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| **GRADUATE DESIGN PROJECT TITLE GOES HERE**  **SECOND LINE IF REQUIRED**  **THIRD LINE IF REQUIRED, FIT THREE LINES** |
|  |
| **CONTROL and AUTOMATION ENGINEERING DESIGN I**  **FINAL REPORT**  **Name SURNAME 1**  **Name SURNAME 2**  **Name SURNAME 3**  **Name SURNAME 4**  **Name SURNAME 5**  **(040080001, 040080002, 040080003, 040080004, 040080005)** |
| **.. / .. / 20..**  **Supervisor: Title Name SURNAME** |
|  |
| **CONTROL AND AUTOMATION ENGINEERING PROGRAM** |

# SUMMARY

In this section, the general purpose of the graduation design project, the methods used, and the expected outcomes should be briefly explained. A concise and clear overview of the project is expected to be provided. It is usually good practice to write this section last as it summarizes your report.

# PURPOSE AND IMPORTANCE OF THE STUDY

In this section, the main objectives of the project, its significance, the problems it aims to solve, or the innovations it intends to contribute to should be explained. You may support your claims with data or references where applicable (e.g. statistics or case studies related to the problem).

# THE DESIGN PROBLEM

You need to explain the design problem(s) that will be considered in your Project. The criteria (including but not restricted to technical, environmental, economic, safety and/or security wise, ethical and/or societal criteria) to be considered in your design **must** to be given clearly. **Please note that you must handle multiple design criteria in your design and demonstrate this in your reports.** The linkage between the design criteria and the objectives and problem statement must be clarified. **Discuss the boundary conditions in your design problem and how you will address them during the design process.**

# METHODOLOGY

You need to explain the proposed/possible methods to solve the design problem you will be considering. How do you plan to handle the problem? Are there any theorems, algorithms etc that you think that will be useful? You should give the main design stages and the proposed architecture (if available) of your proposed solution and provide a justification for the chosen methods (why the algorithms or the tools you propose to use are suitable).

# DEVELOPMENT PLAN OF THE GRADUATE DESIGN PROJECT

In this section, the project's progress, stages, timeline, and task distribution should be explained in detail.

First, provide the work plan carried out during this semester. Briefly define the tasks you have completed as work packages and explain who performed which tasks in each work package.

Table 1 Work Plan (KON 4901)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Weeks** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| Work Package 1 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 2 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 3 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 4 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 5 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 6 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Second, the roadmap to be followed from the start to the end of the project in the next stage (KON 4902) should be given. You should define work packages for your project. Each work package should be described in detail, including its name, start and end weeks, and the planned activities within the package as well as the outputs of the workpackage. You also need to plan who will be woking in each working package.

Table 2 Work Plan (KON 4902)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Weeks** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| Work Package 1 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 2 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 3 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 4 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 5 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Work Package 6 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

# RISK PLAN

Describe the possible technical and economic risks in your project. Describe your proposed actions to mitigate these risks. For each of the risks you consider provide an alternative approach (Plan B) to use in case the risk occurs. You may use the following tables for your risk plan. In these tables, give the risks in the Risk column and your proposed mitigation measures in the next column. Possibility of the risk occurrence even after your mitigation actions should be given in the column entitled Probability and should have one of the values “Very High”, “High”, “Moderate”, “Low”, “Very Low”. The possible impact of the risk (if it occurs) on your project should similarly be given in the Impact columns. This column should also have one of the values “Very High”, “High”, “Moderate”, “Low”, “Very Low”. You should also give your B plans in the last column specially concentrating on the risks that have “Moderete” or more probability and impact.

Table 3 Risk Plan (Technical)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk** | **Mitigation measures** | **Probability** | **Impact** | **Plan B** |
| Risk 1 |  |  |  |  |
| Risk 2 |  |  |  |  |
| Risk 3 |  |  |  |  |

Table 4 Risk Plan (Economic)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk** | **Mitigation measures** | **Probability** | **Impact** | **Plan B** |
| Risk 1 |  |  |  |  |
| Risk 2 |  |  |  |  |
| Risk 3 |  |  |  |  |

# RELEVANT STANDARDS

The numbers, names, purposes, and contents of the standards and/or norms to be considered in the project should be briefly explained, and their relevance and importance to the project should be summarized in a few sentences.

