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CPE 403

Lab 3: Initialization and GPIO

Links to videos:
Task 1: https://youtu.be/9YJYLAXSKE4
Task 2: https://youtu.be/faFTc8Zl514
Task 3A: https://youtu.be/2P_mY-SQnOw
Task 3B: https://youtu.be/-8HIcnD3A5Q

Task 1: Adding comments to original code

```
#include <stdint.h>                 //variable definitions for the C99 stan-
dard
#include <stdbool.h>          //Boolean definitions for the C99 standard
#include "inc/hw_memmap.h"          //macros defining the memory map of Tiva
C Series
#include "inc/hw_types.h"           //defines common types and macros
#include "driverlib/sysctl.h" //defines macros for System Control API of Dri-
verlib
#include "driverlib/gpio.h"   //defines macros for GPIO API of Driverlib

uint8_t ui8PinData=2;   //unsigned 8-bt int that is used to cycle through
LEDs

int main(void)
{
      //sets clock: xtal = 16Mhz,  400MHz PLL divided by 10
      SysCtlClockSet(SYSCTL_SYSDIV_5|SYSCTL_USE_PLL|SYSCTL_XTAL_16MHZ|
SYSCTL_OSC_MAIN);
      //enables PORT F
      SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOF);
      //set 3 GPIO pins conneced to the LEDs as ouputs
      GPIOPinTypeGPIOOutput(GPIO_PORTF_BASE, GPIO_PIN_1|GPIO_PIN_2|GPI-
O_PIN_3);

      while(1)
      {
            //turn on the LED specified in ui8PinData
            GPIOPinWrite(GPIO_PORTF_BASE, GPIO_PIN_1|GPIO_PIN_2|GPIO_PIN_3,
ui8PinData);
            SysCtlDelay(2000000); //delay =  2000000 * 3  = 6000000 CPU cy-
cles
            // turn all LEDs off
            GPIOPinWrite(GPIO_PORTF_BASE, GPIO_PIN_1|GPIO_PIN_2|GPIO_PIN_3,
0x00);
```

```
            SysCtlDelay(2000000); //delay =  2000000 * 3  = 6000000 CPU cy-
cles
            //set ui8PinData to the next LED color in the sequence
            //0010 (red), 0100 (blue), 1000 (green), ...
            if(ui8PinData==8) {ui8PinData=2;} else {ui8PinData=ui8PinData*2;}
      }
}
```

Task 2: Change the delay of the LED blink (approx. 0.333 sec) by changing the clock sourceand configuration – do not change the delay value – determine the CLK frequency – verify the delay to be approx 0.333 sec.

```
            .
            .
            .

      //2000000 loop * 3 CPU CYCLES = 6000000 CPU CYCLE
      //6000000/ freq = 0.333sec => freq = 6000000/0.333 sec = 18.18MHZ
      //sets clock: xtal = 16Mhz,  400MHz PLL divided by 22

      SysCtlClockSet(SYSCTL_SYSDIV_11|SYSCTL_USE_PLL|SYSCTL_XTAL_16MHZ|
SYSCTL_OSC_MAIN);

            .
            .
            .
```

Task 3: Part(a) change sequence of LEDs Part(b) blink two LEDs at an instance and in a sequence

```
uint8_t ui8PinData=8;    //unsigned 8-bt int that is used to cycle through
                         LEDs in reverse

            .
            .
            .

            //1000 (green), 0100 (blue), 0010 (red), ...
            if(ui8PinData==2) {ui8PinData=8;} else {ui8PinData=ui8PinData/2;}
      }
}
```

Task 3: Part(b) blink two LEDs at an instance and in a sequence

```
uint8_t ui8PinData= 6;  //unsigned 8-bt int that is used to cycle through
LEDs

            .
            .
            .

            //blink two LEDs simultaneously in a sequence
            if(ui8PinData==6) {ui8PinData=10;}        //  0110 (BR-purple)
            else if (ui8PinData==10) {ui8PinData=12;} //  1010(RG-yellow)
            else {ui8PinData=6;}                      //  1100(GB-aqua)
      }
}
```