# Review on IOT based electric vehicle battery management system using LAB View.

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***Abstract***

*Electric vehicle mostly preferred now a days because of it is less costly and eco-friendly. But comes with a trade-off of battery overcharging and deep discharging. This problem affects the life span of battery and its performance over the years. To overcome this problem, we design IoT Enabled Electric Vehicle's Wireless Battery Management System. In which we will observe different parameter of battery like voltage, current and temperature which may help us to avoid the overcharging and deep discharging of battery. Observation can be done with the help of different sensors. Voltage, current and temperature data are transferred to microcontroller MSP 430, then data of battery is transferred using cloud to display. The data of battery monitoring are displayed on PC and android Smartphone with lab view environment. The monitoring system is able to demonstrate real-time data of voltage, current and temperature and display data on Android Smartphone and PC simultaneously. This may help us to increase the performance and life span of battery.*

***Keywords:*** *Electric vehicle, Voltage sensor, Current censor, MSP controller, Android Smartphone etc.*

## I. INTRODUCTION

Today, the electric vehicle (EV) is becoming popular as fuel prices become more expensive. Because of this scenario, many vehicle manufacturers are looking for alternatives from energy sources other than gas. The use of electricity sources can improve the environment as there is less pollution. In addition, EV produces great advantages in terms of energy saving and environmental protection. Overcharging the battery can not only significantly reduce battery life, but can also cause serious safety incidents, such as a fire. Therefore, an electric vehicle battery monitoring system is required that can communicate the battery status to the user to avoid the indicated problem. Thanks to the advancement of the notification system design, Internet of Things (IoT) technology can be used to inform the manufacturer and users regarding battery status. LabVIEW software is used as an integration platform to acquire, process and transmit physiological data, as it is an excellent graphic programming environment for developing sophisticated measurement, test and control systems.
Objective:
1. To design a prototype model for an electric vehicle,
2. Turn off the vehicle if the temperature is exceeded above the limit

## II. LITERATURE SURVEY

In this paper, we present a charging station integrated with photovoltaic system/battery storage/grid-tied system power dispatch method for electric vehicles in an electric vehicle charging station and this method based on the non-cooperative game achieves automatically adjusting the charging power. The outstanding advantage is this method can provide charging service for all electric vehicles at the same time, especially in the situation where available charging power is limited. Comparing to the commonly used constant charging scheme, the simulation results showed that the proposed charging method can achieve higher charging service rate and higher utilization of charging pole inside charging station [1].

The intensive design idea in traditional substation, switch station and other places has gained popularity and the promotion, if it could be applied to the field of electric vehicle charging, charging infrastructure benefits of efficiency, improving the user experience will be of great difference. In view of this, in this paper, a preliminary study of the electric vehicle charging group control system and cluster control technology is proposed, in which the overall design of group control system is firstly given, then the application scenario electric vehicle charging group control system is analyzed, and finally the cluster control technology is analyzed in detail. The research results can provide scheme support for the cluster control of widely connected charging facilities [2].

This paper studies the development characteristics of the electric vehicle charging network business market and forms a charging network procedure environment that includes national and local policies. Then, use wariness tools and divide wariness tools into supply, environment, and demand. Finally, based on the wariness influence from the perspective of wariness tools, the corresponding development suggestions are put forward [3].

In order to meet the demand of accurate metering and fast charging for dynamic wireless charging of electric vehicles, this paper proposes a metering and charging system composed of the identification equipment, the charging software, the power meters, the on-board unit and the charging control unit. This paper also provides a charging fee billing strategy to calculate the electricity fee and service fee considering power loss, construction cost and balance of EV number on the charging road. Experiments show that the metering and charging system can correctly calculates the charging fee of the EVs on the wireless charging road [4].

This paper, we combined the berth allocation problem with the scheduling of electric vehicle charging stations and formed a new problem namely the position allocation problem (PAP). To solve this problem, we used a meta-heuristic algorithm namely the Simulated Annealing (SA) and presented the results as a scheduling chart. Our findings are focused on the reduction of the charging time. Also ,we considered the length of the cars and the length limit of the charging stations in order to allocate a suitable number of cars. For this reason, we choose several electric vehicle models and by considering their characteristics like the length and time of charging, formed an optimized schedule for the charging [5].

