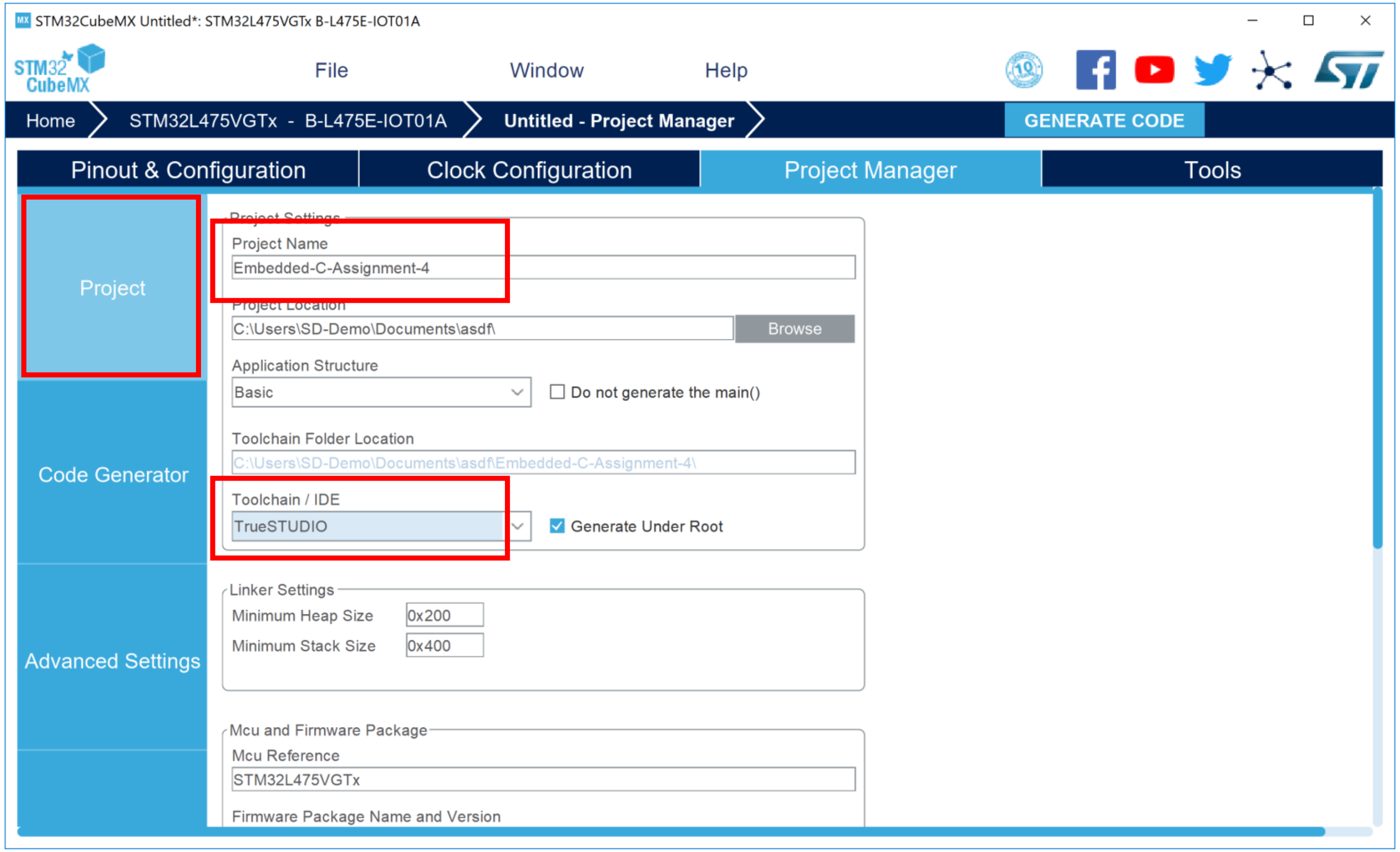
Minimum Stack Size: 0x400

Mcu and Firmware Package

Mcu Reference: STM32L475VGTx

Firmware Package Name and Version

Step 9. Enter “Embedded-C-Assigment-4” and select TrueStudio as IDE



Project Settings

Project Name: Embedded-C-Assignment-4

Project Location: C:\Users\SD-Demo\Documents\asdf\

Application Structure: Basic

☐ Do not generate the main()

Toolchain Folder Location: C:\Users\SD-Demo\Documents\asdf\Embedded-C-Assignment-4\

Toolchain / IDE: TrueSTUDIO

☑ Generate Under Root

Linker Settings

Minimum Heap Size: 0x200

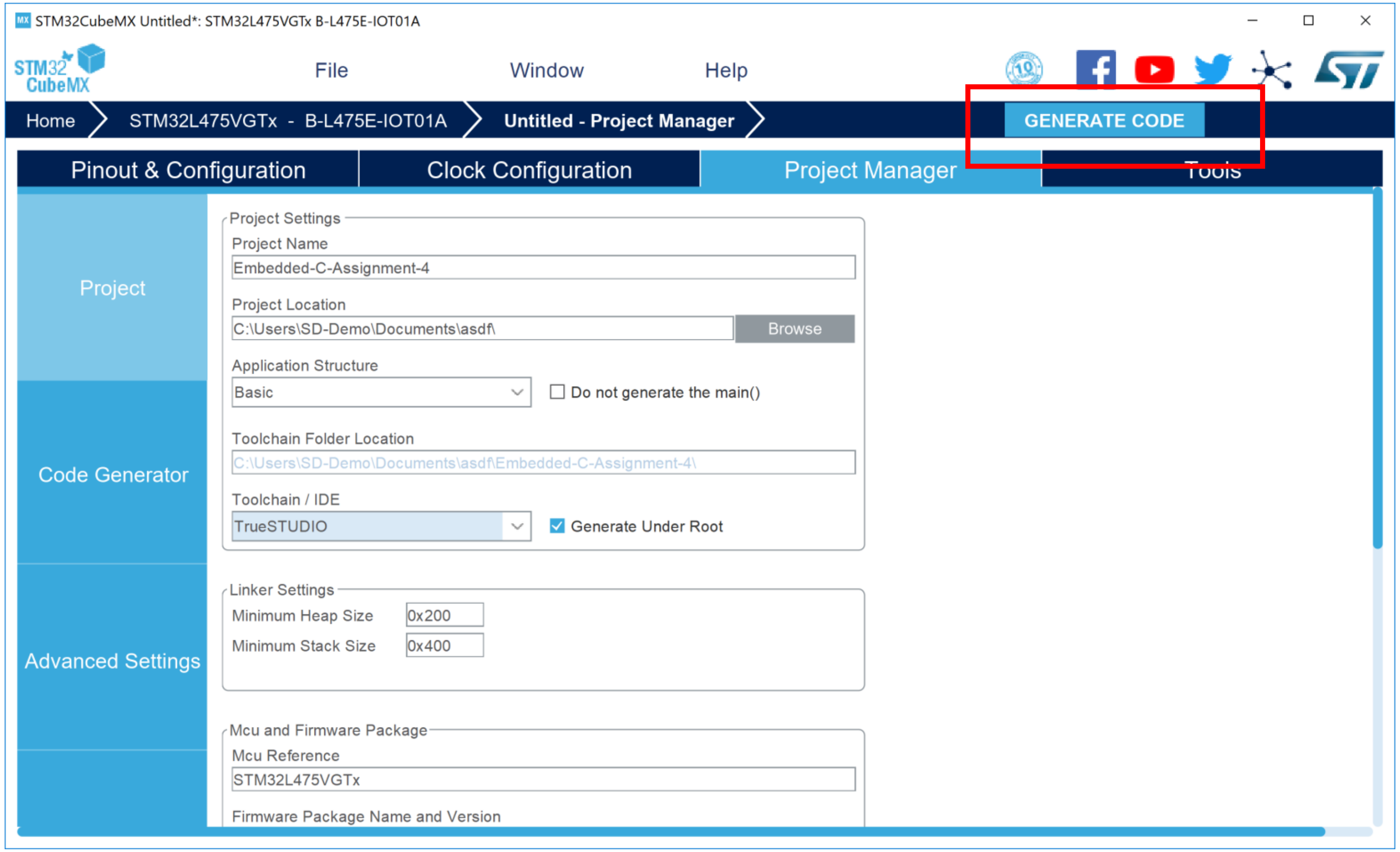
Minimum Stack Size: 0x400

Mcu and Firmware Package

Mcu Reference: STM32L475VGTx

Firmware Package Name and Version

Step 10. Select “Generate Code”



Project Settings

Project Name: Embedded-C-Assignment-4

Project Location: C:\Users\SD-Demo\Documents\asdf\

Application Structure: Basic

□ Do not generate the main()

Toolchain Folder Location: C:\Users\SD-Demo\Documents\asdf\Embedded-C-Assignment-4\

Toolchain / IDE: TrueSTUDIO

☑ Generate Under Root

Linker Settings

Minimum Heap Size: 0x200

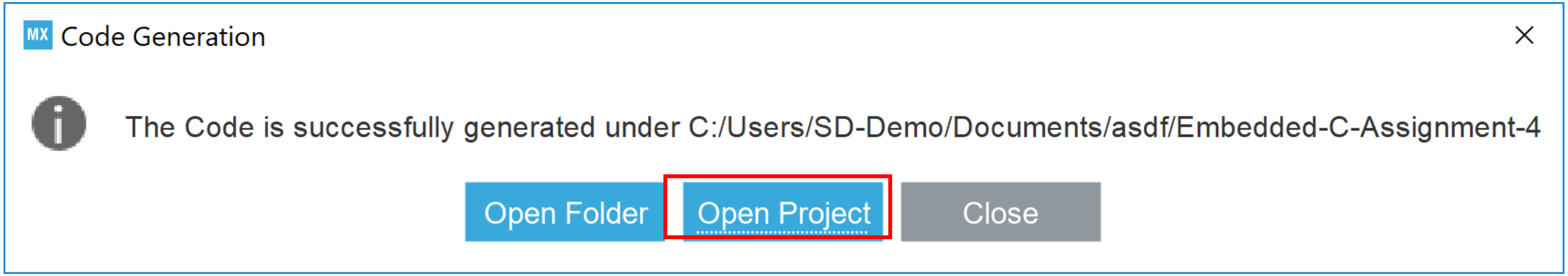
Minimum Stack Size: 0x400

Mcu and Firmware Package

Mcu Reference: STM32L475VGTx

Firmware Package Name and Version

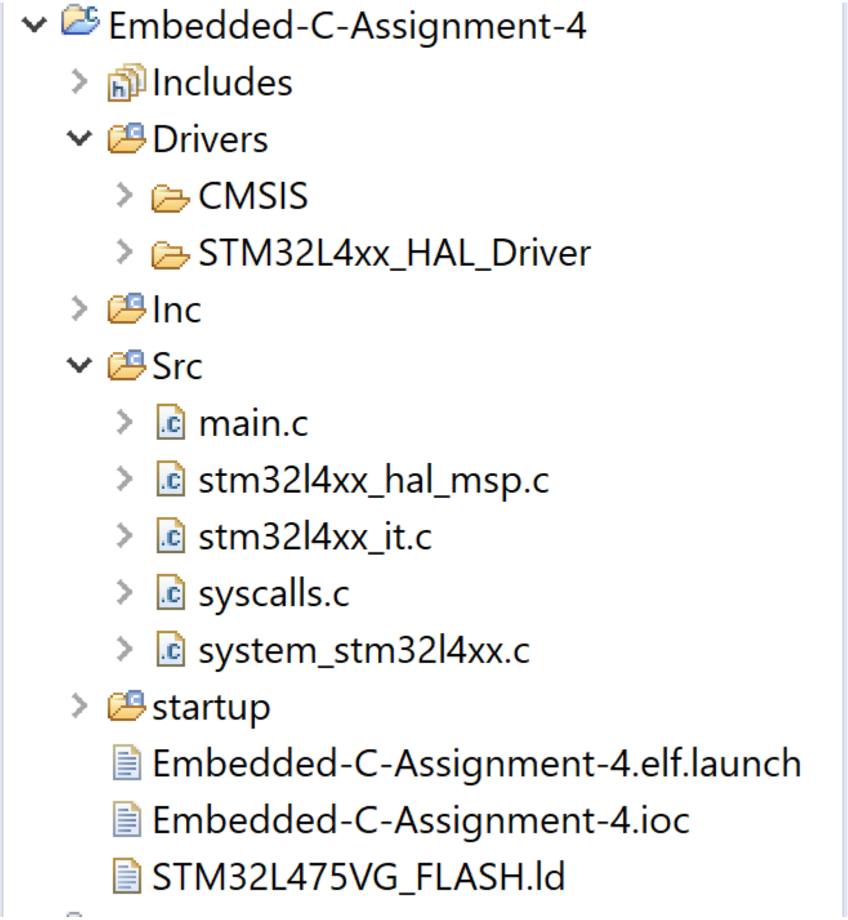
Step 11. Select “Open Project”



