

**DESIGN AND DEVELOPMENT OF A MOSFET-BASED INVERTER WITH
DUAL-AXIS SOLAR TRACKING AND MECHANICAL STOPPER FOR
MICROGRID APPLICATIONS**

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.

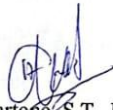


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ABSTRACT

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This research focuses on the design and development of a simple solar inverter integrated with a dual-axis solar tracking system and a mechanical stopper for small-scale renewable energy applications. The purpose of this study is to provide a stable AC power output from a photovoltaic source while improving energy utilization and mechanical durability of the tracking system. The system uses a 100 WP solar panel supplying DC power to a MOSFET-based push-pull inverter with a center-tapped transformer to produce a 220 V, 50 Hz AC output. A dual-axis solar tracker is employed to maximize solar irradiance capture, while a mechanical stopper integrated with a micro limit switch restricts panel rotation to 180° to prevent excessive movement and mechanical stress. The methodology includes system design, component selection, electrical calculations, and integration of inverter, tracking, and stopper mechanisms. The results indicate that the inverter is capable of delivering stable AC voltage suitable for small loads, while the mechanical stopper effectively limits rotation and reduces unnecessary energy consumption. In conclusion, the proposed system demonstrates improved efficiency, operational stability, and durability, making it suitable for small-scale solar energy systems and microgrid applications.

Keywords: Solar inverter, Dual-axis solar tracking, Mechanical stopper, Renewable energy system, Microgrid



DEDICATION

I dedicate this thesis work for my beloved family that has supported me throughout my life and for the future of this country.



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