

Maglev Windmill and Solar Powered Generator

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Abstract— The traditional wind turbine need very high structures to allow room for their massive blades, hence Maglev Turbines are an ideal solution. It is estimated that renewable sources might contribute about 20%-50%to energy consumption in the later part of the 21st century. Maglev wind turbines have several advantages over conventional wind turbines. For instance, they're able to use winds with starting speeds as low as 1.5 meters per second (m/s). Also, they could operate in winds exceeding 40 m/s.

I. INTRODUCTION

The traditional wind turbine need very high structures to allow room for their massive blades, hence Maglev Turbines are an ideal solution. It is estimated that renewable sources might contribute about 20%-50%to energy consumption in the later part of the 21st century. Maglev wind turbines have several advantages over conventional wind turbines. For instance, they're able to use winds with starting speeds as low as 1.5 meters per second (m/s). Also, they could operate in winds exceeding 40 m/s. At present the largest conventional wind turbines in the world produce only five megawatts of power. However, one large maglev wind turbine could generate one GW of clean power, enough to supply energy to 750,000 homes. The paper aims to make a systematic analysis of design and fabrication processes to find out optimum output from the Vertical Axis Maglev Wind Turbine and by also using solar panel for using the solar energy to generate electricity.

II. EASE OF USE

For instance, they're able to use winds with starting speeds as low as 1.5 meters per second (m/s). Also, they could operate in winds exceeding 40 m/s. At present the largest conventional wind turbines in the world produce only five megawatts of power.

A. Maintaining the Integrity of the Specifications

Combining latest MagLev technology with PV (Solar) panels gives the best of both worlds for greater independence from costly grid electricity bills. From apartments to street lighting, hybrid systems are starting to bring consistent power to areas worldwide, Maglev turbines are an ideal solution to the traditional wind turbine, which need very high structures to allow room for their massive blades. MagLev technology (so called due to the 'magnetic levitation 'friction free drive) has been around for a while as we know from the Magnetic Levitation high speed trains.

III. WHY WINDMILL AND SOLAR POWERED GENERATOR

Renewable energy is generally electricity supplied from sources, such as wind power, solar power, geothermal energy,

hydropower and various forms of biomass. These sources have been coined renewable due to their continuous replenishment and availability for use over and over again. The popularity of renewable energy has experienced a significant upsurge in recent times due to the exhaustion of conventional power generation methods and increasing realization of its adverse effects on the environment. It is estimated that renewable sources might contribute about 20%-50% to energy consumption in the later part of the 21st century.

A. Advantages

Energy is the primary and universal measure of all kinds of work by human beings and nature. Everything what happens in the world is the expression of flow of energy for input to their bodies or to the machines and thinks about crude and electric power. The energy sources available can be divided into 3 types.

B. Parts

- Two ring type neodymium (NdFeB) magnets of grade N-42 of outer diameter 40 mm, inner diameter 20 mm and thickness 10 mm are placed at the center of the shaft by which the required levitation between the stator and the rotor is obtained.
- A stepper motor is an electric motor whose main feature is that its shaft rotates by performing steps, that is, by moving by a fixed amount of degrees. This feature is obtained thanks to the internal structure of the motor, and allows to know the exact angular position of the shaft by simply counting how many steps have been performed, with no need for a sensor.
- The performance of a stepper motor — both in terms of resolution (or step size), speed, and torque — is influenced by construction details, which at the same time may also affect how the motor can be controlled. As a matter of fact, not all stepper motors have the same internal structure.
- In the designed prototype, the stator and rotor are separated in the air using the principle of magnetic levitation. The rotor is lifted by a certain centimeters in the air by the magnetic.

C. Principle

In selecting the vertical axis concept for the wind turbine that is implemented as the power generation portion of this project, certain uniqueness corresponded to it that did not pertain to the other wind turbine designs. The characteristic that set this wind generator apart from the others is that it is fully supported and rotates about a vertical axis

When designing a generator it is important to have a firm grasp of the basic laws that govern its performance. In order to induce voltage in a wire a nearby changing magnetic field must exist. The voltage induced not only depends on the magnitude of the field density but also on the coil area. The relationship between the area and field density is known as flux

$$\alpha + \beta = \chi. \tag{1}$$

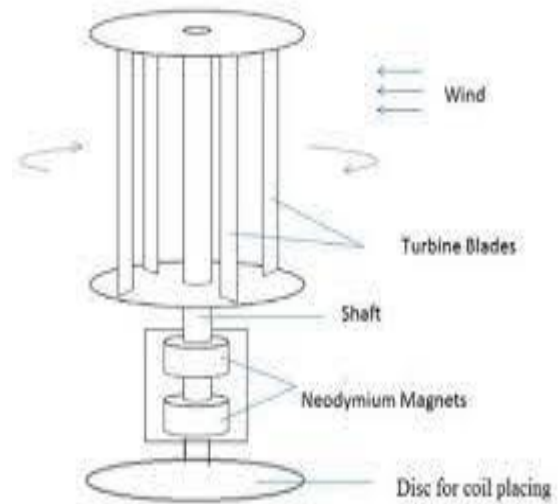
The way in which this flux varies in time depends on the generator design. The axial flux generator uses the changing magnetic flux to produce a voltage. The voltage produced by each coil can be calculated using Faraday's law of induction

