International Journal of Innovative Research in Computerand Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.194 |

||Volume 8, Issue 4, April 2020||

Battery Management System For Electrical Vehicle

Vishwajeet B. Shinde[1] , Indrajit B. Malwade[2], Amol S. Sonakamble[3], Prof.Amol D. Sonawane[4]

BE Student, Department of Electronics and Telecommunication, JSPM's RSCOE, Pune-33, India[1]

BE Student, Department of Electronics and Telecommunication, JSPM's RSCOE, Pune-33, India[2]

BE Student, Department of Electronics and Telecommunication, JSPM's RSCOE, Pune-33, India[3]

Asst. Professor, Department of Electronics and Telecommunication, JSPM's RSCOE, Pune-33, India[4]

ABSTRACT: With the increase in the electrical vehicle industry,there is a drastic demand for an efficient battery management system but for that initially monitoring of the battery is required.For electrical or hybrid electrical vehicles in today's world there is an increasing need to manage performance and parameters of battery as fuel system for vehicle safety such as overheating, explosion, excessive discharge current voltage level to maintain vehicle in better working condition. In India we can see an exponentialgrowth in the number of electric Rickshaws which use Lead Acid battery instead of using a more efficient lithium ion battery. Hence it is important to build a battery monitoring and management system for lead acid battery.In thissystem the values of temperature,current and voltage are been taken through various sensors and are processed byATMEGA328P microcontroller. The real time SOC, charging or discharging conditions, voltage and current are displayed on a LCD screen. Aim of this product is to get involved in many of the industries where Automation is done in automatic electrical vehicle and hybrid electrical vehicle. It is easy to replace battery after knowing the levels of parameters early so it can be possible to maintain vehicle in good condition with low cost.

KEYWORDS: Micro-controller ATMEGA328P, Lead Acid battery, Current Sensor, Voltage Sensor, Temperature Sensor Motor driver etc

I. INTRODUCTION

A literature review has revealed that BMSs are still in a premature stage. The reliability of BMSs would still make end users suspicious. Thus, the gap between the laboratory tests and the real requirements should be addressed by future research. Generally, the estimation and prediction methods have unfeasible hardware requirements, such as, impedance measurement, which is costly and not practical in many BMS applications today. Meanwhile, the high computational complexity depends on costly hardware, like the central processor. It can be seen that the linearity between high performance and feasibility in a BMS is important. The performance of BMSs under operating conditions, such as vibration from bumpy roads and temperature extremes from snow, rain or summer heat, has rarely been studied. These external loads will be reflected in the battery's available capacity. Thus, it will add un-modeled effects not taken into account in existing models. As the present scenario, the charging time required is about 6 to 8 hours when normal charging is considered, which imposes another challenge of time management. While talking about fast charging this can go well under 90 minutes or less, but this depends on the availability of charging stations.

DC charging points need charging infrastructure, which is yet another difficult to overcome.But some of leading EV companies across globe like Tesla,Nissan,Mahindra has taken initiative and also laid charging stations.

emergency situation the message is send to the family or the friends. The water sensor which is connected to the bottom of the stick is used to detect the wet surface in path and notify to the user.

II. METHODOLOGY

To develop a better BMS we need to have a good understanding of the relation of the temperature with the SOC. Also, the precession has to improve with time and hence we should try to incorporate more hybrid methods with which problems like early discharge could be avoided. These days the trend of electric cars is catching its pace and the demand of the market looks for a better solution for EV's and this technology can be best incorporated in the vehiclesbecause of their extensive use of the Lead Acid battery. It could possible to combine controller for motor drive

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.194 |

||Volume 8, Issue 4, April 2020||

and BMS. With the help of good understanding of the batteries in various condition and smarter battery management system can achieve a better efficiency and power at the same time.

