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IOT BASED DUAL BATTERY MONITORING AND CHARGING SYSTEM FOR ELECTRIC VEHICLE APPLICATIONS

S. Rakkammal*, M. Anbarasan, B. Durga Sree**, V. Kowsalya** & M. Manikandan****

* Associate Professor, Department of EEE, MAM College of Engineering and Technology, Tiruchirappalli, Tamilnadu

** UG Student, Department of EEE, MAM College of Engineering and Technology, Tiruchirappalli, Tamilnadu

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Abstract:

This Project describes the application of Internet-of-things (IoT) in monitoring the performance of electric vehicle battery. It is clear that an electric vehicle totally depends on the source of energy from a battery. However, the amount of energy supplied to the vehicle is decreasing gradually that leads to the performance degradation. Battery monitoring system is consists of two major parts i) monitoring device and ii) user interface based on experimental results, the system is capable to detect degraded battery performance and sends notification

Key Words: Battery Management, Electric Vehicle, Arduino, Android

Introduction:

Battery supervision system is an application platform for the monitoring the batteries performance and estimated time for charging and discharging battery for at present load conditions. It is used for real time monitoring the performance of batteries. The way to access the data from batteries, which will directly reflect the quality of battery management system. The battery management system. To see the status of charging and discharging activities of batteries regularly and also having historical information regarding batteries performance. By using historical information easy to analyses the condition of batteries. The more and more advancements in the field of automobile have resulted in autonomous guided vehicles (AGV). In AGV monitoring each and every parameter plays an important role for its movement, path planning and the distance it can travel with the battery's current state. By monitoring the state of the battery, it is possible to predict the life span and the amount of time until which the battery can be drained safely. The battery monitoring system should be reliable and scalable so that the functionalities can be extended whenever needed. Though few systems are available in foreign nations, this type of systems are yet to be implemented in India.

The recent research issues in the automotive industry seeming excellent improvement with the atmosphere approachable Electric Vehicles. It considers for the customer expenses and give excellent mileage in one charge. Monitoring and using determined energy from the battery holdup without substantial impact on the battery life. Based on environment conditions and customer request to monitoring battery performance using Wireless communication architecture. It is more reliable and environment friendly. Due to technological growth to increase a greater number of vehicles in the globe, but environmental condition and power crises issues needed to develop gradually protruding. Eco friendly situations can create very bad impact on the huge business loss due to power crises. Publics rewarded in India.

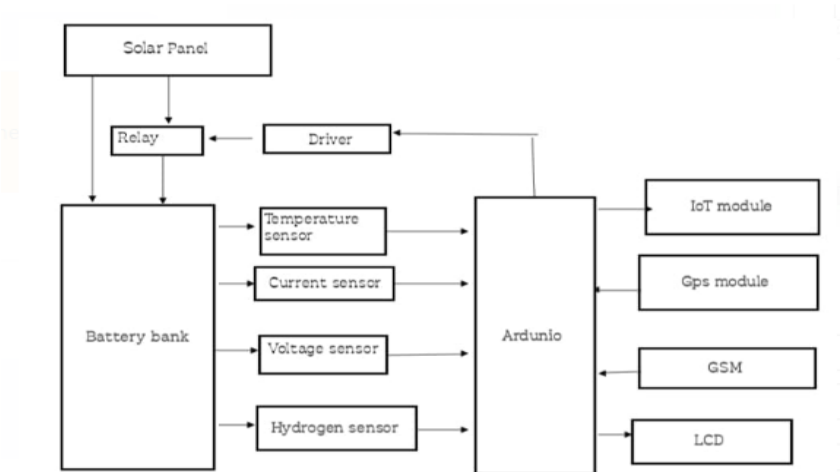
Governments and research institutions. Due to pollution problem, the electric vehicle is best replacement of motor vehicle. The main important reason limited to the EVs is the existing battery technology. The main important problem of battery is short life time and also have some serious accident such as fire. Our work gives some suitable solutions to existing problems. PV high level hybrid multilevel inverter is an advanced converter derived from the buck-boost converter.