The growing popularity of electrification of private vehicles will have a negative impact on the electricity system, especially in distribution networks, if the charging of electric vehicles (EV) is not managed correctly. In this document, a new technique for intelligent charging of electric vehicles is proposed and tested. A fuzzy logic controller is used to control and manage the EV charging process to maximize electrical utility and to charge low cost EV while maintaining the normal operating conditions of the distribution network. MATLAB / SIMULINK is used to perform simulations and test the effectiveness of the proposed intelligent charging method. The results showed that the proposed smart charging method reduced the Advantages for owners of electric vehicles. The advantage of the electric company is to mitigate the impacts of charging electric vehicles on the distribution network by modifying electric vehicles charge up to the period of minimum activity, while owners of electric vehicles benefit from the recharge of low-cost electric vehicles. The controller adjusts and controls the EV charge power based on the electricity price signal provided by the power company and the state of charge of the EV battery (SoC). This controller requires basic communication with the electricity company to receive the electricity price signal every 1 hour. The goal of the controller is the impact of the EVs loaded on the distribution network. compared to uncontrolled loading [6].

## III. SYSTEM BLOCK DIAGRAM

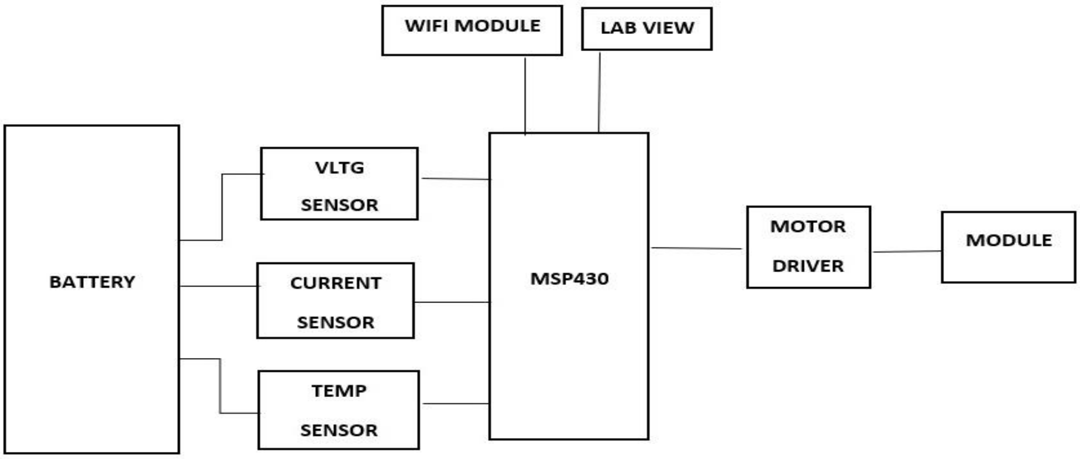



Fig.(1):Block Diagram.

*A.MSP430 microcontroller:*

The TI MSP430 ™ family of microcontrollers is comprised of several devices with peripheral assemblies intended for a variety of applications. The architecture, combined with large low-power modes, is optimized for longer battery life in portable measurement applications. The microcontroller has a powerful 16-bit RISC CPU, 16-bit registers and constant generators that help to maximum code efficiency. The digitally controlled oscillator (DCO) allows you to activate devices from low power modes to active mode in 3.5 μs (typical). The microcontrollers MSP430F5529, MSP430F5527, MSP430F5525 and MSP430F5521 have USB and PHY consonant with USB 2.0, four 16-bit timers, a high-performance 12-bit analog-to-digital converter (ADC), two USCI, a hardware multiplier, DMA, a module RTC with alarm capability and 63 I / O pins. The MSP430F5528, MSP430F5526, MSP430F5524 and MSP430F5522 microcontrollers include all these peripherals but have 47 I / O pins.

*B.Current sensor*:
The device consists of a precise linear circuit of the low-displacement Hall sensor, with a copper conduction path located near the surface of the matrix. The applied current passing through this copper conduction path creates a magnetic field which is sensed by the integrated IC Hall and transferred into a proportional voltage. The accuracy of the device is optimized through the proximity of the magnetic signal to the Hall transducer. Chopper-stabilized low-displacement BiCMOS Hall IC provides precise proportional voltage, programmed for accuracy after packing. The output of the device has a positive slope when an increasing current passing through the primary copper conduction way (from pins 1 and 2, to pins 3 and 4), which is the way used for current sense

