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Electric Performance and Power of Wind Turbines

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Abstract: *Electric cars are a variety of electric vehicles. The term "electric vehicle" refers to any vehicle using electric propulsion motors. The maximum speed of travel on public roads and city streets varies by country. Electric cars need to charge their batteries every 300 km or 400 km, we propose to add wind turbines to an electric car for using wind energy neglected during the movement of the vehicle to produce electricity.*

In this paper, the usage of unused wind energy in vehicles was developed so that additional power for vehicles is made possible and that is via converting wind power into electric one. The wind turbine was assembled from a fan and transducer. The experiment was carried out so that the wind turbine was installed above the car; values of voltages and currents in various speeds of the car were recorded. When five fans were used with different specification, the consequence was a direct proportionality instead was recorded between voltages, currents and power car's speeds.

A comparison between the five fans showed that: the light weighted fan with big blade dimensions was the best one to generate voltages. Finally, These results offer a solution that we can avail from wind energy to supply batteries or operate the vehicle directlyas long as vehicles move along the way.

Keyword*: wind turbine, wind energy, charge batteries, generate electricity, Electric Performance.*

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I. Introduction

Greenhouse gas (GHG) emissions caused by the use of energy services have contributedsignificantly to the historic increase GHG concentrations in the air. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) concluded that “Most of the observed increase in global average temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations." Recent data concur that use of natural gas on most of worldwide produce the GHG Emissions, and increased in carbon dioxide concentrations had risen to over 390 ppm, or 39% above preindustrial levels, by the end of 2010[1]**.**

Coal, oil and natural gas have their relative merits in terms of availability, price and thermal performance. Coal produces the highest amount of carbon dioxide for a given output of energy, then oil, then Natural gas which produces early half the emission of coal [2].

In the 1990s, the transportation sector saw the fastest growth in carbon dioxide emissions of any major sector is of the US economy. And the transportation sector is expected to generate nearly half of the 40% increase in US CO_2 emission forecast for 2025[3].

In the 2015 Paris Agreement, the world agreedto targets for reducing greenhouse gas emissions to combat climate change. The use of renewable energy sources is a key strategy reduce CO_2. As hydropower, biomass or geothermal potential are limited in many countries, wind power and solar photovoltaics (PV) play an increasing role. The use of renewable energy is a key strategy to reduce greenhouse gas emissions, reduce fossil fuel imports, and establish a sustainable energy system[4].

Only 30% of an engine’s fuel combustion energy is converted into useful work to driving. The remainder is engine waste heat dissipated by the engine exhaust system, the cooling system, and convection as well as radiation from the engine block. Nearly 40% ofthermal energy is wasted by using exhaust gas**.** If this portion of waste thermal could be harnessed, energy efficiency will be enhanced, as vehicles around the world can save a lot of energy[5].

Several investigations about possible applications of thermoelectric power generation are a recovery of waste heat in the in the vehicle to improve fuel economy. In this idea, the heat of vehicle waste, usually from the exhaustto produce electricity. More drive-train power is available to move the vehicle, and electricity is still available[6].

In this paper, we used the waste of wind energy during the vehicle movement. Thewind turbine having blades which are joined to a rotor generator leading to produce electrical energy as moves by the flow of wind.The electrical energy produced by the system needs to be either utilized completely or stored. So, it should be stored rather than wasted.Electrical batteries are the most relevant, low cost, maximum efficient storage of electrical energy in the form of chemical reaction[7]

II. Material And Methods

The Theoretical Model: the power generated by wind is given by

$$power = current \times voltage \quad \ldots\ldots \quad (1)$$

$$P = I \times V$$

$P = Power\ in\ watts\ (W)$
$V = voltge\ in\ volts\ (V)$
$I = current\ in\ amperes (A)$

The power P is known to increases upon increasing the voltage and the current. [Amjadi, 2010 #12][8]

Apparatus and Equipment: We carried outfive experiments in which we used the following apparatuses and equipment's: Wires, five fans, a car, transducer12 volts 50 ampere/DC, trestle "support", Avometer "measure a voltage and currents" and a battery 12volt.

