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REVIEW PAPER ON DESIGN OF ELECTRICAL VEHICLE CHARGING BASED ON WIND POWER

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ABSTRACT

The scarcity of fossil fuels used in automobiles is currently a crisis. Furthermore, CO2 emissions have a significant detrimental influence on the environment. As a result, developing a sustainable energy system has become a major concern that has attracted a lot of attention. For daily consumption, the modern world requires enormous amounts of energy, resulting in exhaustion energy resources that aren't renewable. As a result, using renewable energy resources in the production of energy is a good idea. In today's world, the most significant difficulty is the proposed concept is to generate electricity by exploiting the natural resources around us. The car's motion produces opposing wind forces. This study focuses on the design of a wind turbine that will be mounted on an electric vehicle and used to generate electricity to charge the vehicle's batteries while it is in motion. Because of the car's aerodynamic nature, the turbine is mounted on the roof near the windscreen, where the air velocity flowing around it, is highest. When the car starts moving, it produces an air current.

Keyword*: Wind Power, Vertical Axis Wind Turbine, Electric Vehicle, Battery Charging*

1. INTRODUCTION

Renewable energy sources provide limitless resource and surroundings friendly operation compared to standard energy sources. kinds of renewable energy corresponding to solar energy, wind energy, geothermal energy, tidal energy, hydro energy and bioenergy. However, wind strength is that the maximum valuable, secure and fastest developing renewable strength. Since the monetary revolutions, the auto commercial enterprise with burning engine makes oldsters comfortable and handy life, and it conjointly elevated efficiency and generated risk for commercial enterprise. On the contrary, the extreme price of fossil fuels increased sharply year by year. As a result, it reasons the oil marketplace fee elevated sharply. This can directly impact the products and materials for people' financial gain seriously. Thus, all kinds of transportation will face the problems of gas prices and energy saving. By the way, to the surroundings, greenhouse gas emissions will cause the greenhouse effect, and create world climate and ecological environment abnormal. the number of CO2 emissions is occurred from the sector of transportation concerning 20%, whereas the car and motorbike are engaged additional than 80% of it. consistent with the reports, the mileage accumulation is engaged from the freight transportation concerning 80%. That is, the freight transportation is that the prim offender of fossil fuels consumption and greenhouse gas emission. [1]

It is feasible to artificially boost the incoming wind speed for an installed wind turbine. Use the vehicle's speed as a result, a wind turbine is mounted on a vehicle to take advantage of the increased speed, and it is known as a Vehicle Mounted Wind Turbine (VMWT). For the locations VMWT can be used in situations where the wind speed is insufficient to run a solitary wind turbine. It's also a good way to generate electricity. Furthermore, VMWT can be used in Small-scale production in a residential setting.[2]

VMWT is powered by a vertical axis wind turbine (VAWT). This project focuses on charging the vehicle's batteries while it is in motion. This is accomplished by capturing the wind. The polar opposite of a moving vehicle. As long as the automobiles are moving at a constant speed, the wind will always be blowing speed. To receive wind, a wind turbine is installed on the vehicle's top. The creator of the generator creates wind-generated electricity and stores it in a second battery. The vehicle moves with the pre-charged battery, and to detect the voltage drop, a voltage detecting circuit is installed on one or more of the car's batteries. In this situation, the wind-charged reservoir battery swaps places with the low-voltage battery, allowing the vehicle to continue to run while the other battery is recharged. This cycle can continue until the car reaches a complete stop.

2. OBJECTIVE

The aim of this project is to create a vehicle-based wind power system. Several automotive manufacturers are working on battery-powered automobiles. One of these cars' drawbacks is that the charge can last for a certain amount of time, after that the batteries need to be recharged. This necessitates the development of a system that can continuously charge the batteries, allowing vehicle to without any interruption.

3. LITERATURE SURVEY

1. A project at the University of Mines and Technology intends to create a wind turbine that will be fitted on an electric automobile and generate electrical power to charge the car's batteries while it is in motion. The turbine is situated on the car's roof, where the air velocity is high. Because of the car's aerodynamic design, the flow around it is at its maximum. By way of the theoretical, a large quantity of electrical power is created by the wind, according to calculations. When the automobile is travelling at 120 km/h, (about 3.26 kilowatt) is returned (stored) to the batteries.[3]

Figure.1 Isometric Views of the Wind Turbine

They also suggested that more research should be done to determine the extent to which the power provided by the turbine can extent the electric cars driving range. More study should also be conducted in order to adapt the turbine design into the body of electric vehicles.

2. Members of Malaysia's TATI university college worked on a similar project involving the construction of wind turbine systems for pickup trucks. The wind turbine system in miniature was found on the pickup truck's body's roof. According to the results of the tests, During the test, roughly 120 watts of wind power (at a target speed of 120 km/h) was converted to electricity. [3]

3. In Gujarat, a Tata Nexon electric vehicle with a roof-mounted windmill was sighted.[4]

4. The concept of using wind turbines on highways isn't totally new. Several people and organizations have attempted to recycle power from highways. the concept seen in a you tube video titled "Highway Helical Wind Turbine Project (Next Generation Highway's Potential for Wind Power)."is the most stunning. Fig. 2 & 3 shows a prototype of a highway wind turbine built by a group of Mechanical Engineering Students from YCET Kollam in Kerala [5]

Figure.2: computer simulation of highway wind turbine, India

Fig.2 shows a computer - animated design of a highway wind turbine proposed by Students of Mechanical Engineering in India.

