Guide to Writing the KittiCopter System Report

- Very sketchy at best
- Use with caution as it has been prepared by a student who is struggling with control theory.

Table of Contents

1. Introduction

Objectives

Briefly outline the purpose of the experiment, the specifications that the system should meet, and the approach taken in the subsequent sections.

2. System Modelling

Higlyy advise to make use of your pre lab

Free-Body Diagram

Create a comprehensive free-body diagram to illustrate the forces acting on the KittiCopter. Label all forces and relevant components.

Block Diagram

Design a block diagram to show the whole system architecture and the various signals that interact within the system.(use the one in the prelab)

Differential Equation

Formulate a differential equation that describes the motion of the KittiCopter.

- Use physical principles such as Newton's laws.
- Define all variables used.

Transfer Function

Derive a transfer function from the differential equation. The transfer function will serve as a mathematical model for system behavior.

- Define each term and explain how you arrived at this model.
- Justify any assumptions or approximations.

3. System Identification

Step Test Plots

Include plots from your step tests, detailing the input signals and system responses.

Calculations and System Parameters

Perform calculations to extract system parameters based on your step tests. Present your results in a structured and legible format.

Model Validation

Validate your model against real-world behavior.

- Compare theoretical predictions with experimental results.
- Comment on the validity of your model.

4. Controller Design

Design Process

Provide a detailed description of your controller design process. Include supporting calculations

- Justify why this controller meets the specifications.

Simulation Tests

Describe the tests you performed in simulation to verify your controller design. This will set the stage for a future chapter that focuses solely on simulation tests.

focus on:

- Reference tracking performance
- Robusteness
- Overshoot
- Settling time
- Velocity tracking if you are ambitious enough

Physical Design

Showcase the physical design of your controller:

- Circuit schematic
- Photos of the final board
- Components used
- Any simplifications/caveats

5. Controller Tests

Test Description

Explain the tests you conducted to evaluate the controller's performance experimentally. Include any plots or data that help illustrate these tests.

Performance Evaluation

Assess how well the controller met the given specifications. Support your evaluation with data and observations.

Recommendations

Offer insights on how the performance of the controller could be further improved, if applicable.

6. Conclusion and Recommendations

Summarize the main findings, state whether the objectives were met, and offer recommendations for future work.

7. Appendices

Include any supplementary material such as code snippets, additional graphs, or raw data.

8. References

List all references cited in your report.