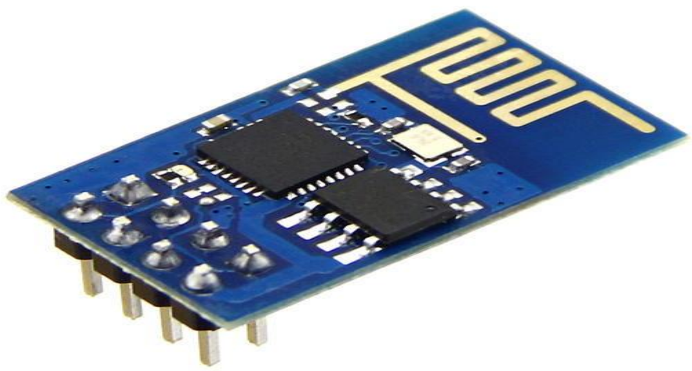
*C.Voltage sensor:*
This module is based on the principle of pressure of the resistance points and can cause the input voltage of the red terminal to reduce the original voltage by 5 times. The maximum analog input voltage of Arduino is 5 V, therefore the input voltage of this module must not exceed 5 V x 5 = 25 V (if for a 3.3 V system, the input voltage must not exceed 3, 3 V x 5 = 16.5 V).

*D.Temperature Sensor:*

The LM35 series are accurate integrated circuit temperature devices with an output voltage linearly proportional to the centigrade temperature. The LM35 requires no external calibration or adjustment to provide a typical accuracy of ± ¼ ° C at room temperature and ± ¾ ° Cover a full temperature range between -55 ° C to 150 ° C. Lower cost when cutting is guaranteed and calibrated at the wafer level. The low output impedance, the linear output and the precise intrinsic calibration of the LM35 device make the interface for reading or the control circuit particularly easy. The device is used with single power supplies or with more and less sources. Since the LM35 device extracts only 60 μA from the power supply, it has a very low self-heating of less than 0.1 ° C in calm air. The LM35C device is rated for operation in a temperature range between of -55 ° C to 150 ° C, while the LM35C device is rated for a range of -40 ° C to 110 ° C (−10 ° with improved accuracy). LM35 series devices are available packaged in hermetic TO transistor packages, while LM35C, LM35CA and LM35D devices are available in TO-92 plastic transistor package.

*D.ESP8266 WiFi module:*

ESP8266 is a Wi-Fi enabled chip system module (SoC) developed by the Express if system. It is mainly used for the development of integrated IoT (Internet of Things) applications.



Fig(2) ESP8266-01 WiFi Module

ESP8266 comes with capabilities of

- 2.4 GHz Wi-Fi (802.11 b / g / n, compatible with WPA / WPA2),
- general purpose input / output (16 GPIO),
- Integrated circuit serial communication protocol ($I^2C$),
- analog-to-digital conversion (10-bit ADC)
- serial communication protocol serial peripheral interface (SPI),
- $I^2S$ (Inter-IC Sound) interfaces with DMA (Direct Memory Access) (share pins with GPIO),
- UART (on dedicated pins, in addition to a transmission only UART it can be enabled in GPIO2) e
- pulse width modulation (PWM).

It uses a 32-bit RISC CPU based on TensilicaXtensa L106 that runs at 80 MHz (or overclocked at 160 MHz). It has a 64 KB boot ROM, 64 KB RAM instructions and 96 KB data RAM. External flash memory can be accessed via SPI.

To communicate with the ESP8266 module, the microcontroller must use a series of AT commands. The microcontroller communicates with the ESP8266-01 module using UART with a specified transmission rate.

There are many third-party manufacturers that manufacture different modules based on this chip. Therefore, the module comes with several pin availability options such as

*E.LAB view:*

LabVIEW (Workbench Engineering Instrument Virtual Laboratory) is a graphical programming language that uses icons instead of lines of text to create applications. Unlike text-based programming languages, in which the instructions determine the order of execution of the program, LabVIEW uses data flow programming, where the flow of data through the nodes in the block diagram determines the execution order of the VIs and the functions. VIs, or virtual instruments, are LabVIEW programs that mimic physical instruments. In LabVIEW, you create a user interface using a set of tools and objects. Then add the code using the graphical representations of the functions to control the front panel objects. This graphical source code is also known as G code or block diagram code. The block diagram contains this code. Somehow, the block diagram resembles a flowchart

*F.Lead acid battery:*

Lead acid batteries are the most common large capacity rechargeable batteries. They are very popular because they are reliable and inexpensive based on the cost per watt. There are few other batteries that supply bulk energy as much as lead acid, and this makes the battery economical for cars, electric vehicles, forklifts, marine and uninterrupted power supplies (UPS).

