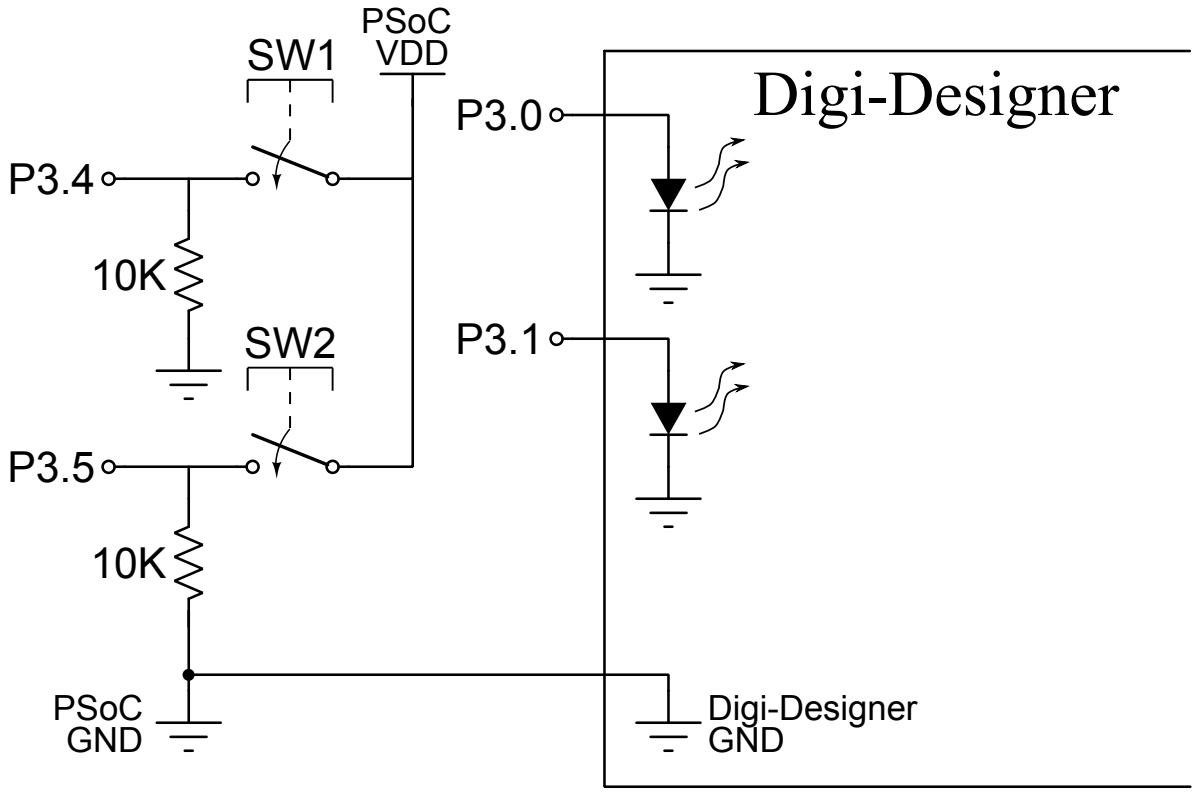
ECE381 – Lab 2 – Polling Digital Input and Hitachi LCDs

Introduction:

In the previous lab, you learned a bit about how to set up projects in PSoC Creator, as well as the very basics of Digital Output on the PSoC5. In this lab, you will learn how to read a digital input through the process of polling. Polling is continually looping to check a pin's (or pins') value to detect a change. In part one of the lab, you will poll two normally open (NO) switches with 10K pull-down resistors to detect if either one is pressed. If either is pressed, it will toggle the a corresponding LED on the Digi-Designer. Pay attention from the lecture about debouncing! If you don't know which pins connect on the switch, you can always use the LEDs on your Digi-Designer to find out (or a multimeter). In Part 2, you will use the push buttons as a volume control interface on the LCD screen.

Part 1 – Polling a Switch

Hardware Diagram:



Configuration:

- Create a new PSoC Creator project
- From "Ports and Ping" drag over a "Digital Input Pin" to the schematic. Configure the pin and change it's name to "SW1". (You don't need the HW connection unless you are going to connect it to Off-Chip components).
- Place another "Digital Input Pin" and change its name to "SW2".

