EE 2920 - Week 5 Lab: ADC – Part 1

1 dedicated lab period, 2 lab periods to complete

Name:_____

Objectives

- Understand and use the integrated ADC
- Use interrupts

Prelab

	student check off
Review ADC class notes	☐
Review class notes on interrupts	☐

Assignment

Part 1:
a) Create a 0-3.3v DC voltage divider signal using a potentiometer
b) Wire the DC signal to an ADC input
c) Configure the ADC in single capture mode – no interrupts
d) Create a program to sample the voltage divider at 100 ms intervals
e) Display both the ADC code value (decimal) and the measured voltage on the LCD

> 8 lines for main
> 2 lines for pin config fn
> 9 lines for LCD setup fn
> 4 lines for ADC setup fn
> 3 lines for ADC read fn
> 4 lines for LCD update fn

EE2920 Lab5a	on line 0
ADC code =	on line 1
(the value)	on line 2
Voltage =	on line 3
(the voltage)	on Line 4

f) Characterize your design by taking 10 readings at various potentiometer settings along with measuring the voltage with a DMM. Be sure to select an appropriate range of readings

Part 2:
a) Configure the ADC in free running mode – with interrupt
Select a sampling frequency appropriate for a 5KHz band limited signal.
Be sure to document this selection
b) Generate a 0.5Hz, 0-3.3V sine wave signal using a signal generator
c) Create a program to sample the sine wave in free running mode using an ISR to collect the samples. Remember to keep your ISR as short as possible
d) Display both the ADC code value (decimal) and the measured voltage on the LCD

> 6 lines for main
> *2 lines for pin config fn
> *9 lines for LCD setup fn
> 8 lines for ADC setup fn
> *4 lines for LCD update fn
> 4 lines for ADC ISR

Check Off

You must demonstrate your working design(s) prior to the end of the 2nd lab period

- Demo your Part 1   50%   _____
- Demo your Part 2   30%   _____

Lab Report (informal)

- Due at 4:00 pm, 1 day after the second lab period – in the box outside my office
- Include this cover sheet
- Include a properly documented informal lab report.   20%   _____

Strategy

**** Create a program Flow Diagram for each part ****

** I suggest you create 2 different programs – do not overwrite prog x to make prog y **

Part 1: Wire up the voltage divider and verify operation with a voltmeter. Configure and run the ADC – checking the code values. Convert the code value to voltages.

Part 2: Modify ADC setup for interrupts. If necessary – verify interrupt operation by putting a breakpoint in the ISR during debug. The ISR is reading the ADC values – you need a loop to print the values periodically.