

ELC 343 - PROJECT #2

PART I

In this design project the students will write a simple PC console I/O program. We will use any suitable terminal interface program on the PC side. In essence, the PC screen and keyboard will become I/O devices of the microcontroller, and the microcontroller will be the CPU of the overall system. The concept of using this type of interface can be useful to get information in and out of the microcontroller for any actual application or for debugging a program in development. Upon program START, the microcontroller will output the following:

```
My First Microcontroller I/O Console Program
Microcontroller Programmer
Press Enter key to continue...
```

After the user presses any key, the program will display:

```
Program completion succeeded
```

At this point, the program will end.

You are to:

1. Write the program in Assembly language, with appropriate comments.
2. Build the program to get a .HEX file.
3. Download the .HEX file to the development board.
4. Debug the program very carefully; include portions of the debug in your report.
5. Demonstrate that the program runs by looking at the output.
6. Demonstrate the operational program to the instructor.
7. Produce a technical report as if you were in industry.
8. The report is to include, but not limited to the following:
 - a. Introduction.

- b. Discussion of results including development of any equations, detailed graphs and schematics, oscilloscope pictures, and any other component that you think helps you to explain what, why and how you did what you did.
 - c. The report must be understandable to another engineer or supervisor not working on this project.
 - d. A conclusion of your results and discussion of anything you found especially interesting or not expected from your work on this project.
9. This report is a group report and is due to me no later than the class period discussed in class.

PART II

In this part, we will design a user interface for the microcontroller using asynchronous serial communication with the PC. The system has the following specifications.

SYSTEM REQUIREMENTS

1. Upon program *START*, the system will turn on the LED's of the *BOL*.
2. The system will display a greeting message.
3. The system will display a prompting message asking the user to enter his or her name.
4. The system will capture the name entered by the user.
5. The system will display a greeting message using the name entered by the user, and tell the user to press one of the number keys (1 through 8) to toggle to state of one of the LED's. Key 1 corresponds to toggling LED1, key 2 corresponds to toggling LED2, etc.
6. The system will monitor user input for a valid key to be entered, and will toggle the appropriate LED. If a non valid key is entered, the system will simply ignore that entry.
7. The system will display a message in the terminal telling the user which LED was toggled last.
8. After the user enters the first toggling key directive, the program will just continuously monitor user

input to continue toggling LED's and updating the message that informs the user which LED was toggled last. The program will do this until the system is restarted or RESET.

You are to:

1. Write the program in Assembly language, with appropriate comments.
2. Build the program to get a .HEX file.
3. Download the .HEX file to the development board.
4. Debug the program very carefully; include portions of the debug in your report.
5. Demonstrate that the program runs by looking at the output.
6. Demonstrate the operational program to the instructor.
7. Produce a technical report as if you were in industry.
8. The report is to include, but not limited to the following:
 - a. Introduction.
 - b. Discussion of results including development of any equations, detailed graphs and schematics, oscilloscope pictures, and any other component that you think helps you to explain what, why and how you did what you did.
 - c. The report must be understandable to another engineer or supervisor not working on this project.
 - d. A conclusion of your results and discussion of anything you found especially interesting or not expected from your work on this project.
9. This report is a group report and is due to me no later than the class period discussed in class.

REPORT FORMAT: Free form, but it must comply with the following:

- a. One report per team
- b. Have a cover sheet with identification: Title, Class, Your Names, etc.

- c. Include all the deliverables previously mentioned.
- d. COMPLETELY word-processed
- e. Double spaced
- f. 12 pt Times New Roman font
- g. Fully justified (optional)