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EV BMS with Charge Monitor and Fire Protection

Miss. Vaishnavi. S. Shinde[1], Miss. Priti. T. Randhir[2],

Mr. Rohit. P. Gavade[3], Dr. D. S. Bhangari[4]

[1,2,3]Department of Electrical Engg. Sanjay Bhokare group of Institute, Miraj

[4]Professor, Department of Electrical Engg. Sanjay Bhokare group of Institute, Miraj

ABSTRACT: Battery storage is the most important part of any electric bus or vehicle (EV) and it stores the necessary energy for the operation of an electrical vehicle. To prize the maximum affair of a battery and to ensure its safe operations it's necessary. BMS (battery operation system) exactly works spectators all Parameters and gives necessary services to ensure the safe operation of the battery. Hence battery operation system forms an integral part of any electrical vehicle and Safety is handed to both the user and the battery by icing that it operates within its safe operating parameters. The given system only monitors the battery parameters and charges it safely and also protects it to avoid any damage or accidents. The given model has the following functions current dimension, voltage dimension, protection, battery status discovery on television, and charge battery safely, etc. Electric vehicles are buses powered by one or farther electrical motors, which draw energy from rechargeable batteries rather of counting solely on internal combustion machines that consume reactionary powers. A Battery Management System is a critical part of electric vehicles and other battery- powered systems. It monitors and controls the operation of the battery pack, icing its optimal performance and safety.

Keywords: Battery Management System (BMS), Electrical Vehicle (EV), Liquid Crystal Display (television),

I. INTRODUCTION

Electric vehicle EVs are the type of vehicle that uses one or more electrical motors for propulsion. Instead of using an internal combustion engine (ICE) that burns fuel, an EV uses a battery pack to store electrical energy to power an electrical motor, which turns the wheels. Compared to conventional ICE vehicles, EVs provide several benefits or advantages, such as decreased pollution, quieter operation, and a lessened reliance on fossil fuels. Electricity is frequently less expensive than gasoline and electrical motors are more efficient than internal combustion engines, they also have reduced operational expenses. The popularity of electrical vehicles is fast rising as the globe moves towards a cleaner, more sustainable future. Electric vehicles are the future of transportation, but EV technology has not been fully developed concerning efficiency and safety as of 2023. We come across electric vehicle battery fires and similar accidents as the EV market expands. Most electrical vehicle fire incidents occur due to battery blasts or fires. So here we attempt to solve this problem by using some

sensors and a battery pack-based system powered by an Arduino IDE controller. The system is designed to protect batteries from various parameters that may incite fire.

II. LITERATURE SURVEY

Check Battery Energy Storage System (BESS) and Battery Management System (BMS) for Grid-Scale operations. Due to a distinction between the volume of energy consumer's use and the amount of energy generated by generation sources, the current electric grid is a hamstrung system that wastes a considerable amount of the electricity it generates. To ensure respectable power quality, power shops constantly produce further energy than is demanded. Multitudinous of these inefficiencies can be barred by making use of the energy storage that formerly exists inside the grid. To directly cover and regulate the storage system while using battery energy storage systems (BESS) for grid storage, comprehensive modelling is demanded. The storage system is controlled by a battery operation system (BMS), and a BMS that makes use of sophisticated medicines- predicated models will enable extensively farther reliable operation of the storage system. The essay describes Matthew. Lewder; Bharat Kumar Suthar; PaulW.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 several issues that need to be resolved. Current battery systems are rigid; only cells with the same electrical characteristics may be coupled; and cell excrescencies significantly dock the continuance of the entire battery or indeed spark a system knockout. Also, the system's weakest cell restricts the system's maximum useful capacity and outside charging current. Current Battery Management Systems (BMS) can enhance the maximum useful charging current as well as the useable battery capacity to some extent. A truly adaptable, fault-tolerant, and provident 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 was published in 2014 by M. Hesan at the 16th European Conference on Power Electronics and Applications.

Battery Management System via Bus Network for Multi Battery Electric Vehicle. This paper proposes the multi- battery design of battery operation control using a machine communication system predicated on circle shaping. The trial of the proposed system shows that the capacity dynamics of the battery have been bettered. The multiple battery control system is executed in the electric vehicle's model, and we modify the origin control system using the machine communication system machine-tuning predicated on circle shaping. The result of the modified control system using the machine system predicated on circle shaping is shown in the performance design response of battery operation that the cost and responsibility are bettered. Also, this system could maintain the error steady state to be zero.

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Of five times. The time series monthly data is collected on stock prices for sample enterprises and relative macroeconomic variables for 5 times. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of the KSE- 100 index are taken from Yahoo Finance.

