VORTEX BLEDLESS WIND TURBINE

"A New Approach to More Efficient Wind Energy Source"

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Abstract— *Recently renewable energy generation plays a vital role in power system. Wind energy generation is the best option to replace conventional energy generation. But, due to less efficiency of conventional wind turbine; more efficient Bladeless Wind Turbines are proposed. Bladeless wind turbine also avoids the problem of space and size.This design represents a new paradigm in wind energy and aims to eliminate or reduce many of the existing problems in conventional generators.*

Key Words —Bladeless Wind Mills, Vortex, Space, Size

1.INTRODUCTION

Wind power has become a useful source of energy over the past few decades as larger, more efficient turbine designs have produced ever-increasing amounts of power.in conventional wind power generation, transportation is increasingly challenging because of the size of the components. Bladeless turbines will generate electricity for 40% lesser in cost compared with conventional wind turbine.
The bladeless windmills uses a radically new approach for capturing both intermittent wind energy pulses and constant wind flow under specified wind velocity and pressure. The windmills utilises the energy of vorticity, an aerodynamic effect. As winds strikes fixed structure , its flow changes and a cyclic pattern of eddies are formed in the vicinity of the structure.

As these forces go strong, the structure starts vibrating.Consequently, these aerodynamic instabilities can be utilized to run a linear alternator or a crankshaft.
Then natural frequency of the structure should not match with the frequency of vibration, which is one of the design criteria, our design takes care of this major criteria. The design of our windmill is entirely different from a traditional windmill. Instead of the huge tower, nacelle and blades, this device has a conical frustum mast made up of fiber-glass, a crankshaft, a crank, a connecting rod and a hinge joint. The hollow and light weight mast makes this device portable and user-friendly. Also, this low cost components open a way for low cost renewable source of energy.

In this project, Bluetooth module is interfaced to 8051.The program written to the 8051 microcontroller communicates with Bluetooth module serially to receive the commands. Microcontroller switches the electrical loads automatically based on the commands received from the the Bluetooth.

2. PROBLEM STATEMENTS

1. The increasing demand of energy by increasing population.
2. Pollution and other natural hazards.
3. The installation of conventional wind turbines requires a very big space which is the main problem.
4. Efficiency of conventional wind turbine is also less.
5. To satisfy pressing environmental and social demands.

3. OBJECTIVE

In this project, we try to increase the efficiency of Wind Turbine. Also, the space required for the installation is Reduced. It produces clean energy. It is also helpful for Rural Electrification.

Fig:-1 Bladeless Wind Turbine

4. CONCEPT OF VORTEX BLADELESS WIND TURBINE

Vortex is a wind generator without blades. Instead of capturing energy via the rotational motion of a turbine, the Vortex takes advantage of what's known as vorticity, an aerodynamic effect that occurs when wind breaks against a solid structure (Kármán vortex street). The Vortex structure starts to oscillate, and captures the energy that is produced.

Vortex doesn't just eliminate the blades. We have deliberately designed the it to have no parts in contact at all (no gear, linkages). this way we can make vortex cheap and easy to maintain. basically, we reduce the amount of raw material use for manufacturing, which cuts the production cost and time to produce the equipment.

