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"EV BMS WITH CHARGE MONITOR AND FIRE PROTECTION"

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KEYWORDS:

- Electric vehicles
- Battery management system
- Li-ion battery
- Stm 32 Microcontroller
- Plug in electric vehicle
- Battery isolation switch

INTRODUCTION:

Battery management systems (BMS) are electronic control circuits that monitor and regulate the charging and discharge of batteries. The battery characteristics to be monitored include the detection of battery type, voltages, temperature, capacity, state of charge, power consumption, remaining operating time, charging cycles, and some more characteristics.

The task of battery management systems is to ensure the optimal use of the residual energy present in a battery. In order to avoid loading the batteries, BMS systems protect the batteries from deep discharge and over-voltage, which are results of extreme fast charge and extreme high discharge current. In the case of multi-cell batteries, the battery management system also provides a cell balancing function, to manage that different battery cells have the same charging and discharging requirements.

BACKGROUND:

- Kaushik Rajashekara “Present Status and Future Trends in Electric Vehicle Propulsion Technologies” (2022)
- Rui Xiong “Research Progress on Electric and Intelligent Vehicles” (2021)
- Ramesh C. Bansal, “EV bms with charge monitor” (2021)
- Naoki Shinohara “Fire protection in electric vehicle” (2020)
- Su Y. Choi “EV power monitoring system for electric vehicle” (2020)

OBJECTIVES:

Electric vehicles (EV) are playing a key role because of its zero-emission of harmful gases and use of efficient energy. Electric vehicles are equipped by a large number of battery cells which requires an effective battery management system (BMS) while they are providing necessary power. The battery installed in an electric vehicle should not only provide long lasting energy but also provide high power. The battery installed in an electric vehicle should not only provide long lasting energy but also provide high power. Lead-acid, Lithium-ion, -metal hydride are the most commonly used traction batteries, of all these traction batteries lithium-ion is most commonly used because of its advantages and its performance. The battery capacity range for an electric vehicle is about 30 to 100 KWH or more.

METHODOLOGY:

Battery management system (BMS) is the crucial system in electric vehicle because batteries used in electric vehicle should not be get overcharged or over discharged. If that happens, it leads to the damage of the battery, rise in temperature, reducing the life span of the battery, and sometimes also to the persons using it. It is also used to maximize the range of vehicle by properly using the amount of energy stored in it.

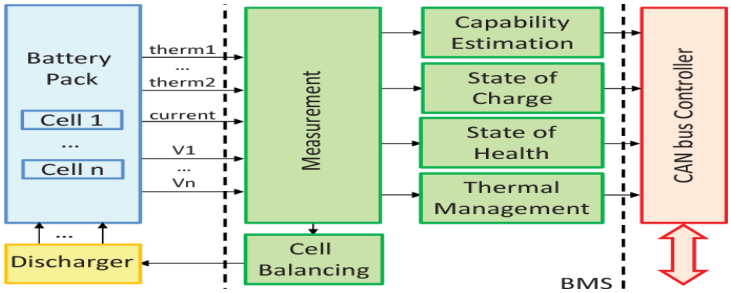

Fig:Block Diagram of EV BMS System

Lithium-ion batteries are highly reactive, smaller in weight and has the highest energy. Charging and discharging of lithium-ion batteries are very faster than the other batteries. Lithium-ion cells should be operated beyond its safe operating voltage range to avoid combination of many chemical reactions, rise in temperature which leads to cell venting and generation of fire. Hence, Battery management system (BMS) is used which allows the battery to operate with in their safety zone.

State of charge is defined as the available amount of battery as the percentage of rated capacity of the battery. State of health estimation describes the state of the battery with respect to the newly manufactured battery.

RESULTS AND CONCLUSION:

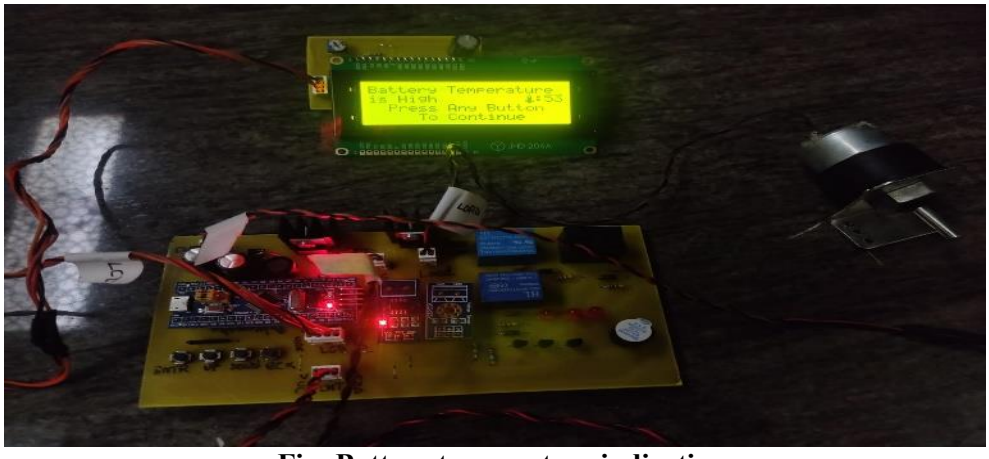

Fig: Battery temperature indication

The final approach for making this hardware modules is to give an easy way of protection.

We tried to fulfil almost all the missing requirement for these types of platforms make this hardware modules as much as Flexible, User friendly, User interactive and Latest use of technology.

Electric vehicles are trending nowadays compared to internal combustion engine because of its advantages and less limitations. Global warming is effective with electric vehicles because of no emissions of gases. Limitations are the installed charging stations are not able to meet the increasing charging demand of Electric Vehicles. So, if that is overcome then effectively electric cars can be into effect. Among the configurations of electric vehicles battery Electric Vehicles is more advantageous because of its features. Within that Battery Management System plays a key role in Battery Electric Vehicles.

FUTURE SCOPE:

The future scope for electric vehicle (EV) battery management system (BMS) charge monitor and fire protection is significant, and there are several areas where research can be focused to improve the safety and reliability of EV batteries. One potential area of future research is the development of BMS that can accurately predict battery aging and degradation. As EV batteries age, their performance and capacity decrease, which can lead to reduced driving range and increased risk of thermal runaway. BMS that can accurately predict battery aging and adjust the charging process accordingly can extend the battery life and improve safety.