III. BLOCK DIAGRAM

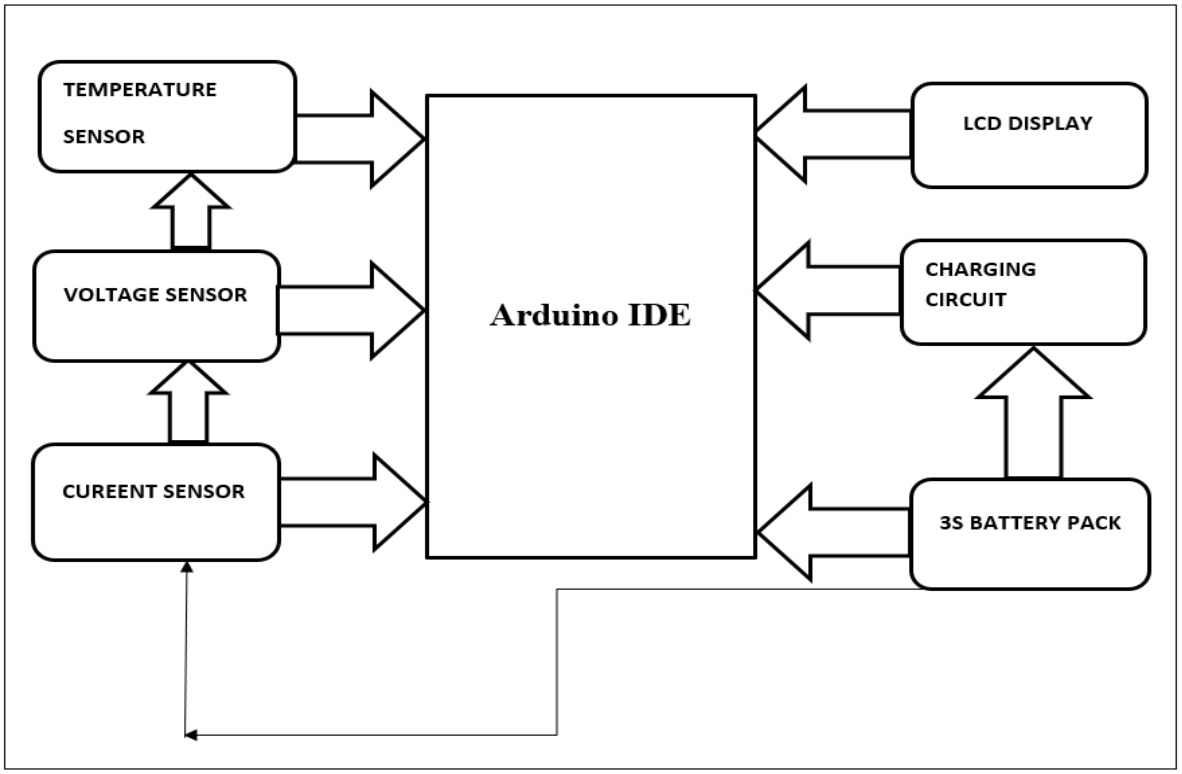

Fig. 1: Block diagram

The system makes use of a Li- ion Battery, Battery charging and examiner system, Push Buttons, TV Display, current detector, voltage detector, and temperature detector to develop this system. The system monitors as well as protects an EV battery at all times. We then develop the system as per a 3S li- ion battery. The system we design won't only cover the battery and charge it safely but also cover it to avoid accidents from being. The system when turned on uses its charging and monitoring circuitry that allows druggies to safely charge the 3S battery. While charging the voltage detector is used to check voltage and limit the inflow of current too to the battery using charging circuitry. The TV also displays the current voltage position of the battery. As soon as the battery is completely charged, the system cuts off the force and displays the Battery completely charged on the TV Display. When connected to a cargo the current detector keeps track of the current drawn from the battery and displays the parameter on the TV Display. The temperature detector is used to cover the temperature of the battery while charging as well as discharging. However, the system automatically cuts off the input as well as affair force and displays the temperature as well as a buzzer alert on the TV, if the battery temperature is observed to

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diverge from standard values. Therefore, the system allows for smart and effective battery charging as well as a protection system.

