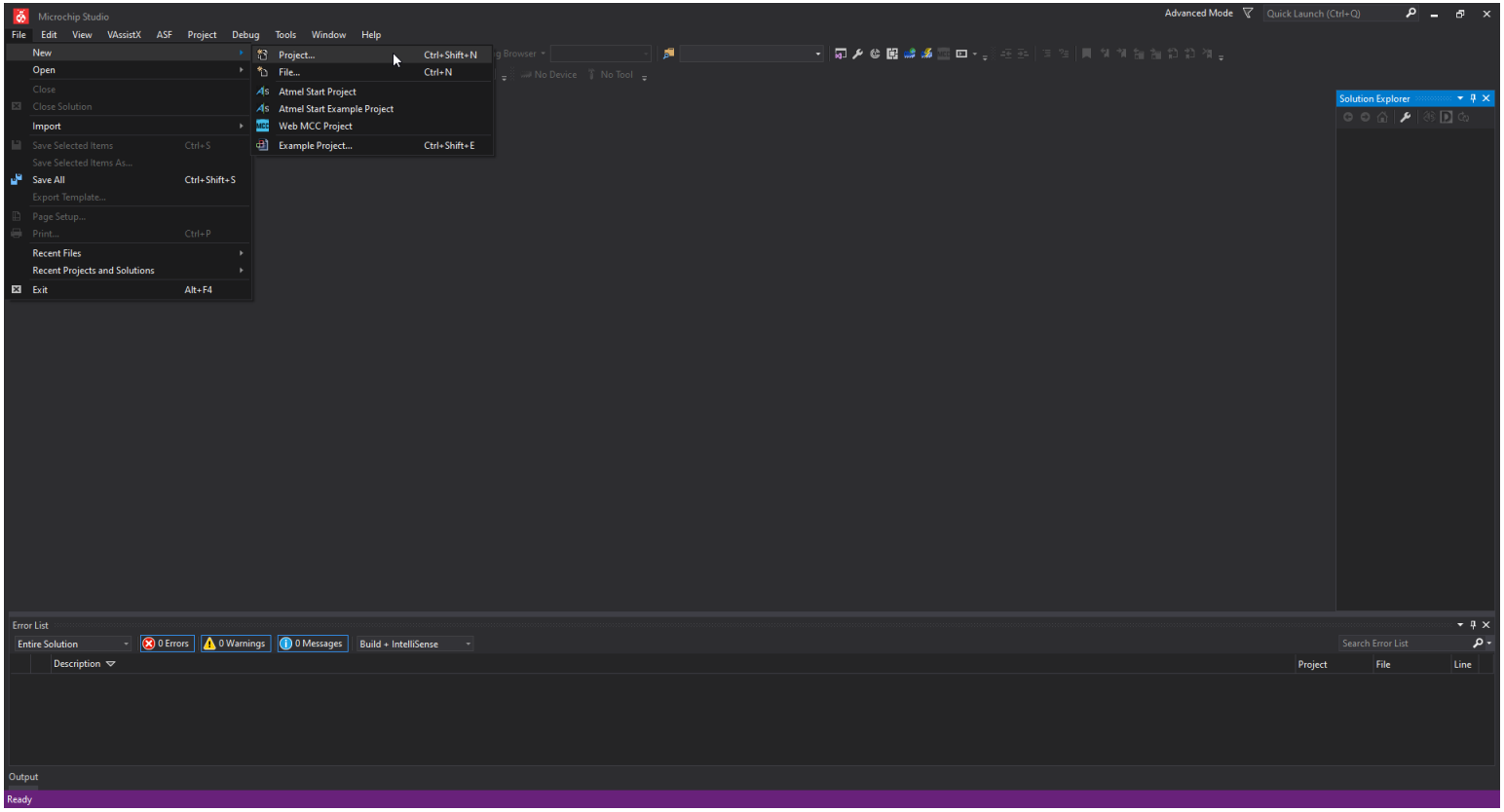
XMega Microcontroller Guide for HaHa v3.0 Board

Contents

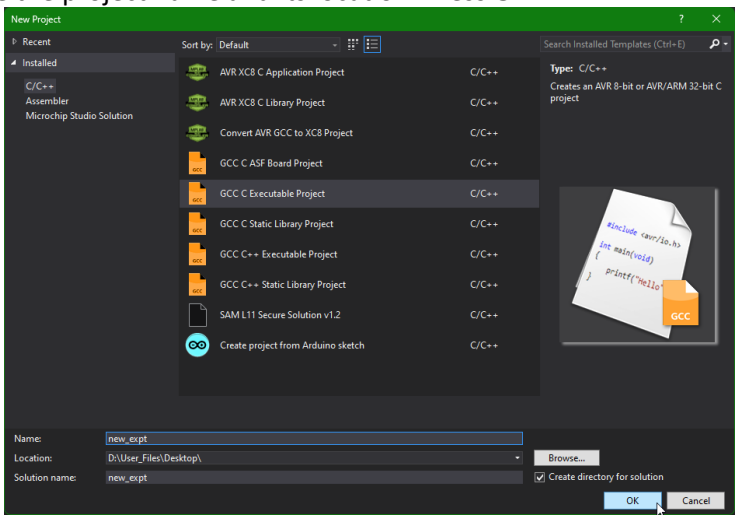
Instructor: Dr. Swarup Bhunia
Co-Instructor: Reiner Dizon-Paradis

Starting a Microchip Studio Project

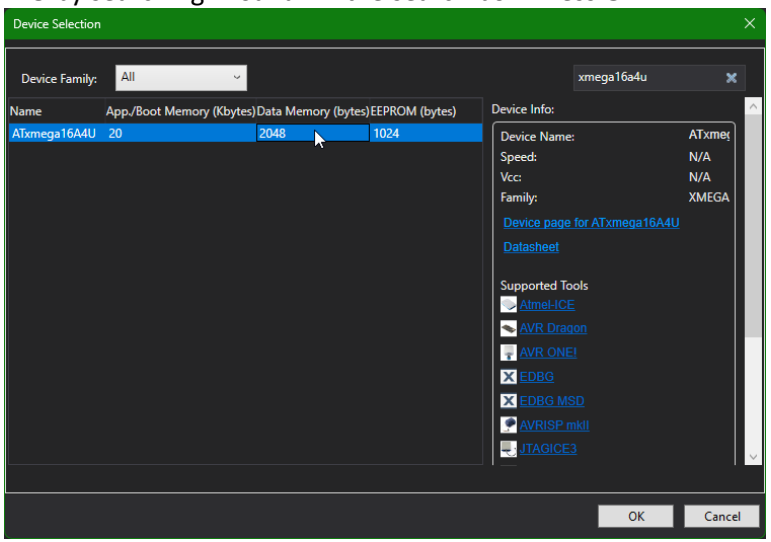
1. Open Microchip Studio. Go to **File** > **New > Project**.



