

University of California at Berkeley  
Mechanical Engineering

**ME 230 Real Time Software for Mechanical System Control  
Fall, 2006**

**Lab1: Introduction to LabVIEW and Analog Signal Simulation**

Assigned: Wednesday, September 06, 2006

Due: Before class, Wednesday September 13, 2006

**Objectives**

1. Create a LabVIEW program to simulate a limited function of both the HP 54503A Digitizing Scope and the HP 33120A Arbitrary Waveform Generator.
2. Familiarize yourself with the concept of simulated signals for the purpose of software development and test.

**Lab1**

This lab is fairly simple. My thoughts are to get all of you started with a very simple task. For those of you that have formed groups you may work on this lab as a group. The only problem with group development is that there is only one keyboard and in reality only one person will be programming.

To insure that everyone has an opportunity to program, it is my hope that with each of the future lab, a different group member is the lead programmer.

**Background**

Throughout this course and in the development of your final project, you will need to interact with signals from the outside world. You are all familiar with the keyboard as the input media, however some of you may not be familiar with other signals. There will be two major types of signal you will encounter in your project. Namely, **Analog** and **Digital**. This lab will focus on the Analog signal. This lab will not actually deal with real signals but rather a simulated signal. This is quite often useful for software development and test. Simulated signals are also useful when the actually hardware is not ready. This also means you can complete this lab entirely at home or in the lecture room. You may need to go to the lab once or twice to gather the features you need to program.

## Assignment

There will be six computer stations pre-wired for the lab by the end of Thursday. You will be utilizing the HP 54503A Digitizing Scope and the HP 33120A Arbitrary Waveform Generator as your reference.

As you can see, the instrument in the lab are getting old and out dated. Although they were all state of the art at some point in history, they are long overdue for an upgrade. In the spirit of virtual instruments it is your assignment to duplicate the functionality of the two instruments listed above.

You can log on to the computer in the lab:

Username: **ME230**  
Password: realtime

When you start the lab, you will find in:

C:\Documents and Settings\me230\My Documents\My ME230  
Samples\Assignments\Lab1\lab1.vi

Copy the file to a working directory that you create for your group. Part of this lab is also to train you in creating a well organize directory structure. Remember as you finish each lab you should end up with a VI that can be used in future labs as well as in your final project.

Invoke LabVIEW 8.20 and open the lab1.vi.

Go ahead and run the VI. Wait for a few seconds on some computer this may take up to 30 seconds.

You should observe that a 10 Hz sine wave of 1V amplitude appears on the chart.

Using this VI as your starting point, implement the following features:

- A) Add button(s) to change the sine wave to a triangular, square, or sawtooth waveform.
- B) Add a knob to change the amplitude of the wave. Limit the amplitude to +/- 10V.
- C) Add a second knob to change the frequency of the wave. Limit the frequency to between 0 to 10 kHz.

I leave it up to you to design the front panel. You have both of the instruments to use as a sample.

## **Deliverables**

Each group is to e-mail their final report and attached VI to my e-mail at:

[ganwar@integratedmotions.com](mailto:ganwar@integratedmotions.com)