EE-712 Embedded system design
Lab2 - Parallel IO and basic operations in Assembly

Aim: To interface switches and LEDs to the parallel ports of the TivaC board and to perform some basic operations on the inputs and give proper output using Assembly programming.

Program is to loop for reading the inputs and displaying the outputs. TivaC break out board is provided with 4 switches that are connected to port pins PA.2 to PA.5. Use these 4 switches to take the input.

Task flow:

1. Input and output are of 16 bits. Let's say X15X14....X0 is input and Y15Y14....Y0 is output. Operation to be performed is given by X15X14, operand1 is given by X13X12..X7 and operand2 is given by X6X5..X0.

2. Input from the 4 switches should be taken for 4 times to form 16 bit data using the protocol mentioned below.
   (a) A notification of the board ready to accept new data should be given by glowing any of the LED connected to port F.
   (b) After the LED is on, user should set the switch position to give input.
   (c) SW1/2 of the port F should be pressed to indicate the board to accept the data.
   (d) LED should be made off and the data read from switches should be saved.
   (e) After a delay, LED is made on and the process repeats.

3. Operations:
   (a) When X15X14=00, whole input is copied to the output.
   (b) When X15X14=01, Y15Y14=01, Y13Y12..Y0= X13X12..X7+ X6X5..X0.
   (c) When X15X14=01, Y15Y14=01, Y13Y12..Y0= X13X12..X7 - X6X5..X0.
   (d) When X15X14=01, Y15Y14=01, Y13Y12..Y0= X13X12..X7 x X6X5..X0.

4. Output should be given 8 bits at a time to the LED array. Sufficient delay should be given between the display of MS Byte and LS Byte. Port B can be used to connect the LED array.

NOTE:

1. GPIOs on TM4C123 can be configured for 2mA, 4mA, 8mA drive strength. On reset, GPIOs are default to 2mA drive strength. While interfacing

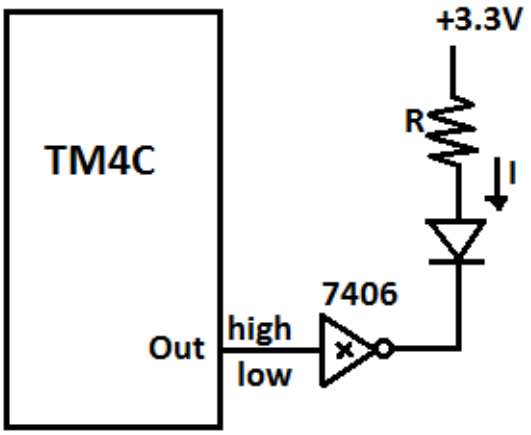

Fig 1: Interfacing of 7406 buffer with TM4C

LEDs, if the LED current is more than 8mA then we cannot connect it directly to the microcontroller pin. It may damage the chip due to high current. Use 7406 buffer to avoid accidental damage to microcontroller pins as shown in the figure above.

2. Refer to *Supporting doc for Assembly.pdf* for tips on assembly programming.