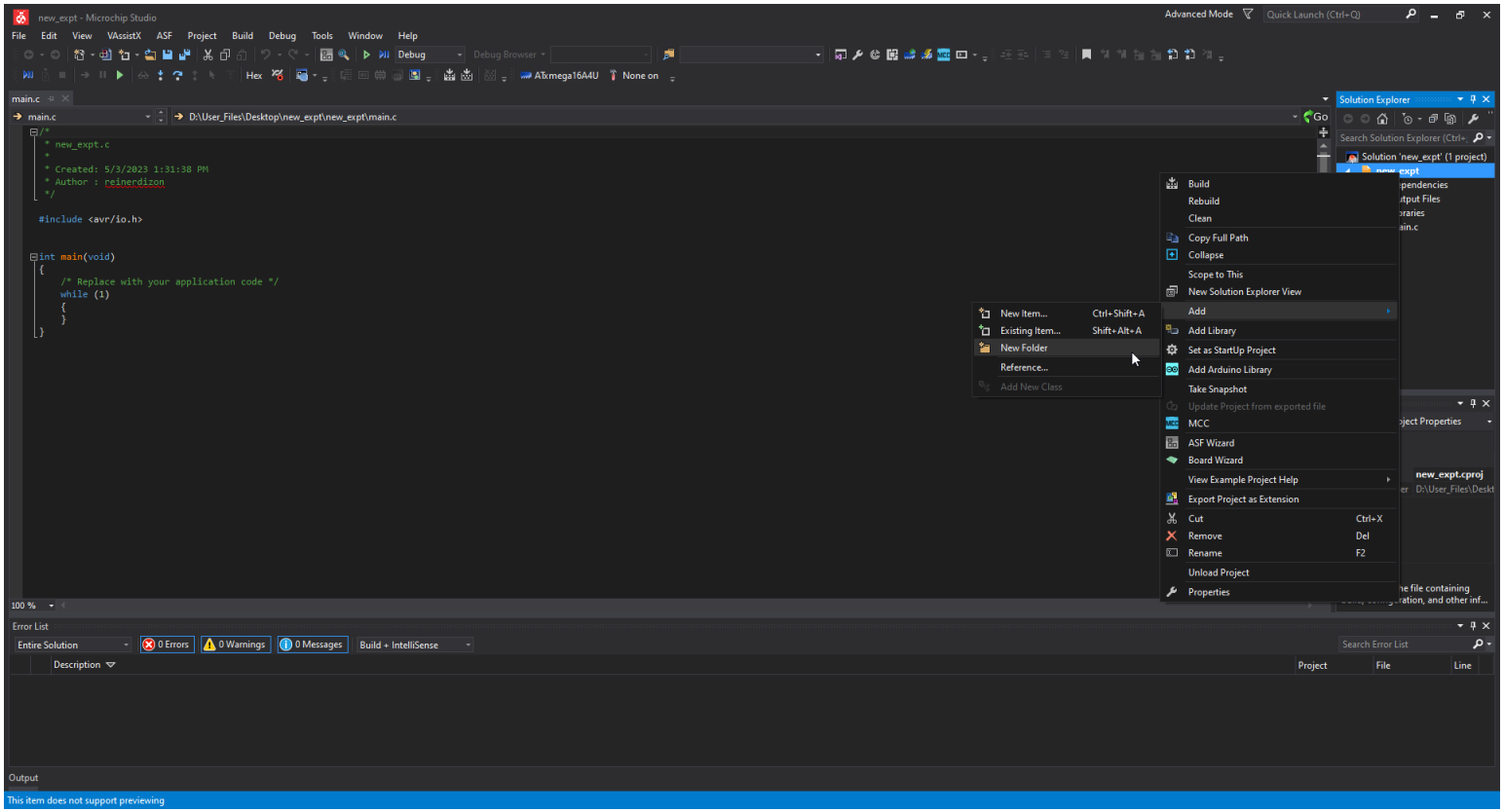
2. Select **GCC C Executable Project**. Type the project name and its location. Press **OK**.



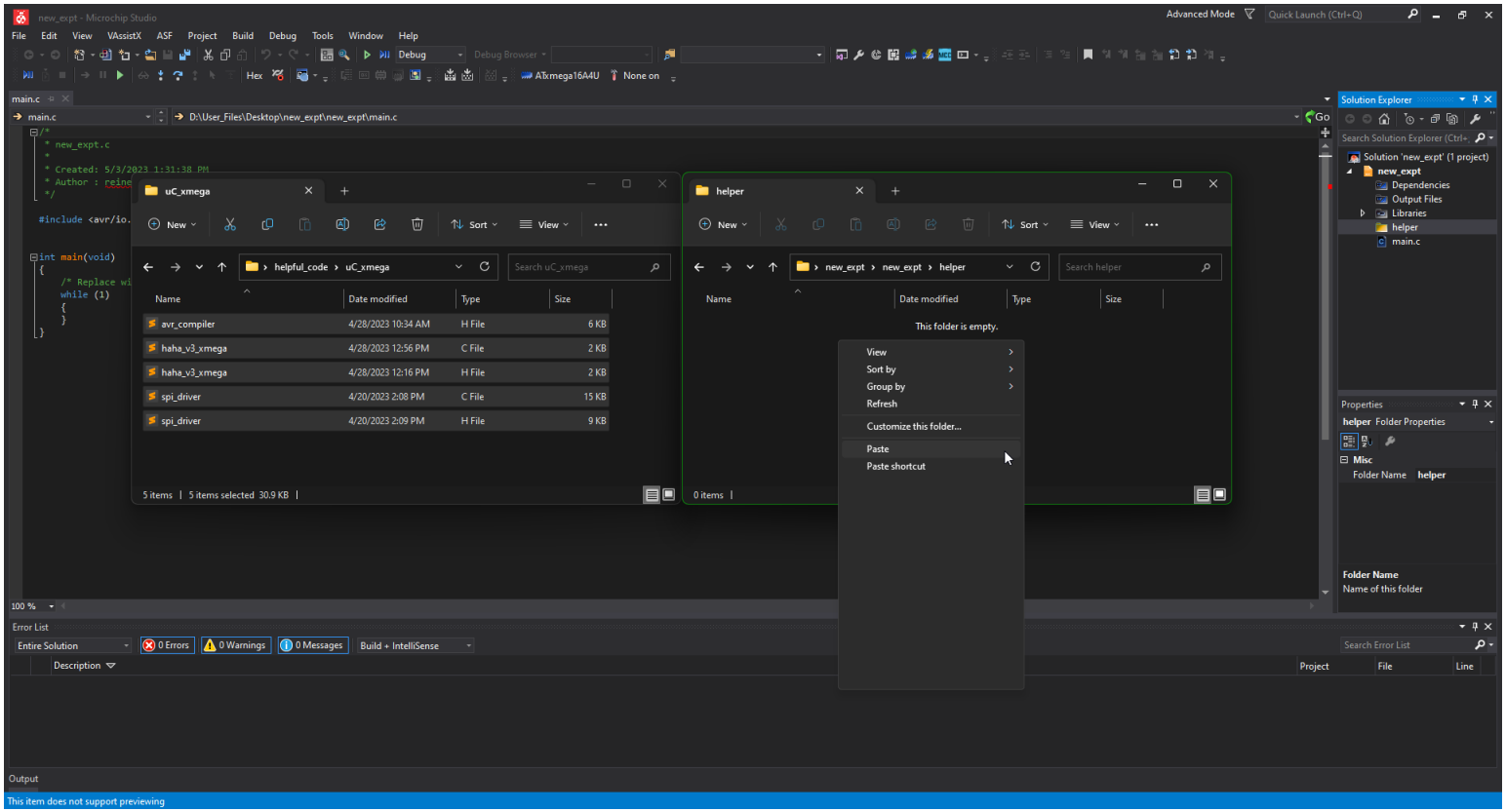
3. Select the device called **ATxmega16A4U** by searching “16a4u” in the search box. Press **OK**.



