DESIGNING A SYSTEM WHICH GENERATES ELECTRIC ENERGY FROM WIND FORCE OF CARS

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Abstract: Although studies about solar energy are continuing for 20 years, little studies are done about transforming of wind energy into electric energy of traveling cars (Anonym, 2013, Anonym 2013-1) and almost no application is done in this area. The most important reason of this study is transforming the wind energy of a traveling car into an electric energy and to use it in case of need. The most important feature of this design is procuring energy in all conditions when the car is moving. Considering the reasons, it is obvious that this study will contribute to our country academically and also in commercially speaking.

Keywords: Renewable energy, wind energy, new generation fuel, wind energy on cars.

Introduction

Transportation means transferring an object or a person from one place to another. To get an object moving from one place to another, an absolute energy is used. Thrust power is needed to move a table across. This power can differ according to the size of the table and the friction coefficient of the ground. New sources and new fuels are searched to cover large quantity of power which is needed for transportation and reduction of costs. It is obvious that the energy of the future is in the renewable energy sources. The longest distance covered in energy source for transportation is procured energy of the sun with the help of solar panels (Akfidan T, 2010; Kaymak M E, 2009).

It is possible to procure extra energy of a moving vehicle without affecting the aerodynamic features, in other words without an increase of fuel consumption due to the addition of the designment to wind inlet points. (Gümüşlüol Ü., Çetinkaya T A, ve Albayrak K., 2006; Aka H., 2003; Solmaz H, 2010).

The purpose of this study; to reduce fuel consumption of cars, to power air conditioning, starter motor on cars which need high energy, without using any fuel. Only with the energy of the moving car which creates energy by taking advantage of the wind power. The area of use will differ and the study is applicable on vehicles like trains, buses, ships, cars and motorcycles. Also it can be used as renewable energy sources for electric cars in case of charging to increase the range and lower the costs of charging. One of the attention grabbing features of this designment is that, it can be used longer than solar energy, in other words, in can be used not only under the sun, this energy can be procured in all conditions and hours when the car is moving.

General description about this study is stated in the introduction chapter. Materials and features of this study are approached in the material and procedure chapter. The applicability and the details of the prototype of our study is handled in the application chapter. The advantages of the designment, numeric data, and the applicability are examined in the conclusion chapter.

Material and Procedure

In general, a wind turbine is made up of a tower, generator, speed converters (gear case), electric generator and a propeller. The kinetical energy of the wind is transformed into mechanical energy in the rotor. Transferring it to the generator on the body, by increasing the rotary motion of the rotor shaft. Obtained electric energy from the generator is stored with the help of batteries or transmitted directly to the recipients.(Çokünlü G , 2007). The internal structure of the wind turbine is shown in image 1.

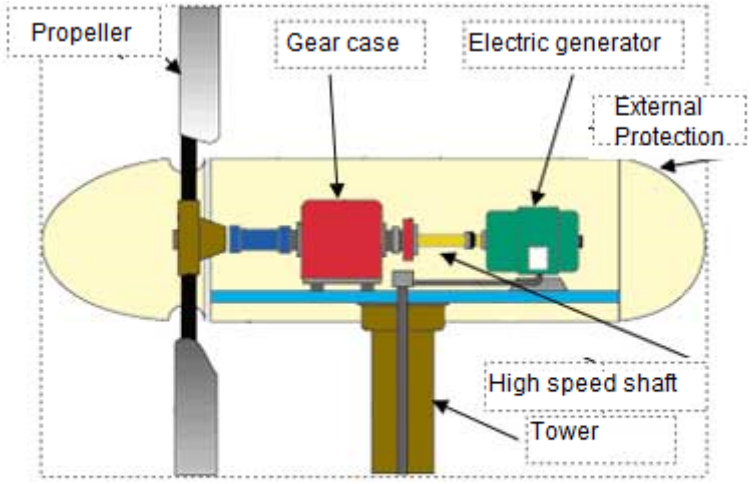

Image 1. Internal structure of wind turbine

The leafed turbine prepared in cylindrical shape (done with stainless sheet material) can transmit the power to the used motor by help of the shaft installed in the center. The motor which will be used, is a DC motor; it is a motor type which can rotate the shaft by giving electricity and also generate electricity with the rotation of the shaft. The shaft of the motor is placed in a stiff plastic gap in the center of the turbine. The rotating turbine with the help of the wind is providing power generation by rotating the shaft of the motor.

