

ELECTRIC VEHICAL DRIVEN BY USING SOLAR POWERED BLDC MOTER

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ABSTRACT

In earlier days the when the electric cars were designed, they went through various losses and were less efficient. Thus, there was a decrease on demand of electric cars/ vehicle which almost made the concept of electric cars as not efficient. So, for increasing the efficiency as well as in automobiles markets, we are using BLDC motor operation cars. Many of the researches are going on for finding the use of solar powered energy. Electric vehicles are the only alternative for clean, efficient and eco-friendly urban transport system. Electric vehicles are being popular across the world but they are having some problems associated with driving range, energy storage system and stored energy management. Any equipment without is an idle bunch of components. It is very prominent with those dependable upto the non-renewable sources. This paper details the study of designing a solar powered BLDC motor driven electric vehicle which is one of the solutions for the oncoming crisis. The integrated system consisting of the solar module, charge controllers, batteries, boost converter and BLDC motor, henceforth developed into the solar powered electric vehicle.

Keywords–Solar vehicle , Renewable energy, BLDC Motor, Alternat, boost convert.

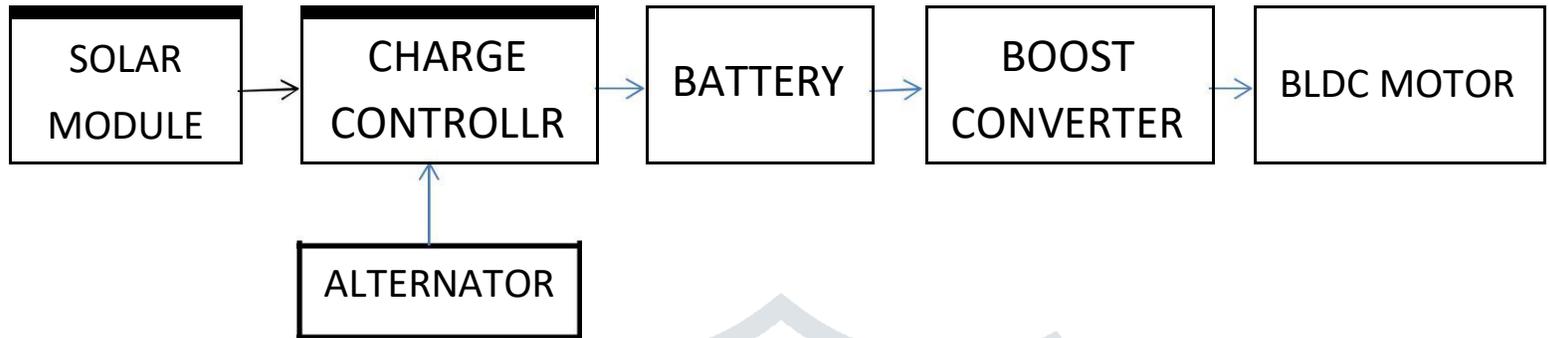
so as to avoid overcharging and deep discharge. The voltage is then boosted up using the boost

INTRODUCTION

This paper discusses about the usage of solar energy to power up the vehicle. Electric vehicle plays a major role to reduce global warming and keeps the people healthy. In many developing countries like India petroleum is imported at very large scale and very high subsidy is provided by government to the people, which cause losses of economical growth . A proper energy management system is needed to control the energy uses, every single watt of stored energy has importance in electric vehicle. the Photo Voltaic (PV) Module may be connected either in parallel or series, but it's costlier. Thus to make it cost effective; power converters and batteries are been used. The electrical charge is consolidated from the PV panel and directed to the output terminals to produce low voltage (Direct Current). The charge controllers direct this power acquired from the solar panel to the batteries. According to the state of thebattery, the charging is done,

1. BLOCK DIAGRAM

power converter, ultimately running the BLDC motor which is used as the drive motor for our vehicle application.



2. SOLAR POWERED VEHICLE OF PROTOTYPE

The integration of the whole system evolves as the Solar Motor Driven Electric Vehicle. The powered BLDC prototype of the vehicle was designed with just forward and backward movement which was able to achieve a speed of 23 Kmph. The rear axle of the vehicle is connected to the driving shaft of the BLDC motor through the fly wheel. With the change in motor, which has

high Torque, the vehicle would be capable of been driven with heavy load. The current from the batteries flows to the controller, which controls the whole control system of the vehicle. With respect to the movement of the accelerator, the controller sends forth the current, thereby increasing or decreasing the speed of the vehicle.

3. CHARGING THE BATTERIES THOUGH THE CHARGE CONTROLLER

Charge Controller limits the rate at which electric current is added to or drawn from the electric batteries. The prime purpose of using the Charge Controller is to prevent against overcharging and deep discharging of a battery. For the 12V/42Ah battery, individually. As the next step, the battery is 12V/6A solar charge controller is an ideal choice. According to the rating of the battery and solar module the selection of the charge controller is done. Two charge controllers are connected between the solar modules

(35W and 40W) and the batteries studied and simulated.

