EV Vehicle Charging Station Finder App

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Abstract*: The ever-increasing population of India accompanied by the recent concerns regarding fossil fuel depletion and environmental pollution has made it indispensable to develop alternate mode of transportation. Electric Vehicle (EV) market in India is expanding. For acceptance of EVs among the masses, development of charging infrastructure is of paramount importance. This work formulates and solves the charging infrastructure-planning problem for city, that will develop as a smart city soon. The allocation of charging station problem was framed in a multi-objective framework considering the economic factors, power grid characteristics such as voltage stability, reliability, power loss as well as EV user's convenience and random road traffic. The advent of alternative vehicle technologies such as Electrical Vehicles (EVs) is an efficient effort to reduce the emission of carbon oxides and nitrogen oxides. Ironically, EVs poses concerns related to vehicle recharging and management. Due to the significance of charging station infrastructure, electric vehicles' charging stations deployment is investigated in this work. Its aim is to consider several limitations such as the power of charging station, the average time needed for each recharge, and traveling distance per day. Initially, a mathematical formulation of the problem is framed. In this work is proposed the design of a system to create and handle Electric Vehicles (EV) charging procedures. Due to the electrical power distribution network limitation and absence of smart meter devices, Electric Vehicles charging should be performed in a balanced way, taking into account past experience, weather information based on data mining, and simulation approaches. In order to allow information exchange and to help user mobility, it was also created a mobile application to assist the EV driver on these processes. Then, this problem is optimized by application, with the objective to calculate the necessary number of charging stations then finding the best positions to locate them to satisfy the clients demand. In this paper, the potential need for electric vehicles, charging station infrastructure and its challenges for the Indian scenario are studied. Further more understanding of the topic and searching and locating of the charging stations.*

Keywords: EV Vehicle

I. INTRODUCTION

Today, India is one of the fastest growing economies in the world, but its increasing dependency on oil imports, rising environmental concerns and growing need for sustainable mobility solutions are posing serious economic and social challenges for the country.Rising fuel costs, growing public awareness and concern over environmental issues such as local urban air quality and global warming, combined with higher performance batteries mean that electric vehicles (EVs) are becoming an attractive alternative to internal combustion engine vehicles (petrol/diesel). Increased market penetration of electric vehicles will increase electricity loads, may place increasing demands on electricity grids. It will also require the installation, management and maintenance of compatible recharging infrastructure. Careful analysis, planning and management will be needed to reduce the costs of and to optimize placement of this recharging infrastructure and to minimize the impacts on electricity grids. The goal of this study is to determine the optimal number and locations of electric vehicle charging stations in the area supplied by the main electricity grid in city, taking account the expected location, number and movement/ charging patterns of electric vehicles.From general aspects of energy, with reduction of greenhouse gas emission target and to have a non-polluting, reliable and sustainable energy system, almost all automotive companies are committed to switching to Electric Vehicles (EVs) rather than keeping conventional cars, which work with Internal Combustion Engine (ICE). Although electric vehicles are quite expensive in comparison   conventional cars, the most motivating news is that users can get benefit with a lower spending on

maintenance and operation costs. However, governments encourage people by giving users subsidies and invest in EV Charging Stations Infrastructure to help companies make this transition smoother from ICE Vehicles (ICEV) to the new generation of cars. The efficiency of EV relies on many parameters such as its battery, the power of charging stations, etc.Thus, regarding this methodology, by optimizing the distance between charging stations, the cost will be minimized. Charging Station (CS) infrastructure deployment is the most significant issue for the EV industry.In the last decade, the electric vehicle market has seen a rapid evolution with the ongoing development in the automotive sector. The sensitivity of different governments across the world toward a cleaner environment has increased the demand for electric vehicles and EV charging station apps. Developed countries including the USA, UK, and Germany are promoting the use of electric vehicles for reducing emissions, that's why electric vehicles are observing huge growth. In automotive cars, the electric vehicle industry is being dominated by global players like Tesla, BYD, BMW, Volkswagen, and Nissan. When a customer buys an electric car, then you can't maintain it in an ordinary way. You will require some apps especially a charging station finder app to find charging stations.

II. LITRATURE SURVEY

Literature survey is gathering the information of previous work done related to your project. It contains the research study year, researchers name, technologies used and drawback of the system.

