International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Iot Electric Vehicle Health Monitoring System Such As Battery Voltage, Temperature, Running Status Using Blynk Cloud Server

P.Manjusha[1], L.Pavani[2], G.Karthikeya[3], E.Srinivas[4], V.Suresh[5], V.Varma[6]

[1]Assistant Professor, Department of Electrical and Elcetronics Engineering, VSM college of Engineering, Ramachandrapuram, Andhra Pradesh, India
[2,3,4,5,6]UG Students, Department of Electrical and Elcetronics Engineering, VSM college of Engineering, Ramachandrapuram, Andhra Pradesh, India

Abstract
Electric Vehicles (EVs) are getting more and more popular in the modern world as petrol costs climb. Due to this situation, a lot of automakers are exploring gas substitutes for other energy sources. By lowering pollutants, using electrical energy sources might be good for the environment. In addition, EVs offer noteworthy advantages in terms of energy savings and environmental protection. Rechargeable lithium-ion batteries will be used in a greater number of electric vehicles. It's considerably smaller than lead acid. It actually has a life cycle that is 6 to 10 times longer than a lead acid battery and provides consistent power. In the recommended method, an electric car battery's performance is tracked via the Internet of Things. It is clear that a battery is the only source of electricity for an electric vehicle. Performance, however, degrades when energy input to the vehicle drops. This poses a severe problem for the battery business. The idea of employing IoT technology to directly monitor the performance of the vehicle is put out in this article. The suggested IoT-based battery monitoring system includes monitoring tools and a user interface. According to the findings of the experiments, the system may be able to recognize declining battery efficiency and send alert notifications directing the user's next move. Microcontroller and IoT based Battery Monitoring system is designed to check the status of Lithium Battery and upload data on cloud server.

INTRODUCTION

An electric vehicle EVs is a type of vehicle that uses one or more electric motors for propulsion. Instead of using an internal combustion engine (ICE) that burns fuel, an EV use a battery pack to store electrical energy to power an electric motor, which turns the wheels. Compared to conventional ICE vehicles, EVs provide a number of benefits, such as decreased emissions, quieter operation, and a lessened reliance on fossil fuels. Since electricity is frequently less expensive than gasoline and electric motors are more efficient than ICEs, they also typically have reduced operational expenses. The popularity of EVs is fast rising as the globe moves towards a cleaner, more sustainable future. Governments all around the world are granting incentives to stimulate the use of EVs, and numerous automakers are already selling a variety of EV models. In addition to its benefits, common EV problems include internal cell shorts that may result in thermal runaway. An EV typically catches fire because of excessive heating. The electric vehicle's battery warms up, and when that heat interacts with petrol that has leaked, the battery simply

catches fire. A battery management system (BMS) is an electrical device that controls and keeps track of the operation of rechargeable batteries, such as those found in renewable energy sources and electric cars. By regulating the charging and discharging process, keeping track of the battery's state of charge and overall health, and guarding the battery from harm brought on by overcharging or overheating, the BMS aids in ensuring the safe and effective operation of the battery.

What is IOT?

Internet of Things (IoT) is an ideal buzzing technology to influence the Internet and communication technologies. IoT allows people and things to be connected anytime, anyplace, with anything and anyone, by using ideally in any path/network and any service.

Why IOT Technology is important?

The term "Internet of Things" has come to describe a number of technologies and research disciplines that enable the Internet to reach out into the real world of physical objects.

The term "Internet of Things" has come to describe a number of technologies and research disciplines that enable the Internet to reach out into the real world of physical objects. The Internet of Things, also called The Internet of Objects, refers to a wireless network between objects.

From any time, any place connectivity for anyone, we will now have connectivity for anything.

