DEVELOPMENT OF CUSTOM INVENTORY SYSTEM FOR ASIA WOOD INTERNATIONAL CORPORATION – A SKILL-BASED PARTNERSHIP

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Approval Sheet

This design project entitled **"DEVELOPMENT OF CUSTOM INVENTORY SYSTEM FOR ASIA WOOD INTERNATIONAL CORPORATION – A SKILL – BASED PARTNERSHIP"** prepared by **Asugas, Kenneth R. , Delinia, Filjohn B. , Eulin, Ryan Bertrand B. ,Hermosura, Leigh B. , Maringal, Czer Justine D. and Polestico, Paul Justine D.** of the Computer Engineering Department, was examined and evaluated by the members of the Student Design Evaluation Panel and is hereby recommended for approval.

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SOFTWARE DESIGN PROJECT INFORMATION

2ND Semester, SY 2025-2026

Student/Team **Team HAMPED Devs**	Kenneth R. Asugas Filjohn B. Delinia Ryan Bertrand B. Eulin Leigh B. Hermosura Czer Justine D. Maringal Paul Justine D. Polestico
Project Title	Development of Custom Inventory System for Asia Wood International Corporation – A Skill-Based Partnership
Project Concentration Area	Software Development
Design Objectives	The general objective of this project is to develop a Web-Based Custom Inventory Management System for a wood-processing corporation to replace manual spreadsheet-based tracking with a centralized and automated software solution. Specifically, it aims to: 1. Design the system architecture and database structure, including: ● A relational database schema optimized for wood product categorization (e.g., species, dimensions, and grades). ● A user-friendly web interface (UI) designed for efficient data entry and real-time stock monitoring. 2. Develop the software modules and functionalities, such as: ● An automated inventory tracking system to manage incoming and outgoing wood products. ● A secure user authentication system with role-based access for admins and warehouse staff. ● A automated report generation tool for stock levels, sales and transaction history. 3. Test and evaluate the *system*'s accuracy and performance to ensure reliable data synchronization and integrity across the corporation's operations.

Constraints	
Constraint (Metric)	Time Constraint - The system must be deployed and completed within 4 months of the entire semester.
Constraint (Metric)	Money Constraint - The system must be developed in a cost-friendly manner while ensuring high-speed execution and low memory consumption by utilizing open-source libraries and a local database.
Constraint (Metric)	Storage Constraint - The system must maintain a minimal installation footprint, aiming for a file size that does not exceed a few megabytes, ensuring deployment across various hardware configurations.
Constraint (Metric)	Performance Constraint - The system must prioritize high-speed data processing and responsiveness with a target response time of less than one second for all database activities,ensuring consistent performance even in intense activity volume.
Constraint (Metric)	Efficiency Constraint - The system must be optimized for minimal RAM and storage utilization to achieve low hardware resource footprint by means of decreasing computational demands to decrease energy consumption and heat generation, thereby prolonging the lifespan of the client's existing hardware.
Constraint (Metric)	Design Constraint - The system must feature a digital catalog-style interface that allows users to browse and visualize products in an e-commerce-inspired layout. However, it is strictly limited to internal inventory management and informational display, therefore no mode of payment features will be included. The UI will be designed for high readability and minimalist navigation, ensuring consistency in the system's speed and efficiency.
Other constraints: These constraints do not affect each design; therefore, these were not included in selecting the best design.	
Constraint	Definition.
Corporate Compliance	The system must strictly adhere to the corporation's policies regarding data handling, inventory reporting formats, and security protocols. This ensures that all digital records and stock reports generated are valid for the company's administrative and auditing purposes.
Budgetary Limits	The development and implementation of the software must be executed within the financial resources allocated by the partnership. This includes costs related to web hosting, database maintenance, or any third-party software licenses.
Timeframe	The project must be completed, tested, and ready for deployment within