Experiments: The wind turbine was assembled from a fan and transducer with battery.The device was put above a car After that turn on and drive the car and taken values of voltage and current while the values of car's speed were changed. In the experiments used transducer, and took values of voltages and currents .

III. The Result

The following are records of the experiment, where the table shows the dimension records of the used fans, and the followed five graphs show the power generation in the different speed of the car.

Table no 1: shows Specifications of the fans.

Number of the fans	Number of the blades	The length/cm ±0.01	Maximum of width/cm ±0.01	Minimum of width/cm ±0.01	The weight of the fans/g ±0.001
1	3	17	16.3	6	402
2	3	16.9	17	4.5	196
3	3	16.9	16	4.5	302
4	3	17.4	8.6	7.5	172
5	4	14	16.8	8	454

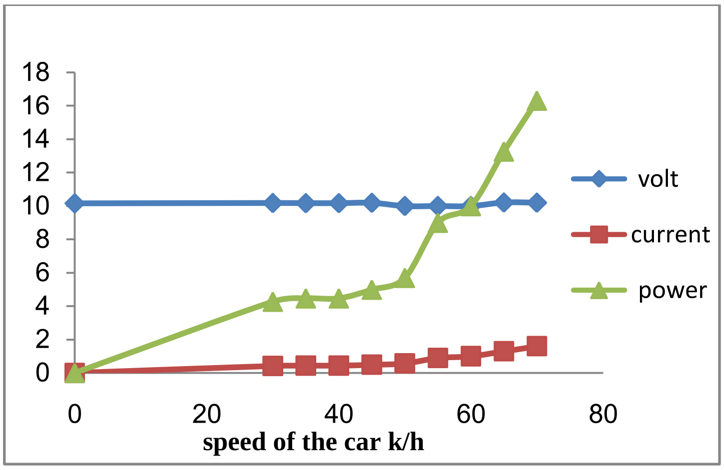

Figure no1: The speed againstthe volt, current and the power progressively for first fan