The electric vehicle appeared in the mid-19th century. The electric battery powered taxis were available at the end of the 19th century in the street of London. At the beginning of 21st century, interest in electric vehicles has increased due to growing concern over the problem associated with hydrocarbon fuel vehicles, including damage caused by their emission. Among many important technologies developed in electric vehicles, the development of the lithium ion battery has become milestone. Lithium ion batteries are responsible for development of electric vehicles capable of long-distance travel.Since 2010, combined sales of all electric cars and utility vans achieved 1 million units delivered globally in September 2016 and combined global sales of light-duty all electric and plug-in hybrids have passed 5 million in December 2018 (clean energy Nepal, (2003)

Pursuit al. (2009) analyzed the effect of uncontrolled EV charging on daily load profile. They also showed the improvement in load profile by incorporating coordinated charging.

McCarthy et al. (2010) examined the effect of PHEV load on the Metropolitan distribution network of Australia. They concluded that with uncoordinated charging and with 100% PEV penetration 41% peak load shifting is required.

Jiang et al. (2016) presented the daily load variation with different penetration of EV. Gnann et al. (2018) made an attempt to analyze the impact of EV chargers on peak load demand by considering various scenarios of EV penetration. The authors commented that increase in evening peak load caused by charging of commercial EVs is less than the increase in load caused by home charging of private EVs. Shinde & Swarup (2018) studied the impact of EV load on the upsurge in load demand and proposed a demand response program for profit maximization.

2.1 Fuel Management System:

Areeg Abubakr Ibrahim Ahmed, Siddig Ali Elamin Mohammed, Mohamed Almudather Mahmoud Hassan Satte. Department of Electrical and Electronics Engineering University of Khartoum Khartoum, Sudan in this paper the author describes that the fuel management system is a monitoring device built on the Raspberry-Pi computer, it takes information about tank's fuel level in real time through its sensor and live streaming of the site, then uploads it directly to the internet, where it can be read anytime and anywhere through web application. The bits referred from the above paper are IoT architecture and general methodology and understanding of various sensors

2.2 Fuel Monitoring and Vehicle Tracking:

Sachin S. Aher, Kokate R. D. International Journal of Engineering and Innovative Technology (IJEIT) Volume 1, Issue 3, March 2012 This paper deals with today's world, actual record of fuel filled and fuel consumption in vehicles which is not maintained. It results in a financial loss. To avoid this, we are implementing a microcontroller based fuel monitoring and vehicle tracking system. The bits referred from the above paper are GPS technology and fuel management. This paper gives a broad idea regarding the management of fuel in huge firm or companies with many vehicles.

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DOI: 10.48175/IJARSCT-11204

ISSN
2581-9429
IJARSCT

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2.3 Automatic Fuel Tank Monitoring, Tracking & Theft Detection System

Komal D/o Shoukat Ali Khuwaja, Brohi Arif Ali, Vlad O. Mihalca and Radu Cătălin Ţarcă1 MATEC Web of Conferences 184, 02011 (2018) Annual Session of Scientific Papers IMT ORADEA 2018. This system is proposed for fuel carrying road tankers which carry fuel from oil depots to end users such as petrol-stations. This system is based on hardware as well as software. The hardware part consists of fuel level circuits, on-board Arduino, GSM and GPS modules. It also provides a technique for detecting theft or fraud incidents in case of fuel theft or fuel leakage. The point referred from the above paper is regarding the fuel theft in the oil tanker. The device is minimized to an extent which can be used in an automobile for theft and leakage detection from the fuel tank

III. METHODOLOGY

To develop an application for Searching charging stations for electric vehicles. Lack of knowledge of exact quantity of charging stations in vehicle, So owner or operator has to estimate the quantity by assumption and sometime theft of vehicle charging at the charging station is also creates problem. The arrival of electric vehicles is the most significant initiative towards going green and making our environment cleaner. With the constant evolution in the automotive industry, the EV market has experienced a massive development over the past decade. And the growing demand for a greener environment has raised the need for creating EV charging station finder app.We still have fewer electric vehicle (EV) charging stations, so businesses are developing EV charging station finder apps. By building such an app, it becomes easier for you to find the nearest EV charging stations. Moreover, you can make the payment directly via that app and book a charging slot beforehand.
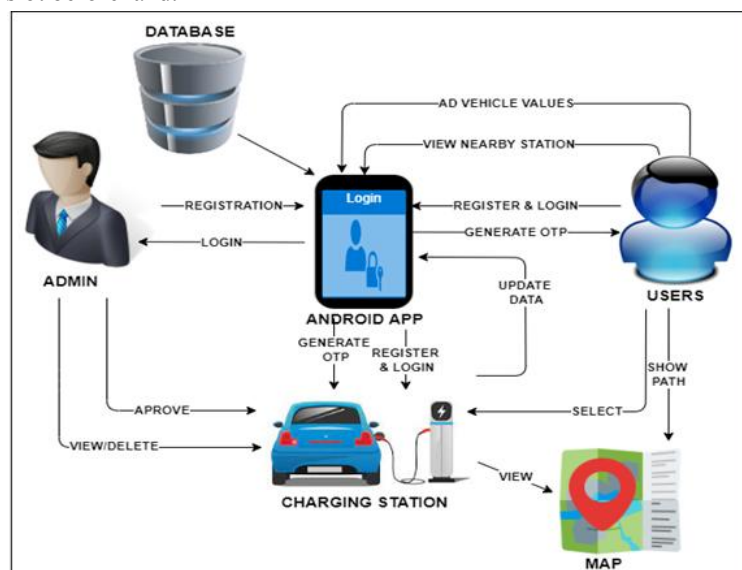

