Protection of Battery management system using Electric vehicles

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Abstract— The paper present the charging and discharging technique integrated into battery management system for lithium ion batteries. The charge and discharge method can be manage by the batteries are connected in parallel. We describe a charging and discharging based on battery with battery management used for electric vehicle. It protect the battery, increase the battery life time operate at various modes of conditions. The battery management system is very flexible, economical, and stable. Simulation and experimental results confirm the charge and manage technique**.** The battery management system method maintains the continuous charging mode without reducing the discharging in increase the efficiency

Index Terms—, battery management system (BMS), dc–dc power converter, fuzzy logic controller lithium-ion batteries

I INTRODUCTION

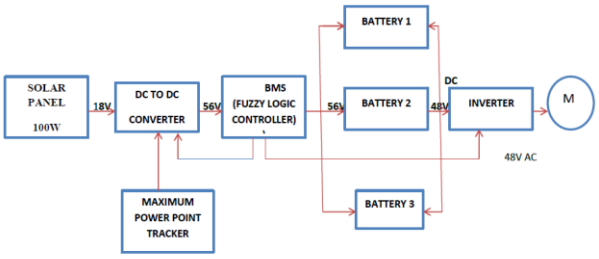
Lithium ion battery is one of the most important applications like battery operated vehicle, battery charger and electric vehicle [1]. Like lithium ion batteries due to their great density, high terminal voltage have commonly used for several applications. The advantage of the lithium ion battery represent is attractive and valid solution of industrial applications and electrical vehicle applications. The battery is connected in parallel in order to simplify the assembly and management of the battery [2]. Lithium ion battery is high sensitivity to overcharge, deep discharge, and temperature in a specified range. An embedded control system called battery management system is used to guarantee their protection, safety and effective use. The battery management system is used to monitor the input voltage, current and Power and it is important for remaining useful life. The lifetime of the battery consisting of four battery are connected in Parallel and energy stored in the battery and remaining useful life. The Presented reasons charge and discharge equalization technique procedure to improve the efficiency. First of all the battery management system to improve the overall efficiency. In addition during charging and discharging condition improving the effective balancing [3]. A battery management system must satisfy requirement to enable the use of lithium ion battery technology it increase the life time of the battery and the Power can be delivered to the load. A battery management system used to enable the use of lithium ion battery technology in safety applications[1-2]. Therefore the fundamental Problem in the design of battery management system is the verification of safety and Protection systems. The battery management system is successful applied for the safety and Protection systems.[3] Formal method is applicable for the verification of simulation and hardware systems at both the circuit for the design and verification of computer controlled system respectively.[5]

Hence, EV batteries require a high-energy capacity and a long-life cycle for extending the driving range. To meet these demands, lithium-ion batteries are widely used in EV applications due to their high-energy density and efficient charge properties [3], [4]. However, lithium-ion batteries require a more careful management system due to the overcharged and undercharged battery states. An overcharged cell has a high risk of explosion, and an undercharged cell can reduce the battery cell's life cycle [5], [6]. Moreover, repeated battery charging and discharging can cause a charge imbalance among the battery cells due to their different characteristics. This charge imbalance decreases the total storage capacity and the whole life cycle of batteries [7]–[9]. It is possible to replace an entire battery pack when one imbalanced cell prematurely terminates its charge cycles. Hence, a battery management system (BMS) with individual cell monitoring is required for the battery's safety [9]. Furthermore, the charge equalization method is essential for the battery's life cycle in EVs. The battery pack used in EV applications consists of a long series of lithium-ion cells. In this type of battery pack, the BMS has the difficulty of individual cell balancing and monitoring due to the size problem as well as the cost. In addition, it is difficult to construct an on-board system due to controller complexity, high voltage and current stress [5], [6]. For these reasons, the BMS employs a cell monitoring integrated circuit [10]–[13]. The monitoring is used for individual cell monitoring, cell protection, and charge equalization. However, as EV batteries increase their storage capacity in each cell, more efficient methods of charge equalization are required from the monitoring for a large number of EV cells. Numerous charge equalization methods have been

