

## Design of a car model for the application of renewable energy

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### Abstract

The designed car model is an Innovative method to generate current by using renewable energy resources mainly solar and wind energy for automobile car. The solar panels are arranged on the top roof of the car and wind turbine is arranged on the back side of the car roof with convergent and divergent position. The air passes through the convergent part to the turbine with high velocity and passes out. The generated electricity can be used to fulfil the required power in car.

**Keywords:** Solar energy, wind energy, automobile, renewable energy.

### INTRODUCTION

Renewable energy resources are the great source for generating energy to full fill the demanding needs of automobiles. It is very much essential in present days an alternate of energy because the petrol and diesel shortage may occur in coming future and the pollution levels are increased which are causing huge damage to the human's health.

The existed car design models are not able to generate the required amount of energy. It is very much essential to design new models to capture more amounts of renewable energy resources.

The designed car model helps to capture more wind energy to generate electricity to run the automotive vehicles. The solar panels can be attached on the top roof of the car such that it captures sun energy to generate electricity. The

figure.1 shows the design of detailed Isometric view of the car.

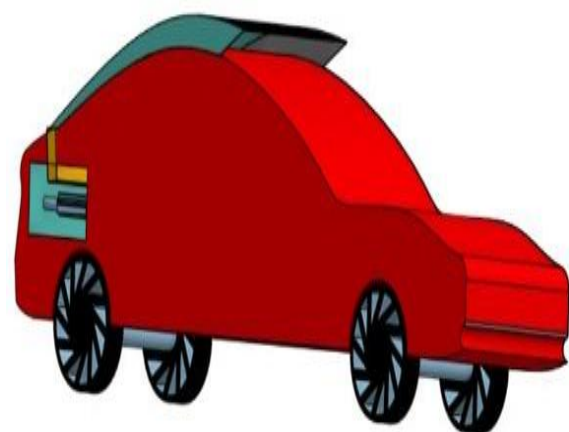


Fig.1: Isometric view of design model.

Fig.2: Gasoline displacement by plug-in Electric vehicles

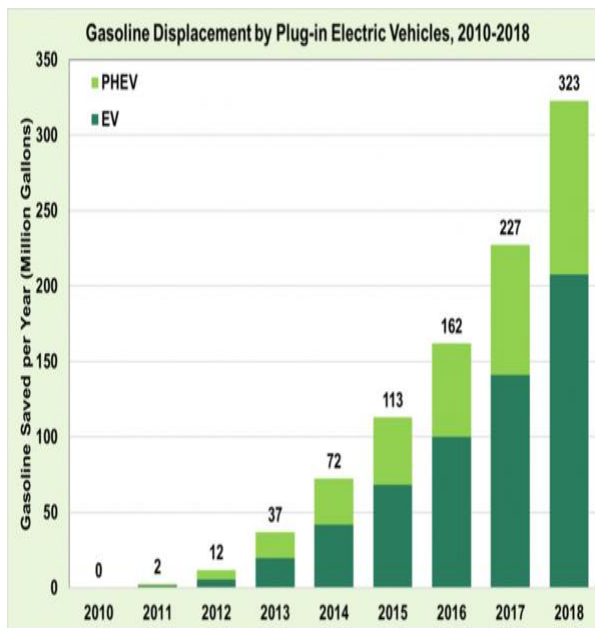


Fig.2: Gasoline displacement by plug-in Electric vehicles

The gasoline saved per year is increasing gradually by using electric vehicles. 21A study conducted in USA shown in figure.2 reveals that usage of electric vehicles (EV) are increasing gradually and amount of gasoline saved per year also increased.

Plug-In hybrid electric vehicles (PHEV) are increasing year by years which is almost double the number every year.

The design is very much suitable for the EV's and PHEV's to generate electricity which is required to run the electric motor. This design helps to reduce the usage of gasoline IC engines so that maintenance cost reduced. The air pollution is major problem now a day in major cities due to automobiles this can be minimised by using this new design model. The figure .2 shows the detailed graphical analysis of gasoline displacement by plug-in electric vehicles.

