Battery online detection

Can a data-driven approach be used for online anomaly detection in battery packs?

The early detection and tracing of anomalous operations in battery packs are critical to improving performance and ensuring safety. This paper presents a data-driven approach for online anomaly detection in battery packsthat uses real-time voltage and temperature data from multiple Li-ion battery cells.

Can a model-based anomaly detection approach detect a battery electric locomotive?

Statistical testing of the proposed approach is performed on the experimental data from a battery electric locomotive injected with model-based anomalies. The proposed anomaly detection approach has a low false-positive rate and accurately detectsand traces the synthetic voltage and temperature anomalies.

What ML techniques can be used to detect battery faults?

ML techniques, such as neural networks , the k-means clustering algorithm , support vector machines , and random forest classifiers [34, 35], have also been applied to anomaly detection in battery systems. However, most of these techniques require large amounts of labeled battery-fault data for training.

How to identify a fault in a battery?

By determining the number of abnormal sensors, it is capable of identifying the fault location if the fault has occurred within the battery. The method of distinguishing between sensor faults and connection faults will be described in Section 3. Fig. 2. Non-redundancy crossed-style measurement topology.

Is there a non-model multi-fault diagnostic method for battery packs?

An online non-model multi-fault diagnostic method for battery packs is developed. A non-redundancy measurement topology for fault discrimination is proposed. The correlation coefficient is improved to catch fault signatures. The robustness to measurement errors and inconsistencies is demonstrated.

Why are sensor anomalies important in battery management systems?

Furthermore,sensor anomalies can lead to inaccurate control actionsby the battery management system (BMS). Thus,it becomes critical to have an early and quick detection method followed by appropriate actions to avoid fault propagation,ensuring the safe and reliable operation of LiB packs.

This paper presents an online multi-fault diagnostic method for the series string of batteries in EVs to detect and diagnose the external/internal short circuit, connection fault detection and sensor fault. The non-redundant crossed measurement circuit effectively ...

The algorithm"s effectiveness is evaluated using long-term operational data from a number of battery packs. The analytical findings demonstrate that the algorithm proposed in this study has a high detection rate and a low false alarm rate. Key words: lithium-ion battery, clustering algorithm, parameter normalization, internal short circuit ...

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During charging at low temperatures, high rates, and high states of charge, the deposition of metallic Li on anodes occurs which leads to rapid battery aging and failure. 11,19,21,34,65-69 This Li deposition on anodes can be detected in battery cells with a reference electrode. 19,65,68,70 However, commercial cells in automotive or consumer electronics ...

The early detection and tracing of anomalous operations in battery packs are critical to improving performance and ensuring safety. This paper presents a data-driven approach for online anomaly detection in battery packs that uses real-time voltage and temperature data from multiple Li-ion battery cells. Mean-based residuals are generated for ...

Aiming at the issues of fault diagnosis and thermal runaway early warning of battery systems, an online fault diagnosis method for lithium-ion batteries based on signal decomposition and dimensionless indicators selection is proposed, and the main conclusions of the research are summarized as follows.

Abstract: Fast and accurate battery system fault diagnosis is essential to ensure electric vehicles" safe and reliable operation. This paper proposes an online multi-fault detection and isolation method for battery systems by combining improved model-based and signal-processing ...

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The early detection and tracing of anomalous operations in battery packs are critical to improving performance and ensuring safety. This paper presents a data-driven approach for online anomaly detection in battery packs that uses real ...

The rapid development of electric vehicles (EVs) has promoted an electrification revolution in the transportation sector [1, 2].As the core power source, the energy density, power capability, durability and safety of power batteries determine the performance of EVs [3, 4]..Lithium-ion batteries (LIBs) are commonly used in electric vehicles (EVs) due to their high ...

In this paper, a method is proposed to construct the battery fault knowledge graph which supports online knowledge query and fault inference. Reliability models for battery undervoltage, inconsistency, and capacity loss are built based on cloud data, and are deployed and continuously updated in the cloud platform to accommodate the migration of ...

As substations develop towards intelligent and unmanned modes, this paper proposes an online battery monitoring and management system based on the "cloud-network-edge-end" Internet of Things (IoT) architecture. Firstly, advanced battery monitoring system based on IoT architecture is reviewed in depth. It

provides basis for later designing.

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3 ???· A multifunctional battery anomaly diagnosis method deployed on a cloud platform is proposed, meeting the needs of anomaly detection, localization, and classification. First, the proposed method extracts four anomaly features from discharge voltage to indicate battery anomalies. A risk screening process is applied to classify vehicles into high ...

To solve these problems, a lithium battery anomaly online detection method integrating Long Short-Term Memory Variational AutoEncoder and Dynamic Time Warping evaluation (VAE-LSTM-DTW) is proposed, which realizes the online detection of abnormal battery conditions and ...

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