

GENERATOR BASED ALTERNATE CHARGING AND DISCHARGING BATTERY SYSTEM

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Abstract-21st century marks the beginning of an evolution in automotive industry in the form of Electric Vehicles. The two most important factors to be considered in manufacturing Electric Vehicles is range of the battery provided and efficient charging of the battery. Normally for charging the batteries supercharger stations are installed where people can charge car batteries and continue their journey ahead. The batteries are used to power an AC/DC motor which runs the vehicle. Most of the space in the drive train is occupied by the battery. In this project we propose a new concept i.e. charging the batteries with help of a generator attached to the front wheels. The output of the generator is variable and is not enough to charge the battery, to overcome this problem we propose to use a part of power electronics i.e. a voltage regulator. The voltage regulator will not only stabilize the output voltage but also will amplify or rectify the voltage depending upon the fixed output. This fixed output will be provided as a charging voltage for the battery and will result in effective charging while the vehicle is in motion. Another part of this concept is the use of a second battery, both these batteries will simultaneously charge and discharge i.e. while the first battery is in use the second battery will undergo charging and vice versa

Key Words- AC/DC Motor, Generator, Generator, Voltage Regulator

1. INTRODUCTION

The US publisher Ward's estimated in 2010 that there are almost 1.015 billion automobiles on the road including cars: light and medium, auto rickshaws, heavy duty trucks, buses and motorbikes. All these vehicles use fuel: diesel, petrol, natural gas as the source of energy for transportation. Since the invention of first automobile which run on gasoline, it's been more than a century. Since then there has been a rise in number of automobile companies and the vehicle revolution faced an upward surge. There are two main problems of gasoline based vehicles. Firstly, depletion of the natural resources as a result of excessive combustion of these resources and secondly it causes pollution; the most troublesome reason as it leads to the formation of greenhouse gases which in turn causes global warming. So, there has to be a solution for this and the answer is ELECTRIC CARS. It's still under research and lot of automobile companies are

entering into this sector as this is going to be a new revolution in the automobile sector which can solve the problems of pollution, global warming, and natural resources depletion. It is a clean and green technology. Electric car functions with the help of two or more motors which uses the electrical energy stored in the rechargeable batteries or any other energy storage device. Instant torque is given to the electric vehicles by the motors which assures smooth acceleration. It is stated that electric vehicles are three times more efficient than the conventional (IC engine) cars. The first usage of electric cars can be traced back to 1880s but it became really famous in 21st century. There is a revolution in electric vehicles manufacturing due to advances in batteries and energy management. 'Electric vehicle' term represents any vehicle that makes the use of motors for propulsion while electric car refers to highway capable automobile using electricity.

2. CONCEPT

In electric cars worldwide, the main components are battery, their charging system and motors. Batteries are charged at charging stations or at one's household. No generator is used worldwide for charging the batteries. Our project differs in this case because we are going to use generators as charging system. Generator is located on the front axle. Battery selected for this project is a lithium ion battery which is situated in the middle portion and is connected to generator as well as motor which is situated on the rear axle. Motor is connected to the wheels so that the wheels can rotate and set the vehicle in motion. Initially there is some power stored in the batteries which will supply energy to the motor and hence the rear wheels will be operated and the car will run. Due to the car's motion, generator which is placed in the front will supply electricity to the batteries via a DC to DC Boost Converter to the batteries. Battery will get charged and provide power to the motor hence completing the cycle. This project focuses on generator. And as the size of generator is huge, we have used DC motor as a generator because DC motor can act as a generator. If we rotate the shaft of the motor at a particular speed the motor will generate electricity.

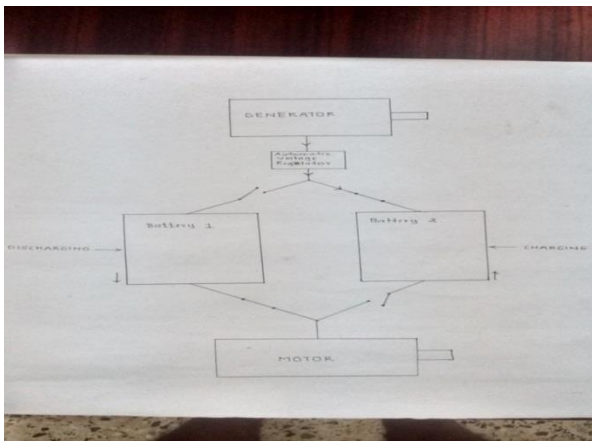


Figure 2: Concept

3. COMPONENTS

3.1. Motor-

A direct current or DC Motor is a motor that converts electrical energy to mechanical energy. If a conductor carrying current is located in the magnetic field, it will experience torque and has propensity to move which is known as motoring action. For our purpose we have used brushless DC motor. High power to weight ratio, electronic control and high speed are some of the factors of BLDC motor.

