EECE-321
Embedded Systems

Report on BLE Lab #3:IoT Sensor-Based System Design

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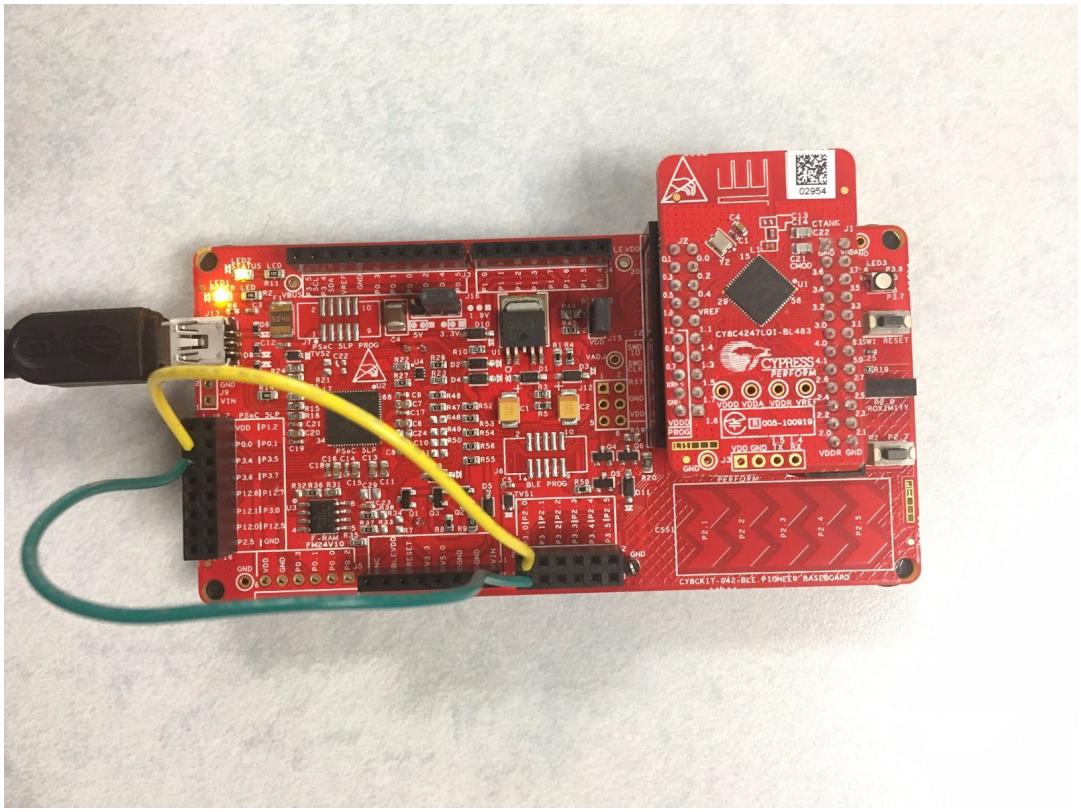
Introduction

