CpE 213: Project 2
8051 ASM Programming Based Application

Goals: Design a simple, self-contained 8051-based device that will count a number of key presses. The number of key presses can be any. To detect whether the user has not pressed any more keys, check whether any key has been pressed for 1 or 2 seconds. If the count has gone above 15 'n' number of times, sound the alarm n number of times with short pauses. Display the balance count in binary on a set of 4 LEDs. Hardware will be provided for you. **Software must be written in ASM!** The alarm frequency should be in the range of 500-1500 Hz (you can choose the type of sound. It should be audible and clear). The balance count should be displayed until a switch is pressed. After that try to implement anything that you think is cool (Creative Component)! The system can be reset only on power-on. You must not use timers/counters to create delays. Use subroutines instead!

GROUPS: Working a group of 2 students is preferred and strongly advised. If you prefer to work alone you may.

PARTS: Your project will be implemented on the "Simon2" board. It uses a Philips P89LPC932A1, which can be programmed "in place" using a serial port connection and the FlashMagic programming software. 10 Simon boards are available in the closet. **The circuit schematic for the Simon2 board can be found at the "Intro to CpE" website (Link available on Blackboard).** You may check out the Simon2 board to work on your own time!

SOUND: You can generate a sound on the Simon's speaker by sending it a square wave at a frequency from a few hundred to a few thousand Hz (1000 Hz is fine). The 8051 has on-board timers that can be used for this task, but for now feel free to use internal delay loops. While calculating the frequency of sound you are generating, please double check the number of clock cycles per machine cycle used by the P89LPC932A1 – it *may* not be the same as the standard 8051 (hint). The clock frequency used on the Simon2 board is 11.0592 MHz.

DELIVERABLES AND DEADLINES:

- **Project demonstration:** Prove to me that your project works. "Cool" extras will be viewed favorably when grading your project. **Note: start debugging your project ahead of time or you seriously risk missing your deadline.**
    - Project demonstrations must be scheduled outside normal class hours. Please work with me to schedule a demonstration time. Saturdays are also possible!
    - Entire project folder: Please e-mail your entire project folder. I should be able to compile and download your program, on the Simon2 board and run it.
- **Project code:** Due with project. During your project demonstration I will ask you to: show me your code, compile your code, email me a copy of your code, download the code to your device, and show me your working device. Your code does not have to be commented at this point. Having comments in your ASM code will help me understand your code better.
- **Short report**. Submit a well-written, but brief, summary (in MS Word or Adobe PDF format) of what you did in your project, what problems you encountered, and how you got around them. Email your report to rdua@mst.edu at the time of project demonstration. Your report should include:
    - **Title and team members**
    - **Summary.** Give a quick summary of what you did in your project, the problems you encountered, and how you got around them. State the desired output frequency from the buzzer and show, mathematically, how you achieved it.
    - **Explanation.** If your code didn't work, explain what you might do to fix it.
    - **Future work.** Explain what you might do to improve your project or the way you went about completing your project (timeline, etc.).
    - **Project code.** Well documented code is essential. Code that makes appropriate use of segments, variables, labels, and the like, is far more valuable.

- **Work effort distribution.** List each person in your group. Explain what their job was and the total percentage effort they contributed to the completion of the project.

Projects must be completed, demonstrated, and submitted by

Grading Policy:

- Project Demonstration: 50%
- Project Creativity: 30%
- Project Report: 20%

Note: For the project submission to be valid the project must be demonstrated and a report must be submitted. Failure to do so will result in a reduced overall score for project 2.