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Perpetual Motion Wind Turbine Generator for Novelty Energy Harvesting System; Conceptual Design Approach

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ABSTRACT

This paper deals with optimal design of energy harvesting system with perpetual motion. This design gives flexibility in promoting new sources of generation of electrical energy. The demand of electrical energy is increasing exponentially day by day so it is necessary to find alternative ways of energy generation at low cost. Additionally, by considering the fossil fuels are going to be replenished so the sources should be other than fossil fuels. The substitute of fossil fuels is the renewable energy source. Wind energy is one of major sources of renewable energy. The perpetual motion in this system is another new innovation. The whole system can be used for generating electrical energy without any harm to nature. With this system, the dependency on the continuous natural wind energy source can be eliminated at all. The perpetual motion system will produce the wind to energy harvesting system so that the wind turbine generator can be operated and then generate the electricity. The system also can be run continuously without depending on the current condition of the weather. The energy generated by perpetual motion machines (PMM) are usually discounted by the scientific community since they are considered impossible at industrial level but for small operations PMM can become very efficient.

1. Introduction

This paper gives alternate method to generate electricity rather than fossil fuels. The world population is growing at very rapid speed and hence the electricity demand is also increasing. At present the world are dependent on fossil fuels and the fossil fuels are rapidly depleting. So, it is an important task to find out alternate methods for generation which are not dependent on fossil fuels. The renewable energy sources are the best solution of this problem. To create more sustainable energy, many researches were going on to discover better ways of utilizing wind, sun, geothermal and biomass sources. There are numerous intentions in sustainable energy source which incorporate money related advantages, political and financial maintainability, condition inviting influence creation, discovering solution for exhausted conventional energy sources such as fuel and coal.

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The most preferred renewable energy source is wind with a great sustainability. In this paper, only one renewable source is using for generation. Wind is one of the most sources present which is never going to be end and the generated electricity is green energy. Any type of pollution does not occur by this source. The development of wind turbine generator system is because today, wind turbine systems have turned into a point of convergence to meet the necessities of electric power request. This system consolidates a few advancements, and is considered as one of the fitting choices for providing power in remote regions or stand-alone system, where the electric utility was not accessible. It is one of the promising strategies because of their more noteworthy adaptability, high dependability, higher proficiency, and lower costs for a similar amount of energy created by traditional sources. The perpetual motion is also added in the energy harvesting system as a source of electricity generation. The perpetual motion machine is made with new innovation. The perpetual motion practically not possible but the technology can make motion to last long and with the help of this electricity can be generated.

2. Technology

The proposed system is using two types of technologies for generating electricity. These technologies in combine form making the energy harvesting system. This system contains different type of source for the generation the description about the technologies is given below

i. Perpetual Motion
ii. Wind Energy

3. Perpetual Motion

Perpetual motion can be defined as “motion or moving that continues indefinitely without any external resource of energy. The machine which works on the concept of perpetual motion is called perpetual motion machines (PMM). In the practical life perpetual motion machines considered impossible because these types of machines are violating the rule of thermodynamics and energy conservation [1]. The rule is extracted below.

The first law of thermodynamics is the law of conservation of energy. It expresses that energy is constantly moderated. It implies that energy can be neither created nor demolished. Rather, it just changes starting with one structure then onto the next. To keep the system operating, the energy connected should remain with the system with no losses. As a result of this reality alone, it is difficult to fabricate perpetual movement machines. In this manner, machines that separate energy from limited sources will not work inconclusively, on the grounds that they are driven by the energy kept in the source, which will in the end be depleted. But this project can try to make the perpetual motion machines which wind can be produced and remained for long time period and by that can generate electricity [2-4]. Thus, the types of perpetual motion machines can be classified into three types

i. A perpetual motion system of the primary kind creates work without the contribution of energy. It breaks up the first law of thermodynamics: the law of conservation of energy.
ii. A perpetual motion system of the second kind is a system that unexpectedly changes over thermal energy into mechanical work. At the point when the thermal energy is identical to the work done, this does not damage the law of conservation of energy. Notwithstanding, it violates the more unpretentious second law of thermodynamics. The mark of a perpetual system of the second kind is that there is just a single warmth repository included, which is as

a rule suddenly cooled without including an exchange of heat to a cooler supply. This transformation of heat into valuable work, with no reaction, is inconceivable, as indicated by the second law of thermodynamics.

iii. A perpetual motion system of the third kind is normally characterized as one that totally removes friction and other dissipative forces, to keep up movement everlastingly because of its mass inertia. It is difficult to make such a system, as dissemination can never be totally wiped out in a mechanical system, regardless of how close a system gets to this perfect.