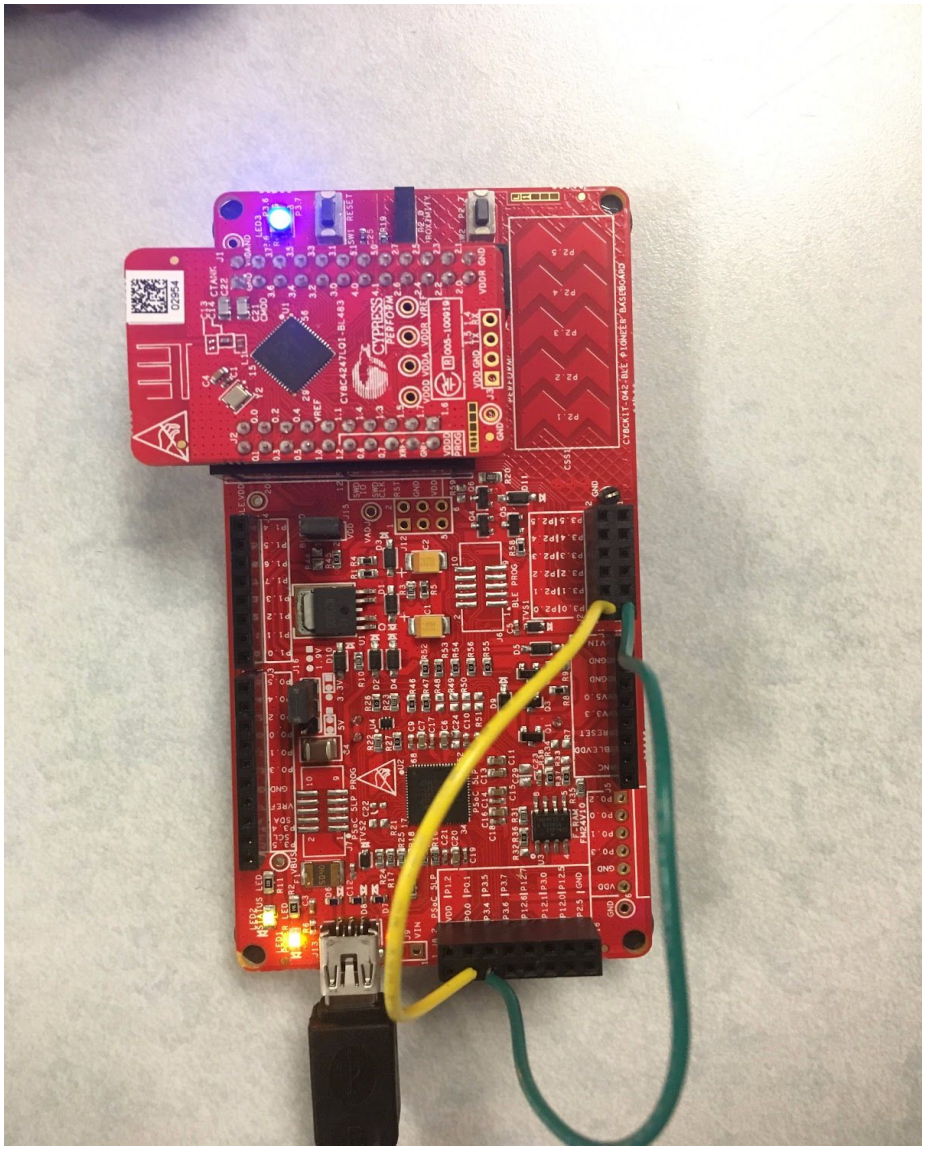
The purpose of this lab is measure simulate heart rate using the Programmable Analog Blocks. Then implement a Heart Rate Profile and send the data via BLE. The final exercises include optimizing the design for low power consumption using Sleep, Deep-Sleep & Hibernate modes.

