

ECE499 Project Final Report Format – Design Report

Here is a detailed explanation of a technical report. Most sections are appropriate for all capstone design reports, but you may discuss the addition, deletion, or modification of these sections with your project supervisor. Some general report guidelines follow the format template.

Project Report

Cover Sheet

Title of Project
Author(s) of Project
Course Number, Course Title
Project Supervisor
Date

Report Summary (about 1 page)

The report summary is a 1-page summary of the entire report. It should contain all of the major points, including the project topic, goals, design requirements, design overview, and results.

Table of contents (with page numbers)

Table of figures and tables (with page numbers)

Introduction (about 1 or 2 pages)

The introduction should orient the reader to the topic of the report by including the following:

- The problem - Explain the particular problem that is addressed in the report.
- The objective - State the assignment (what your project needs to accomplish to solve the problem).
- The method of the report - Describe the organization and structure of the report.

Background (3-6 pages)

Discuss the context and history of this general topic and describe what has been done in the past. Answer the question: What are the most important issues for this topic in terms of the goals of the project and the effects on society? Write about at least three of the following issues, and cite references for research sources:

- economic: effect of this topic on the economy in the past, possible cost of project development in mass production, target cost if project is marketed (note – this is NOT the same as your prototype costs)
- environmental: influence on the environment in the past, possible effects for future developments
- sustainability: product life cycle, future markets
- manufacturability: material availability, use of off-the-shelf versus custom components, special needs for hostile environments
- health and safety: positive or negative impacts on the health and safety of individuals or society for past or future applications in this topic
- social: relationship of this topic to social aspects of society such as education, culture, communication, and entertainment
- political: relationship of this topic to political issues

Discuss the ethical issues for your project: include any decisions that someone working on this topic might encounter that have an impact on the lives of others, any unintended uses or issues that could cause harm to an individual or society, and any ethical dilemmas that came up in the design and implementation process.

Previous work: explain what already has been done on this topic. Include literature search results for the OVERALL problem and context, rather than the options for component parts here.

Design Requirements (3 to 6 pages)

Give the detailed specifications that served as the basis for the project (interpretation of rules of a contest, interpretation of customer requirements, interpretation of desired features – how they determine or constrain size, velocity, response time, cost, weight, etc.) Consider aspects such as potential users, cost, safety, user-friendliness, performance, compatibility with other things, functionality, acceptance, convenience, capacity, misuses, legal issues, standards or codes, availability, materials, productivity enhancement, entertainment, technology, and design methods.

Functional decomposition of the project - Explain the major functions required by your design. Figures such as block diagrams and tables should be used to supplement discussion.

Selection of design criterion - Based on your specification, specify goals for performance, reliability, cost, code size, manufacturability, safety, societal factors (human interface, environmental factors, etc) and any other criteria relevant to the project. A table is often helpful for this section.

Design Alternatives (2-5 pages)

Results of literature search - Provide the options and justification for overall approach (hardware, software, choices of methods).

Options and justification for each functional part - Provide the options and justification of design approach and components or methods used in each functional part.

Be sure to cite all of the literature used in your discussion.

Preliminary Proposed Design (3-6 pages)

Explain your design choice using diagrams, pseudocode, tables, parts lists, and text. The final result should be a clear design proposal from your Fall term work. In other words, it should be as clear and specific as possible. Include equations or other justifications to justify your design choices. Be sure to cite any outside work that you used in your design or justifications.

Final Design and Implementation (5-15 pages)

Presentation of design used in the final implementation. Describe the project and its functions (include diagrams, code examples, and other figures in the body of the text and refer to any large engineering drawings, listings, etc. in the appendices in the body of the text). You might organize the implementation presentation by functional groups. Discuss and present the calculations used in the design of the project in the relevant subsections. Summarize repetitive calculations in tables.

Performance estimates and results (2-5 pages)

Present the estimated performance of the project (and how it was derived) based on the preliminary design (estimates include speed, cost, power consumption, noise-immunity, ease of use, etc, depending on the project). Present the actual performance results. Discuss the results, compare with estimated performance and explain discrepancies. Include suggestions for design changes that would improve the performance of the project. Use graphs or other figures to show relationships when appropriate.

Production schedule (1-2 pages)

Discuss the phases of the design and implementation of your project. (Pert charts may be appropriate in the discussion.) Recommend any improvements that could have been made in the scheduling and planning.

Cost Analysis (1-2 pages)

Tabulate component costs and compare to estimated cost and market cost where appropriate.

User's Manual (1-3 pages)

Provide a user's manual for the operation and maintenance of the system designed in the project.

Discussion, Conclusions, and Recommendations (2-4 pages) [Completed for ECE499 Report]

Restate the problem that gave rise to the report.

Summarize the main points and the approach that was taken. Summarize the design performance. Provide recommendations, explaining subsequent action or posing specific questions for investigations. Discuss the lessons learned.

References

Give a bibliography listing all references used for background work, the specification of parts, cost comparisons, etc.

Appendices

Put oversized drawings and long programs here.

General Report Guidelines

General Guidelines

Be sure to introduce and summarize each section.

Always write from general to specific in each section.

Do not write chronologically (a technical report is not a story or novel).

Use section and subsection titles.

Make sure that subsections follow each other in a logical progression.

Number each page.

Use bulleted or enumerated lists rather than lengthy textual discussion of requirements, subsystems, etc.

Figures and Tables

Technical reports only contain Figures and Tables.

Refer to graphs as figures, photos as figures, small code segments as figures, etc.

Figures and tables should be prepared professionally with appropriate tools, and not hand sketched.

Figures and tables should be used to supplement the discussion.

Figures and tables should be located in the body of the text, AFTER they are introduced in the text.

Always introduce a figure or table in the text and never place a figure or table in the text that is not discussed.

Discuss the meaning and significance of the table or figure.

It is often appropriate to pull out small segments of code from a main program or to write pseudocode to describe an algorithm or major point of the project. This is considered a figure and should be titled and numbered as such.

If a group of figures or a long table or code listing takes up too much space, locate them in an appendix.

Figures and tables can be located at the end of the text but it is less convenient for the reader.

Figure titles and numbering

- Figures should be numbered consecutively in the report
- Every figure must have a descriptive title located immediately below the figure.

Table titles and numbers

- Tables should be numbered consecutively in the report
- Every table must have a descriptive title located above or below the table

References

All references should include author, title, journal, or magazine title (if a journal article), publisher, page number, date. Below are sample references from a conference proceeding paper [1], book [2], journal article [3], Ph.D. dissertation [4], technical specification [5], and web page.

- [1] P. J. Hurst and W. J. McIntyre, "Double sampling in switched-capacitor delta-sigma A/D converters," in *Proc. IEEE Int. Symposium on. Circuits and Systems.*, 1990, pp. 902.-905.
- [2] J. C. Candy and G. C. Temes, *Oversampling Delta-Sigma Data Converters: Theory, Design and Simulation*. New York: IEEE Press, 1992.
- [3] L. R. Rabiner, R. W. Schafer, and C. M. Rader, "The chirp z-transform algorithm," *IEEE Trans. on Audio Electroacoustics.*, **AU-17**:6 (June, 1969), pp. 86-92.
- [4] S. Bagchi, "The nonuniform discrete Fourier transform and its applications in signal processing," Ph.D. dissertation, Electrical Engineering Department, Univ. California, Santa Barbara, 1994.
- [5] *Motorola CMOS Logic Data*, Series C, Motorola, INC, 1990, pp. 6-97 - 6-107.
- [6] EE Design Center - Questlink Technology, www.questlink.com, 1999.