Application

Wind turbine is a system which transforms the kinetical energy of the wind into a mechanical energy and then into electric energy. To understand the working principle of the wind turbine, two important aerodynamical power have to be known well. These are, drag and lifting forces.

Drag force takes place on an object in flow direction. For instance, the maximum drag force on a straight plate can occur when the air flow is upright 90° on the object; and the minimum drag force can occur when the air flow is parallel to the surface of the object.
The best example for drag force is parachute. Due to this force the parachute is decelerating.

Lifting force takes place upright in flow direction. It is a reason for the take offs of airplanes.

In the designed system, the inlet and outlet channels of the equipment placed on the car are designed for efficient usage of the intake air and for ease and orientable exit of the air. Electric energy is generated without damaging the aerodynamics of the used car. The wind entries and exits of the designment are shown in image 2 and 3.

Image 2. Wind entry of the designment.

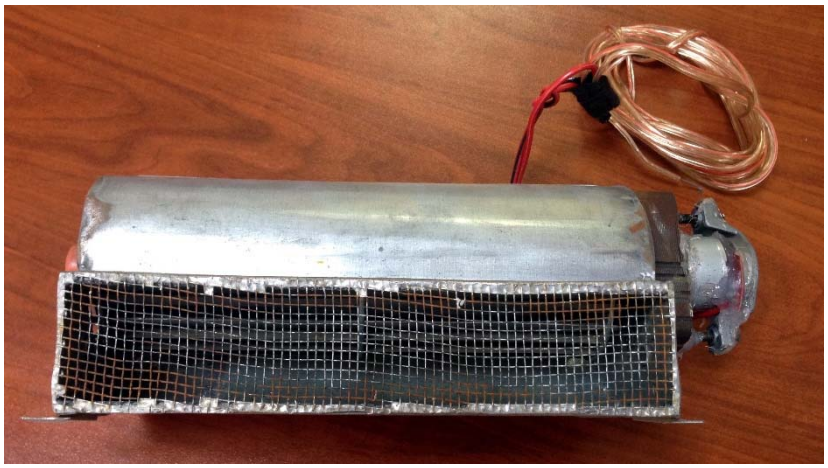

Image 3. Wind exit of the designment.

There are some critical and important factors in our study. The consisted wind reaches high energies on moving cars which requires a material strong enough against this energy. Instead of resisting the consisting wind energy, our study is designed to let the wind pass as easy as possible. Thus, the used thin sheet metal can't be damaged in the face of the wind energy. Image 4 and 5 shows the system placed on the car.

Image 4. Application of the designment.

Image 5. Application of the designment – 2.

Conclusion

The most functional feature of this designed system is that it is applicable on all moving vehicles (car, lorry, train, motorcycle, ship, electric cars, etc.). The mounting on big vehicles is easy. The mounting can be done on vehicles with narrow mounting areas like on cars and motorcycles without damaging the aerodynamic features and with designing the grills of the air intakes.

As long as the vehicle is moving; continuous energy generation is provided with the condition of depending on variables like moving speed, wind direction and speed.

The measuring is performed from our prototype implemented on a car and are stated below in table 1.

Table 1. Measuring results of prototype

speed (km/h)	measured value (v)
50	3,5 - 4
70	5,5 - 6
100	9,5 - 10,5
110	11 - 12,5

The motor we used is a DC motor with 12V and 0.5A. The results are according to this motor. With the help of a second motor on the other side of the propeller, the gain can be doubled and with enlarging the other equipments and two 12V, 5A motors the gain can be quadrupled on the same car.

As a result; although studies about solar energy are continuing for 20 years, it is done little studies about transforming of wind energy into electric energy of traveling cars and almost no application is done in this area. In consideration of the data, it is proven that our system provides fuel economy and extra power gain and will contribute to our country academically and also in commercially speaking.

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