Future Electric Vehicle Battery Management System

Hazel Scarlett*

Editorial Office, International Journal of Innovative Research in Science, Engineering and Technology, Brussels, Belgium

Corresponding Author*

Hazel Scarlett
Editorial Office
International Journal of Innovative Research in Science, Engineering and Technology, Brussels
Belgium
E-mail: innovativeresearch@scienceresearchpub.org

Received: 10-March-2022, Manuscript No. IJIRSET-22-60899; **Editor assigned:** 15-March-2022, PreQC No. IJIRSET-22-59567 (PQ); **Reviewed:** 23-March -2022, QC No. IJIRSET-22-60899 (Q); **Revised:** 26-March-2022, Manuscript No.IJIRSET-22-60899(R); **Published:** 28-March -2022, DOI: 10.35248/ ijirset.22.3(3).22.

Abstract

The design, monitoring, and management of the car battery and its accompanying components are critical to the future of electric vehicles. Along with an initial ideal design of the cell/pack-level structure, the battery's runtime performance must be regularly checked and refined to ensure safe and dependable operation and long life. To maintain and sustain the battery, better charging mechanisms must be devised. This Special Issue aims to solve all of the aforementioned concerns by supporting creative design approaches, modeling, and state estimate methodologies, charging/discharging management, and hybridization with other storage components.

Introduction

Recent developments in battery technology have pushed electric (EV) and Hybrid Electric Vehicle (HEV) sales even higher. The design and chemistry of the battery pack and its accompanying technologies are solely responsible for advancements in EV/HEV range, energy/charging efficiency, safety, reliability, and longevity. The majority of the safety issues surrounding the battery's unanticipated temperature rise and forecasts of internal reactions leading to temperature swings must also be addressed.

Battery Management System

The technologies for estimating, monitoring, and controlling battery states, as well as associated modeling techniques, and thermal and charging/ discharging management for an improved life, performance, and range. Optimal size, storage system hybridization, and new battery test benches were also encouraged. There are seven accepted and published articles in all, which are summarised below: The first publication, written by Hakeem and Solyali provides a battery thermal management system (BTMS) with better battery cooling performance. An improved pack structure is presented and tested experimentally with various airflow rates and current rates of charge-discharge profiles. Finally, an artificial neural network is trained on the available data to provide the thermal model of the battery pack. Tseng and Yang describe a torque and battery distribution method (TBD) that optimizes range and efficiency by taking into consideration torque-speed relationships as well as battery state of charge. Three torque distribution modes are then recommended based on the State of Charge (SoC) gaps and ratios between the front and rear battery packs. To confirm the effectiveness of the TBD in extending the range of electric vehicles, modeling, hardware-in-the-loop testing, and actual road tests are undertaken first.Kuo provides a battery model based on a modified Thévenin circuit, Butler-Volmer kinetics, the Arrhenius equation, Peukert's law, and a backpropagation neural network in his third publication (BPNN). The model can predict the battery's coulombic efficiency and remaining capacity, which have been tested experimentally under various climatic situations. A thorough model is constructed based on experimental data and curve fitting techniques. A correction factor is applied, and the remaining capacity is predicted using a BPNN.

Cao offers a wireless distributed and enabled battery energy storage system (WEDES) for Electric Vehicles (EVs) created utilizing a tiny signal modeling approach in his fourth work. The WEDES controller is intended to handle SoC balance, bus voltage regulation, and battery module current/voltage regulation all at once. Finally, simulation and hardware tests are performed to assess and confirm the accuracy and efficacy of the resulting model and controller.

Guo et al. provide an online SoC estimate approach based on an analogous circuit model, followed by model parameter identification. To increase the accuracy of the SoC estimation, an optimization strategy is provided. The Adaptive Unscented Kalman Filter (AUKF) is then used to achieve an online estimation with optimal model parameters. The estimation accuracy of the AUKF is compared to that of the UKF. The convergence of the AUKF's initial error is also examined before and after parameter tuning.

As a result of analyzing all five publications, we can conclude that the innovative contributions take into account numerous elements of energy storage management and optimum charging/discharging schedules.