

Q) What is a BMS? Types of BMS and differentiation between types of BMS?

Ans). BMS are Battery Management Systems, is technology used to oversight battery pack. It provides monitoring the battery packs, providing battery protections, estimating the battery operational state. Continuously optimizing battery performance, reporting operational status to external devices. Its ensuring a big role in EV safety. It monitor state of health of battery, battery implies entire pack, specifically applied to individual cells called modules in the overall battery pack assembly. A battery BMS S/W is connected to an external communication data transfer S/W or data bus referred to as a smart battery pack. The monitoring S/W in BMS will protect device by giving signal to generate alarm and to disconnect the load/charger. It prevent over charging, over discharging, over current during charging etc. There are two types of BMS @ hardware & software BMS.

① Hardware :- It controls Over voltage, Under voltage, Continuous current, over current, over temperature. The BMS also control energy from regenerative braking S/W. Thermal management S/W of battery is mainly classified into two types ① passive & ② Active.

② Passive

If the sm is cooled by either air, liquid or some form of phase change. It is more simple.

Active

If sm is cooled by fan for air flow. so liquid cooling increases the weight to BMS sm.

② Software BMS / Smart BMS

It's same as that of hardware ~~code~~ BMS. Here software BMS can control data, it will store data, transmit data via CAN, Bluetooth. A smart BMS offers benefits such as online monitoring for battery status regarding voltage, current, impedance, internal temperature etc.

There are different types of BMS

① Centralised BMS architecture :- Here there is only one BMS in the pack assembly. All the battery packages are connected to the central BMS directly.

② Modular BMS Topology :- Here BMS is divided into several duplicate modules, each with a dedicated bundle of wires and connections to an adjacent assigned portion of a battery stack.

3) Primary / Subordinate BMS

In this case slaves are more restricted to just relaying measurement information and the master is dedicated to computational control.

4) Distributed BMS architecture

It's different from others; ~~the~~ the electronics hardware and software are encapsulated in modules that interface to the cell via bundle of attached.

Doing

Advantages of BMS

- ① Functional safety ② Lifespan & reliability ③ performance & range.

Q2) What are the technical parameters to keep in mind while procuring a BMS for assembling a battery pack?

1) Battery cell monitor

A. battery cell monitor primarily monitor the voltage for battery cells.

2) Cellage Fc's

~~It~~ It can be connect to a battery packs low or high.

- 3) Monitoring of Temperature :- we can identify whether battery charging or discharging is desirable very temp. nearness.
- 4) Cell voltage balance :- to determine the health of battery pack. Voltage monitoring is done.
- 5) BMS Algorithms :- To make quick and effective decision ~~and~~ in real time based on the info. received.
- 6) Real-Time clock

Allowing the user to know the battery packs behavior before any time or during event, the real time clock acts as black box s/w.

Q3) What is the purpose of BMS with communication? What are the various protocols of communication used in a BMS?

The main goal is to keep the battery within the safety operation region in terms of voltage, current, and temperature during the charge, the discharge, and in certain cases at open circuit. Also provide automated control of energy effing and occupant comfort from a single digital interface.

Here BMS keeps the battery within the safe operation region. In BMS, there is a BMS IC. It uses to control BMS. These IC's will communicate with each other and to send or receive information from one another.

① UART :-

Universal asynchronous Receiver / Transmitter is the most widely used communication protocol in BMS. It is a form of serial communication, which means bits are sent one after another sequentially instead of multiple bits. It is used for communication b/w BMS IC's & microcontroller within the BMS.

② SPI,

Serial peripheral interface, is a master slave type protocol that provides a simple and low cost interface b/w a microcontroller and its peripherals. It is used as a dedicated clock signal that is created by the master device to synchronise the transmitter and receiver or master and slave.

CAN

Controlled Area Network, is the most widely used communication protocol in the automotive industry. CAN communications are used frequently in automotive applications, it removes all signal noise such as electromagnetic noise.

It is the most robust and reliable communication protocols in the new days. It can be used in simple to extremely complex applications. These are used both in gasoline & electric vehicles.