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The Generation of Power through the Use of Solar Spinning Cells and Wind Turbine

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Abstract

An increase in power demand prompts young minds to look out alternative ways to create electricity utilising diverse modes. Among the various methods of conventional energy generation, solar is a popular energy source. The Indian renewable energy business has exploded, with India on track to overtake China and the United States as the world's third largest solar market. However, the same is only available during solar peak hours, which in India are around 8:30AM to 5:30PM, or approximately nine hours. In addition, the area required for solar panel installation is higher than for the same rated solar spinning cell. This research proposes a solar spinning cell as a solution to solving this challenge. The self-rotating solar spinning cell assists in cooling the system, resulting in increased efficiency. The efficiency and producing capacity of a spinning cell utilised for power generation are investigated in this study. Alternatives to self-driven spinning cells are also discussed in this work.

Keywords: *Flat Plate Solar, Solar Spinning Cells, DC Gear Generator, Wind Turbine*

INTRODUCTION

As the population grows, so does the demand for energy; as a result, power consumption has increased as a result of power outages occurring frequently throughout the day. To meet demand, we must boost energy output; but, due to negative environmental consequences, we

must shift the need for electricity to renewable energy sources rather than traditional energy sources. Renewable energies on the planet include solar, wind, ocean, hydropower, geothermal resources, biomass, and biofuels. The paper "Sizing and Analysis of Renewable Energy and Battery Systems in Residential Micro Grids"1 tries to create an integrated model that takes into consideration the various elements and characteristics of energy consumption in modern power systems. The study "Design and Implementation of Automatic Street Light Control Using Sensors and Solar Panel"2 presents a new model that reduces the power consumption of the street lighting system by 20-35 percent as compared to the conventional design. The paper "Analysis of Solar Water Heater with Parabolic Dish Concentrator and Conical Absorber" aims to develop a novel conical heat absorber that can absorb heat from multiple directions and thus improve the heat transfer rate. The rate of heat exchange is expected to be 20% higher than that of a flat plate solar water heater.

In this paper, we use a wind turbine-driven solar spinning cell system to provide the best alignment of solar cells with the sun for maximum intensity. Because the position of the sun's highest intensity with respect to a given spot changes throughout the day, it is necessary to automatically rotate the position of solar cells to always align with the sun's highest intensity. The efficiency of solar cells is mostly determined by the angle of photon incidence. Thus, the cells are designed to capture photons rather than bounce them back, which necessitated the use of the proper angle of incidence. Each cell has the best angle computed for installation to enhance efficiency.

Regardless of whether it's morning, noon, or night, the solar spinning cells produce an environment that allows for prolonged periods of optimal angle of incidence between the panels and the sun. Cooling the cells is a beneficial thing that helps with efficiency in and of itself. A less effective solar cell is one that is hotter. Immobile flat cells do not benefit from natural convection cooling, which is achieved by spinning the cells. Brushes and slide rings capture the electricity generated in the spinning cells and feed it into the battery.

MATERIAL & METHOD

The suggested solution aims to reduce power loss during the day and at night. The design includes solar cells, a spinning solar structure, two brushes, two slip rings,

conducting wires, a lead acid battery, a gear mount DC generator, a wind turbine, bearings, two germanium P-N junction diodes, and a mechanical gear system coupled between the shafts. The major goal is to enhance solar cell manufacturing and provide power 24 hours a day, 7 days a week.

The graph (a). The dual power generation setup is shown. The uppermost part of the solar spinning cells generate the initial power, and the second generation comes from the mechanical gear box coupled DC generator, which is connected to the battery via a forward bias P-N junction diode. Because the spinning cells are cone-shaped, they expose more surface area to the sun's irradiation (watt/m2) at various angles and time intervals. The solar spinning cells are self-rotating thanks to the wind turbine, which helps to prevent temperature rises on the spinning cells' surfaces, resulting in increased efficiency. In addition, the wind turbine's output is fed into a gear-mounted dc generator, which generates power 24 hours a day, seven days a week. As a result, the system's total efficiency improves. The wind turbine is located right below the spinning cell on the rotor shaft.

