

## POWER SAVING SYSTEM FOR ELECTRIC VEHICLES USING ARDUINO

Kishor R. Dandage<sup>\*1</sup>, Laxmi D. Giripunje<sup>\*2</sup>, Priya R. Deshmukh<sup>\*3</sup>, Prof S.A. Bankar<sup>\*4</sup>

<sup>\*1,2,3,4</sup>EE, NIETM, Nagpur, India.

### ABSTRACT

A power saving system for electric vehicles using Arduino aims to optimize battery usage by dynamically adjusting power consumption of non-essential vehicle components based on real-time battery level monitoring, using an Arduino microcontroller to implement intelligent control mechanisms like reducing motor power, dimming lights, and shutting down auxiliary systems when battery levels are low, ultimately extending the vehicle's driving range. Power saving is a critical component in Electric Vehicles (EVs) that ensures the safe and optimal performance of the battery pack. This abstract outlines the importance of a power saving and burning prevention in EVs. The Power saving monitors the state of charge, temperature, and voltage of each battery cell and balances the cells to avoid overcharging or discharging, which can lead to reduced battery life or even fire incidents. The burning prevention system involves the use of sensors, software, and other safety measures to detect and mitigate potential risks of battery fires in EVs. With the rapid growth in the EV market, Power saving and burning prevention systems are essential for ensuring the safety and reliability of EVs. Our system monitors and stores parameters that provide an indication of the lead acid battery's state of charge, voltage, current, and the remaining charge capacity in a realtime scenario.

**Keyword:** Arduino UNO (Microcontroller), Regulated Power Supply (RPS), Temperature sensor, Voltage sensor Current sensor, Battery, LCD, LED, Buzzer, Relay, Node MCU.

### 1. INTRODUCTION

The industrial process expansion has become very complex in the electronics system. In such developing industrial field fault detection and fault isolation is very important. This proposed work reduces the system in identifying the fault in the EV. The vulnerable part in the EV is the battery. Battery performance is influenced by factors such as depth of discharge (DoD), temperature and charging time. This paper attempts to provide the current level and voltage level using Internet of Things. By depending on the output of the battery fault can be analyzed. The battery is a device that converts the chemical energy into electrical energy through electrochemical reaction. Lead Acid battery is the most commonly used battery in UPS. To know the present status of the battery some important parameters are to be measured in regular interval. The important parameters are terminal voltage, load current, discharge current, room temperature of each battery used in the battery. The UPS that are used in the industries require electric power for smooth operation. The systems are equipped with lead acid batteries as an alternate source of electric power. Battery management system (BMS) forms a crucial system component in various applications like electric vehicles (EV), hybrid electric vehicles (HEV), uninterruptible power supplies (UPS), telecommunications and so on. The accuracy of these systems has always been a point of discussion as they generally give an error of maximum 10% considering all the parameters together. Batteries are the heart of the automation system, and its applications are more in all the fields, where the electrical supply requires. The periodical monitoring/observations are required for battery source to provide continuous power to the load without any interruption.

### 2. OBJECTIVES

- **Real-time battery monitoring:**

Continuously measure battery voltage, current, and temperature to accurately assess remaining battery capacity.

- **Adaptive power control:**

Adjust power consumption of various vehicle systems (motor speed, lighting, climate control) based on the monitored battery level.

- **Prioritization of essential functions:**

Ensure critical systems like steering and braking remain fully functional even during low battery situations.

- **User interface feedback:**

Provide clear visual or audible alerts to the driver regarding battery status and power saving mode activation.

- **Cost-effective implementation:**

Utilize readily available Arduino components and sensors for a practical and affordable solution.

