IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 6, May 2024

Battery Management System for Electric Vehicle

Samarthi Alane[1], Mangesh Bhushtte[2], Dhanajay Dudhe[3], Dr. S. B. Mule[4]
UG Students, Department of Electronic and Telecommunication[1,2,3]
Professor, Department of Electronic and Telecommunication[4]
Sinhgad College of Engineering, Pune, India

Abstract: *As humanity is evolving the consumption of energy is increased. Continue power supply is not possible everywhere. So that we require energy storage devices. The stored energy is used in the places where the supply of energy is not available. The stored energy needs to be a monitor protected and easy to use. Battery management system is providing the function of monitoring the storage energy protection from overload and overheating and easy to use for charging and discharging purpose. The stored energy can be transferred from one place to another place easily in the form of battery, cells, or any store energy storage device.*

90% of the batteries used in daily life is lithium-ion batteries. The lithium-ion battery can explode due to overheating over current for any fault occurs in a battery. This should be harmful for humankind. We are required to take a protection against this accident so that we required a BMS for the protection and monitoring to increases the lifespan of a cell or battery and the current conditions such as charging, discharging overcharging etc.

Keywords: Energy storage devices, Lithium-ion batteries, Overload protection, overheating protection, Charging, and discharging control, Lifespan optimization, Safety measure, Monitoring, Transferability of stored energy Currency Recognition, Currency Classification, Deep Learning, Convolution Neural Network (CNN), Feature extraction, Image processing

I. INTRODUCTION

As we are living in a modern lifestyle of 21st century the consumption of energy has increased in our daily life. Today every person has a personal electronic device such as phone laptop tablets smart watch. This all devices required secondary power supply called a battery. The power of a battery should be managed properly and safely. As the demand of the energy consumption is increase the battery power is also increase there is a necessity for a battery power management or called as a management system. Battery management system can be defined as it is an electronic device to control monitor protection of a battery from overloading overheating overcharging. BMS need to perform very accurately for safe operation of electrical energy storage system and energy storage devices. BMS are controlling may system in real time operations. BMS monitoring system includes over voltage, over current, over temperature, overheat, optimizing battery performance, maintenance of schedule, prediction of failure and prevention form failure of system. Battery management system is also collecting the data of system and perform the calculation and analysis for improving BMS efficiency.

In a battery bank there are server cells of a battery is connected in parallel or series, but every cell has their own characteristics for charging and discharging there may be a chance for a seam cell are connected in series, but the characteristic of a charging is different. To manage the overall power or voltage of a battery is required to manage every cell. All lithium-ion (Li-ion) batteries require a BMS. This is because all Li-ion batteries will fail if overcharged, completely discharged, or operated outside their safe temperature window. Each Li-ion cell type has its own safe operating area, which makes it necessary to program the BMS accordingly shows the safe operating area typical for a C/lithium iron phosphate cell. Li-ion batteries must have a battery safety and longevity. State of-function in the form of state of charge (SOC), state of discharge and state of health (capacity) Prompt caution and service for the battery management system. This could be cell imbalance or calibration or high temperature. When the capacity falls below the user-set target threshold, it indicates end of life.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 6, May 2024

Battery management system is an electronic device which management rechargeable battery pack and protects the battery from operating against safe area, by state monitoring, reporting its data, calculation of secondary data, controlling its temperature, charging and discharge of battery to balance the battery pack. BMS is external circuit the 5V TO 12V input voltage required. Due the operation of main device BMS is observes, analyses and measure the cell value and provide as constant output current and voltage as requirement.

Battery management system (BMS) is an electronic system which manages a battery or a pack of cells. It monitors and controls battery critical parameters, estimate its state, balancing and make sure that they operate in recommended safe conditions. A battery plays a key role in the fields of military, transportation, communication especially in portable devices like mobile phones, electric vehicles and appliances. The rechargeable electric battery is the most common and widespread device used to store electro-chemical energy for power systems. This wireless battery voltage monitoring system can also be used for monitoring the Solar Panels, in fact, you can monitor anything so far, the voltage that is to be monitored is less than or equal to 25volts. This is the Voltage sensor Module that we will be using for monitoring the battery voltage, This Module can measure the voltages ranging from 0.02445v to 25volts dc.

As you can see on one side we have a block terminal, this is where we connect the voltage and ground wires coming from the battery, solar panel, or any other source. The Voltage wire is connected with the VCC terminal, and the ground is connected with the GND terminal.

II. METHODOLOGY

Arduino is the heart of the system. We have use relay here for turn on and off the charging supply of the battery as a protection and over charging protection circuitry. also we use a different components like relay, Arduino, battery, etc.

here firstly we check the battery voltage and the temperature of each battery of the battery pack. If the voltage and the temperature of each battery is ok then there this all data are then complete data is shown on LCD

If there is as any low voltage of the battery then the only one relay will on which is connected to that battery. Here we use LM35 temperature sensor for sense the battery temperature and if any battery will get high temperature, then the this battery relay will automatically turn off. This is how the power supply for the battery is cut off.

