Automatic EV Battery Management and control Systems using IOT

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Abstract- *A battery is a fundamental component of the electric vehicle (EVs), which represents the step forward towards a sustainable mobility. From the statistics, transportation sector contributes over 25% of the CO2 emissions and 50% of the oil consumption this causes air pollution which is leading to the increase in temperature and also leads to the Global warming. Electric vehicles (EVs) should be replaced by the fuel vehicles this is the major solution to decrease the air pollution because electric vehicle (EVs) are zero emission which does not affect environment. Where, here engines are replaced by a battery the Lithium-ion battery is typically the best battery for electric vehicles (EVs). Battery management system(BMS) plays a crucial role in management of controlling the battery. Due to the limitation like electrical power distribution limitation, Electric Vehicles (EVs) charging should perform in a effective way. This proposed system for a Electric Vehicle (EVs) utilization and charging system having many advance features. The proposed device will automatically stop the overcharging and charging will not happen in battery and different parameters will monitor based on the parameter battery charging and utilization for a load and it will be controlled automatically in this implementation.*

Key Words: **Micro-controller, IoT Module, Electric Vehicles(EVs), BMS, Electric sensor, Voltage sensor.**

1.INTRODUCTION

Electric vehicles(EVs) plays an important role in sustainable mobility thanks to the zero–emission and efficient energy utilizesation. The battery has an great impact on the performance of the electric vehicles (EVs), basically it is determining the driving range. As a consequence, the battery technology and its effective utilization is of paramount importance. From today's perspective, Lithium-ion chemistry is one of the battery technology of choice due to the good power rating, good energy density, and charge/discharge efficiency in a pulsed energy flow system. Usually, a large number of cells depending upon its application are series connected to build the battery string with a required voltage.

Li-ion chemistry is sensitive to deep discharge and overcharge, which may damage the batteries and also shortens its lifetime and also even causing hazardous situations. For this it requires the adoption of proper Battery Management System (BMS) to maintain its each cell of the battery within its reliable and safe operating range. In addition to this a primary function of battery protection the Battery Management System (BMS) should be able to estimate the battery status in order to predict its actual amount of energy that can still be delivered to the load and this is a quite challenging task, as the performance of the battery in terms of usable internal resistance and capacity varies over time.

This project is making electric vehicle (EVs) battery management system using the automatic technique. By using this technique the system battery input and output will be managed. Once the charging starts, that will stop automatically when the charging is done and load will be control automatically based on the different parameter like temperature and charging status. User will able to see all information using LCD display.

2. DESIGN OF PROPOSED SYSTEM

Here, main supply we are using for charging source here in this section we are using step down transformer for converting the voltage high to low, Rectifier Bridge and filter are used at charging source. This source will connect with battery for charging through the charging relay. This charging relay will automatic trigger off after the charging is done. This relay will off by microcontroller section. Microcontroller will get charging status and condition with help of different sensor like, current sensor and temperature sensor. This senor will send battery information to microcontroller and microcontroller will display all the values to user using LCD display and also by IOT server.

Based on charging level in battery the microcontroller will control the load and if the battery has very less charging, the controller will trigger off the load by using load relay section.

All management of battery will be automatically executed.

