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Electric Vehicle Charging Station

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ABSTRACT: In this research paper, we explore the application of Switched-Mode Power Supply (SMPS) technology in electric vehicle (EV) chargers. With the increasing adoption of electric vehicles, the demand for efficient and fast charging solutions has become crucial. SMPS technology offers several advantages over traditional chargers, including higher efficiency, reduced energy losses, and compact size. This paper aims to investigate the performance and feasibility of integrating SMPS into EV chargers, with a focus on optimizing power delivery, minimizing charging time, and enhancing overall charging efficiency.

KEYWORDS: EV charging, EV charging station, SMPS, Boost Converter

I. INTRODUCTION

Electric vehicles (EVs) are getting popularity in recent years as they use sustainable energy and environmentally friendly mode of transportation. However, one of the key challenges in the widespread adoption of EVs is the availability of efficient and fast charging infrastructure. Traditional charging solutions often suffer from issues such as high energy losses, long charging times, and bulky equipment. To overcome these limitations, the integration of Switched-Mode Power Supply (SMPS) technology in EV chargers has emerged as a promising solution.

SMPS technology offers numerous advantages over conventional chargers. By utilizing high-frequency switching techniques, SMPS chargers can achieve higher efficiency, resulting in reduced energy losses and improved power delivery. Additionally, SMPS chargers are typically more compact and lightweight, making them easier to install and transport. These benefits make SMPS an attractive option for enhancing the charging experience of electric vehicle owners.

II. METHODOLOGY

Components Required

ATmega 328 SMD microcontroller, 16*2 LCD Display, ESP8266 Wi-Fi Module for internet connection and IOT implementation, Switched Mode Power Supply (SMPS) for power supply, Boost Converter, Two Potentiometer 10k each, DHT11 Sensor, Buzzer, Relay for protection purpose, Lithium-Ion Battery Cells

Working

The model is fed with 230v Ac supply. SMPS converts 230v Ac into 12v DC output. This 12v DC voltage is fed to Boost Converter which provides 18v DC output. Output from boost converter is fed to Lithium-ion battery through relay and BMS. The main function of relay is to prevent battery from overcharging and disconnect battery from the supply when temperature exceeds preset value 45 degrees Celsius. DHT11 sensor continuously measures the temperature and humidity in the kit. The ATmega 328 Microcontroller is fed with 5v power supply for its operation. Real time data of the prototype model is displayed on LCD Display and ThingSpeak channel. On ThingSpeak platform project parameters such as voltage, temperature, and humidity are displayed in the form of graph and are stored there. Data from IOT can be used in future to evaluate battery performance.

When battery is fully charged it is disconnected from the supply by relay and buzzer will give indications. As the model is a prototype voltage values are varied with the help of potentiometer as high and low voltage.

III. MODELLING AND ANALYSIS

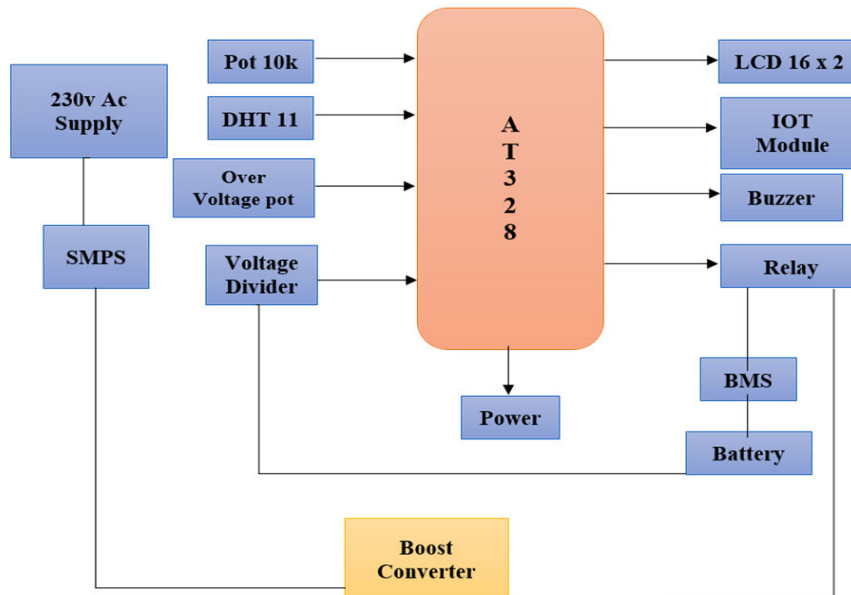


Fig 1: Block Diagram of proposed system.