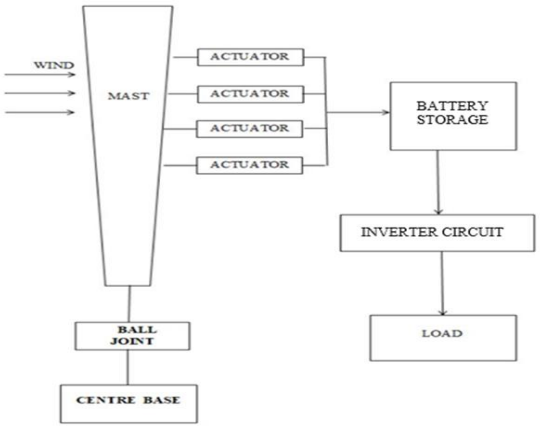

Fig:-2 Layout of Bladeless Wind Turbine

5. COMPONENTS OF BLADELESS WIND TURBINE

 Actuator
 Ball joint
 Frame
 Battery
 Inverter Mast

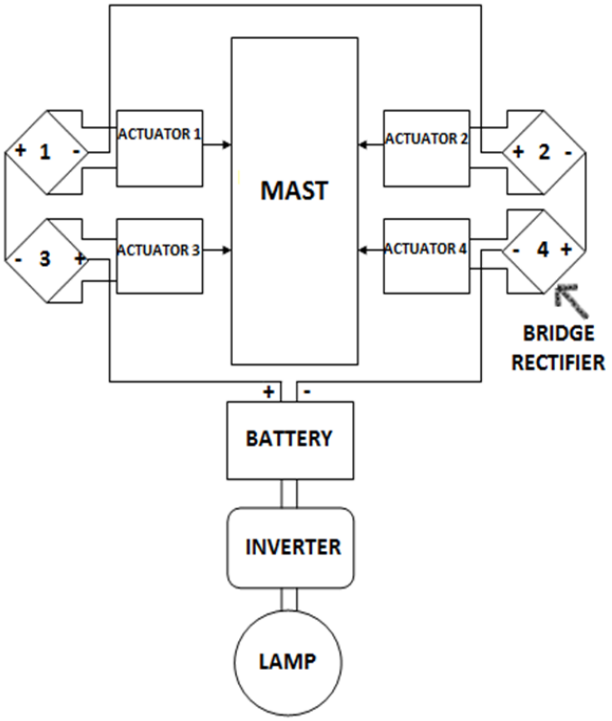

Fig:-2 Schematic illustration of the whole system

6. KEY FEATURES OF VORTEX BLADELESS WIND TURBINE

- Production of energy with Vortex is 40% less expensive than conventional turbines.
- This requires less space than conventional turbine.
- Size of Vortex Bladeless Wind Turbine is less than conventional wind turbine.
- This also useful for Rural Electrification.
- This may also play very important role in power supply for industries and houses.
- This is also useful for Off-grid lighting and Off-grid Rail Signaling.

7. FUTURE IN VORTEX BLDELESS WIND TURBINE

- Tapping newer ways of wind turbine for renewable energy is gaining momentum in the recent years. The purpose of this project is to provide some fundamental result on the analysis of bladeless wind turbine structure and serve as stepping stones for the future development of bladeless wind generating system. The output can be increased in the various ways like the output of the project can be improved by increasing the height of the mast. By installing efficient generators the output of the project can be increased.
- In order to demonstrate the feasibility of this technology, dozens of wind tunnel tests have been carried out and field tests are currently being performed with scaled models. The main idea is to develop two different power-size technologies: Vortex Gran for mass power generation, big clients, renewable energy investors and electricity companies up to 1 MW and Vortex Mini for domestic or industrial generation near the consumption point up to 4 kW.
- Its makers boast the fact that there are no gears, bolts, or mechanically moving parts, which they say makes the Vortex cheaper to manufacture and maintain. The founders claim their Vortex Mini, which stands at around 41 feet tall, can capture up to 40 percent of the wind's power during ideal conditions (this is when the wind is blowing at around 26 miles per hour). Based on field testing, the Mini ultimately captures 30 percent less than conventional wind turbines, but that shortcoming is compensated by the fact that you can put double the Vortex turbines into the same space as a propeller turbine.
- This is also useful for various applications like Off-grid Lighting, power supply for industries as well as houses, off-grid Rail Signaling System etc.

8. CONCLUSIONS

The bladeless windmills can offer promising results in near future with respect to efficiency, capacity and productivity.
This topic is a great area for research and so far the results are encouraging. Further, developments can be done in the mechanism which is converting vibrations to electricity.
The results above are based on 1 m prototype along with ANSYS analysis software outcomes.
The purpose of this paper is to form some basis for the research in the field of renewable resources of energy in near future and be an encouragement for generations to come.
The project has five main advantages: Less space requirement, less impact on fauna, less noise, better running, multiple uses due to its portability and use in case of intermittent pulses of wind and its low cost Moreover, some disadvantages such as starting torque requirement, low extraction efficiency can be solved with optimization and changes in design.
The use of rack and pinion, direct alternators and slotted link mechanisms can be done instead of crank mechanism.

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