Solution to Problem of Electric Vehicle Charging

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Abstract

As the technologies is increasing, it can be observed that the vehicles are becoming electrically operated, which is good for automobiles and environment. But, there is a major problem in electrical vehicle that is charging of the battery and the infrastructure of charging stations. As the electric vehicles require lots of time for charging, which the individual doesn't have nowadays. For this, the solution identified is, the concept to install a **generator** in the electric vehicles. As we know that generator is used to convert the mechanical energy into the electrical energy. So, the concept is to introduce the generator that will be mounted inside the electric vehicles at a specified position to charge the battery of the vehicles. More power will be generated when the car speed will be between 65-80 km/h. Through this concept we can drive our vehicle for a long distance without any fear of battery charging problem.

Keywords: Electric Vehicle, Sustainable, Generator, Technology, Charger, Electrical Innovation.

Introduction

Nowadays more and more focus is laid on the conservation of energy and the environment, keeping this in mind the development of the electric vehicles is speeding up [1]. Automotive manufacturers, governments and environmental organisations are thinking about the more and more production of electric vehicles in order to save the nature and environment [2]. This, being a matter of concern, this paper describes a solution to problem of electric vehicle charging. The solution is an efficient way of installing a generator inside the vehicle. There are several types of generator, this is a 220V d.c generator which produces efficient electricity of 60Hz at 1800 0r 3600 RPM of the vehicle's wheel [3]. In other words we can say that on introducing generator in vehicles we can run our vehicles for long time and we can say that it will help us as a free energy concept.

Position of generator: - The generator is positioned in such a way that it is connected to the differential shaft by introducing a system which consist of sprocket and chain. The generator will be placed in the luggage compartment [As shown in figure 1], when the car is in motion, the generator working will start working.

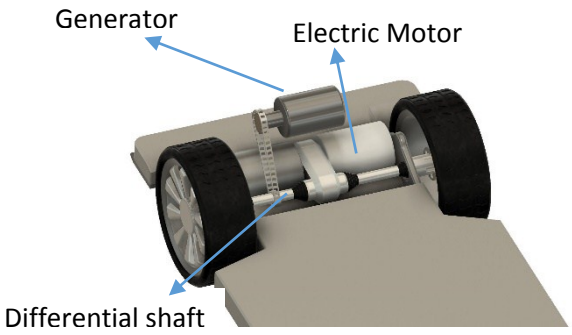

Figure 1:- Schematic view of arrangement of generator

Working

In electric vehicles the power is delivered from the battery to engine and the engine uses that energy and supplies power to the wheels through differential shaft to move the vehicle [4]. The concept here is to connect generator to the differential shaft. [As shown in figure 1]]As the wheel rotates through differential shaft, simultaneously the differential shaft rotates the rotor part of the generator and the electrical energy will be produced, and this energy delivered or stored in the battery of the vehicle and the process becomes a cyclic process [as shown in figure 2].

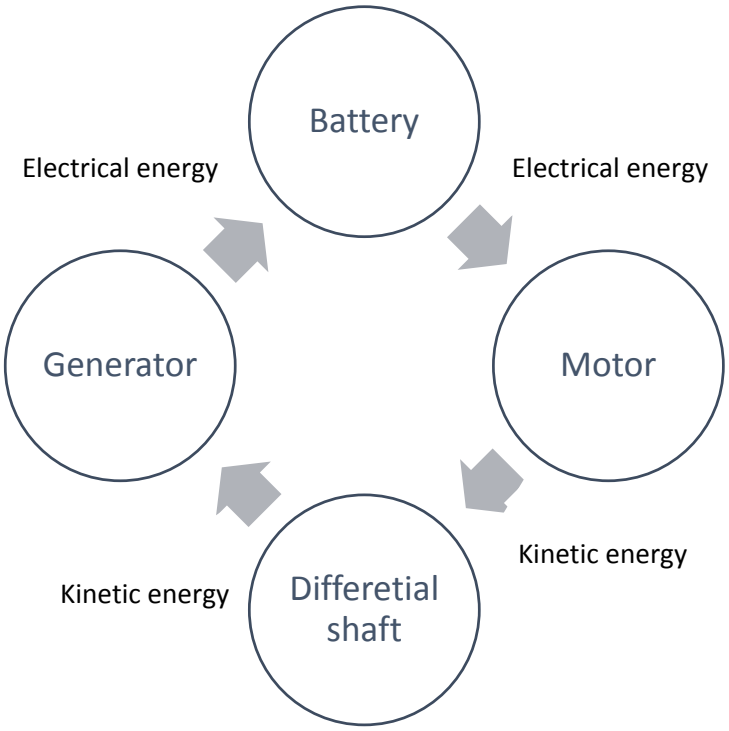

Figure 2: Block diagram of energy flow

Major Components

Major components in an Electric Car Driving System. Electric vehicle driving system is made up of three main parts; namely, the motor, the controller and the battery.

