

Physics 335, Spring Quarter 2012

Electric Circuits II, Homework Assignment 6

Lab-Project Proposal: Due Tuesday May 15

You and your partner will work together over the last two weeks of the quarter in lab on your lab project. The goal of the project is to use the PIC microcontroller to control some system or process. Your homework assignment is to talk with your lab TA and your lab partner and decide on a project, then turn in a project proposal.

You have two project options: Option A or Option B.

Option A is to choose your own project. The ideal project will use parts and components you already have around the lab. You should look in drawers, bins and cabinets to get an idea what's available. For displays, consider LEDs, 7-segment displays, and bar LEDs; we have lots of those. For input, you might consider switches of various kinds. We have 8-bit DACs and ADCs and stepper motors and photodiodes as well. If you have your heart set on a project for which we don't have the components, don't despair. You might be able to get little things at the local Radio Shack. You can also find lots of things at the EE Department storeroom. And if you're stuck, you can order parts from Digi-Key. If you need an obscure part, you're responsible for getting it. The ideal project is fun. It's also ambitious, and proceeds in phases so that if you don't get to its final phase, at least you have something interesting at an intermediate phase.

Option B is a project defined as follows: use the PIC processor and two AD7569 DACs driving the X-Y analog inputs of the oscilloscope to display lines and curves. This project proceeds in several phases. The first project phase is to simply generate a diagonal line. The second phase is to generate a square or other continuous shape made of straight-line segments. The third phase is to generate a circle. The final phase is to modify the circle display to vary the vertical and horizontal phase so as to produce a Lissajous figure.

This is an ambitious set of phases, but if you run out of time, you'll be able to stop at an intermediate project phase and still have a complete project.

(a) The homework assignment this week is for you and your lab partner to turn in a one-page project proposal, with both your names at the top of the proposal. (b) The proposal should include a hardware block diagram and description indicating how to interface the various chips (e.g., DACs), displays and inputs with the PIC. This diagram will demonstrate you have enough PIC lines to drive the various peripherals. If you use option B, show how you'll drive two 8-bit DACs from one 8-bit output port (hint: you can use bits from the port A for "chip select"). If you're choosing Option A, for each special purpose chip or component (e.g., ADC), include the relevant data-sheet. If you can't get the special chips in time, you'll need to go to Option B. (c) Also, include a flow chart of the software, this should describe how the project functions. Ensure the main program loop is described and how interrupts are processed (if you use interrupts). (d) Describe how your device functions.

A caution: Think big and small. You'll need to finish something to get a grade; ensure that even if you can't finish your big idea, there's a smaller project along the way there. Things take longer and are harder than you think.

[ver 08may12 13:30]