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"Design and Analysis of Energy Generation Using Wind in Electric Vehicle"

Rohit G. Ramteke[1] ,Shivani K.Shukla[2], Bhavika D.Barapatre[3], Urvashi M. Ghangare[4], Anshul J. Barahate[5], Tushar R. Tajne[6]

Jhulelal Institute of Technology, Nagpur-441111

[1]r.ramteke@jit.org.in,[2]shivanishukla8390@gmail.com, [3]barapatrebhavika@gmail.com, [4]urvashighangare101@gmail.com, [5]anshulbarahate90@gmail.com, [6]itushartajne@gmail.com

Abstract- Nowadays, wind energy has become one of the most economical renewable energy technologies. Sources and Quantum of fossilenergy gettingexhausted at veryfast rate. Many countries have considerable wind resources, which are still unutilized E-vehicles hasput fourth itsefforts togenerate electricityfrom wind power inmovingcar. Somewhere there is a scope of improvement in previous designs. The technological development of recent years, bringing more efficient and more reliable wind turbines, is making wind power more cost-effective. So,conservation,tapping new sources of energy form the variousnon-conventional sourcesis animportant aspect of energy production and utilization. In this paper, we are going to build one structure in which we are going to install few wind turbine's which are going to generate energy. This device is installed on E- vehicle, we have Air-filter at inlet, as the wind enters the pipes it will create Wind pressure (Kinetic energy) on turbines. This will result in the rotation of turbine which generates the energy i.e. Mechanical energy gets converted into Electrical energy. This energy charges the existing battery which is being used.

***Keywords*- Wind, Battery, Electricity generation, Electrical vehicle, Wind turbine, Motor, EV, etc.**

I. INTRODUCTION

Wind energy or wind power includes the age of mechanical force from wind. Now a days, a steadily expanding number of people are using wind turbines to wring power from the breeze. Over the earlier decade, wind turbine usage has extended at in excess of 25 percent a year. Wind turbines work on a fundamental norm. The energy in the breeze turns the cutting edges fixed around a rotor, the rotor associated with the essential shaft likewise turns the generator to produce mechanical force. A quantitative proportion of the breeze energy open at any territory is known as the Breeze Force Thickness. It is a computation of the mean yearly force open per square meter of cleared zone of a turbine. The breeze power thickness, estimated in watts per square meter, shows how a lot energy is available at the site for change by a breeze turbine Wind turbine can be vertical, level upward or descending. Streamlined lift is the power that conquers gravity and is in a privilege calculated bearing to the breeze stream. It happens due to the lopsided at tension on the upper and lower aerofoil surfaces while streamlined drag power is corresponding to the course of approaching breeze movement. Drag happens because of lopsided tension on the upper and lower aerofoil surfaces. In this paper, we are going to build one structure in which we are going to install few wind turbine's which are going to generate energy.This device is installed on electric vehicle (EV), we have Air-filter at inlet, as the wind enters the pipes it will create Wind pressureon turbines. This will result in the rotation of turbine which generates the energy i.e.,mechanical energy gets converted into Electrical energy. This energy charges the existing battery which is being used.

II. PROPOSED METHODOLOGY

In this paper, we are going to build one structure in which few wind turbines will be installed to generate energy. This device willbe installed on electric vehicle. Below Fig. 1 represents the basic block diagram of entire model/prototype.

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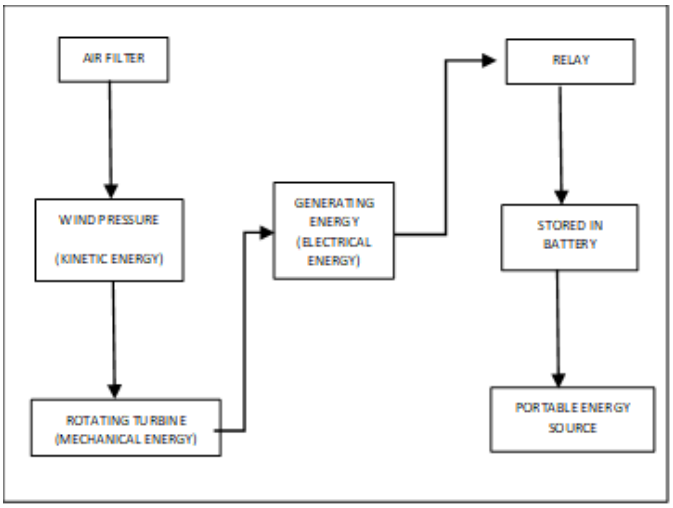

Fig. 1: Basic Block Diagram

We have Air-filter at inlet, as the wind enters the pipes it will create wind pressure (kinetic energy) on turbines. This will result in the rotation of turbine which generates the energy. The above block diagram shows the working of structure in EV.

