

Self Charging Electric Vehicle

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Abstract: In this era conservation of energy is the most necessary part of the society and as automobile is an important part of society in day to day life, hence the conservation of energy as well as pollution due to the use of Bio-fuels in automobile sector is a challenging job. So energy conservation and pollution free vehicle became most important factor. To solve this issue the concept of Electric Vehicle (EV) (electricity powered automobile) system was introduced, this can be used in all type of automobiles such as cars, bus; truck etc. But once the battery of EV is charged it travels a limited distance, again we have to charge the battery of vehicle, which is a time consuming process. If one self charging EV is assembled using some kind of alternators with other circuitries, which can charge the battery simultaneously when it is moving, then the problem can be solved. We can use a single powerful battery or two batteries for this case. Single battery can be charged in static manner as well as when the vehicle is moving. For this case the circuit connection may be complicated and the battery life may be decreased. But if we use two different batteries one for driving the motor and simultaneously another will charged during first one discharges. After the first battery drained the second battery will drive the motor and the first battery will be charged mean while. This project is aimed to develop a prototype of a self-charging Electric Vehicle. The arrangement of batteries will be done in such a way that the batteries will be charged alternatively. Alternators with mechanical joint with driver motor and gear box with some amplifying circuits with other elements are used in this arrangement. However this will minimize the rate of energy waste and maximize the energy utilization and also the traveling range of Electric Vehicle can be increased and will not be a time consuming process to charge the vehicle for next journey. But there will be a speed limit for this type of vehicle.

Keywords: Electric Vehicle

1. Introduction

In this era conservation of energy is the most necessary part of the society and as automobile is an important part of society in day to day life, hence the conservation of energy as well as pollution due to the use of Bio-fuels in automobile sector is a challenging job. So energy conservation and pollution free vehicle became most important factor. To solve this issue the concept of Electric Vehicle (EV) (electricity powered automobile) system was introduced, this can be used in all type of automobiles such as cars, bus; truck etc. But once the battery of EV is charged it travels a limited distance, again we have to charge the battery of vehicle, which is a time consuming process. If one self charging EV is assembled using some kind of alternators with other circuitries, which can charge the battery simultaneously when it is moving, then the problem can be solved.

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2. Literature Survey

- 1) Shrinivasa Kannan Jeyakanthan, Sudharshan (2017)" *Design and Fabrication Of Self-Charging Electric Vehicle*" has developed a self charging electric vehicle which generates the electric power required to drive the vehicle during the running condition by the means of two auxiliary power source. One power source is dynamo which is directly coupled with driving motor and second one is horizontal windmill placed in the front of the car. The power source are managed by the means of a current regulator for a charging the battery simultaneously.
- 2) Suhas V, Sukeerth Calastawad, Phaneesh M, Swaraj S(2015)" *Performance Of A Battery Electric Vehicle With Self Charging Capacity For Its Own Propulsion*" "in this work they have designed and fabricated a self charging system for 2 passengers and for weight upto 250kgs.they fabricated an electric vehicle same as commercially available golf carts. The components used are alternator, motor, and dc-dc converter. All were arranged in such a way that the rotational energy is transferred ay a MS bright rod to the alternator and the alternator has a capacity to produce 12v to 14v which was directed to dc-dc converter through a batter source. Dc--dc converter converts 12v to 54v, which energy was used to charge the batteries.
- 3) Abatan O.A., Adewale A.O., Alibi A.A.(2008) "*Constant Electricity Generation From Self Charging Inverter*" this paper focused on an economical, noiseless, emission free and uninterrupted alternate source named self charging inverter.
- 4) Daan Bakker(August 2010)"*Battery Electric Vehicles Performance, CO2 Emissions, Lifecycle Costs And Advanced Battery Technology Development*". The emissions of CO2 caused by the transport sector can be reduced by the battery electric Vehicle. The well-to-wheel CO2 emissions are reduced by approximately 50% compared to a similar internal combustion engine vehicle. All the researched battery electric vehicles in this thesis have lower CO2 emissions than the ICE vehicles when the electricity comes from the European

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mix. The Smart Fortwo emits 62 g/km, where the Smart fortwo petrol emits 121 g/km. The Ford Focus petrol emits 187 g/km, the highest of all the vehicles researched in this thesis.

- 5) Fuad Un-Noor, Sanjeevikumar Padmanaban, Lucian Mihet-Popa, Mohammad Nurunnabi Mollah and Eklas Hossain (2017). "A Comprehensive Study of Key Electric Vehicle (EV) Components, Technologies, Challenges, Impacts, and Future Direction of Development". This paper is focused on reviewing all the useful data available on EV configurations, battery energy sources, electrical machines, charging techniques, optimization techniques, impacts, trends, and possible directions of future developments. Its objective is to provide an overall picture of the current EV technology and ways of future development to assist in future researches in this sector.

3. Problem Identification

The conventional vehicles use fossil fuels (petrol and diesels etc.) as main fuels for energy source. These fuels cause heavy damage to our environment by the emission of harmful gasses CO (carbon monoxide), Hydrocarbons etc. Other types of fuels such as bio gas, natural gases and other types of oils are also used instead of existing fossil fuels. The fossil fuels can exceed only for a certain period of time and it also becomes costlier, scares and creates environmental issues. Solar energy, hydro power and wind energy are the alternates of harmful fuels. But in automobile sector these energy sources cannot be used because of their bulky size. So we have to find alternate energy source for automobile sector.

