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VERTICAL AXIS WIND TURBINE WITH MAGNETIC REPULSIVE PRINCIPLE

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ABSTRACT

Recently renewable energy generation is increasing to meet the demand for electricity. In this project, the generation of electricity is achieved by using vertical axis wind turbine in addition with magnetic repulsion power buster, using the force created by moving shaft. For that purpose, wind turbines are placed at the center of the highway for the generation and utilization. An energy harvesting device such as highway wind turbines can still be used for applications where less power is needed. This energy can be harvested using vertical axis wind turbines (VAWT) placed on the sides of the highways to make use of the vehicles moving in both directions. This work presents an experimental study of using a VAWT specially designed and manufactured for producing electrical energy from wind energy of moving cars on highways for lighting purposes such as the highway lights, traffic signals, and light guide lines. The wind speed due to vehicles passing on a highway is used for power generation by using VAWT. Results will evaluated for different parameters consideration using the VAWT prototype establish on the highway. The working model namely magnetic repulsion engine is works on the repulsion principle of magnets either permanent or electromagnets. Both the magnets are facing each other with like poles for continuous repulsion. These mechanism does not require any input source and works on the magnetic

force of its own ,thus it is eco-friendly and can be used in running power generation application in wind mill. The engine can be best alternative for wind mill power buster.

KEYWORDS: Electricity; Renewable energy ; Wind turbine

1. INTRODUCTION

Wind is caused due to uneven heating of earth's surface, atmosphere, irregularities of earth's surface and rotation of the earth about its own axis. The amount of wind flow depends on various factors such as earth's rotation speed and difference in temperature of places. However, VAWT research work endures in parallel on one relatively small. Scientists and engineers have established various Wind turbine structures and use different Methodologies for their analysis. The optimum conditions for working VAWTs were determined. The details of these methods and alignments the major findings of the researchers on the vertical axis Wind turbines are reviewed in this paper.

A closer look at the concepts The fact that VAWTs are (HAWT). 2) Vertical axis wind turbine (VAWT). HAWT has successfully evolved in making of electricity from wind. However, recently working on VAWT has also been started due to its additional advantage over HAWT such as it does not require yaw mechanism because it can produce power independent of wind direction. VAWT can be produced at low cost then HAWT and also affordable maintenance cost. VAWT are further classified as 1) Savonious vertical axis wind turbine 2) Darius vertical axis wind turbine 3) Giro mill. The aim of the project is to utilize the maximum amount of wind energy and hence highway is selected as the installation site. The wind turbine will be placed in divider so that the tangential acting airflow from both sides of the road due to moving vehicle will help the turbine to rotate. The variation of blade angle is made so as to get the maximum output and blades are then fixed.

On highways, vehicle moves faster than the usual. Moving vehicles on the highway create wind turbulence. When a vehicle moves on highway, it disturbs the wind present over that highway. Vehicle creates low wind pressure field and big vertex behind it while moving. The wind disturbed by the vehicle intend to cover that space created by the moving vehicle and creates huge wind turbulence at highways. The direction of the wind turbulence is always moving along the vehicle to the center of low pressure field. Turbulence presents at the highways along with normal breeze creates a strong wind effect near the highways. This wind effect can be easily feel by any one on the highway side. Wind turbulence at the highways is

directly depends upon size and speed of the automobile along with the traffic frequency .

There is currently some interest in developing engine which is useful to the environment, the present system the fossil fuel sources are fast depleting and their combustion products are causing global environmental problems. Though pollution is controlled in combustion engine Nox gas level is increased which leads to damage in ozone layer and also by using other various technology like Exhaust Gas Recirculate (EGR) valve are used the Nos content is reduced but the co2 content is increased , due to increase of co2 in atmosphere global warming occurs . Since the use of fossil fuel rate is increased day by day at the year of 2050 the existence of fossil fuel decreases and leads to fuel scarcity.