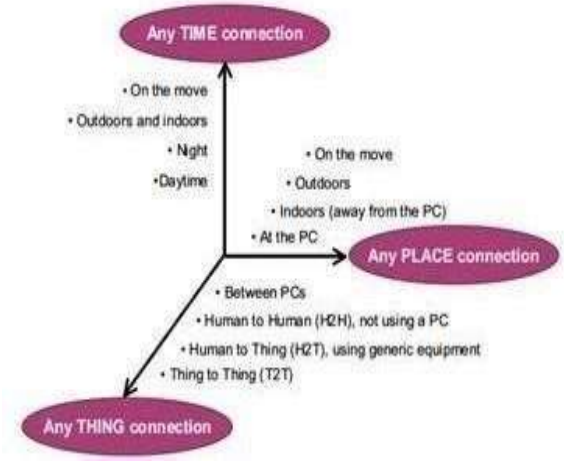

Figure.1: IOT Technology

The Internet of Things represents an evolution in which objects are capable of interacting with other objects. Hospitals can monitor and regulate pacemakers' long distance, factories can automatically address production line issues and hotels can adjust temperature and lighting according to a guest's preferences, to name just a few examples.

LITERATURE SURVEY

Battery Energy Storage System (BESS) and Battery Management System (BMS) for Grid-Scale Applications Due to a discrepancy between the quantity of energy consumers use and the amount of energy generated by generation sources, the current electric grid is an inefficient system that wastes a considerable amount of the electricity it generates. In order to assure adequate power quality, power plants often produce more energy than is required. Many of these inefficiencies can be eliminated by making use of the energy storage that already exists inside the grid. To accurately monitor and regulate the storage system while using battery energy storage systems (BESS) for grid storage, comprehensive modelling is needed. The storage system is controlled by a battery management system (BMS), and a

BMS that makes use of sophisticated physics-based models will enable considerably more reliable operation of the storage system. The essay describes theMatthew T. Lawder; BharatkumarSuthar; Paul W. C.
Northrop; Sumitava De; C. Michael Hoff; Olivia,2008.
A Battery Modular Multilevel Management System (BMS) For Electric Vehicles And Stationary Energy Storage Systems. Although the reliance of energy systems on battery storage systems is constantly growing, there are still a number of issues that need to be resolved. Current battery systems are rigid; only cells with the same electrical characteristics may be coupled; and cell flaws significantly shorten the lifespan of the entire battery or even trigger a system blackout. Additionally, the system's weakest cell restricts the system's maximum useful capacity and maximum charging current. Current Battery Management Systems (BMS) are able to enhance the maximum useful charging current as well as the useable battery capacity to some extent. A very adaptable, fault-tolerant, and economical battery system can be developed with the help of the Battery Modular Multilevel Management System (BM3) described in this work. With the current setup, it Published in: 2014 M.Hesan in 16th European Conference on Power Electronics and Applications.
A Battery Modular Multilevel Management System (BMS) For Electric Vehicles And Stationary Energy Storage Systems The dependency of energy systems on battery storage systems is constantly increasing, but there are still several unsolved problems. Current battery systems are inflexible, only cells with the same electrical parameters can be combined, and cell defects cause a high reduction of the overall battery lifetime or even a system black out. In addition, the maximum usable capacity and the maximum charging current are limited by the weakest cell in the system. Current Battery Management Systems (BMS) can increase the usable battery capacity to some extend and are able to enlarge the maximum usable charging current. With the Battery Modular Multilevel Management System (BM3) presented in this paper, a very flexible, fault tolerant, and cost- efficient battery system can be implemented. With the system it is possible to establish either serial or parallel connections between neighboring cells or to bypass a cell. Thus the cells can be operated according to their needs and their state of charge (SOC). Separate balancing means for balancing the cells SOC, however, become obsolete. Published in: 2014 16th European Conference on Power Electronics and Applications.

EXISTING SYSTEM

Charging of Lithium Ion Battery is crucial method and it has to be monitored closely its parameters such as Temperature, Voltage. User has to monitor this data by visiting to charging area such as near vehicle. 8051 based microcontroller is used to designed this system, which process data very slowly. Earlier the was No Balance charging system to charge this battery, that doesn’t charge the battery evenly and dangerous.

PROPOSED SYSTEM

In this proposed system, we have designed a Innovative solution to monitor the Electric Vehicles battery wireless from anywhere. We have used Blynk based cloud server to monitor the battery health parameter such as Voltage, Temperature and charging status online using Cloud server. User can monitor this data wirelessly from anywhere in thse world. This system is designed using Arduino based high speed controller, Nodemcu and multiples sensor as main components. User can monitor the battery status using Blynk based Application. 12V Transformer based power supply is used to provide energy to this system

and using Voltage Regulators and filter capacitor it generated stable output voltage. BMS based balance charging system is used to charge this lithium Ion Battery.

