CENG 3131: Lab for Telecom & networks – Lab 7
UART Temp Readings Using MSP 430 Launchpad

Goals: Introduce the students to UART communication using MSP 430 Launchpad.

1. Introduction

In telecommunication, Universal asynchronous receiver/transmitter(UART) is a computer hardware device for asynchronous serial communication in which the data format and transmission speeds are configurable. In this lab, we will implement UART TX and RX using MSP430 Launchpad and watch the temperature results in computer terminal.

You need to install the software in our own computer.
Download and install:
Code Composer Studio 6.2.0 from TI. You may need to register. Only MSP430 is required when installing.
PuTTYtel: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

2. TASK 1: Learning UART

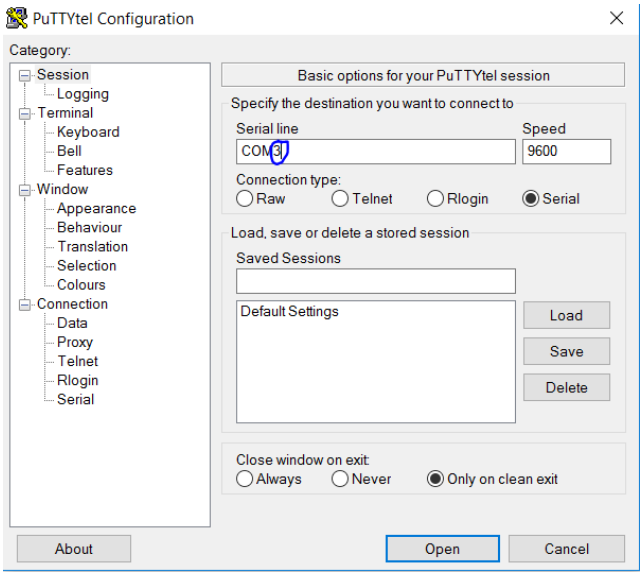
Review asynchronous and synchronous communication, and previous lab (I2C). Then answer the questions below:

1. What is UART? What is the difference between UART and I2C?
2. What are the differences between Software UART and Hardware UART?
3. Review the asynchronous character waveform. Draw an ASCii **A** waveform in your lab book, assuming 1 stop bit and no parity, TTL levels and 1200bps.
4. Review the EIA 232 interface standard. Draw an ASCII A as in step 3, but use EIA 232 voltage levels.

3. TASK 2: Create simple UART TX/RX example.

In this lab, we will use hardware UART.

1. Please change the jumper to HW UART setup. See on the board.
2. Create a new ccs project with target msp430g2553 chip. (project type msp 430 if asked.)
3. Copy the given code and replace your main.c code. **Finish** the given sample code in **red**.
4. Build the code and make sure no error is shown up.
5. Open PuTTYtel in your computer. Setup to serial port and speed to 9600. Make sure you have the correct com port number.



6. Debug it. In debug mode, click the little green resume arrow  .

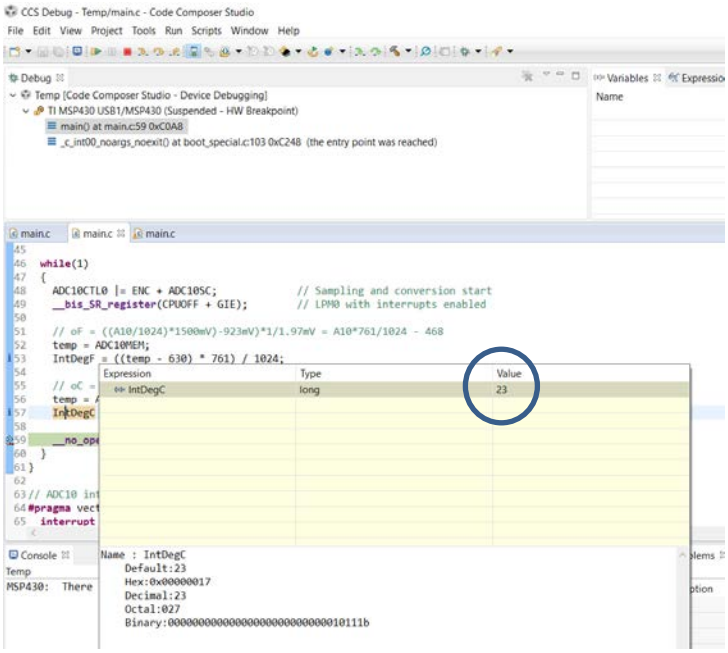
Report:

1. In your report, please take screen shot of what you have observed on PuTTYtel.
2. Explain what is the functionality of this UART code.

4. TASK 3: Temperature Sensor in MSP 430 Launchpad

Try to read the temperature sensor in MSP 430 Launchpad in debugging mod. The temperature sensor is already built inside the board.

1. Load the sample code 2 in a new project.
2. Debug the code. Double click the line (‘`__no_operation();`’) to set a breakpoint.
3. Move your mouse to variable `IntDegF` or `IntDegC` to see temperature.



Report:

1. Show the result in debug mod. What is the room temperature?

5. TASK 4: Send Temperature to Computer through UART

In this task, we will combine the previous two samples into one code that can read the temp sensor and send the value to computer.

1. Create a new project and finish the sample code 3. You need to fill code in red.
2. Debug and see the value in PuTTYtel like in Task 1.
3. Monitor the temperature.

Report:

1. Please attach your completed code 3.
2. Please screenshot your PuTTYtel output.
3. Please move your board to hot area (e.g. near the fan of computer) to see the change of the temperature (record a high temp e.g. > 35c or 95). Redo the PuTTYtel output again.

6. Laboratory Report

In no later than 7 days from the starting time your lab section, provide the TA a hard copy of a lab report following the CENG 3311 Lab report Template given on the Black Board. You can write it down to the lab book or include your report in lab book. Each student will submit one lab report to the TA. Your report should have the reporting requirements needed for all tasks. **The TA will take off a significant number of points if your does not follow the lab template.**

7. GRADING POLICY

1. Completion of Task 1 with results included in lab report (20%)
2. Completion of Task 2 with results included in lab report (20%)
3. Completion of Task 3 with results included in lab report (20%)
4. Completion of Task 4 with results included in lab report (30%)
5. Completeness, quality, and correctness of the lab report (10%)