IV. SIMULATION DESIGN

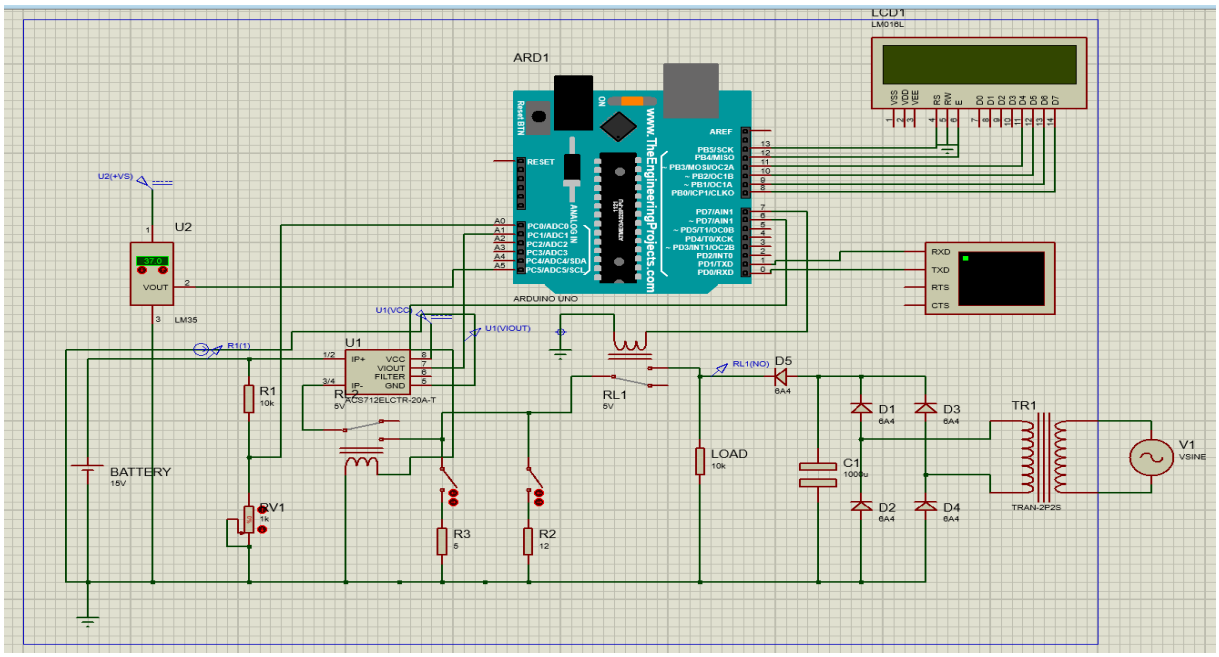

Fig. 2: Simulation diagram.

The below circuit was implemented with the use of Proteus 8.12 simulation software. So, in this simulation, we have implemented the voltage monitoring, current monitoring, and temperature monitoring system as shown below the simulation, for the simulation we have used the Arduino Uno, A 16*2 LCD. The system monitors as well as protects an EV battery at all times. We here develop the system as per a 3S li-ion battery. The system we design will not only monitor the battery and charge it safely but also protect it to avoid accidents from occurring. The system when turned on uses its charging and monitoring circuitry that allows the user to safely charge the 3S battery. The LCD also displays the current voltage level of the battery. As soon as the battery is fully charged, the system cuts off the supply and displays the Battery fully charged on the LCD Display. When connected to a load the current sensor keeps track of the current drawn from the battery and displays the parameter on LCD Display. The temperature sensor is used to monitor the temperature of the battery while charging as well as discharging. If the battery temperature is observed to deviate from standard values, the system automatically cuts off the input as well as output supply and displays the temperature as well as a buzzer alert on the LCD.

