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(57) Abstract:

The present invention relates to the development of a sustainable battery health prediction framework for next-generation electric vehicles, where next-generation electric vehicles will utilize state-of-the-art machine learning algorithms, real-time analytics, and cloud computing services for battery reliability, efficiency, longevity, and sustainability. The proposed framework will efficiently perform continuous battery health monitoring by acquiring real-time, multi-dimensional parameters such as voltage, current, and temperature, charge-discharge cycles, internal battery resistance, and environmental factors from myriad battery management systems incorporated in these advanced vehicles. The acquired large-volume datasets will be accurately processed and analyzed by hybrid battery health prediction models consisting of deep learning, time-series prediction, adaptive state-of-health estimation, and allied techniques, thereby ensuring the early prediction of battery degradation with substantial accuracy. To achieve sustainable battery health, appropriate optimization techniques such as eco-friendly battery charge management will be