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Windmill Power Generation System

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Abstract: ***Wind turbines are the most ancient known means of extracting energy from natural sources (wind in this case). It is not possible to create high consistent power from a wind turbine due to changeable weather and wind speed, but a small-scale wind turbine can be used to power tiny appliances at home and in moving vehicles. This research investigates the design features of an innovative small-scale wind turbine intended to supply power. The paper covers design, improvement, power management, and production procedures.***
Keywords: Windmill Power Generation, Windmill Energy Production

I. INTRODUCTION

With growing awareness of global warming caused by carbon dioxide emissions from automotive fuel combustion, the usage of natural energy sources is becoming more popular. Engineers are adapting the usage of renewable energy sources (such as wind, solar, and hydro) to create power. One of the earliest known techniques of obtaining energy from natural sources is the utilisation of wind turbines. Wind turbines are underutilised since they rely largely on the wind blowing as well as geographical disturbances; nevertheless, a small-scale wind turbine may be used to power automobile appliances, lowering the cost of gasoline consumed to create the same amount of energy. Wind turbines use wind energy to create electricity. Installing wind turbines atop autos, like any technical design, presents a number of obstacles. This research investigates the present designs of small-scale wind turbines, as well as market requirements, before designing a new wind turbine system. Current designs, power generation, blade design, and other topics are covered in the study. The paper also analyses development challenges such as noise, aesthetics, material cost, maintenance, and other concerns that restrict design enhancement. These are the issues that have an impact on design and production. Renewable energy has been in high demand recently owing to the overuse of non-renewable resources and their rising costs. Wind energy has therefore been used in this project to generate power using a renewable resource. A windmill creates energy due to magnetic interaction between the spinning and stationary coils when there is enough wind. This project makes use of a horizontally spinning Windmill prototype. Tiny Windmill Energy Production The Windmill, or Wind Turbine Generator, is used in this project to charge a 12V battery. The system is built around an Atmega328 microprocessor, which intelligently detects and charges the battery while displaying the voltage on the LCD. When there is enough wind to propel the windmill, it provides enough electricity to charge a battery. It can charge the battery automatically and without emitting any harmful emissions since it can function in favourable natural circumstances without requiring fossil fuel. As a result, this project exemplifies how natural resources, such as wind energy, may be efficiently exploited to generate power in harmony with nature.

II. SCOPE AND RELEVANCE

India has a long coastline that provides an excellent source of fresh air. Apart from these, there are additional techniques to create wind that require immediate attention. In India, a highway wind turbine is an alternative for energy generation. Wind power development in India began in the 1990s and has grown dramatically in recent years. Despite being a relative newbie to the wind sector in comparison to Denmark or the United States, local policy support for wind power has helped India to become the country with the world's fifth highest installed wind generating capacity.

III. LITERATURE REVIEW

Wind farms are formed when several wind turbines are installed in the same spot to generate substantial amounts of electricity. There are currently thousands of wind farms in various nations throughout the world as a result of growing energy prices and the resulting hunt for alternatives. There is still much debate about the merits and downsides of wind power and its local influence. The articles on this page investigate wind farm news and information. The three-bladed rotor is becoming more common, with a separate front bearing and a low speed shaft coupled to a gearbox that offers an output speed adequate for the most common four-pole (or two-pole) generators. In the larger wind turbines, the blade pitch is often adjusted constantly under active control to manage power at greater operational wind speeds.

Most frequently, support structures are tubular steel towers that taper in some form, both in metal wall thickness and in diameter from tower base to tower top. Concrete towers, concrete bases with steel top portions, and lattice towers are also utilised, but they are far less common. Tower height is site dependent, and turbines are frequently supplied with three or more tower height options. The creator, Fujin Deng, used a variable speed wind turbine with a drive-train design of multiple permanent magnet synchronous generators (MPMSGs). Based on the MPMSGs, a cascaded multilevel converter interface is created to generate a desirable high ac sinusoidal output voltage that may be directly linked to the grids. Furthermore, such an arrangement has been developed such that the output alternating current voltage has a predetermined phase angle difference among the stator windings of several generators.

