Rotor Blade Inspection System for Wind Turbines

Development and Testing with Drone-Mounted Camera

Graduate

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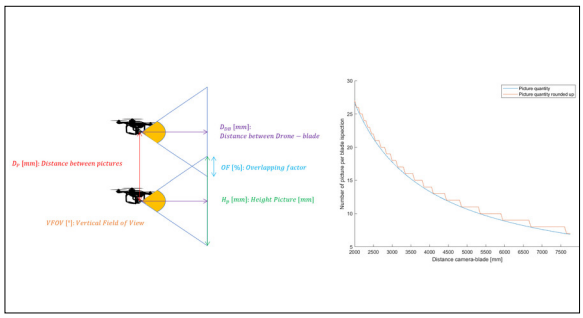
Introduction: With increased electrification, Europe objective is to reduce emissions by 55% by 2030 and achieve climate neutrality by 2050. Currently providing 17% of Europe's electricity needs, wind energy's growth will be impacted by financial obstacles among other things. This emphasizes the need for efficient inspection methods, to increase turbine efficiency by minimizing the downtime. This project addresses the primary challenge, of creating a comprehensive Rotor Blade Inspection System with drone mounted camera, for wind turbine blades.

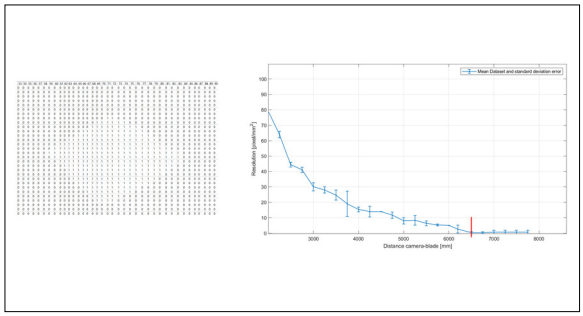
Approach: The project starts with a thorough literature review, summarizing main damage scenarios detectable through visual inspection. Subsequently, it examines the traditional approaches, discussing the transformative role of drones in blade inspections. The research expands to include details of drone-based inspection data collection. In the following phase, the project treats the inspection approach through a combination of experiments and calculations. The primary goal is to precisely define key image specifications such as quality, accuracy, and photo positioning while simultaneously demonstrating how to meet these criteria. Providing detailed insights into the equipment, materials, and procedures, addressing critical aspects such as camera calibration, determination of drone-blade distance range, considerations for photo quantity, and the required drone movements.

Conclusion: The conclusion acts as a guide for engineers not directly involved in the project, offering a concise summary of crucial implementation steps. Additionally, it establishes a solid groundwork for the next project phase by introducing key concepts that serve as a robust link connecting the study's results to the upcoming steps of the project.

Picture density for a vertical blade inspection.
Own presentment



Determination of the maximal drone-blade distance for a defined minimal image quality.
Own presentment



Drone based wind turbines inspection with DJI Matrice 300 RTK
https://www.nearthlab.com/wind-turbine-inspection/

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Subject Area
Windenergy