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# RESEARCH ON DESIGN & ANALYSIS OF SMART BATTERY MANAGEMENT SYSTEM FOR ELECTRIC VEHICLE (EV's)

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**Abstract -** The amount of exhaust gases increases with the increasing use of vehicles with internal combustion engines. To reduce CO2 emissions, researchers and industry are working to improve electric vehicle technology around the world. This paper deals with the design and simulation of a bidirectional power converter for electric vehicles. The electronics block consists of batteries, a bidirectional DC-DC converter and a DC motor. The initial state of battery charge is set at 90% where the discharge current is 44.5 A in motor mode. The nominal voltage of the battery stack is 350 V and the maximum capacity is 100 Ah. The rated power of the DC machine is set at 250 HP with 500 V armature voltage and 300 V field voltage. The operation mode of the power converter is determined according to the torque value of the DC machine which is operated in motor and generator mode. Battery charging and discharging conditions have been controlled with respect to DC motor operating modes. The bidirectional dc to dc converter is controlled by fuzzy logic in both modes. The proposed converters and controllers are designed to meet the charging control and motor drive requirements for electric vehicles.

***Keywords: Battery management system,Problem Statement, Proposed System***

## 1.INTRODUCTION

As green energy will increase in quality, more and more electric vehicles (EVs) of all kinds from electric scooters to cars to buses and trucks can make the road better. Electric power manufacturers are competing to come up with a system that will adapt to different types of batteries and vehicles with different performance. , of course, safety when it comes to smart battery management and charging EV battery pack is made of many cells set in parallel and not parallel. Organized around the battery and throughout the vehicle, the battery management system (BMS) covers the entire vehicle, at various points including maintaining the relationship with the battery cell it individual, one or more power conversion levels specified by the car must, and intelligence. Controller or Embedded processors have been put into the design to control many aspects of the office.. This project introduces a battery observation computer circuit (BMIC) or cell-balancer device is often assigned to observe the voltage of every battery cell during a module, the temperature of varied points within the module and other conditions.

## 2 .Existing System

1.Existing battery sustem hasLimited data logging function
2.Lack of state of health (SOH) and state of life (SOL) estimations
3.Less safety protection regarding over/under voltage, over current and short circuit current
4.Low cell life
5.Cannot be able to work efficiently with hybrid cars
6.Over and under voltage
7. Over heat
8. Over pressure
9.Leakage current and voltage
10.Over charging and discharging
11. Fault in connected device
12. Ground fault
13.Short circuit

## 3.Battery Management System

Battery management systems are an important part of electric vehicles and electric vehicles.
• The purpose of BMS is to ensure efficient and reliable battery performance. To ensure the safety and reliability of the battery, monitoring and monitoring of the state, charge management and measurement of the cell are the functions performed in the BMS.
• Like electronic devices, batteries perform different functions depending on the task and the environment

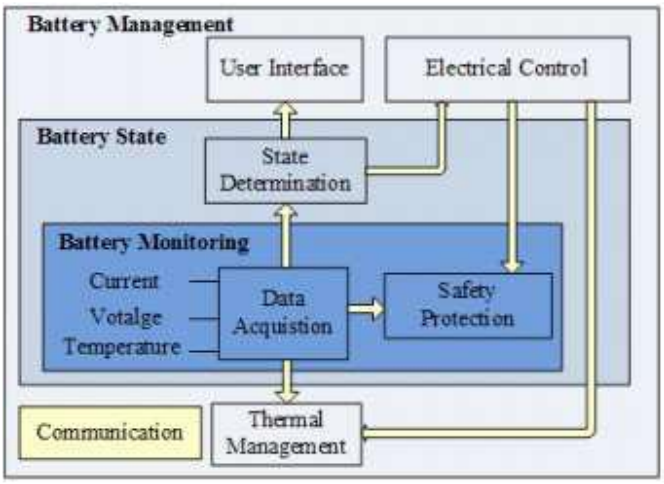


Fig.1 Battery Management System

## 3. Research Background

From compact hardware to electric vehicles (EV), batteries are used as the main fuel source in many applications. Interest in electric car batteries can be traced back to the mid-nineteenth century, when electric cars appeared. Meanwhile, because electric cars can reduce fuel consumption up to 75%, the battery has increased to revive the car market. A Boston Consulting Group revealed that the global market for advanced batteries for electric vehicles will reach $25 billion by 2020, which is several times the current market for lithium-ion batteries for consumer applications.