	the agreed-upon schedule or semester timeline. All software modules (Inventory, User Management, and Reporting) must be functional by the set deadline.
Data Integrity and Accuracy	The system must maintain a 100% accuracy rate in calculating stock levels and transactions. Any discrepancy between the physical count and the digital record must be traceable through an automated audit log.
Platform Accessibility	The inventory system must be accessible through standard web browsers (e.g., Google Chrome, Mozilla Firefox) to ensure that the corporation can use the system without the need for high-end hardware. upgrades.
Standards	
W3C (World Wide Web Consortium)	The international standard for web development (HTML, CSS, and JavaScript) to ensure cross-browser compatibility. This was used as a guide to ensure that the inventory website displays and functions correctly across different web browsers like Chrome, Firefox, and Safari.
ISQ/IEC 25010	A global quality model standard that evaluates software based on characteristics like Usability, Reliability and Security. This standard was used to design a user-friendly interface for the warehouse staff, ensuring the system is easy to navigate and minimizes input errors.
SQL/ACID Properties	A set of database standards (Atomicity, Consistency, Isolation, Durability) that guarantees reliable data transactions. These properties were applied in the database design to ensure that every stock update or sales record is accurately saved and protected from data corruption.
OWASP (Basic Security)	A standard framework for web application security to protect against common vulnerabilities and data breaches. This served as a baseline for securing the login system and protecting the corporation's inventory data from unauthorized access or malicious attacks.

For single pages, use "p." For multiple pages, use "pp."
Appendices should be italicized and referred to every time it is mentioned.

Abstract

This project addresses the need for enhanced data accuracy, operational efficiency, and organized stock monitoring in a corporate wood-processing environment by designing and implementing a Web-based Inventory Management System. The system replaces traditional manual record-keeping with a digital framework that ensures real-time tracking of inventory levels and transactions. By integrating a centralized SQL database and a secure web-based interface, the system provides the corporation with a reliable tool for managing wood stocks and generating automated administrative reports. Key features include secure user authentication, dynamic stock calculation, and a comprehensive dashboard for inventory visualization. Performance evaluation demonstrates significant improvements in data integrity and a reduction in manual auditing time. The project highlights the potential of web-based solutions in streamlining corporate workflows, offering a scalable and efficient tool for modernizing inventory management systems within the timber industry.

Keywords: *Inventory Management System, Web-Based Application, Data Integrity, Corporate Compliance, Wood Industry, Stock Monitoring, Database Reliability*

List of Tables

List of figures

List of abbreviation

Definition of terms

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CHAPTER 1: THE PROJECT AND ITS BACKGROUND

1.1 The Problem

Asia Wood International Corporation (PH Branch) currently uses Microsoft Excel to manage its inventory. While Excel is useful for basic record-keeping, it is not designed to handle complex inventory processes. The system relies on manual data entry, which increases the risk of errors, duplicate records, and outdated information.

Using Excel makes it difficult to track inventory in real time, monitor stock movements, and ensure data accuracy. Inventory updates are not automatically reflected, which may result in incorrect stock levels, delayed reporting, and poor inventory control. Furthermore, generating reports and monitoring inventory performance require extra time and effort.

Due to these limitations, the use of Excel is no longer sufficient to support the company's inventory management needs. Therefore, there is a need to develop a custom inventory system that will provide accurate, real-time tracking and improve overall inventory management for Asia Wood International Corporation.

1.2 The Client

Asia Wood International Corporation is a business organization engaged in the wood industry, handling various inventory items such as raw materials, finished products, and operational supplies. The company's operations require accurate inventory monitoring to support daily activities and ensure smooth business processes.

As the client of this project, Asia Wood International Corporation seeks to improve its current inventory management practices. The company aims to replace its Excel-based inventory recording with a custom inventory system that is more reliable, efficient, and suitable for its operational needs. Through this system, the company expects better inventory control, improved data accuracy, and easier access to inventory information.

Table 1-1. Client and Engineering Requirements / Considerations

Client Requirements / Considerations	Engineering Requirements / Considerations
The system can	
The system can	
The system can	

1.3 The Project

To address the challenges of managing inventory at Asia Wood International Corporation, this project aims to improve the accuracy, efficiency, and accessibility of inventory operations.

The proposed Inventory System is a web-based application that enables the client to monitor the health of company inventory through a standard web browser, allowing access across multiple devices and locations.

The system is developed specifically for Asia Wood International Corporation, an international wood-working company, and is designed to track materials and finished products across multiple categories while monitoring their stock status.

1.4 Project Objectives

The general objective of this project is to design and develop a Web-based Inventory Management System that improves data accuracy, operational efficiency, and organized stock monitoring for a corporate wood-processing environment by replacing manual record-keeping with a reliable and centralized digital solution.

Specifically, the project aims to:

- Design the required hardware and system infrastructure to support a web-based inventory platform, including server and network resources for reliable system deployment.
- Develop a web-based inventory management system application with secure user authentication and role-based access control
- Develop a centralized SQL database for real-time storage, retrieval, and management of wood stock data and transaction records.
- Develop automated stock calculation and reporting features to support administrative decision-making and corporate compliance.
- Develop a dashboard interface for clear data visualization and monitoring of inventory levels and transaction history.
- Test and evaluate the device's accuracy in tracking inventory data and generating reports, ensuring data integrity and system reliability.

