

POWER GENERATION USING WIND TURBINE AND SOLAR ENERGY

S.sivagami¹, k.thamilarasan², mohamath yousoof salamath shah³, g.saritha⁴

^{1,2,3}New Prince Shri Bhavani College of Engineering And Technology, Chennai, India

⁴Sri sairam institute of technology, Chennai, india

Abstract

Our objective of the project work is to generate power using wind and solar energy. The main system consists of wind turbines and solar panels along with small pulley, large pulley, battery, flat belt, led light which is placed on the highway. To ensure the success of this project several criteria are to be satisfied such as probability, size cost of the system. The design of the preservation is based on the principle of wind and solar energy (wind turbine & solar panel) to generate power. The wind turbine operates with a wind passing on the highway. The solar energy is functioning with the help of panels. After gathering experimental data and necessary guidelines from research papers on the wind and solar energy. The initial design of the model was made based on the calculation diameters of the module selected. The system was fabricated and was experimentally tested for the purpose of power generation.

Keywords: solar energy, wind turbine and solar panel

I. INTRODUCTION

Sustainable power is a form of energy that is produced naturally in the environment. The sun powered vitality driven by alternative energy can be used as active solar heating or passive solar heating. Active solar heating is directly utilized during exercise, such as laundry and heating air. Technology provides a variety of ways to utilize these rich assets. By using photons from the sun to provide energy for the electrons in the silicon cell, photovoltaic (PV) panels fuelled by the sun convert the solar beam into electricity [1]. In this way, you can use the power to flexibly provide sustainable power to your home or business.

Wind is air in motion. Wind energy is the form of solar energy. It is the use of wind to generate the mechanical power through wind turbines to show electrical generators. The kinetic energy is converted into mechanical energy by utilizing wind turbines. This mechanical power is used to generate electricity to power homes, businesses, and etc.

A large portion of us definitely know however a solar power or wind power creating frameworks, all these producing systems have a few or the other complications, like Solar boards are excessively expensive and the expenditure of intensity by utilizing them is commonly greater than the traditional cycle, it isn't accessible in the night or overcast days. Likewise the high or low wind speeds can't operate by wind turbines [2].

2. Literature Review

The use of hybrid solar wind is a necessary condition for economic growth of the nation. Different studies have been completed in the development and performance evaluation of solar and wind hybrid power systems.

Palash Jain et al [3], reported the performance prediction and basic principles of small amplitude VAWT for sharp edge pitching during variable amplitude are discussed. Various structural problems were analyzed, and the final report was that the maximum energy generated by the turbine was due to the wide spectrum of wind speed and the amplitude of blade pitch varied with wind speed and blade tip speed ratio.

Getachew Bekele et al [4], reported the design of wind and photovoltaic hybrid power generation systems in remote areas of Ethiopia. The information gathered from the national agency. The hybrid system is analyzed by using the HOMER software. The work is concluded that the system is operating well and the power shortage coverage rate is as high as 20%.

Chandrakala Gowder et al [5]. Produced hybrid power by using various methods. The key point of this article is the basic principles, characteristics and production of reliable power by hybrid power systems.

3. Methodology

Vertical Axis Wind Turbine: The vertical axis wind turbine is a converter to change over the wind energy into mechanical energy. Fabricating composite edges of lighter weight and more prominent length will be the essential centre for turbine producers since of certain financial focal points edge lengths which can be within the run of 180–230 ft., with a root chord width of 12–16 ft. In any case, one ought to note that the cleared region increments by approximately the square of the edge length whereas the self-weight increments roughly by an example of 2.0 of the edge length.

4. Component used

4.1 Solar Panel

Sun powered begins with the sun. Solar cells are used to transfer light from the sun, which is made of energy particles called "photons", into power that can be used to regulate electrical burdens. Generally 300 watt solar panel used in highways. It is used for many purposes, including remote power supply system of engine room, media communication equipment, remote detection and electricity production of residence [6].



4.2 Wind Turbine

Wind energy is a most popular renewable source. The rotor interfaces to the generator, either specifically or through a shaft and an arrangement of gears that speed up the revolution and permit for a physically littler generator. This interpretation of streamlined constrains to turn off a generator makes power.

4.3 Pulley

Pulleys are shafts or wheels on shafts designed to help tighten the tensioned cables, ropes or belts to develop and change direction along their circuits. Pulleys are used in many ways to lift loads, apply power and transmit power. A pulley has helped to expand and change the direction of the hoop, rope or belt along its outline. Pulleys are used in various methods to lift loads, apply power and transfer power. Otherwise, it is called a wheel with a grooved rim, the rope goes around the wheel and the wheel functions to change the power applied to the rope and are used to increase a considerable load.