SOFTWARE

For developing this project, we mainly used software is Arduino IDE . The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Here, IDE stands for Integrated Development Environment.

Embedded C ?

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems.

Embedded C programming typically requires nonstandard extensions to the C language in order to support enhanced microprocessor features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. The C Standards Committee produced a Technical Report, most recently revised in 2008[1] and reviewed in 2013,[2] providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as fixed-point arithmetic, named address spaces and basic I/O hardware addressing. Embedded C uses most of the syntax and semantics of standard C, e.g., main() function, variable definition, datatype declaration, conditional statements (if, switch case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.[3]

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software.

Embedded C programming plays a key role in performing specific function by the processor. In day-to-day life we used many electronic devices such as mobile phone, washing machine, digital camera, etc. These all device working is based on microcontroller that are programmed by embedded C.

METHODOLOGY

In this project, we have designed an efficient Lithium Ion Battery Health monitoring for system for Electric Vehicles. In this design we have using Arduino UNO Controller as main brain of this system and BMS (Battery Management System) Module is used to charge the Lithium Ion Battery. Voltage Sensor is used to monitor the Battery Level and display in LCD Module. This system is also interfaced with Thermistor to monitor the Battery temperature while charging. Nodemcu module is used for Wi- Fi internet connectivity. Using this sensor data is transferred to Blynk Cloud Server. User can view this data such as Temperature, Voltage and Charging Status on Blynk Cloud Application.

Embedded C Programming along with Arduino ide compiler is used to program the microcontroller board. LCD Module is connected to 2,3,4,5,6,7, Sensor are connected to analog pin of microcontroller, Node MCU is connected to 8,9 Digital Pins. To Power this entire System we have 12V Transformer based Power Supply. 1N4007 diode based full wave rectifier circuit is used rectify 12V AC voltage to 12V Dc Voltage. Voltage Regulator 7805 and 7812 are used to produce constant 5V and 12V DC Output. These Voltages are used by Arduino, LCD Module, and other Minor Circuit. Filter Capacitors are used to produced Constant and filtered DC Voltage. Voltage Sensor is used to monitor the Battery Level and display in LCD Module. This system is also interfaced with Thermistor to monitor the Battery

temperature while charging. Nodemcu module is used for Wi-Fi internet connectivity. Using this sensor data is transferred to Blynk Cloud Server. A Battery Modular Multilevel Management System (BMS) For Electric Vehicles And Stationary Energy Storage Systems. Although the reliance of energy systems on battery storage systems is constantly growing, there are still a number of issues that need to be resolved.

ADVANTAGES

- Real Time IoT Based Monitoring System
- Extended Battery Life
- Optimal Performance
- Voltage Level Monitoring On LCD
- Environmental Benefits
- Saftey and Reliability

APPLICATIONS

- Electric Vehicle Manufacturing.
- Energy Storage System.
- Public Charging Infrastructure.
- EV Battery Recycling.
- EV Service And Maintenance Centers.

EXPERIMENTAL RESULTS

From these results we can conclude the aim of developing cheap and effective vehicle health monitoring system was fulfilled, using which the monitoring of vehicle conditions is made easy for the owner. This also serves as a method for data acquisition to get information of variety of subsystemsofthe vehicle. For future endeavors it could be noted that the collected information could be shared with the corresponding service providers will allow them to discern and warn the user and direct them to servicing of vehicle, which is a form of remote monitoring that can be done by original manufacturers and servicing personnel just by sharing the information logged on IoT platform with them. The collected information will also serve its purpose for use in developing improved versions of the vehicle improving the research and development field. This allows the vehicle manufacturers to keep track of their vehicle parameters even after its sold allowing them to provide improved services to their custom

