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Smart Electric Vehicle Charging Station

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ABSTRACT: Currently we are facing issues related to lack of fuel and hence we are facing the problem of rise in the price of fuel. So people are shifting to the Electric Vehicles. Because Electric Vehicles are more efficient, and that combined with the electricity cost means that charging an Electric Vehicle is cheaper than filling Petrol for your travel requirements. Using renewable energy sources can make the use of electric vehicles more eco-friendly. But people are facing problem because of lack of number of availability ofcharging stations. At the same time the requirement of public charging portals is not sufficient to meet the demand of the consumers even if there are few Electrical vehicles manufacturing companies are available, they are not providing that charging stations, and it is necessary to increase the number of charging stations**.**

Electric vehicles are a relatively recent technology that is seeking place in the market. It has several advantages, such as the reduced greenhouse emissions, fuel savings and easy to use. Transportation electrification is one of the essential components in the future smart planning and electric vehicles. Charging stations are the main source of energy for EVs and their locations are critical to the accessibility of EVs in a city. They should be carefully situated so that an EV can access a charging station within its driving range. The charging stations successfully developed as desired features for electric vehical from renewable energy resources. This project is about charging E-vehicle module using Smart EV charging station and also there is a new term QR code, so user not need to carry all the time by just having mobile application user can do charging.

KEYWORDS:

1. Microcontroller
2. Charging Station

I. INTRODUCTION

Most aspects of our daily life continue to transform by the digital revolution. Recently the most popular form of green transportation is (EV) electrical vehicles. EVs have many advantages including that they are eco-friendlier, energy efficient, economical, and comfortable than conventional gasoline vehicles.

Certainly, EV has evolved to be produced by many mainstream automobile manufacturers. Batteries play an important role in EVs because they serve the purpose of being either the primary energy source or the backup source in hybrid EV's. Battery performance is dependent on certain factors such as temperature, chemical composition, age, and rate of charge or discharge.

In EV's, it is important to monitor the battery's state of charge (SoC) although this is not always easy because the characteristics of the battery itself. The boom of the World Wide Web has intensified interest in e-money that can be transferred over the internet. So, it is necessary to do the transactions for the charging of the vehicle electronically. The currently available charging stations are company based. That is the companies are having their individual charging stations for free of cost. And a person can charge their E-vehicle on the respective companies charging station only. No universal as well as paid charging stations are available.

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II. LITERATURE REVIEW

In Ashish Joshi's Electronic vehicle charging station paper, Project is about a way to integrate the EV system and cloud. The paper uses CAN protocol to collect large data of the vehicle. Then it uses OSGI Gateway to transfer all data to the cloud and helps to process it. All the vehicle data is monitored in real time. [1]

Arunkumar P and Vijith.K developed IOT system uses a cloud platform and Android Apps for communication purposes. Internet of Things (IoT) based smart grid has been developed to monitor status of batteries in smart grid systems. The IoT which is developed here uses a cloud platform and Android Apps for communication purposes. The car user can easily check the health of his car battery and he can easily make a decision whether to take power from grid or to sell power to grid. [2]

In research paper of Mohammad Asaad, Furkan Ahmad, Mohammad SaadAlam, Yasser Rafat, Electric Vehicles (EVs) is a good prospect although the probability of damage to battery pack in case of overcharging or deep discharging situations prevails. To mitigate the danger of damage, an accurate real-time capacity determination of a battery pack is desired to increase their lifespan and to protect the equipment they power. A less complex and easy to implement algorithm i.e., coulomb counting technique is implemented in this paper and the estimated SoC along with measured parameters are made available in real time to the user on a remote basis in form of messaging communication. [3]

The paper State-of-Charge Estimation with Open- Circuit-Voltage for Lead-Acid Batteries by C. S. Moo ; K. S. Ng ; Y. P. Chen ; Y. C. Hsieh is about estimation of State o charge with open circuit voltage. The state of charge is checked under different dynamic conditions.
The open circuit voltage is plotted against different values of SOD. [4]

III. PROPOSED METHODOLOGY AND DISCUSSION

OPERATION OF THE PROJECT CAN BE DIVIDED INTO 3 MODULES:

- Webserver
- Charging Station
- Android App

Working of Webserver:

It can be considered as the ultimate controller of the entire system. It stores the details of the following in the SQL database:
It monitors the SoC received from the EV and when it goes below a predefined value it sends alert message to the user. Then user can search the nearest charging station using app with data of location of charging station from the database. User can book the charging port with app and send the command to database. Now when user reaches at station, he need to scan the QR placed above charging port.
After user scan, Charging station checks in its database whether vehicle user is registered or not. When the matching details of the vehicle are found it sends start charging command to the charging station else it aborts the process and the user won't be able to charge. While the EV is charging, if the SoC reaches an upper threshold value it sends stop charging command to charging station. It deducts the total charging cost from the user account's database and sends it to the charging station's database. With the help of the charge timing table stored in the database, it calculates the total cost based on the following formula, Total Cost = (Start time - End time) * Cost of charge per unit time.

Working of charging station:

On receiving enable message from the webserver, it activates charging port. When the EV stops in front of the charging station, it identifies the vehicle when user scan QR code with the APP. It sends the information of the vehicle to the webserver and checks whether the vehicle is registered on the Android App. After authentication and recognition of the vehicle it waits for the webhost to send the start charging command and on reception of the start charging command it start the charging process by connecting the charger to the EV.As soon as the charging begins it sends the details of the start of charging time to the webhost and continues charging the vehicle until it receives stop message from the webhost. On receiving stop message it records the end of charging time and sends the information to the webhost and disables the power supply. Also, it disconnects the charger from the EV which is now free to travel.