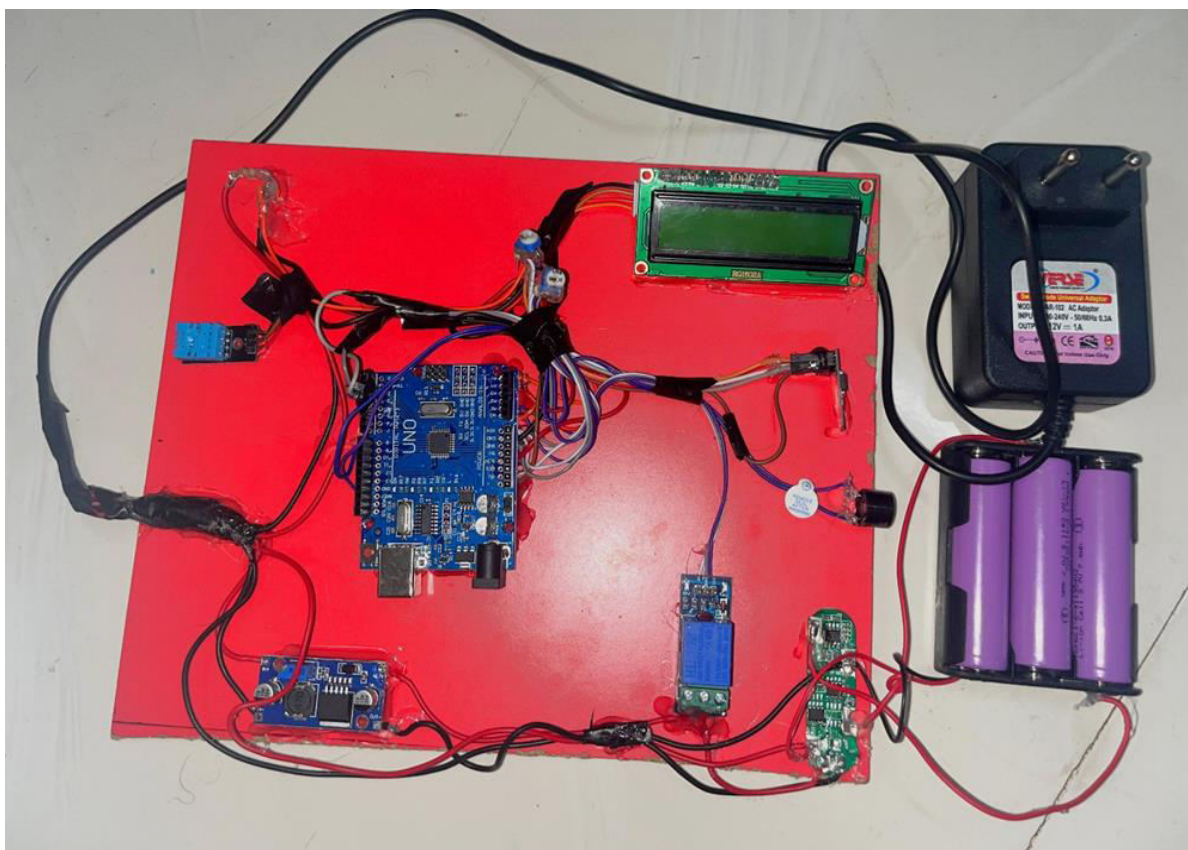


Fig 2: Prototype Model of Proposed system



Model Specifications

Input 230v AC
SMPS Output 12v DC
Boost Converter Output 18v DC
Current 1 amp constant
Temperature Limit 45 degrees Celsius
Li-ion Cell (3.7v , 2000mAh)