presented in [10]–[18]. One of the methods is a resistive current shunt, which consists of a resistor and an active switch [12], [14].This scheme is a very popular method due to its ease of implementation and low cost. A number of battery monitoring employ the resistive method for cell balancing. However, the critical drawbacks of this method are energy dissipation and heat problems[15]. However, a problem with this method is the prolonged equalization time in lithium ion batteries caused by a cell-to-cell energy shift [16]. Another equalizer with a simple control method is the secondary multiple winding method. However, it has difficulty implementing a multiple winding transformer in a single number of battery cells [13], [16]. Other methods with efficient equalization performance are discussed in [17]–[24]. These methods use a separated dc–dc converter for each cell. They exhibit easy implementation and individual control of the charge equalization. Unlike the resistive current shunt, these methods have high energy efficiency. However, these schemes have problems due to their large circuit size and high implementation cost for multiple battery cells. Moreover, all of these equalizers require an auxiliary control circuit for individual cell balancing. This results in increase in the BMS size and cost for EV battery packs This method exchanges the equalization energy between all of the battery cells and a target cell by using the control of the monitoring. In the proposed equalizer, a series-connected battery string is modularized into a master module and multiple slave modules. Each slave module consists of a cell monitoring, a module, and cell switches for the battery modules. A central equalization converter is shared by all of the battery cells through the connection of the master and slave modules, instead of a dedicated charge equalizer for each cell. The monitoring is used for cell monitoring. It also controls the cell switches for individual cell balancing. With this configuration, individual charge equalization can be obtained with a simple control method in the BMS. Moreover, the proposed charge equalizer exhibits ease of implementation and extendibility of the BMS without affecting the size or cost based on the numbers of cells. In this paper, a prototype of 88 lithium-ion battery cells employing the proposed method is optimally designed and implemented. In addition, a control algorithm for the proposed method, an equalization flowchart, and a numerical approach for the equalization time are shown for EV battery packs.[11] Experimental results are presented to verify that the proposed method can achieve excellent cell balancing performance with a simple control method. The Battery Management system architecture that is suited for linear Pack made up of maximum of four battery cell. There are three main features of proposed architecture First one is balancing in both charging and discharging condition. Second one is improve the efficiency. The third one is to protect the severe fault in a battery. In the lithium ion battery ion using battery management system is essential for increase the battery life time and safety. The major advantage of battery management system has high efficiency, long operating life and low maintenance. The main objective of the battery management system is managed the charging and discharging in an electric vehicle, improve the efficiency by varying the input voltage. The different types of converter such as boost converters are introduced. The drawback of these solution that require fast expensive bulky power switches, inductor and diodes. Furthermore implementing the fuzzy logic controller can be disconnected The battery management system is receiving growing attention in terms of solar conversion to electric power.[16-21] The application of battery management system is very good topic of increasing importance in vehicle market, transportation and industrial systems. Batteries have long have been a battery management system option for energy storage in lithium ion batteries such as those in electric road vehicles. They are commonly used as the main energy source for portable equipment, such as communications cordless tools. End-user reliance on electrically powered equipment has also prompted increased use of batteries in backup power systems such as the uninterruptible power supplies often found protecting critical computer systems. In recent years improving energy storage system is one of the most important sources in a electric vehicle. Automotive application of battery technology has been limited due to cost per unit of stored energy and the penalties on battery life occurred by fast charging recharging required for meaningful levels of utility. Electric vehicle are the great advantage of high speed, long life and it have good name in the market. The BMS is Controlling the device such as the voltage and current, Temperature, state of charging and discharge through the LED display.[15] The problem of the battery is suddenly sufficient charge for use while maximizing battery life is then recast as two nested control problems. A battery charge equalization technique can be identified to use for battery management system. Charge equalization enhances the uniformity of batteries made up from group of cells. The maintenance of lithium ion improves the life of the battery. A novel battery management system technique to achieving battery equalization is achieved to drive the vehicle. An outer charging and discharging problem is then formulated with overall battery management in mind. The supervisor is to automatically source the current necessary for fast charging and simultaneously provide overall protection against overcharging. Successful equalization greatly simplifies the supervision task. Simulated and experimental results are presented from the testing of the charge equalization methodology. The paper summarizes and comments on system implementation. The battery management system is with the help of fuzzy logic controller is a decision making unit and which will help full for batteries through electric vehicle. Accurate battery management estimation provides the following benefit to lithium ion batteries long life cycle, low Maintenance and high power density. According to the size and shapes the battery

