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BATTERY MONITORING SYSTEM USING ESP8266 & ARDUINO IOT CLOUD

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ABSTRACT

This research paper describes the Internet of Things (IoT) application in battery performance monitoring. It is clear that electrical equipment is entirely dependent on battery power. However, the amount of power supplied to electrical equipment will gradually decrease, resulting in poor performance. This is a major concern in battery manufacturing. This task proposes the idea of using IoT technology to monitor device performance, so monitoring can be done directly.

I. INTRODUCTION

Now, electric vehicle (EV) is going popular since the Energy prices going more precious. Due to this plot, multiple Vehicle manufacturers looking for choices of energy sources Environmental Other than gas. The use of electrical energy sources may enhance the surroundings since there's lower pollution. In addition, EV Produces great advantages in terms of energy saving and protection. Top EVs used rechargeable battery which has lower to be compared with other batteries. In fact, it has a constant power, Battery life cycle can be docked by some reasons similar as overcharging and deep discharges. On the other hand, EV generally has limited range of travelling due to battery size and body structure. BMS is a very important device in the electronic systems to monitor the status of a battery. It is used to measure voltage, current, and temperature of the battery to be processed to estimate the SOC and state of health (SOH) of the battery. It is important to ensure that the battery has a longer lifespan by avoiding overcharging or over-discharging, thus providing a better performance of electronic systems. Generally, it is necessary to monitor SOC instead of simply monitoring the battery voltage as SOC describes how full the battery is charged. 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, and the value of SOC can be used to predict the battery voltage. 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.

II. BLOCK DIAGRAM

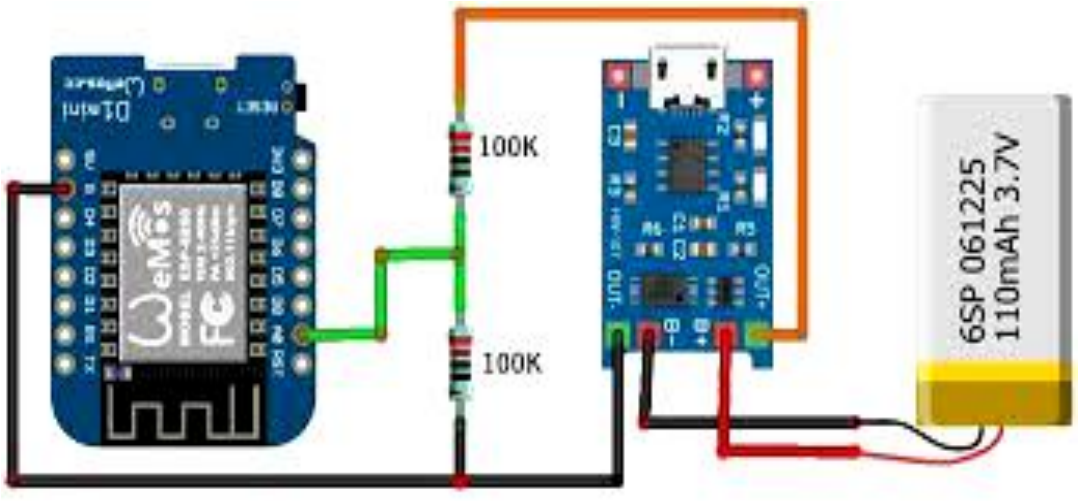

Fig.No.1-Block Diagram

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The Block diagram of battery management system using internet of things contain ESP8266 which is use to communicate using internet for that current sensor and voltage sensor is interface with Wi-Fi module Power supply arrangements is provided to get 5v regulated supply for esp8266 , LCD display, voltage sensor and current sensor. In case of riseof temperature we use lm35 temperature sensor for unwanted heating of battery. In our IoT- based Battery Monitoring System, we will use ESP8266 Chip to send the battery status data to Thing Speak cloud. The Thing speak will display the battery voltage along with the battery percentage in both the charging and discharging case

