Lab 4: ADC and UART

CS308- Embedded Systems Lab
E.R.T.S. Lab I.I.T. Bombay

Lab Objective:
This lab will introduce you to the use of:
1. ADC (Analog to Digital Converter)

2. Serial communication (UART)

Prerequisite:
1. C programming and understanding microcontroller.

2. Basic I/O programming and RGB LED interfacing.

3. Read ADC and UART tutorial (provided in Lab-4 folder) before start.

Note: Please make a new project using the steps you used in Lab-0.

Problem Statement:

Write a code to indicate temperature of TIVA board using in built ADC, in built temperature sensor and serial communication (UART).

Procedure:

Test 1:

1. Make new project in CCS
2. Write a code to Read sensor value form in built temperature sensor
3. Send the temperature value to serial terminal of computer in given format
   `Current Temperature XX °C`

Note: You can use minicom or screen in Linux any other serial terminal software with which you are familiar.

Test 2:

1. Follow the same procedure as described in Test 1 to read the temperature sensor value.
2. Modify the code for temperature controller with two modes: **Temperature Monitor Mode** and **Temperature Set Mode**.
3. When program starts, controller should be in the **Temperature Monitor Mode** with default Set Temperature of 25ºC. (Hint ASCII value 167 corresponds to ‘º’ symbol)
4. **Temperature Monitor Mode**:

a. In this mode print the current and set point temperature in the serial terminal every 1 second in the following format:
   `Current Temp = 25 °C , Set Temp = 30 °C`

b. In monitor mode if Current temperature is less than Set temperature Green LED should glow else glow Red LED.

5. In serial terminal, when user press ‘S’ key controller goes to **Temperature Set Mode**.
6. In **Temperature Set Mode**:
   a. User is asked for entering the Set temperature with following line:
      `Enter the temperature : <User Input>`

   b. When temperature is entered successfully print the following line for acknowledgement and goes back to **Temperature Monitor Mode**.
      `Set Temperature updated to XX °C`

Demo and Submission

1. For Test-1 Temperature value should be update on PC serial window after 1s delay.
2. For Test-2 show the output by setting various temperature for controller.