III. LITERATURE SURVEY

[1] SustainableDevelopment:FromBrundtlandtoRio2012—BackgroundPaperpreparedforconsiderationbytheHigh-LevelPanelonGlobalSustainabilityatitsfirstmeeting,September2010.

In this reference we have studied that how to use wind turbine and generate electricity. Resulting in decreasing in pollution and saving nature through non-conventional source of energy

[2] R. B. Hiremath, S. Shikha, and N. H. Ravindranath, "Decentralized energy planning; modeling and application-a review," Renewable and Sustainable Energy Reviews, vol. 11, no. 5, pp. 729–752, 2007.

In this reference we have studied the use of Renewable and Sustainable Energy Reviews and to communicate the most interesting and relevant critical thinking in renewable and sustainable energy in order to bring together the research community. [3] Devbratta, T. and Jin, J. (2017). Design and Construction of a Wind Turbine Simulator for Integration to a Micro grid with Renewable Energy Sources. Journal of Electric Power Components and Systems, 45(9):949-963.

In this reference we have studied on how to design a wind turbine and how energy is generated in it

[4] Navin, P. E., Janakiram, S., Pradu, T., Sivasubramaniam, S. (2014). Design and Development of Horizontal Small Wind Turbine for Low Wind Speeds. International Journal of Engineering Science and Advanced Technology, 4(1):75-84.

In this reference, we briefly studied on how to properly design small wind turbine and to generate electricity in low wind speed.

[5] Roshen, T. A. and Mahdi, A. A. (2017). Modeling and Simulation of Wind Turbine Generator using MatlabSimulink. Journal of Al Rafidan University College, pp. 282-300.

In this reference we studied on how to simulate our project design in MATLAB Simulink.

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IV. OBJECTIVES

One of the primary factors that impelled the expansion of EV's fame is their commitment to diminish the ozone depleting substance (GHG) outflows.Customary inward ignition motor (ICE) vehicles consume powers straightforwardly and hence produce hurtful gases, including carbon dioxide and carbon monoxide.This methodology expressed the EVs to be the least carbon escalated among the vehicles.EVs likewise produce undeniably less clamour, which can exceptionally decrease sound contamination, generally in metropolitan regions. The reusing of the batteries raises genuine concerns however, as there are not many associations equipped for reusing thelithium-particle batteries completely.From the viewpoint of the EV proprietors, EVs give less working expense due to their boss proficiency it tends to be up to 70% where ICE vehicles have efficiencies in the scope of 60% to 70%. The current significant expense of EVs is probably going to descend from large scale manufacturing and better energy approaches, which will additionally build the financial increases of the proprietors.

The effect of EV infiltration on auto segments will likewise be felt on the interest of range of abilities related with the separate segments, development in battery and charging arrangements industry will require individual with particular abilities.

India doesn't have an away from for the executives of end-of-life Lithium-particle batteries yet notwithstanding, there are a couple of new companies taking activities to smooth out lifecycle the board of the batteries.

V. DESIGNING OF PROTOTYPE

*(A) Working:*In this design as the air enters these hollow pipes which consist of air turbines inside it will start rotating and accordingly the energy will get generated.Below Fig. 2 and Fig. 3 shows the structure of said prototype. This device willbe installed on E- vehicle.

