LABORATORY 01: Using the AVR128DB48 Curiosity Nano Microcontroller Board and Microchip Studio 7 for Firmware Development in C

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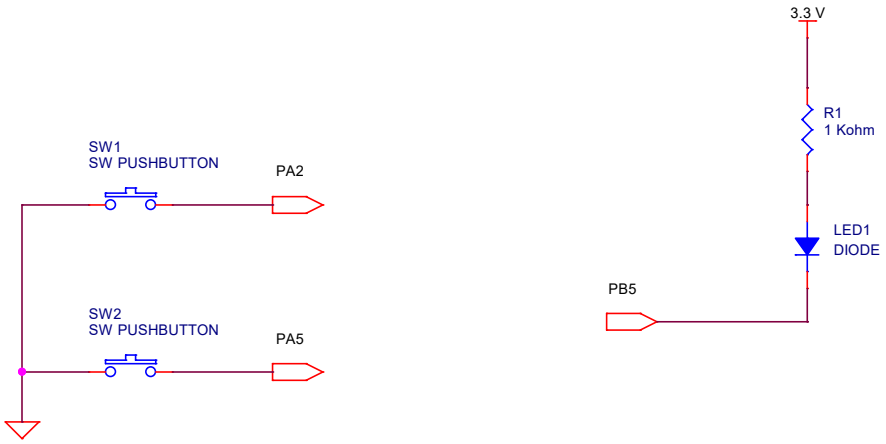
Lab Section L01

```c
/*
 * Lab 1 - Task 2.c
 *
 * Created: 1/27/2024 3:45:15 PM
 * Author : MysticOwl
 */

#include <avr/io.h>


int main(void)
{
   //INPUTS
 PORTA_PIN2CTRL = 0x08;  //enable pullup resistor for SW1
 PORTA_PIN5CTRL = 0x08;  //enable pullup resistor for SW2
  //OUTPUTS
 PORTB.DIR = 0x20;      //set PB5 as an output  for LED1
//bool Led_on = false;

    while (1)
    {
    if ( PORTA.IN == 0b00000011 )
    {

         PORTB.OUT = 0b00000000;
    }
    else
    {
     PORTB.OUT = 0b00100000;
    }
    }


}
```



Title	Lab 1 - Task 2 - Two Pushbuttons Control an LED	
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Questions

Provide a brief written answer for each of the following questions. Submit your answers at the end of your assigned laboratory section.

1. For Task 1, without the oscilloscope connected, does the program produce the same result without the internal pull-up resistor enabled as it does with the pull-up enabled? Explain your answer.

Without the oscilloscope connected, the program produced the desired result with the pull-up resistor enabled, and did NOT when disabled. The pull-up allows the LED to receive the correct voltage and current to operate. With the resistor enabled we fulfill the requirements to turn on the LED.

2. When you connect the oscilloscope and run the program of Task 1 without the pull-up enabled, does the system operate the same as when the oscilloscope is not connected? Explain your answer.

The system doesn't care about whether or not the oscilloscope is connected. The pins are left floating, and the LED cannot turn on without the resistor enabled. The oscilloscope only allows you to see the "Floating" state of the pin and doesn't connect anything important.

3. Give an explanation for why the system from Task 1, without the pull-up enabled and without the oscilloscope connected, operates the way it does.

The pull up enabled system in task one doesn't operate since the LED needs a current and a voltage to turn on. If that pull up resistor isn't present, no current flows and there is nothing to enable the LED.

4. How accurate was the 1 Hz signal at PB3 for Task 3? Compute the percent error for the signal.

.999 HZ was our output.

$$\frac{|1 - 0.999|}{|1|} \times 100$$

= .1% error.

5. If your 1 Hz signal for Task 3 was reasonably accurate, what can you conclude about the CPU's clock frequency?

The cpus clock frequency is 4000000hz , because plugging that number into the delay function (defined by avr) made the delay count accurate to the millisecond.