The Advanced Battery Consortium (USABC) has established minimum battery performance targets for the long-term commercialization of advanced batteries used in electric vehicles and hybrid electric vehicles (HEV). Safety and reliability are the most important things for users if you want to create electric and electric cars. However, both are responsible for battery manufacturing and battery management systems. Similarly, the battery management system (BMS), as the link between the battery and the vehicle, is an important factor in improving the performance of the battery and improving the performance of the vehicle in a safe and reliable way. Given the rapid development of the EV and HEV market, it is feared to create a large number and develop BMS.

This project introduces A battery observation computer circuit (BMIC) or cell-balancer device is often assigned to observe the voltage of every battery cell during a module, the temperature of varied points within the module and other conditions. This information is reportable to a cell management controller (CMC) and, counting on the quality of the system, on to higher-order processing parts, like one or a lot of battery management controllers (BMC). The exactitude of these measurements and also the frequency of the communications from the BMIC to the CMC and BMC is essential to detective work a condition of concern early on and taking corrective action before it becomes hazardous. For instance the BMC may stop regenerative charging or scale back the ability draw from a pack to come individual cell temperatures to an appropriate vary or the driving force of the vehicle might be alert to such a condition through a “check engine” light-weight on the dashboard. In any case BMICs should be capable of terribly correct measurements and strong communications with the CMCs so BMS will take the correct corrective action during a timely fashion. Associate degree electron volt. Thanks to the abudance of electrical noise within the surroundings. Lithium-ion battery packs are the predominant energy storage systems in aircraft, electric vehicles, portable devices, and other equipment requiring a reliable high-energy-density, low-weight power source.

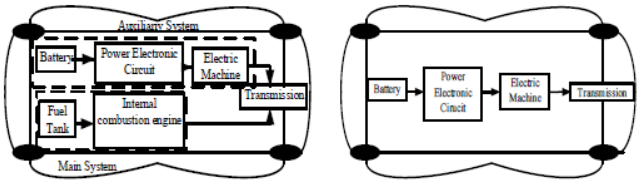


***Fig. 1 Hybrid vehicle and General Electric vehicle***

## 4. Proposed System

In a battery bank there are server cells of a battery is connected in parallel or series discharging there may be chance for a seam cells are connected in series but the characteristics of a charging is different To manage the overall power or voltage of a battery is required to manage each and every cell The availability on energy is employed within the places wherever the supply of energy isn't on the market. The availability on energy would like to be a monitor protected and straight forward to use. Battery management system is providing the perform of monitoring the storage energy protection from overload and warming and straightforward to use for charging and discharging purpose. The hold on energy will be transferred from one place to different place simply within the form of battery, cells or any store energy Storage system.

State of charge (SOC) the time required to charged one cube unit of area of battery or call. The SOC is keep as low as possible for quick charging.

State of health (SOH): The capacity of cell is different from each other for the same rated value and manufacture of cell. The cell capacity is also reduced State of power Due to the internal resistance is different in each cell and internal resistance can change with usage of cell, temperature, chemical properties and other surrounding condition as well. The power value of cell is changing and different. The real time status power of cell and the power available in cell or battery.