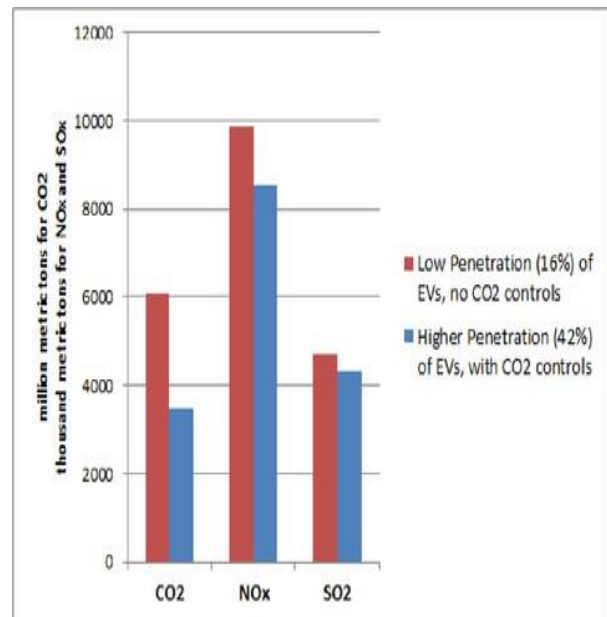


Fig.3: Penetration of EV's and CO2 controls.

22The recent study says that the harmful gases releasing from automobile are reduced by the EV's utilisation. The figure.3 shows that the low penetration of EV's there is no much CO2 control. If the usages of EV's are high then it controls the release of CO2. The new design is very much useful for controlling air pollution due to automobile cars.

**Methodology:**

The model designed for a car as shown in below figure.4 Convergent shape is created on the top of the car roof such a way that the wind flow with high velocity on to the turbine. The wind turbine is attached to the car at the rear end as shown in the figure below. 10The solar panels are arranged on the top roof of the car such a way that it generates more amount of electricity by capturing maximum sun light. The generated electricity by solar and wind energy are stored in a battery bank.



Fig.4: Design model

The electricity stored in battery bank transferred to the motor through charge controller to run the D C motor. The motor is connected to the transmission system. The power goes to the drive wheels by means of transmission system.

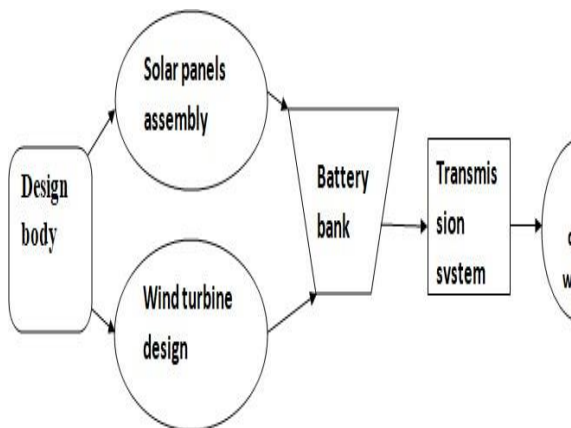


Fig.5. flow chart methodology

The above figure.5 shows methodology of power generation and flow of generated power in a flow chart. Designed car body facilitate to assemble solar panels on the top of the roof and wind turbines on the back side to generate electricity by these both resources. 9The generated power is stored in a battery bank from there it goes to the transmission system through a DC motor. The power transmits to the drive wheels through transmission system.

Detailed design:

The right side design view of car shown in below figure. 6. The top roof surface is designed as convergent shape in order to flow wind on to the turbine which is assembled at the end of convergent shape. It helps to increase the air flow there by turbine rotates at high speed to generate more electricity. 5The mini turbine system is connected to battery system to store the generated power.