Code Generation

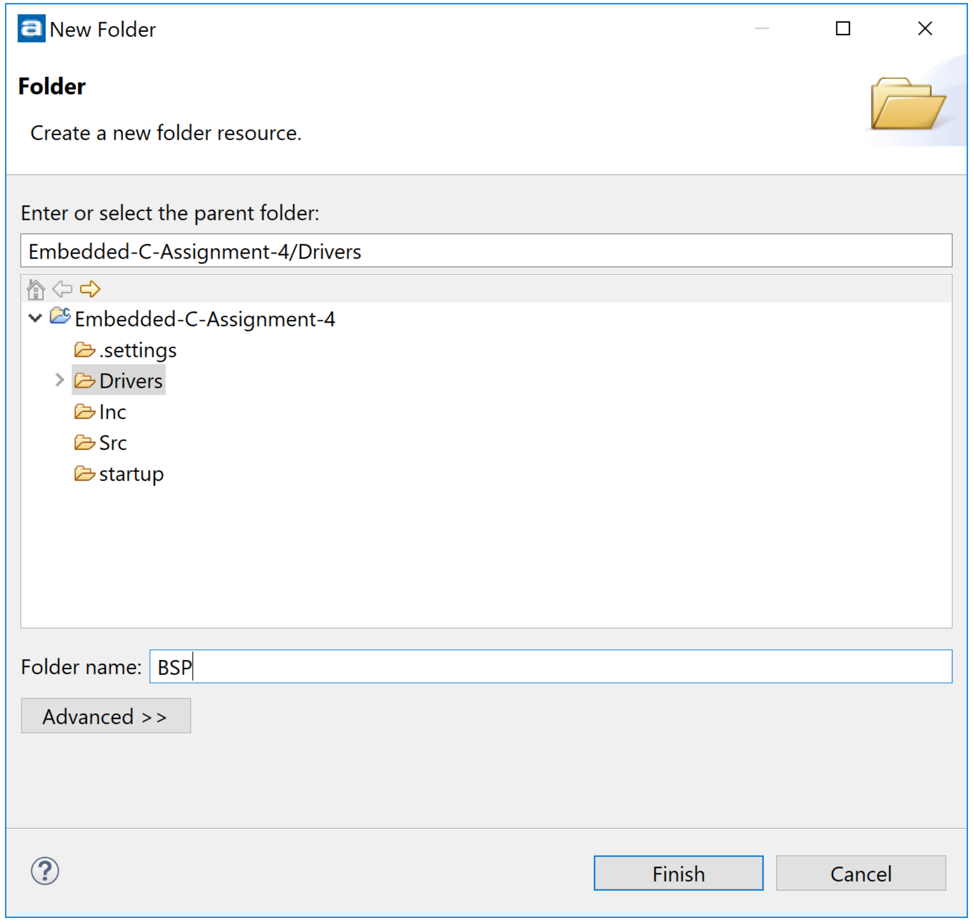
The Code is successfully generated under C:/Users/SD-Demo/Documents/asdf/Embedded-C-Assignment-4

Step 12. Resulting Project



- Embedded-C-Assignment-4
  - Includes
  - Drivers
    - CMSIS
    - STM32L4xx_HAL_Driver
  - Inc
  - Src
    - main.c
    - stm32l4xx_hal_msp.c
    - stm32l4xx_it.c
    - syscalls.c
    - system_stm32l4xx.c
  - startup
  - Embedded-C-Assignment-4.elf.launch
  - Embedded-C-Assignment-4.ioc
  - STM32L475VG_FLASH.ld

Step 13. Crete New BSP Folder under Drivers



New Folder

Folder

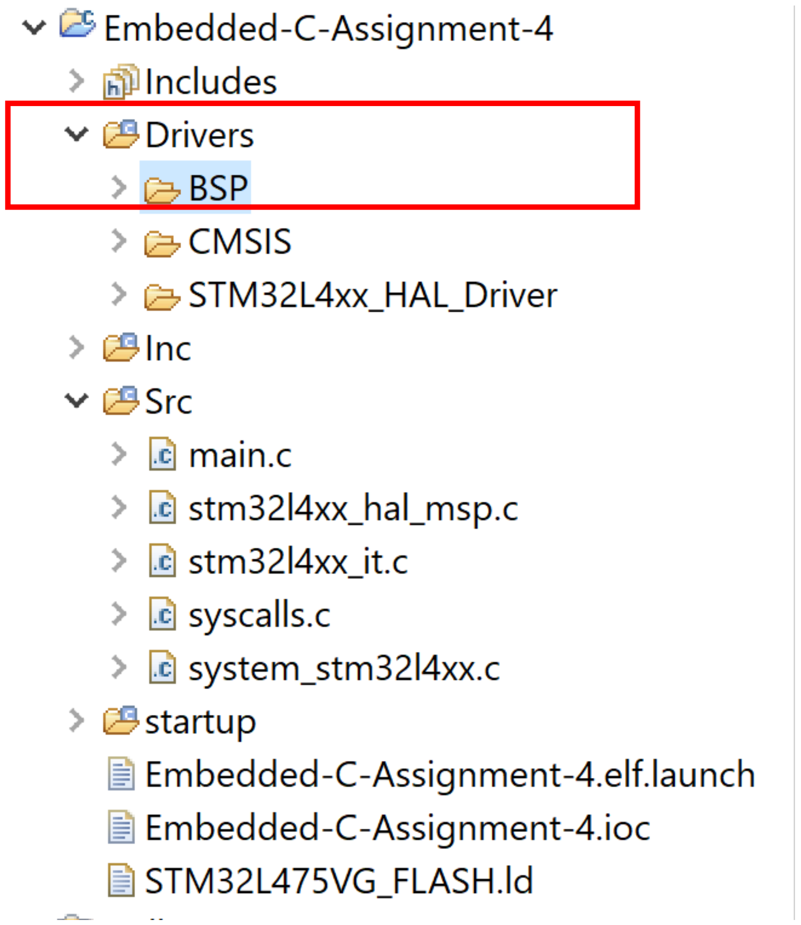
Create a new folder resource.

Enter or select the parent folder:

Embedded-C-Assignment-4/Drivers

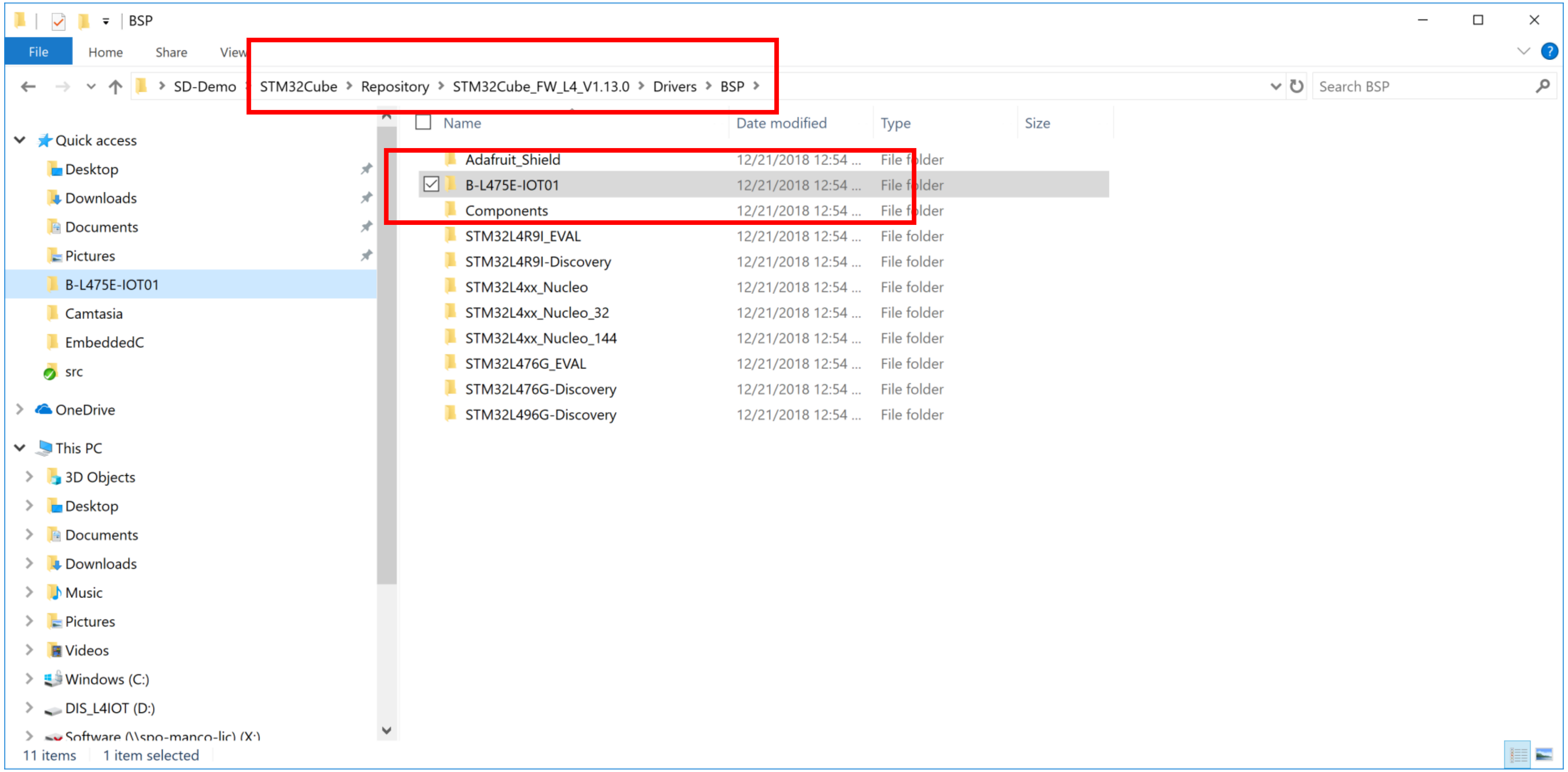
Folder name: BSP

Step 14. Results (Notice new BSP Folder)