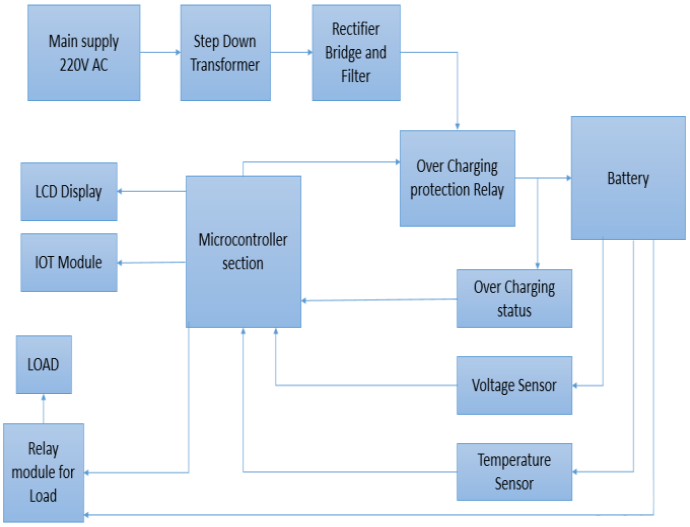


Fig-1. Block Diagram

PROBLEM IDENTIFICATION

- A drop in voltage at a given load can indicate an increase in internal resistance. This then can point toward dry-out, corrosion, plate separation, or other diagnoses.
- A sudden increase in the temperature of battery could indicate the possibility of a thermal runaway event within the whole battery pack. The BMS could then stop the flow of energy and alert the user to a potential problem so that it can be contained before it gets out of control.
- Time Battery overcharging is a common problem in vehicles today. Overcharging your battery can significantly decrease its lifespan, make it more difficult for it to turn over, lower its efficiency, and in extreme cases, can even to battery explosion. Overcharging is a problem that can be difficult to notice.

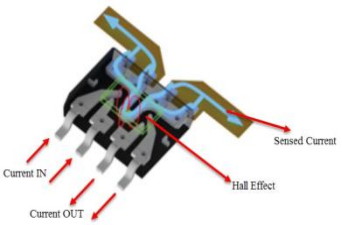
3. OBJECTIVES

The main objective of this project is making EV battery management system using automatic technique. By using this system battery input and output will be manage. Once charging will start, that will stop automatically based on Different parameter like voltage, current, temperature. User will able to see all information using LCD display and IOT. By using IOT user will able to see all information from anywhere of world location using IOT cloud service.

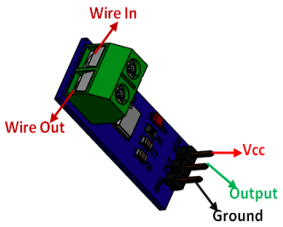
4. Working Principle of Sensor Module's.

(i): Current Sensor

The ASC712 is based on Hall Effect. There is a copper strip connecting the IP+ and IP- pins internally. When some current flows through this copper conductor, a magnetic field is generated which is sensed by the Hall Effect sensor. The Hall Effect sensor then converts this magnetic field into appropriate voltage. In this method, the input and the output are completely isolated.



a)Current Sensors



b) Interfacing ASC712 Current sensor with microcontroller

By using this current sensor the overcharging is controlled by using a protection relay which is controlled by a microcontroller.

(i) Temperature Sensor:

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C).It can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. The LM35 has an output voltage that is proportional to the Celsius temperature

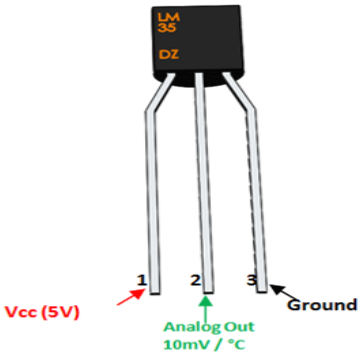


Fig: LM35 Temperature Sensor

Power the IC by applying a regulated voltage like +5V (VS) to the input pin and connected the ground pin to the ground of the circuit. Now, you can measure the temperate in form of voltage. The sensor is operated by the microcontroller when the battery is over heat the temperature sensor will sense it and the microcontroller will stop the power supply so the battery will not been damaged.

Experimental Setup and Results.

The below shown is the Experimental Setup for Battery management and system (BMS) analysis using IoT. Now, it is completed 50% of project.

