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 **School of Engineering Department of Mechatronics Engineering**

 **Bachelor of Science in Mechatronics Engineering**

**Senior Design Graduation Project Report**

ENTER YOUR PROJECT TITLE

Report by

Supervisor

ENTER YOUR SUPERVISOR NAME HERE

Date

SELECT DATE OF SUBMISSION HERE

DECLARATION STATEMENT

We, the undersigned students, confirm that the work submitted in this project report is entirely our own and has not been copied from any other source. Any material that has been used from other sources has been properly cited and acknowledged in the report.

We are fully aware that any copying or improper citation of references/sources used in this report will be considered plagiarism, which is a clear violation of the Code of Ethics of University of Jordan.

In addition, we have read and understood the legal consequences of committing any violation of the University’s Code of Ethics.

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|  | **Student Name** | **Student ID** | **Signature** | **Date** |
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ABSTRACT

ENTER YOUR ABSTRACT HERE - The abstract should not be longer than 500 words and is a short summary describing the contents of the report, rather than being a summary of the project. The abstract is not intended to replace any other part of the report e.g. the introduction. It merely provides a taste for what is to come.

ACKNOWLEDGEMENTS

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LIST OF TABLES

[Table 2‑1 This is a sample table caption. 4](#_Toc33957616)

[List of tables is automatically generated if you use Table captions. Otherwise, create your own list of tables here. To update the List of Tables, Right-click on the LOF area and click Update Fields or Press F9. Ensure that you **do not modify any text** in the LOF area. All modification should be performed in the appropriate caption of the table.]

GLOSSARY

|  |  |
| --- | --- |
| Abbreviation | Description |
| AC | Alternating Current |
| DC  | Direct Current |
| DSP | Digital Signal Processing |
| PWM | Pulse Width Modulation |
| RMS | Root Mean Square |

# Introduction

The first page of chapter 1 is designated page 1 of the report such that any pages before chapter 1 can be numbered in formal numbers i.e. i, ii, iii, iv, v, …

## Background

Background information identifies and describes the history and nature of a well-defined design problem with reference to the existing literature. Background information in your Introduction should indicate the root of the design problem being studied, its scope, and the extent to which previous studies have successfully investigated the problem, noting, in particular, where gaps exist that your study attempts to address. Introductory background information differs from a literature review in that it places the design problem in proper context rather than thoroughly examining pertinent literature.

**NOTE:** Research studies cited as part of the background information of your introduction should not include very specific, lengthy explanations. This should be discussed in greater detail in your literature review chapter.

Sufficient background information helps your reader determine if you have a basic understanding of the design problem being investigated and promotes confidence in the overall quality of your analysis and findings. Background information provides the reader with the essential context needed to understand the context of the design problem.

## Problem Definition

After putting your design problem within its general context and highlighting its importance and impacts, you start defining the problem that you intend to solve. The problem definition is what you identify as an issue with supporting data. You should provide evidence and statements about your rationale for wanting to pursue this topic. This is a critical section because it is the backdrop to your design study and supports why it is important.

## Literature Review

Provides the readers with the information they will need to know in order to fully understand and appreciate the rest of the report. It should:

* Indicate an awareness of other work relevant to this problem
* Show the reader that students have read, and have a good grasp of, the main published work concerning the subject area of the project work and available products (if applicable)

## Aims and Objectives

Many students find it difficult to understand the difference between aims and objectives. However, in the academic context there is a clear distinction between these terms.

* **Aim**: what you hope to achieve. Aims are statements of intent. They are usually written in broad terms. They set out what you hope to achieve at the end of the project.
* **Objective**: the action(s) you will take in order to achieve the aim. Objectives should be specific statements that define measurable outcomes, e.g. what steps will be taken to achieve the desired outcome.

When writing your objectives try to use strong positive statements:

* **Strong verbs:** collect, construct, classify, develop, devise, measure, produce, revise, select, synthesise
* **Weak verbs**: appreciate, consider, enquire, learn, know, understand, be aware of, appreciate, listen, perceive

Objectives should also be **S.M.A.R.T.** - which means they should be:

* **S**pecific – be precise about what you are going to do
* **M**easurable –you will know when you have reached your goal
* **A**chievable – Don’t attempt too much – a less ambitious but completed objective is better than an over-ambitious one that you cannot possible achieve.
* **R**ealistic – do you have the necessary resources to achieve the objective – time, money, skills, etc.
* **T**ime constrained – determine when each stage needs to be completed. Is there time in your schedule to allow for unexpected delays.

How many aims or objectives should there be?

Please check with your project supervisor. Some supervisors are happy with one clear strong aim, while others like to see a main aim supported by at least two subsidiary aims.

Likewise, there is no fixed number of objectives but you will be required to produce sufficient objectives to be able to measure progress towards meeting the aim/s.

## Project Plan

In this section, you present a Gantt Chart outlining all of the tasks involved in the project, and their order, shown against a timescale. This gives you an overview of the project tasks, and when these need to be finished.