1.5 Scope and Delimitations

This project involves the design, development, and evaluation of a Web-based Inventory Management System for a corporate wood-processing environment. The system supports authorized corporate personnel in managing wood inventory records, including stock-in and stock-out transactions, real-time inventory monitoring, automated stock calculations, and report generation through a centralized SQL database. Secure user authentication and role-based access control are implemented to maintain data integrity and system security.

The system also includes a publicly accessible web interface that allows clients to browse the wood products offered by the corporation and view basic product information. Client access is

limited strictly to product viewing and does not permit access to inventory data, stock availability, or internal management functions. The system is accessible through standard web browsers and is evaluated based on data accuracy, operational efficiency, and reliability.

The project is limited to inventory management and product information display functionalities. It does not support online ordering, payment processing, customer account creation, or order tracking features. Financial accounting, payroll systems, supplier management, and full enterprise resource planning (ERP) capabilities are excluded.

The system does not incorporate hardware-based automation such as barcode scanners, RFID systems, or IoT-enabled inventory tracking devices. Evaluation of the system is confined to functional testing, data accuracy, and efficiency improvements and does not include advanced cybersecurity testing, long-term scalability analysis, or multi-branch deployment. The application is designed specifically for managing wood products and does not extend to other industries or material categories.

1.6 Design Constraints

This section outlines the constraints that may affect the design, development, and deployment of the system.

- Time
  - Development timelines may be impacted by scheduling conflicts between the development team and the client, potentially causing delays in project completion.
- Accessibility
  - The Inventory System requires an active internet connection to function. Limited or unstable connectivity may prevent system access or result in delayed data synchronization and reduced accuracy.
- Security
  - As a web-based application, the system is inherently exposed to internet-based threats, making it more susceptible to security risks such as malware attacks and data breaches.
- Marketability
  - Unlike native applications distributed through app stores, the Inventory System relies on direct URLs or search engine access, which may reduce its discoverability among potential users.
- Performance
  - System performance may degrade as the number of concurrent users increases, potentially affecting response times and overall user experience.

Possible constraints: accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, regulations, schedule, standards, sustainability, or usability. (wag muna tanggalin, baka may naiisip pa kayong constraints mga pre lapag niyo lang)

Safety (Root-Mean-Squared Error)
First sentence must explain the constraint. Functionality is… .
The second sentence must explain the metric. Error rate defines … .
Third sentence explains how the metric is obtained. It is computed by 1 - accuracy.
The Fourth sentence must explain the relationship between the constraint and the metric. Followed by the conclusion. A higher error rate indicates lower functional performance … .
Conclusion. Therefore, the design with the lowest error rate is the winning design.

Other constraints: These constraints do not affect each design; therefore, these were not included in selecting the best design.

Sustainability

Public Health

Welfare

Social

Global

Cultural

1.7 Engineering Standards

The engineering standards serve as the foundation for the overall design and functionality of the project. To ensure that all specifications and requirements are carried out in compliance with these standards, the project adheres to the following guidelines:

ISO/IEC 25010 (Systems and Software Quality Model)
This standard defines quality characteristics for software systems such as usability, reliability, security, and maintainability. The system shall follow the ISO/IEC 25010 standard to ensure that the website is user-friendly, reliable, secure, and easy to maintain. This guarantees that the interface design and system functions meet acceptable software quality levels.

W3C Web Content Accessibility Guidelines (WCAG 2.1)
These guidelines provide standards for making web systems accessible to all users. The system shall adhere to WCAG 2.1 to ensure readable text, proper color contrast, and clear navigation, allowing employees of Asia Wood International Corporation to use the system effectively regardless of device or user limitations.

HTML5, CSS3, and Modern Web Standards
These standards define the structure, presentation, and behavior of modern web applications. The system shall follow HTML5 and CSS3 standards to ensure cross-browser compatibility, responsive design, and consistent performance across different devices used within the organization.