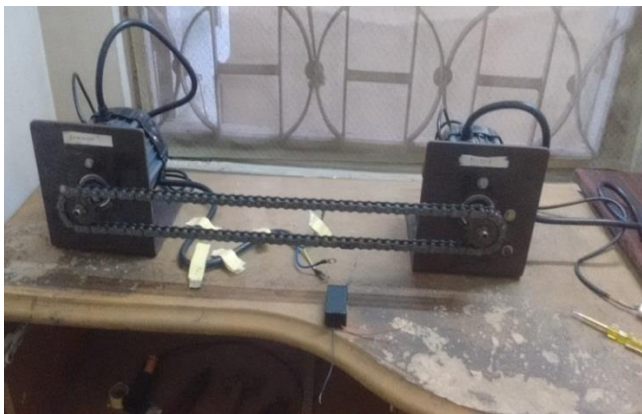


Figure 1: BLDC Motors

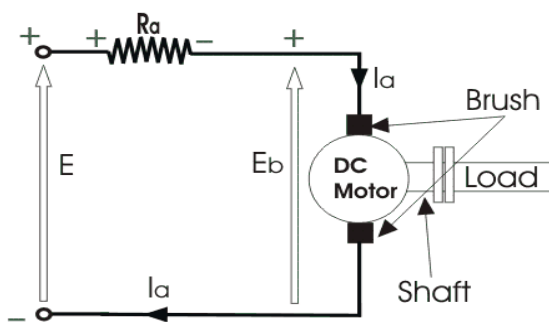


Figure 3: Schematic diagram

Specifications-

Voltage- 48V

Current- 21A

Rated power- 1kW

Rated Torque- 4-5 Nm

3.2. Motor controller-

A single device or group of devices which administers in any prearranged style, the conduct of an electric motor is known as motor controller. It can be manual or automatic.

Specifications-

Rated Voltage- 48V

Peak Protection current- 50A

Rated power- 1000W

Under voltage protection- 42V

Ambient Temperature-20-40 degree Celsius



Figure 4: Motor Controller

3.3. Battery-

Battery used by us in the project is a lithium ion battery because it is a category of rechargeable battery in which lithium ions transfer from negative electrode to positive electrode amid discharge and back when charging. It has tiny memory effect, low self-discharge and high energy density. It is the most efficient battery and it is more adaptable to range of charging conditions.

Specifications-

Capacity-10 - 24Ah

Voltage-48v

Size- 235*160*155

Usage-Motorcycle / Scooter / Solar / E bike

80% with a 5 ampere Boost converter output was 3 hours and discharging took place within 2 hours.

5. REFERENCES

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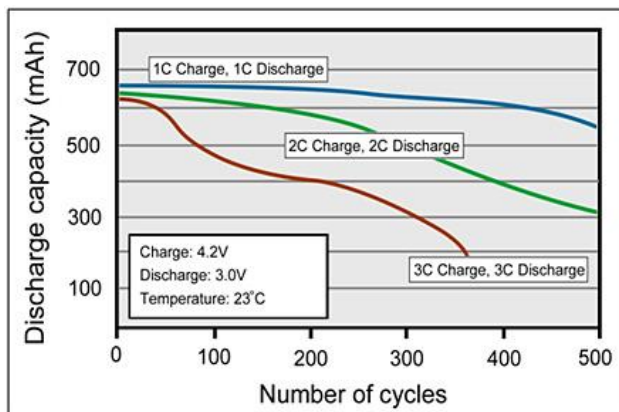


Figure 5: Discharge Capacity



Figure 6: Battery

4. RESULTS AND DISCUSSIONS

DC Motor acting as a generator is able to generate voltage in the range of 10- 35 volts. With the help of DC to DC boost converter we were able to supply the required charging voltage of the battery with sufficient amount of charging current to efficiently charge the battery. The time required to charge the battery up to