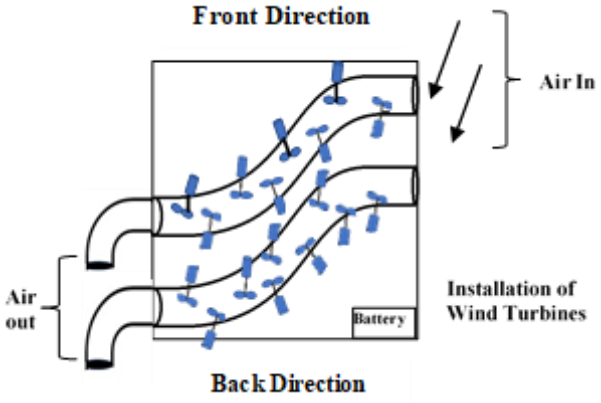

Fig. 2: Prototype structure with one side inlet

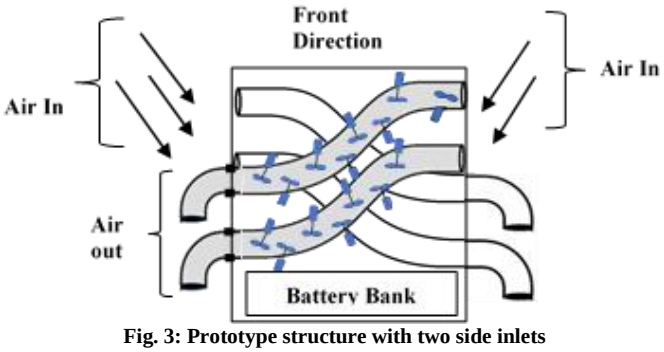

Fig. 3: Prototype structure with two side inlets

We have Air-filter at inlet, as the wind enters the pipes it may have minute particles or objects that may affect on turbine blades. Air from inlet will create wind pressure (Kinetic Energy) on turbines. This will result in the rotation of turbine which generates the energy i.e.mechanical

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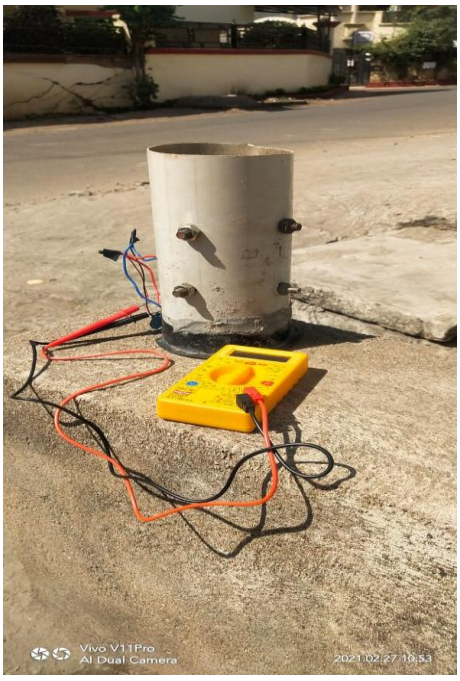
energy will gets converted into electrical energy. This energy charges the existing battery which is being used for the auxiliary parts of vehicle.

(B) Design/Prototype: As per the above said design, we have tested in small scale prototype as shown in below Fig. 4 and Fig. 5. This is just the part-1 of final prototype and got the expected results.

Fig. 4: Tested Prototype-1 (Top View)

Fig. 5: Tested Prototype-1 (Side View)



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VI CALCULATIONS

(A)Power:-

The kinetic energy E (Joule) of a mass of body in motion is obtained is expressed as Equation 1. E = 1 2 $mv2$ (1)

$where$; m is mass (kg); v is velocity (m/s) But the power is defined as the rate of change of energy, thus $P = dEdT$ (2)

Where;
$dEdt$
is the energy flow rate, (J/s)
If the kinetic energy of the wind is assumed to be of constant velocity, then the wind power can be calculated from Equation 3 P = 1 2 $v2$ $dmdt$ (3)

Where; v =is wind speed, (m/s); $dmdt$ is the mass flow rate, (kg/s). Also the mass flow rate is expressed by Equation 4
$dmdt$
= $\rho Adxdt$
(4)

ρ is the density, (kg/m3); is the swept area, (m2); $dxdt$ is the rate of change of distance expressed by Equation 5.
$dxdt$
= v(5)
Therefore, substituting Equation 5 into 4;
$dmdt$
= ρAv
(6)

Hence, from the Equation 3 and 6, the power is expressed as Equation 7.
P = 1 2
$\rho Av3$ (7)

The equation of the area of circle is expressed by Equation 8 $A = \pi r2$ (8)

where; the radius r (m) is equal to the blade length Considering the Betz limit, the theoretical maximum power efficiency for wind turbine system is 0.59 (In other words, close to 59% of the energy conveyed by the wind can be separated by a wind turbine). This is known as the "power coefficient" and is characterized as Equation 9.
$Cpmax$ = 0.59 (9)