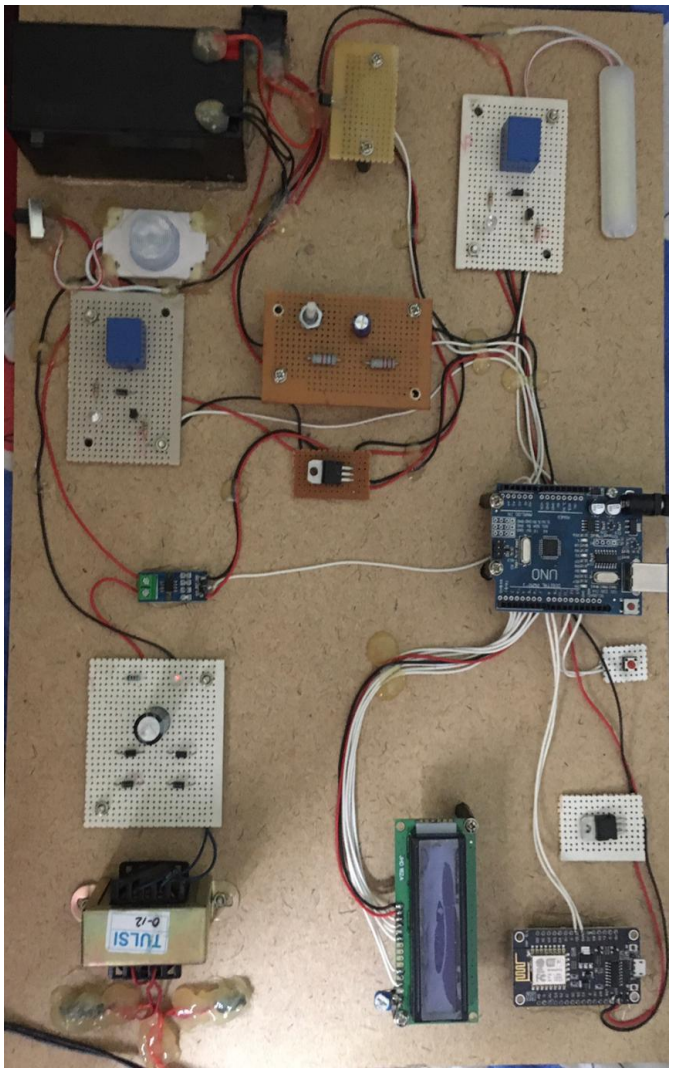
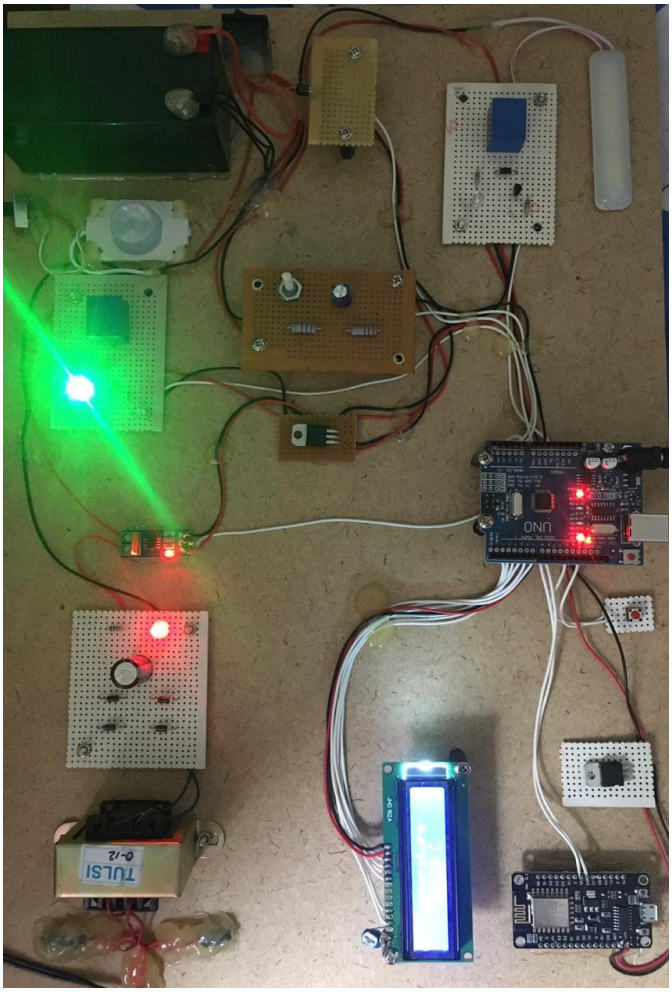