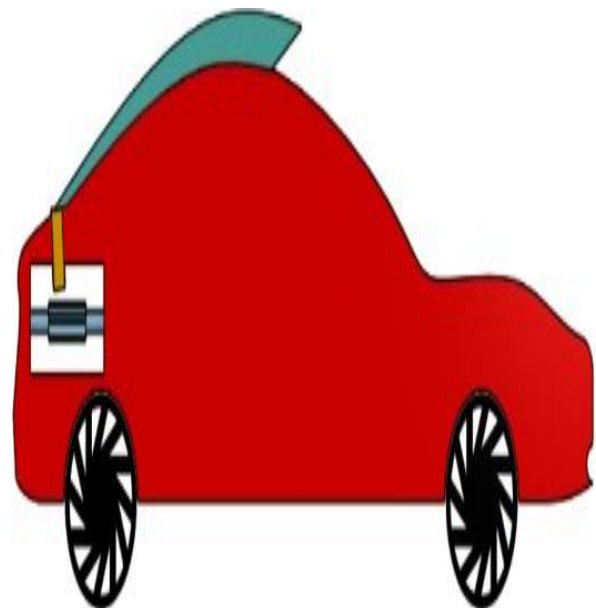


Fig.6: Right side view

The solar panels are assembled on the top roof of the car. Left side view of design shown in figure.7. It helps to capture sun energy and generate electricity when car is in running as well as on parking zone outside. 6The solar panels are connected to battery bank to store the generated electricity. It clearly shows the view of wind flow direction and angle on to the wind turbine. The wind turbine assembly is as shown in the figure.7 attached at the rear end of

the car body. 3The solar panels are arranged on the top surface of the car body as a thin layer.

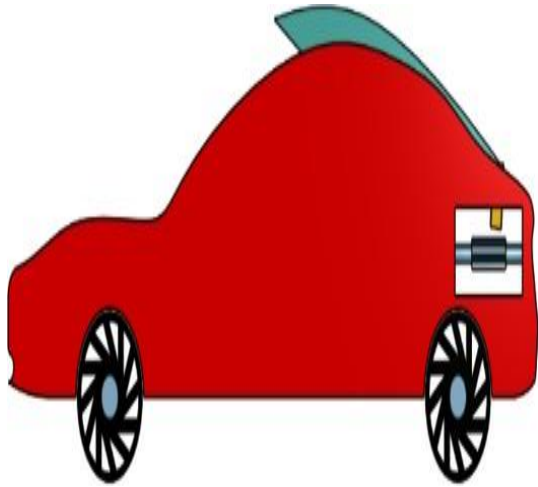


Fig.7: Left side view

The design top view is shown on figure.8. It gives a detailed view of solar panel arrangement. The top view looks like a simple rectangle where the black colour is the solar panel area upon the convergent portion.

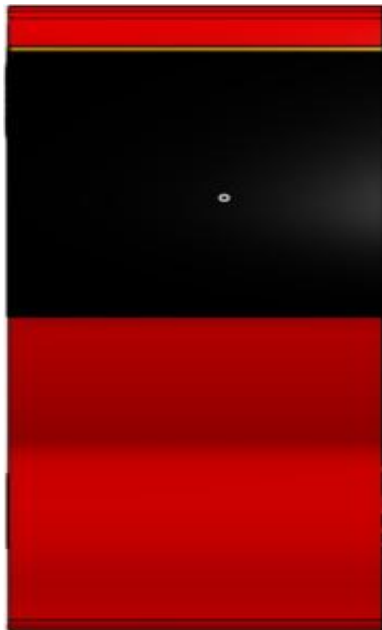


Fig.8: Top view

The design bottom view as shown in figure.9. It gives details about the bottom surface of car. The red colour shade is the body of car and other two colours are wheels, front and rear axles.

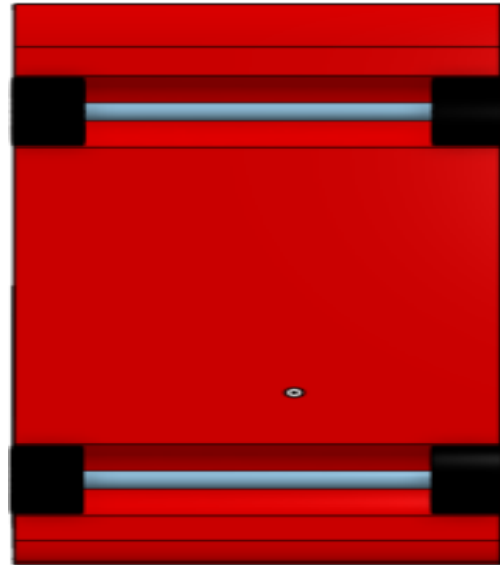


Fig.9: bottom view

#### Advantages:

The design is customer friendly and it won't release any harmful emission gases. The car is fully environment friendly automobile and a best alternate to the conventional IC engine automobiles.