IV. OBJECTIVES OF PROPOSED WORK

1) Build a small or model windmill for your windowsill or garden to learn about wind energy firsthand.
2) Wind turbines generate energy by utilising the wind's inherent power to drive a generator.
3) Wind energy is a clean and sustainable source of energy.
4) Wind turbines generate energy by utilising the wind's inherent power to drive a generator. Wind energy is a clean and sustainable source of energy.

V. METHODOLOGY

Turbines capture wind energy using propeller-like blades that function similarly to an aeroplane wing. A pocket of low-pressure air formed on one side of the blade as the wind blows. The blade is then drawn into the low-pressure air pocket, forcing the rotor to revolve. This is referred to as lift. The force of lift is substantially greater than the force of the wind against the front side of the blade, which is known as drag. The rotor spins like a propeller due to the combination of lift and drag. A set of gears increases the spin of the rotor from around 18 revolutions per minute to about 1,800 revolutions per minute, allowing the turbine's generator to create alternating current (AC).

Block Diagram of Windmill Power Generation

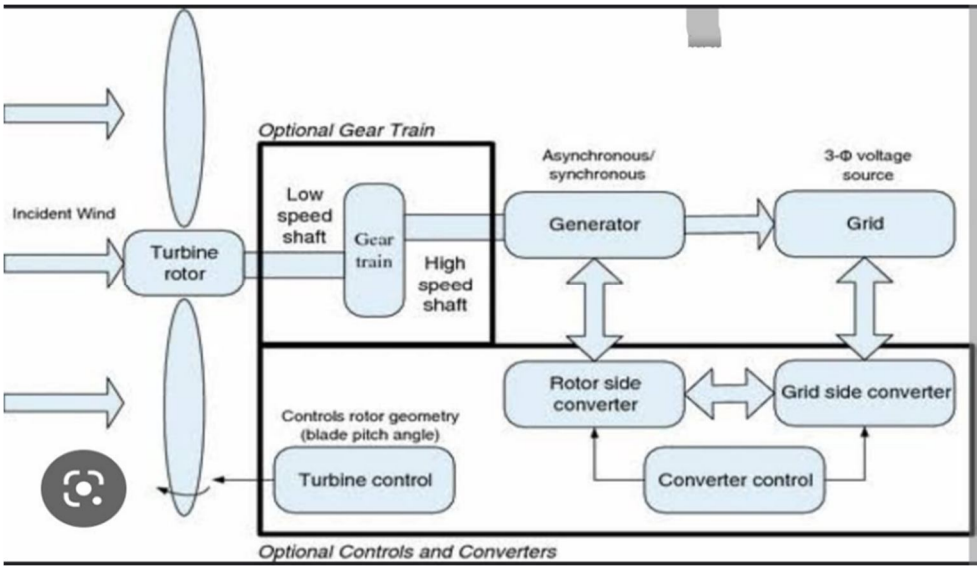

Figure : Block Diagram of Windmill Power Generation

VI. ADVANTAGES

1) It produces greater electricity.
2) It is not required to link the same generator as well as other generators in the same shaft.
3) We will employ all types of generators, including permanent magnet alternating current generators, synchronous generators, and induction generators.
4) There is no gear box; simply two straight bevel or spiral bevel gears are utilised (driver and driven gear)
5) When compared to a single windmill, the power production is doubled.

VII. APPLICATIONS

1) Wind energy is used to move sailboats in rivers and oceans to carry people and goods from one location to another.
2) Wind energy is utilised to power pumps that extract water from the ground using wind mills.
3) Wind energy has also been utilised to power flourmills, which crush grains such as wheat and corn into flour.
4) Wind energy is now being used to create power.

VIII. CONCLUSION

This work provides a new way for generating electricity utilising two identical generators with a single rotor. Another advantage of the system is that it is cost effective and generates high power with the same torque. Theoretical analysis and experimental work are performed to validate the analytical work. We infer that high power is produced by a single rotor, which is twice as powerful as a single pair of DC generator and rotor.