1.8 Engineering Design Process

<Intro>

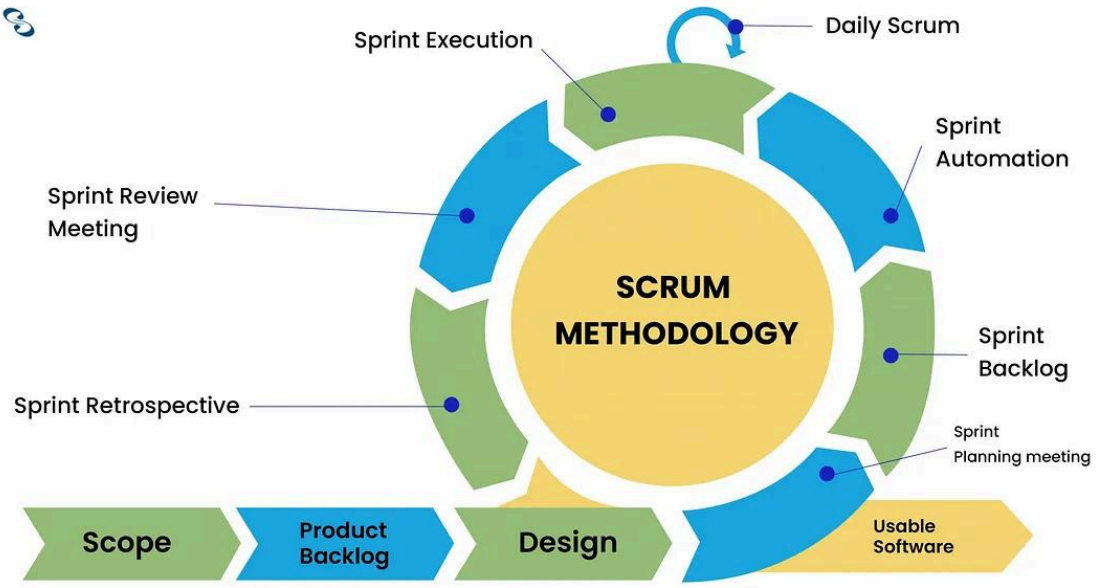

Figure The Agile Design Process (TeachEngineering, 2023)

<Explain the figure>

1.8.1 Ask: Identifying the Need and Constraints

1.8.2 Research the Problem

1.8.3 Imagine: Develop Possible Solution

1.8.4 Plan: Select a Promising Solution

1.8.5 Create: Build a Prototype

1.8.6 Test and Evaluate the Prototype

1.8.7 Improve: Redesign as Needed

CHAPTER 2: SOFTWARE DESIGN

<Brief description of chapter 2>

2.1 Description of the Design Solution

2.1.1 General Description

This section provides a general perspective/overview of the entire design solution.

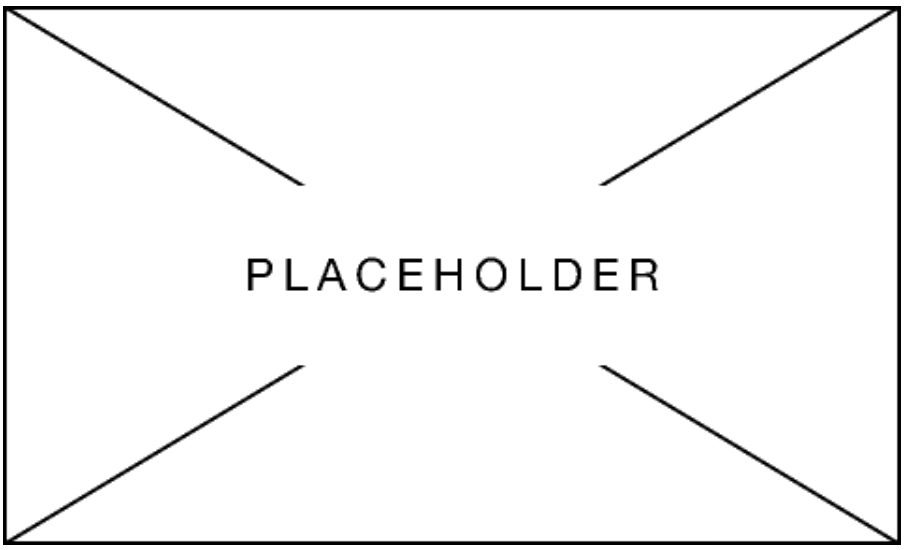

Figure xx Illustrative Diagram of the System

Provide an explanation/analysis of the illustrative diagram.

2.1.2 Engineering Principles Involved

Short introduction of the section.

Engineering Principle

Explanation of relevant studies to the principle used.

2.1.3 Prior Art Analysis

Discusses the existing solutions with existing patents (and other similar registrations) and compares it with the design project.

