Vertical Axis Magnetic Levitation Wind Turbine

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ABSTRACT

Since a decade the demand for electricity is increasing at higher rate and the demand for power is running ahead of supply. The present day methods of power generations are not sufficient to fulfill energy requirement. The energy crisis has forced to think & develop the power generation by renewable sources (wind power). In the world, wind power is one of the most realistic strategic choice to solve the shortage of energy.
Wind is a non-conventional source of energy, by which the electricity can be obtained by converting kinetic energy of wind into electrical energy by using wind turbine. There are two types of wind turbine, one is conventional wind turbine and other is maglev wind turbine, but generation of electricity using maglev technology is now becoming more competitive. It works on the principle of electromagnetism. It has colossal structure. It has several advantages over conventional wind turbine and has certain applications. It is expected that with the use of the levitated turbine design wind as low as 1m/s can produce power. This type of wind setup does not require any significant land for installation, as it can be easily install on rooftop, tower, and buildings. With Maglev VAWT the cost is significantly low with smaller size generator, lower weight, and low maintenance and long lasting. The design of such a maglev based turbine design to demonstrates the effectiveness of the proposed system is presented in this work.

Keyword: *Magnetic Levitation, Wind Energy, Renewable Energy, Turbine.*

1. INTRODUCTION

Wind energy is the fastest growing source of clean energy worldwide. A major issue with the technology is fluctuation in the source of wind. There is a near constant source of wind power on the highways due to rapidly moving vehicles. The motivation for this project is to contribute to the global trend towards clean energy in a feasible way. In today's life the demand on electricity is much higher than that of its production.
The wind turbines will be placed on the road dividers so that wind flow from both sides of the highway will be acting tangentially in opposite directions on both sides of the turbine . These types of turbines can be installed on express highways and other high speed traffic areas to generate electricity. Ideally, the turbine can be used globally as an unlimited power source for street lights and other public amenities. Also this system can be connected to the grid to supply the increased power demand.

1.1 Problem Statement

As the demand of electricity is increasing day by day and availability of electricity is less than the demand of electricity. Generation of electricity by other conventional method of power generation is very costly and it is not economical to small scale industries or common people. The conventional method of power generation has negative impact on environment as they release carbon content to atmosphere so it lead to global warming. The other type of wind turbine required large plane area for their installation. So it is necessary to find out the technique which will overcome all above problems and which will have less maintains cost as well as less initial cost, it should start at low wind speed about 1.5m/s and should withstand high wind speed up to 40m/s and provide greater solution over the crisis of electricity.

1.2 Objectives

Fossil fuels have been used extensively all over the world to satisfy energy demands. However, their availability is limited so objective is to reduce consumption of fossil fuel.
The byproduct of fossil fuel consumption is carbon dioxide, which is leading to Global Warming. The amount of carbon dioxide that someone or something produces is known as its "carbon footprint." So objective is to reduce global warming and its impact on environment.To full-fill increasing rate of energy demand. To promote the way of power generation by using renewable energy resources.

1.3 Scope

The technology is expected to create new opportunities in low-speed areas, with starting speed as low as 1.5m/s & cut in speed of 3m/s.
It is configured to capture wind from any direction and convert wind to energy at very high efficiency. Magnetic levitation reduces the friction & eliminates need of bearings.
Today wind turbines are considered to be the most developed form of renewable
energy technology. Able to deliver clean green-power for less than one cent per kilowatt hour.
This new technology is remarkably cheap with low operating cost. Less noise compared to existing conventional wind turbines.

2. METHODOLOGY

Various methods can be employed for rotation of turbine to convert K.E. of air into Electrical energy.

2.1 Vertical Axis Wind Turbine

In this assembly the the axis of turbine shaft is arrange in such way that it perpendicular to flow of air. It does not require yawing mechanism. There are two type of Vertical Axis Wind Turbine

2.1.1. Darrieus Vertical Axis Wind Turbine

In this type of turbine the number of blade are mounted on vertical shaft. The two ends of blade are attached to shaft and giving bade aerofoil curve shape.

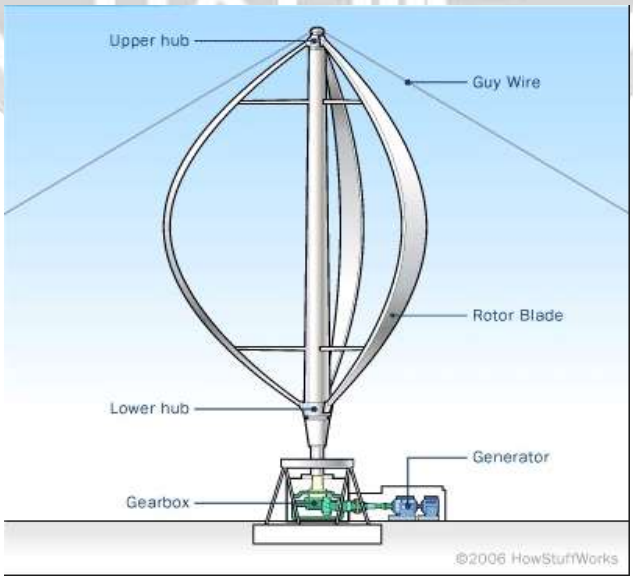

Fig.No.1. Darrieus Vertical Axis Wind Turbine

2.1.1. Savonius Vertical Axis Wind Turbine

It is also called S-type vertical axis wind turbine since there blade are arranged in S-shape. It can capture air from all direction. It more effective than the other.

