EE/CME 495 Final Project Report

Due: April 7, 2020 at 11:59PM
(hand in on course website)

Assignment Description

Overview

This assignment asks you to generate a comprehensive report summarizing your capstone design project. It should describe your work at each stage of the formal engineering design process described in EE/CME 495, as you moved from a vague description of a customer need to a well-defined and validated working system.

Note that many of the topics that are to be discussed in this report have already been covered in previous reports and assignments earlier in the academic year. In such cases, it is acceptable to use some of this earlier material as the starting point for the corresponding sections in this final report. However, you must carefully review these sections to make sure they take into account any subsequent revisions that have been made to your design. Additionally, it is very important to incorporate any feedback that was provided on these earlier submissions.

This final report is expected to be a formal, professional document. It should be carefully written and proofread so as to make a great impression regarding your professionalism and competence. In the past, students have provided their final capstone report to potential employers as evidence of their capabilities, so be sure to give this assignment the attention it deserves!

Document Structure

To facilitate evaluation and grading, students are asked to organize the report into the following sections:

1. **Executive Summary:**

   The executive summary is a brief (no more than one page) summary of the report.

2. **Problem Description:**

   This section contains a high-level description of the problem you are attempting to solve. Why is it an important problem and what characteristics should an acceptable solution have? What are the constraints within which the solution must operate?

3. **Requirements Specification:**

The requirements section lists, describes and justifies the specific technical require-
ments for your design. As described in class, requirements should be specific, mea-
surable, achievable, and independent. Any experiments, calculations, references to
existing products, or discussions with your customer/client which were conducted in
order to help define your requirements should be described in detail to help justify the
requirements you have selected.

4. **System Alternatives and Alternative Selection:**

This section of the report describes the alternative generation and selection process. It
should begin with a discussion of the process that was followed to generate design al-
ternatives. Next, analysis regarding the candidate system designs should be presented.
This should include consideration of each design from the following perspectives: ability
to meet the technical specifications, economic considerations, environmental consider-
ations, safety considerations, project timelines, and project risks.

This section of the report concludes with a discussion of which candidate design was
chosen and why. You should be able to justify your selection to a skeptical audience.

5. **System Design:**

The system design section of the report describes in detail the high level design that was
chosen in the system alternatives section. It should include a detailed block diagram
showing each of the subsystems in the design and the signals and interfaces between
subsystems. Additionally, for each subsystem, the general functionality, inputs and
outputs, and requirements should be described. Any changes that were made to the
system design during the implementation phase should be explained and justified.

6. **Detailed Design:**

This section of the report includes detailed information about the implementation
of the individual subsystems in your design. For hardware-based subsystems, this
includes detailed electrical schematic diagrams. For software-based subsystems, al-
gorithm flowcharts, module/class/functional breakdowns, UML interaction diagrams,
etc. should be provided. If applicable, it may also be valuable to include information
regarding any chassis / enclosure design and any PCB layouts that were produced.

7. **System Test Plan and Results:**

This section of the report is broken into two subsections. The first, which is focused on
the system test plan, should include detailed plans for verifying that the final design
meets the system requirements. As discussed in class, each system test should have a
clear, reproducible, and unambiguous procedure, along with an equipment list and a
description of how the results will be interpreted.

The second portion of the report should list the results that were obtained when the
tests from the system test plan were performed on your prototype system. In addition
to the raw test measurements, an indication of which tests passed and which tests

failed should be provided. For tests that failed or requirements that were unable to be tested, explanation and suggestions for modification or improvement are required.

8. **Economic Analysis:**

An itemized list of costs for the prototypes, including materials, engineering labor, etc. should be provided. Additionally, analysis regarding the costs of producing the design at scale should be included. Comment on the economic feasibility of the project, as well as any discrepancies between the initial budget and the final set of costs for the design.

9. **Project Management:**

Provide a summary of the expected and actual timelines for the project, as well as listings of the expected and actual hours spent by each team member on the project. Comment on the discrepancies and how you attempted to mitigate them throughout the year. To be clear, this should be an extension and analysis of your project management updates from throughout the term. You should also include your original project management updates as an appendix.

10. **Summary and Future Work:**

This section should include general comments on the strengths and weaknesses of your design, as well as a discussion on any additions or improvements that could be made to the design in the future to better meet the customer need.

11. **References:**

Properly citing others' work is an important part of professionalism. If there are any reports, papers, datasheets, product briefs, articles, etc. that have provided information that you relied upon in doing your design, they should be cited at the appropriate places in the body of the report. A complete list of references should be provided in this section. For online materials, be sure to include both the address and the date the document was accessed.

12. **Appendices (as needed)**

Rubric / Marking scheme

This assignment is worth 15% of your final grade. It will be marked out of 35, with marks assigned to the individual sections of the report as follows:

Marks	Section
1	Executive Summary
2	Problem Description
4	Requirements Analysis
4	Alternatives and Selection
4	System Design
4	Detailed Design
4	System Test Plan and Results
4	Economic Analysis
4	Project Management
2	Summary and Future Work
2	References
35	**Total**