

**EE/CpE 415-416, 423-424 DESIGN PROJECT ELECTIVE  
WRITTEN AND ORAL PRESENTATION REQUIREMENTS  
THE PROJECT PROPOSAL**

**A. Written and Oral Presentation Requirements**

Each group in the senior design project is required to make the following written presentations.

- The project proposal-first semester
- The final design report-first semester
- The final report-second semester

The oral presentations required for each group are:

- Oral/Slide presentation-first and second semester
- Prototype demonstration-poster presentation-second semester

The following sections describe the format requirements to be used in the senior design project for the project proposal submission. The format requirements presented here represent good industrial practice.

**B. Project Proposal-First Semester**

General

Each group must submit a written project proposal to the group faculty technical advisor and provide a hard copy to the course coordinator. The proposal must also be published on the senior design web directory. An engineering proposal is a detailed plan of technical actions, which the group recommends and intends to use for a particular project area. It is the group's educated, professional, and strong belief that when these technical actions are executed they will most likely lead to a successful project conclusion.

An industrial engineering group usually writes a proposal to a customer interested in the project with the major object of obtaining funds from the customer to support the development of that project. The customer may grant funds for a particular program to a group if he is convinced by the proposal document that the proposed approach will be successful. Criteria, which the customer may use to determine if the project is credible and will be a success, are:

- Will the project technical goals be achieved?
- Will the project be completed within the proposed schedule?
- Will the project be completed within the proposed budget?

These criteria will also be used in senior design to measure the success of each group's technical project. For a project to be successful, it must be carefully planned and conducted. Much thought must go into a good project plan to insure that the answers to the three questions listed above will be answered in the affirmative by the proposing group.

### **C. Project Proposal Report**

The written format requirements for the project proposal are composed of a number of sections and are arranged in the following order:

- Title Page
- Table of Contents

Section:

- I. Abstract
- II. Project Proposal Plan
- III. Conclusion
- IV. References
- V. Appendices

### **D. Detailed Requirement of Project Proposal Report**

The detailed contents of the required proposal report are as follows:

- Title Page

The title page should include the following information in order:

Project Title  
Group Number  
Date Submitted  
Faculty Technical Advisor Name(s) and Signature(s)  
Group Membership Names, Signatures and ~~Steven's ID number~~  
Stevens Pledge

The title page is not given a page number or a section heading.

- **Table of Contents**

The Table of Contents is composed on a separate page(s) and in the form usually found in textbooks. Page numbers showing the page number in the report where a topic can be found must be included. The Table of Contents lists the various section headings, section numbers and sub sections contained in the report starting with the Abstract and including the Appendices, List of Figures and the List of Tables in that order.

The title Table of Contents appears at the top of the page and is centered. The first page of The Table of Contents is designated page number i. Successive page numbers after page number i are ii, iii etc. as needed.

## **I. Abstract**

The abstract section is a very important part of an industrial written proposal for many reasons. Not the least of these reasons is that some potentially influential members of the customer's technical and administrative staff who may read the report may also be very busy people. There could be a tendency on their part to sometimes read only the abstract and conclusion sections (and perhaps skim through the more detailed technical sections of the report) and form an opinion of the report from these two sections alone. Thus it is important to make the abstract (and conclusion) sections as strong as possible.

For the senior design project proposal report a good abstract should be brief, consisting of about 150-200 words in length and containing the following information:

- A statement defining the general project area being addressed.
- A clear description of the specific problems to be addressed and worked on during the project.
- A description of the technical approaches to be used on the project
- A description of the results to be expected at the conclusion of the project.

The abstract is section I of the report and begins on a separate page immediately after the Table of Contents page(s). The abstract page is designated page 1. Clearly thereafter, page numbers are designated in sequence, except for Appendices. Sections follow contiguously.

## **II. Project Proposal Plan**

### **General**

The project proposal section of the report is the heart of the proposal document. It introduces the project to be investigated including background material, and discusses the technical requirements and goals of the project. The various technical approaches

identified to bring the project to a successful conclusion are discussed. Expected technical problems of each approach are addressed. The analytic and testing methods and selection criteria that will be used and investigated to solve the identified problems of each approach are discussed. A schedule of tasks, time line estimates, manpower estimates and costs of labor, parts, materials and required equipment is presented.

In short, the proposal discusses:

1. What is the present state of the project that the group wants to work on?
2. What state does the group want to take the project to at the end of the program?
3. What are the various technical approaches, and their possible problems, which the group proposes to investigate to change the present state?
4. What methods will the group use to evaluate each approach and compare and select the most promising one amongst them?
5. What are the costs expected to be to bring the project to a successful conclusion?

The format for the project plan contains the following detailed sub sections:

## II-1. Introduction

This section describes the area of the project in general terms. It provides background information on what has been done in the project area in the recent past and who has done the work. It provides recent, and if necessary, basic references which enable other readers to bring themselves up to date in the project area in an effective manner. This section generally demonstrates that the group is up to date in the project area and that the project is recognized as a worthy, useful and timely engineering challenge.

After this part of the introduction is completed the group defines in general terms the technical problem area that the group intends to address for their senior design project prototype development. The section discusses as necessary and relevant:

- What new features and updates does the group intend to provide to the project, and/or what extended or improved performance parameters will the group introduce to the project that will enhance the resultant system performance.
- New and/or upgraded operating environmental conditions under which the improved project will operate are discussed, as well as the possible extension of the project to new users -thus broadening the application of the project.
- Parameters such as increased bit rates, speeds, access times, reliability, efficiency, flexibility, required power and any relaxation of certain assumptions or conditions of operation made in the past to ensure improved system operation are addressed.

