**Project Title**

By

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**TEAM NO.: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ SPRING 2025 INTAKE**

Project Advisor

**Name of Advisor**

Project Co-advisor

**name of CO-ADVISOR**

Project Customer

**Name of customer**

EE 499 Senior Design Project

Department of Electrical and Computer Engineering

Faculty of Engineering

King Abdulaziz University

Jeddah – Saudi Arabia

JANUARY 2025 G – RAJAB 1446 H

**Project Title**

By

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**TEAM NO.: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ SPRING 2025 INTAKE**

A senior design project report submitted in partial fulfillment of the requirements for the degree of

Bachelor of Science

in

Electrical and Computer Engineering

King Abdulaziz University, Jeddah, Saudi Arabia

Checked and Approved by the Advisor:

Advisor Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# ABSTRACT

**PROJECT TITLE**

The abstract should contain several paragraphs describing the problem, customer requirements and needs, methodology used to solve the problem and satisfy the customer needs, the final product, and the unique achievements of the project.

***Index Terms***— e.g. Radar Remote Sensing, Auto-Steering Systems, Power Control Electronics, Electric Wheelchair, Electric Motor Control, Distance Detection.

# ACKNOWLEDGEMENT

In this section, you should thank any person that helped or contributed to this achievement, starting with your advisor, family members, faculty members, lab engineers, and/or any company or entity.

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# Chapter – 1 Introduction

## 1.1 Background

This section should include relevant information for the reader to get familiar with the project topic and the terminologies used in the project title and abstract. This section may also include issues and circumstances surrounding the assigned project, and/or what is needed for the reader to be convinced that there is a need to solve a problem through engineering design. You may also include the latest statistical data and information needed for the reader to understand the physics and mathematics behind the problem and/or engineering fundamentals involved.

## 1.2 Problem Statement

A problem statement is an area of concern, a condition to be improved upon, a difficulty to be eliminated, or a troubling question that exists in theory or in practice that points to the need for meaningful understanding and deliberate investigation.

* The problem to be solved is clearly stated, specific, and right to the point.
* The problem statement should not contain solutions, abbreviations, or difficult terminologies without appropriate explanation.

## 1.3 PROJECT OBJECTIVES

This section should include the higher-level and lower-level objectives for the project.

* The higher-level objectives are the global, long-term goals for the project, such as improving the health of elderly people or reducing the waste of electrical energy.
* Your project will contribute to achieving these objectives, but it may require multiple projects to fully achieve these higher-level objectives.
* Lower-level objectives are the specific, technical features or behaviors that the project will have or exhibit.

## 1.4 ProDuct Design Specifications (PDS)

In this section, customer needs are correctly identified and transformed into complete, specific, and concise design requirements. The requirements should not contain solutions.

This section should include the following:

* A discrete list of technical, measurable design specifications that must be achieved and validated to complete the project (musts / in-scope specifications).
* A discrete list of technical, measurable design specifications that are desirable but not required to be achieved in the project (wants / out-of-scope specifications).
* Applicable realistic constraints (limits or restrictions on the design).
* Relevant engineering standards.
* Realistic assumptions.
* Project deliverables (final products that will be given to the customer).

# Chapter – 2 Literature Review

* Review current technologies and past designs related to your project idea.
* Review previously used solutions to similar problems in the literature.
* Cite books, journal papers, conference papers, reliable websites, etc.
* Cited reference should include a summary of the relevant information and discuss the common theme or issue with your project topic.

# Chapter – 3 PROject DESIGN

## 3.1 Alternative Designs

Based on the Literature Review, brain-storming sessions within the team and discussions with the SDP advisor, customer and other experts, the team must propose at least three alternative designs that satisfy the PDS (at least the musts and constraints). A design is considered an alternative if it uses a different approach.

For each design, you should sketch and explain the general block diagram for the proposed design, describe the main components, and clarify how the system would satisfy the design requirements.

After describing each alternative design individually, make a table listing the advantages and disadvantages of each design. Select the best (baseline) design with appropriate justification for your selection.

## 3.2 Baseline Design

Sketch the block diagram for the baseline design (should be more detailed than the one shown in the previous section). Describe the function of every block using referenced engineering drawings, flowcharts, technical specifications tables, essential design calculations, etc. Also, it is required to mention and use any relevant engineering standard (e.g. components specifications in datasheets, Bluetooth or USB communication protocol). The description should be thorough with enough details about the baseline design such that we can give it to any other engineer to implement. You should also specify the system inputs and outputs and include the operating instructions. Furthermore, an approximate cost for implementing the baseline design should be estimated by determining the price of the components in the design.

# Chapter – 4 implementation

* Document all the practical details for implementing the design.
* Include subsections showing details of the multiple trials you did to reach a satisfactory level. Also, include any related design calculations.
* Justify and document any changes from the baseline design (e.g. addition or replacement of components).
* Include details describing the assembly of the final product showing multiple photographs.

# Chapter – 5 Validation Experiments

This chapter includes the designed validation experiments for testing major parts of the product and/or the final product to validate the design scope (musts and implemented wants). Each validation experiment must include the following:

* Experiment objectives.
* Background information relevant to the experiment
* Work plan with detailed steps
* Appropriate tools
* Collected data displayed in organized figures and tables.
* Data analysis and interpretation of data to draw conclusions with clear reasoning.

# Chapter – 6 Discussion and Conclusion

## 6.1 Evaluation OF Solution

Discuss whether the solution satisfied the customer’s design requirements (musts, wants, constraints, etc.) based on the results of the validation experiments.

## 6.2 Impact OF Solution

Discuss the global, social, environmental, economic and/or safety impacts of your solution.

## 6.3 Future Work

List recommendations for future improvements to the implemented prototype.

## 6.4 Conclusion

Summarize the need, the solution, and the final achievements of this project.

# References

[1] J.G. Webster, *Medical Instrumentation: Application and Design*, 4th ed., John Wiley and Sons, 2010

[2] B. Karagozoglu, *A Guide to Engineering Design Methodology and Technical Presentation*, KAU, Faculty of Engineering, Dept. of Electrical Engineering, 2003

[3] Ulaby, F., *Fundamentals of Applied Electromagnetics*, Pearson, Seventh Edition, 2015 Global Edition

[4] Bausch and Lomb, *The impact social media and proximity of digital screens is having on our eyes*, <https://bausch.co.uk/news/blink-rate> [Accessed 17/10/2021]

# AppendiX – A: EvaluatION Comments

Insert the evaluators’ comments for each of the evaluation stages.

## A.1 IDENTIFYING THE PROBLEM AND DESIGN REQUIREMENTS

## A.2 CONCEPTUAL DESIGNS

## A.3 TERM 1 REPORT AND PRESENTATION

## A.4 PROGRESS UPDATE

## A.5 FINAL REPORT AND PRESENTATION

# AppendiX – B: Effective Team Interactions

* List in one table the names, photographs, university ID numbers, specializations, email addresses, job experiences and roles in the team for all the members.
* Insert all the Meeting Minutes signed by all the participants, including the advisor and/or customer.

# AppendiX – C: Use of Project Management Techniques

* Identify essential tasks for implementing the baseline design.
* Assign the tasks to individual members.
* Estimate the time required for each task and set deadlines.
* Sequence the tasks based on their dependence on each other and create a Gantt chart using a project management software.