Project photo-

Fig. No. 2

Lithium-Ion Batteries:-

A lithium-ion battery or Li-ion battery is a type of rechargeable battery. Lithium-ion batteries are commonly used for portable electronics and electric vehicles. In this battery, lithium ions move from the negative electrode through an electrolyte to the positive electrode during discharge, and back when charging. Li-ion batteries use an intercalated lithium compound as the material at the positive electrode and typically graphite at the negative electrode. The batteries have a high energy density, no memory effect and low self- discharge. Nominal, Maximum & Cut-off Voltage, these are the few Lithium-Ion batteries that I have been using for very long for many of my projects. Some of the batteries have a simple attached Battery Management System Circuit for over-voltage protection, balanced charging, short-circuit protection etc.

Wi-Fi Module – ESP8266:-

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. Node MCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in- built Wi-Fi / Bluetooth and deep sleep operating features.

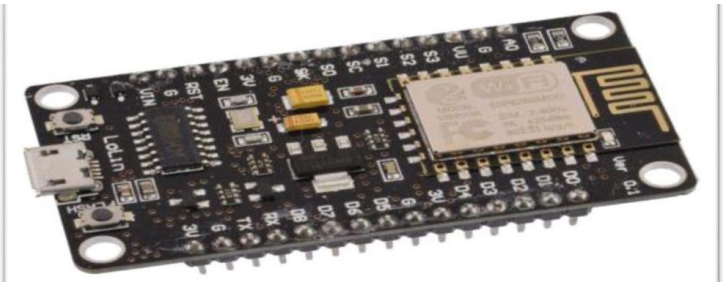

Fig. No. 3:- Wi-Fi Module – ESP826

Arduino Uno

Arduino Uno is a microcontroller board based. It has 14 digital input/output pins (ofwhich 6 can be used as outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get start.

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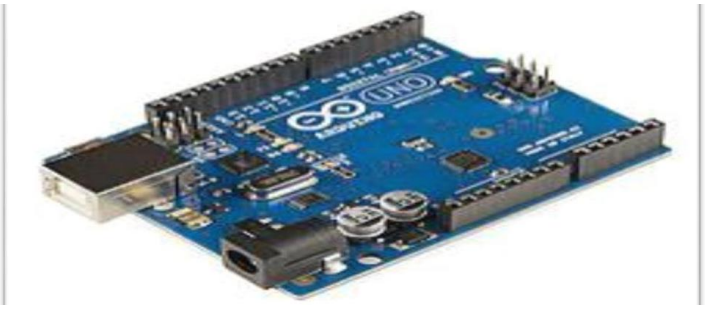

Fig. No. 4:- Arduino Uno

Current Sensor (ACS 712)

The Allegro ACS712 current sensor is based on the principle of Hall-effect, which was Discovered by Dr. Edwin Hall in 1879. According to this principle, when a current carrying Conductor is placed into a magnetic field, a voltage is generated across its edges perpendicular to the directions of both the current and the magnetic field. It is illustrated in the figure shown below.

Fig. No. 5:- Current Sensor

III. CONCLUSION

Advanced BMS can significantly improve the performance of EVs. Adaptive mathematical models are an efficient tool for improving and refining BMS. The State- of-Charge determination algorithms, developed with the help of adaptive battery models, are highly precise and represent a good basis for practical implementation. BMS is a critical component of electric vehicles.

That promotes guarantee safe, efficient and reliable battery operation. The combination of advanced charging algorithms and adaptive S BMS improves the battery functioning thus improving the characteristics of EV.

IV. FUTURE SCOPE

Smart Homes - In the coming years, fully automated smart homes will surely become a reality as the home automation is developing rapidly. Due to good user convenience, smart homes are appealing a wide range of people all over the globe. The User can check for the electricity usage, the condition of his devices and get notification accordingly.

Smart Cities - With increasing automation and IoT, devices can communicate with each other. This will help in building new and smarter cities. Cities that would be free form pollution, traffic accidents, etc. problems.

Agriculture - The proposed system can be used in Agriculture as well. The various devices used in fields can be operated from any remote location.

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