This material basically addresses item 1 above in section II of the project proposal and a general description of item 2 above in section II of the project proposal.

## II-2. Design Requirements

This section discusses in technical terms the specifications of the project that the group intends to engineer. Thus as an example if the group intends to improve the bit error rate (BER) of a communication system by adding certain types of coding, the section in part would specify the expected improved BER numerically, and the parameters of the new coding scheme. Similarly if a robotic entity is to be provided with the ability to negotiate a staircase under certain environmental conditions, then these conditions and objectives should be clearly stated in this section along with their numerical values.

This section generally provides the new parameter values, features and design objectives that the group intends to engineer into the project prototype at the end of the second semester. Numerical values for upgraded parameters that are to be achieved are clearly stated as objectives and goals to be attained and demonstrated at the end of the project.

This material basically addresses item 2 above in section II of the project proposal.

## II-3. Design Approaches

Typically in the proposal stage the design group knows what it wants to achieve for the project, but many times there can be a number of plausible and reasonable ways that a knowledgeable engineering group could propose to reach that goal. These various engineering approaches are discussed in technical detail in this section. The expected benefits and any tradeoffs of each proposed approach are discussed here. The eventual goal of the design effort is to select the best approach out of the number of approaches proposed at this stage. This selection is made at the time of the final design report at the end of the first semester.

In this section of the proposal each approach proposed to achieve the final prototype development is discussed in technical detail with any necessary calculations needed to support the approach. Thus as an example, if a new radio for internet applications is to be prototyped, decisions will have to be made to determine where to use digital elements and where it may be necessary to use analog components. One approach may be to use an all-digital design, another approach may incorporate some analog circuitry and some digital processing at a certain stage of the radio. These two approaches must be discussed in technical detail. Technical problems and risks that may be expected for each proposed approach are listed and discussed along with the proposed solutions for each critical problem/risk possibility.

At this point in the design it is not known which approach will prove to be superior in meeting the goals of the project. Thus it is critical to discuss the criteria by which each approach will be eventually tested and evaluated relative to the goals of the project. The test criteria to be applied must be clearly stated and enumerated in the proposal because it is on the basis of this evaluation that the optimum choice for the project design and

prototype will eventually be made. This discussion should be followed for each proposed approach.

It must be remembered that the actual design work of the project is not and cannot be done in the proposal document. The design approach section discussed in the proposal just states how the work of design, testing and evaluation of each proposed approach to the prototype development will be done. The work to select the proposed design commences after the proposal is documented and submitted to the faculty technical advisor and course coordinator. The actual design approach selected to be used is documented in the final design report at the end of the first semester. The actual prototype development using the selected approach is implemented in the second semester.

This section basically addresses item 3 and 4 above in section II of the project proposal report.

#### II-4. Financial Budget

Every engineering project costs money if it is to be implemented. Some major cost components in all industrial projects include:

- Labor costs,
- Materials and parts,
- Test equipment,
- Documentation costs,
- Travel, hotel accommodations and meals for the engineering staff who travel periodically to the customer to discuss the project status,
- Support staff,
- Rent, utilities, overhead,
- Profit, etc

All these cost centers must be considered and evaluated for the industrial proposed approach so that a realistic and winnable price for the project can be presented to the customer.

In the context of the senior design project many of the costs above are not encountered or considered in the academic environment in which the project is carried out, such as for example, meals and profit. However each group, for example, certainly will incur parts and telephone charges to vendors and these costs will vary depending upon each proposed technical approach considered.

Thus for each proposed approach in this project proposal a table showing the estimated costs for all parts, specialized test equipment that may be needed, travel and or telephone charges to vendors, printing and documentation costs etc must be enumerated and clearly totaled. These estimated costs will eventually be compared with the costs incurred as

refined in the final design report and finally evaluated in the final report in the second semester.

## II-5. Project Schedule

A schedule for each proposed approach will be provided using Gantt charts. Each chart will show the schedule for each approach for both the first and second semesters. The charts will show the schedule for each member of the group and their tasks. The section will also discuss and clearly explain the charts and each group member's responsibility and role in the project.

These schedules are subject to change as the project proceeds and develops after the submission of the proposal. The schedule can be reevaluated and refined in the final design report to be submitted at the end of the first semester.

This section basically addresses item 5 above in section II of the project proposal report.

## III. Conclusion

The conclusion section is a critical section of any report. For the proposal, this section summarizes in a few words (approximately 200-250 words) the following:

- The core intent and scope of the project as documented in the report
- The results to be expected from the engineering work to be done
- The expectation that the recommended approaches will lead to a successful result at the conclusion of the program.

## IV. References

Textbooks, reports and documents used in the body of the report to support the project proposal development should be noted in this section. References should be completely specified so that an interested reader may locate them efficiently. Reference format examples are readily available in the engineering textbooks used at Stevens and elsewhere.

## V. Appendices

Appendices are usually used to provide detailed information which is pertinent to the report but thought to be somewhat less necessary to place in the body of the report. Thus, to be complete, this information is provided in a separate section at the end of the proposal. The appendices are generally meant to be read by those with a specific interest

and detailed knowledge of the material contained therein. Examples of such material include detailed analysis, and lengthy mathematical proofs.

Page numbers for the Appendices are usually not keyed to the page numbers of the report. As an example, if there are two appendices, Appendix A and Appendix B, the page numbers for Appendix A start at A-1, A-2 etc. Page numbers for Appendix B start at B-1, B-2 etc. This decouples the page numbering system from the body of the report and simplifies the addition or deletion of Appendix material.