The Cp value being a function of wind speed is exceptional to every types of wind turbine types. Consequently, the power coefficient is obtained from Equation 9, while the amount of power that can be generated from the wind is expressed by Equation 10

. P = 1 2 $\rho Av3Cp$ (10)

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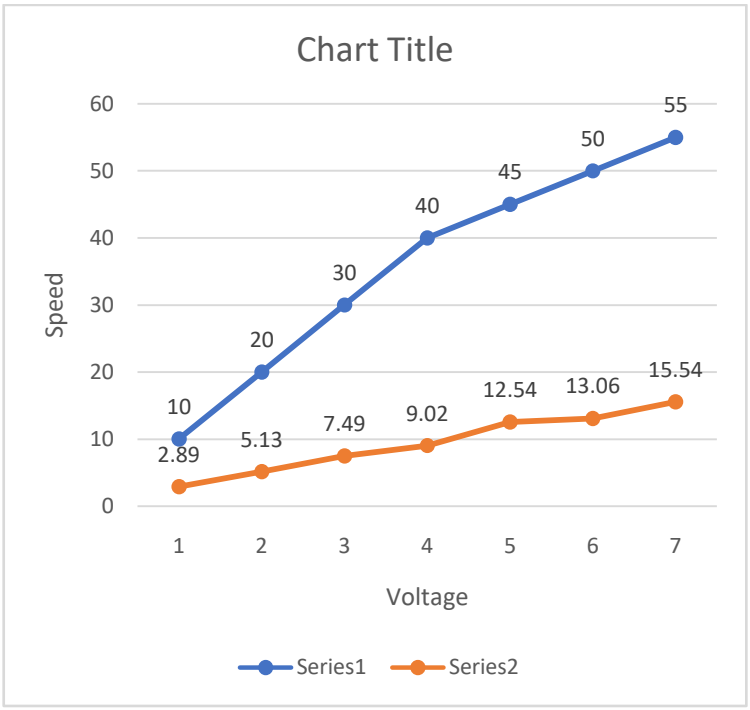
VII RESULT

Speed	*Output Voltage*
10 km/hr	*2.89V*
20 km/hr	*5.13 V*
30 km/hr	*7.49 V*
40 km /hr	*9.02 V*
45 km/hr	*12.54 V*
50 km/hr	*13.06 V*
55 km /hr	*15.04 V*



VIII CONCLUSION

The main objective of this paper isto fulfil the need of electricity in electric-vehicle. The continuous generation of energy and storing in the battery results in the improvement of the efficiency of EV in terms of mileage.Using such prototype, we can reduce the charging problem for certain period of time. The proposed prototype will be environment friendly and ultimately

decrease the usage of conventional energy source.

REFERENCES

[1] C. Chellaswamy and R. Ramesh, "An intelligent energy management and control system for electric vehicle", IEEE International Conference on Advanced Communication Control and Computing Technologies (ICACCCT), pp. 180-184, 2014.

[2] A Review of Wind Energy Scenario in India, International Research Journal of Environment Sciences, ISSN 2319– 1414 Vol. 3(4), 87-92, April (2014) Int. Res. J. Condition Sci.

[3] Kunduru, A. R., Kalyan D., Arimala P., Sai A. N., Nimmala N. M., Vamsi K. R., Beri R., Kuda K. K., Chithaluri S., Sumama Y. A. (2015). A Brief Research, Study, Design and Analysis on Wind turbine. International Journal of Modern Engineering Research, 10(5)

[4] T. A. and Mahdi, A. A. (2017). Modeling and Simulation of Wind Turbine Generator using MatlabSimulink. *Journal of Al Rafidan University College*, pp. 282-300.

[5] Roshen, T. A. and Mahdi, A. A. (2017*). Modeling and Simulation of Wind Turbine Generator using MatlabSimulink. Journal of Al Rafidan University College, pp. 282-300.*

[6]P. Arras, G. Tabunshchyk, V. Okhmak and S. Korotunov, "Modeling and simulation of the services for vehicle infrastructure interaction", IEEE 10th International Conference on Intelligent Data Acquisition and Advanced Computing System IDAACS, 2019