**ANKARA UNIVERSITY**

**ENERGY SYSTEMS ENGINEERING**

SPRING 2024-25

ENE 409 – ENERGY DESIGN PROJECT II

FINAL REPORT

Group number :

Group members :

**abstract**

Abstract should be a short summary of the report. It should not exceed 250 words.

**Özet**

Raporun kısa bir özeti olmalıdır. 250 kelimeyi geçmemelidir.

**KEYWORDS**

Add 4-6 keywords about your study.

**NOMENCLATURE**

Add abbreviations.

Table of Contents

[**abstract** 2](#_Toc190293706)

[**1. INTRODUCTION** 3](#_Toc190293707)

[**2. MANUFACTURING** 3](#_Toc190293708)

[**3. DEMONSTRATION SETUP, CONTROL ALGORITHMS AND SOFTWARE** 3](#_Toc190293709)

[**4. TEST RESULTS AND DISCUSSION** 4](#_Toc190293710)

[**5. CONCLUSION** 4](#_Toc190293711)

[**REFERENCES** 4](#_Toc190293712)

[**APPENDIX** 4](#_Toc190293713)

1. **INTRODUCTION**

In this section, you should include:

* Provide Background Information – Explain the context and importance of the study or project. What is the motivation behind it? Why is it relevant?
* Define the Objectives – Clearly state the purpose of the report. What are you trying to achieve? Overview of design specification and performance targets.
* Outline the Scope – Briefly describe what will be covered in each section.
* Highlight Key Challenges – Mention any technical or theoretical challenges addressed in the study.

1. **MANUFACTURING**

You should provide the details about how the system is manufactured in this section. If any update is needed for your manufacturing plan, mention them here.

*Notes:*

1. *Make sure that you rationalize your decisions about manufacturing and assembly process. Provide valid reasoning for your steps. Mention the test set up considerations if relevant.*
2. *Speculate on why and how the manufactured system can contribute to the evolution of your final design.*
3. *Refer to the technical drawings –parts and assemblies- in the Appendix that were added in critical design for the critical design manufacturing purposes.*
4. **Add proforma or invoice for both product and service purchases to appendices; invoices for those who will produce the prototype, proforma for the rest.**
5. **DEMONSTRATION SETUP, CONTROL ALGORITHMS AND SOFTWARE**

In this section, you are expected to give explanations about your control algorithms and software (if applicable), and your demonstration set-up. This section includes following subtitles:

* Control system (if applicable)
* Demonstration set-up

*Notes:*

1. *In the control system, you should mention which hardware and software you have used in the project. You should provide flow charts and relevant diagrams to explain your algorithms. Provide any code you have written as an appendix refer to them in this section.*
2. *After the manufacturing, you will need to demonstrate that your design satisfies the performance criteria you have determined. Think on how you can measure the performance of your system and which kind of environment you will demonstrate. Determine which parameters you will measure from which part. You should provide explanations and figures for experimental set-up of your demonstration under this title.*
3. ***For those who will not produce the prototype; include the Simulink system & SolidWorks geometry and the exploded view of components.***
4. **TEST RESULTS AND DISCUSSION**

The results gained from the demonstration should be reported in this section. Provide a discussion about whether your design satisfies the design specifications and performance targets you have determined earlier. Mention possible improvements to your system.

*Notes:*

1. *Including graphs, tables and-or figures of your test results if possible is suggested strongly.*
2. *You should clearly indicate with a yes or no whether your system is successful or not. If the answer is no, you should discuss the possible reasons.*
3. **Cost-benefıt analysıs**
4. ***Initial Costs (Capital Expenditure - CAPEX)***
5. ***Material Costs****: Estimated costs of materials if the system were to be manufactured.*
6. ***Manufacturing Costs****: If the design were produced, what would be the fabrication, machining, or assembly costs?*
7. ***Installation Costs****: Infrastructure, land, labor, and setup expenses.*
8. ***Operational Costs (Operational Expenditure - OPEX)***
9. ***Maintenance & Repairs****: Estimated costs of upkeep over time.*
10. ***Energy Consumption****: For systems requiring input power (e.g., pump storage system energy losses).*
11. ***Labor Costs****: If regular monitoring or operation is needed.*
12. ***Benefits & Revenue Generation***
13. ***Energy Savings / Production****: How much energy does the system generate or save compared to conventional methods?*
14. ***Efficiency Gains****: Improvements over existing solutions in energy output, durability, or environmental impact.*
15. ***Market Value / Payback Period****: How long until the project pays for itself?*
16. ***Environmental & Social Benefits (Externalities)***
17. ***Carbon Emission Reduction****: If the system contributes to renewable energy or efficiency improvements.*
18. ***Job Creation****: Does this project create employment opportunities?*
19. ***Sustainability Impact****: Lifecycle assessment of materials, recyclability, and long-term use.*
20. ***Sensitivity & Risk Analysis***
21. ***Economic Risks****: Variations in material costs, energy prices, or unexpected expenses.*
22. ***Technical Risks****: Uncertainties in system performance or external factors affecting feasibility.*
23. ***Break-even Analysis****: Identifying the point at which revenue or energy savings cover the costs.*
24. **CONCLUSION**

In this section, the overview of the report and any conclusions derived from the study should be given. The results of the project work should be clearly stated.

**ACKNOWLEDGEMENTS** *(OPTIONAL)*

**REFERENCES**

Use the IEEE format for the references. Make sure each reference is properly cited in the main text.

**APPENDIX**

The appendices should be numbered (i.e. Appendix-A, Appendix-B) if there is more than one provided in the report. Make sure each is cited properly in the main text.