Hybrid Electric Vehicle System using Bidirectional DC/DC converter- A Review

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Abstract:
This work presents the perpetration for electric vehicle (EV) system, as well as its operations on cold-blooded energy storehouse system. In order to supply long distance abidance and make sure the minimization of a price function for electric vehicles, a relief mongrel energy storehouse system for electric vehicle is meant in this paper. For the mongrel energy storehouse system, the paper proposes an optimal control algorithm designed employing a Li-ion battery power dynamic limitation rule-grounded control supported the SOC of the the super-capacitor.

Keywords: Electric Vehicle, energy storage, Anfis, PI

Introduction:

Due to the pollution caused by energy, new energy sources are continuously developed. Currently, bedded energy storehouse systems in current-generation electric vehicles are substantially supported the Li-ion batteries which, with high energy viscosity, can give long-distance abidance for electric vehicles.

While compared to the supercapacitor, the response of Li-ion batteries is slower than that of supercapacitors. Thus, so as to form electric vehicles like energy vehicles with respect to fast flash acceleration, energy, and long-distance abidance, a mongrel energy storehouse system (HESS) conforming of Li-ion batteries and super-capacitors is applied to electric vehicles. For the event of electrical vehicles, optimizing the energy memory device is critical, and it's necessary to suppose about adding the capacity of the battery while reducing the confines and weight of the battery to extend the charging rate.

DC-DC transformers which play a pivotal part in cold-blooded energy storehouse system are developed fleetly over the times. Through a series of inventions, a spread of DC-DC transformers are proposed. a relief zero Voltage Switch (ZVS) bidirectional DC-DC motor is proposed in (9), which has good controllability to enhance conversion

effectiveness, but is not suitable for electric vehicles thanks to the complex control and better cost. it's been shown an insulated bi-directional DC-DC motor with a complex structure is in a position to convert an outsized power transmission. a relief zero-ripple switching DC-to-DC motor with the integrated glamorous technologies is first proposed in by S. Cuk, and thus the operation is extremely successful insulated.

Interleaved DC/ DC motor introduces the conception of three-winding winding coupled inductors, but it's further suitable for power transmission. It is very important for hybrid energy storage systems to select a suitable energy management strategy. Energy management strategies have been extensively reported in the literature in recent years, including neural networks, fuzzy logic, state machine control, frequency decoupling method, on/off-line optimal strategies, dynamic programming (DP) and limitation of battery power. The main objective of the optimal control strategies is to ensure a continuous supply by the minimization of a cost function. These strategies can be divided into off-line global optimization and on-line local optimization. For off-line global optimization, it is necessary to acquire the best power distribution between different sources. At the same time, for on-line local optimization, accurate predication driving conditions is necessary.

In this existing work, a different integrated magnetic structure of DC-DC device is planned and applied on hybrid energy storage system for electrical vehicles. The planned DC-DC device offers the precise topology and operational modes, together as Li-ion battery and super capacitance management. With regards to energy management strategy, the paper proposes Associate in Nursing improvement management formula designed using a Li-ion battery power dynamic limitation rule-based management supported the state of charge (SOC) of the super-capacitor. therefore on boost the life and trim the size of hybrid energy storage system, the paper uses a hybrid formula supported particle swarm improvement and Nelder-Mead simplex approach to optimize the management parameters. Finally, the simulation and experimental analysis verify the hybrid energy storage system performance.

Figure 1 illustrates the currently existing block diagram.

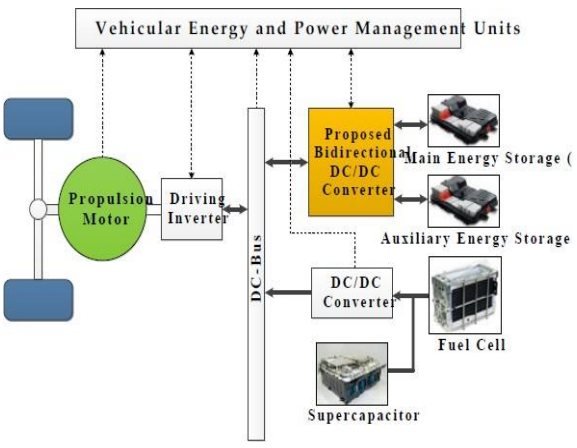

Figure1: Existing Block Diagram for Hybrid EV

The low-tension FC stack is employed because the main power supply, and SCs directly connected in parallel with banking industry. The dc/dc power convertor is employed to convert the FC stack voltage into a ample dc-bus voltage within the driving electrical converter for provision power to the propulsion motor. moreover, ES1 with rather higher voltage is employed because the main battery device for provision peak power, An ES2 with rather lower voltage can be an auxiliary battery device to realize the vehicle vary extender conception. The perform of the two-way dc/dc convertor (BDC) is to interface dual-battery energy storage with the dc-bus of the driving electrical converter.