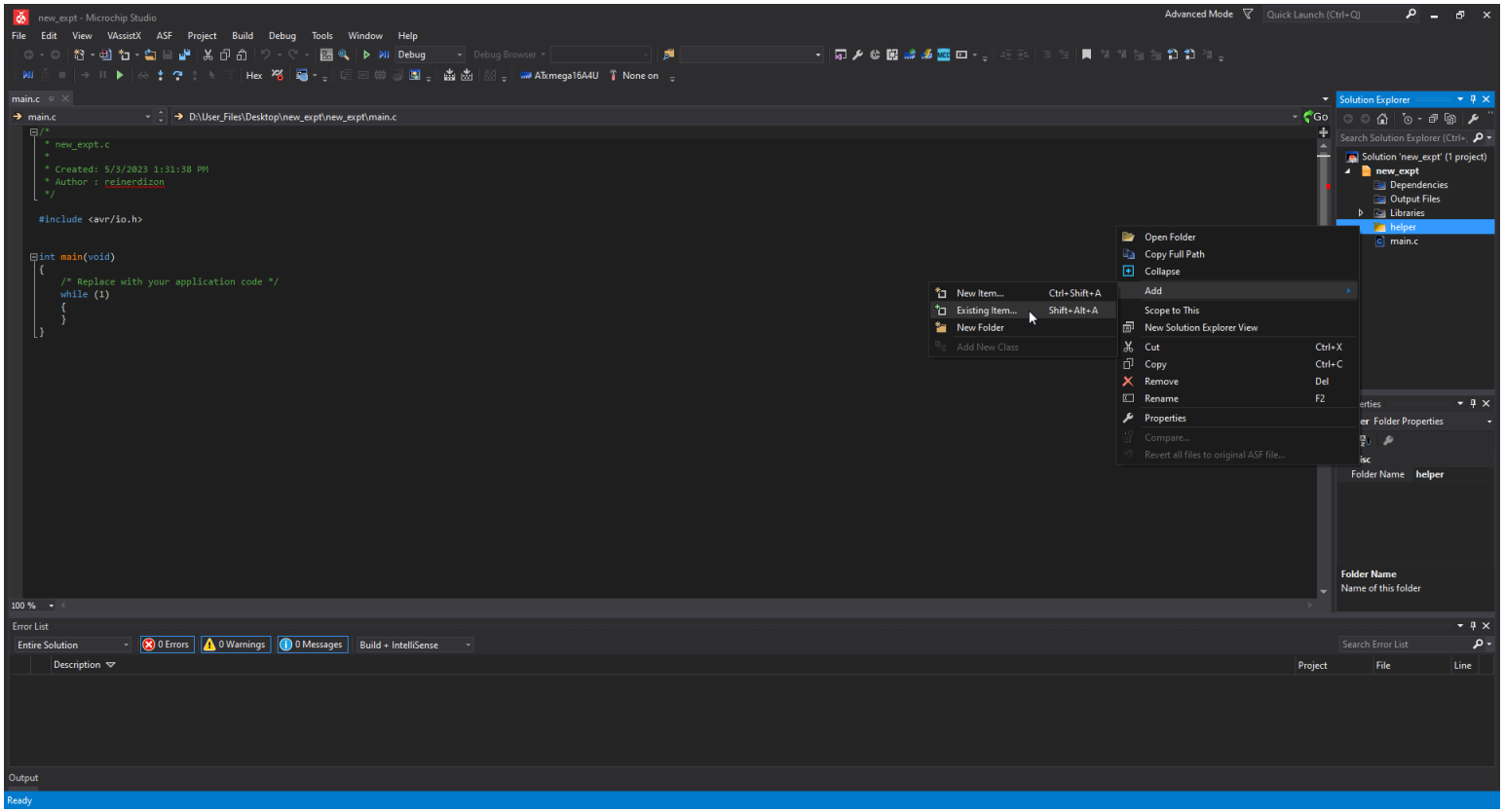
4. Right click on **<project_name>** folder on the right pane. Go to **Add > New Folder**. Call the folder *helper*.



