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BATTERY MONITORING SYSTEM

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ABSTRACT

In this paper we will discuss about Battery Monitoring system using Arduino. Battery seems to be very expensive and also the life of the battery has a short period of time. Between its life span if we don't take care of the battery then maintenance cost the battery-operated equipment will be increase. To avoid this, we are bringing to you Advanced Battery monitoring system using Arduino with less cost and more features. This system can be used to avoid overcharging or over- discharging of batteries to increase its shelf life.

INTRODUCTION

Now a days batteries plays prominent role in our day-to-day life. For there better performance there must be system which will monitor all the parameters of the battery and to give alert to the user/consumer to prevent the accidents. So, we are coming with less cost and efficient Advanced battery monitoring system. This system will monitor battery's voltage, current, and temperature, state of charge (SOC), temperature rise warning, low battery indicator and also, we have used IoT in which data will be seen in the mobile phone of user.

OBJECTIVES

To Monitor Battery health: - Any kind of Battery have some specific life cycle and after that it start losing its original power storing capacity hence to minimize these losses and improve efficiency of that device it is important to monitor battery health.

Prevent Accidents: - Some times when battery get overheated or due to short circuit problem there are chances of fire which can cause dangerous accidents this system will minimize the chances of accidents

Safety: - Under any circumstances if device/vehicle catches fire it will interrupt battery supply and give warning alarm

Minimize the losses: - Once battery complete its life cycle and takes too much time for changing so this will increase loses so this system will count the charging time taken by battery and will show notify the user that it's time to change the battery

LITERATURE REVIEW

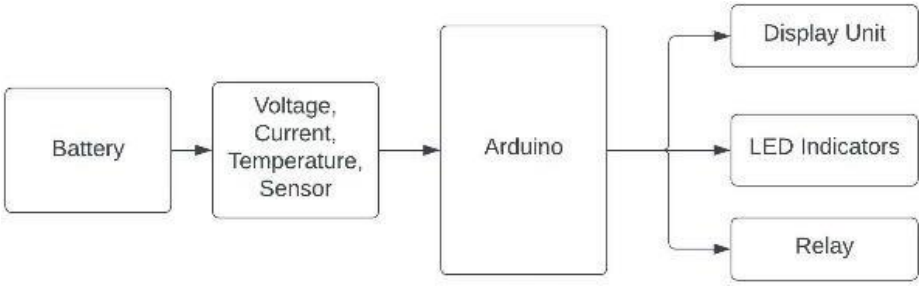
From the reference [3][7] There are wide ranging issues affecting the efficiency of energy storage in batteries; particularly, electric vehicle applications strive to improve efficiency in every possible way. For example, charging efficiency is the percentage of the total energy needed during charging. . According to Ali et al. (2018) and Darvizeh et al. (2018), the important parameters need to be measured to develop the monitoring system are current and voltage of the battery. It means, for a simple BMoS, the temperature parameter can be ignored.

Generally, it is necessary to monitor SoC instead of simply monitoring the battery voltage as SoC describes how full the battery is (Křivík, 2018). When the battery is fully charged, the SoC of this battery is 100% and 0% when the battery is fully discharged. There is an important relationship between current and voltage of the battery and SoC. The integration of current can be used to determine the value of SoC (Křivík, 2018), and the value of SoC can be used to predict the battery voltage (Lee et al., 2018). For high-cost electronic devices, it comes with a battery management system to avoid overcharging and over discharging that can cause damage to the battery.

However, for low-cost electronic systems, such as the Arduino Uno-based system which is widely used in electronic projects for education, hobbyists, and as a prototype before developing the actual system, there is no point in equipping them with expensive BMoS. The problem arises when the battery used in the developed systems has a very short lifespan due to overcharging / over discharging. Without BMoS, there is no indicator to tell the electronic project developers when to stop using the battery to run their project. So, there is a possibility that the battery is used 0% of SoC. When the battery is allowed to be at a low level of charge for too long, it can become damaged. By leaving the battery standing for a long time after discharging without recharging it will cause plate sulfation, a condition in which a large grained lead sulfate layer is formed on the surface of the battery. It may cause premature damage such as overheating or inability of the battery to retain a charge. Hence, this research focuses on the development of Arduino Uno- based BMoS. It can be used for maintaining and monitoring stationary battery systems to maximize the performance of the developed system and reduce battery maintenance and replacement costs by providing the most reliable form of predictive maintenance.[5]

METHODOLOGY

Fig (a). Battery Monitoring System Block Diagram



Above fig. shows that sensors (voltage, current, temperature) are connected to the battery and process the battery data to the Arduino. We have used C language to program the Arduino. Display is connected to the Arduino which will show battery current, voltage and temperature. Also, we will display battery percentage with the help of State of Charge estimation. For Alerting the user we have used led indicator of three lights which will glow. Red light is used for low battery, green light is used for full battery, yellow light for temperature rise.

Relay is used as a switch to disconnect battery from the charger when battery is fully charged to avoid overcharging. Because overcharging decreases the performance by 5% every time. To see battery data, we have on the mobile phone we have connected WIFI module.

ADVANTAGES

- Ensure that the battery is in good working order.
- Battery health is continuously monitored to avoid an explosion.
- Extends the battery's life expectancy.
- Displays the battery level

APPLICATIONS

1. Electric vehicles
2. Battery operated power stations
3. In industrial use
4. Electronic Equipment

CONCLUSION

In this paper we have designed an Arduino based system which will monitor battery's voltage, Current, and temperature continuously. Also, we have seen that in abnormal condition like if the temperature of battery increases then system will blow yellow indicator and it will shut down automatically. This will help battery from getting fire and also battery's health will not decrease.

Also, we have connected relay to disconnect battery from charger after battery is fully charged. Overall Battery performance has increased.

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