Figure.3: highway wind turbine displayed by mechanical engineering students in India

The students Nabeel B, Firoz khan T S, rishnaraj V,Kannan Raj, Arun S, Shaiju mon T K, and Akhil Ganesh show a functioning prototype of their idea in figure 2. (Highway Helical Wind Turbine Project (Next Generation Highway's Potential For, 2012)

4. PROPOSED WORK

Location of VAWT

Simply said, a wind turbine is a mechanism that takes in air and converts it into electricity. It, like any other endeavour, should experience several hurdles and obstacles. We need to be aware of obstacles and how to manage them. Our project's initial issue was determining the best site for a vertical axis wind turbine (VAWT). It was determined that it would be placed beneath the automobiles. Due to two flaws, this plan proved ineffective. The lack of coming air was the first problem. The quantity of air that may move beneath the cars is quite limited. As a result, the turbine will not produce enough electricity. The system's safety was the second concern. On the route, the car may encounter obstacles such as hazards or bumps. They will cause problems on the system. Following that, we decided to mount the (VAWT) on top of the automobiles so that it could receive air without restriction and with greater safety. (3)

Figure.4 The installed locations of wind turbine system

Material of turbine and blades

We observed that (VAWT) was heavy. So, we select the material of the cavity to fibre glass. As a result, it became light and easy to design the angles and curves. We kept the shaft and the fans metallic (Aluminium) to rotate strongly so that will produce more energy. The purpose of placing fibre glass in the cavity is to deal with the entrance and angles, allowing the air to flow in a laminar manner.

Shape of Wind Turbine Blade

The twisted blade with longer arm may provide more torque. Furthermore, the twisted blade has the potential to increase operating stability and output efficiency. Even with a small wind speed, the twisted blade can still run. (1)

Figure.5 Twisted vertical axis blades

Proposed Layout design

Fig. 6 shows the layout of experimental setup of battery charging system. It is primarily focused on the fact that a system must be capable of charging the high-capacity batteries used in Electric Vehicles (EVs) with minimal power loss and must also be highly effective in order for the system to be of more advantage to the customers of those EVs. This system is made of the most efficient components that will deliver the required amount of power while preserving the vehicles performance. This proposed system solution can be used to any batteries which are utilised in the automotive sector. A 35 Ah and 12 V battery was used in the experiment. (6)

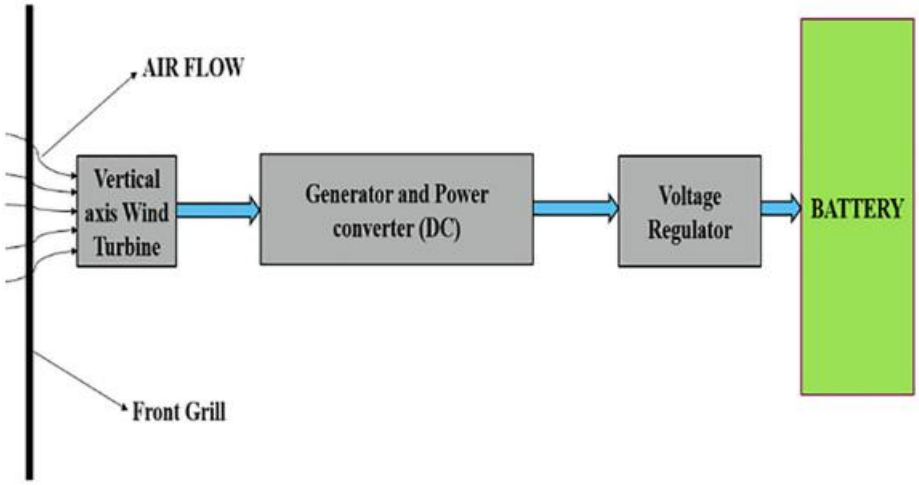

Figure.6 Layout of Experimental Setup

Considering the fact, there is a limited amount of space available at the front side of the car, this system is constructed in such a small and efficient manner that it may be installed in that space. This system is primarily dependent on the vehicle speed, in that while the vehicles travel at a certain pace, power is produced at that speed, and when the speed varies, the power output fluctuates as well. to deal with this problem the system comprises of many components that assure a continues and constant power supply to the batteries, allowing the battery to charge without interruption.

5. CONCLUSION

The automobile industry's future is largely dependent on electric cars due to the key reason of lowering harmful gases released by IC (Internal Combustion) engine vehicles. However, the primary disadvantage of electric cars is that their range of operation is much reduced when compared to IC (Internal Combustion) engine vehicles, and another significant disadvantage is the charge of such massive capacity batteries. The battery charging period is quite long, and these factors are preventing the widespread use of these non-polluting electric vehicles. As a result, by using this suggested battery charging method in electric cars, the range of operation of those vehicles might be improved, as well as the time necessary to charge those batteries.

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