Features of existing solutions that are particularly of interest should be discussed. Not necessarily aligned completely with the title; what sets your project apart?

Matrix Format is preferred, in addition to narratives. Explain the table.

Table xx Prior Art Analysis Matrix

Design	Features				
	Feature A	Feature B	Feature C	Feature D	Feature E
Prior Art A	X		X		

Design	Features				
	Feature A	Feature B	Feature C	Feature D	Feature E
…					
Prior Art *n*		X			
PROJECT	X	X	X	X	X

2.2 General System Architecture

This section does NOT cover definitions of the architectural elements. (that was already done earlier) Rather, this section talks about HOW the engineering concepts / elements was implemented.

2.2.1 Hardware Elements

2.2.2 Software Elements

A. Embedded Software

B. Application Software

Software implemented in web, desktop, mobile devices should be discussed here.
Libraries, platforms, frameworks, languages should also be included.
If a UI has been developed in the device(i.e. Phone app), then it should be included here as well.

C. Key Algorithms Used (Optional)

2.2.2 System Algorithm

2.2.3 Data, Datasets, and Processing

a. Datasets

This section describes the data you used, including data sets that you have acquired from external sources, data you have generated, and data you (may have scraped or mined).
Include in your discussion the detailed PROCESS on how you acquired your data.

b. Data Processing Scheme and Algorithms

This section talks about the processing (including pre and post).
Show the raw dataset, the dataset after pre-processing, and the final dataset.
Include the pre-processing steps on the data.
Discuss also where these processes are applied in your design.

Note: If your alternative designs are focused on algorithms (ML/DL technologies), then you should not mention them here. Alternatively, if your designs do not involve ML/DL but they are used in the SOFTWARE DESIGN, then this is where they have to be mentioned.

c. Other Data Utilized in the Design
This section talks about data that are not necessarily used in the data analytics part, (i.e. Database of patient names, constants used in calibration, etc.)
Including mock data.

2.3 Design Alternatives

2.3.1 Rationale for Design Alternatives
Discuss here why THESE are the design alternatives you used. Why are these critical for the design? Why do these design alternatives matter?

Note: This is similar to the previous "Discussion of Alternative Designs," make sure to keep the content of this section concise. No need to discuss the designs in great detail here as long as you follow the guide questions above. Each design has a section for your extensive discussions.

2.3.1 Design Alternative 1:

A. Engineering Principles of Alternative
Contains discussions (with references) of the technologies, principles, and concepts utilized (i.e. Machine Learning, Convolution, Kinematics, etc).

Note: This repeats for all 3 designs. It must not mention the principles mentioned above but instead those specific to the design alternative.
B. Architecture of Design Alternative

Discuss how key components, sub-systems, algorithms, of this design alternative are implemented.

C. Constraints

Constraint A

Constraint B

Constraint C

Constraint D

Constraint E

iv. Evaluation Results (if model)

2.3.2 Design Alternative B

i. Engineering Principles of Alternative

ii. Architecture of Design Alternative

iii. Evaluation of Constraints

Constraint A

Constraint B

Constraint C

2.3.3 Design Alternative C

i. Engineering Principles of Alternative

ii. Architecture of Design Alternative

iii. Constraints

Constraint A

Constraint B

Constraint C

2.4 Standards Involved in the Design

This section presents the standards followed by the design, including their references. Matrix may be used to show how standards are used in each specific design.

Table xx Summary of Standards Involved in the Alternatives

Standard	Brief Description	DESIGNS		
		DESIGN A	DESIGN B	DESIGN C

IEC 60950	Product Safety Standard for electronic and computing products.	Used in enclosure, power supply leakage, ESD, wiring, and connectors.		
Philippine National Standards for Drinking Water (PNSDW)	Standards for drinking-water quality, water sampling and examination and evaluation.	Used in conditional statements to determine if water is drinkable.		
IEEE 1309-2013	Standard for Calibration of Electromagnetic Field Sensors and Probes	NA	NA	Calibration of sensor used in detecting heavy metals.
IEEE 1858-2016	IEEE Standard for Camera Phone Image Quality	Reference for image processing camera.	NA	NA

Explain this table and end with a summary.

CHAPTER 3: DESIGN TRADEOFFS

3.1 Summary of Constraints

Explain table xx below in this paragraph.

Table xx Summary of Design Constraints

Designs	Constraints				
	Constraint A (Metric)	Constraint B (Metric)	Constraint C (Metric)	Constraint D (Metric)	Constraint E (Metric)
Design A					
Design B					
Design C					

Synthesize for the next section.