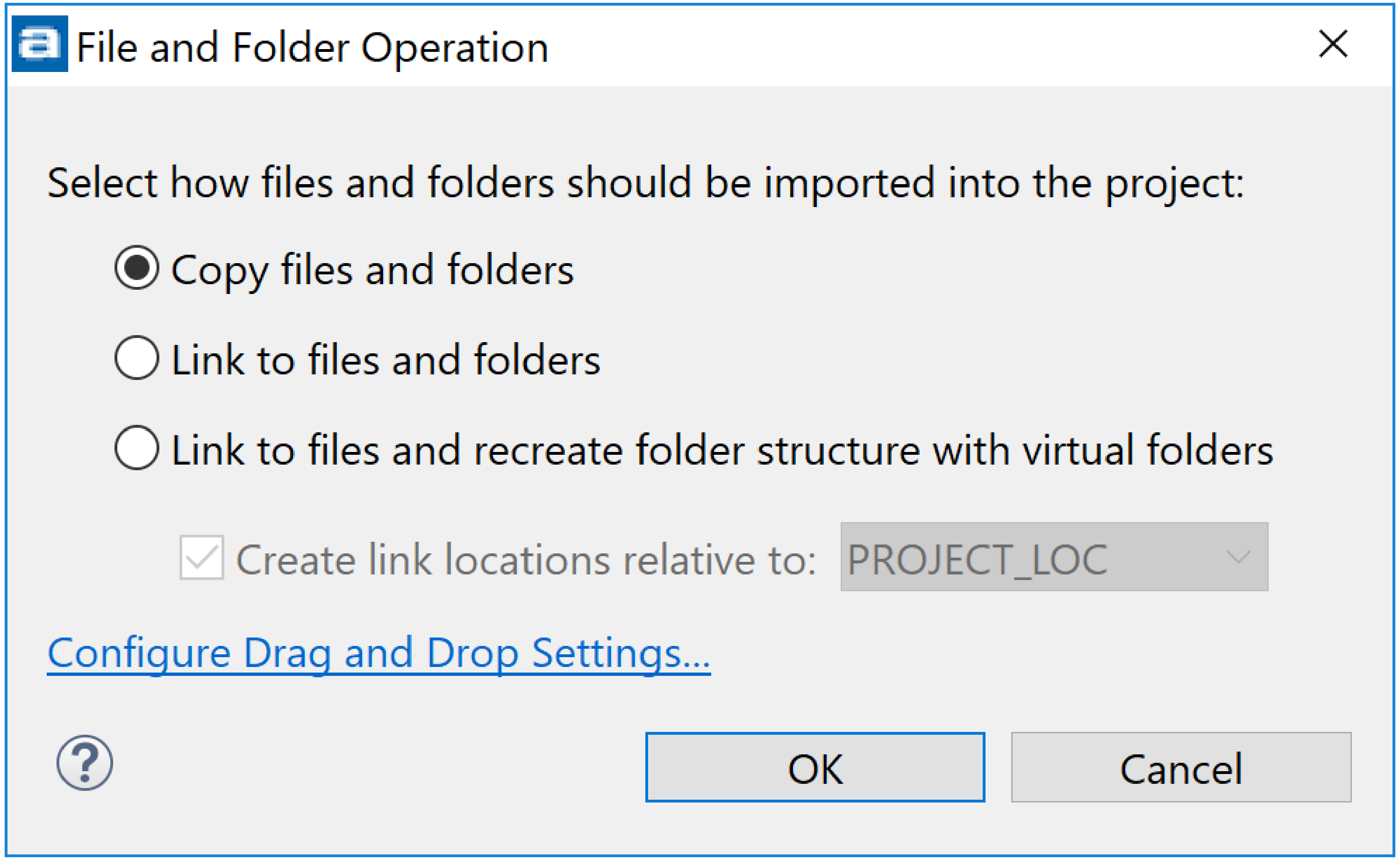
```
Embedded-C-Assignment-4
  Includes
  Drivers
    BSP
    CMSIS
    STM32L4xx_HAL_Driver
  Inc
  Src
    main.c
    stm32l4xx_hal_msp.c
    stm32l4xx_it.c
    syscalls.c
    system_stm32l4xx.c
  startup
  Embedded-C-Assignment-4.elf.launch
  Embedded-C-Assignment-4.ioc
  STM32L475VG_FLASH.ld
```

Step 15. Find the BSP code that is included in STM32Cube/Repository/… Download



Name	Date modified	Type	Size
Adafruit_Shield	12/21/2018 12:54 ...	File folder	
☑ B-L475E-IOT01	12/21/2018 12:54 ...	File folder	
Components	12/21/2018 12:54 ...	File folder	
STM32L4R9I_EVAL	12/21/2018 12:54 ...	File folder	
STM32L4R9I-Discovery	12/21/2018 12:54 ...	File folder	
STM32L4xx_Nucleo	12/21/2018 12:54 ...	File folder	
STM32L4xx_Nucleo_32	12/21/2018 12:54 ...	File folder	
STM32L4xx_Nucleo_144	12/21/2018 12:54 ...	File folder	
STM32L476G_EVAL	12/21/2018 12:54 ...	File folder	
STM32L476G-Discovery	12/21/2018 12:54 ...	File folder	
STM32L496G-Discovery	12/21/2018 12:54 ...	File folder	

Step 16. Drag/Drop Folder into TrueStudio BSP Folder and select Copy Files



File and Folder Operation

Select how files and folders should be imported into the project:

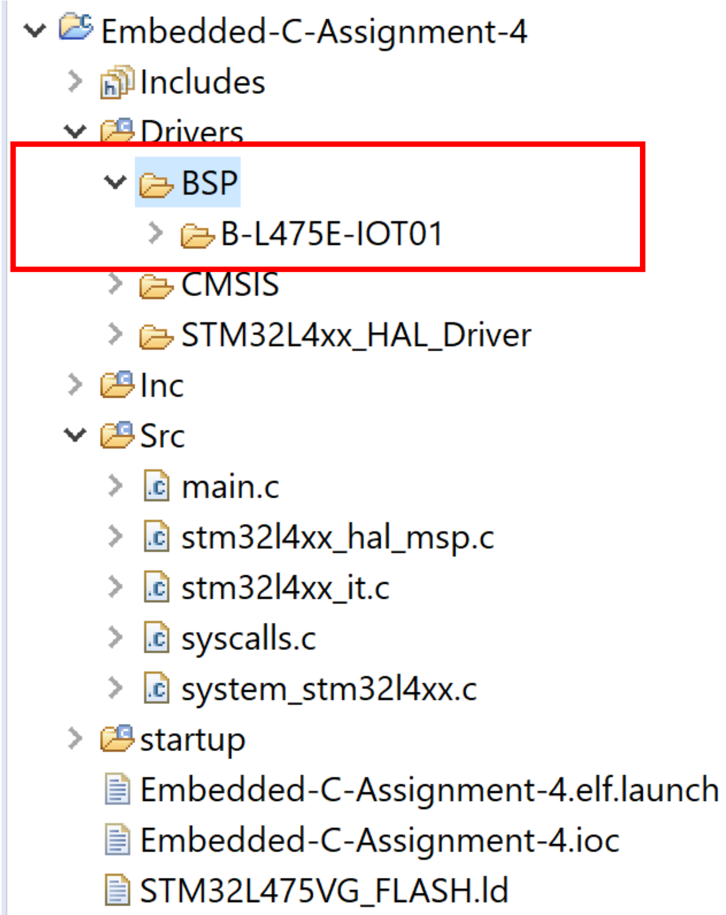
● Copy files and folders

○ Link to files and folders

○ Link to files and recreate folder structure with virtual folders

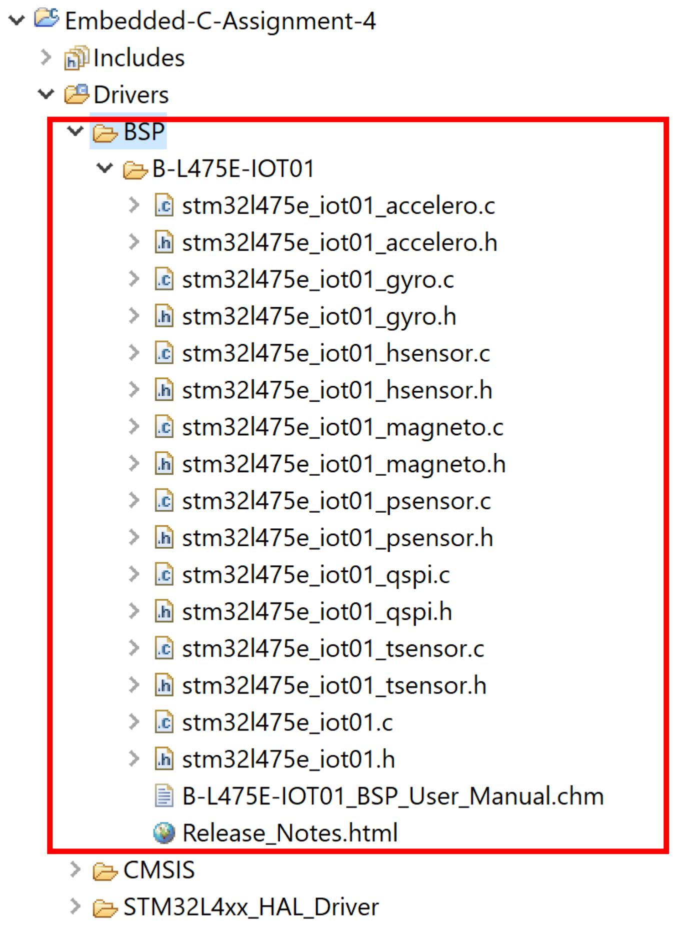
☑ Create link locations relative to: PROJECT_LOC

Step 17. Results



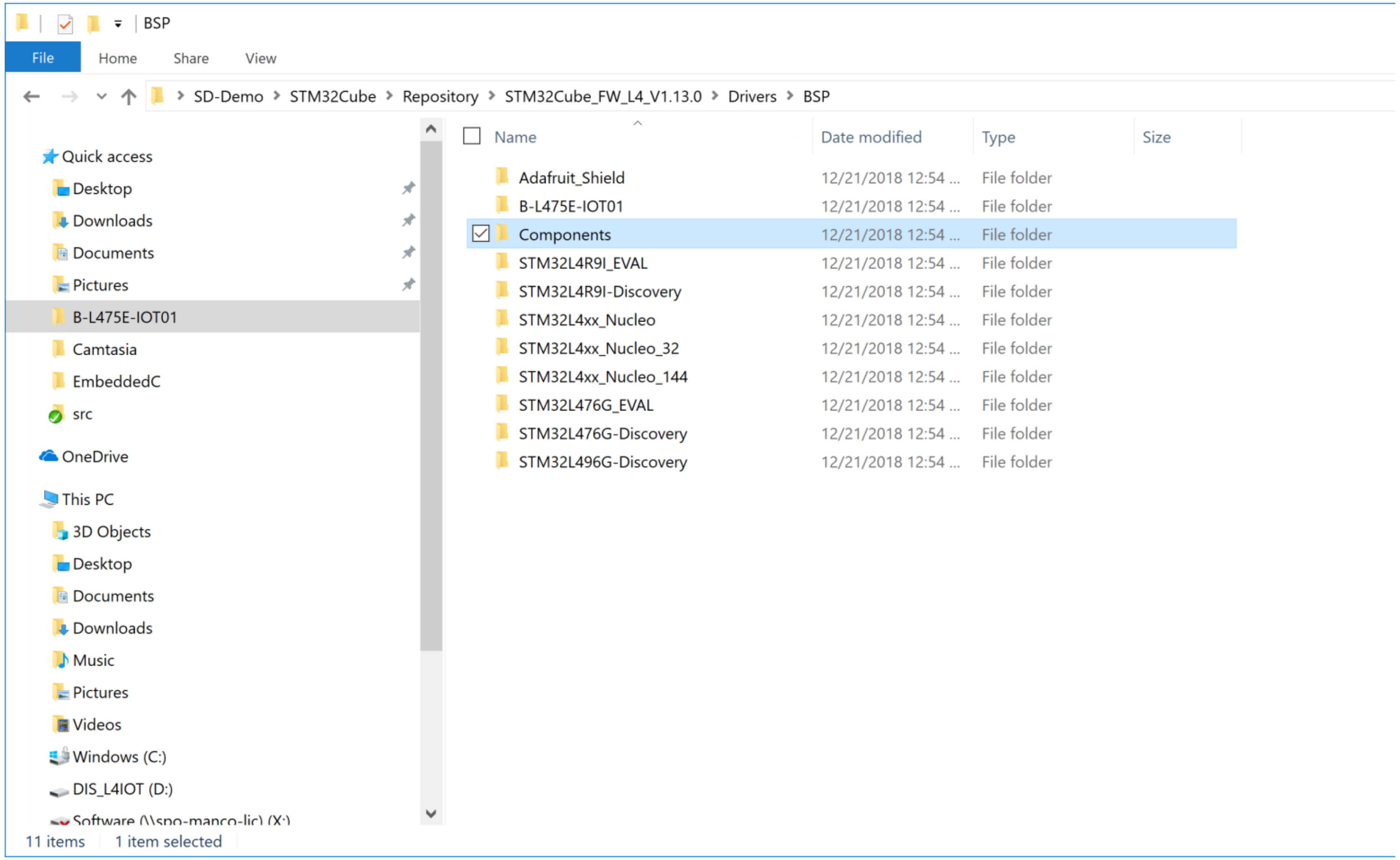
Embedded-C-Assignment-4
Includes
Drivers
BSP
B-L475E-IOT01
CMSIS
STM32L4xx_HAL_Driver
Inc
Src
main.c
stm32l4xx_hal_msp.c
stm32l4xx_it.c
syscalls.c
system_stm32l4xx.c
startup
Embedded-C-Assignment-4.elf.launch
Embedded-C-Assignment-4.ioc
STM32L475VG_FLASH.ld

