Innovative Journal for Opportunities and Development in Science & Technology,
Volume 1,Issue 11, July 2021
Paper Id: – IJ2021V1I11 -3A-D,
ISSN 2582-6026

A REVIEW ON SMART RESERVE CAPACITY FOR ELECTRICAL VEHICLES WITH INTELLIGENT BATTERY SAFETY MONITORING

[1]Ashutosh N. Kandelkar , [2]Abhijeet G. Surve,[3]Rahul R. Mahale,[4]Prof. Piyush M. Desai

[1]UG Scholar, Electrical Engg. Dept., Sandip Institute of Engg.& Management -Nashik, Maharashtra
[2]UG Scholar, Electrical Engg. Dept., Sandip Institute of Engg.& Management -Nashik, Maharashtra
[3]UG Scholar, Electrical Engg. Dept., Sandip Institute of Engg.& Management -Nashik, Maharashtra
[4]Assistant Prof., Electrical Engg. Dept., Sandip Institute of Engg.& Management -Nashik , Maharashtra
desaipiyush@gmail.com

ABSTRACT:-This paper gives a detailed analysis on battery management system (BMS) in Plug in Electric Vehicle (PEVs).It shows an investigation of interfacing save energy ability to run vehicle during questionable condition. As we probably are aware major dubious circumstance is release condition of battery at this state we can't move vehicle further in the event that we need to begin vehicle, first we need to charged its battery then just it is conceivable to start. But connecting a reserve capacity to the electric vehicle gives an opportunity to run vehicle after discharging of main battery.

Key ward: Battery Management System (BMS), Depth of Discharge (DOD), State of Health (SOH), State of Charge (SOC)

I. INTRODUCTION

EVs are supposed to be green solution in today's scenario, because it is pollution free, quick start mechanism, energy efficient, less noisy, and provide smooth travel experience. Also, application of digital system in EV makes EV more attractive. Digital smart technology gives better control on speed as well as energy. However, that isn't adequate if there should arise an occurrence of auto, in light of the fact that each BEV's (Battery Electric Vehicle) is absolutely relies upon its principle battery for its energy prerequisites. In the event of BEVs there is a gigantic burden which is given underneath: driving to engine, regulator, BMS, head light, tail light, bearing sign light, horn, Digital presentation screen, music framework on the off chance that four wheeler, Air conditioner. That is the reason we need total track of voltage level of primary battery. Be that as it may, assuming driver gives his consideration in plain view of his vehicle, it is hard to drive vehicle on street or it very well might be hazardous to his life as well

Innovative Journal for Opportunities and Development in Science & Technology,
Volume 1,Issue 11, July 2021
Paper Id: – IJ2021V1I11 -3A-D,
ISSN 2582-6026

as passenger's life. The above description gives perfect idea why we need we need to connect reserve capacity with intelligent monitoring.

II. SYTSEM DESCRIPTIONS

The Fig. 2.1 shows the block diagram of the proposed system. It consists of sensor, thermal sensor, timer and the controller. From the literature it is conclude that use of UV light for disinfection has proved to be suitable for disinfection of the surface area.

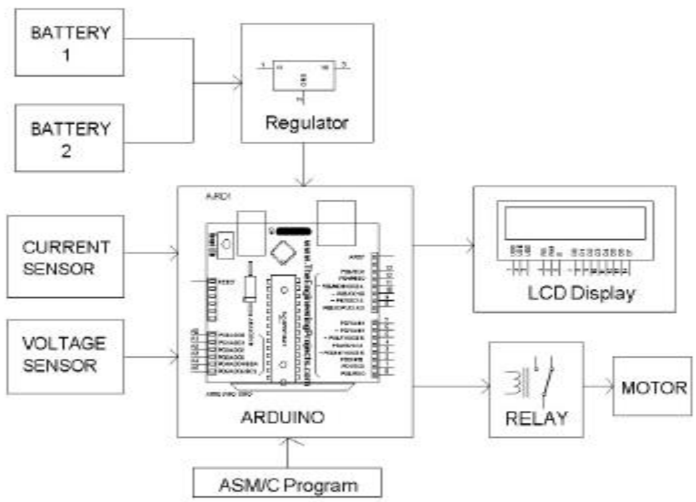

Fig 2.1 Block diagram of smart reserve capacity for EV

Following are the main components of the system.

