Electric Vehicle Boost Charging System Using Supercharging Capacitor

Mr.Nagla Ghanshyam Shankarlal[1] Prof.Miss Alfiya A. Mahat[2]

Matsyodari Shikshan Sanstha College of Engineering and technology, Jalna

gsnagla@gmail.com, alfiya704@gmail.com

ABSTRACT

Over the past two and a half decades, electric vehicles (EVs) have attained a magnificent market, and the day by day it is increasing throughout the world. It is also one of the hopeful remedies for the greenhouse gases.

But the main difficulty is the charging of the battaries. To charge an electric vehicle takes a long time period, and it is also not safe because they use lithium-ion batteries to run them.

Lithium-ion batteries require 5 to 6 hours for their charging, and the battery banks are bulky as well as heavier and are not fireproof. The lifespan of lithium-ion batteries is also too short; they last for less than 3 years.

By using the supercharging capacitor instead of lithium-ion batteries in electric vehicles, the above-mentioned restrictions can be overcome easily.

Super-capacitor modules can provide the high current and high acceleration while the vehicle is starting, as well as they are very hopeful to increase the life of batteries.

The design of this project includes a charger and battery technology that is fast in charging, fireproof, and long-lasting.

This charging system has high-amps-supported electronic circuits and electronic components used for charging of 2.7 V and 1000 F (500 F x 2 Nos.) capacitors.

Introduction

The conventional vehicles generate a huge amount of carbon dioxide (CO_2) gas in their exhaust, which inserts into the atmosphere, resulting in air pollution as well as the greenhouse gases.

The conventional vehicles are powered by internal combustion (IC) engines. But now the electric vehicles (EVs) are the best alternative to the traditional vehicles, which run on the advanced technological batteries, which are also more efficient.

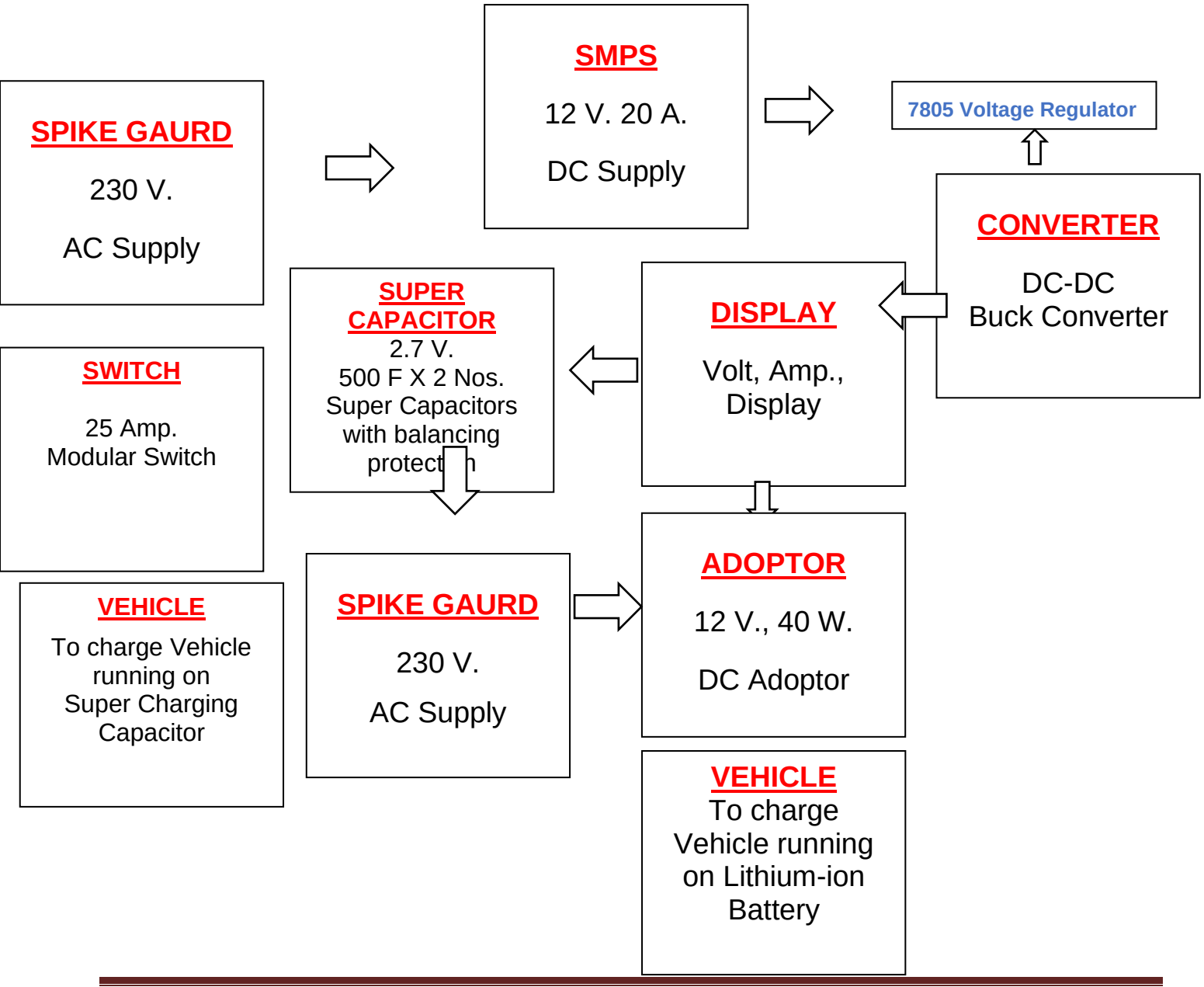
The main drawback or disadvantage of electric vehicles is that they take a longer time to get charged, but a boost charging system using a supercapacitor is the best solution to overcome this problem.