Fig: System Architecture

IV. MANAGEMENT REPORTING AND COMMUNICATION

1. 1.Feedback: Provides a feedback, which ensures to the user that the organization (which develops the software) understands the issues or problems to be solved and the software behavior necessary to address those problems.
2. Decompose problem into components: Organizes the information and divides the problem into its component parts in an orderly manner.
3. Validation: Uses validation strategies applied to the requirements to acknowledge that requirements are stated properly.
4. Input to design: Contains sauciest detail in the functional system requirements to devise a design solution.
5. Basis for agreement between the user and the organization: Provides a complete description of the functions to be performed by the system. In addition, it helps the users to determine whether the spicedrequirements are accomplished.
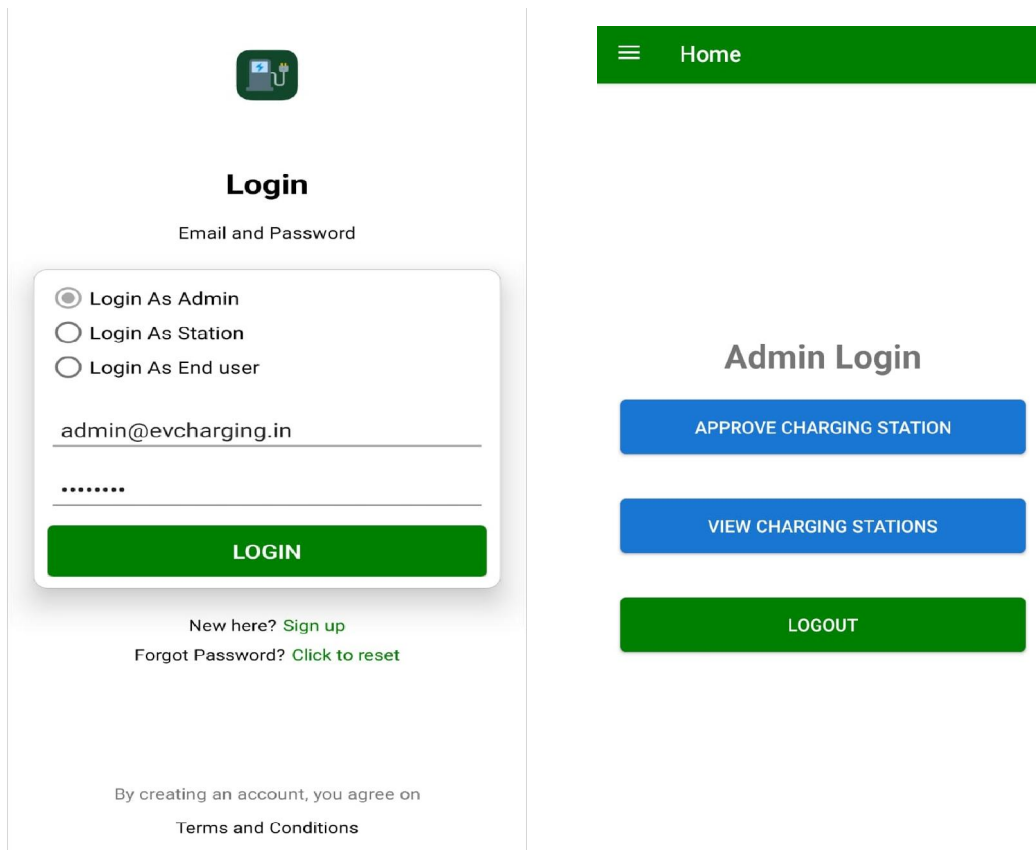
6. Estimating costs and schedules: Determines the requirements of the system and thus enables the developer to have a 'rough' estimate of the total cost and schedule of the project.

WEEK	ISSUE DISCUSSED / FOLLOWED UP
1st Week	Discussed about paper selection and search for 10 paper.
2nd Week	Prepared the literature survey and staring work on the synopsis.
3rd Week	Submitted synopsis and PPT of the project.
4th Week	Discussed about canvas model and idea Matrix and also explain NP-Hard and NP-Complete.
5th Week	Discussed the functional dependency and graphical representation and also discuss the UML and DFD diagram.
6th Week	Discuss the functional principal f the project and also discuss the test cases.
7th Week	Discus the project planning and progress report and submitted plagiarism report.
8th Week	Submitted soft copy of latex report.