Fig.No.2 -: Savonius Vertical Axis Wind Turbine

2.2 Horizontal Axis Wind Turbine

In this assembly the the axis of turbine shaft is arrange in such way that it parallel to flow of air. It does require yawing mechanism.

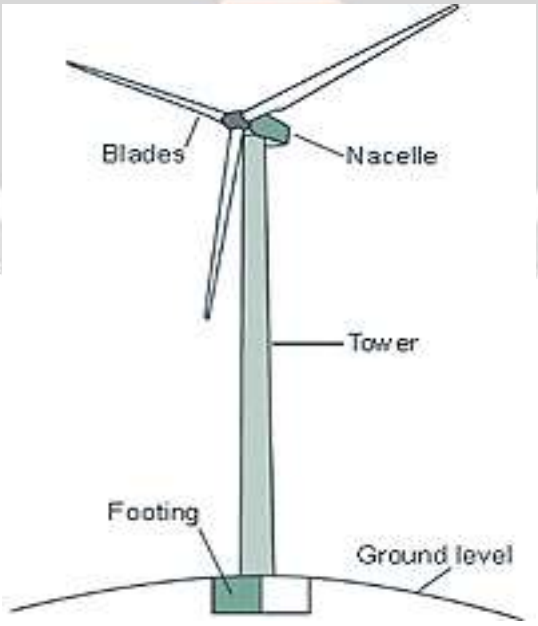

Fig.No.3: Horizontal Axis Wind Turbine

3. MAGNETIC LEVITAION VERTICAL AXIS WIND TURBINE

It is one type of Savonius vertical axis wind turbine since there blade are arranged in S-shape. It can capture air from all direction. It more effective than the other. It experience a less drag when it is place moving against the wind than when moving with the wind due to it's S-type curvature of blade. Friction losses in this turbine are negligible due do use of magnetic levitation.

Components of Magnetic Levitation Vertical Axis Wind Turbine

3.1 Neodymium Magnets

Ring type Neodymium magnets grade N-52 are used to produce magnetic levitation. They are hollow in shape and carries shaft centrally. Two ring type Neodymium magnets are use out of which one is fixed on bottom.disc, a bottom disc is also fixed to assembly.

Disc type Neodymium magnets grade N-52 are used they are attached to the bottom surface of wind turbine. They are used to produce magnetic induction to generate EMF.

3.2 Copper Coil Winding

They are four in number which are fixed on the top surface of bottom fixed disc. When the turbine is rotated then disc magnets are also rotate due to that this coil cut electromagnetic field lines of disc magnet at that time due to electromagnetic induction AC current get in them.

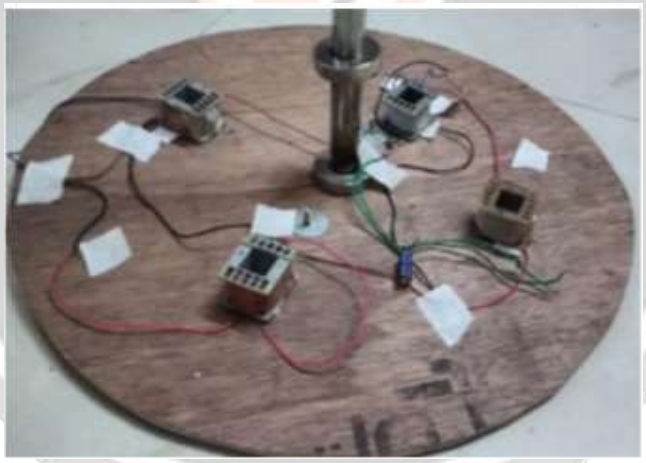

Fig.No.4: Copper Coil Winding

3.3 Voltage Multiplier

It consist two capacitor and two rectifier diodes. The capacitor used for stored the energy and rectifier diodes used for convent AC voltage into rectified DC voltage in it's double value which is later used for battery charging purpose.

Infrared sensors uses special sensors to modulate IR signals emitted from to IR transmitter and detect the modulated IR signal reflected back from near by objects this sensor has built in IR LED driver to modulate the IR signal at 38KV to match built in detector. The modulated IR signal immunes the sensors from the interferences cause by the normal light of the sun light. The module will output a high if no object is detected and low if an object is detected.

4. WORKING

This phenomenon operates on the repulsion characteristics of permanent magnets Using a pair of permanent magnets like neodymium magnets and substantial support magnetic levitation can easily be experienced. By placing these two magnets on top of each other with like polarities facing each other, the magnetic repulsion will be strong enough to keep both magnets at a distance away from each other. The force created as a result of this repulsion can be used for suspension purposes and is strong enough to balance the weight of an object depending on The threshold of the magnets. Power will then be generated with use of permanent magnets and a set of coils.

5. CONCLUSION

Wind energy conversion systems are practical and potentially very contributive to the production of clean renewable electricity from the wind even under less than ideal sitting conditions.
It is hoped that they may be constructed used high-strength, low- weight materials for deployment in more developed nations and settings or with very low tech local materials and local skills in less developed countries.
The MAGLEV wind turbine designed is ideal to be located on top of a bridge or bridges to generate electricity, powered by wind.
The elevated altitude gives it an advantage for more wind opportunity. With the idea on top of a bridge, it will power up street lights and or commercial use. In most cities, bridges are a faster route for everyday commute and in need of constant lighting makes this an efficient way to produce natural energy.

6.REFERENCES

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