5. Result

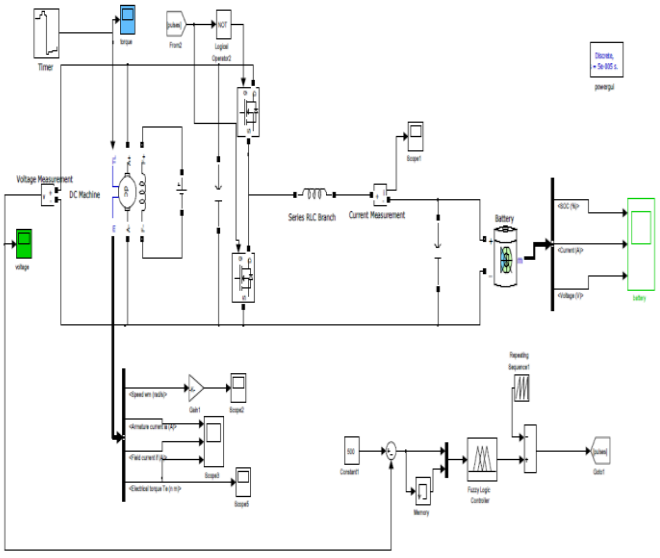

***Fig.2 Battery current, voltage and SOC***

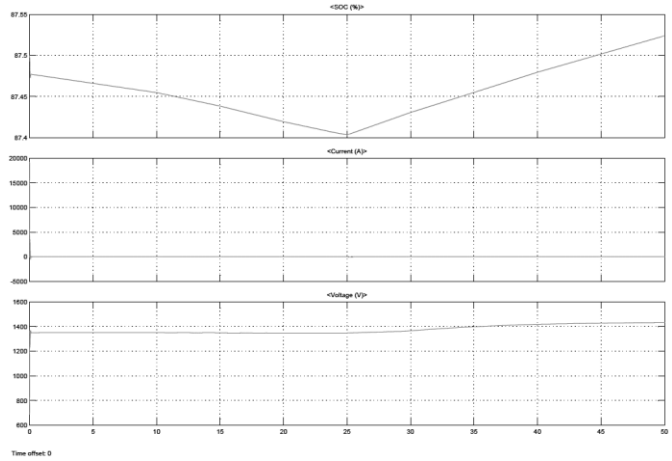

*Fig. 2 a) Battery voltage b) battery current c) SoC*

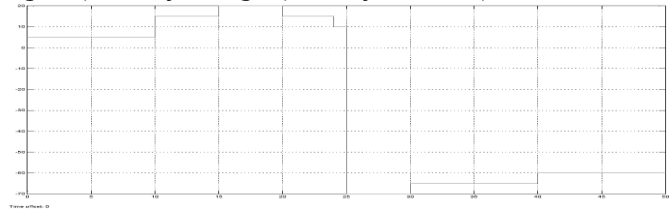

*Fig. 3. Motor and generator torque*

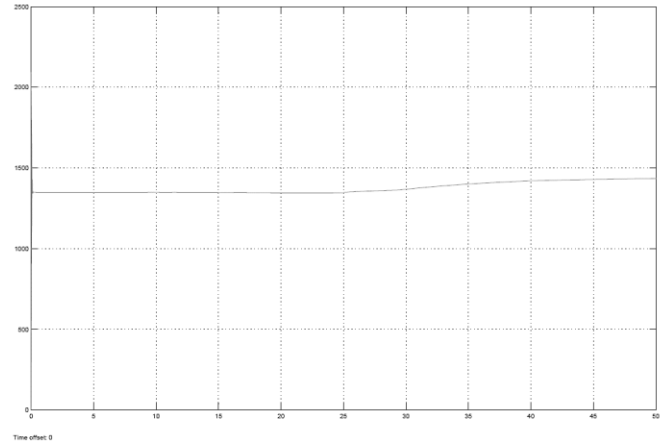

*Fig.4 Voltage of dc machine*

| Parameters | Desired Result | Actual Results (t=0 to t=50sec) |
|---|---|---|
| Battery Voltage (V) | ~1450 | 1430V |
| Current (A) | -50 ~100 | 27.4 |
| SoC % | 87.4 ~ 87.66 | 87.53% |

## *Conclusion*

***As batteries are the center fuel sources in EVs and HEVs, their presentation significantly impacts the attractiveness of EVs. Along these lines, producers are looking for advancements in both battery innovation and BMSs. Synthetic responses in the battery are liable to working conditions, and consequently, the corruption of a battery may shift in various conditions. Building up a complete and develop BMS is basic for makers who might want to expand the piece of the pie of their items. The significant worries of BMSs were examined in this paper. They incorporate battery state assessment, displaying, and cell adjusting, wherein the assessment strategies of battery status were seen as the pivotal issue.***

***Along these lines, related work on the SOC, SOH, and SOL of batteries were audited with examinations. A BMS system was proposed to manage the insufficiencies of momentum BMSs in both exploration and business items. In view of past work, explicit difficulties confronting BMSs and their potential arrangements were introduced as a strong establishment for future exploration. Because of shifting circumstances in certifiable applications, a standard arrangement was not needed. In view of the particular circumstance, various systems ought to be applied to improve and advance the presentation of BMSs in future EVs and HEVs.***

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