UNIVERSITI TEKNOLOGI MARA CAWANGAN PULAU PINANG

HARVESTING THERMOELECTRIC ENERGY FROM HYBRID SOLAR PV SYSTEM

MUHAMAD AIMAN HAFIZ BIN MUHAMAD IKBAL

BACHELOR OF ENGINEERING (HONS) ELECTRICAL AND ELECTRONIC ENGINEERING

February 2025

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Muhamad Aiman Hafiz Bin Muhamad Ikbal	
Student I.D. No.	:	202279	
Programme	1	Bachelor of Electrical and Electronic Engineering	
		(Honours) – CEEE200	
Faculty	÷	Electrical Engineering Studies	
Thesis	:	Harvesting Thermoelectric Energy from Hybrid Solar	
		Pv System	
Signature of Student	1		
Date	÷	February 2025	

ABSTRACT

The integration of thermoelectric generators (TEGs) with photovoltaic (PV) systems offers a promising approach to enhance energy conversion efficiency by recovering waste heat. This study evaluates the performance of a hybrid PV-TEG system compared to a standalone PV system over a 30-day period. The hybrid system achieved an average efficiency of 69.56%, surpassing the standalone system's 68.53%. These results significantly exceed efficiencies reported in literature, where standalone PV and hybrid PV-TEG systems achieved 11.6% and 14%, respectively. The improvements observed in this study may be attributed to optimized system design, advanced materials, and favorable testing conditions. Future work will focus on validating these findings under diverse environmental conditions, improving TEG material efficiency, and exploring additional hybrid configurations. This research highlights the potential of hybrid PV-TEG systems to revolutionize renewable energy by providing sustainable and highly efficient solutions for global energy needs.

ACKNOWLEDGEMENT

First and foremost, I offer all praises to the Almighty for the blessings and guidance that have been granted to me throughout my life. I would like to express my deepest gratitude to my parents for their unwavering support and encouragement in all my endeavors. Their constant love and faith have been the bedrock of my journey. Additionally, I extend my heartfelt thanks to my siblings and extended family members for their direct and indirect support, which has been invaluable.

Endless gratitude and appreciation are extended to our supervisor, Dr. Intan Rahayu Ibrahim, for her unwavering support, guidance, and encouragement throughout the successful completion of this project. The authors also wish to express heartfelt thanks to Universiti Teknologi MARA, Cawangan Pulau Pinang for providing the facilities and support necessary to complete this work

Furthermore, I extend my sincere thanks to all the lecturers at UiTM Permatang Pauh and the facility staff, whose efforts, whether direct or indirect, have contributed significantly to the completion of this final year project. Lastly, I would like to acknowledge the support and camaraderie of my fellow students and friends. Their collaboration and encouragement have been essential in the successful execution of this project.

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