

**UNIVERSITI TEKNOLOGI MARA**

**OPTIMAL DEMAND RESPONSE OF  
SOLAR ENERGY GENERATION  
USING GENETIC ALGORITHM**

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**JULY 2024**

## **ACKNOWLEDGEMENT**

Alhamdulillah, praises to Allah because of His Almighty and His utmost blessings, I was able to finish this project within the time duration given. Firstly, my special thanks goes to my supervisor, Dr. Norlina Binti Mohd Sabri for her guidance, patience, and encouragement throughout this project. Her invaluable insights, and unwavering support have significantly contributed to the success of my project, providing me with a solid foundation and the confidence to navigate through various challenges. Also, special appreciation also goes to my beloved parents for their continuous support, both emotionally and financially, which gave me the strength to persevere. Their constant prayers, encouragement, and belief in my abilities have been a source of immense motivation, enabling me to push beyond my limits and achieve this milestone. Last but not least, I would like to give my gratitude to my dearest friend, for their unwavering support and understanding during the challenging times of this project. In conclusion, this accomplishment would not have been possible without the collective support and guidance from my supervisor, family, friends, and the academic community. I am profoundly grateful to each and every one of them for their role in this journey, and I pray that Allah blesses them abundantly for their kindness and support.

## **ABSTRACT**

The aim of this study is to optimize the demand response of solar energy generation using Genetic Algorithm (GA) to minimize the daily yield loss caused by load shedding. The growing demand for renewable energy, especially solar energy, poses a challenge when it comes to balancing energy supply and demand, as energy is not constant and weather-dependent. The integration of solar energy into existing power grids is often hindered by fluctuations in solar radiation, unpredictable demand and inefficiencies in energy use. Without an effective optimization method, there is instability in the output and efficiency of the solar energy generated. To address this problem, a GA-based optimization model has been developed to improve the efficiency of energy generation by reducing wastage due to load shedding. The method involves collecting data from the solar energy project of UiTM Kampus Dungun, implementing GA for optimization, and evaluating its performance based on the fitness value and convergence trends. The objective function of the algorithm minimizes the daily losses due to load shedding while ensuring a balanced and stable energy distribution to the end users. The experimental results show that GA effectively reduces the energy losses and achieves an improvement of about 99% in demand side management. This study shows that GA is a viable tool for optimizing energy production from the sun and thus contributes to good energy management.

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