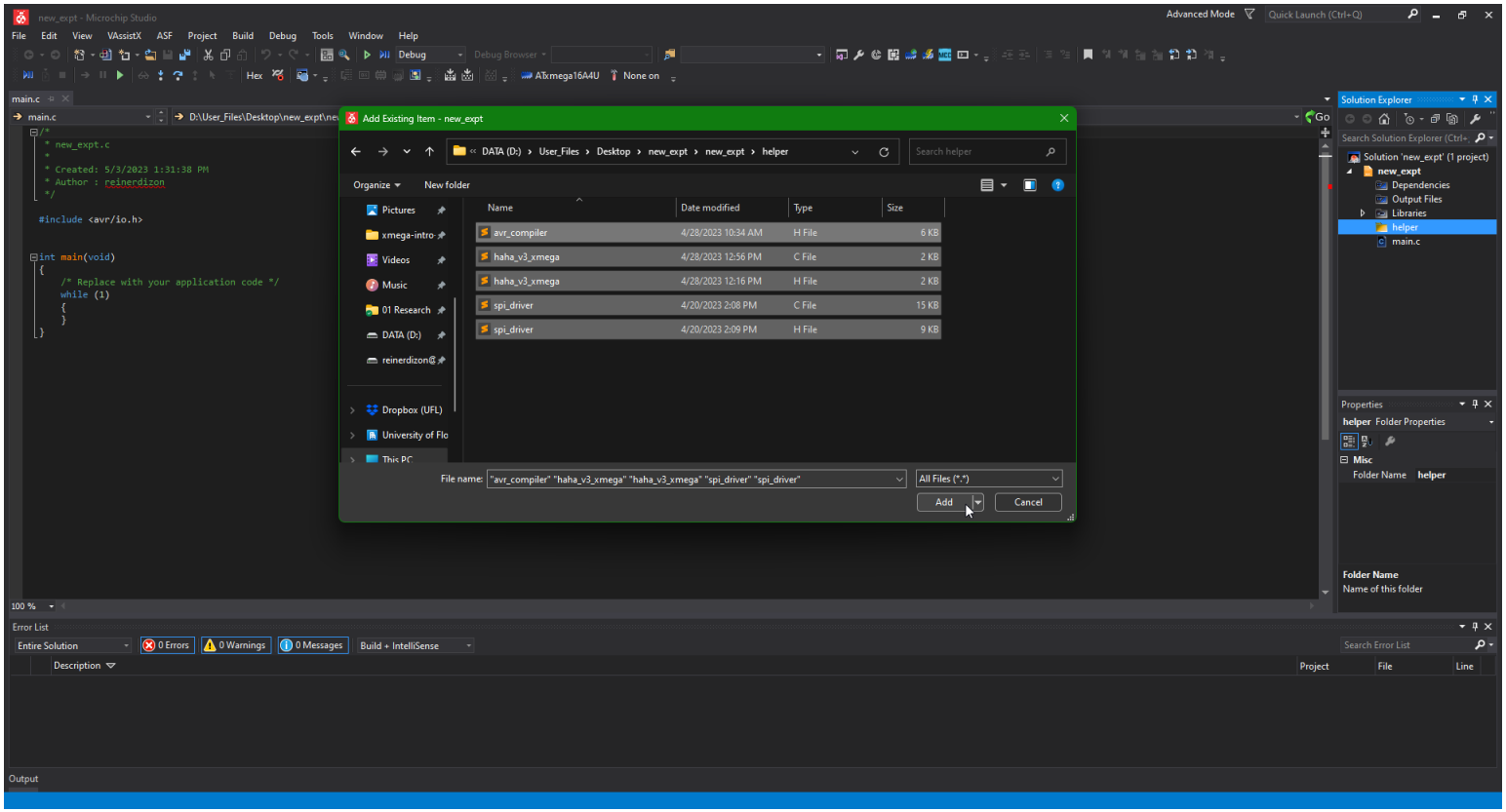
5. Copy the helper codes (from *helpful_code/uC_xmega/*) to the **<project_name>/<project_name>/helper** folder.



