

**DEVELOPMENT OF AN ELECTRONIC BRAKING SYSTEM FOR SMALL
WIND TURBINES**

By

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.



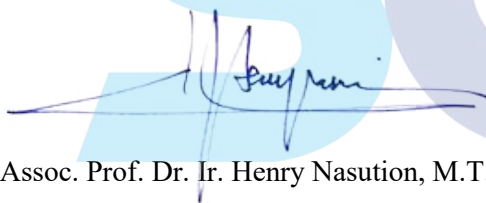
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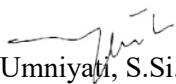


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ABSTRACT

DEVELOPMENT OF AN ELECTRONIC BRAKING SYSTEM FOR SMALL WIND TURBINES

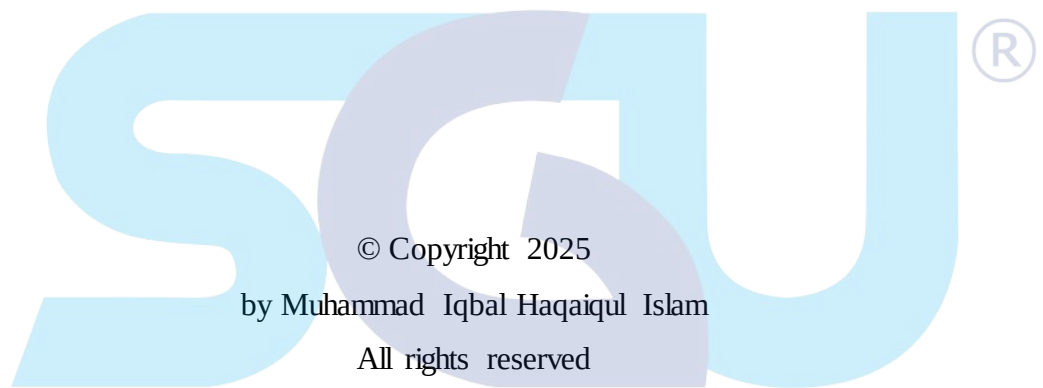
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This thesis aims to design and implement a control algorithm to stabilize the power output of small-scale wind turbines. The research is motivated by the absence of an effective braking mechanism in previous studies, which often leads to power fluctuations and potential system damage under high-wind conditions. To address this issue, an electrical braking system controlled by a Fuzzy Logic Controller (FLC) is proposed. The methodology includes simulating the wind turbine system using a DC motor-driven mini-generator and a braking resistor as the energy dissipation unit. The FLC algorithm processes voltage readings from the generator to dynamically adjust the Pulse Width Modulation (PWM) signal, regulating the braking intensity. Data acquisition and system performance were evaluated using sensors and real-time monitoring tools. The findings demonstrate that the FLC-based electrical braking system effectively reduces voltage overshoot by up to 48.75% and enhances output stability. In summary, this study validates the application of Fuzzy Logic Control as a viable algorithm for stabilizing power output in small-scale wind turbines via an electrical braking mechanism. The outcomes contribute to the development of cost-effective and adaptive control strategies for renewable energy systems, with potential improvements suggested for future work, such as hybrid control approaches or additional sensors for enhanced precision.

Keywords: Wind Turbine, Braking Resistor, Power Stabilization, Voltage Control, Fuzzy Logic



DEDICATION

I dedicate this research to my family, friends, and all those who have supported me up to this point.



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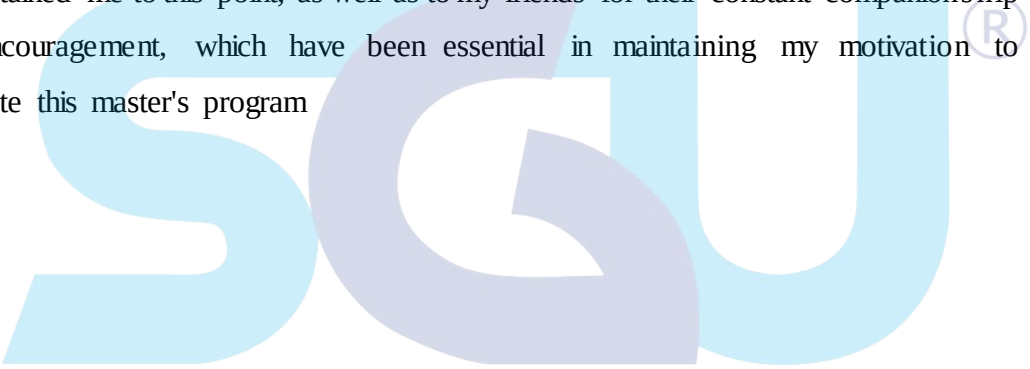


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