TUF | THE UNIVERSITY OF FAISALABAD

IOT Based Battery Monitoring System

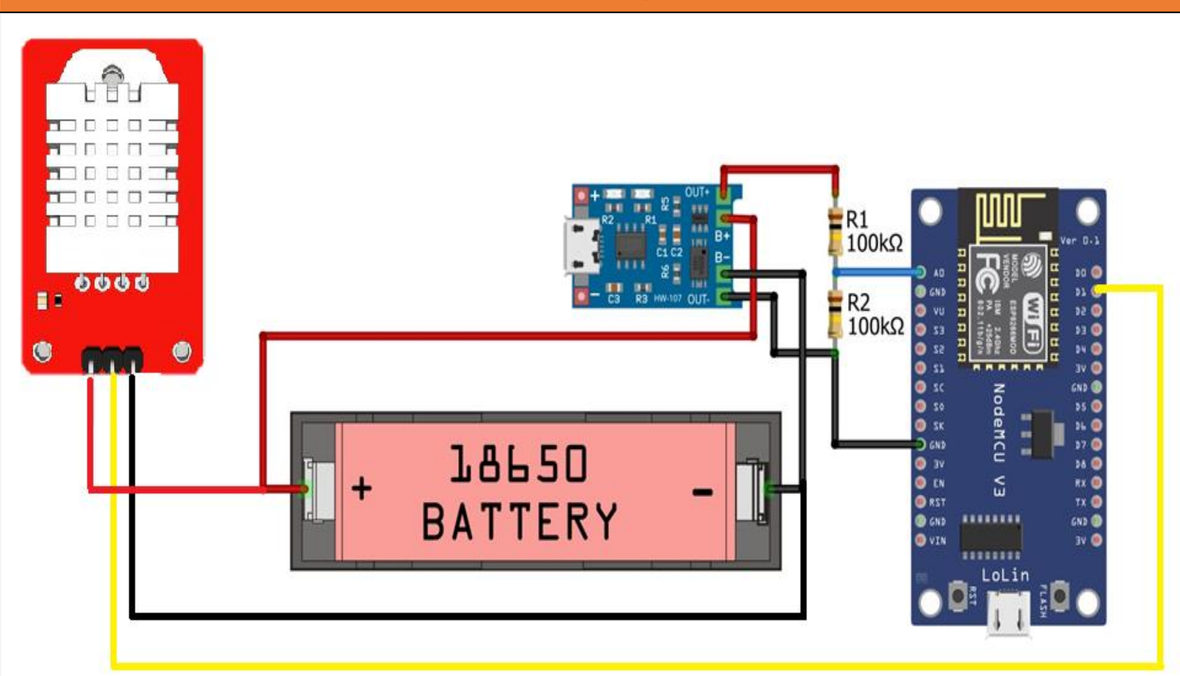
INTRODUCTION

Embedded systems have to go through so many revolutionary changes, with the recent appearance of open operating systems and smart phones, new and innovative applications are invented to manage and monitor the energy consumptions.

Rapidly growing energy demands have not kept pace with advances in battery technology. Most android devices use rechargeable electrochemical batteries for example lithium ion batteries, as their portable energy source. These fully charged batteries can run on this charge for only a few hours.

So for the safety of batteries we have to monitor them continuously to prevent them from overcharging and discharging.

CIRCUIT DIAGRAM/ SCHEMATICS



Problem Statement

Li-ion batteries need careful handling to ensure long life and high efficiency. The life and efficiency of these batteries is dependent of Depth of discharge, charging discharging rate, Temperature, Humidity, etc.

In conventional systems, the batteries are not monitored and there is almost no knowledge of parameters governing the life and performance of batteries. Thus, consumers have no idea if the Batteries are being discharged more than desired value, or if the batteries are operating at high temperatures.