Step 15. Confirm that BSP drivers added to project



```
Embedded-C-Assignment-4
  Includes
  Drivers
    BSP
      B-L475E-IOT01
        stm32l475e_iot01_accelero.c
        stm32l475e_iot01_accelero.h
        stm32l475e_iot01_gyro.c
        stm32l475e_iot01_gyro.h
        stm32l475e_iot01_hsensor.c
        stm32l475e_iot01_hsensor.h
        stm32l475e_iot01_magneto.c
        stm32l475e_iot01_magneto.h
        stm32l475e_iot01_psensor.c
        stm32l475e_iot01_psensor.h
        stm32l475e_iot01_qspi.c
        stm32l475e_iot01_qspi.h
        stm32l475e_iot01_tsensor.c
        stm32l475e_iot01_tsensor.h
        stm32l475e_iot01.c
        stm32l475e_iot01.h
        B-L475E-IOT01_BSP_User_Manual.chm
        Release_Notes.html
    CMSIS
    STM32L4xx_HAL_Driver
```

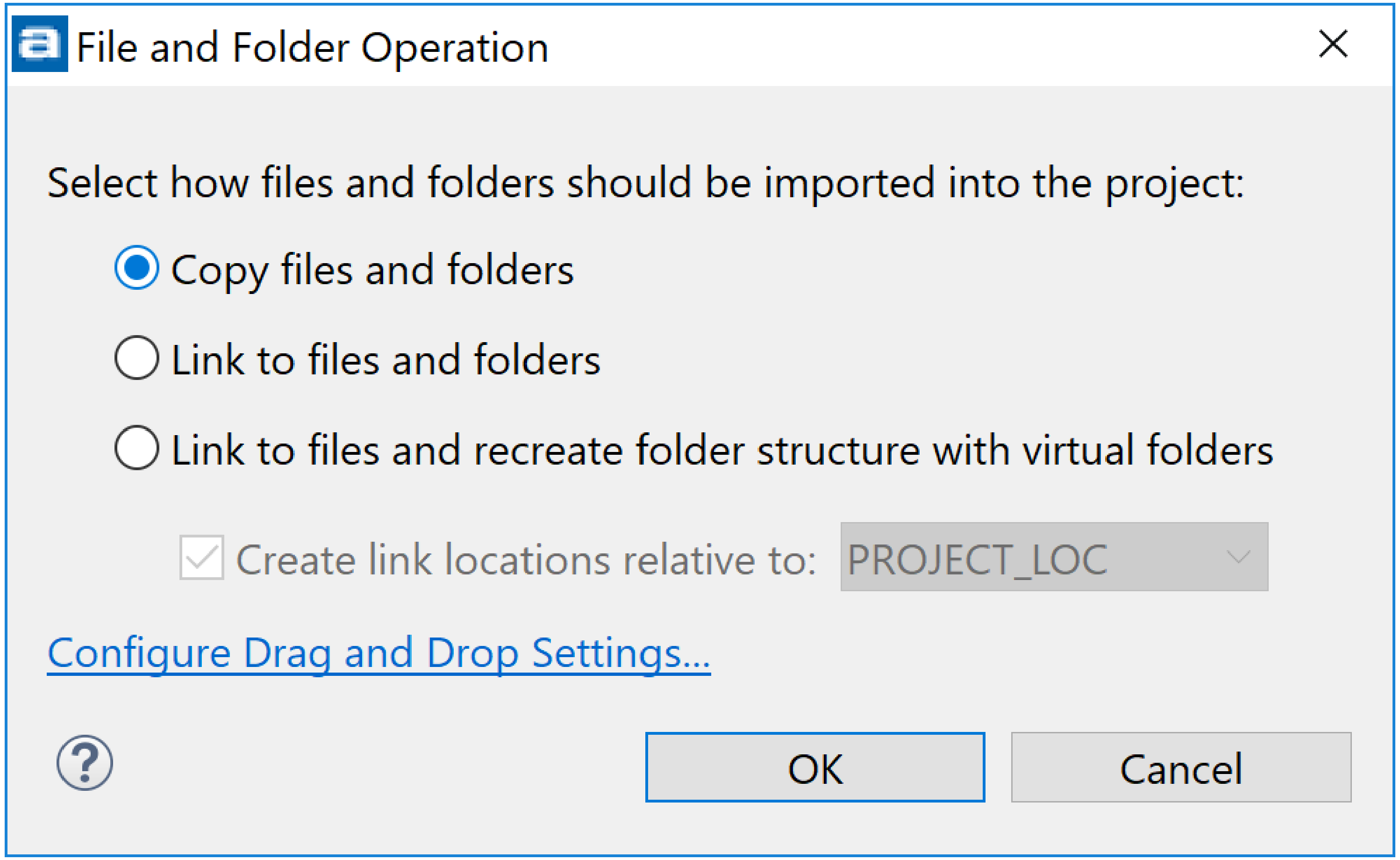
Step 16. Find Components directory



SD-Demo › STM32Cube › Repository › STM32Cube_FW_L4_V1.13.0 › Drivers › BSP

Name	Date modified	Type	Size
Adafruit_Shield	12/21/2018 12:54 ...	File folder	
B-L475E-IOT01	12/21/2018 12:54 ...	File folder	
☑ Components	12/21/2018 12:54 ...	File folder	
STM32L4R9I_EVAL	12/21/2018 12:54 ...	File folder	
STM32L4R9I-Discovery	12/21/2018 12:54 ...	File folder	
STM32L4xx_Nucleo	12/21/2018 12:54 ...	File folder	
STM32L4xx_Nucleo_32	12/21/2018 12:54 ...	File folder	
STM32L4xx_Nucleo_144	12/21/2018 12:54 ...	File folder	
STM32L476G_EVAL	12/21/2018 12:54 ...	File folder	
STM32L476G-Discovery	12/21/2018 12:54 ...	File folder	
STM32L496G-Discovery	12/21/2018 12:54 ...	File folder	

Step 17. Drag/Drop Components folder into TrueStudio BSP Folder and select coy files



File and Folder Operation

Select how files and folders should be imported into the project:

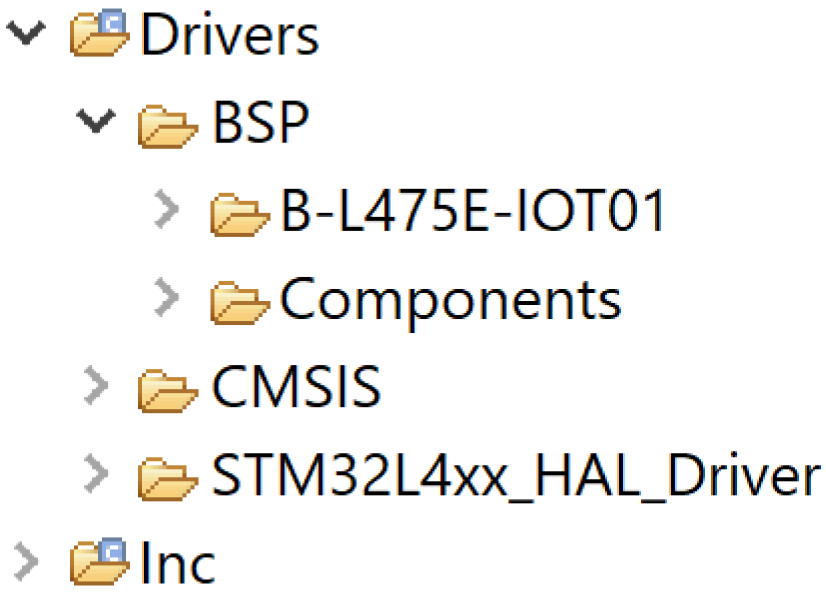
● Copy files and folders

○ Link to files and folders

○ Link to files and recreate folder structure with virtual folders

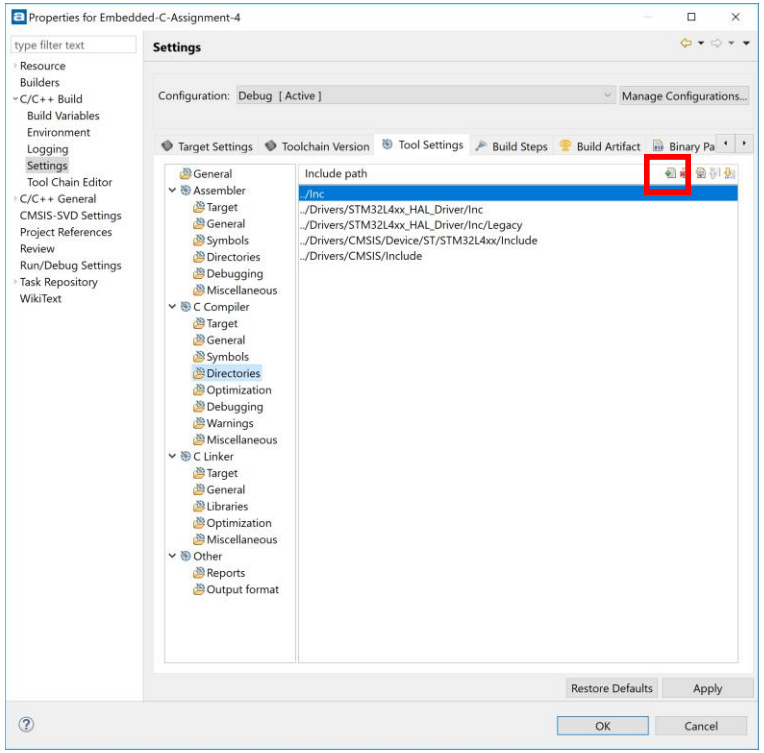
☑ Create link locations relative to: PROJECT_LOC

Step 18. Results



```
Drivers
    BSP
        B-L475E-IOT01
        Components
    CMSIS
    STM32L4xx_HAL_Driver
Inc
```

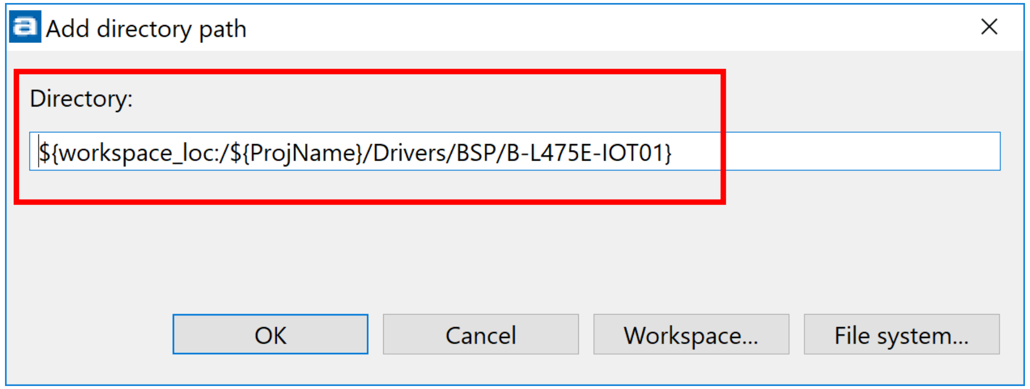
Step 19. Add BSP/B-L475E-IOT01 to include path: Properties, C/C++ Build, Settings, Tool Settings, C Compiler, Directories, Include Path, Add