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Working of Android Application:

It displays nearest charging station form users current vehicle location. It consists of nearby charging station button displays the nearby charging stations by making a link to the Google Map which shows the travel path of user location to that particular charging station selected by user from the list of nearest charging station. It consists of a Book port button on which the user will send booking command of port so that no other user can use that port until this user teaches at that location. It also consists of History button which will fetch the transaction history from the webserver

A. Connection Diagram:

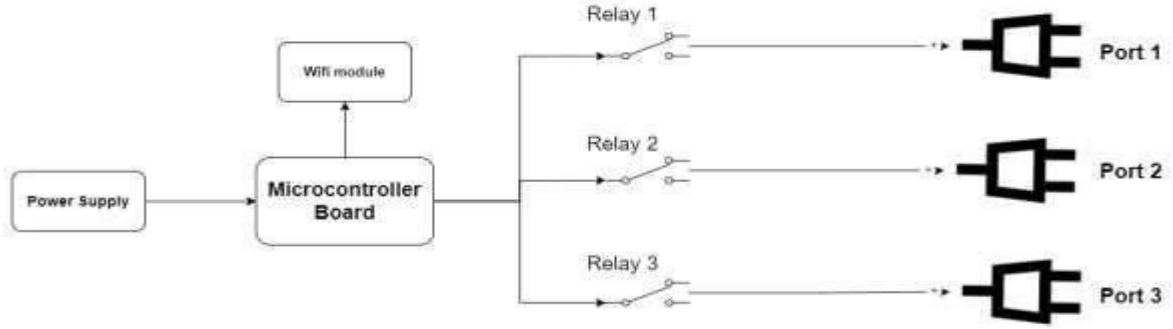

Fig 01

B. System Architecture:

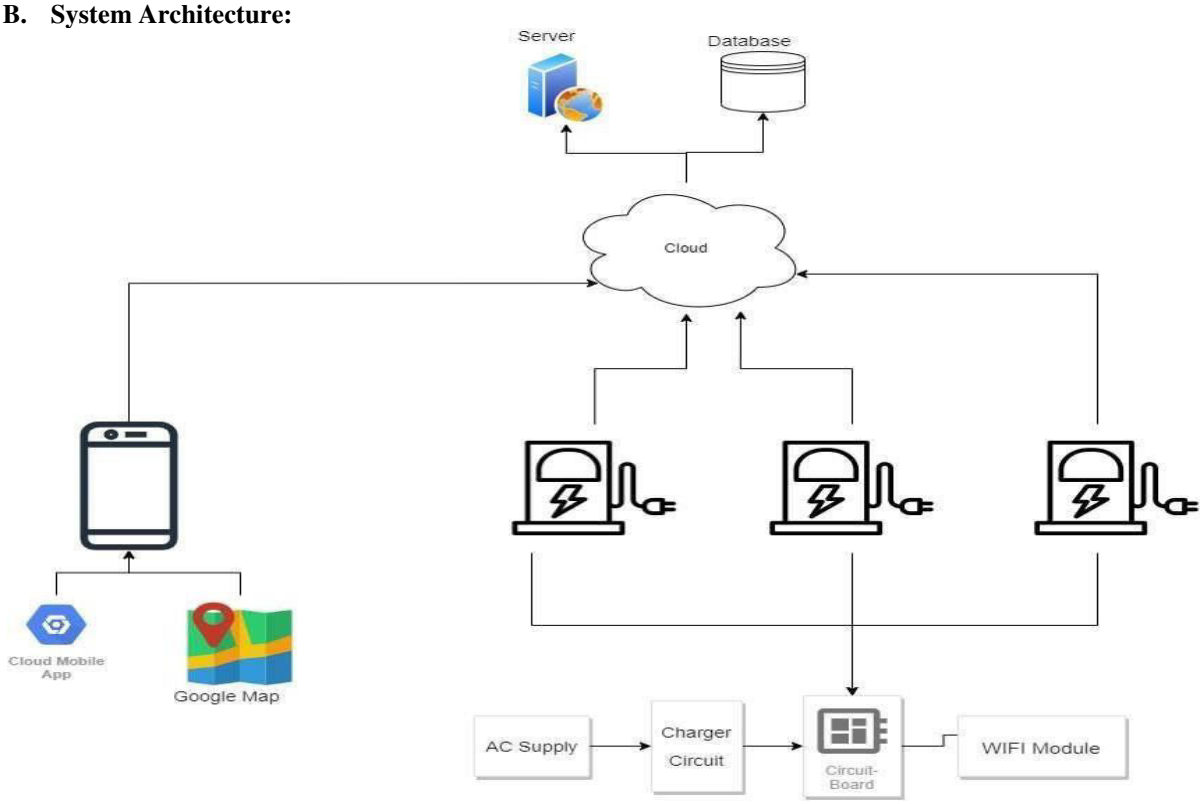

Fig 02

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IV.RESULT

V. CONCLUSION

We have designed and developed semi-autonomous smart charging system for EV where it can charge and display money payment transactions for an EV with the help of IoT.
Hence, we conclude that we successfully created the smart EV Station.

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