Block Diagram:

A Battery management system (BMS) which manages the electronic of a rechargeable battery whether a cell or a battery pack, thus becomes a crucial factor in ensuring electric vehicle safety. It safeguards both the users and battery by ensuring that the cell operates which in its safe operating parameters.

- Power Supply Unit
- Arduino
- WI - FI Module
- Micro SD card
- Real Time Clock
- Voltage Sensor
- Current Sensor
- Relay

The block diagram consists of a power supply, monitoring section logging section and control section.



Hardware Setup:

The monitoring section consists of a Voltage sensor and a Current sensor which measures the voltage of the battery and the current flowing to the battery when connected to a closed circuit. The output of these sensors is an analog data which is then converted into a digital data using the microcontroller's analog to digital convertor. 250 samples are taken and average is found. The average data is processed in the microcontroller and logged. Wi-Fi module is used to connect to available predefined SSIDs. If no networks are discovered, then the data is logged to the Micro SD card as a temporary storage medium. Whenever Wi-Fi networks are available, the data in the micro-SD card is logged to the server. The RTC module is used to find the time so that Wi-Fi networks can be searched every 'A hours thus saving energy usage. The control section is a relay circuit which is tripped when the user fails to pay the monthly rent. IV. Hardwar e Set up Figure 2. Hardware Setup the Figure shows the hardware setup of proposed system. Since the monitoring circuit uses very less power, the battery that has to be monitored is used as the power source for the circuit. A DC-DC converter is used to step down the DC voltage to 5V for the peripherals to operate. The battery terminals are connected to the Voltage sensor in parallel and one of the terminals is connected to the Current sensor in series. The other terminal is connected to a relay in series as well for remote ON and OFF of the battery. The output of the two sensors and the input of the relay are connected to the microcontroller (Arduino Uno). It receives the data and sends it to the system.

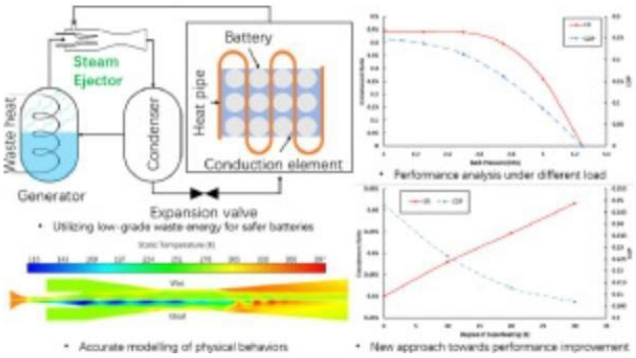
Software Description:

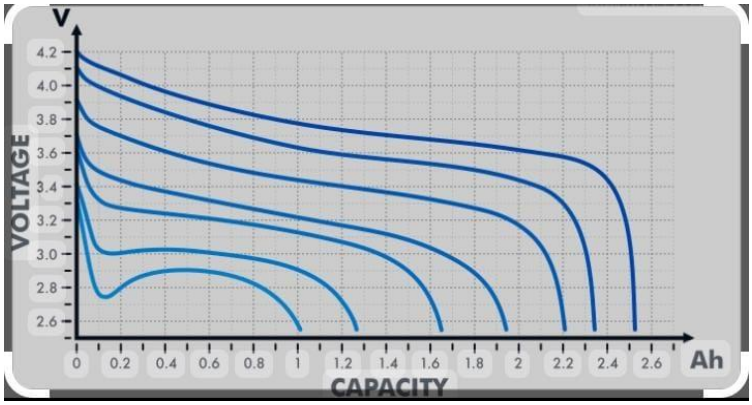
A. Google Apps Script Introduction Google Apps Script is a rapid application development platform that makes it fast and easy to create business applications that integrate with G Suite. Code is written in modern JavaScript and has access to built-in libraries for G Suite applications like Gmail, Calendar, Drive, and more. Shows the snapshot of Google apps script. There's nothing to install to start coding the code editor right in our browser, and our scripts run on Google's servers. Google Apps Script is used to monitor the battery details database.