with battery management system installation and the four types of battery design are connected in parallel battery can be performed. The main motivation of the paper is to develop battery management system characteristics such as output current versus time and output voltage time. In this method the converter output and inverter output voltage and current should be noted in battery management system. The battery management system discusses and several types of measures should be noted such as voltage, current, power measurement is useful to calculate the estimation in an electric vehicle. The commercial and industrial applications of electric vehicle have high efficiency, low cost, free from pollution and less noise. In this paper the full battery management system which is used to run the electric vehicle with study the charging, discharging and state of charge operation. In BMS Implementation various functions and capabilities including cell level voltage Monitoring and Protection, State of Charge estimation, cell balancing among others. The battery management system meets high power density and energy density to meet all the high power demand. Lithium ion battery is one of the important in electrical applications for electric vehicle. The main objective of the battery management system is managed the charging and discharging process. In thermal management system includes heating system and cooling design are very important of battery will be maintain with suitable or constant temperature. In recent years improving energy storage system is one of the most important sources in a hybrid electric vehicle and electric vehicle. Hybrid Electric vehicle and Electric vehicle are the great advantage of high speed, long life and the ordinary vehicle is directly connected to the load and at the same time the power will flow from solar panel to load. The BMS is monitoring the device such as the voltage and current, Engine Temperature, State of charging and discharge through the LED display. The LED display in front of the driver it should be noted manually and controlled automatically. The battery management design with the help of fuzzy logic controller to drive the electric vehicle under the charging and discharging condition. An accurate SOC estimation provides the following benefit to lithium ion batteries long life cycle, low Maintenance and high density. In order to meet the requirement which can be wide range of the maximum output electric power is 1080W. The goal of the battery management system are no of charging cycle and no of discharging cycle will be change in life cycle of the battery. According to the size and shapes the configuration and installation design of the battery management system can be performed. The main motivation of the paper is to develop the system characteristics of the battery namely voltage and current with respect to the time. In literature some SOC estimation methods have been proposed fuzzy logic controller based method. In the special requirement of electric vehicle such as the total estimation of charging and discharging function in an electric vehicle. The battery management system performance of the measurement is very important it use to known the estimation in the full electric vehicle. The commercial and industrial applications of electric vehicle or hybrid electric vehicle have high efficiency, low cost, free from pollution. In this paper the full battery management system and the self-study of state of charge, Protection and Measurement. The battery management system meets the high power density and energy density to meet all the high power demand. This method applicable for continuous charging of lithium ion battery in charging and discharging condition or the floating condition (solar Panel to load) the measurement of maximum output voltage and output current can be noted

II **PROPOSED DESIGN**



This Paper Proposed designed of battery management system is doing the operation like identification, charging, discharging and controlling in an electric vehicles. The battery management functions doing the operation like charging from the battery and discharge through the Load. The objective of the battery management storage system which improves the battery life time, improve the efficiency and improve the overall performance of the system. The converter changes the voltage from 18v to 56v it will be change from one level to another level. The battery management system will depend upon the size of the electric vehicle will depend on battery, fuzzy logic controller, sensor, microcontroller and converter. The battery management system is the how many percentages are charging and discharging is should be noted and the several controller technique modes are dis-cussed. Battery pack design and requirements such as safety issues specific to lithium ion batteries are introduced. A dynamic Performance is required for automotive and industrial, vehicle market applications. The battery has been mainly used for energy storage for the electric vehicle which is used in the state of charge crucial. This is the overall block diagram for battery management system and it the Proposed designed of battery management system operation like charging, discharging and controlling in electric vehicles. The battery management functions and operation in charging and discharging operation in directly or controlled flow through the Load or electric vehicle. The objective of the battery management system improves the battery life time, improve the efficiency and improve the overall performance of the battery management system. They give us all the convenience of electricity in a

handy, portable form [5]. The only trouble is, most batteries run flat very quickly and, unless you use a specialized charger, you then have to throw them away. It's hard on your pocket and bad for the environment as well worldwide, we throw away billions of disposable batteries every single year. Rechargeable batteries help to solve this problem and the best kind use a technology called lithium ion. Battery operated Vehicle, laptop computer, and electric vehicle probably all use lithium-ion batteries. A lithium-ion battery, such as this one from a vehicle is made from a number of power-producing units called cells. Each cell produces about 12 volts, so a lithium ion battery that produces 12 volts typically needs three to four cells and the total voltage is 48V.

Connect the two ends of a battery to something like a flashlight and chemical reactions begin chemicals inside the battery slowly but systematically break apart and join themselves together to make other chemicals, producing a stream of positively charged particles called ions and negatively charge electrons. The ions move through the battery the electrons go through the circuit to which the batteries connected providing electrical energy that drives the flashlight. The only Problem is, this chemical reaction can happen only once and in only one direction that's why ordinary batteries usually can't be recharged. The Ordinary batteries, such as this zinc carbon one, cannot be recharged because the chemical reactions that generate the power are not reversible. Different chemicals are used in rechargeable lithium ion batteries and they split apart through entirely different reactions. The big difference is that the chemical reactions in a rechargeable battery are reversible when the battery is discharging the reactions go one way and the battery gives out power when the battery is charging, the reactions go in the opposite direction and the battery absorbs power. These chemical reactions can happen hundreds of times in both directions, so a rechargeable battery will typically give you anything from two or three to as much as 10 years of useful life. Lithium-ion batteries are less environmentally damaging than batteries containing heavy metals Like any other battery, a rechargeable lithium-ion battery is made of one or more power-generating compartments called cells. Each cell has essentially three components: a positive electrode and negative electrode and a chemical called an electrolyte in between them. The positive electrode is typically made from a chemical compound called lithium-cobalt oxide in newer batteries, from lithium iron phosphate The negative electrode is generally made from carbon and the electrolyte varies from one type of battery to another but isn't too important in understanding the basic idea of how the battery works.