Procedure

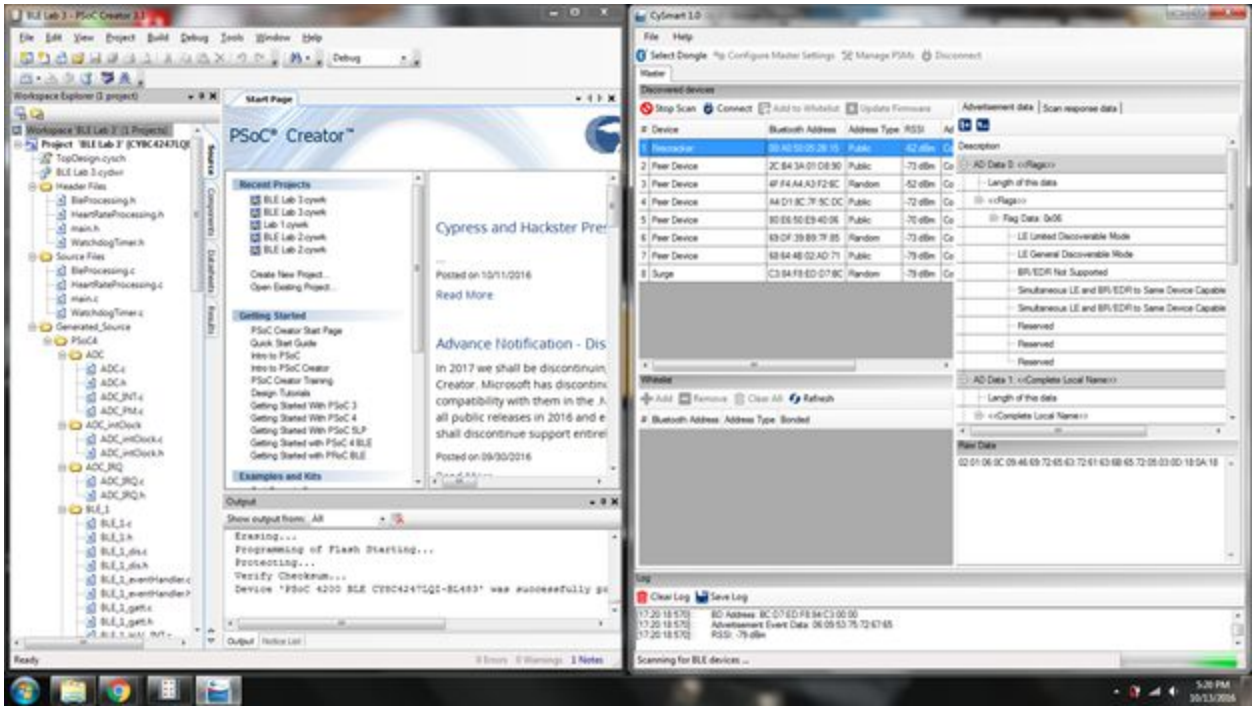
Open Your lab 3 Ble File, and create a BLE Component. Configure it according to steps 1 - 6, and then proceed to create an Opamp Component while using steps 7 - 10 to configure that. After configuring both create a SAR ADC Component and configure it using steps 12 - 15. After Configuring your Components you add any other necessary parts and connect the Components then Build the project to generate source files. The next step it to turn on the circuit board in bootloader mode, then attach any necessary wires. The Bootloader host tool then needs to be configured. Then we insert our BLE-USB Bridge and open Cysmart 1.0 to connect to our device. We then observe the heart rate data generated by the circuit when SW 2 is and isn't pressed. We then disconnect from Cysmart 1.0 and connect instead to the cysmart mobile app to again observe the heart rate data that is created. Finally we disconnect from the mobile app and restore our PSoc firmware to its default settings to complete the lab.



