Electrical Vehicles Battery Management System with Charge Monitor and fire protection

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Abstract — Nowadays, the majority of automakers produce electrical cars for two- and four-wheel drive. Consequently, batteries become a crucial component and better techniques for figuring out how much a car can charge are needed. To prevent overcharging or deep depletion of batteries, an effective battery management system must be designed and developed. To lessen damage, increase the lifetime of electric vehicles, and protect the electronics they power, electric vehicles should have an accurate state of charge assessment. This project proposes a real-time Battery Monitoring System (BMS) that shows the critical metrics and uses the State of charge (Soc) technique. Using the Arduino environment, appropriate sensor technologies, a central CPU, and interface devices, the recommended BMS is realized on a hardware platform.

I. INTRODUCTION

Need A vehicle that is powered by one or more traction motors or electric motors is called an electric vehicle. An electric car can be fueled by fuel cells, solar panels, nonrenewable energy sources, or self-contained batteries, however this is an expensive choice. In addition to EVs, this method is helpful for electric cars on the road, in trains, on the sea, in electric airplanes, and in electric spacecraft. An electric motor, as opposed to an internal combustion engine (IC), powers an electric vehicle (EV). By burning a combination of petroleum and its byproducts, it produces energy. Because of this, it is discovered that these cars are one of the replacements for the present generation of vehicles in order to solve issues like the depletion of natural resources, growing pollution, and global warming. Customers are drawn to electrical vehicles because they are environmentally friendly because they don't have internal combustion engines, which release harmful gases into the atmosphere. They also require less maintenance and may qualify for tax credits because the buyer is reducing their environmental impact by selecting a zero emission system.

Existing method

For safety reasons, reliable battery management is required. Battery degradation and design flaws are two of the many factors that lead to battery failure. Similar to regular battery monitoring systems, manual battery monitoring systems do not save their data in a database. but simply display the real-time data that was gathered. Wireless technologies must so be used to remotely monitor battery systems. Numerous battery monitoring systems, including uninterruptible power supplies (UPS), have been created for the industry via wireless communication. These systems are crucial for maintaining power supply for both residential and commercial purposes during power outages. Suresh and others.

suggested use GSM modules and SCADA to create a PLC-based battery health monitoring system for a UPS that would send alarm signals when the batteries reach room temperature or are in catastrophic condition. Additionally, Sardar et al. created a GSM-based battery monitoring system for UPSs. The battery's voltage, current, and temperature may all be tracked by the system. In order to identify dead battery cells in UPSs, Hommalai et al. devised a battery monitoring system employing wireless communication. Numerous investigations have also been conducted on the creation of wirelessly communicated battery monitoring systems for electric vehicles. Using a GSM module, Dhotre et al. created an autonomous battery charging and engine control system for EVs. When the user's battery health falls below a certain level, an SMS is sent to them.

Then, user can reply via SMS to auto-start the engine to charge the battery. Mathew et al. proposed a wireless battery monitoring system using 2.4GHz

radio transmission scheme for EV.

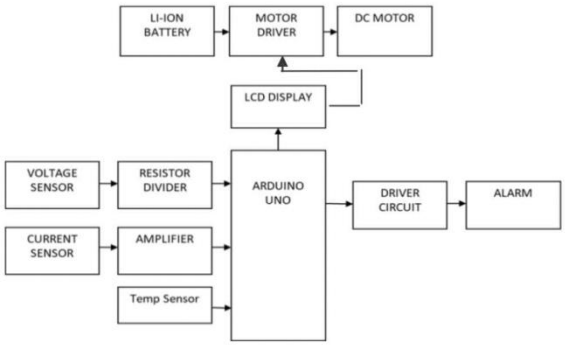

Fig. 5.1 Block diagram of BMS

II.OBJECTIVES

The creation of an intelligent battery management system for electric cars. Utilize an Arduino to gather all of the sensor information, and then employ a variety of sensors and storage methods to save parameters that, in a real-time situation, indicate the voltage, current, temperature sensor, Soc, and remaining charge capacity of the lead acid battery. to use simulation software to get the desired simulated outcome.

III.SCOPE OF THE PROJECT

The breadth of electric vehicles is primarily governed by the most important issues driving the road to a sustainable transportation solution. Battery Management is a performance management system for monitoring the battery's health and charge state. The battery status may be viewed remotely on screen. This thesis is organised as follows: Chapter 2 covers a literature review of existing systems, Chapter 3 discusses the proposed system and its implementation methodology, Chapter 4 discusses the project's hardware and software description, and Chapter 5 discusses the project's results and conclusion.

IV.LITERATURE SURVEY

The Literature survey describes about the are papers that are studied and analysed for the project. The Temperature sensor, Voltage sensor and Current sensor are considered for this project. Therefore, the corresponding project papers are discussed below. A variety of rechargeable batteries are now available in world markets for powering electric vehicles (EVs). The lithium-ion (Li-ion) battery is considered the best among all battery types and cells because of its superior characteristics and performance. The positive environmental impacts and recycling potential of lithium batteries have influenced the development of new research for improving Li-ion battery technologies. However, the cost reduction, safe operation, and mitigation of negative ecological impacts are now a common concern for advancement. This paper provides a comprehensive study on the state of the art of Li-ion batteries including the fundamentals, structures, and overall performance evaluations of different types of lithium batteries. A study on a battery management system for Li-ion battery storage in EV applications is demonstrated, which includes a cell condition monitoring, charge, and discharge control, states estimation, protection and equalization, temperature control and heat management, battery fault diagnosis, and assessment aimed at enhancing the overall performance of the system

V.PROPOSED METHOD

The solution to the Battery burning issue is to monitor and as well control the vehicle function in real time. IN the proposed system, the battery parameters which are responsible for battery condition such as Voltage, Temperature and current levels are monitored using various sensors in real-time continuously and. The Readings from sensors of the vehicle are conveyed to an Arduino Uno microcontroller for processing. Once data transfer is successful, the battery monitoring interface will show the updated data of battery status. When the battery produced low voltage level, a notification message is displayed to the user using a LCD display which is fit in the dashboard of the vehicle and if the voltage is high, the relay turns of the charger and an audio signal is produced. Similarly, when temperature is above the threshold level the motor is turned off and an audio alarm is given to notify the user. The online battery system not only can measure the voltage of the batteries but also communicate with the battery monitoring system to get the parameter of batteries. The use of IoT technology that incorporates together within the

monitoring system can help in improving the preventive maintenance in ensuring the battery quality and increase the safety of the user which will implemented in the next phase.

VI. CONCLUSION

The development of an embedded battery monitoring system for electric vehicles was covered in this project. This will enable online monitoring of battery performance degradation. The process of system development entails creating the embedded user interface and hardware for the battery monitoring. By using sensors and LCS, the system can identify coordinates and display them in the Google Maps app, as well as display information like location, battery life, and time. By creating a smartphone application that assists users in keeping track of their battery, the system will eventually be accessible on cell phones.

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