

ECE 376 - Homework #10

Timer1 Capture / Compare. Due Monday, November 14th

Timer1 Capture

Problem 1-5) Use Timer1 Capture to measure time to 1 clock (100ns). Some options are:

- Reflex Timer: Measure your reflex time with a resolution of 100ns
 - Start the game by pressing RB1.
 - 3-7 seconds later, the lights on PORTA turn on (time recorded with Capture1)
 - Press RB0 as soon as the lights turn on (time recorded with Capture 2)
 - The time difference is your reflex time
- Capacitance Sensor: Measure C using the circuit below. Use Timer1 Captuer to measure the period (T) to 100ns. From that, compute C.
- Temperature Sensor: Make R2 a thermistor. Use Timer1 Capture to measure the period (T) to 100ns. From that, compute R2 and temperature.
- Other...

1) Requirements: Define the inputs, outputs, and how they relate.

- Part of the requirement must be to measure time to 100ns (i.e. use Timer1 Capture interrupts)

2) C-Code and flow chart.

3) Test: Collect data in lab to verify that your interrupts are working properly.

4) Validation: Collect data to validate your design works.

5) Demo

Timer1 Compare

Write a program which uses Timer1 Compare interrupts. Some suggestions are

- Frequency Generator
 - Input a number from 100 to 999 on the keyboard and press enter
 - The PIC will then output that frequency (100Hz to 999Hz) using Timer1 Compare interrupts.
- Really accurate 8-key piano. Play notes A3..A4 when you press RB0..RB7, each note accurate to 100ns.
- Play 500Hz for 500ms, pause 500ms, then play either 500Hz or 501Hz for 500ms. See if the person can tell if the frequency is the same (press RB0) or different (RB1). Record how many times you were right.
- Other...

6) Requirements: Define the inputs, outputs, and how they relate.

- Part of the requirement must be to measure time to 100ns (i.e. use Timer1 Capture interrupts)

7) C-Code and flow chart.

8) Test: Collect data in lab to verify that your interrupts are working properly.

9) Validation: Collect data to validate your design works.

10) Demo