Generally, the FC stack and battery storage devices have completely different voltage levels. many multiport BDCs are developed to produce specific voltages for masses and manage power flow between completely different sources, therefore reducing overall value, mass, and power consumption. These BDCs may be categorized into isolated and non-isolated sorts.

Literature Review:

For energy, atmosphere, and plenty of different reasons, the electrification for transportation has been affecting for several years. In railway systems, the electrical locomotives have already been well developed for several years. A train runs on a hard and fast track. it's straightforward to urge power from a conductor rail exploitation mechanical device sliders. [3] but, for electrical vehicles (EVs), the high flexibility makes it hard to urge power in a very similar manner. Instead, a high power and huge capability battery pack is sometimes equipped as an associate degree energy storage unit to create associate degree eV to control for a satisfactory distance. Until now, the EVs don't seem to be therefore engaging to shoppers even with several government incentive programs. Government grant and tax incentives area unit one key to extending the market share of eV these days. [4] the matter for an electrical vehicle is nothing else however the electricity storage technology, which needs A battery that is the bottleneck these days because of its disappointing energy density, restricted life time and high price. In an EV, the battery isn't very easy to style thanks to the subsequent requirements: high energy density, high power density, reasonable price, long cycle life time, sensible safety, and reliability, ought to be met at the same time. Lithium-ion batteries area unit recognized because the best resolution to be employed in electrical vehicles [1]. However, the energy density of the commercialized lithium-ion battery in EVs is only 90–100 Wh/kg for a finished pack [2].1This variety is therefore poor compared with gas, which has associate degree energy density about 12000 Wh/kg. To challenge the 300-mile vary of an interior combustion engine power vehicle, a pure eV wants an

outsized quantity of batteries that area unit too serious and too costly. The lithium-ion battery price is regarding 500$/kWh at the current time. [6] Considering the vehicle's initial investment, maintenance, and energy price, the owning of A battery electrical vehicle can build the buyer pay an additional 1000$/year on the average compared with a gasoline-powered vehicle [1].

Problem Definition:

Besides the price issue, the long charging time of electron volt batteries conjointly makes the electron volt not acceptable to several drivers. For one charge, it takes concerning one time unit to many hours betting on the ability level of the connected charger, that is persistently longer than the fuel refuelling method. The EVs cannot make preparations in real time if they need run out of battery energy. to beat this, what the house owners would presumably do is to seek out any attainable chance to plug-in and charge the battery. [5] It very brings some bother as individuals could forget to plug-in and realize themselves out of battery energy shortly. The charging cables on the ground could bring tripping hazards. leak from cracked recent cable, specifically in cold zones, will bring further dangerous conditions to the owner. Also, individuals could got to brave the wind, rain, ice, or snow to plug-in with the chance of an electrical shock. [7][8] The wireless power transfer (WPT) technology, which might eliminate all the charging difficult , is fascinating by the electron volt house owners. By wirelessly transferring energy to the electron volt, the charging becomes the best task. For a stationary WPT system, the drivers simply got to park their automobile and leave. [9] For a dynamic WPT system, which implies the electron volt may well be hopped-up whereas driving; the electron volt is feasible to run forever while not a stop. Also, the battery capability of EVs with wireless charging may well be reduced to twenty or less compared to EVs with conductive charging. [10].

Objective:

The objectives of this work are:

- To do extensive research work on electric vehicle system
- To reduce the complexity of the system by involving the use of special algorithms like fuzzy logic controller to reduce any error.
- To improve the performance of the electric vehicle system by introduction of hybridenergy storage system using the controller

Software Requirement:

MATLAB 2016a, Windows 10 PC/Laptop

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