The solution to these issues is battery electric vehicles. Here battery is used as energy source for vehicles. One problem is there when battery is discharged it requires much time to charge again.

If we add a self-charging circuit arrangement in the electric vehicle, then the charging time can be reduced. It can be done using dynamo, alternators, dc to dc step-up circuit, charging circuit, alternate batteries etc.

Plane of Action

Our plan is to use the concept of two battery pack instead of single with higher capacity. For that we want to prepare a prototype model which is shown in fig.no.1. Initially we charged both the batteries then the car is driven by first single battery (B1) upto distance till it's discharged. After that vehicle run with the help of 2nd battery (B2) during this the 1st battery (B1) will get charged by the use of alternator. These way batteries will get charged simultaneously this process will goes vice versa.

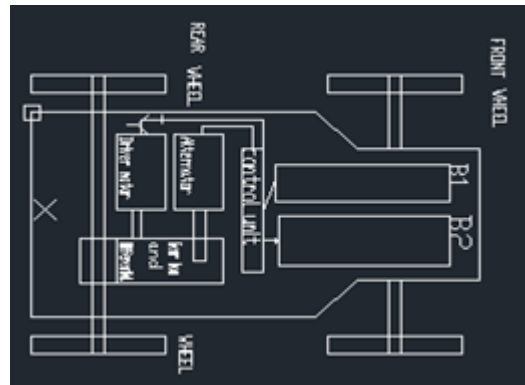


Figure 1: Expected block diagram of an electric car

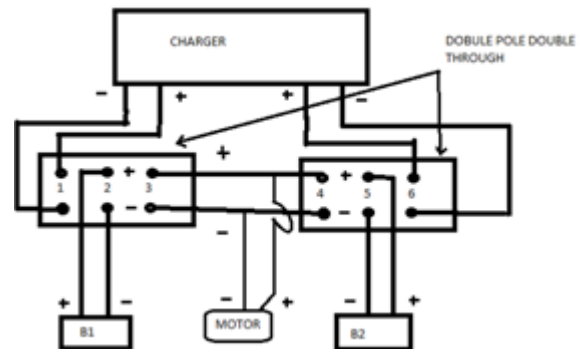


Figure 2: Charging and battery switching technique

4. Components Description

- 1) Alternator - An alternator is an electrical generator that converts mechanical energy to electrical energy in the form of alternating current. (Alternator 10-24v, 0.4 Amp, 2 Phase).
- 2) Driver Motor / Traction Motors - Traction motor refers to a type of electric motor. A traction motor is used to make rotation torque on a machine. It is usually changed into a straight line motion. Traction motors are used in electrically powered rail vehicles such as electric multiple units and electric locomotives and cars. (12v DC motor, 2Amp)
- 3) Control Unit- This will contains of automatic battery switcher, potentiometer, fuse box and general electrical components etc.
- 4) Inverter – It is an electric device which is used for converting A.C current into D.C. as well as D.C. current into A.C. current.
- 5) D.C. Batteries – The most important component or the powerhouse this convert chemical energy into electrical energy. This will consist of two different battery sets as requirement.
- 6) Frame and Other Mechanical Components– This will consist of a transmission gear box, a differential gear, suspension system, steering column etc.
- 7) Benefits – This will optimally solve the issue of energy require for driving an electric car. A very less or even no other sources are requiring driving a car. The important benefit is it is a complete eco-friendly. In the field of defense automobile and transportation of soldiers and equipment are can be done by it. Although electric engine is very small in size but very powerful as compare to I.C. engines.

5. Methodology

We have used an electric toy car of passenger capacity 35kg for this experiment with its own weight of 18kg. The arrangement is simple the alternator and driver motor is connected by a shaft parallelly so that when wheel starts rotating the alternator will also start rotating with same speed as motor shaft speed due installation of reduction gear box. The block diagram of complete arrangement is shown in figure below.

The Working Principle of Battery Switcher

Case 1-

When switch 1 ON and switch will keep off the car will run with help of battery no.1 and battery no. 2 will be charging.

Case 2-

When switch 1 is off and switch2 will kept on the car will run with help of battery no.2 and battery no. 1 will be charging.

And this process will be continued vice-versa for running of car further range without charging from external source.

Specification and details of components:

1. Driver motor capacity 12V, 2Amp, 725gcm (torque)
2. Alternator capacity: 10-24v, 0.4 Amp, 2 Phase.
3. Battery capacity 7AH, 12V.
4. Wheel diameter – 16cm.
5. Shaft length – 45cm.
6. Driver motor RPM – 1500-1600
7. Wheel RPM – 70-80.

6. Result

Inputs Given To Driver Motor

Voltage	Current In Loop	Wheel Rpm
12volt	2amp	70rpm

Outputs

When Dc Generator Used

Voltage Generation	Current In Loop	Wheel Rpm
10.3 Volt	1.81amp	40-45

When Alternator Is Used

S. No.	Voltage Outputs	Current In Loop	Wheel rpm
1.Single Phase	12.6volt	.19amp	70
2.Double Phase Parallel Combination	12.7volt	.27amp	70

7. Conclusion

In this paper we have worked on a battery operated electric toy car which carries only one child. We modified this car according to our setup explained above. The speed of motor was as per our requirement but the current output was quite less. Due to less generated current the charging time was more. But due to presence of secondary battery which was charged by self charging circuit the vehicle can move long distance and the rider cannot wait until the battery to be charged. Further the current can be increased to reduce the charging time of batteries.