

## ECGR4101/5101, Fall 2013: Lab 7

### Oscilloscope

### Learning Objectives

You are to write a program that reads on a single input a signal generated by a Signal Generator instrument. This Oscilloscope applications should be as accurate as possible.

### Laboratory Assignments

In this lab you will be programming the timers and using interrupts. The LCD should display the characteristics of the measured waveform. This lab must be demonstrated to the TA.

### Requirements

- Req. 1. The code generated is written in C for the RX63N board.
- Req. 2. The code is well commented and easy to follow
- Req. 3. The board will accept a single input from a Waveform Generator instrument (in EPIC 2130/32).
- Req. 4. The provided waveform will be between 0 and 3.3 volts.
- Req. 5. The specific max voltage of the waveform should be computed and displayed on the LCD every 1 second (in text).
- Req. 6. The accuracy of the voltage should be within +/- 10%.
- Req. 7. The provided waveform will be between 0 and 100kHz for the base functionality of the exercise.
- Req. 8. The specific frequency of the waveform should be computed and displayed on the LCD every 1 second (in text).
- Req. 9. The accuracy of the frequency should be within +/- 5%.
- Req. 10. The provided waveform will be a square wave or a sine wave.
- Req. 11. The specific shape of the waveform should be identified and displayed on the LCD every 1 second (in text).
- Req. 12. The accuracy of the waveform shape is that it should be exact.
- Req. 13. Extra credit of 20 points will be given to the three teams with the highest correctly detected frequency (+/- 5%).

### Lab Report

1	LCD correctly shows sine vs. square wave at about 1kHz	
2	LCD correctly shows amplitude of the wave at about 1kHz and 2v (accuracy: )	
3	LCD correctly shows frequency of the wave at about 1kHz (accuracy: )	
4	LCD correctly shows sine vs. square wave at about 100kHz	
5	LCD correctly shows amplitude of the wave at about 100kHz & 2v (accuracy: )	
6	LCD correctly shows frequency of the wave at about 100kHz (accuracy: )	
7	Maximum frequency sensed:	

*Include in your lab report observations and procedure like the following:*

*The general learning objectives of this lab were . . .*

*The general steps needed to complete this lab were . . .*

*Some detailed steps to complete this lab were . . . .*

- 1. Step one*
- 2. Step Two*
- 3. . . . .*

*Code generated or modified to complete this lab...*

*No need to include all the files for the lab. Just include the modified code.*

*Some important observations while completing/testing this lab were . . .*

*In this lab we learned . . . .*