Electric motor:-The motor is the most important part of the vehicle; it is the part responsible for the propelling of the car. There are different types of electric motor, i.e., DC wound, Permanent magnet DC and AC motor [5].

Battery: - Major component of electric car parts is the battery. While some cars would use the standard car batteries as a source of energy, the more advanced ones use the Li-ion batteries as more efficient energy source that gives extra range of operation for the vehicle [6]. They require less time to be charged and provide more energy for the motor attached

Controller: - Major part of the electric car parts is the controller. This part is responsible for power management; it senses the amount of energy needed by the motor and supplies it directly from the batteries in order to get the car moving [7].

Generator: - A generator is a device that converts mechanical energy into electrical energy [8]. The smallest generator are used for applications such as Battery charging or auxiliary power on sailing boats, while large grid-connected generators are becoming large sources of commercial electric power.

Parts of the generator

Rotor: - The portion of the generator that collects energy from the rotation of mechanically is called the rotor.

Stator: - The portion of the generator that produces electrical power by the rotation of rotor in generator.

Conclusion

The progress that the electric vehicle industry has seen in recent years is not only extremely welcomed, but highly necessary in light of the increasing global greenhouse gas levels. If every second person starts owning an electric vehicles then there petrol consumption will decrease exponentially, which would result in a more sustainable environment [9]. Then an average of about 40%-60% of national fuel can be conserved by using this type of vehicle [10]. Also electric bill can also be saved, as the batteries last long per charge.

References

[1] Clement-Nyns, K., Haesen, E., & Driesen, J. (2010). The impact of charging plug-in hybrid electric vehicles on a residential distribution grid. *IEEE Transactions on power systems*, *25*(1), 371-380.

[2] Emadi, A., Lee, Y. J., & Rajashekara, K. (2008). Power electronics and motor drives in electric, hybrid electric, and plug-in hybrid electric vehicles. *IEEE Transactions on industrial electronics*, *55*(6), 2237-2245.

[3] Lopes, J. A. P., Soares, F. J., & Almeida, P. M. R. (2011). Integration of electric vehicles in the electric power system. *Proceedings of the IEEE*, *99*(1), 168-183.

[4] Abdin, E. S., & Xu, W. (2000). Control design and dynamic performance analysis of a wind turbine-induction generator unit. *IEEE Transactions on energy conversion*, *15*(1), 91-96.

[5] Jackson, M. C., Umans, S. D., Dunlop, R. D., Horowitz, S. H., & Parikh, A. C. (1979). Turbine-Generator Shaft Torques and Fatigue: Part I-Simulation Methods and Fatigue Analysis. IEEE Transactions on Power Apparatus and Systems, (6), 2299-2307.

[6] Chan. H and Sutano D., A New Battery Model for use with Energy Storage Systems and Electric Vehicles Power Systems, IEEE Power Engineering Society Winter Meeting, 2000.

[7] Sousa D.M., Costa Branco P. J., Dente J.A.: Electric Bicycle Supplied by an Electronic Converter Using Distinct Forms of Energy Storage, Powereng - International Cnference on Power Engineering, Energy and Electrical Drives, paper no. 223, 2007.

[8] K. Yuen, K. Thomas, M. Grabbe et al., "Matching a permanent magnet synchronous generator to a fixed pitch vertical axis turbine for marine current energy conversion," IEEE Journal of Oceanic Engineering, vol. 34, no. 1, pp. 24–31, 2009.

[9] Gassmann Fritz et al, Supercapacitors boost the fuel cell car, Europhysics News Vol. 34, No. 5, 2003

[10] Larminie James and Dicks Andrew, Fuel Cell Systems Explained, Second Edition, 2003 John Wiley & Sons,ltd.