This section cannot be left blank!

A significant portion of the standards can be accessed using the catalogs available on the Library's "Databases" webpage, such as "IEEE Xplore Digital Library," "IEC Standards," "British Standards Online (BSOL)," "ISO (International Organization for Standardization) and IEC Standards," and "TSE (Turkish Standards Institution)."

Some examples are provided below.

The following standards will be considered in this project:

EN 50126-1: 2017 "Railway Applications – The Specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS) Generic RAMS Process" (https://bsol.bsigroup.com/Bibliographic/BibliographicInfoData/000000000030330404)This standard defines the concepts of reliability, availability, maintainability, and safety used in railway systems. In the study to be conducted within the project, specific reference will be made to the Safety Integrity Level (SIL) defined in this standard.

IEEE Std 1471.1-2004 "IEEE Standard for Communication Based Train Control Performance Requirements and Functional Requirements" (<https://ieeexplore.ieee.org/document/1405808>)  
This standard specifies the performance and functional requirements for railway systems using CBTC (Communication-Based Train Control) signaling systems. It will be considered in the design of speed controls developed in the project.

ISO 5286:2023 "Flight performance of civil small and light fixed-wing unmanned aircraft systems (UAS). Test methods"

(https://bsol.bsigroup.com/Bibliographic/BibliographicInfoData/000000000030426801)  
This standard provides the main principles for performance testing of small and light fixed-wing civil unmanned aircraft systems similar to those used in the project. These tests will be taken into account during the project's simulation studies.

BS 8611:2023 "Robots and robotic devices. Ethical design and application of robots and robotic systems. Guide"

(https://bsol.bsigroup.com/Bibliographic/BibliographicInfoData/000000000030451738)  
This standard addresses ethical considerations to be taken into account during robot design. These ethical considerations will be followed in the design of the robot to be developed within the project.

# EXPERIMENT / SIMULATION SETUP

In this section, explain the experimental and/or simulation setup that will be used in your design project. You need to describe all relevant hardware and software, and demonstrate that you are ready to do experiments and/or simulations in the next stage of your project. Justify your selection of experimental setup or simulation tools (show why these tools / setup is enough to reach your goals).

Summarize the work you have done on the mentioned setups during this semester. This section can include details about the setup's assembly, understanding of its operating principles, and initial/preliminary experiments conducted.

# IMPACT OF THE STUDY

In this section, discuss how your project can contribute to scientific knowledge and economic growth, and explain who might benefit from these outcomes and how. Consider the broader effects of your work, including its impact on the environment, economy, society, and ethics.

You might think about questions like:

Does your project promote sustainability or reduce environmental harm?

What are the economic implications, such as cost reduction or market impact?

How does the study contribute to societal needs or solve certain problems?

Are there ethical considerations, such as inclusivity, privacy, or safety, relevant to the work?

Provide a balanced view that acknowledges both the benefits and possible drawbacks of your project. Provide metrics whenever possible to evalute the success of the project at the end.

# REFERENCES

All sources, references, and literature used throughout the report should be listed in this section in an appropriate format.

# APPENDIX A

You may add any number of appendices at the end of your report to include additional material (e.g. calculations, raw data, supplementary diagrams).

# Submission Checklist

Fill this checklist to ensure your report meets all requirements:

## **Content Checklist**

* **Summary**: Concise overview written at the end; includes goals, methods, and expected outcomes.
* **Purpose and Importance**: Objectives are clear, with significance explained and supported by data or references.
* **Design Problem**: Design criteria are explicitly stated and linked to objectives and the problem statement. More than one criterion is described clearly.
* **Methodology**: Methods are explained, justified, and feasible; relevant algorithms/tools are described.
* **Development Plan**: Includes timeline, task distribution, and work packages; Gantt chart is provided.
* **Risk Plan**: Risks are identified, mitigation measures are described, and alternative (Plan B) strategies are provided.
* **Relevant Standards**: Relevant standards are identified, described, and linked to project goals.
* **Experiment/Simulation Setup**: Setup is described with hardware/software justification and feasibility demonstrated.
* **Impact of the Study**: Broader impacts (societal, environmental, economic, ethical) are analysed. Metrics are given for the evaluation of the success of the project.
* **Bibliography**: All references are cited and properly formatted.