1.1 Problem statement:

Most of HAWT having larger investments & big structural requirements for power generations. HAWT having large stricture due to the additional drag as their blades rotate into the wind horizontally. While VAWTs' parts are situated on the ground, they are also placed under the less weight of the structure above it that can nearly possible make small scale structure designed for low cost highway power generation appropriately. In VAWTs having rotors located close to the ground where wind speeds are manage by road vehicle because of wind shear effectively for power generation use. HAWTs may not harvest as much energy at a given site as a VAWT with the same track or height. Thats why VAWTs are normally deployed due mostly to at power generation oh highway. To overcome the problem associated with conventional wind turbine system applications, we are making electricity generation system VAWTs along with road side power generation arrangements. The project deals with the study and design of power generation for highway roads area's applications.

In some cases wind energy turbines are not efficient to produce continues & sufficient power so that, to overcome the problem associated with conventional wind power system, we are making wind power electricity generation system along with magnetic repulsion VAWT for increases the performance of magnetic repulsive VAWT. The project deals with the study, design, fabrication and testing of magnetic repulsive VAWT system of wind energy.

OBJECTIVES:

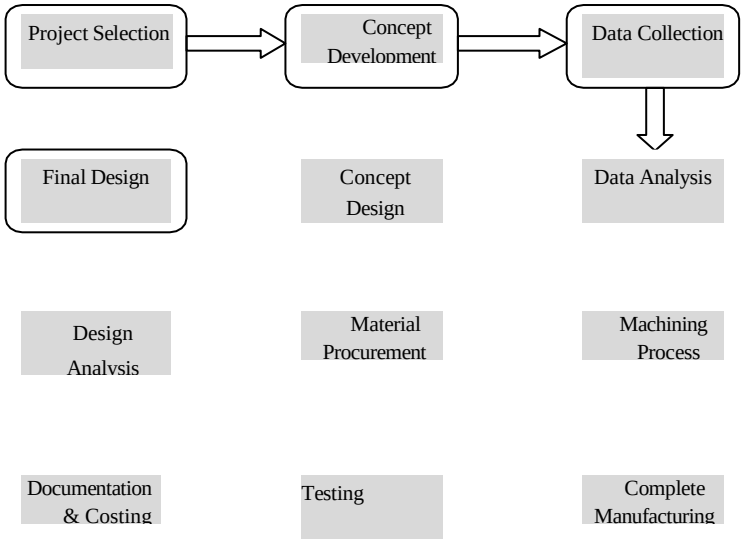
We intend to use the cheapest available sources as raw material for constructing a power generation for highway roads VAWTs unit which can be used as a source of electricity for Powering of street lights so as to make it cost-effective. Analysis of VAWT includes,

1) Taking different readings of power output at two different type wind mill first Normal VAWT & another magnetic repulsive VAWT.

2) The main objective of this project is to assess the feasibility and economic viability of utilizing– Wind–battery based standalone power supply.

Methodology & steps to solve the problem:

1. The below flow chart shows the sequential operation/steps that will be performed during the project process.



2. Coefficient of power can be improved by going for a proper operating range for various configurations. Incredible advances in wind turbine design have been possible due to developments in modern technology. The advanced wind turbine technologies have been reviewed as follows considering overall performance point of view: The features such as selection of choice of wind generators, wind velocity, site, height, wind power potential have been considered as an impartial function of probabilistic models. Selection of windy site for wind power generation requires meteorological data for setting up of wind generator.

Experimental and theoretical methods are used to analyze vibration difficulties of wind turbines. Aeroaccoustic tests are used to detect noise in the aero foil. Wind field modeling is

an important part of a structural analysis of wind turbines. In aerodynamic modeling blade element moment theory stands for calculation of aerodynamic forces acting on the rotor blade. Control system modeling is used to have the operating parameters of the wind turbine within the specified limit. These progresses and developing trends towards wind energy signal is an encouraging prospect for the wind energy industry. With this upgraded technology wind turbine can be designed for its optimum power generation at comparatively less cost. Blade design plays critical role for performance and energy extraction from turbine. With the assumption of placing the turbine in a location with moderate wind availability with optimized blade parameters and design specifications, high power generation is achieved with vertical axis wind turbine and can be serving as energy generation unit for remote areas.

