****

**Capstone Design Project**

**System Design Report**

**<Descriptive Project Title>**

**Project Client**

<Sponsor Name>

<Semester>

<Month>, <Year>

**Prepared by**

<Name (Discipline)>

<Name (Discipline)>

<Name (Discipline)>

<Name (Discipline)>

<Name (Discipline)>

<Name (Discipline)>

<Name (Discipline)>

Project Engineer <Name> - CORE Engineering

Chief Engineer <Name> - <Department>

**Recommended Text Format:**

**Arial, 12pt, double spaced, left-justified**

**BEFORE submitting this report**

**DELETE this page and all instructions (in blue/red text) throughout the document.**

**There are instructions**

**(in blue/red text)**

**throughout the document**

**to help you to complete**

**this report.**

**REFER to EDN Wiki Page** [**https://designlab.eng.rpi.edu/edn/projects/capstone-support-dev/wiki/System\_Design\_Report**](https://designlab.eng.rpi.edu/edn/projects/capstone-support-dev/wiki/System_Design_Report)

**on completing this report.**

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# Glossary

Define all the abbreviations, acronyms, and terms required to interpret the terminologies in this report.

# Introduction

Suggested length – ½ page

Introduce your project in terms of background information and motivation/ justification for conducting this project. Be sure to address work done by prior capstone team(s) to provide context for later sections. **You can use the information in your initial project description and any other project work like Client Meeting #1 Slides.**

# Project Overview

2 pages max.

**You can use the information from Client Meetings 1 & 2 for this section.**

## Project Statement

## Project Objectives (Long-Term)

## Semester Objectives / Deliverables (Short Term)

# Engineering Definition of Problem

# Summary table of 5-7 key and high priority customer Needs and Engineering Requirements, Use Cases, and User Stories that led to the development of your project and each of the subsystems. Use information from the Engineering Definition documentation. Utilize a tabular or list format and include any additional explanations in the text. You have prepared this for your Client Meeting #2. You can use the information from that slide. DO NOT REDO.

* Customer Needs and Engineering Requirements
* Use Cases
* User Stories

*NOTE:*

Some capstone projects involve fairly distinct, non-integrated problems for their client. In such cases, it is often easier to write and read the report using a modified flow rather than the one presented in this template.

If you believe your project falls into this category, the recommended report flow is as follows:

**Full Project** – Sections 1 & 2

 **Problem A**

* Section 3
* Section 4.1
* Section 4.2
* Section 4.3
* Section 5
* Section 6

**Problem B**

* Section 3
* Section 4.1
* Section 4.2
* Section 4.3
* Section 5
* Section 6

**Full Project** – Sections 7

**DISCUSS WITH YOUR CE** to confirm your opinion and determine appropriate flow of report.

This DOES NOT mean A - Mechanical and B - Electrical problems.

This could apply to a project evaluating A - factory layout and B - fixture design for a client.

# Proposed System Design

2 page max

Describe overall system design concept chosen by team to pursue

**DO NOT include previously presented concept generations and selection.**

## System Overview

Give a technical overview of the system you are designing and implementing.

## System Architecture Diagram(s)

Insert picture(s) here, with explanation, e.g. block diagram, CAD, UML, flow charts, etc. It is required that the technical work of each team member be visible in the diagram(s).

In the diagram, it is convention that the blocks represent functions within the system and the lines between the blocks represent interfaces between the functions. It is recommended that all of the interface lines / connections be numbered so that they can be referred to elsewhere in this document.

## Team (Subsystem) Lead Assignments

Table including subsystem names, technical lead, and interfacing subsystems.

Every team member must have a leadership position.

# System Evaluation Plan

1 page max

Plan as to how to evaluate project at system level. Do not rewrite standards, simply make reference to them.

Table including Needs & Requirements/ User Stories/ Use Cases which will be demonstrated at end of semester and the name of the technical lead responsible

Every team member must have technical responsibility for an aspect of this plan.

# Significant Accomplishments (optional but desirable!)

One page max.

# References

Include specific references as needed for standards, tools/methods, etc.

# Appendix - <student name> - Detailed Individual Design

Each student should repeat this entire section. Cover ONLY your portion of the technical work for this project.

## Introduction for This Work

½ page max.

Explain what technical work is covered by this appendix.

## System Architecture and Interfaces for This Work

Text summary (not including tables/figures) 4 pages max.