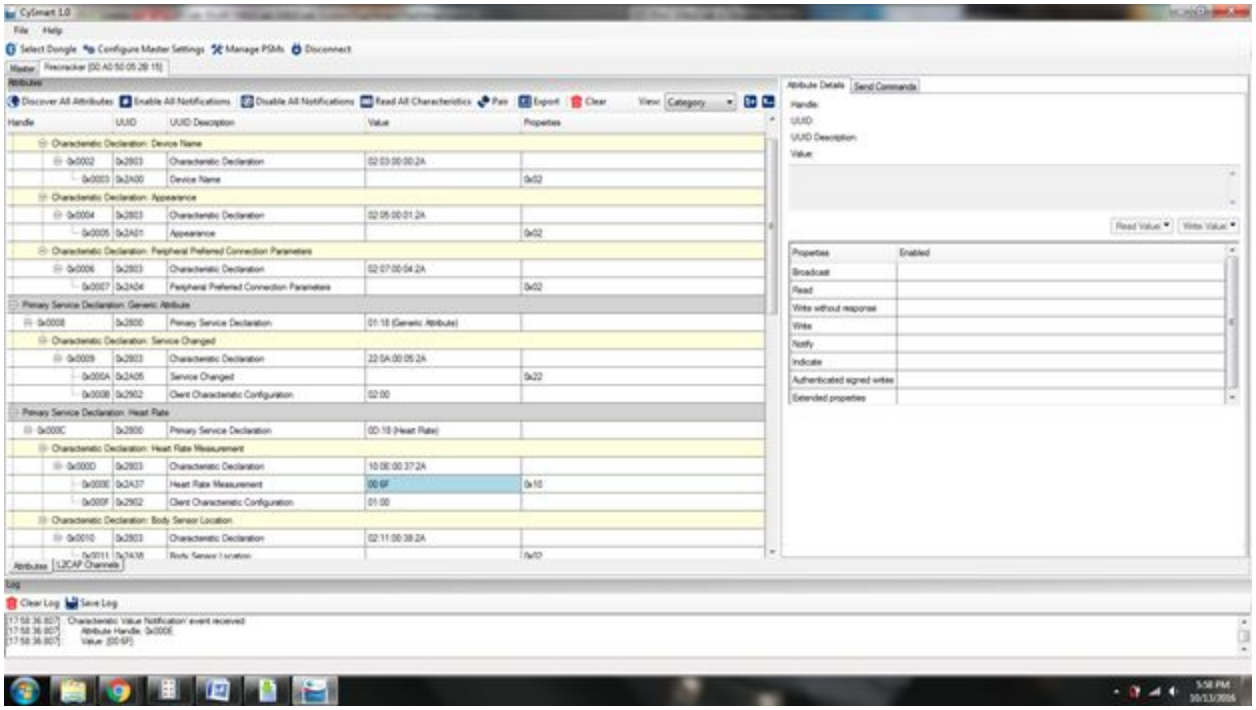
Here we turned on our circuit board in bootloader mode. Led 2 commenced blinking at a regular interval for the duration of bootloader mode



LED 3 that was previously green has turn blue signaling that the circuit board is now connected to another bluetooth device.



After we inserted the BLE-USB Bridge, we opened up Cysmart 1.0 in order to scan for our device named Firecracker.



Upon Connecting to our device (Firecracker) we noticed that the Heart Rate Measurement value constantly changing. Pressing switch 2 also caused the value to the Heart Rate to fluctuate even more drastically.

●●○○○ MetroPCS 18:02 53%

Heart Rate

101 bpm

Sensor Location :