Objectives

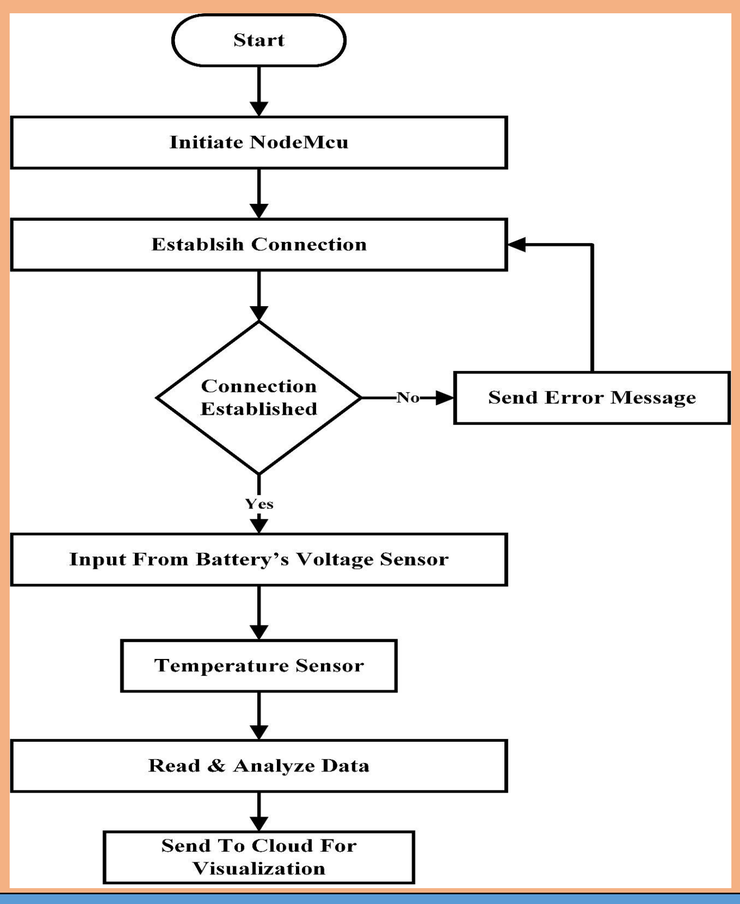
The objectives of this project are as follows:

- **Monitoring Voltage,**
- **State of charge (SoC)**
- **Temperature**
- **Link with online server**
- **User interfacing**

Methodology

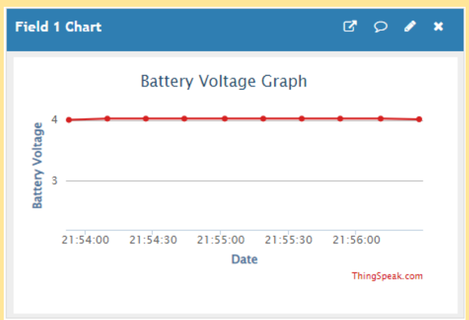
Methodology consist of two stages:

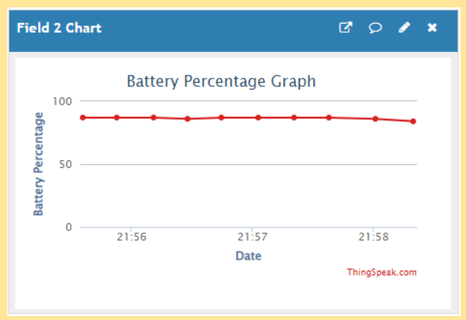
- **Hardware designing**
  - ❑ **Using TP4056 module as charging circuit**
  - ❑ **Using voltage divider to reduce battery voltage for NodeMcu**
- **Programming /code designing**
  - ❑ **Reading digital value of voltages**
  - ❑ **Reading battery voltage and temperature**
  - ❑ **Calculating State of charge**
  - ❑ **Sending and Plotting data via online server**

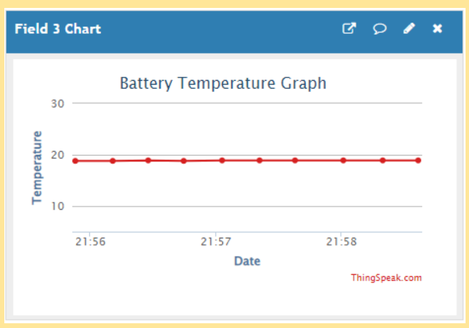


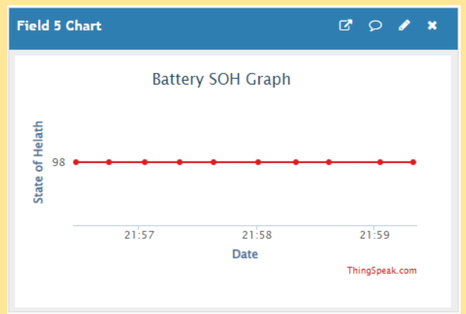
Results and Discussion

- **The required parameters can be seen online.**
- **The measured values and the values seen online matched well.**









Future work

In future, this project can be extended to monitor much more accurate State of charge, current, State of health, and performance forecasting of battery.

The same architecture can be extended and modified to be used for UPS systems for household appliances, EVS, Cell towers powering, Solar applications, space applications and all its applications where batteries are being used.

An app may be developed for visualizing, storage, and analysis of data.

CONCLUSIONS

- **The data displayed online can be very useful in online monitoring of battery. Consumer can check the data from time to time to ensure the battery is being operated in safe environment and conditions.**
- **To perform data analysis and to predict the degradation of battery, the data can be made available via an online server.**

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