Configuration: Debug [Active]

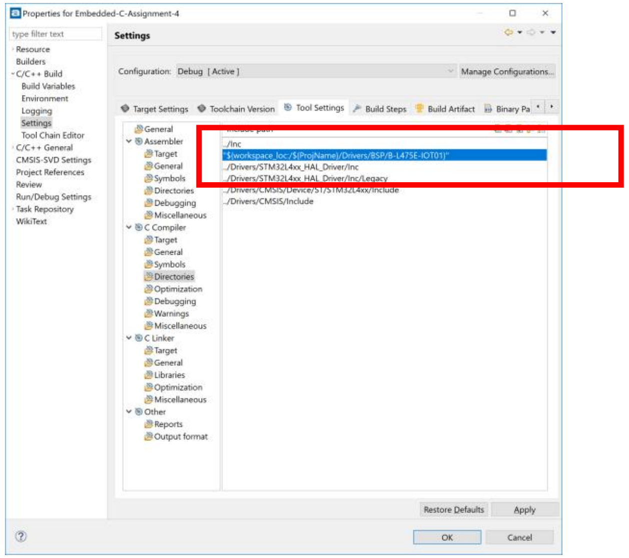
Include path

```
../Inc
../Drivers/STM32L4xx_HAL_Driver/Inc
../Drivers/STM32L4xx_HAL_Driver/Inc/Legacy
../Drivers/CMSIS/Device/ST/STM32L4xx/Include
../Drivers/CMSIS/Include
```



Directory:

```
${workspace_loc:/${ProjName}/Drivers/BSP/B-L475E-IOT01}
```

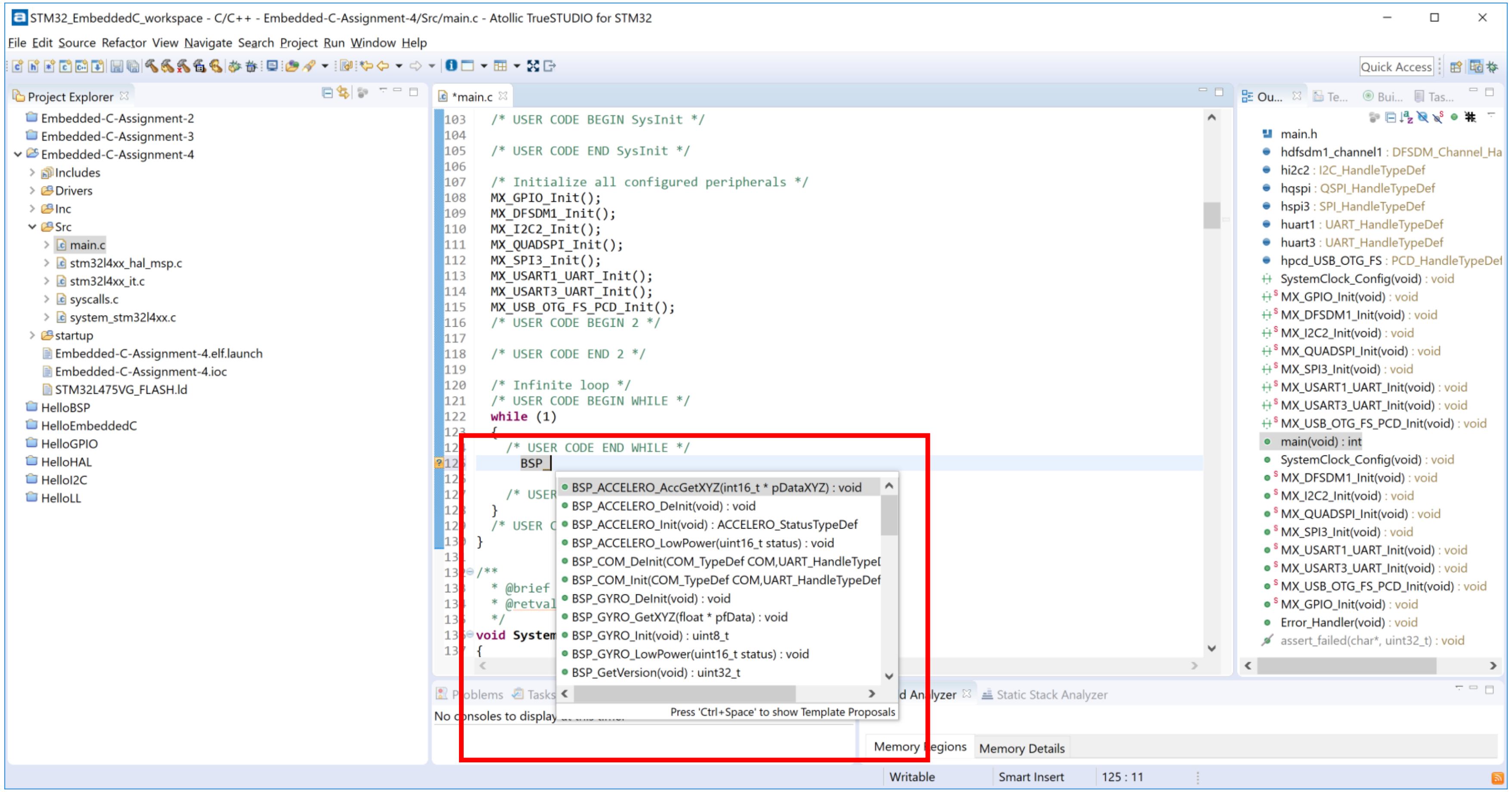


Configuration: Debug [Active]

Include path

```
../Inc
"${workspace_loc:/${ProjName}/Drivers/BSP/B-L475E-IOT01}"
../Drivers/STM32L4xx_HAL_Driver/Inc
../Drivers/STM32L4xx_HAL_Driver/Inc/Legacy
../Drivers/CMSIS/Device/ST/STM32L4xx/Include
../Drivers/CMSIS/Include
```

Step 20. In main.c, inside the “while(1)” loop, enter “BSP_” then press Ctrl+SpaceBar to observe BSP_ APIs



STM32_EmbeddedC_workspace - C/C++ - Embedded-C-Assignment-4/Src/main.c - Atollic TrueSTUDIO for STM32
File Edit Source Refactor View Navigate Search Project Run Window Help
Quick Access
Project Explorer
Embedded-C-Assignment-2
Embedded-C-Assignment-3
Embedded-C-Assignment-4
Includes
Drivers
Inc
Src
main.c
stm32l4xx_hal_msp.c
stm32l4xx_it.c
syscalls.c
system_stm32l4xx.c
startup
Embedded-C-Assignment-4.elf.launch
Embedded-C-Assignment-4.ioc
STM32L475VG_FLASH.ld
HelloBSP
HelloEmbeddedC
HelloGPIO
HelloHAL
HelloI2C
HelloLL
*main.c
Ou...
Te...
Bui...
Tas...
main.h
hdfsdm1_channel1 : DFSDM_Channel_Ha
hi2c2 : I2C_HandleTypeDef
hqspi : QSPI_HandleTypeDef
hspi3 : SPI_HandleTypeDef
huart1 : UART_HandleTypeDef
huart3 : UART_HandleTypeDef
hpcd_USB_OTG_FS : PCD_HandleTypeDef
SystemClock_Config(void) : void
MX_GPIO_Init(void) : void
MX_DFSDM1_Init(void) : void
MX_I2C2_Init(void) : void
MX_QUADSPI_Init(void) : void
MX_SPI3_Init(void) : void
MX_USART1_UART_Init(void) : void
MX_USART3_UART_Init(void) : void
MX_USB_OTG_FS_PCD_Init(void) : void
main(void) : int
SystemClock_Config(void) : void
MX_DFSDM1_Init(void) : void
MX_I2C2_Init(void) : void
MX_QUADSPI_Init(void) : void
MX_SPI3_Init(void) : void
MX_USART1_UART_Init(void) : void
MX_USART3_UART_Init(void) : void
MX_USB_OTG_FS_PCD_Init(void) : void
MX_GPIO_Init(void) : void
Error_Handler(void) : void
assert_failed(char*, uint32_t) : void
Problems
Tasks
d Analyzer
Static Stack Analyzer
Memory Regions
Memory Details
Writable
Smart Insert
125 : 11

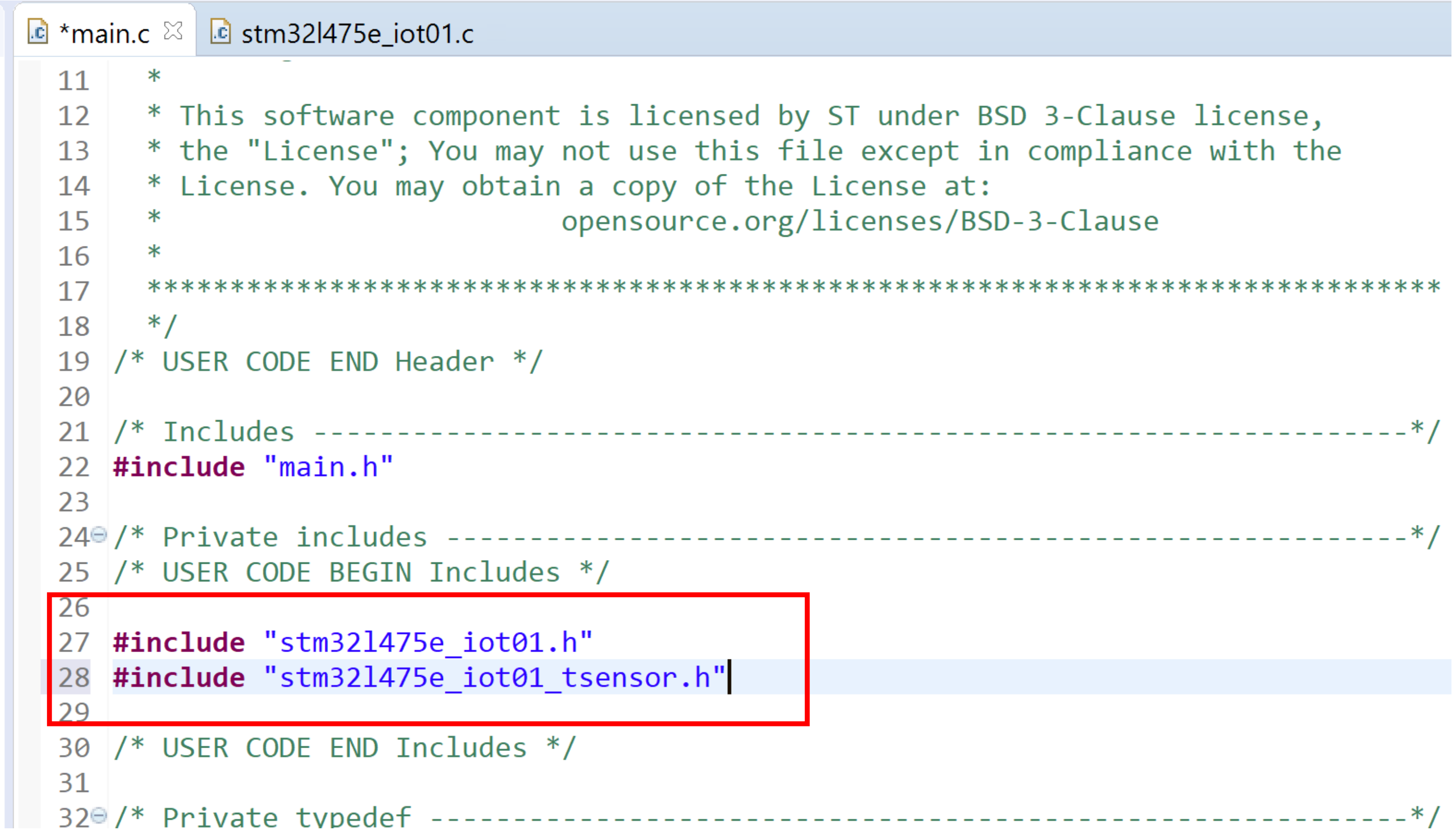
```
  /* USER CODE BEGIN SysInit */

  /* USER CODE END SysInit */

  /* Initialize all configured peripherals */
  MX_GPIO_Init();
  MX_DFSDM1_Init();
  MX_I2C2_Init();
  MX_QUADSPI_Init();
  MX_SPI3_Init();
  MX_USART1_UART_Init();
  MX_USART3_UART_Init();
  MX_USB_OTG_FS_PCD_Init();
  /* USER CODE BEGIN 2 */

  /* USER CODE END 2 */

  /* Infinite loop */
  /* USER CODE BEGIN WHILE */
  while (1)
  {
    /* USER CODE END WHILE */
      BSP_

    /* USER
  }
  /* USER C
}

/**
  * @brief
  * @retval
  */
void System
{
```

```
BSP_ACCELERO_AccGetXYZ(int16_t * pDataXYZ) : void
BSP_ACCELERO_DeInit(void) : void
BSP_ACCELERO_Init(void) : ACCELERO_StatusTypeDef
BSP_ACCELERO_LowPower(uint16_t status) : void
BSP_COM_DeInit(COM_TypeDef COM,UART_HandleTypeI
BSP_COM_Init(COM_TypeDef COM,UART_HandleTypeDef
BSP_GYRO_DeInit(void) : void
BSP_GYRO_GetXYZ(float * pfData) : void
BSP_GYRO_Init(void) : uint8_t
BSP_GYRO_LowPower(uint16_t status) : void
BSP_GetVersion(void) : uint32_t
```