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Task** | **Responsibility** | **Weeks** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| **1** | Literature review | Student #1, Students #2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** | Standards and limitations | Student #1, Student #3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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## Report Organization

In this section, you describe briefly how you organized your report. You start with chapter 2. (e.g. chapter 2 present a design options for …..; chapter 3 describes the proposed design and the methodology followed to solve the problem of …; chapter 4 validates the proposed design through simulations and experiments; chapter 5 concludes the report and recommends some future work.)

**NOTE:** The main body of the report should typically contain the following sections (please refer to the student handbook for more details about the content of each section):

* Introduction
* Literature review
* Proposed Design Description and Analysis
* Proposed Design Testing and Validation
* Conclusion and future work

Due to the diversity of projects, **students should consult their project supervisor** about the most appropriate structure for their Senior Design Graduation Project.

Number all paragraphs but do not use more than three levels e.g. 1.2.4 but not 1.2.4.1. Use alphabets, bullet points, etc. if you feel it is necessary to have further sub-sections.

Chapters may start with an introduction; number all sub-sections but do not use more than three levels e.g. 2.1.4 but not 2.1.4.1. Use alphabets, bullet points, etc… if you feel it is necessary to have further sub-sections.

# Design Options

## Section Heading

Explain the available options of the design then justify the choice of components, software tools, communication protocols, etc.

This is where you type your main text. Figures and Tables must have captions associated to them. Use Figure Text or Table text Styles for text formatting in the figures and tables respectively. Please refer to the examples below:



Figure 2‑1 This is a sample figure

Table 2‑1 This is a sample table caption.

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | C | D |
| 1 | 2 | 3 | 4 |
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[To insert a caption for a picture, Right-Click on the picture and click on Caption, or alternatively, highlight the appropriate picture, select Insert->Reference->Caption. You are advised to use word to automatically generate and manage figure numbers. Otherwise, you’ll end up having to manually adjust figure numbers to match List of Figures.]

All tables, diagrams, charts and graphs must be referenced in the text (using figure numbers) and need to be followed by a caption that briefly describes the table, diagram, chart or graph; the caption should include some form of numbering.

## Design Constraints and Standards

Identify constraints on the design problem, and establish criteria for acceptability and desirability of solutions. Constraints are restrictions that keep something from being the best that it can be. They can be problems that arise or issues that come up. The constraints must be identified through discussions with your project stakeholders (e.g. supervisor, external customers, etc.). This identification must be conducted at the starting of your project. However, some design constraints can be modified in consultation with the stakeholders during the project implementation if they are found unrealistic or very difficult to meet. However, changes must be justified and clearly explained.

When specifying design constraints and standards, it is important to indicate why and how will they apply to your design. Design constraints can be qualitative or quantitative.

ABET listed few examples of possible constraints in its recent criteria as: accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, regulations, schedule, standards, sustainability, or usability.

# [Another Chapter]

## Section Heading

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## Section Heading

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# Design Testing and Results

## Section Heading

In this chapter, you describe how you used simulation and/or experiment to validate your design. You have to clearly describe how you implemented your design and what are all the considerations, assumptions and simplifications you made. You present a selection of your results and discuss them very clearly highlighting how you are validating your proposed design against your initially defined aims.

You can have as many section headings as needed. Nevertheless, keep the last two as follows.

## System Limitations and Compliance with Design Constraints

In this section, you can summarize the limitations of your design based on what you have already presented in the previous sections where you discussed the results obtained. Also in this section you benchmark your final design characteristics and specifications with the design constraints that you listed in chapter 2. You have to explain and justify any deviation.

## Solution Impact

In this section, you discuss the impact of your engineering solution in a global, economic, environmental, and societal context.

# Conclusion & Future Work

## Conclusion

This section should be a summary of the aims of the project and a restatement of its main results

* Do not introduce new material
* Briefly summarize, combine and restate the main points made in the main body of the report
* Be honest and objective in your conclusions.

## Recommendations for Future Work

This section is for expressing your unrealized ideas. It is a way of:

* Stating what could have been done if only time allows it
* A starting point for someone else to continue the work.

REFERENCES

1. Reference 1
2. Reference 2
3. Reference 3

[ENTER YOUR REFERENCES HERE - Information obtained from books, conference and journal papers, or the Internet **must** be referred to in the text using the IEEE referencing style.

References to textbooks should include the author, title, edition number or year, name of publisher and page numbers or section numbers.

Each reference must be referred to at least once in the main body of the report.

References to web pages should include the title of the page, not just the URL.]

Appendices

[ENTER YOUR Appendices HERE - Appendices can be included if relevant, this could be:

* Extensive technical details or mathematical proofs, etc.
* Lengthy tables of data
* Copies of surveys
* Other documents you have written (e.g. user manuals, technical manuals)

The appendices should not contain any of the source code for your software (will be submitted separately)

Should be headed by letters in alphabetical order (i.e. Appendix A, Appendix B, etc.)