LAB #7: Timing Generation and Measurements

Lab writeup is due to your TA at the beginning of your next scheduled lab. Don’t put this off to the last minute! There is pre-lab work to complete before the start of the next lab. **NO LATE LAB REPORTS WILL BE ACCEPTED.**

1 Objectives

- To gain experience using input capture to measure pulse width.
- To gain experience using output compare to do pulse width modulation.

2 Reading

- Read Chapter 6 on timing generation and measurements.

3 Prelab

1. Write assembly code for a program that measures pulse width. Each time the pulse width changes, it should transmit the measurement out the serial port. You may use lab 2 assembly code for this purpose. You do not need to include this assembly code in your writeup. It can simply call subroutines in this code to produce the message.

2. Write assembly code for a program that reads a desired pulse width in number of cycles from the keypad terminated with a # sign. After receiving the # sign, it should output a signal with this pulse width (you may assume a fixed frequency of 32768 cycles). The main program should be able to accept a new pulse width on the keypad at any time. You should use your lab 5 code for the keyboard interface. You do not need to include that code in your writeup. Your writeup can simply call subroutines in this code to produce the message.

Each student should complete the prelab problems individually. Student solutions to these problems are due at the beginning of the lab section.

4 Lab Tasks

1. Each group should select one of their solutions to each of the prelab questions.
2. Use a frequency generator to test your pulse width measurement code.
3. Use an oscilloscope to test your pulse width modulation code.
4. Connect your circuit with the pulse width measurement code loaded to another groups circuit with the pulse width modulation code loaded, and check the results.
5. Swap codes and check again.
5 Writeup

Include the following items. In this lab, only one writeup per team is required.

1. A printout of all your assembly code.

2. Annotated scope output for your pulse width modulation code.