The deep discharging of battery may arise in peack load in lithium-ion electric vehicles.

Hence the boost charging system of electric vehicles using supercharging capacitors is the best solution, even in the peak power and acceleration required in India as well as everywhere in the world.

Electric vehicles are equipped with brushless direct current motors (BLDC motors) that are fitted to drive their rear wheels.

BLOCK DIAGRAM
OF
Electric Vehicle Boost Charging System using Supercharging Capacitor



Major components used in this project

1) Spike Gaurd : Is used to take 230 V input AC supply
2) SMPS : Switch mode power supply
   Input AC 100 – 264 V 50/60 Hz and 12 V DC 20 A. Output used as DC supply
3) DC-DC Buck Converter : DC-DC Buck convertor or step down converter is used to decrease the 12 V DC. Votage is usually 1.8 V, 3.3 V or 5 V.
4) Display : Volt, Amp display is used for monitoring the voltage and the current while charging and discharging the supercapacitors.
5) LM 7805 Voltage Regulator (IC): is used to activate the Volt, Amp display by giving the positive 5 V as initial DC supply
6) Super Capators : used for storage of power to charge the electric vehicle
7) S.P. Switch : Single pole 25 A modular type switch is used as ON / OFF control switch while charging the demo vehicle (Toys Car)
8) Demo Vehicle (Toys Car). - I : Fixed the super capaciters 2.7 V, 500 F x 2 Nos. With balancing protection boards and operating switch
9) Adoptor : 12 V, 4 W DC Adoptor is used to charge the lithium-ion battery of a demo vehicle (Toys Car).

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10) Demo Vehicle (Toys Car) - II :Fixed the lithium-ion battery 2000 mah, 3.7 V With Battery Management System (BMS), DC-DC Boost charger and ON/OFF Switch
11) Lithim Battery Charging Board : This charger is “C” type USB input high current, 3 V polymer Ternary lithium battery fast charging board equipped with IP 2312 main control chip. When the battery charging current is less than 300 mA and the battery voltage is close to 4.2 V. It automatically turns to constant charging voltage mode.

Hardware Photo

Bibliography

Author1

Mr. Nagla Ghanshyam Shankarlal is pursuing his M.TECH degree in the stream of Electrical Power System from Mss's College of Engineering and Technology, Jalna, Dr. BATU University, Lonere, Maharashtra. He has completed his B.TECH in the stream of Electrical Engineering from Matoshri Pratishthan Group of Institutions, Nanded, Maharashtra.

Email id : gsnagla@gmail.com

Author2

Prof.Miss Alfiya A. Mahat received Mtech in Electronics engineering from Savitribai Phule women's College of engineering. She is currently working as Assistant Professor in Department of Electrical Engineering & Technology at MSS's College of Engineering and Technology,Jalna.
Email Id: alfiya704@gmail.com

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