Press 'Ctrl+Space' to show Template Proposals

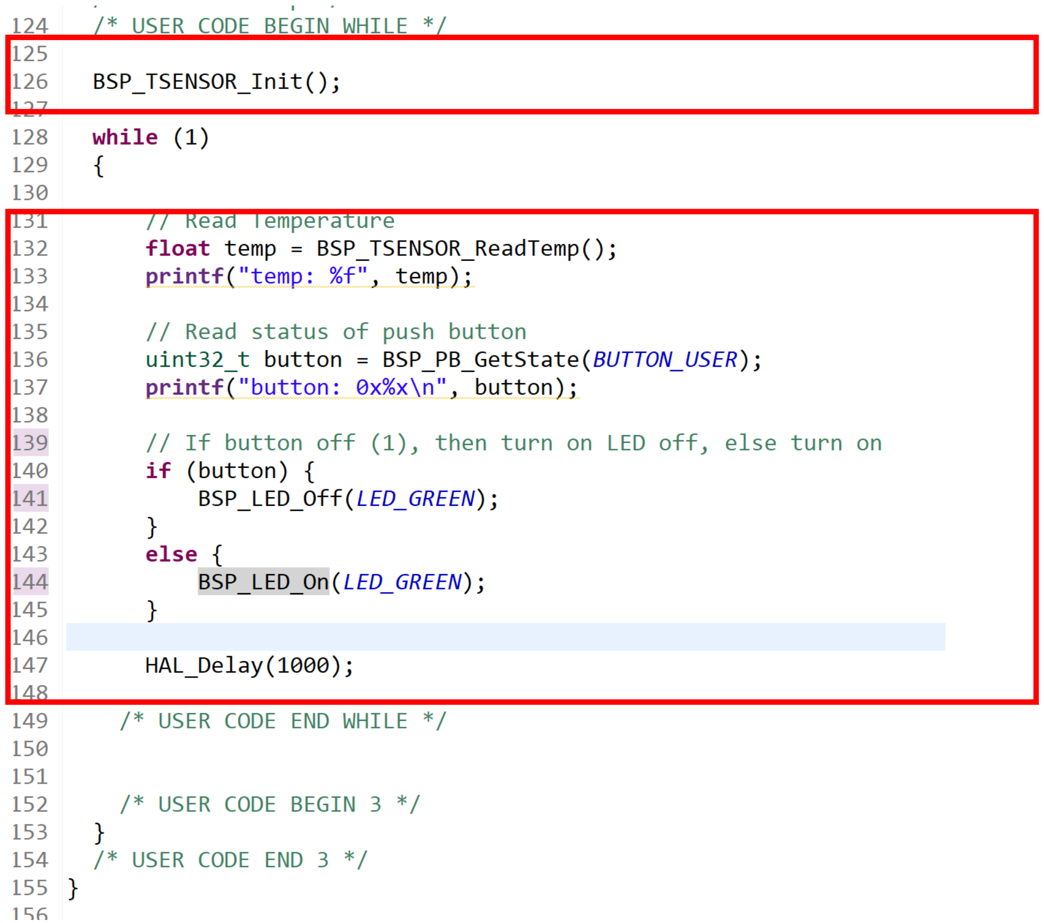
No consoles to display at this time.

Step 21. In main.c, add BSP related code header files



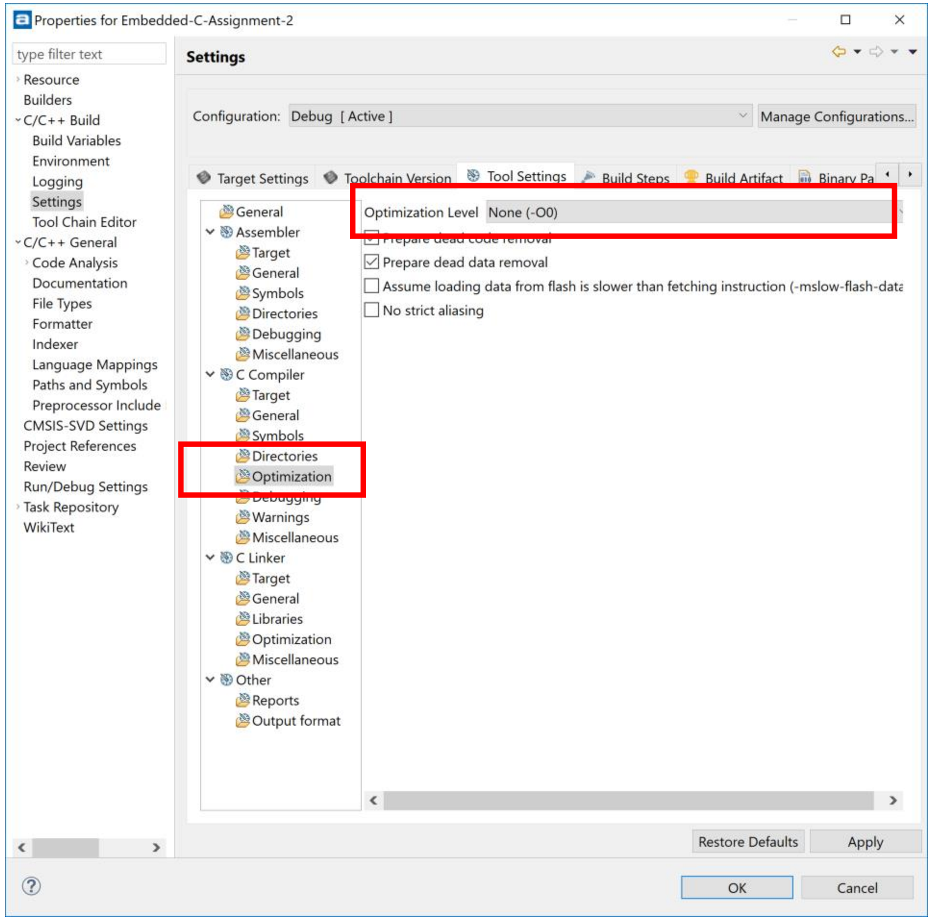
```c
  *
  * This software component is licensed by ST under BSD 3-Clause license,
  * the "License"; You may not use this file except in compliance with the
  * License. You may obtain a copy of the License at:
  *                        opensource.org/licenses/BSD-3-Clause
  *
  ******************************************************************************
  */
/* USER CODE END Header */

/* Includes ------------------------------------------------------------------*/
#include "main.h"

/* Private includes ----------------------------------------------------------*/
/* USER CODE BEGIN Includes */

#include "stm32l475e_iot01.h"
#include "stm32l475e_iot01_tsensor.h"

/* USER CODE END Includes */

/* Private typedef -----------------------------------------------------------*/
```

Step 22. In main.c, enter BSP related code shown below



```
  /* USER CODE BEGIN WHILE */

  BSP_TSENSOR_Init();

  while (1)
  {

      // Read Temperature
      float temp = BSP_TSENSOR_ReadTemp();
      printf("temp: %f", temp);

      // Read status of push button
      uint32_t button = BSP_PB_GetState(BUTTON_USER);
      printf("button: 0x%x\n", button);

      // If button off (1), then turn on LED off, else turn on
      if (button) {
          BSP_LED_Off(LED_GREEN);
      }
      else {
          BSP_LED_On(LED_GREEN);
      }

      HAL_Delay(1000);

    /* USER CODE END WHILE */


    /* USER CODE BEGIN 3 */
  }
  /* USER CODE END 3 */
}
```

Step 23. Properties, C/C++ Build, Settings, Tool Settings, C Compiler, Optimization, None



Configuration: Debug [Active]

Optimization Level None (-O0)

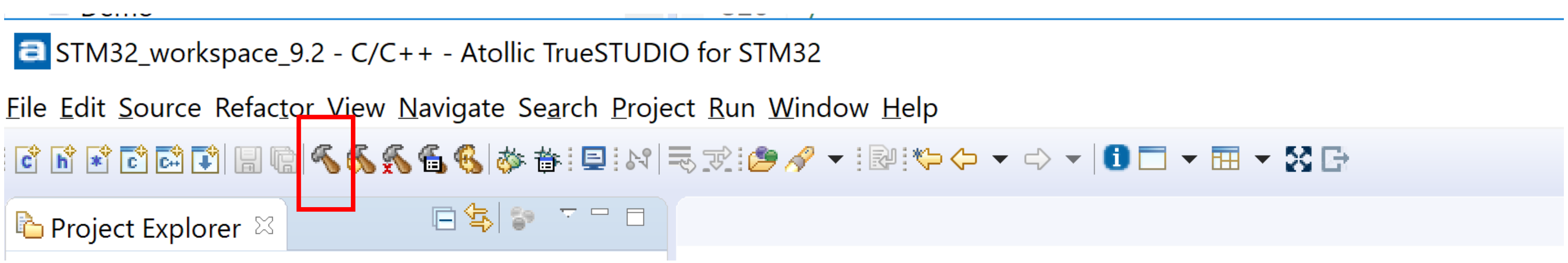
☑ Prepare dead code removal

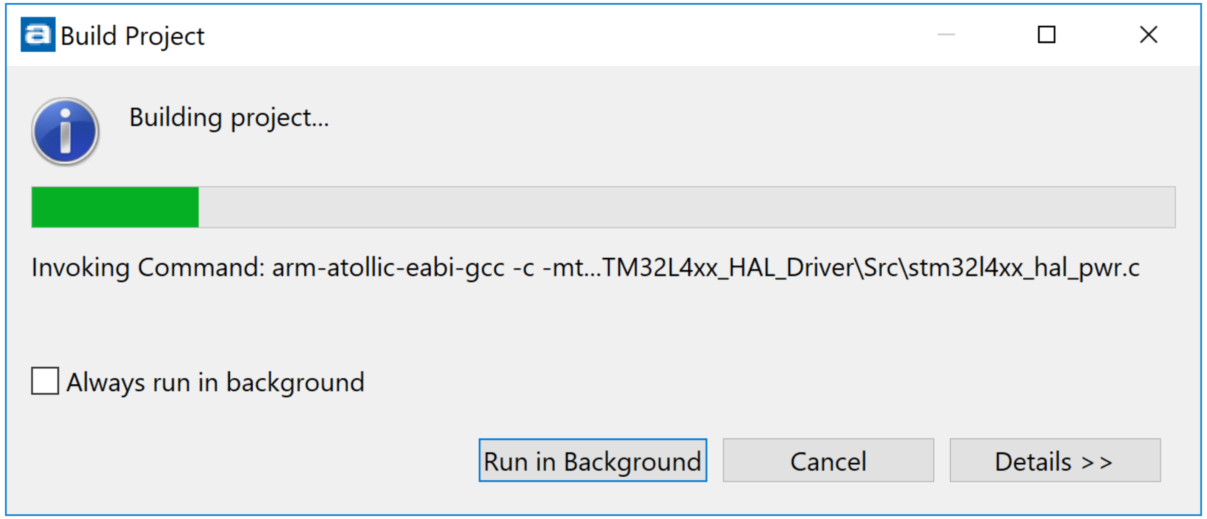
☑ Prepare dead data removal

□ Assume loading data from flash is slower than fetching instruction (-mslow-flash-data