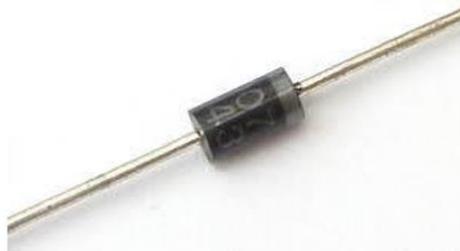
4.4 DC Motor

The electrical energy is converted into mechanical power by rotary electrical motors (DC motor). The DC power from the solar array is converted into 110/240 volt AC power and fed directly into the utility power distribution system of the building. [7].



4.5 Diode

A diode is a machine that basically allows a current in a single direction. It allows power to one way effectively, however, restricts the other way. The key property of a diode is its tendency to conduct electric flow just a single way. The positive pole is known as anode and the negative pole is known as the cathode in diode.



4.6 Aluminium Sheets

Aluminium sheet is characterized as cool turned material over 0.2 mm thick yet not surpassing 6 mm thick. Compound Selection Guide: The alloys are divided into two main categories one is the work hardening alloys and other is the heat treatable alloys. Sheet, the most generally utilized type of mechanical aluminum, is utilized in applications including aviation, transportation, bundling and development.



4.7 Flat Belt Drive

This belt drive employment as it were level and is passed over the driver and driven pulleys. Two types of flat belt available on belt drivers; they are open drive and cross drive. Flat belt drives carry movement and energy from one pole to another pole. In other words, these belts are used where the two poles are different at any point. They contain driving or driving pulley, driven or follower pulley. Belt drives produce minimal measure of noise and vibration [8].



4.8 Ball Bearing

A ball bearing may be a sort of rolling-element bearing that utilization balls to maintain the separation between the bearing balls. Ball bearing acts as rolling resistance and assists radial and axial loads. It accomplishes this by utilizing in any event two races to contain the balls and transmit the loads. Ball will have lower load limit with respect to their size than different sorts of rolling element bearings due to the smaller contact area between the balls and races. Be that as it may, they can endure few misalignments of the inward and external races [9].

5. Working Principle

The principle is used in the wind and solar energy systems are wind turbines and solar panels (PV Cell). The energy is converted into mechanical power by using wind turbines. Anticipated yearly vitality generation from 1 MW solar PV plant and 1 MW wind turbine. Wind Turbine can produce almost 2.97 MU and Solar PV plant can produce 1.50 MU of power and in total can produce 4.37 MU of power.

The produce electricity is utilized to control homes, organizations, and so on... The wind energy is extracted and it is converted into useful work by using a rotary turbine. The solar panel (PV Cell) is used to convert light from sun into electricity. The energy from the sun is called in solar energy. This mechanism has been introduced to generate power with the help of renewable resources such as wind & solar energy.

6. Working Model



7. Advantages

- The biggest advantage of using this type of turbine system is to rotate the rotor at very low rpm and produce sufficient amounts of electricity.
- The gears, belt and bearings are used for ease rotation purposes.

- The wind turbine & solar panel can be placed at highway to generate sufficient amount of electricity to glow the lamp.
- The weight of the turbine and solar panel are low compared to others.
- Efficiency is more than any other module & can produce more electricity without any loss compared as to others.

8. Applications

- The use of this wind turbine and solar panel are mainly for the highway.
- It doesn't require any brakes because there will be no harm caused due to the speed of the rotating blades.
- Highway applications of generation of power can cause tremendous increase in generation of electricity.

9. Future Scope

As the regard for non-inexhaustible sources and pollution causes them, the ideal imperativeness creation with maintainable sources is commonly enjoyed and bit by bit execution of such sources going on, thus, exploration and assets are furthermore extending for such plants and tasks. As the initial go through foundation cost is higher due to plan and gathering perspective. The structure can be monitored using graphical customer checks on the PC. Thus, the whole information will be open to customers and also set aside as for advance applications and improvement.

Conclusion

The use of wind and solar systems clearly state that the efficiency of this system produces more alternating current compared to direct current generated by other systems. This system can run at a very low rpm and can produce an efficient amount of electricity. And this project is totally new to other systems. We can emerge to the never ending and cost reducing project for the society and as it new to the wind turbine and solar panel generating power field would be a boon to the power seekers for highways and can reduce the cause for the government in respective areas. Especially in the highways are more beneficial with the project. It totally replaces the old modules.

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