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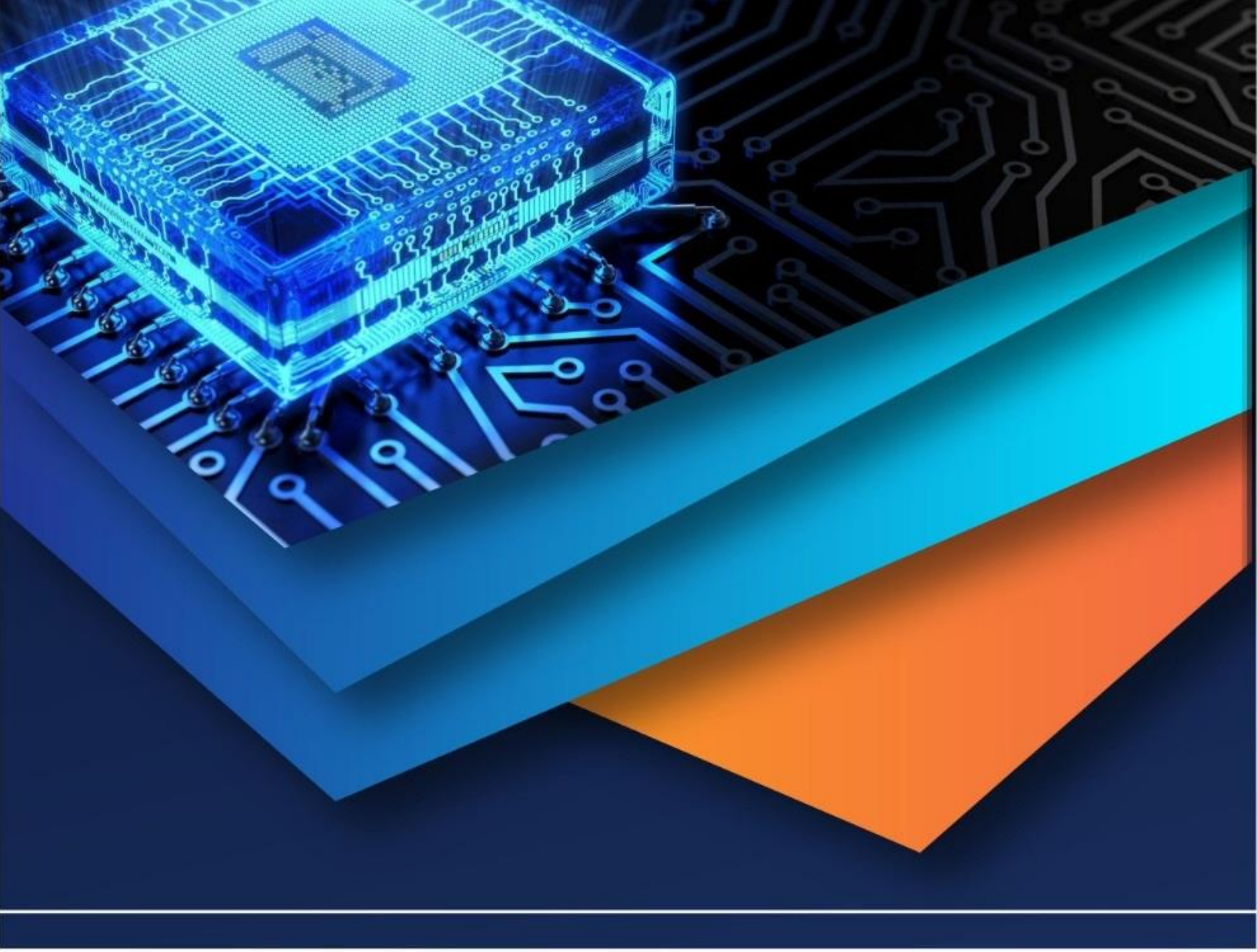

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