All lithium-ion batteries work in broadly the same way. When the battery is charging up, the lithium-cobalt oxide, positive electrode gives up some of its lithium ions, which move through the electrolyte to the negative, are remain there. The battery takes in and stores energy during this process due to maintain charging and discharging process. When the battery is discharging, the lithium ions move back across the electrolyte to the positive electrode, producing the energy that powers the battery. In both cases, electrons flow in the opposite direction to the ions around the outer circuit. Electrons do not flow through the electrolyte it is effectively as electrons are concerned. The movement of ions and electrons around the external circuit, in the opposite direction are interconnected processes, and if either stops so does the other. If ions stop moving through the electrolyte because the battery completely discharges, electrons can't move through the outer circuit either lose power. Similarly, if you switch off whatever the battery is powering, the flow of electrons stops and so does the flow of ions. The battery essentially stops discharging at a high rate but it does keep on discharging, at a very slow rate, even with the appliance disconnected. Unlike simpler batteries, lithium-ion ones have built in battery management system electronic controllers that regulate how they charge and discharge. They prevent the overcharging and overheating that can cause lithium-ion batteries to explode in some circumstances. Electric vehicle The arrangement of a three way ESS consist of battery are connected in Parallel with fuzzy logic controller and a battery unit system. The battery management system we are using a fuzzy logic controller which will be connected to the battery in normal operating condition and it have a decision making unit and to maintain the battery charging condition. The battery management system and the battery are connected in Parallel that is called as parallel connection of the battery which will divide the battery voltage maintain in same level. The Output power will be increases when the battery life time will be increase the overall system. The battery management system studies will depend upon the size of the electric vehicle, battery, fuzzy logic controller, sensor, led display, and converter. The battery management system studies how many percentages are charging and discharging is should be discussed. A dynamic Performance of battery management system solution is required for automotive, industrial, vehicle market applications. The Power source of battery management system will be manage the all four battery is used for electric vehicles. The effectiveness of the battery operated electric vehicle and the control algorithm or MPPT algorithm will studied in various literature. The MPPT algorithm for the converter with the help of battery management system has been studied in various literatures. Battery management system has various research is already focus on several part of area such as design, analysis, Managing, Identifying, controlling and Monitoring. The output or permanent magnet dc motor is drive the electric vehicle or RAV vehicle. The efficiency of the battery is used for automotive applications. The Power source of battery management system will be manage the all three battery is used for electric vehicles. The effectiveness of the battery operated electric vehicle and the control algorithm will studied in various literature. The MPPT algorithm for the converter has been introduced will study in various literatures. Battery management system has various research is already focus on several part of area such as design, analysis, controlling and Monitoring. The permanent magnet dc motor is drive the electric vehicle and the original electric vehicle is the example RAV vehicle. The efficiency of the battery is used for automotive applications.

II BATTERY MANAGEMENT SYSTEM

The block diagram of battery management system is shown in figure 1. There are three module input module, controller module, output module in the overall battery management system. . From this condition, the BMS drives the proposed equalization circuit with three consecutive steps. For presenting these three steps, it is assumed that the second battery the undercharged cell. In these steps, the monitoring in

display gives the logical high and low signals to control the module and cell switches. The low logical signals keep turning ON both the module and cell switches during the equalization time

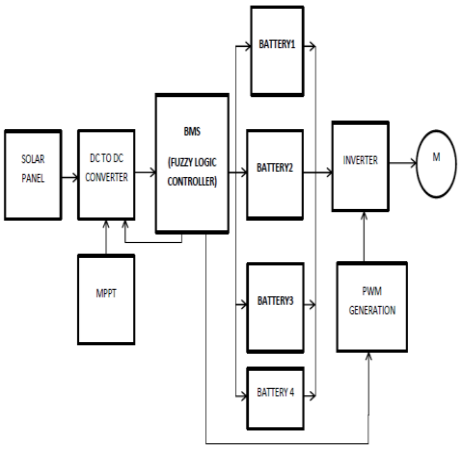


Fig 1 Block diagram of Proposed BMS System.