In this paper, the first kind of perpetual motion machines is considered for the generation of electric energy hence a system is designed which takes no energy as input and give output for long time period the diagram for that system is given below.

4. Wind Energy

Wind energy is another most important renewable energy source present on the earth. The potential of wind energy is also comparatively high than other renewable energy sources. Because of difference in temperatures of different places the wind is subjected to flow. The energy generated by the wind pressure is called wind energy. In this system the turbine is subjected to rotate when the pressure of air works on the blades of turbine [5, 6]. And because of the rotation of turbine the conversion of mechanical energy into electrical energy take place. Wind energy is useful in remote areas where the transmission of electrical energy is not possible by the lines at those places by wind turbines the electricity demand can be fulfilled. Numbers of wind turbines are connected in wind farms and wind farm is connected to the transmission network. The power generated by the wind farms is variable because the wind pressure is varying from seasons to season [7]. So it cannot fully dependent on wind energy so some other supply source is also connected with the wind system [8]. The wind turbines are of the two types the description is given below

i. Horizontal axis wind turbines are the most well-known sort used. Majority of the components and parts such as blades and shaft are over a tall tower and the sharp blades face into the wind sources. The shaft is even to the ground. The wind energy hits the blades of the turbine that are associated with a shaft causing pivot. The shaft has a rigging on the end that turns a generator. The generator generates electrical power and sends the power into the power grid.

ii. Vertical axis wind turbines are not as normal and lately have been utilized for big scale power generation. In vertical turbines the shaft and the blades are associated with is vertical to the ground. The majority of the principle parts are near the ground. Additionally, the wind turbine itself is close to the ground, not at all like horizontal which everything is on top of the tower.

In the proposed system, vertical axis wind turbine type is used due to its advantages for the electricity generation purpose.

5. Proposed Design of Energy Harvesting System

Figure 1 shows the diagram of proposed perpetual motion energy harvesting system design. In this system, the axial fan is used to produce wind. The wind produced will flow through the nozzle system which the velocity of the wind will be increasing. Then, the high velocity of wind will be supplied to the vertical axis wind turbine. The generator will be moving together with the wind turbine to generate DC current. Lastly, the electricity power will be directed to the storage. From the storage, the electricity power will be divided and supplied to the axial fan and load applications.

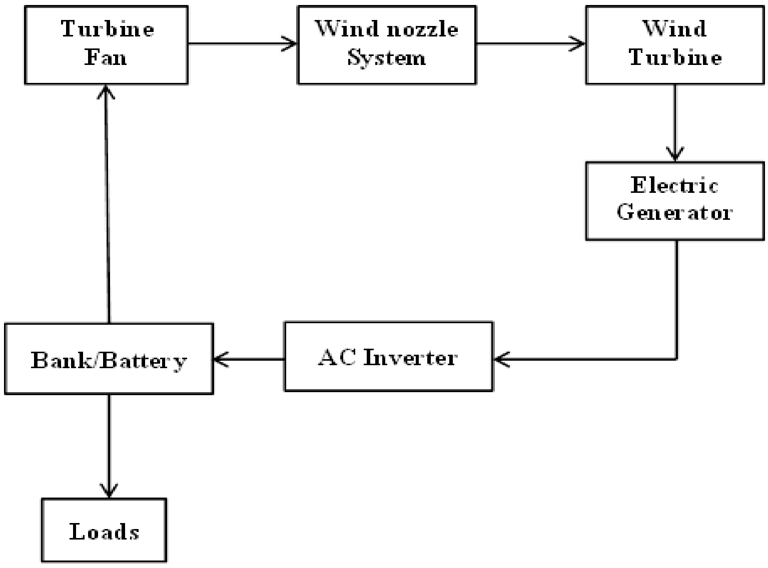

Fig. 1. Proposed design diagram

Perpetual motion energy harvesting system consists of axial fan, nozzle system, vertical axis wind turbine and also generator and output module as shown in Figure 2. The axial fan and nozzle system is part of perpetual motion system which is to source high velocity wind to the energy harvesting system. Energy harvesting system parts are vertical axis wind turbine and generator that convert mechanical energy to electrical energy.

The conceptual of axial fan and nozzle system is quite same with ducted propeller. Ducted propellers typically have two major components: an annular duct with an airfoil cross-section that may be both uniformly shaped around the duct and therefore symmetric with respect to the shaft center line or include certain asymmetric characteristics to handle wake field flow fluctuations. The second component, the propeller, is a non-ducted propeller with the blade design modified to account for the flow interactions induced by the presence of the duct in its flow field. Ducted propellers represent an additional, valid, answer to current design requirements. In the case of vessels for which requirement of high thrust is critical in the low-speed operation range, or when the screw is limited in diameter, the use of accelerating nozzles is widely documented in literatures. With accelerating nozzles, the duct increases the flow rate through the propeller, which consequently operates at a more favorable loading. The nozzle by itself produces a certain positive thrust [9].