D. Maglev over traditional windmill

- Concept of magnetic levitation is successfully illustrated in this project and the design of axial flux generator and levitation system is fully incorporated in the fabricated model.
- Rotor blades are designed using concept of aerodynamics and parameters like tip speed ratio, power coefficient, solidity, material used, design of blades, all are incorporated while designing and fabricating a wind turbine using magnetic levitation wind turbine.
- Voltage generated from Maglev wind turbine can be increased by increasing the number of turns of the coil in proportion with magnetic lines of force obtained from the permanent magnet.
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- The Maglev windmill can be designed for using in a moderate scale power generation ranging from 400 Watts to 1 kW.
- The Maglev windmill can be designed for using in a moderate scale power generation ranging from 400 Watts to 1 kW.
- It is suitable for integrating with the hybrid power generation units consisting of solar and other natural resource

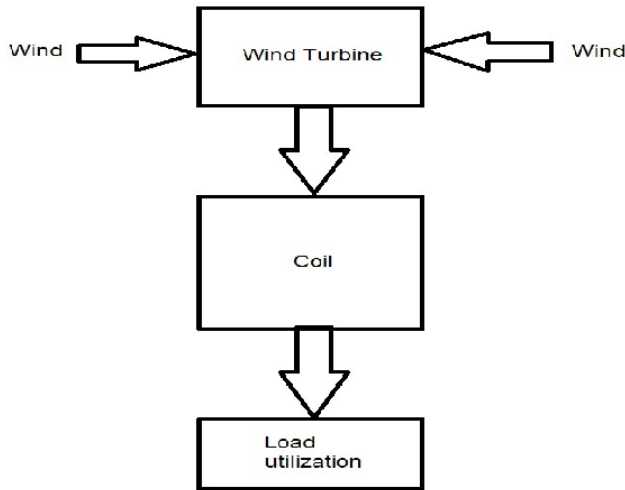
IV. WORKING

The performance of a stepper motor — both in terms of resolution (or step size), speed, and torque — is influenced by construction details, which at the same time may also affect how the motor can be controlled. As a matter of fact, not all stepper motors have the same internal structure (or construction), as there are different rotor and stator configurations.



A. Advantages

- 1) When designing a generator it is important to have a firm grasp of the basic laws that govern its performance
 - a) Reduces maintenance cost.
 - b) A clean, green, eco-friendly machine (zero emission).
 - c) Require less space for installation.
- 2) The nations wind supply is abundant and inexhaustible.
 - a) Low operating costs: no need for gas and inexpensive battery charging (A complete cycle charge will take eight to ten hours).
 - b) Wind turbines can be build in existing building and farms.
 - c) Require less space for installation.
 - d) A clean, green, eco-friendly machine (zero emission).
 - e) When designing a generator it is important to have a firm grasp of the basic laws that govern its performance. In order to induce voltage in a wire a nearby changing magnetic field must exist. The voltage induced not only depends on the magnitude of the field density.



V. CONCLUSION

Concept of magnetic levitation is successfully illustrated in this project and the design of axial flux generator and levitation system is fully incorporated in the fabricated model.

Rotor blades are designed using concept of aerodynamics and parameters like tip speed ratio, power coefficient, solidity, material used, design of blades, all are incorporated while designing and fabricating a wind turbine using magnetic levitation wind turbine.

Design details of axial flux generator and levitation system implies voltage induced in a coil depends upon the permanent magnets, which creates magnetic lines of force based upon their magnetic strength.

In order to levitate a wind mill, selection of magnet plays a very important role. Magnetic forces require to levitate wind mill depends upon the turbine/rotor design. This project demonstrates the utilization of the renewable resource (wind energy) in an efficient way. This type of generation can be used in remote places, where conventional power supply is uneconomic.

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B. Applications

In order to levitate a wind mill, selection of magnet plays a very important role. Magnetic forces require to levitate wind mill depends upon the turbine/rotor design. This project demonstrates the utilization of the renewable resource (wind energy) in an efficient way.

- Open field work, Using replaceable, battery, and panel.
- Used in large plants
- Industrial Applications
- Can be applied on skyscrapers

C. Selection of the leaf

1) In selecting the vertical axis concept for the wind turbine that is implemented as the power generation portion of this project, certain uniqueness corresponded to it that did not pertain to the other wind turbine designs. The characteristic that set this wind generator apart from the others is that it is fully supported and rotates about a vertical axis. This axis is vertically oriented through the center of the wind sails, which allows for a different type of rotational support rather than the conventional ball bearing system found in horizontal wind turbines.

