Development of SOH Diagnostic Technology Based on Real-World Driving Data of Electric Vehicle and Comparative Validation After Battery Pack Removal

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To ensure the dependable management of electric vehicle (EV) batteries, it is essential to diagnose the battery's state and maintain continuous monitoring. Among the various state-of-x (SOx) indicators that represent different aspects of the battery's condition, the accurate estimation of state of health (SOH) is paramount, as it directly correlates with the overall health of the battery. While numerous methodologies have been explored for estimating SOH, many previous studies lack validation due to environmental constraints that prevent the measurement of actual SOH in EV batteries. Additionally, batteries exhibit an increase in internal resistance and capacity degradation as they age, emphasizing the need to assess the effectiveness of SOH estimation through internal resistance. In this study, we verified the correlation between the ohmic resistance of unit cells and SOH and evaluated the performance of various machine learning models for SOH estimation. Furthermore, we utilized real-world driving data to calculate the battery pack's ohmic resistance based on driving distance and applied it to the developed SOH diagnostic model for assessing battery pack health. Ultimately, to validate and compare the performance of the developed model in estimating SOH, we disassembled an actual EV battery pack and conducted testing through a RPT(Reference perfomance test)