Figure 3 showed the design of the axial fan. Axial fan was chosen because of its minimal cost and productivity in delivering high wind speeds. The detriment of utilizing axial fans is they confer a little measure of digressive speed that must be amended with counter-rotational vanes as well as extra flow conditioners. The expense of the additional flow conditioning for the axial fan is considerably less than the expense of blowers, which produce a progressively uniform speed circulation. Axial fan rates can be directed either by modifying the rotational speed or the pitch of the blades. It is proposed that picking a fan with movable pitch is wanted to fixed blades since it takes into account a bigger scope of stable flow conditions and diminishes slowing down issues. For this task anyway factor pitch fans for the model would be restrictively costly, so fixed blade axial fan were utilized; for the full scale wind generator it is ideal to put resources into variable pitch blades to empower the most exact modifications. The axial fans chose are electric driven. These electric fans have the preferred standpoint over their burning driven partners since they have less vacillation, lower working expenses, and have appeared to be progressively solid by and by [10].

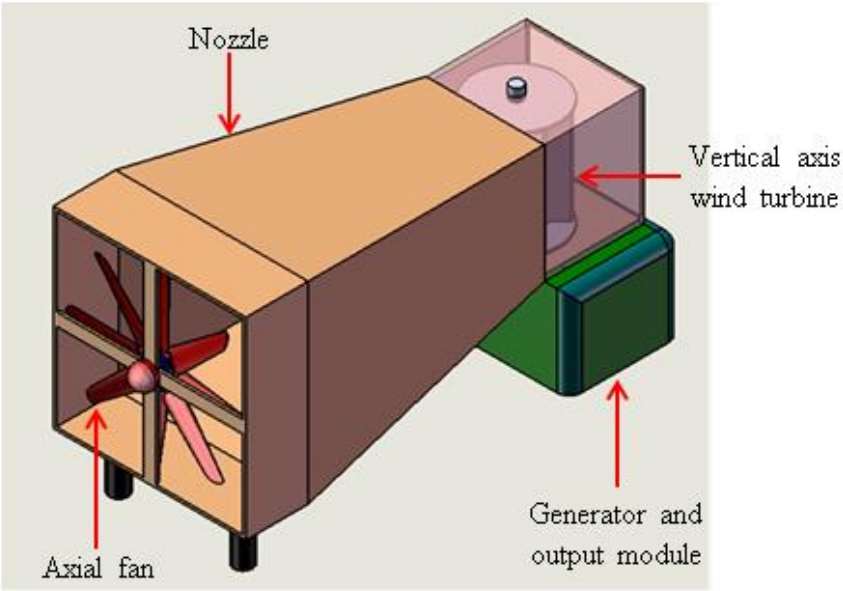

Fig. 2. Design of perpetual motion energy harvesting system

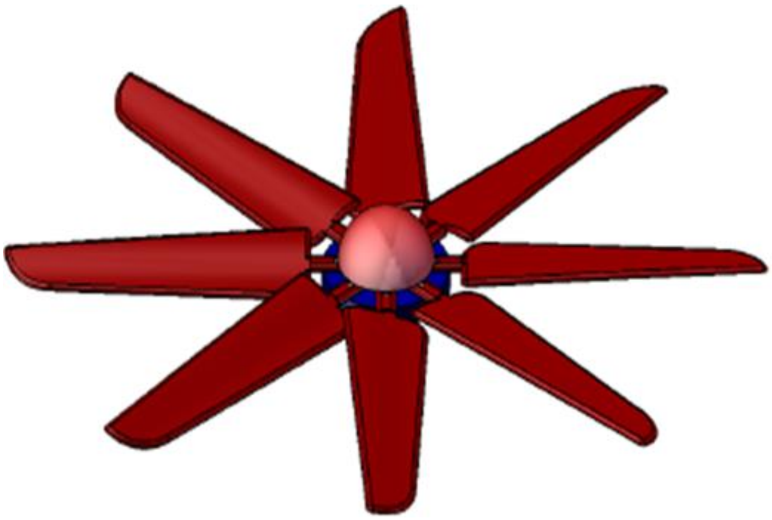

Fig. 3. Axial fan design

The design of the nozzle was shown in Figure 4. At that point, to quicken a flow of wind to high speed wind, a spout must be intended to combine to a base cross-sectional region. As subsonic flow enters the meeting nozzle and the zone diminishes, the flow of wind quickens [11]. After achieving the base zone of the nozzle, otherwise called the throat of the duct, the wind speed can be expanding. In the event that the speed of the flow is to keep on expanding, its density must diminish so as to obey protection of mass. To accomplish this diminishing in density, the flow must extend, and to do as such, the flow must go through a wandering nozzle.