6. Right click on *helper* folder on the right pane. Go to **Add > Existing Item**.

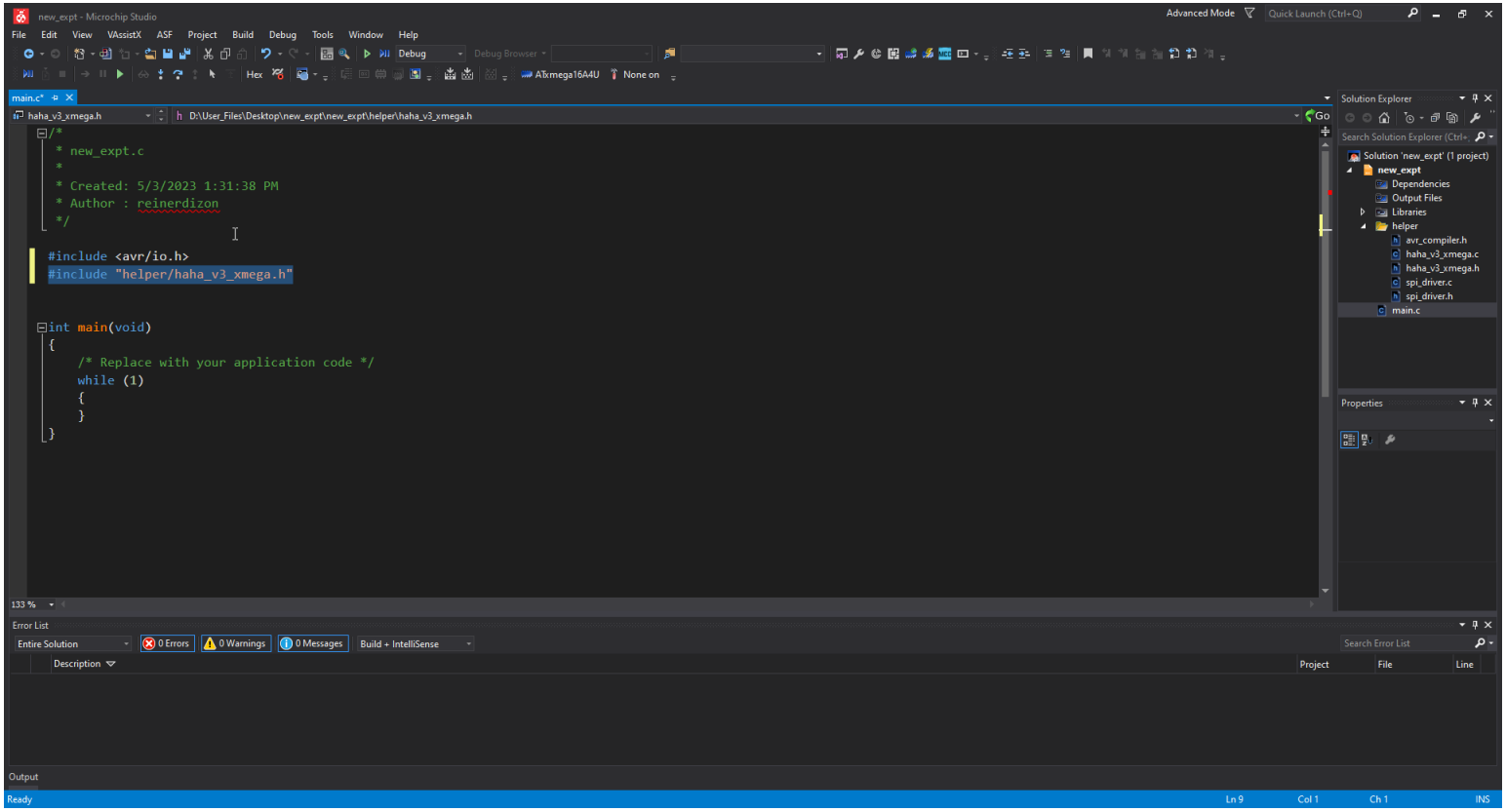


7. Add all the helper codes inside **<project_name>/<project_name>/helper** folder.

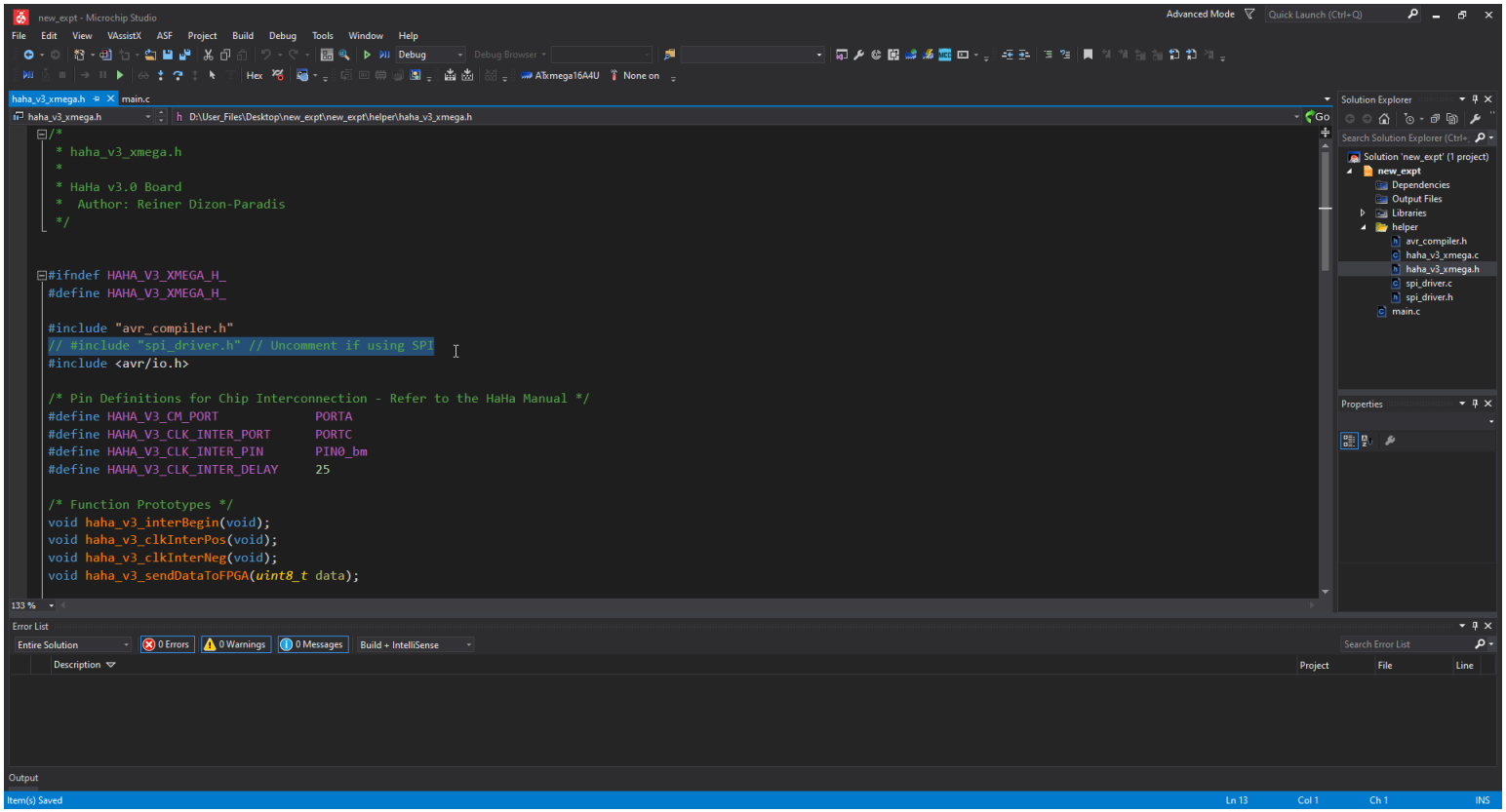


8. In your *main.c* file, add the following include statement:

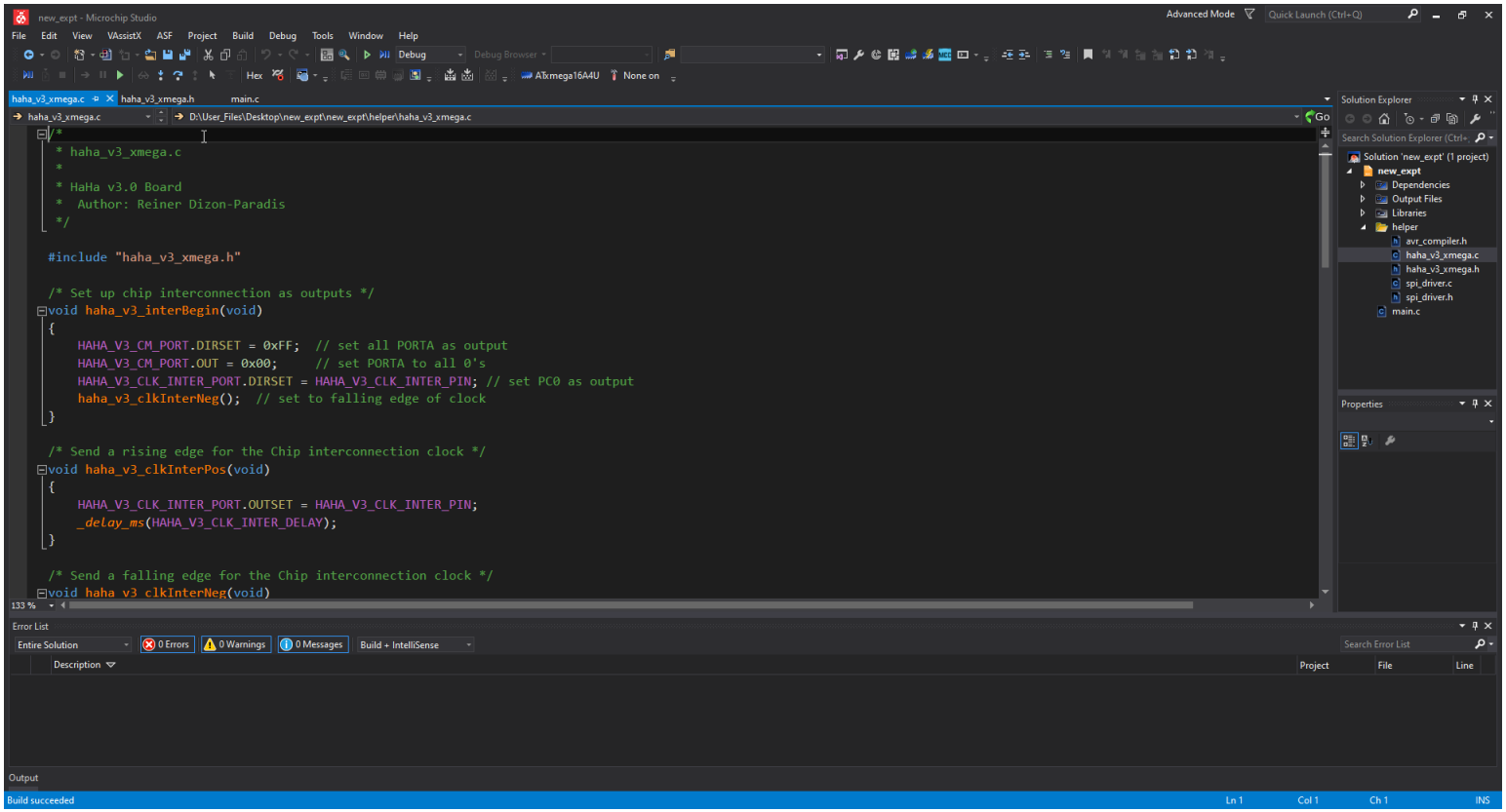
```
#include "helper/haha_v3_xmega.h"
```