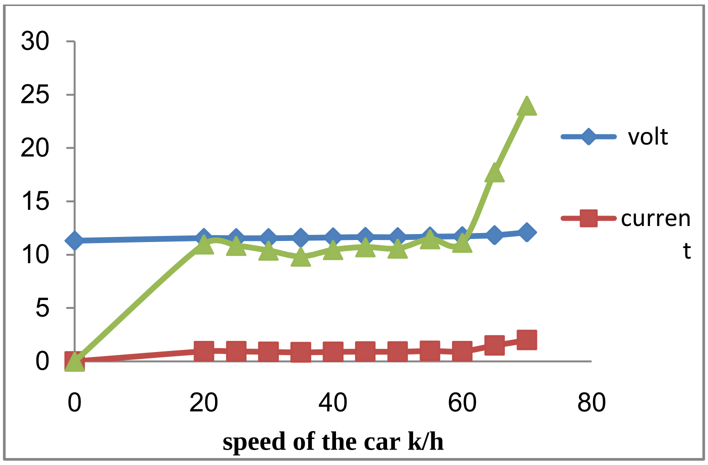

Figure no2: The speed against the volt, current and power for second fan

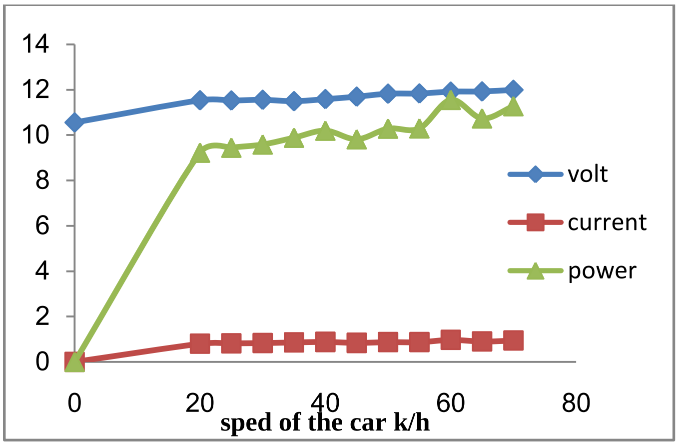

Figure no 3: The speed against the volt, current and power for third fan

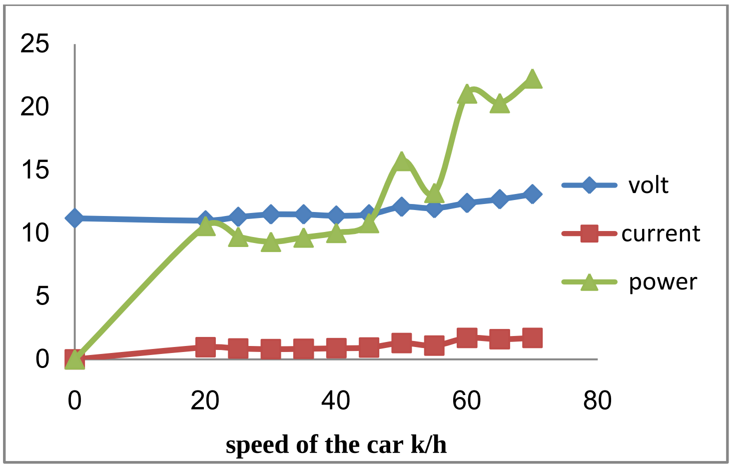

Figure no 4: The speed against the volt, current and power for fourth fan

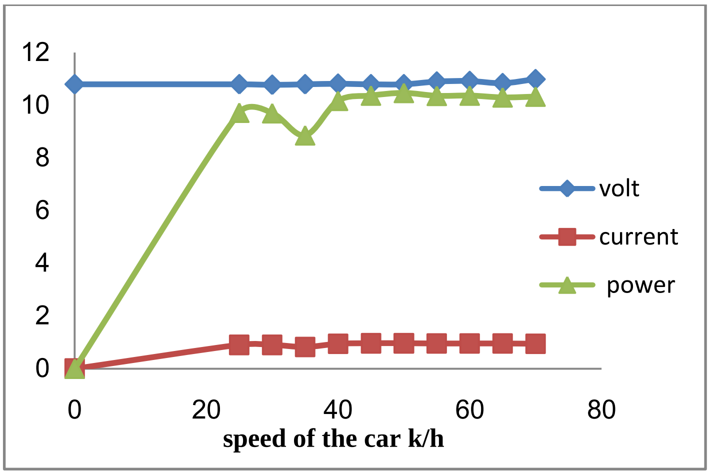

Figure no 5: The speed against the volt, current and power for fifth fan

IV. Discussion

In the previous result section Table no 1 showed measurements of blade dimensions for five fans; different dimensions and different weights mean different resistant to air that affects voltage generation of the wind turbine. In figure no [1,2,3,4,5] the plot of speed of the car against volt, current, and power for the five fans power was calculated from equation (1), respectively were shown, and direct proportionality relation between voltage, current, and power with speed of the car has been observed,this is relation agree with the theoretical relation according to equation(1). Some values were irregular because the car slowed for a bystreet curved. When usage first and fifth fans the blades didn't move before the car reaches25k/h and 30 k/h respectively, moreover, the fifth fan has four blades due to the weight of the fans. Got maximum power 24 watts when used the third fan are provided in figure no 3 the voltage value of the battery beforethe experiment was equal 10.16 volt and after the finish it was equal to 13.10 volt

V. Conclusion

A comparison between five fans showed that: the fan with large dimension blade and lightweight was the best one to generate voltages. These results agree with theoretical model reveal that one avail from wind energy to charge the battery to vehicles as long as vehicles move along the way. Future work of research will aim at addressing the comparison and different combinations of the wind turbine and this experiment should be done connect the wind turbine to the vehicle battery directly and compare the consumption time with battery charge time.

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