Chapter-2

SOC Analysis of EV Batter System

[1]*K. Vijay Kumar*, [2]*Bheemisetty Sai Praveen*, [3]*G Deepthi*, [4]*D Siva*, [5]*V Sirisha*
[1]*Faculty*, [2,3,4,5,6]*Student, Dadi Institute of Engineering & Technology, Anakapalle*
vijaykumar@diet.edu.in, 20U45A0207@diet.edu.in

In this chapter, the components of the BEV system were addressed in this study's abstract, and a simulation of a BEV model using the MATLAB-Simulink platform was performed. Since they have demonstrated a significant potential to reduce the consumption of petroleum-based and other high CO2-emitting transportation fuels, electric vehicles (EVs) are anticipated to be an alternative energy mode of transportation in the future. The pertinent electrical system parts and their matching equations for validation were also found. Additionally, every simulation outcome was considered. A complex and interdisciplinary subject, the sociological study of battery electric vehicles (BEVs) calls for the integration of diverse social, economic, environmental, and technological elements. The purpose of this abstract is to give a concise outline of the major themes and problems surrounding the social study of BEVs. The sociological examination of BEVs must thus take a variety of aspects into account, such as consumer behavior, public regulations, technical innovation, and the larger social and cultural environment in which BEVs are introduced. Including viewpoints from the disciplines of engineering, sociology, psychology, economics, and environmental science in this study is equally important.

Fig.1: Block Diagram

The methodology of SOC analysis of battery EV in MATLAB involves simulating the operation of the BEV using a battery model and driving cycle data, calculating the SOC of the battery at each time step, and analyzing the SOC data to determine the battery performance and optimize its operation.

The battery electric car components were designed using MATLAB-Simulink, which was also utilized to integrate the entire system. Additionally, the battery electric vehicle and its accompanying equation were simulated using MATLAB-Simulink for verification
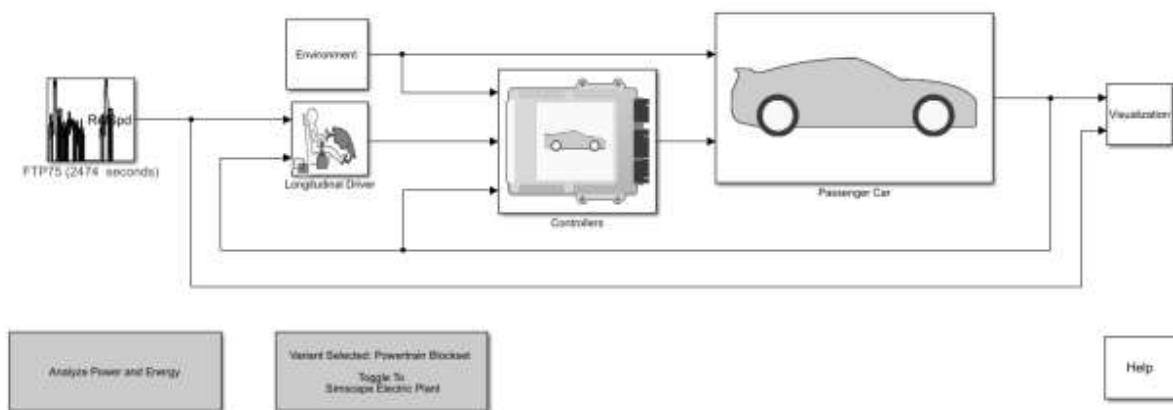

Fig 2: Circuit Diagram

The BMS (Battery Management System) typically comprises hardware and software components that communicate with one another in order to provide real-time monitoring and management of the battery's performance. Hardware components that detect the battery's voltage, current, and temperature and manage the charging and discharging cycle include sensors, microcontrollers, and power electronics. The software component contains algorithms that compute the SoC and SoH of the battery based on sensor readings and find the optimal charging and discharging patterns in order to maximize the battery's

Fig.3: Battery Management System

performance Ensuring the safety of the battery pack by avoiding overcharging, over-discharging, and overheating is one of the BMS's crucial tasks. Also, the BMS has the ability to spot any abnormalities or flaws in the battery pack and take the necessary action, like switching off the battery or warning the driver.
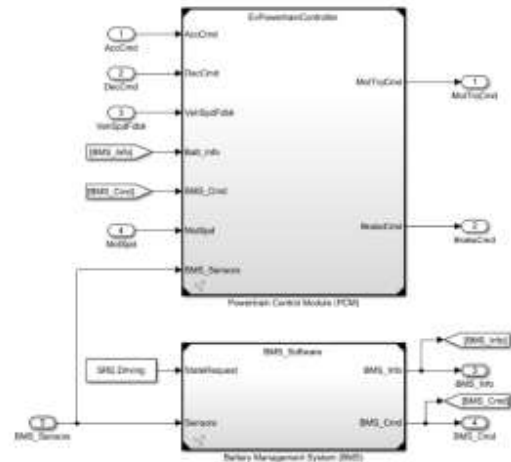
Applications of Soc Analysis of EV Battery System is:

1. Electric Vehicle Owners
2. Battery Manufacturers
3. Electric Vehicle Manufacturers

The beneficiaries of a project on SoC analysis of battery EVs are diverse and include manufacturers, owners, and energy providers, all of whom stand to benefit from improved battery.

Future Scope of EV Battery System is:

The future scope of a project on SoC analysis of battery EVs is quite promising, as the use of electric vehicles is expected to continue to grow in the coming years. Some potential future areas of focus for this project include:

1. Autonomous Vehicle Integration.
2. Charging Infrastructure Optimization.
3. Battery Technology Development.
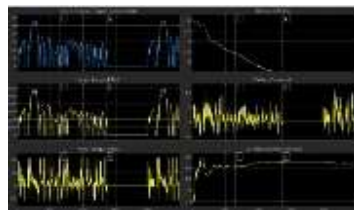4. Battery Recycling and Reuse.

Fig .4: Output Wave Forms

Analyze the results of your SoC analysis to identify any patterns or trends in the behavior of the EV battery system. This may involve using data visualization techniques or statistical analysis to identify any significant findings.