Other

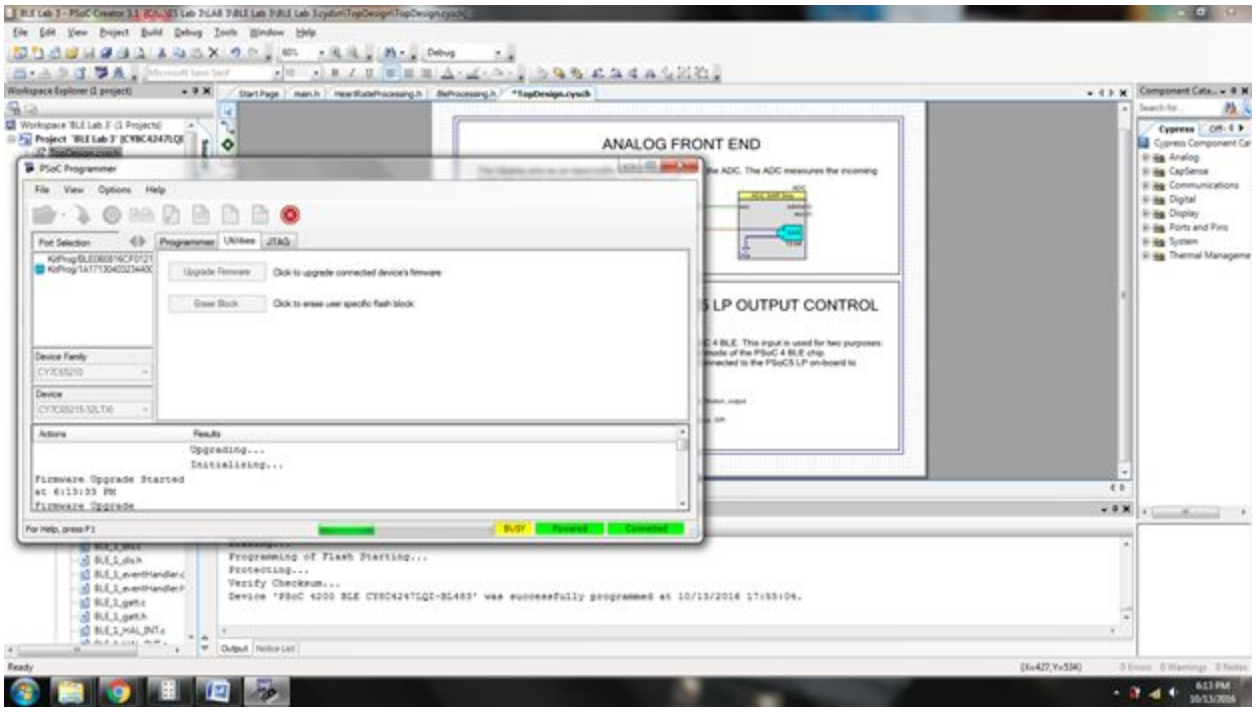
0 kcal

Energy Expended

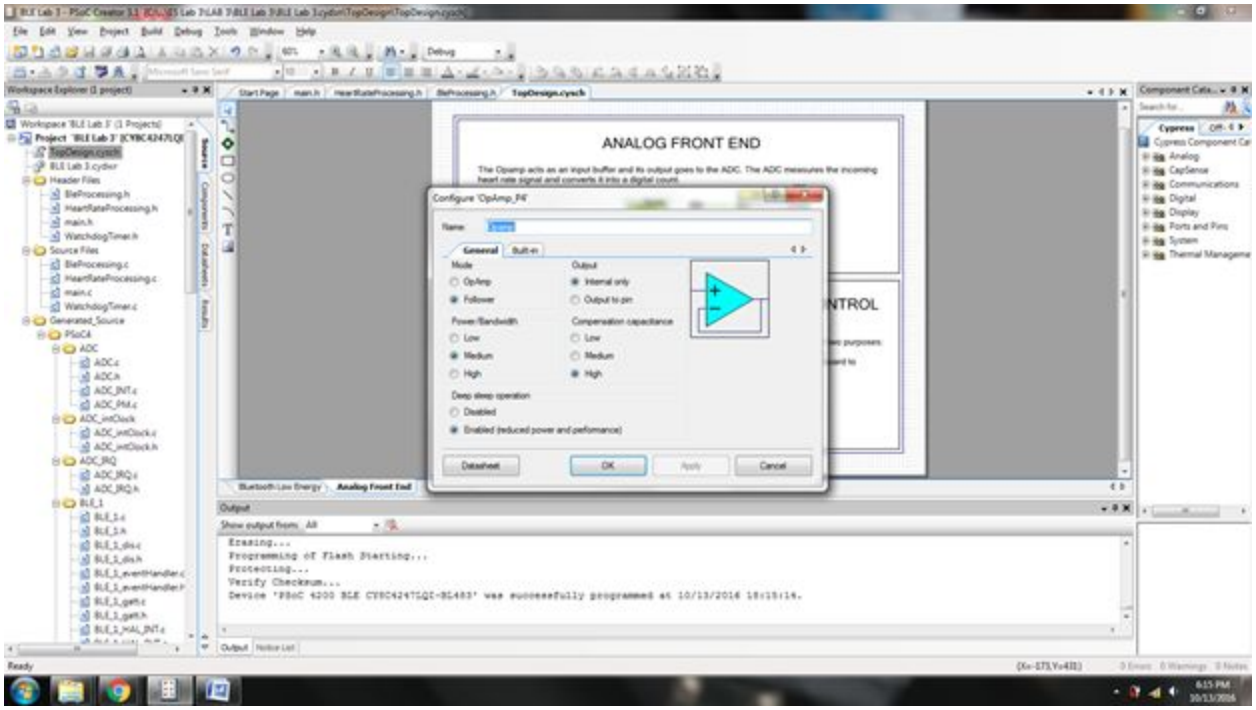
s

RR- Interval

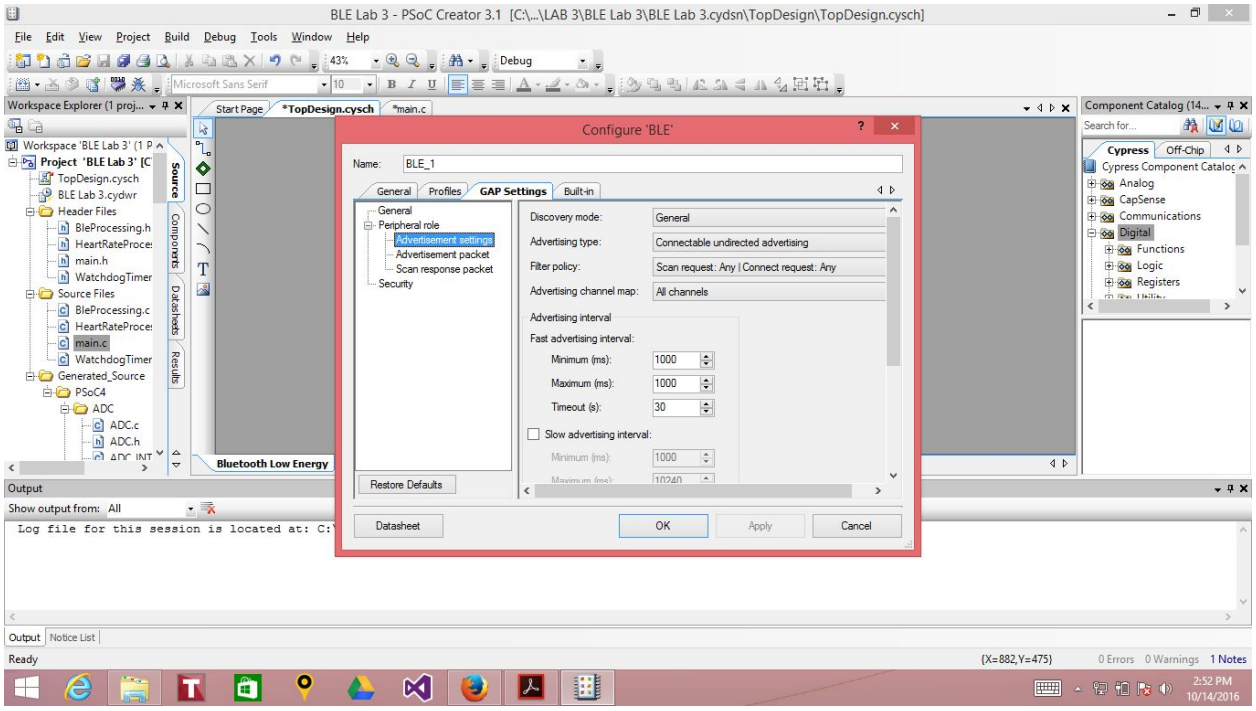
After disconnecting the device and resetting it, we then connect to the CySmart mobile app. We observed the measured heart rate value being transmitted by the circuit board, and the pressed SW 2 in order to change the value.



After we finished observing the Heart Rate Measurements changes we disconnected from the Cysmart mobile app and proceeded to restore the default firmware to PSoC 5.



Additional Exercise 1- We selected the Opamp then changed its deep sleep operation settings so that it now functions with lower power settings.



Additional Exercise 2 - We changed the time interval to 1 second on the BLE Component.

Conclusion:

In conclusion, this lab taught my group how to create a heart rate sensor that was able to harvest the date it collected and stored for the heart rate, and send it to another bluetooth device that was connected to it at the time. We tested our sensor twice by connecting to the BLE device, using not only our computers but our smartphones as well. This lab has helped teach us about the many capacities of bluetooth and why it differs so much from its other wireless counterparts.