IoT Based Battery Management System with PV Source for Real Time Monitoring System in Electric Vehicle

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ABSTRACT: At the present time, the resources that we use for electricity are costly andinefficient. That is why we must rely on those that are of in the least harmful to the environment and inexpensive. There are also additional benefits: Photo voltaic panels and photovoltaic plants use the naturals un-light for additional lighting. photovoltaic cells are used in applications that allow the use of taking solar energy and expanding it into electricity most of the solar systems are situated in sparsely populated regions, large-scale agricultural communities, as well as in medium-sized farm sites and smaller, agricultural local agricultural production facilities that have power grids for a machine to function, it must be operated by a human. This is a hardware-timed sensor system that tracks various variables, like temperature, voltage, and fire and battery percentage and reports them on the cloud so you can see exactly when everything has reached the right value.

Keywords: Photo voltaic panels, solar energy, battery, agricultural

INTRODUCTION

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 an effective battery management system (BMS) while they are providing necessary power. The battery installed in 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. Battery management system (BMS) makes decisions based on the battery charging and cell voltage, temperature, etc. To ensure safe operation of the battery pack, the Battery Management System (BMS) has to make sure the cells remain in this safety window. Electric vehicles are becoming more commonplace as the technology matures and gas prices remain higher than in previous decades. While the internal combustion engine still dominates much of the world's roads, electric vehicles and hybrids (vehicles with both an internal combustion engine and some form of electric motor) are more prevalent in urban areas than previous decades. Electric vehicles do not have any on board power generation and rely solely on stored energy in batteries to power the electric motors during operation. This paper outlines a scalable method of determining the voltage across each battery in an electric vehicle charging and an eventual path for the development of a real-time battery monitoring for use in the Department Electric Vehicle. Ismail can etal., proposed battery chemical composition determination emerges as a technical problem of batteries according to their chemistry is discussed[1]. Guillaume Le Gall et al.,proposed two topology management and scheduling strategies using techniques named Linear Programming based on the results obtained in the experiments and to achieve efficient data transfer while complying to the battery managementconstraints[2]. Nikita N et al., proposed concern for battery manufacture. In this work, the idea of monitoring the performance of the vehicle using IoT techniques.[3]. Voruganti Bharath Kumar, Sk.Syed Hussain proposed a real-time Battery Monitoring System (BMS) using the coulomb counting method for SOC estimation and messaging-based MQTT as the communication protocol, based on ease of implementation and less overall complexity[4] .

EXISTING SYSTEM

Nowadays, the main issue of the automation industries is reduction of carbon emission and also rapid depletion of traditional sources of fuel used in the vehicles. Due to this scenario, many vehicles manufacturer looking for alternatives of energy sources other than gas. An alternate source of fuel was required with lower carbon emission which leads to the Electric Vehicles where the conventional energy sources are replaced with batteries. Still energy is required to charge the batteries so that the vehicles can operate without the issues of emission of greenhouse gases. Renewable energy sources such as PV, fuel cells are used in EVs to store the excess energy for later usage. But the fuel cells require storage of hydrogen gas which makes the design as complex and hence not highly in practice.

Lithium-ion batteries are used in EVs which performs better compared to other battery types but as it depends on electrochemical reactions, there is room for improvement in terms of thermal characteristics which affects the entire system when used for long durations. Fast charging techniques are used to charge the batteries for efficient operation but it leads to reduction in capacity and lifetime of the batteries.Hence optimization techniques are used for charging the batteries without increasing C-rates and estimation of SoC is essential for such techniques.A real-time Battery Monitoring System (BMS) using the coulomb counting method for SOC estimation and messaging-based MQTT as the communication protocol, based on ease of implementation and less overall complexity. The BMS is implemented using sufficient sensing technology, central processor, interfacing devices, and Node-RED environments on the hardware platform. In the Existing system work, there is no implementation of IoT platform with application development.

PROPOSED SYSTEM

The IOT based battery management system for electric vehicle with solar panel is proposed. This system consists of voltage sensor to detect the voltage and update in IOT. The temperature sensor is used to sense the battery temperature as shown figure.1, if there is increase in temperature buzzer alert is given and displayed in LCD. For safety purpose the system is interfaced with fire sensor to detect fire and give alarm. The measured parameters are updated in IOT and displayed in LCD display. Previous battery monitoring system only monitor and detect the condition of the battery and alarmed the user via battery indicator inside the vehicle. Due to the advancement of the design of notification system, Internet of Things (IoT) technology can be used to notify the manufacturer and users regarding the battery status.A battery storage device of 12V,3Ah with a backup battery of 12V,4.5Ah is provided as energy storage devices. The Sensor values are provide to the micro controller and updated to the cloud which can be retrieved and analysed using IOT.