3. Venkata Subbaiah and M.L.S. Deva Kumar studied power generation by using highway vertical axis wind mill [2].

4. Kalpesh Chavda et al. designed and fabricated a highway wind turbine to generate electricity using air pressure created by vehicles [3].

5. Sachin Y. Sayais et al. developed a hybrid system combining vertical axis wind turbine and solar energy for effective power generation [4].

1. Rotations per minute (RPM) increases with increase in velocity.
2. Wind potential power is higher at Pune-Nashik highway.
3. The wind velocity increases consistently with increase in altitude.
4. Maximum power rating was found out to be 18.8580W.
5. Wind thus is an reliable source of non-conventional for energy production.
6. Utilization of highways for energy production fields can give out high yield potentials.

Kulkarni and Birajdar presented a vertical axis wind turbine suitable for highway applications, producing up to 28 W at 6.1 m/s wind speed [6].

The VAWT is designed and fabricated in such a way that the it can able to capture wind from all the direction, power developed from the project is 28W for a speed of 6.1m/s, the efficiency of VAWT can be increase by changing the size and shape of the blade, the theoretical and experimental result is varying because in theoretical calculation we consider the wind is hitting all the eight turbine blades, practically it is not. Our work and the results obtained are very encouraged that vertical axis wind energy conversion are plausible and

potentially very contribute to the production of the clean renewable electricity from the wind even under low ideal sitting conditions. With the idea on highway, it will power up street lights.

In combined together as hybrid turbine. A prototype model has been developed and analyzed in real environment for feasibility and practicality of the system. Wind is a cost effective, green, renewable energy resource for power generation. Highway side application of wind turbine with improved efficiency can help us to reduce a gap between demand and supply of power. An efficient hybrid wind turbine is designed to use in road side application for energy generation. This turbine is specially designed to generate energy by utilization of natural wind and wind turbulence created by the moving vehicles on the highway. Winds from all the direction are utilized by this turbine. This turbine is self-starting, easy to installation, low in cost and suitable for both high and low wind speed. Turbines show 2.75 and 1.57 times better efficiency than the Savonius and Darius turbines respectively. Practical testing is also done on the highway for feasibility analysis of the system. With the proper attention from local authorities highway side implementation can provide a reliable source of energy in remote areas.

6. Ramanan M. et al. experimentally investigated a magnetized piston-powered engine, finding that magnetic repulsion can replace fossil fuels [7].

7. we can reduce the weight of the engine. Also existing transmission systems can be used in the electromagnetic engine. Less noise is produce during working. The disadvantage of the electromagnetic engine is its high initial cost. The electromagnet and permanent magnet can be very costly. Also the power of the permanent magnet will decrease during time and the permanent magnet has to be replaced during regular intervals. The engine is not as flexible as the internal combustion engine. The power source is battery. The number of batteries will vary according to the requirement. In high power engines, the number of batteries will increase which may increase the total weight of vehicle and consume a lot of space. Also the batteries needs to be charged regularly which is difficult and time consuming.So the engine is not dependable The prototype is an idea which uses the property of an electromagnet by virtue of which it changes the polarity of its poles whenever the direction of current is changed. This variation in polarity is utilized to attract or repel the permanent magnet attached to the piston. The usage of relay and timer will limit the output of the engine. By using an ECU in the engine instead, power can be obtained on each stroke which will result

in an increased output. Also, by inserting more permanent magnets in series on the piston will enhance the output of the engine. By slight modification in design and by the use of better hands the engine can be modified to generate more power, thereby increasing its efficiency, so that it can be used in commercial vehicles and other applications.

8. Sumit Dhangar et al. explored a magnetic piston operated engine, showing its potential as a renewable power source [8].
9. Elton Ashok Raju et al. designed a magnetic piston engine using electromagnets and permanent magnets, proving it can produce rotary motion without combustion [9].

