ECEN 5023-001/-001B
Mobile Computing and Internet of Things Security
Simplicity Exercise
Fall 2017

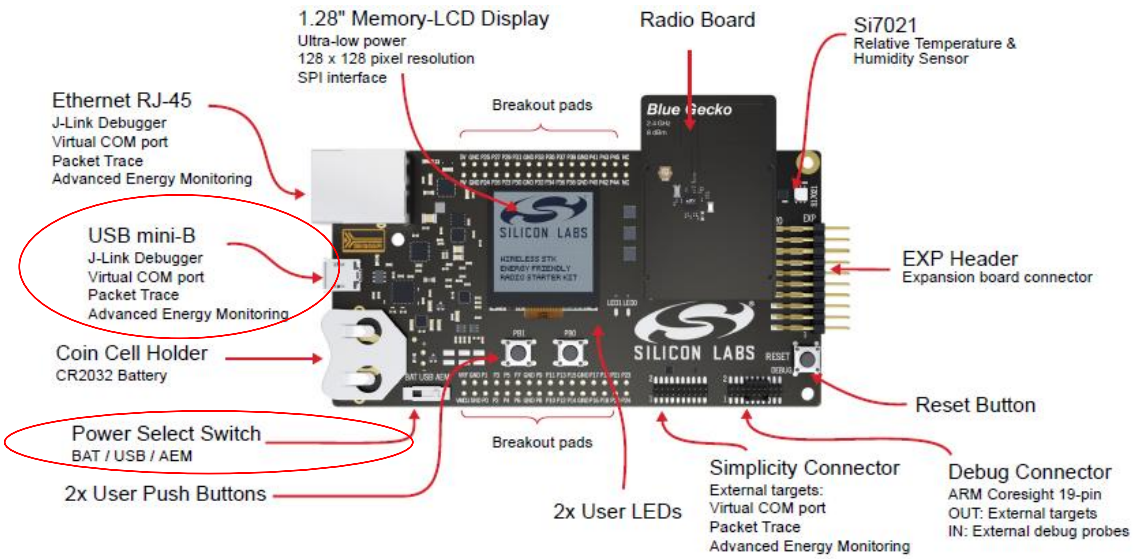
Objective: Install and become familiarized with the Silicon Labs' Simplicity Studio development environment

Due: Wednesday, January 24th, 2018 at 11:59pm

Instructions:

1. Install Silicon Labs' Simplicity Studio 4 development environment. You can download the software from the following site:
    a. http://www.silabs.com/products/mcu/Pages/simplicity-studio.aspx
    b. Insure that you select all EFR32 files as a minimum

