CSE466 LAB 5 – SimpliciTI Networks

AUTUMN 2011

OBJECTIVES

In this lab you will DO the following:

- Use the Amber AM8423 module to communicate with the Chronos sensor watch.
- Control an RGB LED using the data received from the watch accelerometer.

lab you will LEARN the following:

- How to configure and use the SimpliciTI wireless networking stack from TI.

DELIVERABLES

At the beginning of the next lab period you will demo your working system to the TA.

Prior to the beginning of your next lab period, you will turn in the following to the course dropbox:

- Your fully commented and neatly presented code, in a zipped format

RESOURCES

These documents and web resources will be useful in completion of the lab and/or in answering the questions posed.

- [MSP430F2274 Datasheet](#)
- [MSP430FX2XX Family User's Guide](#)
- [MSP430 Code Examples](#)
- [MSP430 Software Coding Techniques](#)
- [eZ430-F2013 User's Guide](#)
- [Code Composer Wiki](#)
- [MSP430 Optimizing C/C++ Compiler User's Guide](#)

PART 1: TESTING THE CHRONOS WATCH

Before attempting to interface with the Chronos watch using the Amber AMB8423 wireless module, you will verify that the watch is properly programmed by running TI's Chronos demonstration application. This application uses the USB radio dongle which ships with the Chronos to receive accelerometer and other sensor data from the watch.

PROCEDURE:

1. Determine whether the Chronos software package is currently installed by looking for "eZ430-Chronos" in the Texas Instruments start menu folder.
2. If the Chronos software is not installed, download and install it from http://www.ti.com/litv/zip/slac341b
3. Connect the USB radio dongle (access point) to your computer, and start the Chronos Control Center from the Start menu.
4. Press the "Start Access Point" button on the "SimpliciTI Acc/PPT" tab of the Chronos Control Center
5. Press the down arrow button on the watch to start wireless communication.
6. If the watch is operating properly, you should observe streaming accelerometer data on the X/Y/Z plots in the Control Center.

PART 2: CHRONOS TO AMBER COMMUNICATION

In this section you will be working with the AMB8423 radio module. This module is very similar to the popular eZ430-RF2500, but uses a CC1101 radio IC in place of the CC2500 used on the eZ430-RF2500. The two ICs are capable of operating in different frequency bands, and the reason you will use the AMB8423 is because it can operate in the same 915 MHz band as the Chronos watch and can therefore communicate with the Chronos.

A demonstration SimpliciTI application is available for the eZ430-RF2500 which behaves similarly to the Chronos USB radio dongle, gathering data from a wireless sensor. You will be reconfiguring this application to work with the AMB8423, which will allow you to receive data from the watch.

You will need the EZ430-RF2500 Sensor Monitor Demo application from TI: http://www.ti.com/litv/zip/slac139f

PROCEDURE:

1. Download and unzip the Sensor Monitor Demo.
2. Open CCS and set your workspace to the …Embedded/CCS/ folder of the Sensor Monitor Demo.
3. Import the project which exists in that directory (Project -> Import Existing CCS/CCE)
4. Switch to the Access Point build configuration and ensure that the project successfully builds as-is (no modifications).
5. Right-click on the project and select "Build Properties". In the "Tool Settings" tab, find "predefined symbols". Change the symbol MRFI_CC2500 to MRFI_CC1101.
6. Copy the smartrf_CC1101.h file provided on the course website into the following directory inside the demo project folder: "…/Embedded/CCS/Code/Components/mrfi/smartrf/CC1101/smartrf_CC1101.h"
7. Give your Amber module a unique ID by opening "config/AccessPoint/smpl_config_AP.dat" and changing any or all of the numbers in THIS_DEVICE_ADDRESS.
8. Modify the function processMessage() to extract the X,Y, and Z acceleration data sent by the Chronos watch:
   X_accel = msg[1]; Y_accel = msg[2]; Z_accel = msg[3]
9. Use the Board Support Package (BSP) functions to light an LED based on the value of the Z acceleration. You will need to get rid of other calls to the BSP LED functions that exist elsewhere in the demo.

PART 3: RGB LED CONTROL

In this section you will implement a wirelessly controlled color changing light effect. Accelerometer data from the watch will be used to change the color of an RGB LED connected to the AMB8423. The manner in which the light color is affected by the watch motion is up to you.
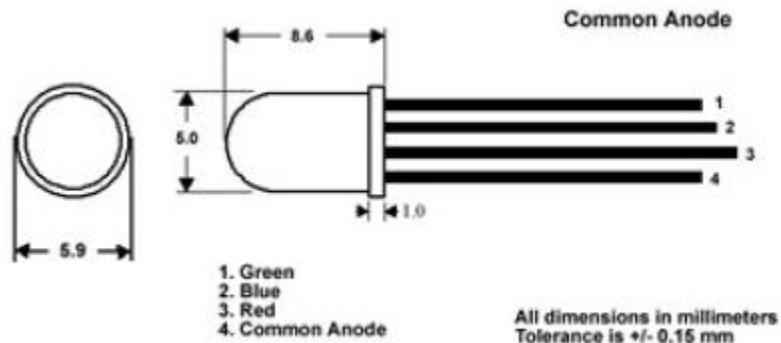
As always, you will need to connect a current-limiting resistor to each element of the LED. To maintain the same brightness for each color segment of this RGB LED, you will use carefully selected resistor values:

RED: 560 Ohm
GREEN: 300 Ohm
BLUE: 300 Ohm

Note that the device is common anode, which means that the anode connection is shared among the three elements of the LED. You need to connect the anode to the positive supply rail, and each cathode to a resistor and then a pin of your microcontroller.

OPTIONAL EXTRA CREDIT: ALTERNATE DISPLAY

To add extra functionality to your receiver, pick up a bargraph, 7-segment, or other LED display from the TA and connect it to the Amber radio module. Display some or all of the received acceleration data in an interesting format.