

Lab 9: Interrupts and Buttons in “C”

Submit button.c at the end of your lab.

I. Button Exercises: You have already used the buttons on the LCD display board in one of the previous lab setup. In this lab you will use “C” instead of the assembly language to interact with the buttons. Download button.c. This program uses the LED strip and buttons to display which button is pressed. Modify this file to incorporate (write) two subroutines (init_buttons, button_pressed) based on the given code.

Submit button.c at the end of your lab.

II. Timer Interrupts

The goal of this exercise is to use timer interrupts in “C”. In order to use the built in interrupt features you need to include the interrupt header like this: `#include <avr/interrupt.h>`. We are going to use an Interrupt Service Routine (ISR) for this purpose and need to define the ISR for timer1 overflow. For example:

```
// timer1 overflow
ISR(TIMER1_OVF_vect) {
    // process the timer1 overflow here
}
```

Download timer_interrupt.c. This program uses two timers, Timer 0 and Timer 1. Timer 0 is a 8-bit timer while Timer 1 is a 16-bit timer. They both are set to pre-scale the system clock to 1024. Our system clock is 16Mhz. When Timer 0 expires, it should blink (toggle) the LED connected to Pin 52 (i.e., PORT B: bit 1) and when timer 1 expires it should blink the LED connected to Pin 48 (i.e., Port L: bit1).

Question: What is the blink rates of these LEDs?

Submit the timer_interrupt.c at the end of your lab.