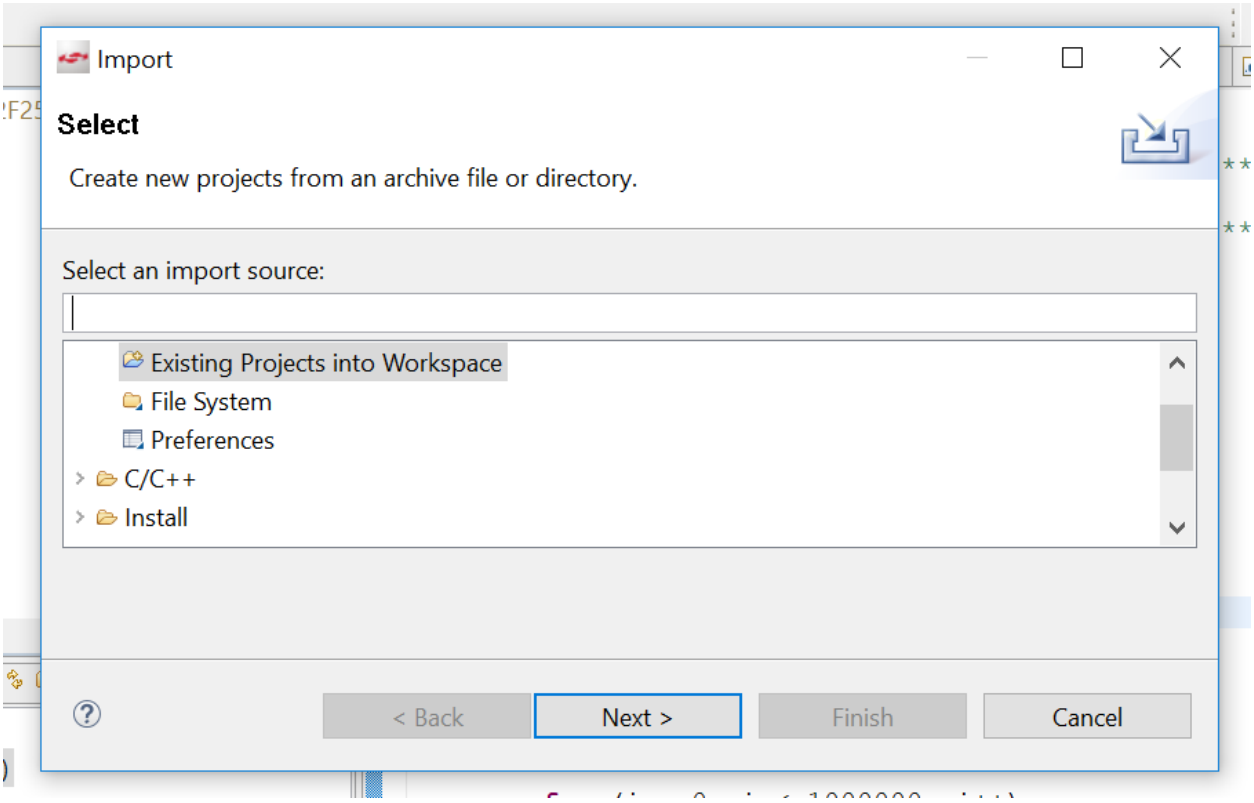
2. Connect your Silicon Labs' Blue Gecko SLWSTK6101C starter kit, USB Interface, to the computer with the BGM121 module connected to it. No extension board should be attached.



Silicon Lab SLWSTK6101CUser Manual

3. Insure that the Power Source Select is to the AEM position

4. Select Import… under file, and highlight Existing Projects into Workspace before clicking on Next



5. Select the radio dial “Select Archive File:” and browse to select the downloaded archive project file for this exercise, LED_Blinking. Then click on Finish. Now, the demo / example project should be loaded into your workspace.

6. Expand the LED_Blinking project and then open up the /src folder. Open up the gpio.h file and complete the following #define statements by tracing the trace from the LEDs to the Blue Gecko

    a. #define LED0_port
    b. #define LED0_pin
    c. #define LED1_port
    d. #define LED1_pin