4. POWER FROM THE BATTERIES TO MOTOR

In the next phase of the work, the power which is stored in the batteries is used in driving the BLDC motor. In this phase the detail study of motor is done and simulated. The specification of the BLDC motor is given in Table 3. From the specification it's well understood that the required voltage to run The switching diode used in the boost converter must withstand a reverse voltage equal to the circuit output voltage and must conduct the peak output current. A suitable diode must have a minimum reverse breakdown voltage greater than the circuit output voltage. Stocky barrier diodes are

the motor is 48V, while the rated voltage of a single battery is 12V. Thus to achieve the rated voltage of the motor; we are in need of four batteries which when connected in series can satisfy the requirement. In order

often used. The current supplied to the output RC circuit is discontinuous. Thus a larger filter capacitor is required to limit the output voltage ripple. The filter capacitor must provide the output DC current to the load when the diode is off.

In a boost converter the output voltage is greater than the input voltage. The boost converter required for the Solar Powered BLDC Driven Electric Vehicle needs 24V (from batteries connected in series) to 48V (required rated voltage of BLDC motor) the designed boost converter for the vehicle application.

to make it cost effective, two batteries are connected serially, giving 24V as the output voltage. This 24V from the serially connected batteries are then boosted to 48V using the boost converter.

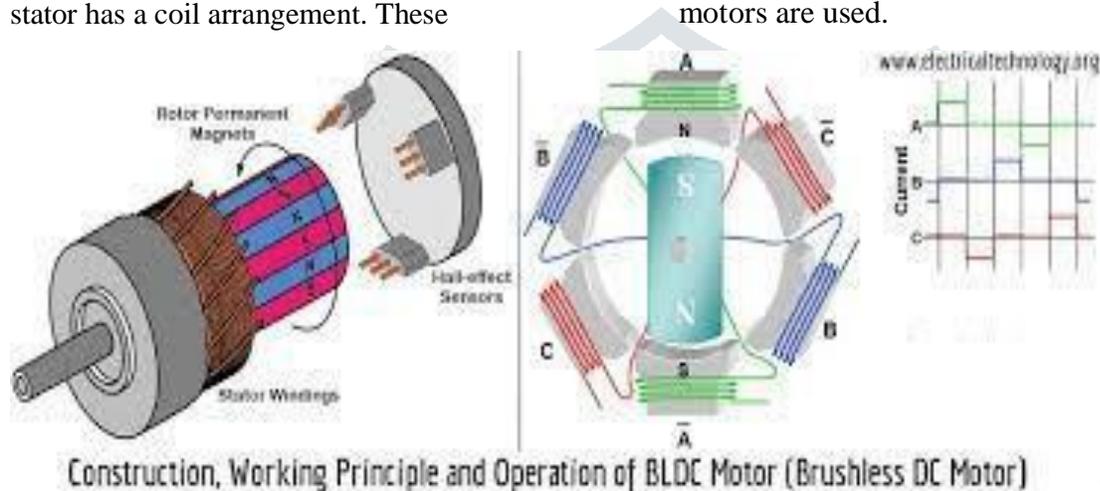
5. SPECIFICATION OF THE BLDC MOTOR

| | |
|-------------------|-----------|
| ➤ Power | 500Watts |
| ➤ Rated Voltage | 48V |
| ➤ Rated Current | 10.5A |
| ➤ Rated Speed | 3500rpm |
| ➤ Rated Torque | 198 oz-in |
| ➤ No load Current | 1.6A |
| ➤ Rated Voltage | 48V |
| ➤ Rated Current | 10.5A |
| ➤ Rated Speed | 3500rpm |
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6. STUDY OF BLDC MOTOR

The operation of a BLDC is based on the force interaction between the permanent magnet and the electromagnet. In this condition, when the coil A is energized, the opposite poles of the rotor and stator are attracted to each other (the attractive force is shown in green arrow). As a result the rotor poles move near to the energized stator. The stator has a coil arrangement. These

windings can be arranged in either star or delta. The stator must be chosen with the correct rating of the voltage depending on the power supply capability. For robotics, automotive and small actuating applications, 48V or less voltage BLDC motors are preferred. For industrial applications and automation systems, 100V or higher rating motors are used.



test directly reflects to the speed of the vehicle with respect to the load. For a vehicle, irrespective of the driver; the wind force, friction, incline or decline movement, and the weight of vehicle (for a solar powered vehicle; the solar modules, batteries, controllers and motor) are the

parameters that affect the speed of the motor, there by affecting the speed of the vehicle. The permanent magnet creates rotor flux and stator creates electromagnetic poles. The rotor is attracted by the energized stator phase generating a rotation.

The load

CONCLUSION

The importance of making shift in the source of energy which is made cost effective was put forth, and utilization of solar power in vehicle application was implemented. The objective of selecting the

appropriate components for the application was studied, and the various components for the same is subjected to various tests which was cross check with simulation results tool. The designing of the whole system depends

on the application for which it shall be used, and accordingly the components are been chosen starting from the motor to the solar modules. It was observed that according to the application, the motor was chosen first. From the rating of the motor, the battery which could satisfy its starting current and

full load current was been selected, and then according to the rating of the battery, the solar charge controllers and the solar modules were selected. Finally the BLDC motor mounted upon the frame realized the prototype.

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