Fig: Experimental Setup.

i.e, showing temperature of battery in the LCD display and charging status display .The word LCD refers to it is a specific sort of electronic display module used in a wide array of circuits and devices including computers, calculators, TV sets, mobile phones, and other electronic devices. Seven segments and multi-segment light-emitting diodes are the two major applications for these displays. The primary advantages of adopting this module are the , easy programming, animations, low cost and the lack of any restrictions on displaying customized characters, unique and even animations, etc. The data register and command register are two of the 16 by 2 LCD's registers. The main purpose of the RS (register select) is to switch between registers. A register set of 1 is referred to as a data register. The register set is referred to as a command register when it is set to "0".



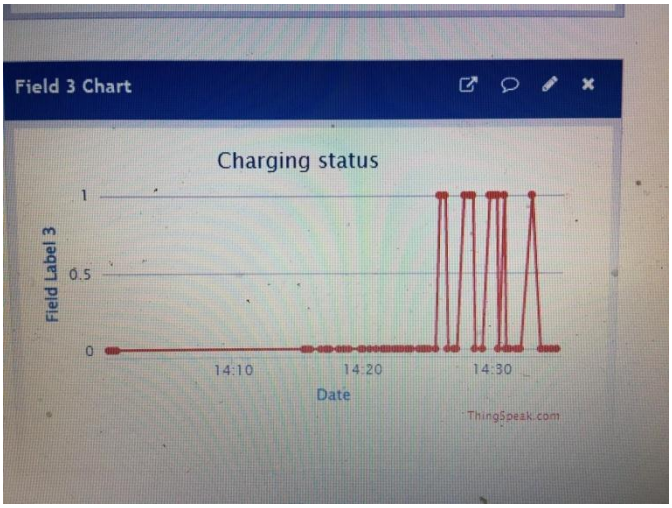


Fig: Charging status Results.

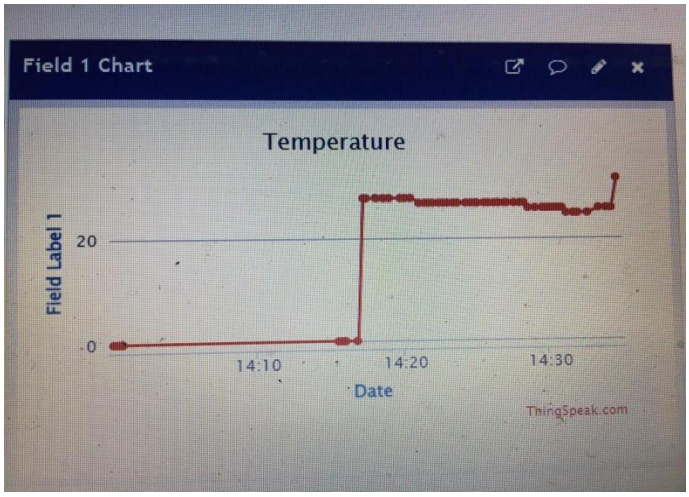


Fig: Temperature Sensor Results.

3. CONCLUSIONS

The transportation sector is one of the major contributors to carbon dioxide emissions and air pollution. The widespread adoption of the Electric Vehicles (EVs) is one of the promising solution to address the de-carbonize transportation sectors and environmental. This project is developed a system for management and control of a battery for charging and the utilization of a battery.

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