#### Limitations:

The design is not suitable for sports purpose cars.

#### Results and future scope:

The design of car model is well suitable for modern electric cars. The design of convergent part for turbine is done by taking consideration of aerodynamics. This design reduces 80 percentage of utilisation petrol or diesel for car.

It can reduce air pollution caused by automobiles. Since the power is generated within the system, no need to use petrol or diesel. The future scope for this work is to dynamic analysis and can development a working prototype. In future It brings lot of changes in EV's and PHEV's in automobile market. P

Petrol and diesel prices are increasing day by day and one day these fuels may not be available. It is very much essential an alternate systems in automobiles. This design is one of

the best alternate to overcome the problem of resources to run automobile cars.

### Conclusion:

The design is a best suitable to the electric cars. Some of the existed electric cars are hybrid automobiles which uses IC engine and battery. It is the best alternate design for electric cars. The designed model helps to generate electricity while the car is running so maintenance cost is very low as compared to the existed models.

### References

- [1] K. Someswara Rao, et al., Development of a working prototype model of pollution free automobile, Test Engineering and magazine, Volume 83, Issue May/ June 2020, pp. 6911–6915.
- [2] K. Someswara Rao, et al., Design and analysis of an autonomous hybrid vehicle, AIP Conference Proceedings, Volume 2317, Issue-1, Feb 2021, pp.050008.
- [3] K. Someswara Rao, et al., Power generation through renewable energies–An idea for application in passenger trains, AIP Conference Proceedings, Volume 2317, Issue-1, Feb 2021, pp.030010.
- [4] K. Someswara Rao, et al., DESIGN AND ANALYSIS OF LIGHT WEIGHTED CHASSIS, International Journal of Mechanical Engineering and Technology (IJMET) Volume 8, Issue 5, May 2017, pp. 96–103, Article ID: IJMET\_08\_05\_011.
- [5] K. Someswara Rao, et al., DESIGN OF CHASSIS OF TWO-WHEELED ELECTRICAL VEHICLE BY OPTIMIZATION OF DESIGN PARAMETERS USING TAGUCHIMETHOD, International Journal of Mechanical Engineering and Technology (IJMET) Volume 8, Issue 4, April 2017, pp. 223–232 Article ID: IJMET\_08\_04\_026.
- [6] K. Someswara Rao, et al., DESIGN AND ANALYSIS OF ELECTRIC THREE WHEELER AUTO, International Journal of Mechanical Engineering and Technology (IJMET)
- [7] Volume 8, Issue 5, May 2017, pp. 89– 95, Article ID: IJMET\_08\_05\_010.
- [8] K. Someswara Rao, et al., Simulation and Analysis of Suspension System of Formula-1 Vehicle under Dynamic Conditions by using CAD Tools, Indian Journal of Science and Technology, Vol 9(48) DOI:10.17485/ijst/2016/v9i47/100500, December 2016.
- [9] K. Someswara Rao, et al., Simulation and analysis of two wheeled upright vehicle, International Journal of Mechanical Engineering Research. ISSN 2249-0019 Volume 6, Number 1 (2016), pp. 7-18.
- [10] K. Someswara Rao, E.Dileep kumar et.al “Design and development of aerosolar car”, IJTARME, V-1, ISSUE-2,2013, page-31-34.
- [11] K. Someswara Rao, E.Dileep kumar et.al “Design and Development of Green Car”, IJTARME, V-3, ISSUE-4, 2013, page-37-40.
- [12] I. S. Jha, Subir Sen, M K Thivari, D P Kothari, “Renewable Energy Technology”, New age International Publishers, (2018).
- [13] Railway hand book 2012 , energy consumption and CO2 emissions – 2012
- [14] Shiva ganesh Malla, Jayadeepu Dadi, Editor: International conference on energy, communication, Data analysis and soft computing (ICECDS), 2017, August 1, Chennai, India.
- [15] J.E. MOSHE DAYAN, SOLAR AND WIND POWERED SERIES HYBRID GROUND VEHICLE.