The Master circuit consists of fuzzy logic controller, battery and converter also. The converter (MOSFET) switch will be used) which will increase the Power level. The converter makes the equalization current between the unbalanced cell and battery. Before the battery ideal switch is connected with each battery. These switches are composed of bidirectional switches are connected in the circuit. With this control method, individual cell balancing can be effectively achieved in the proposed battery management system method. The key features of the proposed scheme can be summarized as follows the proposed BMS exhibits ease of implementation of the charge equalizer when the whole battery system is modularized into master and slave modules in contrast to the on-board systems in [14]–[20]. The modular connection, which is shared by the slave modules results in extendibility of the BMS for a large number of battery cells the monitoring IC is effectively used for individual cell balancing and the monitoring circuit the individual charge equalizer is easily achieved in monitoring IC instead of the resistive balancing circuit with energy dissipation [12]. They construct a current path between the dc–dc converter and a selected battery cell Battery management system is used for electric vehicle system such as temperature sensor, fan, cooling system. Relay, controller and can bus. In battery management system the can be divided into two type of condition one is normal condition the other one is full charge condition. In normal condition the 56v can be converted into 48v can be connected to the load and the full charge condition the 56v is directly fed to the load. And other one condition the floating mode condition the power flow from solar panel to load.[15] The current and voltage Measurement are the most important variable that can be measured by using various measurements. The sensors are also fixed in RAV Electric vehicle so it is used to measure the engine temperature, battery temperature and overall temperature.[18]. The difference in the battery SOC is the battery designer's choice according to the battery performance and characteristic.

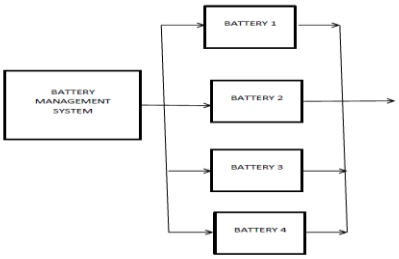


Fig 2 Simplified Block diagram of BMS System.

The battery management system studies the percentage of charging is very important four batteries are connected in parallel but we need only one battery in operating modes. The battery management system with the help of monitor to identified the problem in the how much percentage also shown in charging, discharging are available in LED display [6]. The battery management system lithium ion is discussed in the quick charge with the help of lithium ion battery which will be helpful for electric vehicle application. The battery management system using fuzzy logic controller take decision making unit through charging and discharging method will be helpful for such as driven by the permanent magnet dc motor with the help of acceleration mode and deceleration mode will be done in electric vehicle.[7] The overall of Battery management system with battery has been providing to storing energy in the way of discharge through the electric vehicles. The proposed method exchanges the equalization current between the overall battery string and a selected cell. To achieve this process, the proposed equalizer is controlled by the master module which is implemented by Fuzzy logic controller. The master module follows the BMS algorithm with the equalization method. Fig. 2 shows a simplified of the driving method for the BMS. In the proposed algorithm, the cell information is transferred to the fuzzy logic controller by using the monitoring IC in real time.[8] From the cell information, the proposed method can be activated under any condition of battery charging, discharging [9] The external current from the charger or discharger for battery pack has less influence on the cell balancing because the proposed equalization energy comes from stored energy of the battery pack. However, since the battery state of charge (SOC) condition can be influenced through the charging or discharging current of the battery pack, this has to be considered by the microcontroller to estimate the battery SOC [6], [28]. The cell balancing condition of the proposed method is determined by the difference in the battery SOC between the overall battery cells and specific battery cells. If specific cells have a lower charge level than the average SOC, they can be charged as much as the difference in the SOC. The operational assumptions are as follows the metal–oxide–semiconductor field-effect transistor (MOSFET) switches are ideal except for their internal body diode. The dc–dc converter is operated as an ideal current source in the steady state. The cell switches are regarded as a short path if they are turned ON. They are modeled as an open path when the are turned OFF. The four batteries B1,B2,B3 and B4 in the master BMS recognizes an undercharged battery cell, from the communication with the battery monitoring IC, the first step starts. The monitoring always communicates the cell state to the fuzzy logic controller.

In this step, the monitoring gives the on signal Therefore it has great storage in the battery management system with charging and discharging state estimation system, Peripheral circuit controller circuit and current measuring are used for the Purpose. If all the battery should be in balanced condition in any condition the battery will be comes to unbalanced it can be comes to change the state in balance mode automatically. The mode of operation has been verified all other battery will be comes to a balanced mode and the unbalanced mode are properly region with high temperature. According to the characteristics of lithium ion the charge and discharge process the battery management system controls the fans to work in the form of wind based on the collected temperature. The battery management system can be represent as the Converter set to run the electric vehicle with the help of permanent magnet dc motor the ultra-capacitor capacitor it used to purified the voltage. Energy storage is increased when the three or four battery are connected in charging and discharging condition or floating mode condition when the Power will flow through solar Panel to load.

Floating mode the power given to solar panel to load voltage the battery will provide high power load. In this approach the battery behaves as highly significantly lower internal resistance, high capacitive region, actively varied as a function of the power electronics including the models can help reach cost with open circuit voltage estimation. The estimation of the total voltage is 230v,5A and the total Power is 1080W The SOC is the most important issues in the application of battery power in the battery management system. The SOC is could be measure by using the graph that it include the SOC versus voltage level during the process of overcharging and discharging. The initial charge and final charge is obtained from state of charge with the help of the total the battery management system in a charge time and discharging time.

