Some useful tips for Homework 1

Please go through the documents on WEL lab website http://wel.ee.iitb.ac.in/teaching_labs/ee712/supporting documents. The document *SPMU296.pdf* gives a brief overview of kit Tiva™ C Series TM4C123G LaunchPad Evaluation Board (EK-TM4C123GXL) which we are using for lab experiments. Since we are going to use switches and LED for homework 1 it is advised that you go through the *SPMU296.pdf* and know how these peripherals operate and interface to the microcontroller.

The switches and RGB LED are connected to GPIO (general purpose input/output) PORT-F. The table below is taken from *SPMU296.pdf* and it shows the port pins corresponding to RGB LED and switches.

GPIO Pin	Pin Function	USB Device
PF4	GPIO	SW1
PF0	GPIO	SW2
PF1	GPIO	RGB LED (Red)
PF2	GPIO	RGB LED (Blue)
PF3	GPIO	RGD LED (Green)

Please note that SW2 is connected to PF0 which is a special consideration GPIO pin (please refer tm4c123gh6pm.pdf). This pin is configured as a GPIO by default but is locked and can only be reprogrammed by unlocking the pin in the GPIO Lock (GPIOLOCK) register and uncommitting it by setting the GPIOCR (GPIO commit control) register. The purpose of GPIOCR is to provide a layer of protection against accidental programming of critical hardware signals including the GPIO pins that can function as JTAG/SWD signals and the NMI signal. In order to use PF0 pin as an input pin, i.e. for SW2, we have to unlock this pin. Writing 0x4C4F434B to the GPIOLOCK register unlocks the GPIOCR register. Please note that PORT-F has a base address of 0x40025000 and GPIOLOCK has an offset 0x520. Thus we have to write 0x4C4F434B at location 0x40025520. The GPIOLOCK register enables write access to the GPIOCR register. GPIOCR has an offset of 0x524 and we have to write 1 in the last bit of this register, i.e. at location 0x40025524, to unlock PF0. Please follow the steps given below to unlock PF0 and to configure the port pins.

1. Define MACROS globally before main for the base address of GPIOLOCK and GPIOCR.

```
#define LOCK_F (*((volatile unsigned long *)0x40025520))
#define CR_F   (*((volatile unsigned long *)0x40025524))
```

2. Write 0x4C4F434B to LOCK_F and GPIO_PIN_0 or 0x00000001 to CR_F after setting system clock and enabling peripherals (i.e. after SysCtlClockSet() and SysCtlPeripheralEnable()) in hardware_init function.

```
LOCK_F=0x4C4F434BU;
CR_F=GPIO_PIN_0|GPIO_PIN_4;
```

3. Set the desired pins of PORT-7 as input and output pins.

```
GPIOPinTypeGPIOOutput(GPIO_PORTF_BASE, GPIO_PIN_1|GPIO_PIN_2|GPIO_PIN_3);
GPIOPinTypeGPIOInput(GPIO_PORTF_BASE,GPIO_PIN_0|GPIO_PIN_4);
```

4. Program the GPIO pad configuration to have weak pull-up.

GPIOPadConfigSet(GPIO_PORTF_BASE,GPIO_PIN_0|GPIO_PIN_4,GPIO_STRENGTH_2MA,GPIO_PIN_TYPE_STD_WPU);

Please make the above mentioned changes in the code given to you for lab 1 and proceed with the homework.

Best luck, enjoy!!