#### Major Components Used

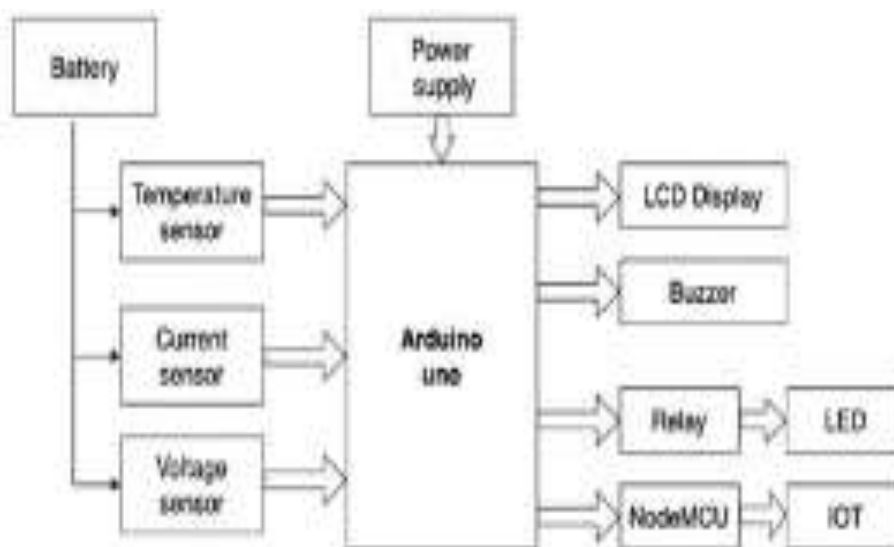
**Arduino Uno Controller:** Arduino Uno controller is the main element of the mission. All sensors are connected to Arduino and it controls all sensors through giving instructions. by using the use of Arduino we can do all things at low

price. Arduino has analog and virtual pins through which we will manage the challenge by way of giving inputs in analog in addition to digital form. Current Sensor: On this task we have used

**Node MCU:** Node MCU is the open supply IoT based platform. The wireless firmware included on this, which runs on ESP8266 WiFi The version of Node MCU used in this challenge is 1.0 carries ESP-12E in which E stands for more advantageous.

**IoT Cloud Platform:** The IoT cloud is a large community that supports IoT gadgets and programs. The platform consists of the underlying infrastructure, servers and garage, it wished for actual time operations and processing.[6]

### Block Diagram



### 3. WORKING

Our proposed system uses Arduino microcontroller, Temperature sensor,

Voltage sensor, Current sensor, Lcd Display, Buzzer, Relay and Node MCU. Temperature sensor is used to measure the temperature level of battery and display the temperature on LCD display then the Current and Voltage sensor is used to measure the current and voltage level of the battery. The buzzer alerts the user and the relay shuts off the battery output power if the battery temperature level suddenly reaches a specified level or threshold limit. The Node MCU is used to continuously upload battery information to an IoT webpage that is available for viewing by the owner or other authorized users

### 4. ADVANTAGES

Enhances battery life.

Improves safety by preventing battery fires.

Provides accurate battery monitoring.

Increases efficiency of the EV.

Helps comply with regulations.

Smarter battery management system can achieve a better efficiency and power at the same time The proposed system will help us to avoid regular site visits, prevent battery failure, extend battery life, reduce maintenance cost and increase safety.

Purchasing of Batteries / Cells through planned schedules, not emergency replacement.

### 5. APPLICATIONS

Automotive industry.

Household application.

Industrial application.

### 6. CONCLUSION

The fully electrically operated vehicles will come in future because of depleting fossil fuels and will definitely create an impact in everyone's life. At this time the battery management system will be major phenomena that every electric vehicle manufacturing company will be looking for. It is clear that an electric vehicle totally depends on the source of energy from a battery. In this work, the idea of monitoring the performance of the vehicle using IoT techniques is

proposed, so that the monitoring can be done directly. The system is capable to detect degraded battery performance and sends notification messages to the user for further action.

## 7. FUTURE SCOPE

Improved battery management algorithms: With the advent of artificial intelligence and machine learning technologies, there is a lot of scope for developing better algorithms to manage the life of electric vehicle batteries.

Advanced energy storage technologies: There is a growing need for energy storage technologies that can provide higher energy density and longer cycle life for electric vehicle batteries.

Battery recycling: Proper recycling of electric vehicle batteries is crucial to prevent environmental damage.

Enhanced thermal management systems: Thermal management is a critical issue for electric vehicle batteries as overheating can damage them.

Integration with smart grid technologies: As electric vehicle adoption increases, it becomes important to integrate EVs with smart grid technologies.

## 8. REFERENCES

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