The voltage should be increased linearly will be based on the state of charge. In literature review we should study the state of charge estimation with the help of battery management system in charging and discharging time. The state of charge can be the charge from the low voltage to high voltage is drawn from the graph the state of charge versus voltage. The state of charge can be estimated in the overall battery management system process includes the charging and discharging time. Further charging failed to bring all batteries the state of charge comes to charging state and it should be reached after some time it should be discharged. From an estimate of low unbalanced batteries could be able to be charging could be effectively and normally and the batteries should be state of charge can be modeled as normally distributed throughout the sample size is large.In all these methods, the coulometer method is the most practical used and easy to implement in the battery management system research method. Here the voltages are increased gradually with respect to the state of charge from 0 to 100 and the voltage is 0 to 2v.In hardware implementation the same voltage is noted with the help of charging and discharging time. The state of charge can be noted continuously in the smooth mode of operation with respect to time. The SOC of the lithium ion battery used in Hybrid electric vehicle usually keeps in the range of 90%, where the conditions of fully charged of charging and discharging conditions will be noted. So the total error of the simple coulometer method can be modified easily and checking process will be notified. Some kind of method must be used to correct the error correction method can be checked and identified. The method used in the presented Battery management system integrates the coulometer method and the open circuit voltage method and also takes the influence of charging, discharging methods. So the BMS can carry out the SOC estimation more efficiently accurately correctly in the goals for EVs

III DESIGN CONSIDERATION

The simulation diagram is shown in figure. The battery management system simulation should be calculated voltage, current measurement during the hybrid EV and electric vehicle. Therefore the total EV is dependent on the speed and the charging power and discharging power can be calculated with respect to time. The basic layout of simulations blocks such as the battery, display, PWM generation, converter, battery, inverter, solar panel and DC Motor. The simulation diagram is shown in figure above all the blocks are included the overall battery management system. The battery power should be calculated power and energy demand during the hybrid EV and electric vehicle. Therefore the total Electric vehicle is dependent on the speed and the charging power and discharging power can be calculated with respect to time.

The battery management system project consists of solar panel, converter, BMS, and permanent magnet brushless motor necessary for proper battery operation, normal operation. The BMS keeps the battery pack in balance by charging the weak cells and discharging the strong cells. This helps to increase the battery life time and require less maintenance and increase the life of the battery. The BMS system consist of the solar panel output current and it should be operation at constant temperature is shown in figure. The output power should be measured in the electric vehicle system by varying the output dc voltage and maintain the constant dc voltage. The output of the speed controller is to control the speed signal and converted into pulse width modulation signal the output which is given to the input of PMBDC Motor. The battery management system is a simpler circuit and considering a pack consisting of many single battery cells from the ground voltage increase gradually. The battery pack up voltage is measured through a voltage divider circuit to adapt the voltage ranges from 0 to 1000v. All lithium-ion batteries work in broadly the same way. When the battery is charging up, the lithium-cobalt oxide, positive electrode gives up some of its lithium ions, which move through the electrolyte to the negative, graphite electrode and remain there. The battery takes in and stores energy during this process. When the battery is discharging, the lithium ions move back across the electrolyte to the positive electrode, producing the energy that powers the battery. In both cases, electrons flow in the opposite direction to the ions around the outer circuit. Electrons do not flow through the electrolyte: it's effectively an insulating barrier, so far as electrons are concerned.

The movement of ion is interconnected processes, and if either stops so does the other. If ions stop moving through the electrolyte because the battery completely discharges, electrons move through the outer circuit either lose your power. Similarly, if you switch off whatever the battery is powering, the flow of electrons stops and so does the flow of ions. The battery essentially stops discharging at a high rate keep on discharging, at a very slow rate, even with the appliance disconnected

Unlike simpler batteries, lithium-ion ones have built in electronic controllers that regulate how they charge and discharge. They prevent the overcharging and overheating that can cause lithium-ion batteries to explode in some circumstances. The battery voltage is measured through the simple voltage circuits. There are several advanced battery technologies under the study for electric vehicles. The Lithium-ion batteries are example for high power to weight ratio, low self-discharge, and safe.So the BMS can carry out the SOC estimation more efficiently accurately correctly in the goals for EVs.

