

COMM424DA Project Proposal: Structural health monitoring of Offshore Wind Turbines using Functional Accelerometer Data

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Abstract

A brief summary of the research proposal, including the research question, objectives, methodology, and significance.

1 Introduction

1.1 Background

Offshore wind turbines (OWTs) represent a critical component in the transition towards sustainable energy sources, offering substantial benefits due to their high energy yield and reduced visual and noise impacts compared to onshore wind farms. OWTs operate in harsh marine environments, subjecting them to various stressors such as strong winds, waves, and corrosive saltwater. These conditions can lead to structural fatigue, component degradation, and unexpected failures, posing significant safety risks and increasing maintenance costs.

Traditional inspection and maintenance methods for OWTs are labour-intensive, costly, and often require downtime, which affects the turbines' operational efficiency. There is a critical need for an effective Structural Health Monitoring (SHM) system that can continuously monitor the structural integrity of OWTs, detect early signs of damage, and provide timely diagnostics to prevent catastrophic failures.

1.2 Problem Statement

Clearly state the problem or research question you intend to address.

2 Research Context

Outline the main objectives of the project.

3 Aims & Objectives

Review of relevant literature, identifying gaps and key theories/models.

4 Data & Resources

Clearly state the research questions or hypotheses.

5 Methodology

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6 Research Design

Describe the overall research design.

7 Data Governance & Ethics

Explain the methods for data collection.

8 Project Plan

Outline the techniques for data analysis.

9 Risk Assessment

Specify any materials, equipment, or tools required.

10 Conclusion

Provide a timeline or schedule for the project [1].

References

- [1] José M. Gutiérrez, Rodrigo Astroza, Francisco Jaramillo, Marcos Orchard, and Marcelo Guarini. Evolution of modal parameters of composite wind turbine blades under short- and long-term forced vibration tests. *Journal of Civil Structural Health Monitoring*, 14(4):1059–1074, 2024.

Appendix A Project Plan

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Appendix B Code

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