1. Power supply: Power supply provides the power to all other components of the system such as controller, motor and led's etc. As per the requirement of the different components the power at different voltage levels is made available in this.
2. Temperature sensor: This is also an input of the system. Temperature of the battery casing is detected by this sensor at the time of on condition of vehicle. If the temperature of the battery casing is greater than 40 degree Celsius then buzzer will on, shows abnormal condition.
3. Controller: The whole process is controlled by microcontroller. It controls all the components such as input sensors, output devices such as motor, buzzer, LCD. For this controller C language is used for developing the code for smart reserve capacity, battery safety monitoring, buzzer etc.
4. Relay: Relay is used to detect discharge voltage level of main battery and switch the load on second battery or reserve battery and showing indication by glowing red led which is clear indication of the vehicle is running on reserve capacity.
5. LCD: It is the output device and display the information about the status of Battery one (B1) voltage and Battery two (B2) voltage, current consumption (I) and finally temperature of battery casing.

6. Buzzer: It is also output device and it will turn ON when current is greater than prescribed value and temperature of battery casing is greater than 40 degree Celsius.

III. WORKING OF PROPOSED SYSTEM

1. The Fig. 3.1 shows flow chart of the system. In this project we are using Arduino UNO as a controller, current sensor for detecting the current through the heap or engine, voltage sensor for detecting the voltage across the heap or engine, LCD shows Battery1 and Battery2 voltage level, hand-off is utilized to detect strange condition, temperature sensor sense temperature level of battery packaging and the engine goes about as a drive for EV. For connecting power supply two input portsmade available for connecting two source, 1st source for connecting battery one (main battery) and second source for connecting battery two (reserve battery).

2. Defining the abnormal condition:
a. When battery one (B1) voltage level gets reduce below 10 volts due to discharging or any fault in it then relay gets actuated and indicating light will glow. And motor load gets shifted on battery two (B2).
b. When battery one (B1) temperature increases above 40 degrees Celsius then relay actuate and buzzer will be ON.
c. When current value increase above 1Amp then relay gets actuated and buzzer will get ON both the battery having same voltage rating with different AH capacity.

3. What is Reserve Mechanism: Reserve battery and main battery has same voltage level of value 12 volt and but different AH capacity let’s say main battery Amp-hour capacity 7.2AH and reserve battery Amp-hour capacity 1.2AH.
4. What is battery monitoring: When a system is turned ON then voltage level, current level and temperature level is monitored and its value is display on LCD. And hence battery condition is monitored.

The step-by-step procedure is as follows.
Normal operation
Defining Normal operation: When a system is running in normal operation battery one voltage is in between 12 to 10 volt, current range between 0 to 0.99 Amp and temperature range between 0 to 39 degree Celsius.
Display Result: a) Battery one (B1) Voltage is 11.70 volt
b) Battery two (B2) voltage is 12.60 Volt
c) Current through load/motor is 0.06 Amp
d) Temperature is 30 Degree Celsius

Protective system: Indicating lamp status is OFF.
Buzzer sound status is OFF.
Defining abnormal condition: When battery one (B1)

Innovative Journal for Opportunities and Development in Science & Technology,
Volume 1,Issue 11, July 2021
Paper Id: – IJ2021V1I11 -3A-D,
ISSN 2582-6026

voltage goes below 10 Volt relay goes high and indicating lamp will glow. This result shows the total load is shifted to battery two (B2).

Display Result: a) Battery one (B1) voltage is 9.923 volt.
b) Battery two (B2) voltage is 12.60 volt.
c) Current through load/motor is 0.02 Amp.
d) Temperature is 30 Degree Celsius.
Protective system: Indicating lamp status is ON.

Buzzer sound status is OFF.
Defining abnormal condition: When current through load increases to a value above 1 Amp then buzzer will give sound.
Display Result: a) Battery one (B1) voltage is 10.45 volt.
b) Battery two (B2) voltage is 12.2 volt.
c) Current through load is 1.0617 Amp.
d) Temperature is 30 Degree Celsius. Protective system: Indicating lamp status is OFF.

Buzzer sound status is ON.

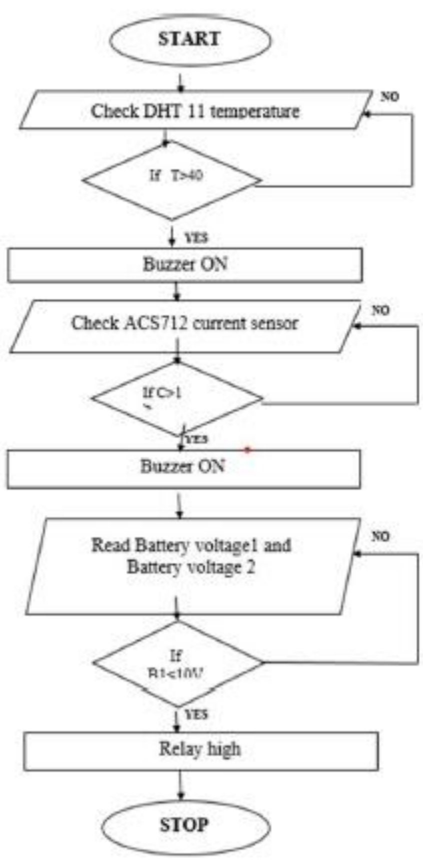

Fig 3.1 Flow chart of the working of system

Innovative Journal for Opportunities and Development in Science & Technology,
Volume 1,Issue 11, July 2021
Paper Id: – IJ2021V1I11 -3A-D,
ISSN 2582-6026

IV. FEATURES OF THE SYSTEM

Advantages, limitations and of the system is as follows.