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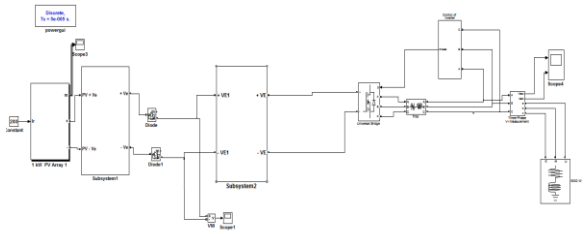

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V DESIGN CONSIDERATIONS

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VI RESULT & DISCUSSION

The total result of the battery management system is shown below. The total basic performance of the battery management system with Converter is to achieve and improve the overall performance. Several configurations in the Energy storage system design have been change into simple circuit

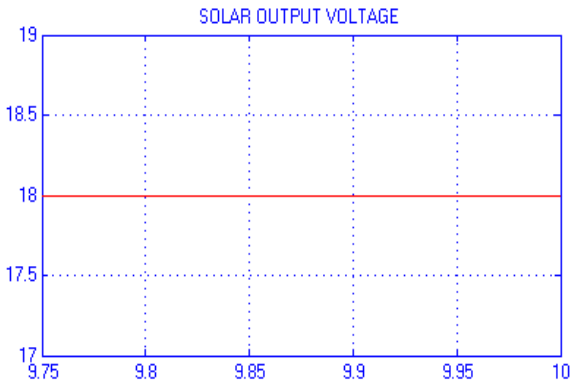

Fig 3 Solar output voltage

The graph represent solar output voltage and current is above. In Proposed system is increase the voltage from 18v to 56v from dc to dc converter directly connected to the load. In normal operating condition the battery is connected dc to dc converter trough load in case of critical situation the battery will be connected from solar panel to the load directly. Battery Management system in automotive applications it undergo the charging and discharging cycles will continually flow through the load. If the over voltage is also directly come to the solar panel in case 0.5 voltage should be increased. The output is shown in figure above the converter which increases the level. The output current can be measured in the ranges of 120A.

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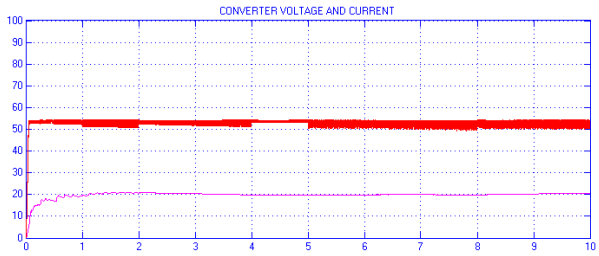

Fig 5 *converter output voltage*

The converter output is shown in above. The converter should be used for boost converter it should be increase the output from one or two times. The converter should be converted into 18v to 56v. Problem of energy storage system is providing charging and discharging through controller. The discharging power there is no additional requirement is not needed.

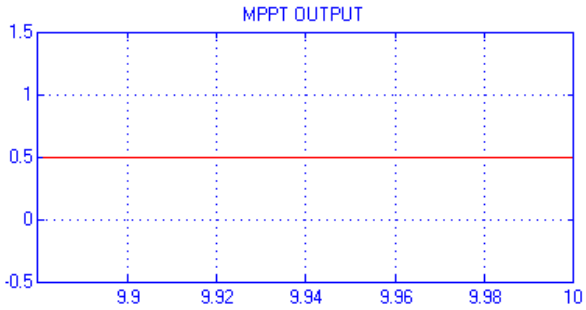

Fig 6 Mppt output

The MPPT Output is a Maximum Power Point tracking Output here also we should be measure the output is 0.5v

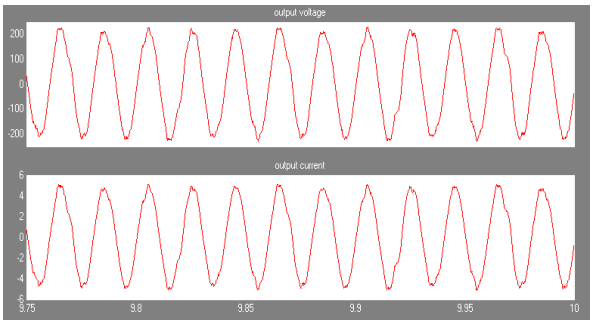

Fig 7 *inverter output voltage & current*

In a battery management system it is very important technique to be followed by protect the battery and also increase the overall performance. If the battery voltage is die quickly the other battery ready will ready to charge automatically. The state of charge and discharge can be estimated in the charging and discharging time. Further charging failed to bring all batteries the state of charge comes to discharging state and it should be comes in charging mode. A battery management system prototype setup was to be constructed in order to the electrical way with the help of fuzzy logic control. The finished experimental battery management systems components used with the help of HESS System.

