

ELECTRICAL ENERGY GENERATION BY USING SMART SOLAR TRACKING SYSTEM AND VERTICAL WIND MILL

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Abstract - In today's life, generation of electricity is most important part because in India power crisis occurs due to different reasons & also the non renewable energy sources are limited, to save the non renewable energy sources we need to use renewable energy sources. The renewable energy sources are totally free available in environment. In our project we use smart solar tracker & vertical wind mill, it is the new & important modification to getting maximum energy. The dual axis solar or smart solar tracker means, the tracker changes its position according to maximum intensity of sunlight. We use vertical wind mill because wind direction doesn't matter, its adjust to itself & reduces friction & losses due to that we get maximum efficiency. We combine output of solar tracker & vertical wind mill for getting maximum efficiency.

Key Words

Smart Solar Tracking System, Vertical Wind Mill Turbine, Inverter, Battery.

1. INTRODUCTION

Electricity is most important in world, without electricity we can't imagine human life. Now a day's the non renewable energy sources are decline day by day so we choose renewable energy sources to generate electricity.

In this project combination of two renewable energy sources that is solar energy & wind energy is done for getting maximum electrical energy. In much United States, wind speed is low in summer when the sunshine brightest & longest. The wind is strong in the winter when less sunshine is available because the peak operating time for wind & solar systems occur at a different times of the day & year, combination of wind & solar system more likely to produce power when you need it.

The direction of sun rays is not perpendicular to solar panel due to that low power generate as compare to direction of sun rays are perpendicular to solar panel. In our project 360degree solar tracking system is used to generate maximum efficiency. In addition to solar tracking system, most popular & widely converted vertical axis wind turbine is used which is more practical cost effective & reliable.

1.1 Block diagram

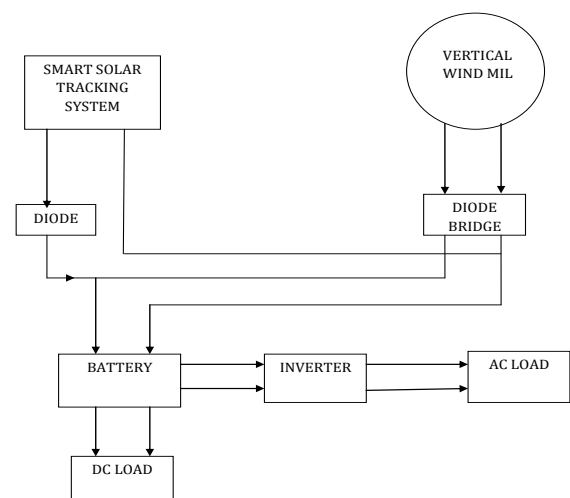


Fig: 1 Block diagram

2. Working Principle

This system is used for getting maximum electrical energy from combination of output of two renewable energy sources. That means the combination of output of solar tracking system & vertical wind mill turbine.

The solar tracking system is track the maximum intensity of sunlight, If there is decrease in intensity of sun light, this tracking system is automatically charges its position to get maximum sunlight for generating. At the output of solar tracking system getting Dc supply. The diode is used to the prevent reverse current from battery to the solar panel.

The vertical wind mill is used converted to the wind energy into electrical energy. The diode bridge is connected to the output of vertical wind mill to rotate the blades of wind mill in both direction. For getting maximum electrical energy.

The output of solar tracking system & vertical wind mill are combined together & it is gives to the battery. Battery is used to storage the Dc supply which is given from solar tracking system & vertical wind mill turbine. The output of battery is given to the inverter.

Inverter is used to convert the Dc into Ac supply at the output of inverter we get Ac supply & for connecting the Ac load.

a) Solar PV cell :

Solar electricity system absorb the sun energy using PV cell .The cells convert the sunlight into electrical energy .Solar power from PV cells are made from semiconductor material. The PV cells are made from crystalline silicon & that includes such as polysilicon & monocrystalline silicon.



Fig : 2. Solar pv cell

Solar tracking system:

There are two types of tracker system are as following:

- **Single axis solar tracker:**

There are horizontal or vertical axis tracker. This tracking system is simple & commonly used. The horizontal axle are used steamy regions where sun at noon very high. The vertical axle type is used in high latitudes but very long summer days.

- **Dual axis solar tracker:**

Dual axis solar tracker means solar tracker is rotates 360degree. The position solar tracker moves maximum intensity of sun light .Application of solar tracker includes power tower & dish system solar tracker have both horizontal & vertical axis .Tracker is follow the sun path rays maximum energy capture.

Solar energy is good power source to produce electrical energy. In this project we develop solar tracking system using arduino uno for generating maximum electrical energy used.

Tracker is a dual axis tracker that means rotate 360degree, tracker moves with the direction maximum sunlight.

This means once you have your tracker set up you will never need to change or adjust anything.

Due to the dual axis solar tracking system we generate maximum electrical energy.



Fig: 3 solar tracking system.

Vertical wind mill:

To generate electrical energy with the help of vertical wind turbine. The vertical wind turbine does not need to be oriented into the power transition; it can be mounted at ground level for easy axis.

Generation of electrical power is depend on velocity of wind. The wind turns the blades of turbine shaft which connects to the generator it will produce electricity.

In our project, wind direction does not matter it adjust itself in the wind direction and its efficiency is 50 to 66%. It works at lower wind speed, it having silent operation and light weight tower.



Fig: 4. Vertical Wind Mill

Arduino Uno:

Arduino uno is a microcontroller based on AT mega 328. It has input output pins, 6 analog inputs, a 16 MHz crystal oscillator USB connection, power jack and reset button. It having input supply 7-12V dc supply.

Arduino uno is used to the control the solar tracking system. Program of servo motor is set in the arduino uno.



Fig: 5 Arduino Uno

Servo motor:

In our project servo motor is used to rotate solar panel in the direction of sunlight. Servo motor is controlled with electric signal which determines the amount of movement the shaft.



Fig: 6 Servo Motor

Battery:

The battery is used to store electricity generated from wind and solar system. The battery provides a perfect performance for long discharges. In our project, we use the battery of 12V, 5A rating.

Inverter:

Electrical energy stored in the battery is drawn by electrical loads through the inverter. It converts DC power into AC power. At the output of inverter we are connect AC load. The input voltage, output voltage, frequency & power handling depend of design of inverter. Inverter does not produce any power that power provided by Dc source.

Advantages:

1. The efficiency increases by 30-40%.
2. The space requirement for a solar park is reduced, and they keep the same output .
3. The return of the investment timeline is reduced.
4. Fuel saving & saving of electrical energy.

5. No pollution.

6. It is economical.

7. Vertical wind mill is more easily installed than horizontal wind mill.

8. Uninterrupted power supply

9. Wind direction doesn't matter.

10. Silent operation.

3. CONCLUSIONS

In this paper presented by ,Hybrid power generation from renewable energy sources (i.e. solar & wind) is good & effective system than non renewable energy sources. This system has high efficiency than other power generation system .

Due to fog, dust & cloudy days the performance of solar cell is decreased, hence we are using dual axis solar tracking system. Using of solar tracking system the efficiency is increased.

In case of Vertical Wind Mill, the blades will increase the efficiency of the system .Wind direction doesn't matter because the vertical wind mill turbine is rotate in both direction .This system is avoids interruption of power supply .In our project model, output of smart solar tracking system and vertical wind mill turbine are combined together to produce maximum electrical energy.

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