Massachusetts Institute of Technology
Department of Electrical Engineering and Computer Science

6.111 - Introductory Digital Systems Laboratory

Project Information

Introduction

The term project in 6.111 is your opportunity to specify a small digital system. You will design, build, debug, demonstrate, and report on this system. This memorandum sets forth our expectations and requirements for this project and makes a few suggestions which should help to make your project a success.

In order to accomplish all that is expected by the end of the term, it is essential that you *stay on schedule*.

Both the determination of grades and the project time requirements are inherently subjective. Lab 3 provides some guidance to the evaluation of project size and complexity. A reasonable guideline as to size of 6.111 projects is that it not require more than a kit and a proto board per person.

6.111 student projects often become too large because of a desire to effect computations in parallel and at high speed. Data paths are often unnecessarily wide and redundant. It is generally far better to minimize the type and extent of the data paths even though this results in more complicated control circuitry.

Use of microprogrammed sequencers and FSMs implemented with PALs allows implementation of complicated control with a small number of ICs. Please remember that massive data paths that enable computation at speeds far faster than needed do not represent a good design! It is almost always better to spend more time thinking and less time wiring.

Instructions

1. The first step in starting your project is to find a partner with whom you wish to work. Two-person projects are preferred, but three-person projects are permitted. Individual projects must be approved by the lecturer.

2. The second step is to decide what you wish to do. A list of project suggestions appears in this handout. This list may be helpful in this regard since it is compiled from past projects which were successfully completed.

3. The third step is to submit a PROPOSAL ABSTRACT (one for each student) using the attached form. This item and the PROPOSAL which follows are to be prepared jointly with your partner. We will use the proposal abstract to assign project teams to members

of the teaching staff. Those assignments will be posted shortly after the deadline for proposal submission.

4. The fourth step is to write the PROPOSAL. It is comprised of:

1. A description of the project in words, stating what your system is going to do and how you plan to implement it.

2. A block diagram.

3. A set of specifications that define in detail what your system is (in input, output terms) and what tests will be used to prove that it functions properly.

4. A statement of how the project work is to be divided among the partners. The block diagram should be referenced.The project should be partitioned into two separately testable subsystems. Each subsystem is to be the responsibility of a single partner.

The proposal should be typewritten. Typically, it should be two to five pages in length, single-spaced, plus the block diagram and any figures you may need.

5. The fifth step is the Proposal Conference, which is when the proposal is to be submitted. Each project Proposal must also be presented orally to the Staff so that both you and we understand what it is you are attempting, and whether your basic design approach is sound. Each project group should sign up for a 30 minute session. Sign-up sheets will be posted in the lab in advance of the first day of proposal conferences. Be sure to bring extra copies of your Proposal with you to the presentation so that TA's can follow your talk without your having to draw your block diagram on the chalkboard.

6. The sixth step is to prepare detailed Module Designs and Logic Diagrams for each of the blocks in the block diagram, and have these approved by your project TA at the Block Diagram Conference. This approval is a prerequisite to your adding 6 extra units of 6.905. You and your project partner(s) are to present your project design to the rest of the class. You are encouraged to use an overhead slide to show the class the block diagram. Do not count on drawing it on the board as there is not enough time for this. The presentation day will be chosen by the teaching staff and communicated to you by email and also posted on the web.

7. The seventh step is to build, debug and test your system. Project CONSTRUCTION may not begin until you have:

- Completed and handed in all problem sets and assigned lab exercises and,
- Had your detailed logic diagram approved by your TA.

8. The eighth step is to demonstrate your project to a member of the Staff. It is likely we will want to videotape your presentation.

9. The ninth step is to complete and submit the PROJECT REPORT. Material from the proposal can be used. The report may be prepared jointly:

- The Introduction and Summary sections can be joint efforts of the project team, but
- it must contain separate sections, individually written, describing subsystems for which each partner is responsible. Each section of the report should indicate the responsible author.

See the *Report Guide* handout for general requirements for the Final Project Report.

10. The final step is to turn in your kit and other components. Remove all wires from the socket strips and return the chips to their places in the box.

Schedule
Refer to the on-line syllabus for pertinent due dates. Pertinent milestones are as follows:

Formation of Project Teams
Project Abstracts
Proposal Submission and Conferences
Design Conferences
Last Day to ADD 6.905 (Drop Date)
Project Design Presentations
Project Demonstrations
Vide-taping of Project Demonstrations
Project Reports

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PROPOSAL ABSTRACT FOR TERM PROJECT

(Submit one copy per project team.)

NAME:
(last) (first) (initial) (Term residence phone)

(Address)

NAME:
(last) (first) (initial) (Term residence phone)

(Address)

Title of Project (nine words or less):

ABSTRACT
(One paragraph description)

TENTATIVE DIVISION OF WORK
(One paragraph statement of how work is to be divided between partners.)

(Continue on separate sheet if necessary.)