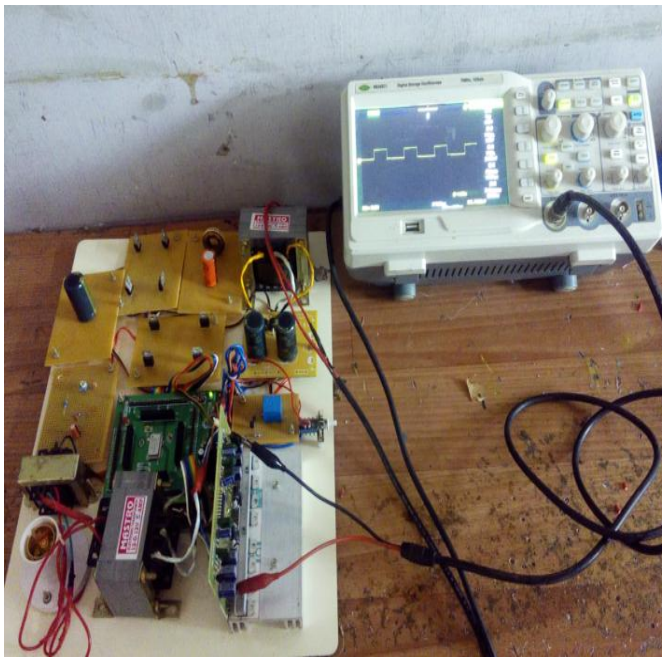

Fig 8 Hardware module

Among these components, the dc to dc converter and battery management system are designed. The maximum output voltage of the battery management system is getting the voltage such as 30v and the current ranges are 4A. During the charging and discharging process the four battery are connected in parallel if any one battery in below 30% it will comes in charging mode and above 70% it will come discharging mode the process is done in automatically. This fuzzy logic control scheme will be allow between the battery management system and the total estimation of low unbalanced and balanced batteries could be able to be charged and discharged effectively. The batteries should be state of charge can be verified modeled as charging and discharging in the electric vehicle. The total capacity of the battery pack is sudden changes in operation and the result may protect the battery. The basic idea of battery management system with Converter is to achieve and improve the overall performance. Several configurations in the Energy storage system design have proposed in the simple to complex circuits.In Proposed system is increase the voltage from 18v to 56v from dc to dc converter directly connected to the in the load. In normal operating condition the battery is connected dc to dc converter trough load and the abnormal condition the battery will be connected solar panel to the load directly. Energy storage system in automotive applications it undergo the charging and discharging cycles will continually flow through the load. If the voltage is injected directly into a battery without regulating the battery could die very quickly in normal operating condition the battery is connected dc to dc converter

to load and full charge condition the battery will not connected to the load directly. The problem of energy storage system is providing charging and discharging through controller. The discharging power there is no additional requirement is not needed. In a battery management system it is important to protect the battery and also increase the overall performance. If the voltage is injected directly into a battery without regulating the battery quickly. The state of charge and discharge can be estimated in the charging and discharging time. Further charging failed to bring all batteries the state of charge comes to discharging state and it should be comes in charging mode. Among these components, the dc to dc converter and battery management system are designed. The maximum voltage of the battery management system used in this experiment is 30v and the current ranges are 4A. During the testing, the dc/dc converter with battery management system is programed to work in a constant power mode, constant voltage mode with a power limit of 120WA battery management system prototype setup was to be constructed in order to the electrical way with the help of fuzzy logic control. The finished experimental battery management systems components used with the help of HESS System This fuzzy logic control scheme will be allow between the battery management system and the total estimation of low unbalanced and balanced batteries could be able to be charged and discharged effectively. The batteries should be state of charge can be verified modeled as charging and discharging in the electric vehicle. In the electric vehicle are in order to test the battery management system has been developed.

COMPARITIVE OF PROPOSED STUDY

This study focuses on the implementation problems, balancing performance, and control method for 4 battery the system size and cost are evaluated based on the number of electronic components the resistive method has a smaller number of electronic components than the other methods. The proposed Battery management system scheme also reduces the number of electronic component in the dc–dc converters, because the dedicated dc–dc converter per cell is replaced by a common dc–dc converter. Still, the large number of MOSFET switches for the cell switches can be a weak point in terms of system reliability. To minimize this problem, the proposed scheme constructs a modular switch network in order to reduce the fault. The whole system can ensure its operation by only replacing the cell switch module with a specific fault. Furthermore, the proposed scheme only uses a monitoring to control the cell balancing without an additional circuit in the BMS. From this comparative study, the proposed method is shown to have good cell balancing performance a small size, a low cost, and a simple control method without the an additional circuit.

CONCLUSION

Battery management design An individual charge equalizer with a monitoring is proposed and a prototype for 4 battery is implemented. The operation principle, the equalization algorithm, comparative studies, and the cell balancing performance are presented in work. The proposed method using MOSFET switches and the Output monitoring is shown above. With this configuration, efficient charge equalization based on the simple cell monitoring can be achieved. Furthermore, it reduces the size and the complexity of individual cell balancing. Experimental result on 4 lithium-ion battery system demonstrates that the proposed circuit has outstanding equalization performance with a simple control method. Therefore, the proposed equalizer can be used widely for the high stack of lithium-ion battery cells in EVs. The procedure is design of battery management system with the help of fuzzy logic controller should be analysed and checked. The bms research is very good topic in presently the paper will be develop to percentage of charging they will be given in ideas of various project to run the electric vehicle.

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