□ No strict aliasing

Step 24. Build Project


STM32_workspace_9.2 - C/C++ - Atollic TrueSTUDIO for STM32
File Edit Source Refactor View Navigate Search Project Run Window Help
Project Explorer

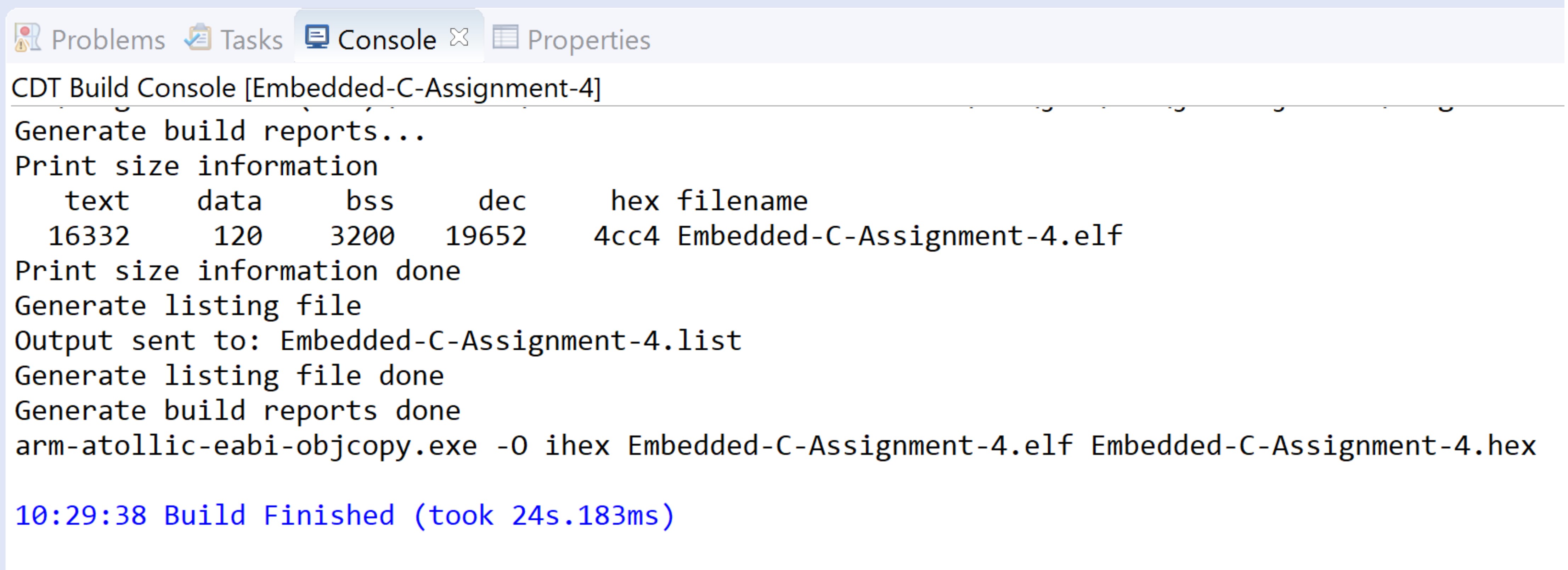

Build Project

Building project...

Invoking Command: arm-atollic-eabi-gcc -c -mt...TM32L4xx_HAL_Driver\Src\stm32l4xx_hal_pwr.c

☐ Always run in background

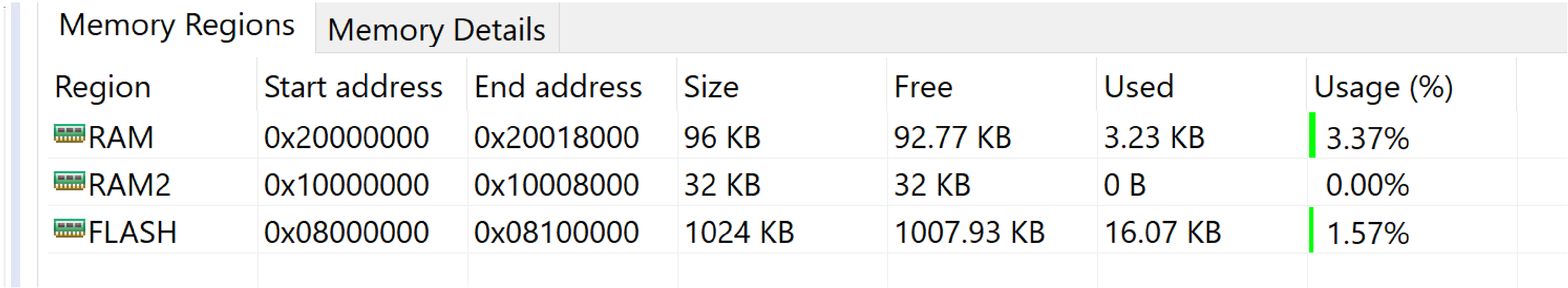
Step 25. Results of Build – Part 1



CDT Build Console [Embedded-C-Assignment-4]

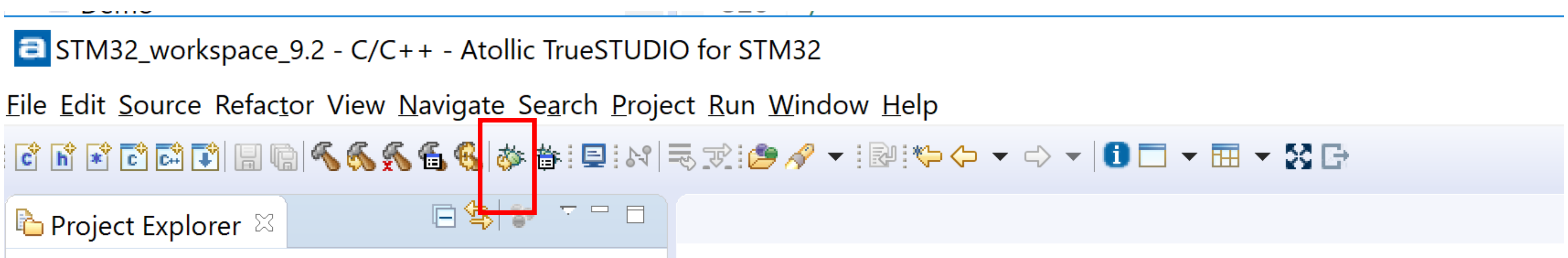
```
Generate build reports...
Print size information
   text    data     bss     dec     hex filename
  16332     120    3200   19652    4cc4 Embedded-C-Assignment-4.elf
Print size information done
Generate listing file
Output sent to: Embedded-C-Assignment-4.list
Generate listing file done
Generate build reports done
arm-atollic-eabi-objcopy.exe -O ihex Embedded-C-Assignment-4.elf Embedded-C-Assignment-4.hex

10:29:38 Build Finished (took 24s.183ms)
```

Step 26. Results of Build – Part 2

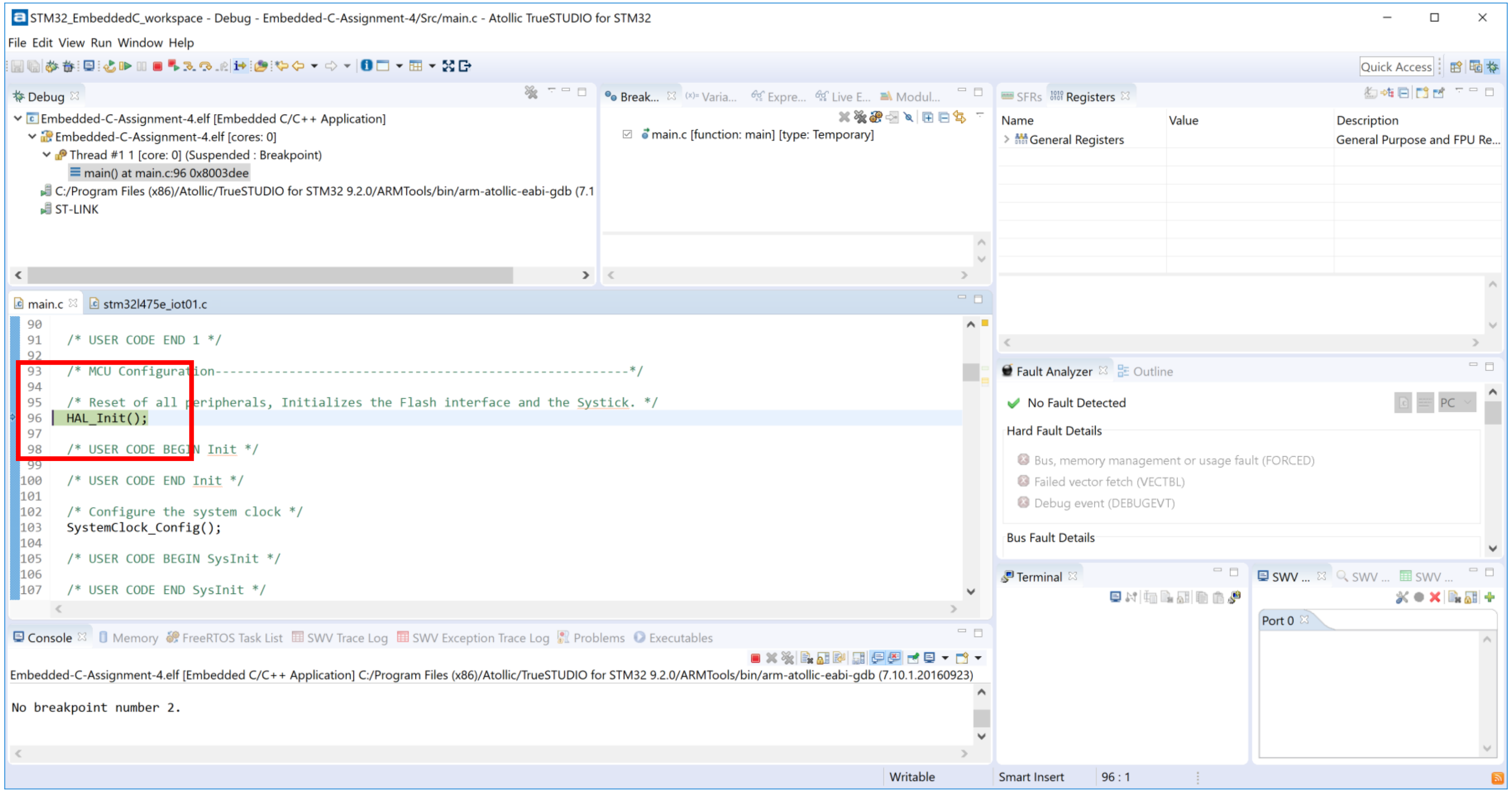


Region	Start address	End address	Size	Free	Used	Usage (%)
RAM	0x20000000	0x20018000	96 KB	92.77 KB	3.23 KB	3.37%
RAM2	0x10000000	0x10008000	32 KB	32 KB	0 B	0.00%
FLASH	0x08000000	0x08100000	1024 KB	1007.93 KB	16.07 KB	1.57%

Step 27. Run in Debug


STM32_workspace_9.2 - C/C++ - Atollic TrueSTUDIO for STM32
File Edit Source Refactor View Navigate Search Project Run Window Help
Project Explorer

Step 28. Hit Breakpoint



STM32_EmbeddedC_workspace - Debug - Embedded-C-Assignment-4/Src/main.c - Atollic TrueSTUDIO for STM32