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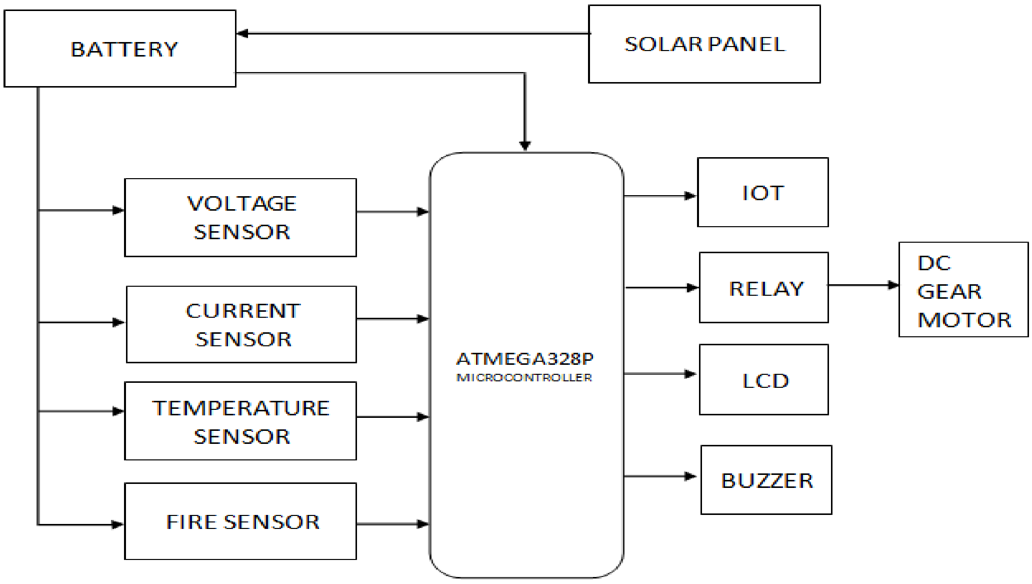

Figure. 1 Block diagram

Experimental Setup:

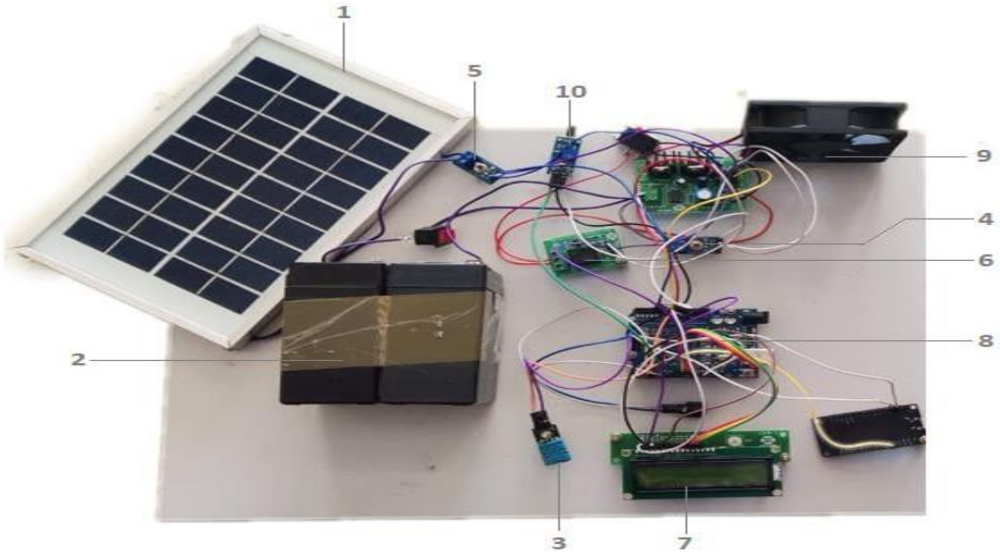

Figure2. Hardware Setup

1.	SOLAR PANEL	6.	RELAY
2.	BATTERY	7.	LCD
3.	TEMPERATURE SENSOR	8.	ARDUINO UNO
4.	VOLTAGE SENSOR	9.	DC MOTOR
5.	CURRENT SENSOR	10.	FIRE SENSOR

SIMULATION OUTPUT:

The simulation of proposed “PV Sourced Battery Management with IOT Based Real Time Monitoring in Electric Vehicle” is done and the status of battery is monitored by PROTEUS software with the help of IOT as shown in fig.3 and 4. A MPPT algorithm is being used to simulate the proposed system and an LCD shows the battery’s state. The battery voltage, battery current capacity and the temperature and also the fire alert can be shown in the LCD.