Table: Management Report

V. DATA REPORT / OUTPUT REPORT

Admin:

Login.
Approve Charging Stations.
View Charging Stations (on map) (On list).
Delete Charging Station.
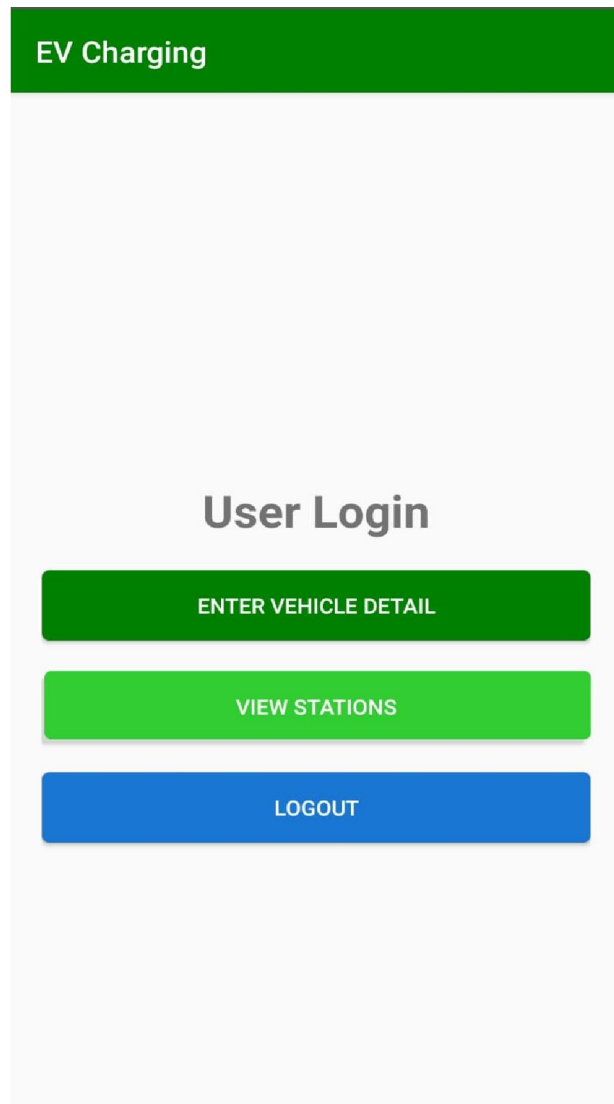
Charging Station:

Register (Station Name, Address, City, Taluka, District, Open Time, Close Time, GPS Location: -LAN, Longitude)
View Station on map (Own Station Only)
Update Data: Power Remaining

User:

Register (All Necessary Documents)
Login (OTP Verification)
View Station on map (On map)(On list)
After Submitting
Display Station on Map
Select Station
Show Path and Direction

VI. APPLICATION

If you have launched an EV charging station, then taking your business online can be the best business decision you will ever make. Developing an EV charging station finder app will be your best investment if you are jumping into the EV charging station business. It will increase the visibility of your business and will generate more revenue.

An EV charging station finder app allows the car owners to not wait in the long queue at the charging station. The users can book the spot in advance so that they don't need to wait at the time of need. Thus, there will be no hassle for users to charge their electric vehicles.

There are many other benefits of developing an EV charging station app. You can track the stats and finance of your charging station business including the profit earning daily, electricity consumption at each station, details of the customers, successful or failed payment transactions, customers reaching your refueling station, issues customers are facing on your charging station, and feedback.

VII. FUTURE WORK

Future work should focus on identifying which variables and performance indexes have the most practical applications in planning for building new EV charging stations on college campuses. For example, conducting EV driver behavioral analysis and categorizing charging point users into different clusters may yield important information.

VIII. CONCLUSION

India should start initially by small scale reinforcement thus reducing the load issues instead of going for massive changes. Home charging should be encouraged thus proper management of grid electricity and leads to reduction of traffic population and thus proper safety measures can be done. Proper planning of location of charging station which should be done by pre assessment at city level for identifying static location based on availability of land and reliable source of power. With some great features and functionalities, we expect to get many electric vehicles on the market in the future. The rising demand for EVs increases the need for charging stations and station locator apps also. So, if you are planning to create such an app to meet users' expectations. The cost to develop an EV charging station finder app majorly depends on many factors. The influential factors are development platform you choose (Android, iOS or both), app complexity, location of app development company you choose, and features you want to integrate in the app.

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