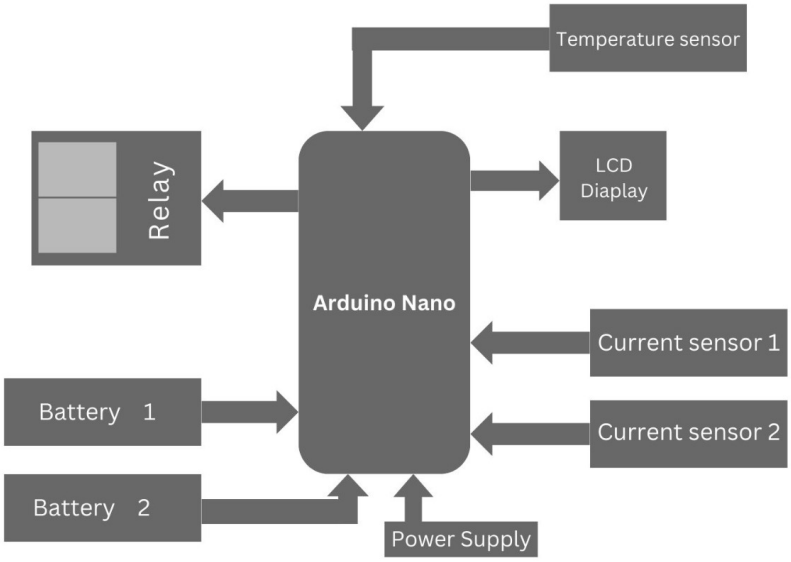

Fig.1. Block dig of Battery management system

III. LITERATURE SURVEY

The vehicles emitting organic compounds, Pd, nitrogen oxide and carbon monoxide have done significant pollution of air. World population is growing by an extremely high rate so that the vehicle usage is also rising with the rise of the population. Fossil fuel is the main energy resource of these vehicles. In 21th century oil production reached a peak. Estimates indicate that petroleum and natural gas will be run out by the year 2042 (Shafiee and Topal, 2009). After

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 6, May 2024

inventing the lead acid batteries and the electric motors in late 1800s, the first electric vehicles were invented. In the early 1900s, electric vehicles were very popular and that time is called the golden period of electric vehicles. After the arriving of gasoline powered vehicles almost every electric vehicle was disappeared due to limitation of range, long charging time, heavy weight and poor durability of batteries (Young, Wang, and Wang, 2013) (Kulkarni, Kapoor, and Arora, 2015). Because of gas emission laws and air pollution automobile manufactures were forced to manufacture low carbon emission vehicles so the electric vehicle manufacturing is increasing today (Sagar, 1995) (Kulkarni, Kapoor, and Arora, 2015). Electric vehicles present an excellent alternative to the current fossil fuel powered vehicles due to several reasons. Low noise and zero emission are some main reasons why people buy electric car now days. Electric vehicles are perfectly suitable for urban environment thus they are very compact, not as wasteful as internal combustion engines in traffic and the limited range is not a matter in the urban environment (Sagar, 1995). Internal operation of electric vehicles is similar to the internal combustion vehicles. Like in combustion vehicles, electric vehicles have an electric motor, an ECM, a battery, battery management system with regenerative braking system a charger and a cooling and heating system.

There are two types of motors used in electric vehicles AC motors, and DC motors. DC motors are easily control when comparing with AC motors and also less expensive than AC motors. However, DC motors are larger and heavier than the AC motors. Hence the electric motors have high torque acceleration of an electric vehicle is quicker than the internal combustion engine. That property can use to build fast electric racing cars because in races instant torque is much help full. Electric vehicle also has a feature called regenerative breaking and by using that feature the vehicle can generate electricity by own kinetic energy that can be stored in super capacitors. Electric vehicles sales are increasing rapidly when we compare the sales data for previous years. That shows that the demand for electric vehicles are higher now days. With the rise of the demand, much more research must be done to develop the EV technology

IV. CONCLUSION

As batteries are The core energy sources in EVs and HEVs, their performance greatly impacts the salability of EVs. Therefore, manufacturers are seeking for breakthroughs in both battery technology and BMS.

The major concerns of BMS were discussed in this presentation. Due to varying situations in real-world applications, a standard solution was not wanted. Based on the specific sit- uation, different strategies should be applied to improve and optimize the performance of BMS in future EV

REFERENCES

[1] Rodrigue, J.P.; Comtois, C.; Slack, B. The Geography of Transport Systems; Taylor & Francis: New York, NY, USA, 2016.

[2]Plett, G.L. Battery Management Systems, Volume I: Battery Modeling; Artech House: Norwood, MA, USA, 2015.

[3]Plett, G.L. Battery Management Systems, Volume II: Equivalent-Circuit Methods; Artech House: Norwood, MA, USA, 2015.

[4]Thomas, K.E.; Newman, J.; Darling, R.M. Mathematical modeling of lithium batteries. In Advances in Lithium-Ion Batteries; Springer: Boston, MA, USA, 2002; pp. 345–392.