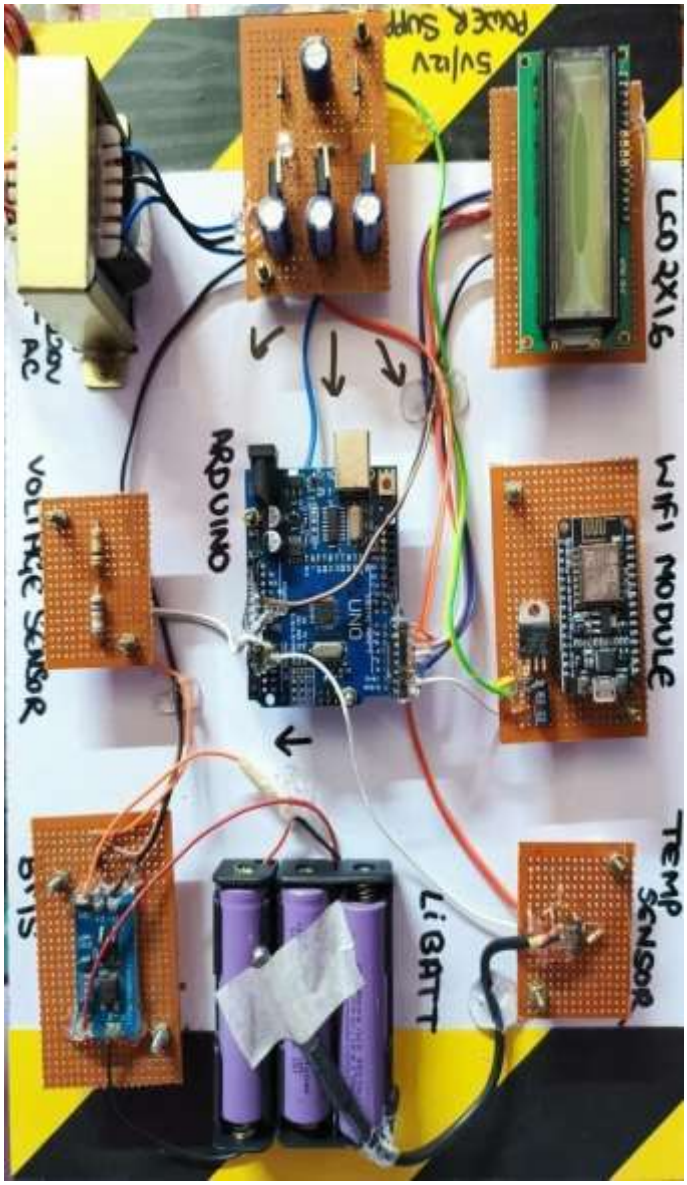

Figure.2: Before the Supply

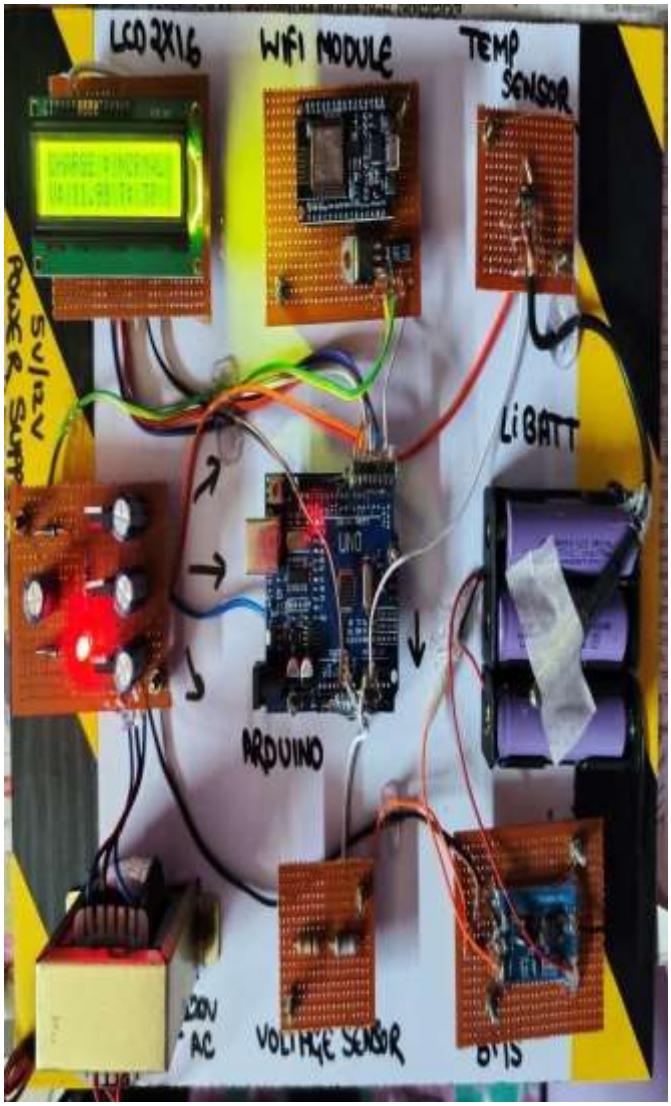

Figure.3: After the Supply

CONCLUSION

In conclusion, an essential part of electric vehicles that guarantees the security, dependability, and longevity of the battery pack is the EV BMS using IoT Technology. By supplying crucial safety features like Voltage Monitoring, Temperature Monitoring, cell balancing, and fire prevention, the system lowers the possibility of battery fires and enhances the overall efficiency of electric vehicles. In order to improve the features and capabilities of EV BMS with charge monitor and Temperature Monitoring System; more research and development is still possible. A few potential future work areas include enhancing the precision and dependability of battery monitoring systems to deliver more accurate and timely data regarding the charge, health, and function of the battery pack.

FUTURE SCOPE

In future this system can interface with Control system and Alert using GSM Technology. Using this if any parameter crossed threshold value, than further charging will automatically stops and generated SMS alert to the user.

REFERENCES

1. Y. Liu, X. Qian, and H. Guan, "Development of electric vehicle battery management system with charge balance control," IEEE Transactions on Power Electronics, vol. 28, no. 6, pp. 2901-2908, Jun. 2013.
2. D. Chao, C. Shen, and K. S. Low, "Real- time state-of-charge estimation for electric vehicle batteries using a coupled electrochemical-thermal model," Journal of Power Sources, vol. 329, pp. 261-268, Jan. 2017.
3. J. Li, J. Fan, and J. Li, "A novel active cell balancing scheme for series-connected battery packs of electric vehicles," IEEE Transactions on Vehicular Technology, vol. 68, no. 5, pp. 4138-4148, May 2019.
