16.317: Microprocessor Systems Design I
Spring 2012

Lab 4: PIC Microcontroller Programming
Due **Wednesday, 4/25/12**

Introduction

Please note: Because we have a limited number of PICkit sets available, you are strongly encouraged to work in a group for this lab. You may not be able to find an available kit to complete your lab if you do not do so. I encourage those of you who have been working alone to either:

- **Speak to your classmates directly to find a partner.**
- **Post something on the course discussion board to aid in this search.**

In this lab, you will learn:

1. How to use the PICkit 1 Flash Starter Kit to compile and upload a program to the PIC microcontroller.
2. PIC microcontroller assembly language programming.

Remember that each student must generate an individual report that follows the guidelines listed in the "Lab Report Format Guidelines", and that the last page of this assignment contains a cover page each student must use as the first page of that report.

Reference

PICkit 1 Flash Starter Kit User's Guide *(Note: this guide is on the CD included with the PICkit at \UsersGuide\40051d.pdf; the course website also contains a link to this guide.)*

Part 1: Basic PIC Programming

Follow the directions in Chapter 4 of the PICkit User's Guide to run your first PIC program. You'll use the button debouncing example *(debounce.asm)*, which can be found either on the CD (\Lesson 1\Asm) or on the course schedule page.

You should be able to compile this file and program it into the chip, after which you should be able to toggle the first LED (D0) on and off using the button.

PLEASE BE SURE TO FOLLOW THE IMPORTANT NOTES BELOW:

1. **The chip you will use is the 14-pin PIC16F684 that comes with the kit.**
2. **Please use a chip socket to hold the PIC chip. Plug the socket into the development board—do not plug the chip in directly, as doing so may damage the chip or cause injury.**
3. **Please unplug the USB cord before removing or mounting the PIC chip.**
4. **Read the user's guide carefully, as it likely contains answers to most of your questions.**

Part 2: Bonus

For **20 bonus points**, modify the program to toggle the second LED (D1) instead of the first.

Check off and deliverables

To check off, demonstrate your running code to an instructor (for each part, if necessary).

I strongly suggest reading the grading rubric on the next page to ensure your program meets all requirements for this lab.

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You must include this sheet as the cover page of your lab report. Fill in your name and your partner's name (if applicable). The table below provides the grading rubric for this assignment, as well as space for an instructor to record your grade for each section.

Student name: _____ **Student ID #** _____

Partner's name: _____

Grading rubric

Item	Description	Max points	Actual points
Demo 1	Demonstrate that you were able to correctly compile and download your code to the evaluation board.	80	
Report 1	Discuss Part 1 of the lab in your report	20	
Bonus: Demo 2	Modify the program to toggle the second LED and demonstrate its correct operation	15	
Bonus: Report 2	Describe the changes you made and any difficulties you encountered while modifying the debounce.asm file.	5	
	TOTAL	100 *(120 with bonus)*	