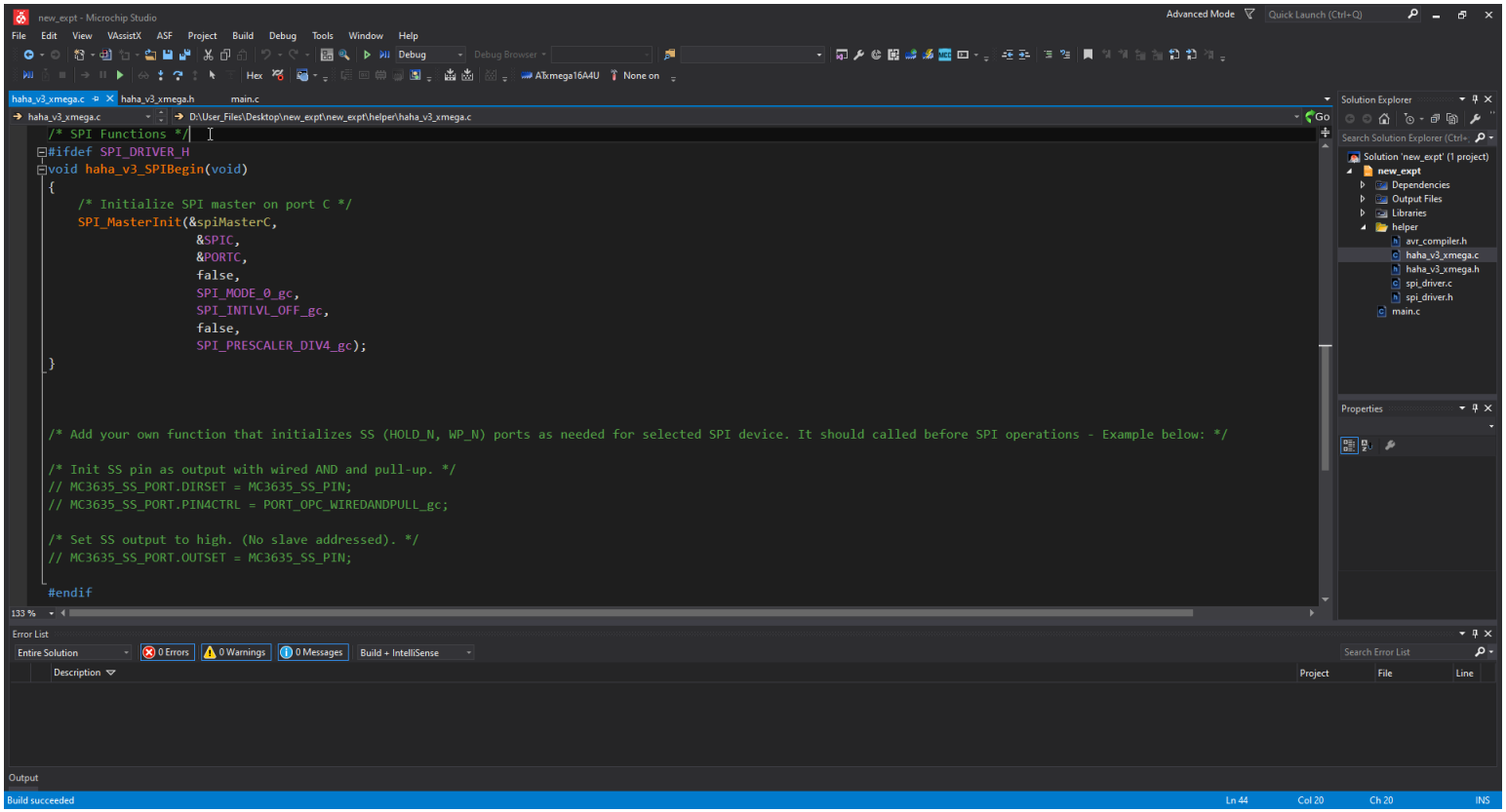
9. Examine **haha_v3_xmega.h** header file. This file includes helper constants, variables, and function prototypes that defines the chip interconnection ports and Serial Peripheral Interface (SPI) ports. In order to access SPI libraries, you need to uncomment the following line in the code below. Otherwise, let the file as it is to save space in the microcontroller.



