International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 09 | September - 2022 Impact Factor: 7.185 ISSN: 2582-3930

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. Literature Review

Xuwang Yuanwang proposed Battery Management System Based on AURIX Multi-core Architecture ", 2019 IEEE 4th Advanced Information Technology, electronic and Automation Control Conference (IAEAC) IEEE Xplore 2019 BSN 1145625832 DOI:10.1109/IAEAC47372.2019.8997570.

Battery management system (BMS) is the core component of new energy vehicle battery system. With the increase of energy density of new energy vehicle battery, its control algorithm becomes more and more complex, and the task of battery management system will be more and heavier. The hardware, software and control strategy model of battery management system are developed based on ARIX multi-core microcontroller. The minimal BMS system is developed by using AURIX265 + LTE35584 chip which meets the functional safety requirements. The dual-core processing of control strategy and individual information acquisition is realized, and the processing efficiency is improved. The three-tier software architecture of battery management system is developed based on the software hierarchical architecture. The graphical development of battery management system strategy model is realized by using MATLAB / Simulink. The results of bench test and real vehicle test show that the battery management system developed meets the application requirements of enterprises, and the batch matching is obtained in vehicle enterprises.

- ***Yang Xu ; Shen Jiang ; Tong Xin Zhang, investigated Research and design of lithium battery management system for electric bicycle based on Internet of things technology 2019 Chinese Automation Congress (CAC) IEEE 2019 DOI: 10.1109/CAC48633.2019.8997319.***

Compared with ordinary lead-acid batteries, lithium batteries are gradually favored by more electric bicycle manufacturers due to their high energy density, high charging and discharging efficiency and other properties. In order to ensure that the operating status of the rental battery pack applied to electric bicycles can be monitored by the operating units in real time during charging or discharging, a lithium battery management system for electric bicycles is designed. The battery management system can monitor the voltage, current, temperature, energy storage and location information of the battery pack in real time, and transmit information to the cloud management platform in real time. The system has been used in the leasing battery products of a battery leasing enterprise.

- ***Fawad Ali Shah ; ShehzarShahzad Sheikh ; UmerIftikhar Mir ; Syed OwaisAthar proposed in Battery Health Monitoring for Commercialized Electric Vehicle Batteries: Lithium-Ion IEEE Xplore: 28 October 2019 DOI: 10.1109/PGSRET.2019.8882735***

Batteries are extensively used to power electric vehicles (EVs), hybrid electric vehicles (HEVs), and for many other power demanding applications, where the modeling of a battery plays a vital role in their efficiency, safety, and reliability. In this paper, initially different types of batteries used in the EVs and HEVs are investigated, according to the latest battery management systems (BMS). Li-Ion batteries are a popular source of EVs and HEVs because of their long-life span, high energy and power density, and good charging and discharging performance. However, there remain some issues associated with the deployment of Li-ion batteries, such as complex electrochemistry, degradation, and inaccurate battery health estimation.

3. Problem Defination

•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.

4.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

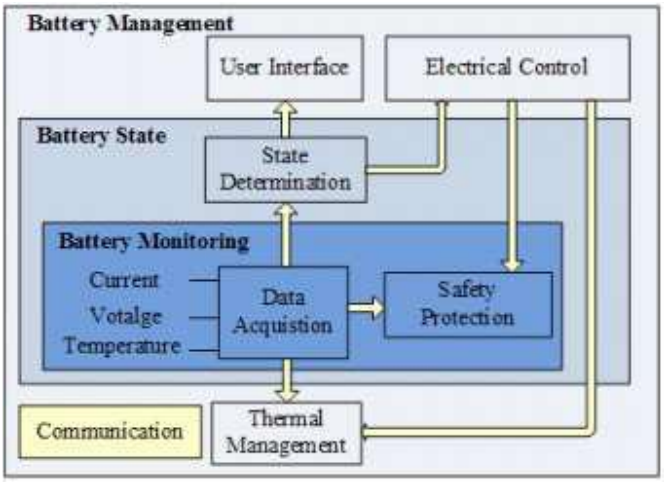

Fig.1 Battery Management System

3. CONCLUSIONS

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

REFERENCES

1. Baldonado, M., Chang, C.-C.K., Gravano, L., Paepcke, A.: The Stanford Digital Library Metadata Architecture. Int. J. Digit. Libr. 1 (1997) 108–121
2. Bruce, K.B., Cardelli, L., Pierce, B.C.: Comparing Object Encodings. In: Abadi, M., Ito, T. (eds.): Theoretical Aspects of Computer Software. Lecture Notes in Computer Science, Vol. 1281. Springer-Verlag, BerlinHeidelbergNew York (1997) 415–438
3. van Leeuwen, J. (ed.): Computer Science Today. Recent Trends and Developments. Lecture Notes in Computer Science, Vol. 1000. Springer-Verlag, BerlinHeidelbergNew York (1995)
4. Michalewicz, Z.: Genetic Algorithms + Data Structures = Evolution Programs. 3rd edn. Springer-Verlag, BerlinHeidelbergNew York (1996)