Results and Discussion:

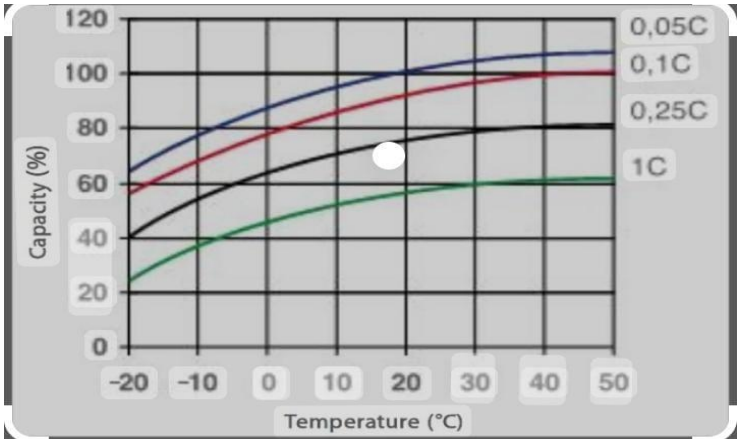
The following results have been achieved using this project. The battery Current, Voltage and power are monitored and sent to the main database hosted in the server. These details are then sent to the app which can be used to monitor the health and charge state of the battery. Rented out and monitored by the rented firm. If the rent has not been paid, the relays can be tripped preventing the battery from being discharged. If the batteries are rented out, GPS systems can be used to track them. Payment of rents can be made using UPI (Unified

Payments Interface), BHIM (Bharat Interface for Money) or any other means of online payment with proper authorization.

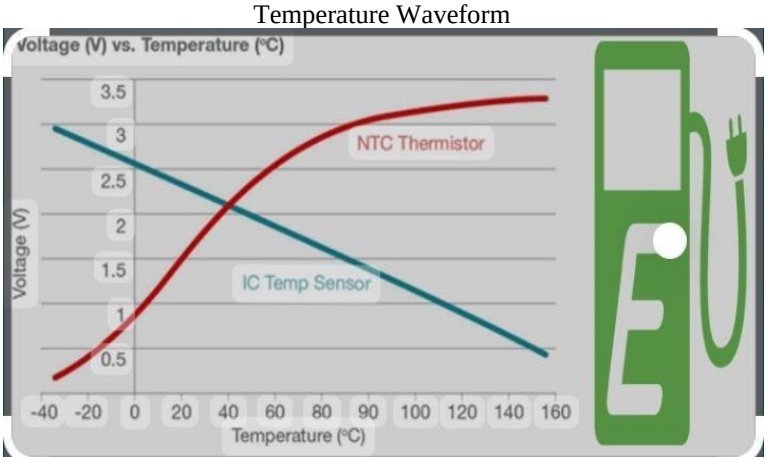




Current Wave Form



Temperature Waveform



Voltage Waveform

Conclusion:

This battery monitoring system for electric vehicles can be used to monitor the real time health of the batteries present in electric cars, bikes or trucks. It paves a way by aggregating data from batteries and other such sources to a common place for analysis and applications. This can be further extended to homes and industries which use large batteries for backup power and other commercial applications to predict the life of batteries and improve it. By knowing the life earlier, it would better be for timely replacement of the components without disrupting the day-to-day work.

Future Enhancement:

By monitoring the real time parameters of a battery, one can easily know about the health of the battery anytime and anywhere. Due to the advancements in battery technology batteries with longer life span supporting larger charge cycles are being developed. If sufficient data set is available, machine learning and deep learning algorithms can be implemented to give users about the amount of time the battery has to be charged and the life span of the battery. If more users start to user this system, it would provide sufficient data to improve the life cycle and charging time of the battery in general. Alerts can be given to the user by means of SMS, Application notifications and emails. Since lithium-ion batteries for E vehicles are costlier than conventional batteries, they can berented out and monitored by the rented firm. If the rent has not been paid, the relays can be tripped preventing the battery from being discharged. If the batteries are rented out, GPS systems can be used to track them. Payment of rents can be made using UPI (Unified Payments Interface), BHIM (Bharat Interface for Money) or any other means of online payment with proper authorization.

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