7. Now, click on build to build the project and under the Run pull down menu, select “Profile.”

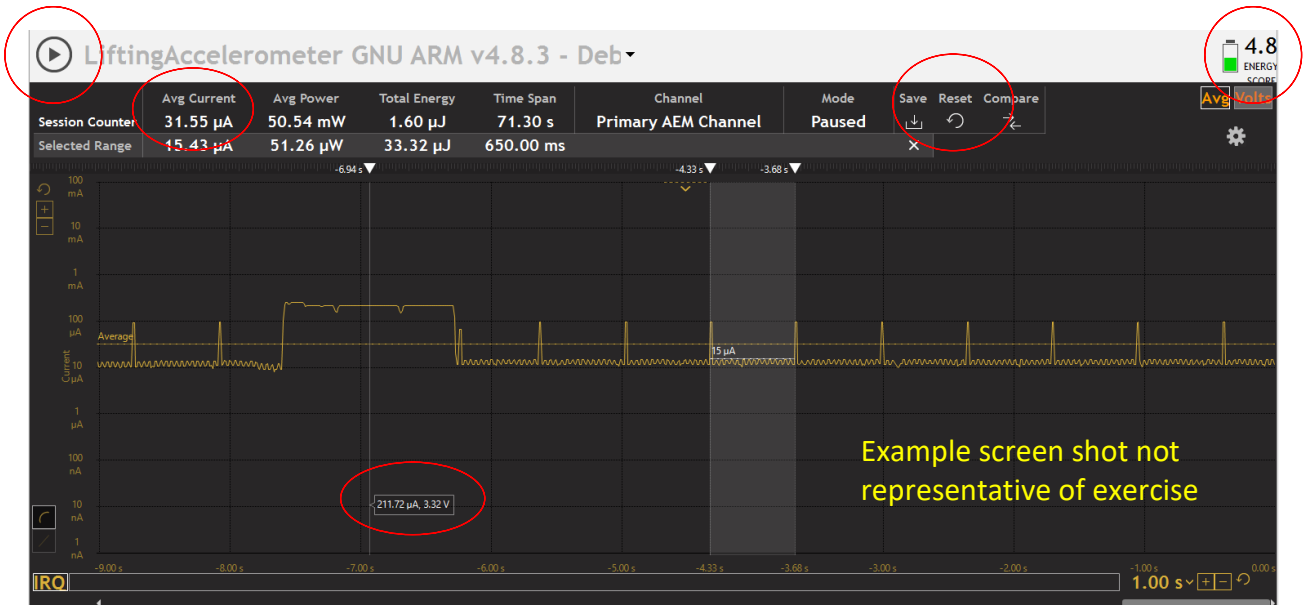
    a. Simplicity IDE should begin to compile the project, and then download and flash the code into Blue Gecko on the SLWSTK6101C
    b. After flashing the microcontroller, the code should begin to run, and the LED on the SLWSTK6101C should begin to flash
    c. Simplicity should now open the Energy Profiler

8. In the Energy Profiler, click the pause button towards the upper left corner.

9. Click once somewhere after the program has started. Towards the bottom of the marker, the instantaneous current measurement can be found.

10. Click the play button towards the upper left corner to restart the Energy Profiler measurements.

11. Towards the right end of the session counter, click on the counter clockwise arrow to reset the session counters and the Energy Profiler score. Wait 30 seconds after resetting to determine the Energy Score and average current



12. Pausing the Energy Profiler, without zooming in, use the instantaneous current measurement to determine how much current of a single LED draws.

13. In gpio.c, comment out these lines of code:
    a. GPIO_DriveStrengthSet(LED0_port, gpioDriveStrengthStrongAlternateStrong);
    b. GPIO_DriveStrengthSet(LED1_port, gpioDriveStrengthStrongAlternateStrong);

14. In gpio.c, uncomment out these lines of code:
    a. GPIO_DriveStrengthSet(LED0_port, gpioDriveStrengthWeakAlternateWeak);
    b. GPIO_DriveStrengthSet(LED1_port, gpioDriveStrengthWeakAlternateWeak);

15. Pausing the Energy Profiler, without zooming in, use the instantaneous current measurement to determine how much current of a single LED draw at the lower output current setting.

16. Now go back into the Simplicity IDE, and comment out the following line of code in the main.c routine
    a. GPIO_PinOutSet(LED1_port, LED1_pin); => //GPIO_PinOutSet(LED1_port, LED1_pin);

17. Now click on Run for Simplicity Studio to compile, flash, and start the updated program.

18. click on the counter clockwise arrow to reset the session counters and the Energy Profiler score. Wait 30 seconds after resetting to determine the Energy Score and average current.

Questions:

In a separate document to be placed in the drop box with the program code, please answer the following questions:

1. How much current does a single LED draw when the output drive is set to “Strong” with the original code?

2. After commenting out the standard output drive and uncommenting “Weak” drive, how much current does a single LED draw?

3. Is there a difference in current between the answers for question 1 and 2? And, explain your answer, why or why not?
    a. Due to measurement accuracy, a difference is defined as currents measured with a difference greater than 75uA

4. Using the Energy Profiler with “weak” drive LEDs, what is the Energy Score and average current measured before commenting out turning on LED1?

5. Using the Energy Profiler with “weak” drive LEDs, what is the Energy Score and average current measured after commenting out turning on LED1?

Deliverables:

In the D2L drop box for this assignment, please include two files:

1. Answers to the 5 assignment questions

2. Modified sample program with all modifications made (set to a single LED and “weak” drive)

a. Export the project and submit the .zip file via the D2L drop box