IV. RESULTS AND DISCUSSION

ELECTRIC VEHICLE

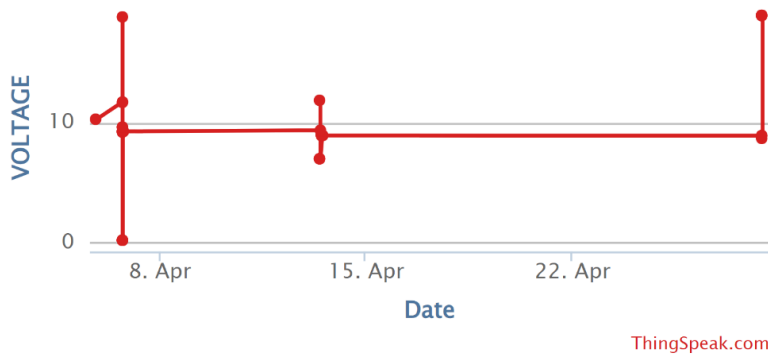


Fig 3 : Real Time Voltage Display on ThingSpeak channel

ELECTRIC VEHICLE

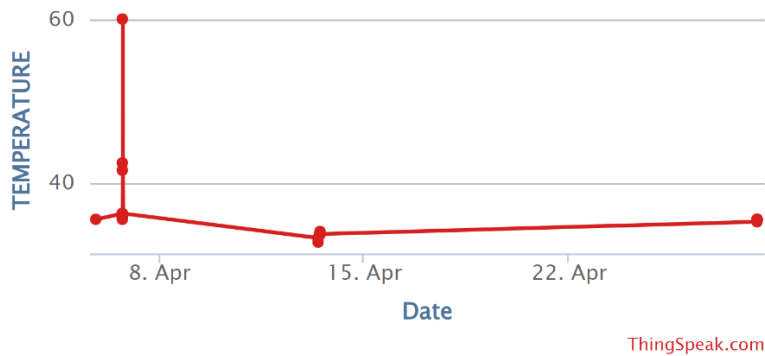


Figure 4: Real Time Temperature Display on ThingSpeak channel

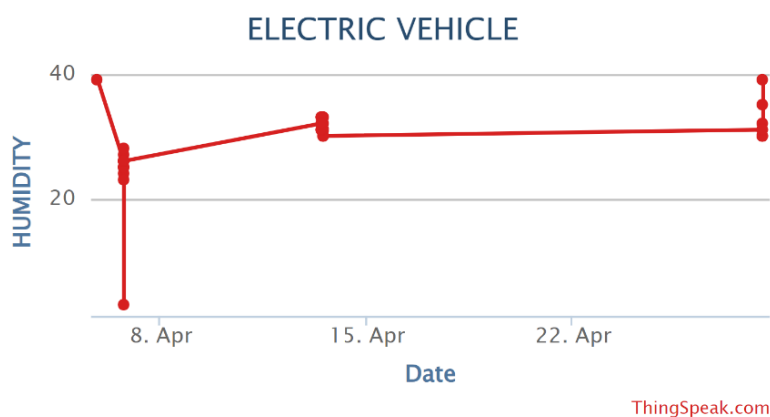


Figure 5 : Real Time Humidity Display on ThingSpeak channel

V. CONCLUSION

In conclusion, the combination of ATmega 328 microcontroller, boost converter, SMPS, IOT, Li-ion battery provides a compact and efficient solution for charging EV battery. ATmega microcontroller acts as central processing unit, it interfaces and provides controlling over components of charging systems. The voltage and current sensing elements play a vital role in monitoring charger and battery parameters, which allows precise measurements of voltage and current. It helps ATmega microcontroller to regulate charging conveniently, preventing overcharging and ensure safe temperature. The IOT integration provides real time monitoring of battery charging and this data can be used for future references.

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