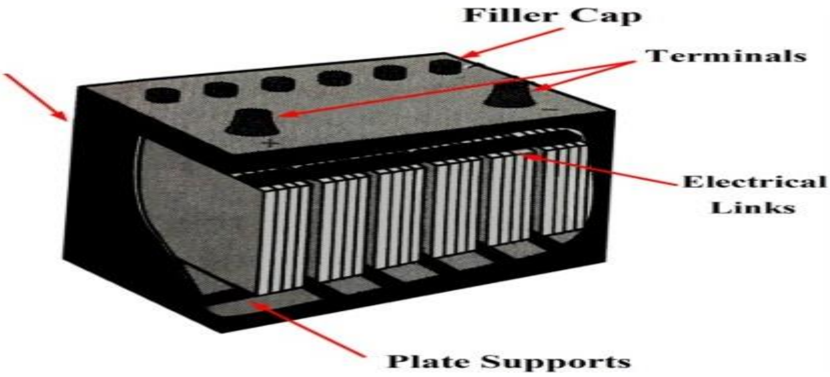



Fig.(3) Lead Acid Battery

*G. IoT:*

IoT admits that people connect to request a system anytime, anywhere. IoT technology helps collect information on environmental conditions. The system uses Internet of Things (IoT) technology and the Azure cloud platform to automate the management procedure, improve scalability, improve the user experience of the plants and contribute to a green and indoor climate. Agriculture

## IV. IV. SYSTEM FLOW

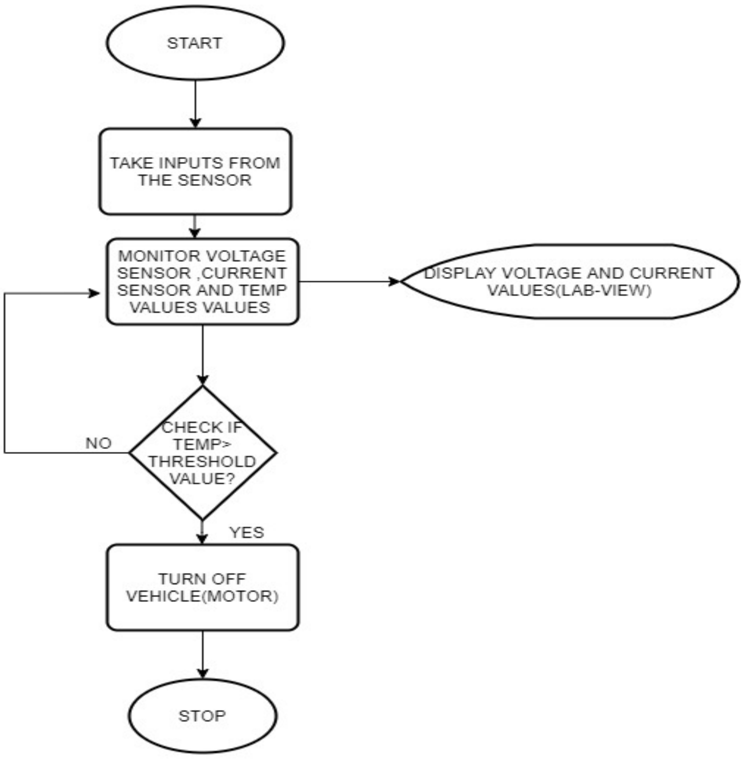



FIG: FLOW CHART

*I. Advantages:*
- Remote controlling and monitoring.
- Increase the life span of battery.
- Data manipulation using cloud computing.
- Reduces cost of battery.

*II. Applications*:
- Industrial applications.
- Electric bike
- Electric car
- Automotive industry

## V. V. CONCLUSIONS

The paper studies to monitor and control the electric vehicle and the monitoring of battery parameters in the PC using LABVIEW and in wireless smartphone technology, i.e. via IOT. Rechargeable batteries are lead acid. The price of the system is reduced by using IoT instead of ZigBee. Thanks to the IoT-enabled wireless battery management system, battery life has been increased. To avoid battery overcharging and deep discharge.

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