Chapter 2

2.1. Shaft :

Shaft is a common and important machine element. It is a rotating member, in general, has a circular cross-section and is used to transmit power. The shaft may be hollow or solid. The shaft is supported on bearings and it rotates a set of gears or pulleys for the purpose of power transmission. Material for Shafts is generally ferrous, non-ferrous materials and nonmetals are used as shaft material depending on the application.

2.2. Washer:

10. A washer is a thin plate (typically disk-shaped) with a hole (typically in the middle) that is normally used to distribute the load of a threaded fastener such as a screw or nut. Other uses are as a spacer, spring (wave washer), wear pad, preload indicating device, locking device, and to reduce vibration(rubber washer).Washers usually have an outer diameter (OD) about twice the width of their inner diameter (ID).Washers are usually metal or plastic. High quality bolted joints require hardened steel washers to prevent the loss of preload due to Brinelling after the torque is applied. Rubber or fiber gaskets used in taps (or faucets, or valves) to stop the flow of water are sometimes referred to colloquially as *washers*; but, while they may look similar, washers and gaskets are usually designed for different functions and made differently. Washers are also important for preventing galvanic corrosion, particularly by insulating steel screws from aluminum surfaces.

2.3. Wild mill blade:

The number of blades is selected for aerodynamic efficiency, component costs, and system reliability. Noise emissions are affected by the location of the blades upwind or downwind of

The tower and the speed of the rotor. Given that the noise emissions from the blades' trailing edges and tips vary by the 5th power of blade speed, a small increase in tip speed can make a large difference. Carbon fiber- reinforced is generally used material for wild mill blade.

2.4 DC Motors:

11. A DC motor is a mechanically commuted electric motor powered from direct current (DC). The stator is stationary in space by definition and therefore so is its current. The current in the rotor is switched by the commentator to also be stationary in space. This is how the relative angle between the stator and rotor magnetic flux is maintained near 90 degrees, which generates the maximum torque. DC motors have a rotating armature winding (winding in which a voltage is induced) but non- rotating armature magnetic field and a static field winding.

Chapter 3

3.1 WORKING

1. Wind energy is renewable, inexhaustible and environmental pollution free. Wind is a natural phenomenon related to the movement of air masses caused primarily by the differential solar heating of the earth's surface. Seasonal variations in the energy received from the sun affect the strength and direction of the wind. The wind turbine captures the winds kinetic energy in a rotor consisting of two or more blades mechanically coupled to an electrical generator. The turbine is mounted on a tall tower to enhance the energy capture. Here we are developing an modules to generate VAWT for road side power generation. In the proposed model, It also simultaneously charges battery and gives power to the load. A specifically chosen battery is used to store the generated power. A controller, considered as a heart of generation system, is used to regulate the voltages and current coming from the wind generator. It regulates the charge to the batteries preventing any overcharging.

2. This project model is consists series of permanent magnet were organized with different opposite polarity that created a series of free movement of rotor as crank arrangement. There are four permanent magnets are in use, in view of their material structure. This project of permanent magnet repulsion VAWT we will synchronize with working of wind mill application for power buster. When blade of wind mill will rotate with air velocity it will rotate the magnet connects to the rotating crank shift. At the same time the generator coupled to end of crank shaft rotate the armature to produce the electricity.

Chapter 4

4.1 ADVANTAGES & APPLICATION

1. The advantages covered by the propose system are listed as,
2. Overcoming disadvantages of standalone renewable electrical energy generation system.
3. Producing much more efficiency as two or more renewable energy generation system working in the terms of electrical energy generation.
4. Since, the system does n‟t complexity of system testing and understanding became easy in terms of difficulties.
5. System maintains is remarkably reduced and becomes easy
6. Renewable energy sources having no waste production.
7. Producing clean, friendly to environment, renewable energy.
8. Once the system is designed and developed or manufactured, the installation of system is easy.
9. Within certain time period the installation cost gets covered.
10. If the system gets damaged in case, no need of changing entire system or subsystem. Just, changing a damage component will work out.

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