Optimisation of Savonius wind Turbine Using Adjustable Guide Vanes

Solen Ollivier

Kasetsart University, Bangkok, Thailand

Abstract:

This thesis explores the optimization of a Savonius wind turbine by incorporating adjustable guide vanes and servo motor controls. The system, managed through an Arduino platform, adjusts the vanes in response to wind speed and orients the turbine based on wind direction using two dedicated sensors. The turbine was designed using CAD software and manufactured through 3D printing, showcasing a practical approach to integrating modern technology with renewable energy solutions.

Performance evaluation focuses on torque and force as functions of rotational speed (RPM). The study compares scenarios where the vanes are fixed versus adjustable and cases where the system aligns with the wind versus remaining static. The results demonstrate how adaptive control mechanisms improve the turbine's overall efficiency, especially under varying wind conditions.

The thesis includes the Arduino code and the calculations used for system optimization, offering a transparent look into the methodology. The findings underline the benefits of real-time adjustments in enhancing turbine performance. This research contributes to the field of small-scale wind energy by illustrating how adaptive systems, combined with advanced manufacturing techniques, can significantly improve the functionality and efficiency of renewable energy devices.

6