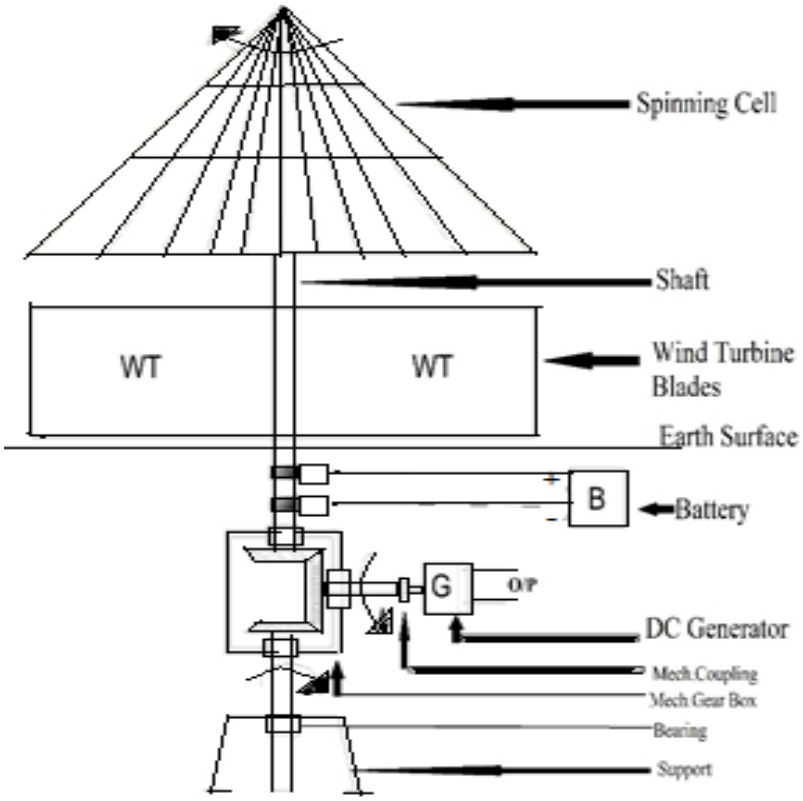

Figure (a): Actual Working Diagram

The entire system can be mounted on the divider of roadways in metro cities, where it will be propelled by automobiles moving on the roads. We may also put it in coastal regions where the wind blows continuously. When we build it on the coast, it is powered by the continuous wind. Brushes and slip rings are linked beneath the wind turbine to collect the generated current from rotating solar cells, which is then sent to the battery. To minimise the reversed current, the DC generator's power is directly stored in the battery via a forward bias P-N junction diode.

Working Principle:

The operating concept is similar to that of a flat plate solar cell or photo voltaic cell, which is an electrical device that uses the photovoltaic effect, a physical and chemical phenomena, to transform light energy directly into electricity.

In comparison to a flat plate solar system, the surface area for incident irradiation (watt/m2) is always large due to rotation due to the cone shape, which increases the generated output. The DC created in the rotating spinning cell is then collected using brushes and slip rings and stored in the battery, while the rising temperature of the solar spinning cell is cooled by the rotating solar cells generated by the wind turbine, increasing efficiency. The mechanically connected wind turbine drives the DC generator, which generates power both during the day and at night.