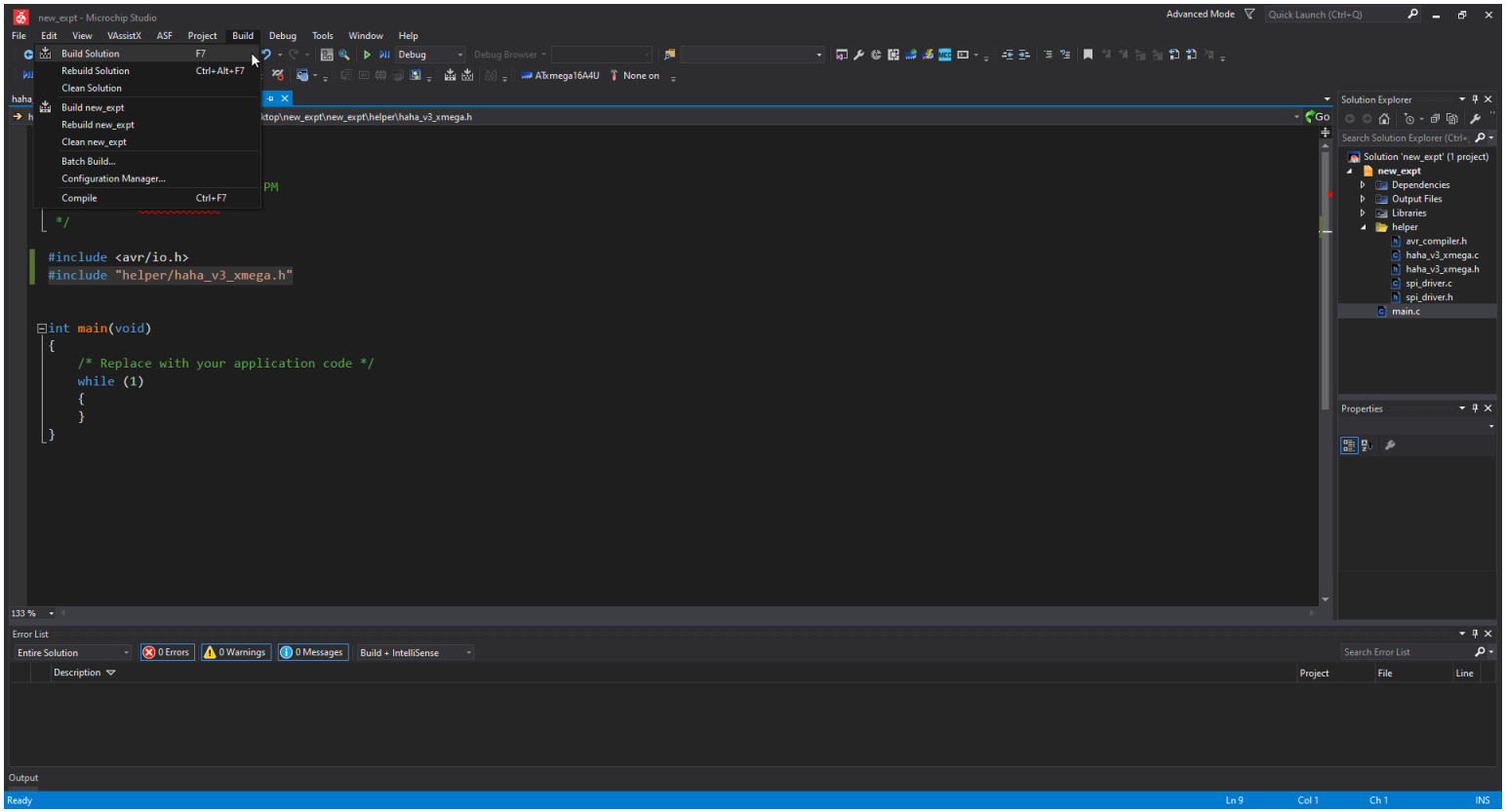
10. Examine **haha_v3_xmega.c** implementation file. This file includes helper function definitions that set up the chip interconnection ports and interfaces with Serial Peripheral Interface (SPI).



11. Scroll down the **haha_v3_xmega.c** implementation file. The SPI functionalities do not include setting up the SS pin for device(s) used for a particular experiment. Refer to the experiment instructions and its references for more details.

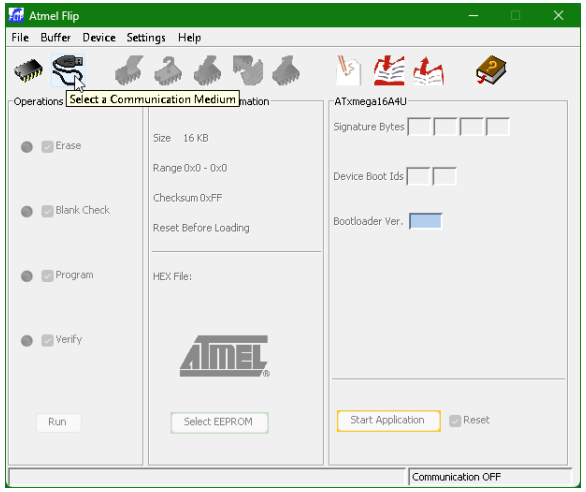


12. In theory, programming binaries can be built for this project, but nothing will happen on the HaHa board. Once you make the changes appropriate for the experiment instructions, you can build your project by going to **Build > Build Solution**. Fix any issues that arise. After that, you can proceed to programming the microcontroller.