## **Formatting Checklist**

* Used provided template and followed all formatting guidelines.
* Section headings are clearly distinguished.
* Text is double-aligned and free of widows/orphans at page breaks.
* Figures and tables are high resolution, numbered, and captioned.
* All visuals and references are cited within the text.
* Proper use of boldface and italic fonts.
* Appendices are labelled correctly and relevant.

## **Submission and Academic Integrity Checklist**

* Submitted in PDF format on the Ninova system before the deadline.
* All text from other sources is clearly marked (e.g., quotation marks).
* AI tools were only used for wording improvements, not content generation.
* Report is ready to be checked for plagiarism and fraud using tools like Turnitin.

# Individual Contribution Statement

| **Team Member Name** | **Tasks Assigned** | **Estimated Work Time (Hours)** | **Contribution Percentage (%)** | **Contribution Explanation (Short Notes)** |
| --- | --- | --- | --- | --- |
| Member 1 | [Task description] | [Hours] | [%] | [Short explanation] |
| Member 2 | [Task description] | [Hours] | [%] | [Short explanation] |
| Member 3 | [Task description] | [Hours] | [%] | [Short explanation] |

In this section, team members must clearly state their individual contributions to the project and the report. By completing the table above, each team member should specify the areas they contributed to and the extent of their contributions. This section requires the approval of all team members and must be signed and submitted at the end of the report.

**Sample Task Descriptions:**

* "Conducting literature review and preparing analysis report."
* "Developing simulations and documenting the results."
* "Planning and executing the setup of experimental equipment."
* "Creating the Gantt chart and developing the project timeline."

**Note:**

1. The total contributions of all members must sum up to **100%**.
2. If a specific member has contributed significantly more to certain tasks, this must be clearly stated.

# Student Declaration

We, the undersigned students, declare that this report was entirely prepared through our own efforts and work. All sections of the report that rely on external sources have been explicitly stated and properly cited.

During the preparation of the report, AI tools were used solely for supporting tasks such as grammar corrections, writing adjustments, and formatting. No AI tools or external sources were used for content generation in any part of the report.

For projects involving teamwork, we confirm that the contribution percentages specified in the **Individual Contribution Statement** section at the end of the report are accurate and that all team members contributed to the project in alignment with these percentages.

The checklist accompanying this report has been accurately and completely filled out in accordance with the relevant instructions.

**Signatures:**

| **Student Name and Surname** | **Student ID** | **Date** | **Signature** |
| --- | --- | --- | --- |
| [Name Surname] | [ID] |  |  |
| [Name Surname] | [ID] |  |  |
| [Name Surname] | [ID] |  |  |
| [Name Surname] | [ID] |  |  |
| [Name Surname] | [ID] |  |  |

(THE FOLLOWING IS NOT PART OF THE REPORT)

**SUBMISSION GUIDELINES:**

Your reports must be prepared in PDF format and uploaded to the Ninova and Turnitin systems before the specified deadline. For team-based reports, only one team member needs to upload the report. You will have the opportunity to view the similarity report on the Turnitin system. After your initial upload, you can make changes to your report and re-upload it. In this case, you must update your submission on both systems. Otherwise, your report may be evaluated based on its previous version. You are allowed a maximum of three uploads.

**NOTES:**

Please note that you have to be careful with the formatting of your report.

* Use this template to produce your report
* All sections must be clearly seen and distinguished.
* All page breaks should be in proper positions (so that you do not have a section head without any text at the end of a page for example).
* You should use figures, tables, charts etc to improve readability of your reports whenever possible.
* All text must be double aligned (CTRL+J) when possible.
* All figures and tables should have high resolution and should be produced by yourself whenever possible.
* All figures and tables must have numbers and captions, and they must be cited within the text.
* Similarly, all references must be cited within the text.
* Use boldface and italic fonts carefully.
* Give proper references to anything (text, picture, table etc) that is **not yours**.
* When you use text from other sources you must clearly mark it (e.g. using quotation marks).
* You may get help from AI tools to improve the wording in your report. However, do not use any AI tool to generate any part of your report.
* Note that your reports will be checked by Turnitin and/or similar tools against AI produced text and fraud.

**Warning: Plagiarism, including AI-generated or copied content, may result in disqualification of your project and disiplinary action which may result in suspension from the university for one or two terms according to ITU Reagulations.**