### **System Architecture**

Refer to the system architecture figure(s) from the System Architecture Diagram(s) section earlier in this Document. Please do not insert another copy!

Describe the key system architecture elements that relate this work to the rest of the project, referring to the diagram(s). If it’s helpful, you may update the diagrams to number the items in the figure so that you can use those when describing it.

### **Interfaces from This Work to Other Project Elements**

Must include specific references to the System Architecture Diagram(s) section earlier in this Document. Include mechanical, electrical, and software interfaces, but focus only on how THIS work connects to the work of your team mates.

See <https://designlab.eng.rpi.edu/edn/projects/capstone-support-dev/wiki/Example> for sample Interfaces.

Table 1 – Interfaces For This Work

| **#** | **Source (from) and Inputs (Interface)**  | **Destination (to) and Outputs (Interface)**  | **Notes** |
| --- | --- | --- | --- |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |

This work MUST be listed on each line, in either the Source or Destination column, or possibly both. You may add more lines to the table if needed.

## Key Needs and Requirements/Use Cases/User Stories for This Work

Text summary (not including tables/figures) is 1 page max.

From the overall Engineering Definition of the project, identify the key requirements and/or use cases for this work in a table. You may copy only those lines from the Table in [Section 3](#_Engineering_Definition_of). **DO NOT just include the entire table!**

As with all figures and tables, the supporting text should explain the contents of this table. Be sure to clarify how they support the functionality of the completed project.

*NOTE* – at the end of the semester, ensure that all the Needs and Requirements, Use Cases, and User Stories related to EACH subsystem are merged back into the project's single set of Engineering Definition documents.

## Concepts for This Work

Text summary (not including tables/figures) is 3 pages max.

**You can use the information from Concept Generation & Selection Slides you submitted previously.**

Include sketches/summaries for at least 3 concepts relating to this technical work. For each, show/explain how it addresses the project's needs/use cases/user stories. If you are struggling to identify at least three concepts, we invite you to **consult with your PE as soon as possible**.

## Technical Design Challenges (Risks) for This Work

Text summary (not including tables/figures) is 1 page max.

Define and describe the perceived technical **design** challenges for this work. While there may be challenges associated with obtaining materials, working with a team, fabrication, scheduling, etc., this section must focus on the **technical** design challenges. Focus on facts and avoid opinions. Include justifications as to why you feel these will be challenges.

What unresolved technical issues or unanswered technical questions are preventing you from moving confidently forwards with the design work?

**DO NOT include personal items, such as learning new software, material costs, purchasing / supply chain issues.**

## Unit Test Strategy (Demo) and Integration for This Work

Text summary is 1 page max.

Explain how you will test your subsystem without requiring the rest of the project to be completed. This is commonly referred to as “unit testing”. When each individual unit or subsystem of a project has been individually tested to success, the team can then focus on integration.

**At the end of the semester, you will demonstrate your unit testing, referred to as the “Individual Technical Demo” – see the Capstone Support wiki.**

Describe how your completed / tested subsystem will be integrated with the others to create the overall team project. Final testing then can confirm that the assembled project works to meet the specified requirements.

## Individual Project Plan

Text summary (not including tables/figures) is 2 pages max.

This is the Gantt Chart on the EDN filtered to show only your technical tasks. To create, go to Gantt Chart, filter for you, and export .png file (bottom right of page). If you have non-technical tasks, please use additional filters to exclude those. See your PE for help with filtering, if needed.

As with all figures, be sure to add a summary explaining your project plan – not just the figure!

## Standards

Present in Table format as given below, typically 1 page max.

This section should identify which present industry and de facto standards are relevant to your portion of the project. Some of these standards become design constraints. Examples of things that might be applied to your project are found in:

<https://designlab.eng.rpi.edu/edn/projects/capstone-support-dev/wiki/Standards>

The categories below are suggestions. You may include others as needed. You should delete the ones that do not apply.

In the caption for the table, replace <this work> with words that describe your work.

Table 2 - Standards which apply to <this work>

| **Category** | **Standards** | **Purpose / Application to Your Work** |
| --- | --- | --- |
| Software |  |  |
|  |  |
|  |  |
|  |  |
| Electrical |  |  |
|  |  |
|  |  |
|  |  |
| Mechanical |  |  |
|  |  |
|  |  |
|  |  |
| Industrial |  |  |
|  |  |
|  |  |
|  |  |