IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, August 2025
Impact Factor: 7.67

Design and Development of a Battery Monitoring System for EV Applications

Nivedita Shainaj Nair, Pronil Polpakkara, Diyasha Agarwal, Sri Revathi B
School of Electrical Engineering, VIT, Chennai

Abstract: *For electric vehicle (EV) applications, a battery monitoring system is essential for assuring the performance, dependability, and safety of the vehicle. We demonstrate the effectiveness of the electric car in this project. A battery is an electric vehicle's only energy source, but as the quantity of energy delivered to the vehicle declines over time, the vehicle's performance degrades. The manufacturing of batteries is quite concerned about this. In order to do the monitoring directly, it is suggested in this study that IoT approaches be used to monitor the functioning of the vehicle. The user interface and the monitoring device are the two main components of the proposed IoT-based battery monitoring system.*

The widespread adoption of electric vehicles (EVs) has led to an increased demand for battery monitoring systems (BMS) that can accurately and reliably monitor the health of battery packs. With the advent of the Internet of Things (IoT), it is now possible to create BMS solutions that are more powerful, flexible, and cost-effective than ever before. IoT-based BMS solutions typically consist of a network of sensors, microcontrollers, and communication interfaces that work together to measure and analyze the performance of battery packs. These systems can provide real-time monitoring of battery health, which can help to prolong battery life, reduce maintenance costs, and increase safety.

One key advantage of IoT-based BMS solutions is their ability to leverage the power of cloud computing. By connecting the BMS to the cloud, it is possible to store and process large amounts of data, and to access this data from anywhere in the world. This allows manufacturers and operators to monitor the performance of their batteries in real-time, and to make informed decisions about how to optimize their usage. Another advantage of IoT-based BMS solutions is their ability to support remote diagnostics and maintenance. By accessing the data stored in the cloud, technicians can identify and diagnose faults in battery packs from a remote location. This can save time and money, as it eliminates the need for technicians to travel to the location of the battery pack.

IoT-based BMS solutions can also support predictive maintenance, which involves using data analytics and machine learning algorithms to predict when a battery pack is likely to fail. By monitoring the performance of batteries over time, it is possible to identify patterns and trends that can be used to predict when a battery pack is likely to fail. This can help manufacturers and operators to schedule maintenance and replacement activities in advance, which can reduce downtime and maintenance costs.

One key challenge in developing IoT-based BMS solutions is ensuring the security and reliability of the system. Battery packs are critical components in EVs, and any failure or malfunction can have serious consequences. Therefore, it is essential to ensure that the BMS is designed to be secure and reliable.

One way to address this challenge is to use secure communication protocols to transmit data between the battery pack and the cloud. This can include using encryption and authentication mechanisms to ensure that data is not intercepted or tampered with during transmission. Another approach is to use redundancy and fault-tolerance mechanisms to ensure that the BMS can continue to operate even in the event of a failure or malfunction. This can include using multiple sensors and communication interfaces and implementing failover mechanisms to ensure that data is always available.

In conclusion, IoT-based BMS solutions are powerful tools for monitoring the health of battery packs in EVs. By leveraging the power of cloud computing, these systems can provide real-time monitoring, remote diagnostics, and predictive maintenance capabilities. However, it is essential to ensure that these

DOI: 10.48175/IJARSCT-28617

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, August 2025
Impact Factor: 7.67

systems are secure and reliable, in order to prevent any failure or malfunction that could have serious consequences. As the adoption of EVs continues to grow, the development of reliable and efficient BMS solutions will be critical to the success of this industry. The system is able to recognize experimental outcomes' degraded performance and alerts the user for further actions.

Keywords: *EVs*