Battery Pack Modeling By Battery Management System of An Hybrid Electric-Vehicle Using ANFIS

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Abstract- *Battery management systems (BMS) is used in electric vehicle to monitor and control the charging and discharging of rechargeable batteries which makes the operation more economical. Battery management system keeps the battery safe, reliable and increases the senility without entering into damaging state.*

In order to maintain the state of the battery, voltage, current, ambient temperature different monitoring techniques are used. For monitoring purpose different analog/digital sensors with microcontrollers are used.

This paper addresses state of charge, state of health, and state of life and also maximum capacity of a battery. By reviewing all these methodologies future challenges and possible solutions can be obtained.

This paper discuss about battery modeling as consideration for battery management system to protect the battery and improve the lifetime to maximum. BMS is a critical system of Hybrid electric vehicle to keep the EV on the best quality. This system prevent the battery from over-charging, over-discharge, and over-heat so the battery will not be damaged.

For this purpose, many monitoring techniques are used to monitor the battery state of charge, temperature and current. In the current paper, the monitoring system for battery powered Hybrid Electric Vehicles (HEV) has been implemented and tested.

I. INTRODUCTION

Hybrid 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 require a effective battery management system (BMS) while they are providing necessary power. The battery installed in a 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 a electric vehicle is about 30 to 100 KWH or more. Battery management system (BMS) makes decisions based on the battery charging and discharging rates, state of charge estimation, state of health estimation, cell voltage, temperature, current etc.

II. EXISTING SYSTEM

Due to electrical vehicle charging as the charging power is locally generated in a'green' manner through solar panels. For improved efficiency, there is direct interfacing of EV on DC instead of AC interfacing. EV is inherently DC by nature. EV charging can be varied with time therefore dynamic charging of EV is possible. DC charging provides Vehicle-to-Grid (v2g) protocol. A charging station is accessible to multiple electrical vehicles and has an additional current mechanism to disconnect the power when EV is not charging. Standard socket outlets are used to connect EV to the power grid. The safety regulations, earthing system and a circuit breaker are important to protect against an earth leakage protection and overload. Battery capacity and charging power affects the charging time.

III. PROPOSED SYSTEM

In the Existing Project, the charging rate and discharging rate of batteries are calculated by using coulomb counting .

BMS is also equipped with temperature sensor to determine if the battery has reach over heating state.

So the battery can be monitoring and protected from over charging (or) over discharge and also over heating condition.

Fuzzy logic is a compact representation of Human knowledge, its used to consider an air temperature measuring sensor.

PROPOSED BLOCK DIAGRAM

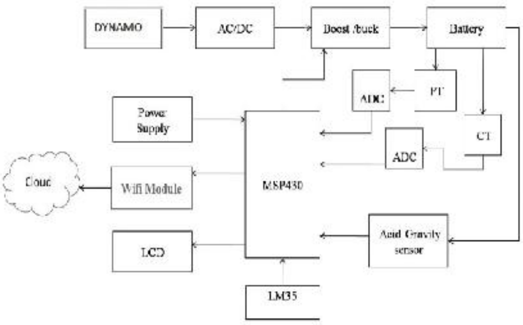

Figure-1.Block Diagram

IV. SYSTEM DESIGN

The dynamo is connected to the rectifier and to the Control unit and to Dc-Dc converter. The condition of the battery is monitor by the LCD display and stored in the cloud IoT. The LCD can Monitor Temperature, Voltage, Acid Level, Generator output and State of charge.

V. EXPERIMENTAL SETUP

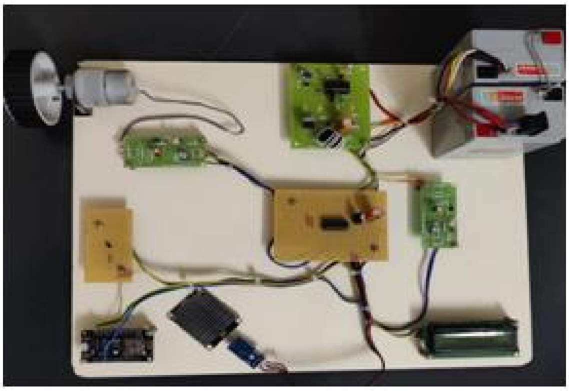

Figure-2.Snapshot of hardware kit

The Dynamo Produce AC source as output it is converted into Dc in rectifier and send to the Control unit MSP430 its is the brain of the system its used to monitor and store the output values on the cloud.

The Dc-Dc converter is used to maintain the level of charging the battery the temperature sensor lm35 used to measure the heat of the battery . The acid sensor is used to measure the acid level of the battery.

VI. RESULT AND DISCUSSION

Figure-3.Snapshot of output

This output of LCD shows the temperature and Acid level of the battery.

Figure-4.Snapshot of Output

This output shows that Battery Voltage , Generator Voltage by Dynamo , State of Charging, Kilometer that vehicle can travel.

S.NO	EXISTING SYSTEM	PROPOSED SYSTEM
1	EFFICIENCY 78%	EFFICIENCY 96%
2	DEFFICULT TO CONFIGURE	EASY TO CONFIGURE
3	VOLTAGE DROP OCCUR	VOLTAGE DROP NOT OCCUR
4	IOT NOT INTERFACED	IOT INTERFACED
5	LOW POWER	HIGH POWER
6	OUTPUT VOLTAGE 12 V	OUTPUT VOLTAGE 24V

VII. FUTURESCOPE

The BMS optimization algorithm could be further improved by considering the cost of each charge of each cells as an techno economical and discharge cycle of battery to prevent excessive activities that could shorten the battery life.
Algorithms can be developed to predict power usage and generation in the microgrid, such algorithms can be integrated with optimization-based power flow control method for real time energy management in the microgrid.

New transmission capacity and better operating practices, such as greater automation controller, forecasting, renewable energy visibility, and transmission planning methods, market integration and implementation of smart energy management systems can resolve the problems and challenges for grid operators, often circumventing the need for curtailment

VIII.CONCLUSION

In this way developing the system model for battery management in electric vehicle by controlling the crucial parameters such as voltage, current, state of charge, state of health, state of life, temperature. It is every important that the BMS should be well maintained with battery reliability and safety. This present paper focusses on the study of BMS and optimizes the power performances of electric vehicles. Moreover, the target of reducing the greenhouse gases can greatly be achieved by using battery management system.

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