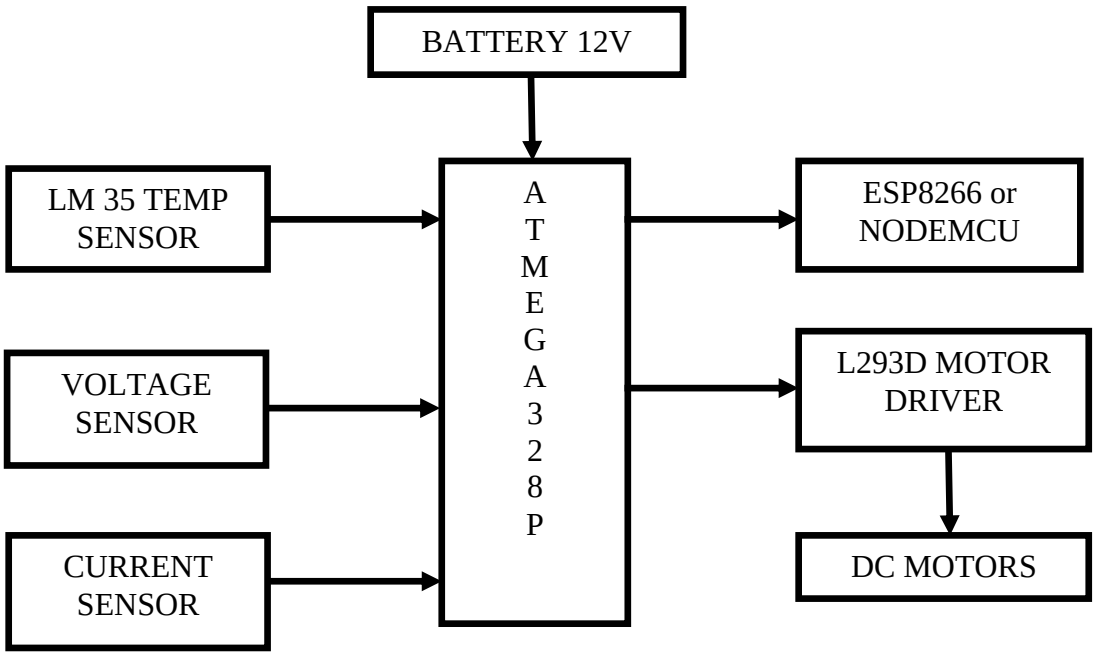

Fig.1. Block diagram of proposed system

Through this project we have tried to design and implement a circuit for battery management system for electrical vehicle to monitor battery parameters like temperature, voltage and current. On turning on the system, power supply is given to all devices for power up. The microcontroller (ATMEGA328P) controls the operation of different sensors, wifi module and motor driver IC's. It also senses the physical parameters of battery like temperature, current and voltage which is obtained from sensors. The physical sensed parameters by microcontroller are send over the mobile application through wifi module. Android application displays all the sensed parameters and the values of these parameters are continuously changes according to the use of battery.The LM35 Temperature sensor is used to measure temperature of battery. By using voltage divider circuit Or voltage sensor battery voltage is measured. The current sensor ACS-712 is used to measure current of battery.Using L293D motor driver Dc motors can be operates. We use Wifi module ESP8266 or NODEMCU for communication between hardware and Software part.For demonstration purpose a four wheel drive car is designed which can be controlled by android application using wifi module.

Micro-controller (ATMEGA328P): The ATMEGA328P is a single chip micro-controllercreated by Atmel in the mega AVR family. It has modified harward architecture 8bit RISC processor core.Microcontroller is used for controlling purpose. It is cost efficient, fully static operation and advanced RISC architecture for faster execution

Temperature sensor (LM35): The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin,

Dc motors:A DC motor is equipped with magnets, either permanent magnets or electromagnetic windings, that produce a magnetic field. When current passes through the armature, also known as the coil or wire, placed between the north and south poles of the magnet, the field generated by the armature interacts with the field from the magnet and applies torque.

ESP8266 wi-fi module: It can be controlled from your local Wi-Fi network or from the internet (after port forwarding). The ESP-01 module has GPIO pins that can be programmed to turn an LED or a relay ON/OFF through the internet.

ACS-712:A current sensor is a device that detects electric current in a wire and generates a signal proportional to that current. The generated signal could be analog voltage or current or even a digital output. The generated signal can be then used to display the measured current in an ammeter, or can be stored for further analysis in a data acquisition system, or can be used for the purpose of control.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.194 |