4. D. Wang, Z. Xu, and L. Xu, "An integrated thermal management system for lithium-ion battery pack in electric vehicles," Journal of Power Sources, vol. 329, pp. 337-348, Jan. 2017.
5. Chesnokov, A. S.; Gorodnichev, M. G.; Gavrish, K. A.; Zhidkova, M. A. "Intelligent Vehicle Condition Monitoring System", IEEE Systems of Signals Generating and Processing in the Field of on Board Communications - 1– 4, 2019 DOI: 10.1109/SOSG.2019.8706727
6. S. Byttner, T. Rögnvaldsson, and M. Svensson, "Consensus self-organized models for fault detection (COSMO)," Engineering Applications of Artificial Intelligence, vol. 24, no. 5, pp. 833–839, 2011.
7. R. Prytz, S. Nowaczyk, T. Rögnvaldsson, and S. Byttner, "Analysis of truck compressor failures based on logged vehicle data," in Proceedings of the International Conference on Data Mining (DMIN), p. 1, The Steering Committee of The World Congress in Computer Science, Computer Engineering and Applied Computing (WorldComp), 2013.
8. E. Naryal and P. Kasliwal, "Real time vehicle health monitoring and driver information display system based on CAN and Android," International Journal of Advance Foundation and Research in Computer, vol. 1, no. 11, pp. 76–84, 2014.
9. Uferah Shafi, Asad Safi, Ahmad Raza Shahid, Sheikh Ziauddin, Muhammad Qaiser Saleem, "Vehicle Remote Health Monitoring and Prognostic Maintenance System", Journal of Advanced Transportation, vol. 2018, Article ID 8061514, 10 pages, 2018.
10. M.Jyothi kiran, S.Ravi teja / International Journal of Engineering Research and Applications, "VEHICLE HEALTH MONITORING SYSTEM", (IJERA) ISSN: 2248-9622, Vol. 2, Issue 5, pp.1162-1167, September- October 2012.
11. Daniel Robin K. Jeffin Steve T., "Intelligent Condition Monitoring System for Hybrid Electric Vehicles - An approach to maximize the efficiency of HEVs" SSN- 2457-0931 Imperial International Journal of Eco-friendly Technologies Vol. - 2, Issue-1, pp.09-12, 2017 IIJET.