CMPE 121L: Microprocessor System Design Lab

Fall 2015

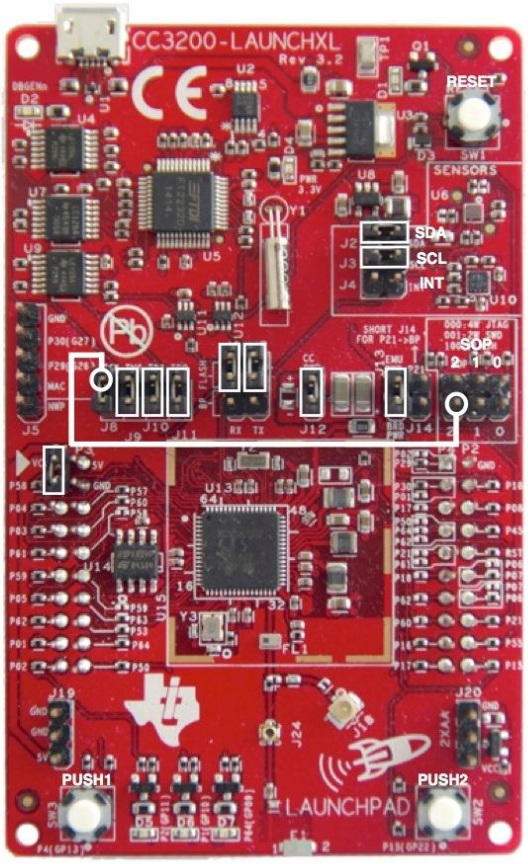
Using the CC3200 WiFi LaunchPad for the Connect4 Game Project

This document describes how to use the CC3200 cards to set up a communication link between two players and to exchange moves between them over a WiFi network.

Configuring the CC3200 Cards

The software for the CC3200 is provided to you so you only need to develop the code for the PSoC-5 to send commands to it through its UART. Once configured, you will not need to reprogram the CC3200 cards.

Before using the card, install jumpers on the board as shown below:



This involves soldering or wire-wrapping a long wire between two jumper posts as shown above. Also, the UART RX and TX jumper positions shown are for connecting the serial

port of the card to the USB link. This facilitates programming and testing the card, but after the board is programmed the jumpers must be moved to their alternate positions to enable connecting the PSoC-5 UART to the board.

To program the software needed for game playing into the board, you need to use the *Energia* tools. These are installed only on some of the machines in the lab.

- On the lab machines, go to the directory C:/energia and click on the energia executable.
- Open the sketch in C:/Connect4_WiFi.
- Connect the CC3200 board through the USB cable.
- Under Tools, Board, set the board type to CC3200.
- Under Tools, Serial Port, set the COM port to the one used by the USB link to the board.
- Click on the Upload button to program the board.

After the board has been programmed, click on the white reset button. The red LED will flash for a while, indicating that the board is attempting to connect to the WiFi Access Point and acquire an IP address. A solid red indicates the board has connected to the AP and is ready for use. Now move the serial port RX and TX jumpers so that the PSOC-5 UART can connect to them.

Setting up the WiFi Link for Game Playing

Playing the game through the WiFi network requires setting up a communication link between a pair of players. This involves sending a sequence of commands to the CC3200 cards as described below. The messages used for setup are all text-based. To monitor the progress of the connection, it is recommended that you set up a USB-UART link in the PSoC to forward all data transmitted to the CC3200 and received from it to a terminal window on the PC.

When the CC3200 board is powered on or reset, it will first connect to the AP and acquire an IP address (which may vary each time it connects). During this phase, the CC3200 will send status messages and will also communicate its IP address. To see the format of these text messages, have the PSoC-5 forward all the data received from the CC3200 through the USB serial link to a terminal application running on the PC. Your PSoC-5 code needs to capture the IP address for use as player id.

Once the IP address has been acquired, you need to send a command to the CC3200 board to advertise your presence to other players on the network. This is done by transmitting the sequence

```
advertise player-ID
```

where `player-ID` is an ASCII string (8 characters of less) you can use to identify yourself to others.

(A newline character should be transmitted at the end). You will then receive an OK response from the CC3200. Once this step has been completed, the CC3200 will start to send periodic advertisements of your status to all the players on the network.

```
Player VARMA ready, IP address = 192.168.1.111
```

These messages repeat every 5 seconds. You will also receive advertisements from all the other players on the network who are ready to start a game. You can then select a player from these advertisements and connect to his/her IP address by sending the command

```
connect 192.168.1.111
```

All the characters must be sent as ASCII text (for example, 192 is a sequence of three ASCII characters 0x31 0x39 0x32). A newline character should be sent at the end.

When your connect request is accepted by the other player, both will receive the following message from the CC3200 attached to their respective boards:

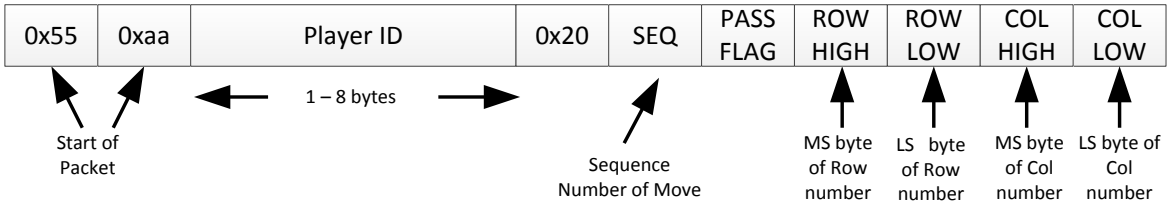
```
Connected to IP address  xx.xx.xx.xx
```

where xx.xx.xx.xx is the IP address of the remote player. At this point you will stop sending and receiving advertisements.

You can then start playing the game. Each move must be sent to the CC3200 encapsulated in a command as follows:

```
data <move> \n
```

where the data token (in ASCII text) tells the CC3200 that the following characters need to be transmitted to the remote player over the WiFi network. <move> is the entire contents of the packet as defined in the project description:



To disconnect from the emote card at the end of a game, send the following string to the WiFi card:

```
disconnect\n
```

You can now advertise yourself, connect to a different card, and play a new game.

Order of Play

There needs to be a rule to determine who makes the first move when the players get connected. On the WiFi network, the rule is that the player with the lower IP address starts the game by making the first move. For this, the IP addresses must be compared as unsigned 32-bit numbers: for example, 192.128.1.1 is represented as 0xc0800101.