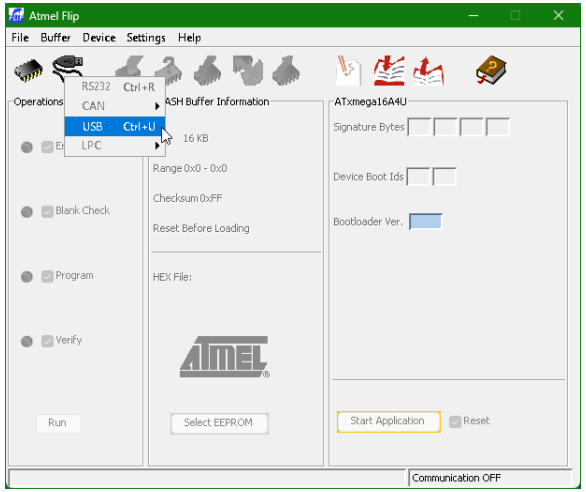


Programming the Xmega microcontroller

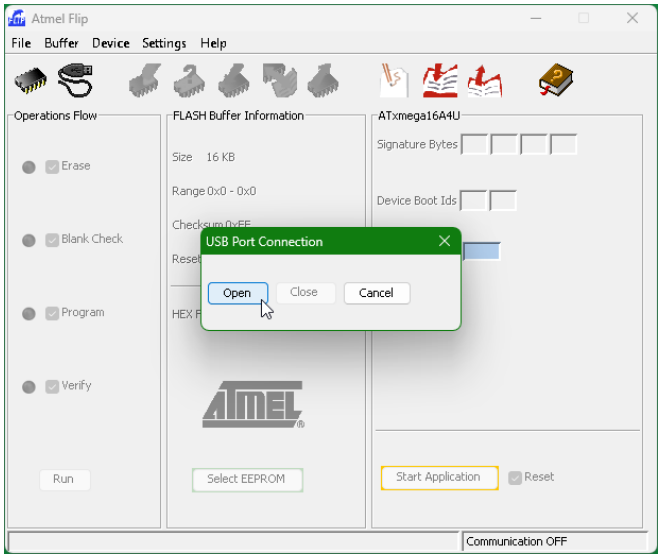
1. Make sure the switch next to the *MCU RST* button is switched down to *BOOT*. Double tap the *MCU RST* button.
2. Open Atmel FLIP. Click on the button (**Select a Communication Medium**) shown below.



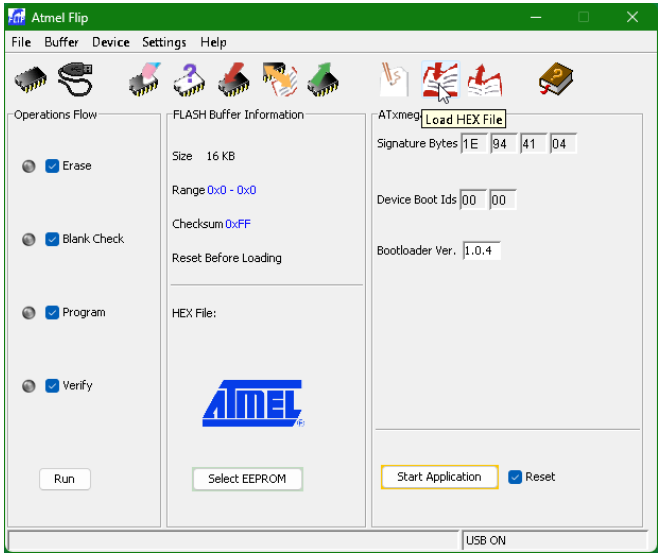
3. Select the **USB** option.



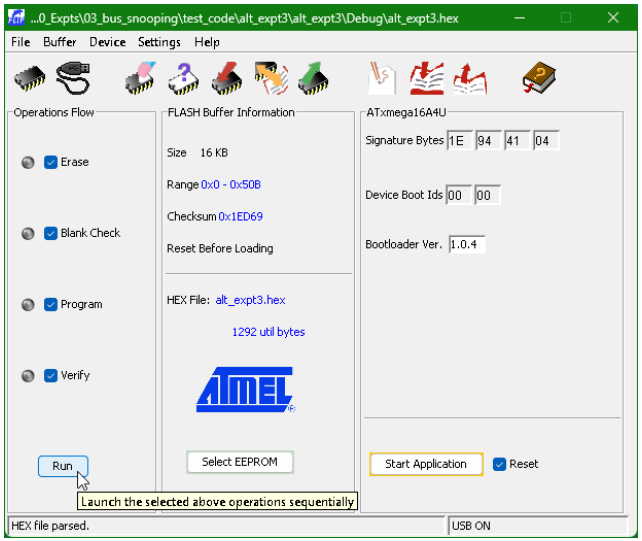
4. Click **Open**.



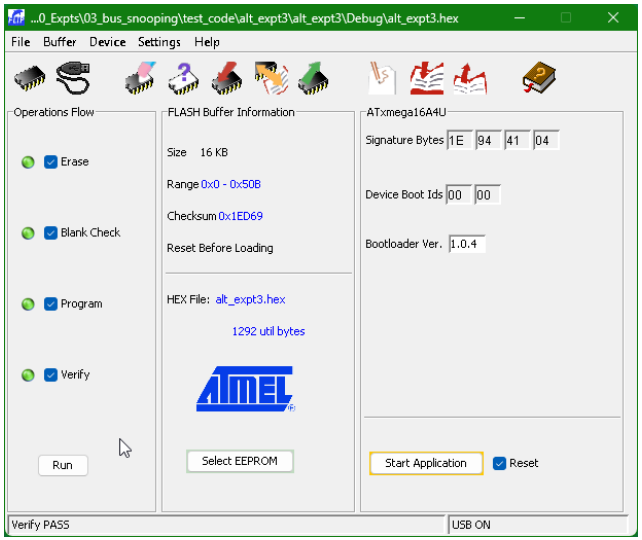
5. Click on the button (**Load HEX File**) below. Locate the HEX file and Click **OK**.



6. Click **Run**.



7. Your microcontroller program should be loaded. Then, the switch next to the *MCU RST* button should be switched up to *APP*. Double tap the *MCU RST* button.



Using the SPI Libraries within HaHa v3 Header Files

- For your reference, here are the pin names for FLASH pins:
  - SS (Slave Select): PORTC4
  - HOLD_N: PORTE1
  - WP_N: PORTE2
- For your reference, here are the pin names for Accelerometer pins:
  - SS (Slave Select): PORTE3
- Set those pins appropriately for your application.
- Make sure to add the following include statement:

```
#include "haha_v3_xmega.h"
```

- Make sure to uncomment the following line inside haha_v3_xmega.h file:

```
#include "spi_driver.h"
```

- Initialize your SPI master using the following:

```
haha_v3_SPIBegin();
```

- Make sure to set SS low before sending/reading data from SPI and then high after the intended operation.
- Send 1 byte of data to SPI slave using the following:

```
SPI_MasterTransceiveByte(&spiMasterC, <send_data>);
```

- Read 1 byte of data to SPI slave using the following:

```
read_data = SPI_MasterTransceiveByte(&spiMasterC, <send_data>);
```