||Volume 8, Issue 4, April 2020||

FLOWCHART

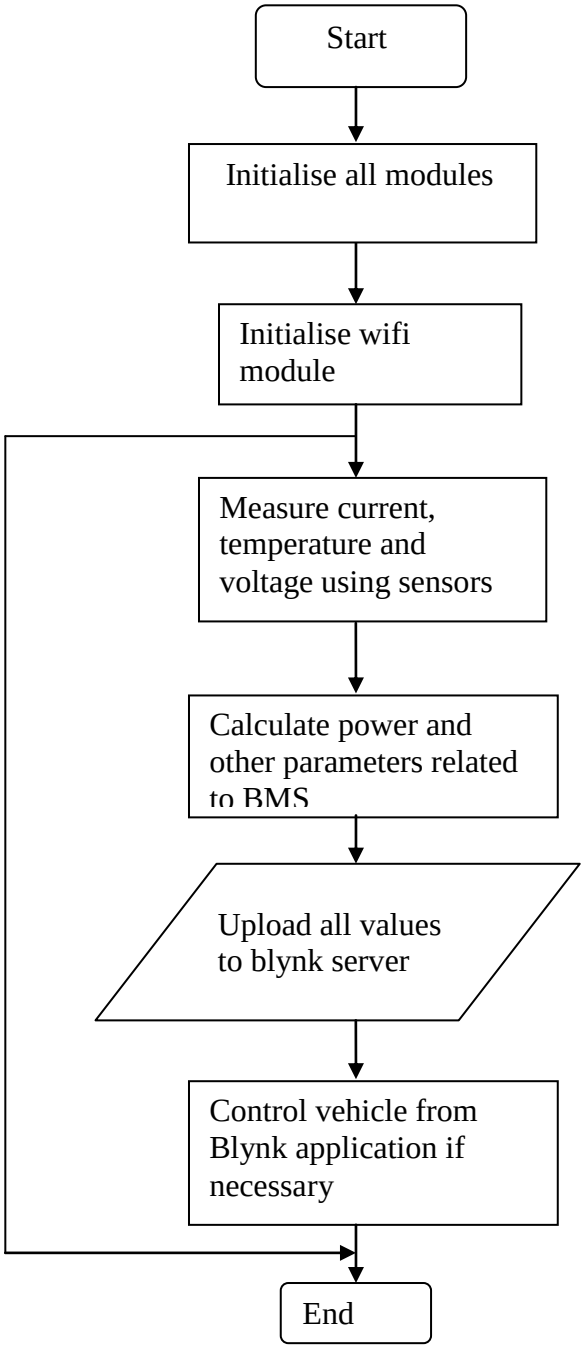

Fig.2. Flow chart

On turning the system on all modules are initialize, also initialize wifi module. Using different sensor measure the parameters of battery such as voltage, current & temperature further calculate power and other parameters related to battery management system. When we get the battery information using sensors upload that data on the blynk server using wifi module. Also we can control from android application if it is necessary and all the battery parameters are displayed on the screen.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.194 |

||Volume 8, Issue 4, April 2020||

III. RESULTS AND DISCUSSIONS

As per the existing system, the process of testing involves checking of different parameters like temperature sensor, current sensor, voltage sensor, motor, wifi module, controller, etc. We tested all these parameters accordingto its specifications. In the observed result we saw that, voltage, current, temperature sensors are successfully updating their output according to the use of battery. The expected outcome of this system would be that the battery management system would be able to measure all the battery parameters successfully and showing it on android application using wifi module and continuously notify the user by updating the behaviour of battery parameters. This would, in turn, help the person to avoid any mishap.

IV. CONCLUSION AND FUTURE WORK

The proposed system is designed and implemented to measure the battery parameters of electrical vehicles effectively and display battery parameters on smart phone using wireless technology. The rechargeable batteries are lead acid and it has been strongly recommended for electrical vehicles because of high power density, long lifespan and relatively low cost and the proposed system is designed to achieve safe and reliable for battery management.
Battery management System can be used in Automobile Industries for design and development of Electrical and Automotive Vehicles for their Electrical safety. We can use Fuzzy logic for Energy management of vehicle system in future for better performance of Battery life span.For energy saving in future solar panel can be used. Super capacitor is also option for fast charging of batteries.

REFERENCES

1. Perez, R. (1993). Lead-acid battery state of charge vs. voltage. Home Power, 36, 66-69.
2. Pavlov D. (2011) Lead-Acid Batteries: Science and Technology, Elsevier London.
3. Chang, W. Y. (2013). The state of charge estimating methods for battery: A review. ISRN Applied Mathematics, 2013.
4. Guo-quan, X. I. N. G. (2007). Temperature Characteristics and Application of LM35 Sensor [J].Information of Medical Equipment, 11, 20.
5. Li, L., Chen, Y., & Liu, J. (2010, October). The application of hall sensors ACS712 in the protection circuit of controller for humanoid robots.In Computer Application and System Modelling (ICCASM), 2010 International Conference on (Vol. 12, pp. V12-101).IEEE.
6. Coleman, M., Lee, C. K., Zhu, C., & Hurley, W. G. (2007). State-of-charge determination from EMF voltage estimation: Using impedance, terminal voltage, and current for lead-acid and lithium-ion batteries. IEEE Transactions on industrial electronics, 54(5), 2550-2557.
7. H. Mahyiddin, M. R. Mohamed, Z. Mustaffa, A. C. Khor, M. H. Sulaiman, H. Ahmad, S. Abdul Rahman.“ Fuzzy logic energy management system of series hybrid electric vehicle”, IEEE Issue no: 32 -I 2017
8.Subah Saib,Zahir Hmuada, “Energy Management in a Fuel Cell Hybrid Electric Vehicle using a Fuzzy Logic Approach”, IEEE, Issue no: r 29-31, 2017
9.Qiwei Xu, Xiaobiao Jiang, Shurnei Cui, Jing Sun “Comparison Analysis of Power Management used in Hybrid Electric Vehicle based on Electric Variable Transmission”, IEEE, Issue no: 978-1-4673-9891©2016 IEEE