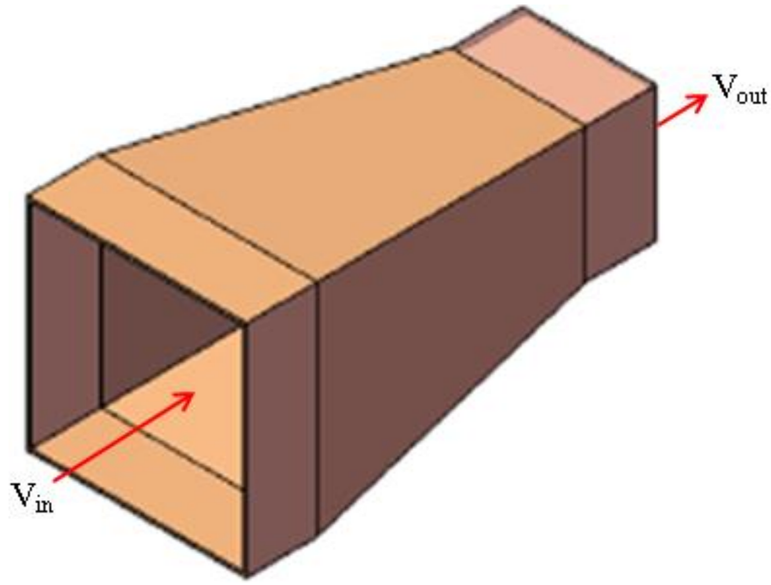

Fig. 4. Design of nozzle

Aerodynamic optimization has provided a suitable tool for all aerodynamic designs used in the design of aircraft, cars, trains, bridges, wind turbines, flow inside pipes, cavities, etc. Due to the issues of reducing fuel consumption and controlling the harmful effects on the environment, it is necessary to choose the best aerodynamic shape [12].

Savonius type turbine as shown in Figure 5 is designed with a high drag factor but the frames element of the Savonius type should be designed aerodynamically form to reduce drug force on the wind action for not working elements of turbine [13]. The Savanious are one of the simplest self-starting vertical-axis turbines. Aerodynamically, these turbines are drag-type VAWT, so it cannot rotate faster than the wind speed. The Savanious turbines consist scoop rotor looks like an “S” configuration in cross section. Referable to the curvature from the shape “S”, the scoops experience less drag force when going against the wind compared when the scoops moving with the stream of the current of air [14]. This differential drag causes the Savanious turbine to spin. Furthermore, the cavity shape of the blades allows the wind pressure to rotate turbine with low speed and produces a high bending moment along the barb of the turbine due to a large area of the curved components. Most of the swept area of the Savanious rotor is near the ground, creating the overall energy extraction more effective due to lower wind speed at lower heights. The advantages of this type of VAWTs are the simplicity, the reliability and the very low noise production. It can operate well also at low wind speed because the torque is very high especially in these conditions [15, 16]. Even so the torque is not invariant, thus some improvement like helical shape is used.

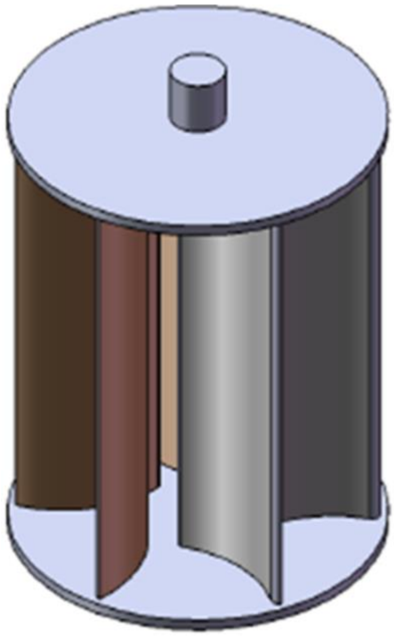

Fig. 5. Vertical axis wind turbine design

6. Conclusions

In this system, two technologies are used which are wind energy system and perpetual motion machines for the generation of electric energy. The perpetual motion energy harvesting system is the least expensive energy source when compared to traditional electricity generation methods. The system is reliable and sustainable and also provides greater flexibility in siting new generation.

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