INTRODUCTION

The EE 757 Laboratory

The EE 757 laboratory is a Senior/Graduate level control laboratory that follows EE 557, and is almost exclusively oriented towards small-scale digital control applications. You are expected to have some knowledge of classical control techniques, programming in a higher level language (in this case C) and some laboratory experience.

EE 755, the basic Digital Control course is a prerequisite or co-requisite The level of sophistication of the control algorithms used in EE 757 gradually increases through the Quarter. Furthermore, you will gain experience in the software/hardware aspect of implementing your algorithms, and will get to learn more about measurement techniques and interfacing.

The experiments that will be performed in this laboratory are:

WEEK	EXPERIMENT
1	Introduction
2	On/Off Control -- Simple tracking
3-4	Sliding Mode DC Motor Position Control
5-6	PWM DC Motor Speed Control
7-8	Mobile robots -- More complex tracking
9-10	Mobile robots -- Coordination

Some General Comments

- All the tasks require extensive preparation before you come to the lab. Read the handouts carefully. Make a list of what you have to do and what has to be ready. Write, check and recheck all your programs. The time you can spend in the lab is limited and is only enough to make minor changes and correct minor errors.

- Be sure of EXACTLY what you are to do. Determine before hand what you expect to happen.

- Each group is to prepare one joint report for each lab except the first. You are not required to hand in a report for lab 1.
- Reports (co-signed by all group members) are due before the start of the following lab period. No late reports will be accepted. The only exception to this

is when a bona-fide equipment malfunction has occurred (and confirmed by the TA or the instructor).

- 70% of your grade will be based on your Reports, 10\% will be on homework assigned in class and 20% will be based on your final exam.

- You are expected to be very careful and WILL be held responsible if something goes wrong. It will be reflected in your grade.

- DO NOT apply power to any analog device before checking your circuit twice. Three times is even better!

- If you are not sure it will work, DO NOT do it. Ask first.

Suggested Format for Lab Reports

1. TABLE OF CONTENTS

2. OBJECTIVE

3. PROCEDURE

    - Explain the methodology you used to accomplish the lab task.

    - Figures for any hardware interface circuits that were used.

    - Try to relate where possible how topics covered in the lecture relate to the lab task.

4. THEORETICAL ANALYSIS

    - Discuss any background theory related to control design, modeling of the plant, etc.

5. RESULTS

    - Data obtained in lab.

    - Graphs or tables. Discuss all plots or tables that are presented. If a plot is not worth mentioning, do not include it!

    - Brief explanation of how the experimental results compared with any theoretical analysis or simulation done.

6. CONCLUSIONS

    - If the experimental results were different from the theoretical results give some explanation why.

    - Explain how better results may have been obtained if other approaches or better resolution equipment were used (e.g., better results could have been obtained using a 42 bit A/D instead of a 12 bit A/D).

7. PROGRAM LISTINGS

    - Outline, description or flow chart of program.

    - C program listings

    - Program listings have to be in understandable form. You may have to cut and paste printer outputs, so as to properly append them to the rest of your report. If you are using subroutines developed in previous experiments, say so.

8. REFERENCES

    - If any, these should be given in standard IEEE format.

General Comments Concerning Report

Be careful when organizing your reports. In several of the experiments, you will obtain large amounts of data. A portion of your grade will be based on how well you summarize, organize, and present this information.

As mentioned previously, discuss all plots or tables that are presented. If a plot is not worth mentioning, do not include it! Label all plots with figure numbers and refer to each plot where it is discussed. Try to place your plots "close" to the text where the plots are discussed. Do not merely staple pages of plots to the end of your report. The typesetting program "Latex" attempts to place figures close to references in the text, and is recommended for this course.

In your analyses, show all appropriate calculations and a sufficient number of intermediate steps to follow your development. Support and quantify (if possible) all observations and conclusions with specific examples taken from the experimental data.