Your Thesis Title

[Team Member 1, Student ID]  
[Team Member 2, Student ID]  
[Team Member 3, Student ID]

# Problem Statement and Introduction

[Explanation] Please describe concisely and include all the important information. State clearly to make sure what you are going to do. the key questions to consider as following

* What are the goals and purpose of the project?
* What problems does it solve?
* What are the key requirements in the design?
* What are specific usage scenarios of this design?

# Background Study

[Explanation] Explain key concepts that are important in this project. Capture specific keywords that are important to your project and explain them here. We expect you should have 5-15 key concepts explained in this section.

[Example]

**InstructGPT**

InstructGPT is a transformer-based language generation model modified from GPT-3 architecture (Generative Pre-trained Transformer 3). The model is designed to capture long-range dependencies in a sequence of words (input data) to capture the context and generate high-quality language output. InstructGPT was trained by 3 special techniques:

1. Supervised fine-tuning (SFT) This technique involves fine-tuning the GPT-3 models using labeled examples. The final SFT model was selected based on performance evaluated by RM.
2. Reward modeling (RM) They trained another model, starting from the final SFT model but without the final layer. This model takes in a prompt and a response and outputs a score indicating how good the response is.
3. Comparison collection: In order to train the RM, they collected comparisons between different responses. They showed labelers between 4 to 9 responses and asked them to rank them. This resulted in a large number of comparisons, which they trained the RM on.
4. Reinforcement learning (RL): To train the SFT model further, they used reinforcement learning following the PPO method (Proximal Policy Optimization). This involves training the model in a virtual environment, where it is presented with a customer prompt and asked to provide a response. The virtual environment then provides a reward based on the response and the RM.

# Conceptual Design

[Explanation] Rough design of your system. Major components and explanation.

[Example] Please look at section 3-6 in [this example](http://www.igvc.org/design/reports/dr134.pdf). They explain their system by breaking them down into the mechanic, electrical, and computer design. They also include details on system integration. We expect more details about your system than this in the final report. For the mid-term report, please include as much details as you know at this point. You can structure this section however you see fit to your project.

Guideline:

1. Mechanical components (examples):
   * CAD mockups of each design concept
     1. Description of the features being illustrated in the CAD model
     2. Benefits of each concept
   * Comparison of concepts
     1. Criteria used to compare designs?
     2. Which design is best? Why?
2. Software components (examples):
   * System requirement summary
   * Flowchart (or other schematic) of each system
   * Clear definition of each system’s, subsystem’s, and component’s requirements
   * High-level outline of design features that meet each of these requirements

# Team, Task, Process

[Explanation] Who does what? What tasks are to be done (milestones), what process will you use to follow up with the project. answers the following questions

* Who is responsible for each task?
* What are the milestones and tasks that need to be completed?
* What process will be used to monitor the progress of the project?
* How will the team work together, such as through weekly updates, in-person meetings, or a discord group?

[Example] Please look at section 2 in [this example](http://www.igvc.org/design/reports/dr134.pdf). You don’t need to follow this format, we just want to know who does what in your project, what timeline you plan to follow, how do you plan to work together (weekly updates, meet up in person, discord group, etc.)

# Methodology

[Explanation] Describe the methods and techniques that you used to make engineering design decisions or collect data to test the performance of your invention.

The methodology section typically includes the following components:

1. Your Model, Calculation and Tools used: description of the mathematical or computational model used or calculations. You can also describe tools used in design and simulations here.
2. Data Collection: This component describes how the data was collected, including the instruments or tools used, the procedures followed, and any protocols that were used to ensure the validity and reliability of the data.
3. Data Analysis: This component describes the methods used to analyze the data, including any statistical techniques or models used to test the research question or hypothesis.

You can look at any scientific paper you read for how to write this section. Please think about how you might organize information in this section so that readers can follow and understand what you did.

If you have not done much data collection in your project, feel free to write this section briefly or describe what you think the future methodology should be.

# Results

Results provide data from measurements with proper statistical analysis. The results should be presented in a logical order, with the most important findings presented first.

1. Description of the data: A description of the data collected, including any measures or variables used.
2. Presentation of the data: The data should be presented in a way that is clear and easy to understand, such as tables, graphs, or charts.
3. Statistical analysis: Any statistical analysis performed on the data should be described in detail, including the type of analysis and the statistical tests used.
4. Interpretation of data: The findings should be presented clearly and concisely, with a focus on the most important results. The results should be presented in a way that is consistent with the problem statement.

If you have not done much data collection in your project, feel free to write this section briefly.

# Discussion and Conclusion

Describe the relationship between your work with other work in the same field and provide implications for future direction of the project. Provide a summary of the whole document in a concise manner.

1. Restate Problem: Explain problem briefly and how far along you are at solving the problem.
2. Summary of Results: A summary of the main results.
3. Significance: How does your work matter to the project or company?
4. Limitations: Any weaknesses of the project that you might need to improve in the future?
5. Future Research Directions: How would you go about building this project further to completion.

If you have not done much data collection in your project, you may summarize what you learn in this project.

# Reference

Cite the sources you use in this work based on IEEE format. See this document for reference format template.

<https://www.bath.ac.uk/publications/library-guides-to-citing-referencing/attachments/ieee-style-guide.pdf>