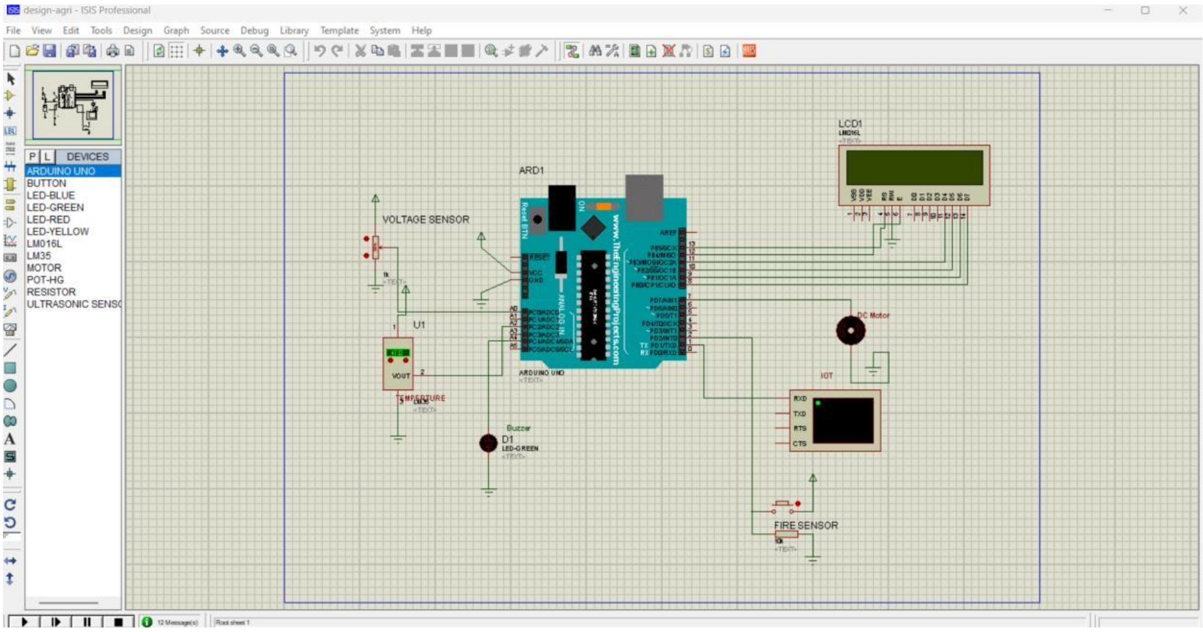

Fig.3 Simulation Circuit of Proposed System-OFF State

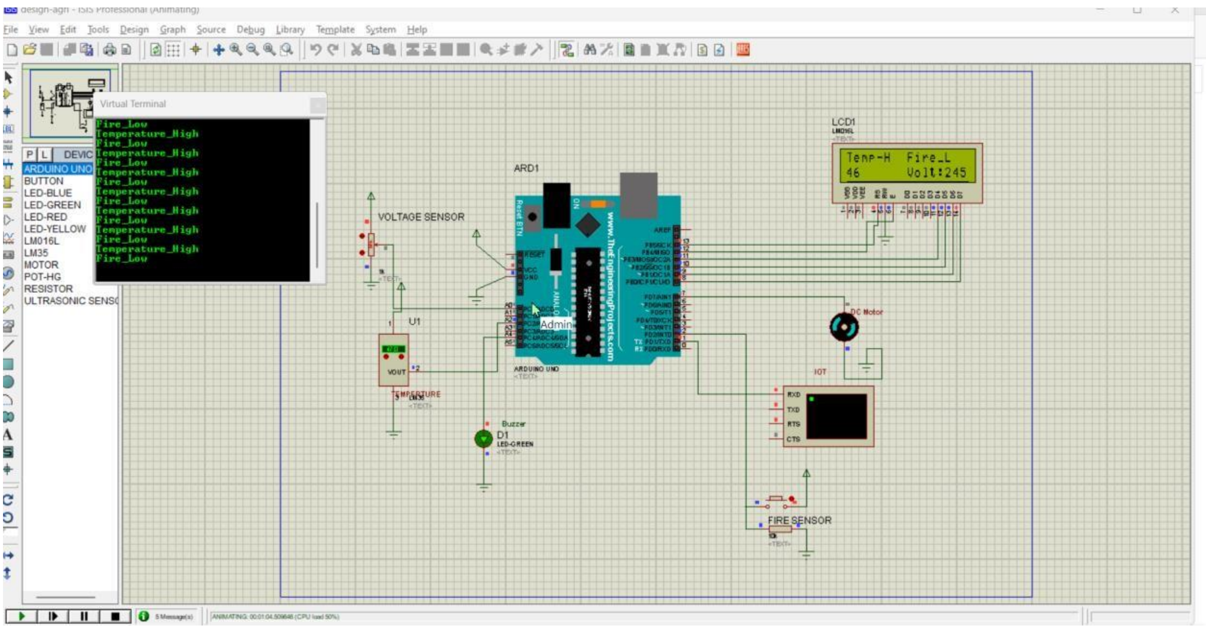

Fig.4 Simulation Circuit of Proposed System-ON State

CONCLUSION

This paper proposed the design and development of an IoT-based battery monitoring system for electric vehicle to ensure the battery performance degradation. We are developing the system with solar model for battery management in electric vehicle by controlling the crucial parameters such as voltage and temperature. It is very important that the BMS should be well maintained with battery reliability and safety. This paper focus on the study of Battery Management System 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. In the future, in addition to PV sources, other sources like wind, piezoelectric and thermoelectric production systems can be introduced to lesson the need for batteries in the absence of PV sources. Additionally, by combining zero voltage and zero current switching, we may decrease the switches from proposed Bidirectional converters with reduced current stress and keep the switching losses at a minimum value.\

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