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V. SIMULATION RESULT

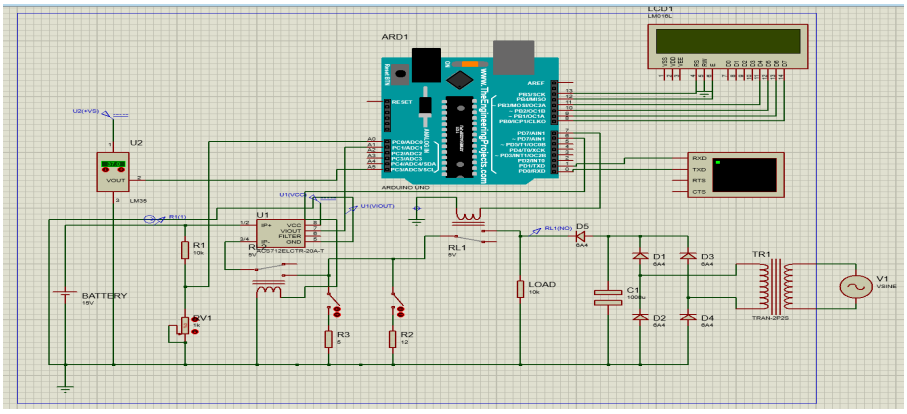

Fig. 3: Simulation

The below circuit was enforced with the use of Proteus8.12 simulation software. So, in this simulation, we've enforced the voltage monitoring, current monitoring, and temperature monitoring system as shown below the simulation, for the simulation we've used the Arduino Uno, A 16 * 2 TV. The system monitors as well as protects an EV battery at all times. We then develop the system as per a 3S li- ion battery. The system we design won't only cover the battery and charge it safely but also cover it to avoid accidents from being. The system when turned on uses its charging and monitoring circuitry that allows the stoner to safely charge the 3S battery. The TV also displays the current voltage position of the battery. As soon as the battery is completely charged, the system cuts off the force and displays the Battery completely charged on the TV Display. When connected to a cargo the current detector keeps track of the current drawn from the battery and displays the parameter on TV Display. The temperature detector is used to cover the temperature of the battery while charging as well as discharging. However, the system automatically cuts off the input as well as affair force and displays the temperature as well as a buzzer alert on the TV, if the battery temperature is observed to diverge from standard values.

Case 1: Below simulation shows the batter management system (BMS) is active.

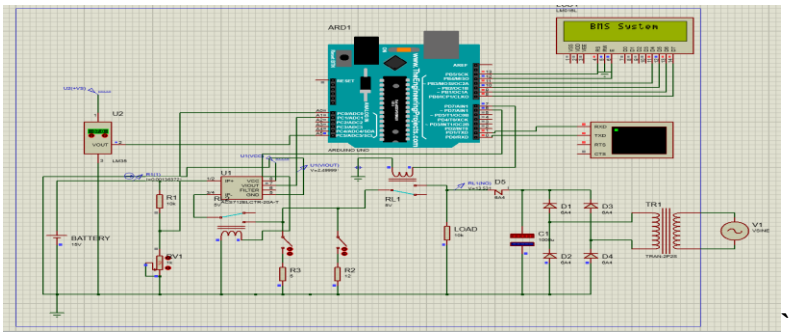

Fig. 4: Simulation

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Case 2: In the below simulation temperature sensor senses the temperature and the current sensor senses the current

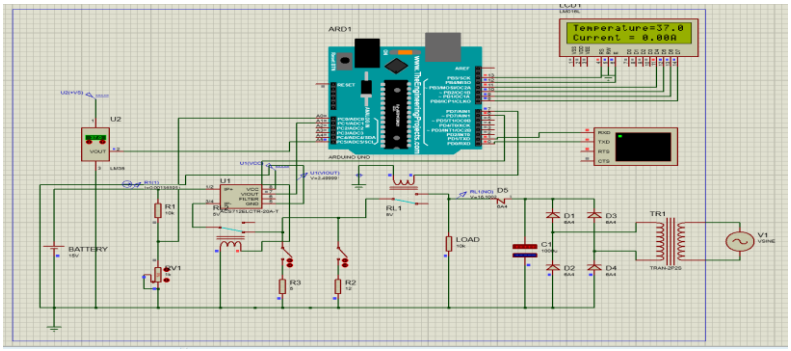

Fig. 5: Simulation

Case 3: In the below simulation voltage sensor senses the voltage and checks all parameters and then the result is System is working ok.

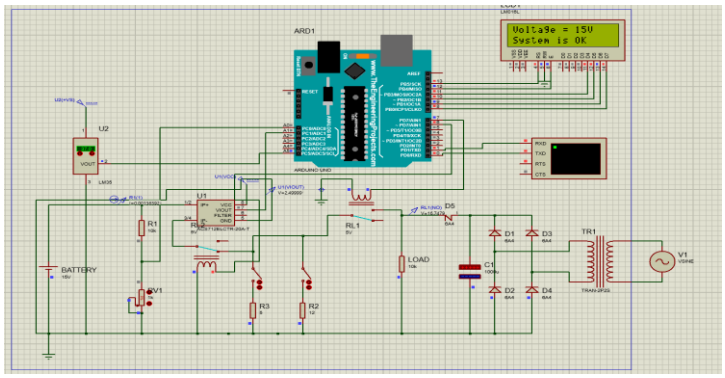

Fig. 6: Simulation

VI. CONCLUSION

In conclusion, an essential part of electric vehicles that guarantees the security, responsibility, and life of the battery pack is the EV BMS with charge examiner and fire forestalment. By supplying pivotal safety features like temperature control, fault discovery, cell balancing, and fire forestalment, the system lowers the possibility of battery fires and enhances the overall effectiveness of electric vehicles. In order to ameliorate the features and capabilities of EV BMS with charge examiner and fire forestalment, further exploration and development is still possible. A many implicit unborn work areas include enhancing the perfection and responsibility of battery monitoring systems to deliver more accurate and timely data regarding the charge, health, and function of the battery pack.

VII. ACKNOWLEDGEMENTS

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of engineering aspiring us to published paper helped us in doing a lot research and we come to know about so many new things.

VIII. REFERENCES

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