A. Advantages

1) Increased reliability of the batteries in the vehicle.
2) In case of battery faults/cut outs vehicles can be taken to the nearby charging station through reserve capacity battery.
3) Reserve battery unit will be generally powered by regenerative breaking or any other source of power in the vehicle. This makes it more energy efficient.
4) Automatic battery health parameters monitoring will make Electric vehicle drive more safer and trouble free.
5) By application reserve battery in electric vehicle KM range of electric vehicle will also increase.
6) Smart monitoring gives the best voltage level tracking system in electric vehicle.
7) Smart monitoring and automatic alert mechanism give smooth working of vehicle as well as reduce
Overall maintenance cost which is required when any of the problem occurs.

B. Limitations

There are very less disadvantages in these systems which are in given below.
1) Increase in the cost of battery which is used as a reserve battery.
2) Increase in weight of vehicle when reserve battery is used in electric vehicle but this disadvantage is overcome by using light weight technology and less amp hour capacity battery.

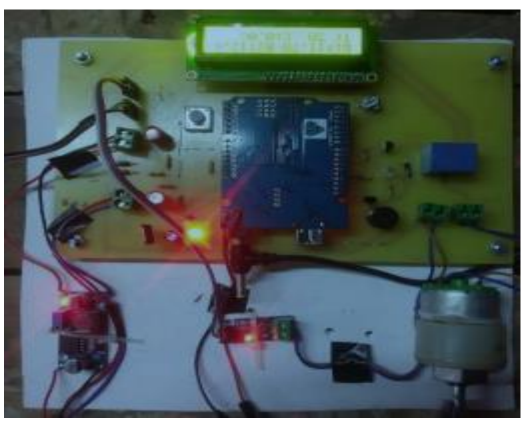

Fig 4.1 Hardware design of the System

V. CONCLUSIONS

This course of action exhibits an original battery the executives framework which effectively screens the basic boundaries like voltage, temperature, current and plays out an important activity via naturally moving the heap towards solid battery at whatever point required. The framework is incorporated with regulator for checking and controlling reason. Proposed battery the board framework constantly screens voltage. In the event that voltage of battery one gets decreased beneath limit esteem, load gets naturally shifted on battery two. Then this data is display on LCD and validation of an efficient battery management system has been partially accomplished. Several imperative tasks viz., voltage, current and temperature of battery have been monitored and display.

REFERENCES

[1] Electric vehicle technology explained 2nd edition A. Nordelöf, M. Messagie, A. Tillman, M. Söderman, and J. Mierlo, "Environmental impacts of hybrid, plug in hybrid, and battery electric vehicles – what can we learn from life cycle assessment?", Int J Life Cycle Assess (2014) 19:1866–1890.

[2] P. Egedea, T. Dettmera, C. Herrmanna, and S. Karab, "Life Cycle Assessment of Electric Vehicles – A Framework to Consider Influencing Factors", The 22nd CIRP conference on Life Cycle Engineering, Procedia CIRP 29 (2015) 233–238.

[3] T. Hawkins, B. Singh, G. Majeau-Bettez, and A. Strømman, "Comparative Environmental Life Cycle Assessment of Conventional and Electric Vehicles", Journal of Industrial Ecology vol. 17, no. 1, 2012, pp. 53– 64.

[4]M. Messagie, F. Boureima, T. Coosemans, C. Macharis, and J. Mierlo, "A Range-Based Vehicle Life Cycle Assessment Incorporating Variability in the Environmental Assessment of Different Vehicle Technologies and Fuels", Energies 2014, 7, 1467–1482.

[5]P. Lebeau, C. Macharis, J. Mierlo, and K. Lebeau, "Electrifying light commercial vehicles for city logistics? A total cost of ownership analysis", EJTIR 15(4), 2015,

[6] http://www.bbc.com/news/business-19830232 (last visited – Nov. 2015).

[7] http://onlinelibrary.wiley.com/doi/10.1111/j.1530-9290.20 12. 00532.x/abstract (last visited – Nov. 2015).

[8]http://www.conserve-energy-future.com/advantages-and-disadvantages-of-electric-cars. php (last visited – Nov. 2015).