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Construction of a Hybrid Photovoltaic System Connected to an Air Conditioner and Utilization of Wind and Solar Light Reflection for Cooling an Enclosed Space

The main objective of the research is to design a closed space
and project the necessary modifications to decrease its temperature and reach a suitable temperature for human comfort through wind, reflection of sunlight, and an air conditioning unit solely for cooling, powered by electricity from solar panels. To achieve this objective, an air conditioning unit is selected that can decrease the temperature within the working volume. Additionally, solar panels with a performance greater than 16% and a solar charge controller are determined to supply the electrical energy required by the air conditioning unit.Photovoltaic application batteries and a solar power inverter are also selected for the storage and conditioning of the electrical charge from the solar panels. To develop this system,studies were conducted using solar atlases from the National Aeronautics and Space Administration and various wind databases to understand the environmental characteristics of the working area (Northern Zone of Mexico City).
An On/Off control is developed for the energy system, programmed on ARDUINO UNO, which allows us to switch the electrical supply from the solar panels to the grid distribution system used as a final backup for electrical energy after the batteries. Additionally, a simulation of the photovoltaic energy system is performed with each of the selected components to verify the system's functionality (Matlab Simulink student version). It is stated that the temperature difference generated by the air conditioning unit, with the help of the characteristics of the enclosed space, ranges from 3.5℃ to 4.5℃ within a timeframe of 20 to
30 minutes, and 6 to 10 minutes in cases where the intermediate wall was used.

Keywords

Electrical energy, Solar panels, Temperature reduction

Reference

Y. Li, G. Zhang, G.Z. Lv. (2015, mayo). "Performance study of a solar photovoltaic air
conditioner in the hot summer and cold winter zone". Institute of Refrigeration and Cryogenics.China.

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