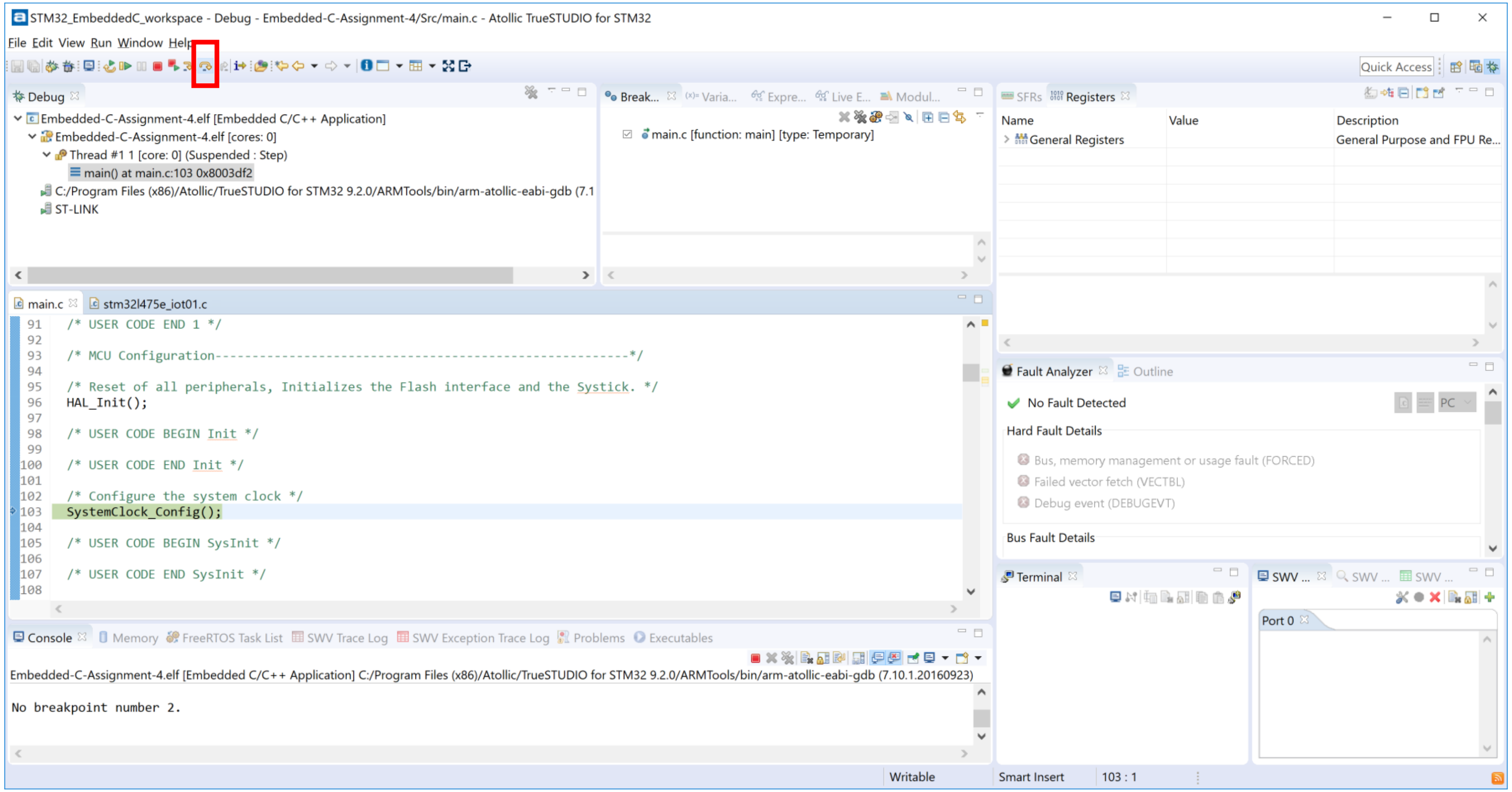
```
Embedded-C-Assignment-4.elf [Embedded C/C++ Application]
  Embedded-C-Assignment-4.elf [cores: 0]
    Thread #1 1 [core: 0] (Suspended : Breakpoint)
      main() at main.c:96 0x8003dee
  C:/Program Files (x86)/Atollic/TrueSTUDIO for STM32 9.2.0/ARMTools/bin/arm-atollic-eabi-gdb (7.1
  ST-LINK
```

☑ main.c [function: main] [type: Temporary]

```c

  /* USER CODE END 1 */

  /* MCU Configuration----------------------------------------------------------*/

  /* Reset of all peripherals, Initializes the Flash interface and the Systick. */
  HAL_Init();

  /* USER CODE BEGIN Init */

  /* USER CODE END Init */

  /* Configure the system clock */
  SystemClock_Config();

  /* USER CODE BEGIN SysInit */

  /* USER CODE END SysInit */
```

```
Embedded-C-Assignment-4.elf [Embedded C/C++ Application] C:/Program Files (x86)/Atollic/TrueSTUDIO for STM32 9.2.0/ARMTools/bin/arm-atollic-eabi-gdb (7.10.1.20160923)

No breakpoint number 2.
```

Step 29. Click “Step Over”.



Embedded-C-Assignment-4.elf [Embedded C/C++ Application]
Embedded-C-Assignment-4.elf [cores: 0]
Thread #1 1 [core: 0] (Suspended : Step)
main() at main.c:103 0x8003df2
C:/Program Files (x86)/Atollic/TrueSTUDIO for STM32 9.2.0/ARMTools/bin/arm-atollic-eabi-gdb (7.1
ST-LINK

☑ main.c [function: main] [type: Temporary]

Name	Value	Description
General Registers		General Purpose and FPU Re...

```
/* USER CODE END 1 */

/* MCU Configuration--------------------------------------------------------*/

/* Reset of all peripherals, Initializes the Flash interface and the Systick. */
HAL_Init();

/* USER CODE BEGIN Init */

/* USER CODE END Init */

/* Configure the system clock */
SystemClock_Config();

/* USER CODE BEGIN SysInit */

/* USER CODE END SysInit */
```

✓ No Fault Detected

Hard Fault Details

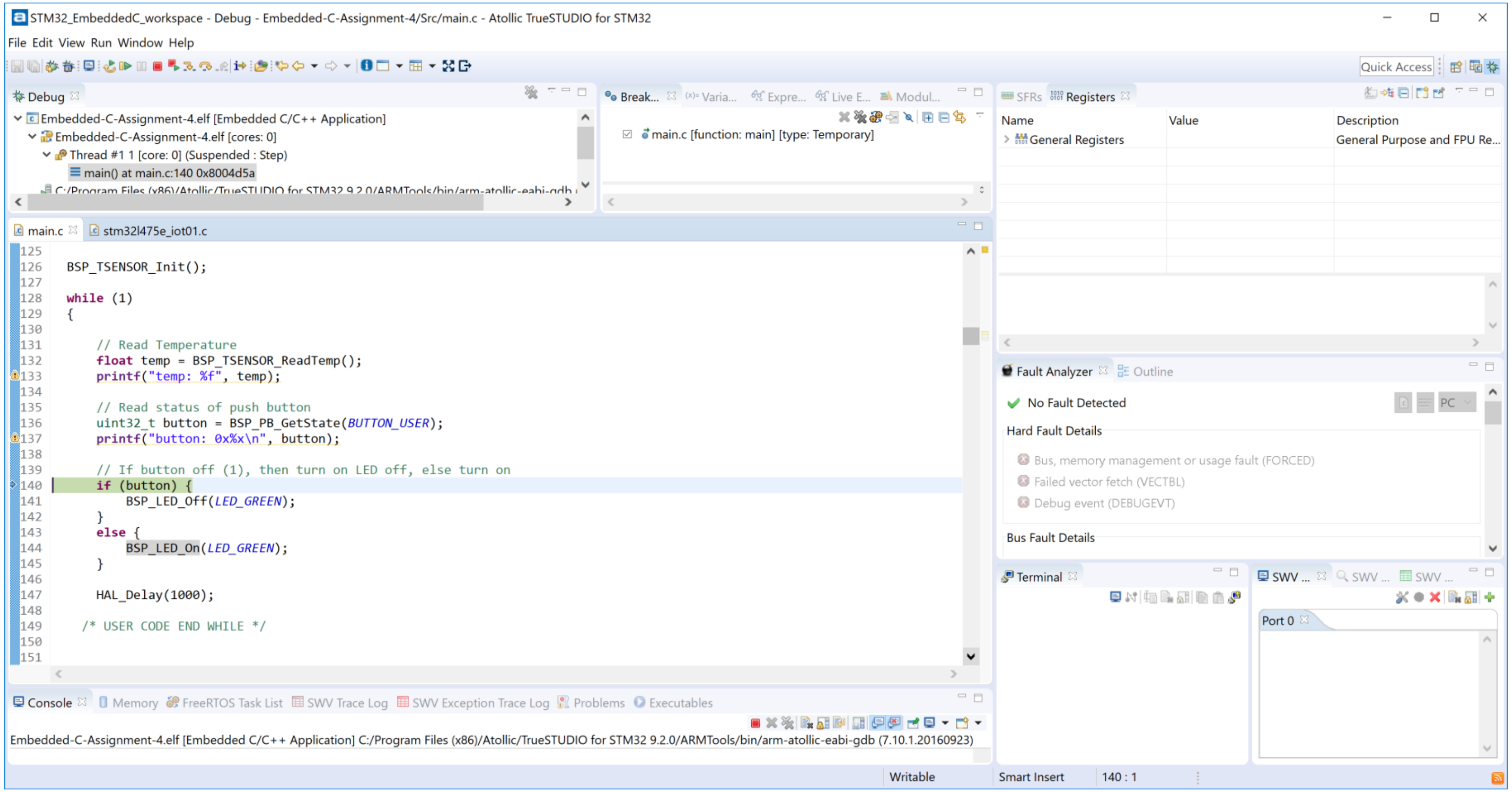
- Bus, memory management or usage fault (FORCED)
- Failed vector fetch (VECTBL)
- Debug event (DEBUGEVT)

Bus Fault Details

Embedded-C-Assignment-4.elf [Embedded C/C++ Application] C:/Program Files (x86)/Atollic/TrueSTUDIO for STM32 9.2.0/ARMTools/bin/arm-atollic-eabi-gdb (7.10.1.20160923)

```
No breakpoint number 2.
```

Step 30. Click “Step Over”. Repeat as needed. Confirming that the LED toggles on/off when button pressed using BSP



Embedded-C-Assignment-4.elf [Embedded C/C++ Application]
Embedded-C-Assignment-4.elf [cores: 0]
Thread #1 1 [core: 0] (Suspended : Step)
main() at main.c:140 0x8004d5a
C:/Program Files (x86)/Atollic/TrueSTUDIO for STM32 9.2.0/ARMTools/bin/arm-atollic-eabi-gdb

☑ main.c [function: main] [type: Temporary]

Name	Value	Description
General Registers		General Purpose and FPU Re...

```
  BSP_TSENSOR_Init();

  while (1)
  {

      // Read Temperature
      float temp = BSP_TSENSOR_ReadTemp();
      printf("temp: %f", temp);

      // Read status of push button
      uint32_t button = BSP_PB_GetState(BUTTON_USER);
      printf("button: 0x%x\n", button);

      // If button off (1), then turn on LED off, else turn on
      if (button) {
          BSP_LED_Off(LED_GREEN);
      }
      else {
          BSP_LED_On(LED_GREEN);
      }

      HAL_Delay(1000);

    /* USER CODE END WHILE */

```

✓ No Fault Detected

Hard Fault Details

- Bus, memory management or usage fault (FORCED)
- Failed vector fetch (VECTBL)
- Debug event (DEBUGEVT)

Bus Fault Details

```
Embedded-C-Assignment-4.elf [Embedded C/C++ Application] C:/Program Files (x86)/Atollic/TrueSTUDIO for STM32 9.2.0/ARMTools/bin/arm-atollic-eabi-gdb (7.10.1.20160923)
```