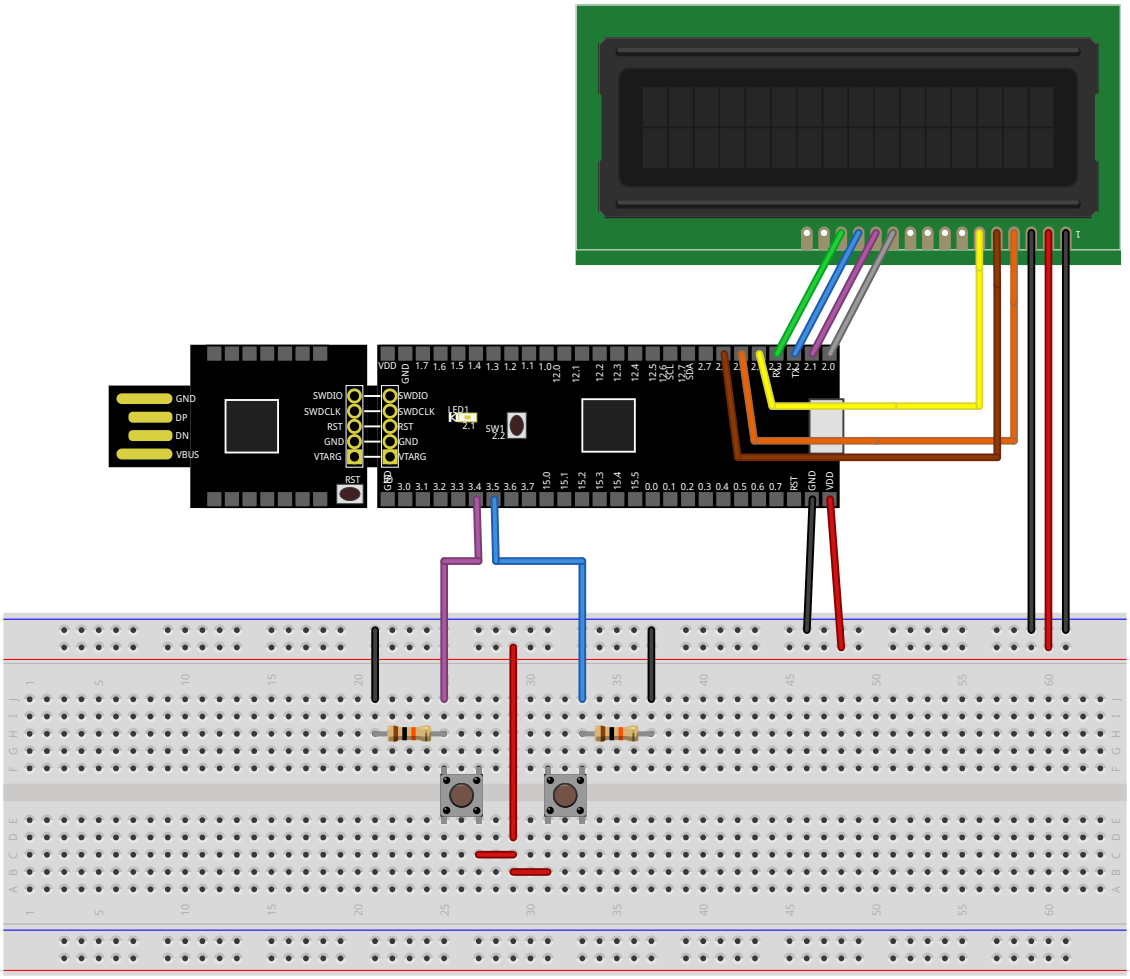
- Place two “Digital Output Pins” and change their names to “LED1” and “LED2”.
- On the left, under “Design Wide Resources”, click Pins. Assign LED1 to P3[0], LED2 to P3[1], SW1 to P3[4], and SW2 to P3[5].
- Generate the Application. (Build → Application)

Requirements:

- Write a program that repeatedly reads the value on Port3[4] and Port3[5].
- When the switch is pressed, a binary 1 will be present on the port to which it is attached.
- Your program should detect the low-to-high transition and turn on LED1 if SW1 is pressed and LED2 if SW2 is pressed.
- When either switch is released, your program should detect the high-to-low transition but not take any action.
- When a switch is pressed again, it should turn off the corresponding LED.
- In summary, your program should poll the switches and toggle the corresponding LED every time the appropriate switch is pressed.

Part 2 - Hitachi LCDs

Hardware Diagram:



Configuration

- Use the same switch connections as the first part of this lab.
- Grab an LCD from one of the old PSoC1 Eval Kits. Wire it as shown above. We will use Port2 on the PSoC5 to interface with the LCD.
- Create a new PSoC Creator project. In the schematic window, from “Display” grab the “Character LCD” and drag it into the schematic window. Rename the module the “LCD” and make sure “LCD Custom Character Set” is set to None with “Include ASCII to Number Conversion Routines” checked.
- Add your two “Digital Input Pins” named SW1 and SW2.
- Double-click “Pins” under “Design Wide Resources” to bring up the pin assignment window. Assign “\LCD:LCDPort[6:0]\” to Port P2[6:0]. Assign SW1 to P3[4] and SW2 to P3[5] as in Part 1.

Software

- Write a program that increments a count variable when SW1 is pressed, and decrements the same count variable when SW2 is pressed. The count variable should be initialized to 50.
- The count should be a uint16.
- The LCD should display the current count and update whenever the count changes.
- The LCD has two rows and sixteen columns.
- Row 0 should display text saying what the PSoC is doing (e.g. “Count”, “Incrementing”, “Decrementing”)
- Row 1 should display the count in base-16 hexadecimal and base-10 decimal.
- To figure out how to do both, go back to the schematic window, right-click on the LCD module, and select “Open Datasheet”. Go to the “Application Programming Interface” for a list of all functions for controlling the LCD (including the Optional Number to ASCII Conversion Routines
- Don’t forget, before your main loop, you have to have LCD_Start() for the LCD to be usable