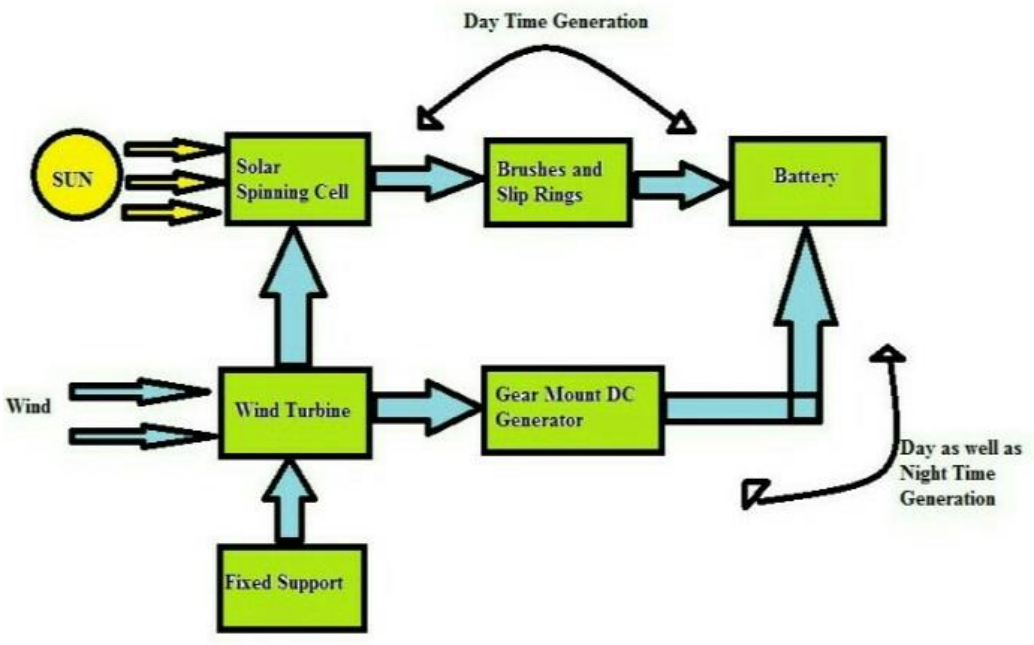

Figure (b): Block Diagram

RESULT & DISCUSSION

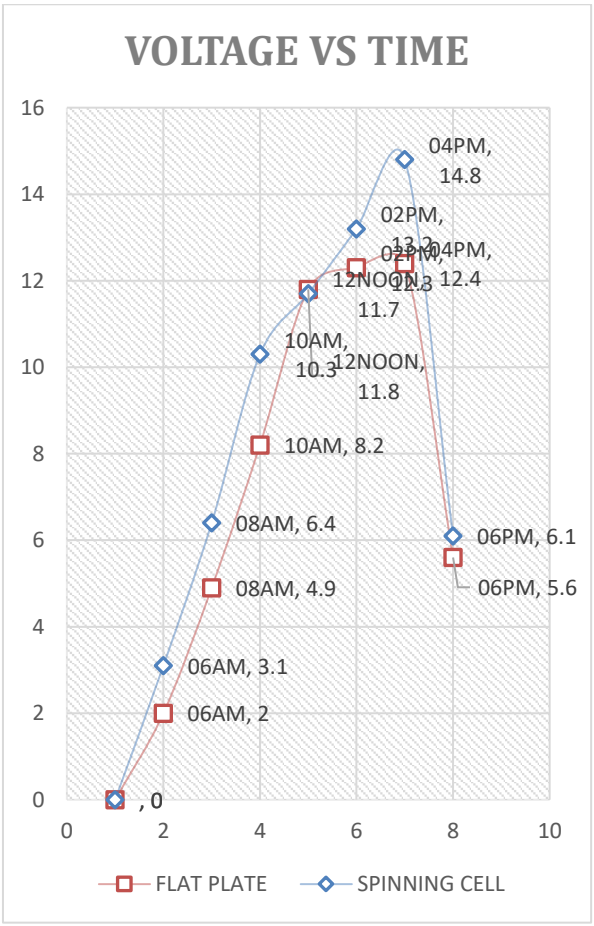

Figure (c): Graph of solar spinning cell and flat plate.

This graph compares the voltage generated by spinning cell and the voltage generated by flat plate at various intervals of time. The voltage generated by solar spinning cells is always greater than that of identical rating flat solar cells in the intervals 6AM to 11AM and 3PM to 6PM, as seen in this graph.

Tables:

Table 1. Comparison of power generation using solar spinning cells and wind power generation

Type of generation	*Day time*	*Night time*
Spinning cells	***14.8V***	***0V***
Wind power generation	***8.4V***	***5.3V***

Table 2 Comparison table for Solar Spinning Cells Vs Flat Plate Solar

S. No	Parameters	Flat Plat	Spinning Cell
1.	Voltage Generation	13.2	14.8
2.	Volume Req. For Installation	V=(1/2)*l*w*h=(1/2)*7.1*7.7*10=252.05 cm^3	V= $\left(\frac{1}{3}\right)$*3.14*r^2h=(1/3)*3.14*5^2*9.1 =238.11 cm^3
3.	Temp. Raising	High temp.	Low temp.
4.	Efficiency	19.8 %	22.5 %

CONCLUSION

It was deduced and determined that solar spinning cells successfully conserved power during the day, but that wind power DC generators also effectively conserved power throughout the day and night. We may also use the kinetic energy of moving cars to rotate the wind turbine to create power and to rotate spinning cells to boost efficiency in metro cities. Furthermore, because the angle of incidence of the sun is constantly perpendicular to solar spinning cells, no tracking device is required to boost production.

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