3.2 Trade-offs

Table xx Preference and Importance of Constraints

Constraints	Preference	Importance (raw)	% Importance

Explain the use of Pareto Multi-Criteria Decision Making (MCDM).

$$Minimization = 9\times\left(\frac{Max\,Value - Raw\,Value}{Max\,Value - Min\,Value}\right) + 1$$ Equation No. xx

$$Maximization = 9\times\left(\frac{Raw\,Value - Min\,Value}{Max\,Value - Min\,Value}\right) + 1$$ Equation No. xx

3.2.1 Tradeoff 1: Constraint A (Metric)

3.2.1.1 Design 1: Normalization of Constraint A (Metric)
<Introduce>

Table xx Evaluation of Three Design Alternatives based on Constraint A

Design	Constraint (Metric)

<Analyze>

3.2.1.2 Design 2: Normalization of Constraint A (Metric)

Table xx Evaluation of Three Design Alternatives based on Constraint B

Design	Constraint (Metric)

3.2.1.3 Design 3: Normalization of Constraint A (Metric)

Table xx Evaluation of Three Design Alternatives based on Constraint C

Design	Constraint (Metric)

3.2.2 Tradeoff 2: Constraint B (Metric)

3.2.2.1 Design 1: Normalization of Constraint B (Metric)
3.2.2.2 Design 2: Normalization of Constraint B (Metric)
3.2.2.3 Design 3: Normalization of Constraint B (Metric)

3.2.3 Tradeoff 3: Constraint C (Metric)

3.2.3.1 Design 1: Normalization of Constraint C (Metric)
3.2.3.2 Design 2: Normalization of Constraint C (Metric)
3.2.3.3 Design 3: Normalization of Constraint C (Metric)

3.2.4 Tradeoff 4: Constraint D (Metric)

3.2.4.1 Design 1: Normalization of Constraint D (Metric)
3.2.4.2 Design 2: Normalization of Constraint D (Metric)
3.2.4.3 Design 3: Normalization of Constraint D (Metric)

3.2.5 Tradeoff 5: Constraint E (Metric)

3.2.5.1 Design 1: Normalization of Constraint E (Metric)
3.2.5.2 Design 2: Normalization of Constraint E (Metric)
3.2.5.3 Design 3: Normalization of Constraint E (Metric)

3.3 Summary of the Normalized Values of the Three Designs

Designs	Constraints				
	Constraint A (metric)	Constraint B (metric)	Constraint C (metric)	Constraint D (metric)	Constraint E (metric)
Design A					
Design B					
Design C					

3.4 Designers Raw Ranking for the Three Designs

Table xx Designers Raw Ranking for the Three Designs

Decision Criteria	Criterion's Importance		Ability to Satisfy Criterion		
	Scale (0-10)	Percentage (%)	Design A	Design B	Design C

3.5 Sensitivity Analysis
3.6 Influence of the Design Tradeoffs in the Final Design

CHAPTER 4: FINAL DESIGN

4.1 Final Design
4.1.1 Software Application
4.1.2 Hardware Design
4.2 Test Procedures and Evaluation
4.2.1 Test Procedures
4.2.2 Test Evaluation
4.3 Test and Evaluation Results
4.3.1 Test Results
4.3.2 Evaluation Results
4.4 Conclusion
4.5 Impact of the Design
4.5.1 Societal
Target UN SDG.
4.5.2 Ethical
In compliance with known ethical codes/standards
4.5.3 Legal
National / Intl Laws
4.6 Sustainability Plan

CHAPTER 5: BUSINESS PLAN AND MODEL

5.1 Business Plan
5.1.1 Executive Summary
5.1.2 General Company Description
5.1.3 Products and Services Offered
5.1.4 Marketing Plan
5.1.5 Marketing Strategy
5.2 Business Model
5.3 Intellectual Property (IP) Reports

REFERENCES

Note: This must be done using APA format. Check the guide for more details: https://www.scribbr.com/apa-style/apa-seventh-edition-changes/

Covey, S. R. (2013). *The 7 habits of highly effective people: Powerful lessons in personal change*. Simon & Schuster.

APPENDICES

Include standards preview, certification from experts/clients, code snippets, patent reports, and other long and detailed documents here. Format is as follows below:

APPENDIX A: TITLE OF THE SECTION

<figure>

Note: No figure number. Standards must be followed with a paragraph explaining its contents and purpose.