

Web-Based EV Charging Station Finder System

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Abstract

The worldwide shift towards electric vehicles (EVs) is gaining momentum, driven by environmental issues and the demand for sustainable transport. Nevertheless, a significant obstacle to the widespread use of EVs is the insufficient availability of reliable and easily accessible charging infrastructure. Current options, including generic mapping services and third-party apps, frequently fall short in terms of accuracy, real-time updates, and centralized management capabilities. To fill this void, this paper introduces a Web-Based EV Charging Station Finder System that allows users to effortlessly locate nearby charging stations. The system offers crucial information such as the station's name, location, contact details, and charging costs. Administrators are equipped with backend tools to update, add, or remove charging stations, guaranteeing that users have consistent access to trustworthy information. Built with PHP and MySQL, the system is designed for scalability, efficiency, and user-friendliness. This solution not only improves user convenience but also supports the broader objective of promoting clean energy and environmentally friendly transportation. Keywords: EV Charging, Web-based System, PHP, MySQL, Sustainable Transportation

1. Introduction

As electric vehicles gain popularity around the globe, the need for efficient and easily accessible charging infrastructure has become essential. EV users frequently encounter scarce or information is outdated. Relying on manual methods, such as contacting service providers or using static lists, can be

both time consuming and ineffective. The proposed solution tackles this issue by offering a web-based platform that streamlines the process of finding EV charging stations. Users can simply input their city and location to quickly discover nearby stations. Furthermore, the platform provides comprehensive details, including the station's name, contact number, city, and charging fees per kWh and per hour. Unlike standard maps, this platform is specifically designed for EV charging services, ensuring both accuracy and reliability. Administrators possess special permissions to manage station information by adding new stations, modifying existing entries, and deleting inactive ones. This guarantees that the system remains up-to-date, avoiding outdated or misleading data. The primary goal of the project is to enhance the EV user experience and promote the adoption of sustainable transportation options.

Keywords

EV Charging Station, Web-Based Application, PHP, MySQL, Sustainable Transportation, Green Mobility, Electric Vehicle Infrastructure, Real-Time Data, Location-Based Services, Smart Energy Systems

2. Literature Review

Previous research and current applications for finding EV charging stations show various shortcomings. While general map services like Google Maps offer location-based searches, they often do not cater specifically to the needs of EV users, such as charging costs or station availability. Additionally, many existing

applications are tied to specific networks, which restricts users to viewing stations from a single service provider and limits access to other networks. Studies in the area of green mobility indicate that a significant challenge for EV drivers is "range anxiety," which refers to the worry of depleting their charge without locating a nearby charging station. To tackle this issue, a centralized digital platform is necessary, one that consolidates multiple providers and supplies real-time data. Some earlier initiatives have developed mobile applications for EV charging; however, many of these lack administrative oversight, making it difficult to update outdated information. Furthermore, subpar user interfaces and restricted functionalities effectiveness of these diminish the systems. These limitations highlight the urgent need for a dedicated, web-based EV charging locator system that provides both user and administrative control.

3. Proposed System

The Web-Based EV Charging Station Finder System aims to address the limitations of current solutions. For Users: - Simple registration and login process. - Search for charging stations by entering the city and area. - Access details like station name, contact number, and charging fees. - Enjoy an intuitive interface for easy navigation. For Administrators: - Secure login using a username and password. - Add new stations with all necessary information. - Update or remove outdated entries. - Monitor and ensure data accuracy. Advantages: - Offers a centralized platform for EV charging stations. - Guarantees updated and precise data. - Minimizes search time and effort for users. - Improves usability with a straightforward and clean design. - Promotes widespread EV adoption by simplifying the charging process.

4. Methodology&System Design

The system was created using a well-defined methodology that includes the following elements: Frontend: Developed with PHP, providing both flexibility and scalability. Backend: MySQL database crafted to hold user information, station specifics, and location data. Input Design: Intuitive forms equipped with validation checks to minimize errors. Database Design: Comprises relational tables for administrators, users, stations, and locations. Output Design: Information is displayed in a clear manner with organized results. System Features: Admin Panel for managing data. User search capability with filtering

options. Secure login and authentication processes for both users and administrators. Real-time updates of charging station information.



Figure 4.1 Use Case Diagram

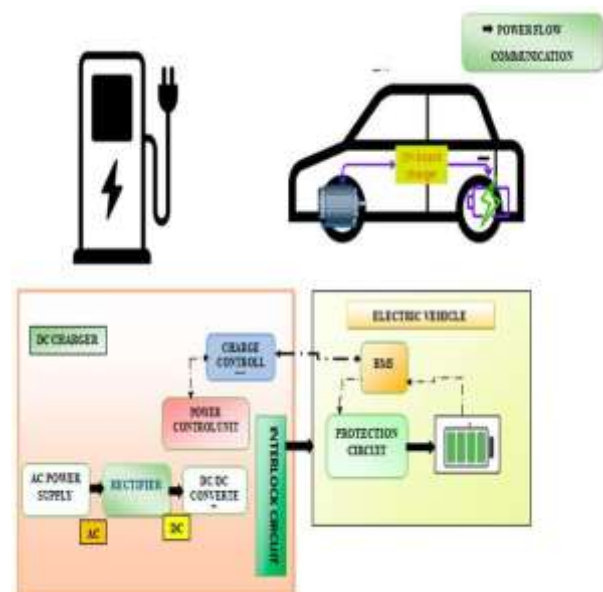


Figure 4.2 System Architecture

5. Implementation & Testing

The system was set up in a XAMPP server environment, utilizing PHP for scripting and MySQL for the database. The testing process included: Unit Testing: Each module (login, registration, search) was tested on its own. Integration Testing: The modules were merged and assessed for compatibility. Validation Testing: Verified that user inputs were processed accurately. Black Box & White Box Testing: Evaluated system performance with and without internal insights. Acceptance Testing: Confirmed the system met user requirements. The testing process verified that the

system is operational, dependable, and aligns with project goals.

6. Results & Discussion

The system effectively allows users to find charging stations by city and area. It offers precise information such as fees and contact details, enhancing overall efficiency when compared to current solutions. Test users provided feedback indicating that the system is user-friendly, quick, and very effective in minimizing search time. Administrators discovered that the backend management is straightforward, guaranteeing that data stays current. The centralized design of the system ensures scalability across various regions, facilitating the broad adoption of electric vehicles

7. Sample Output

- User Search Result Display:** When a user enters a city or area name, the system displays a list of nearby EV charging stations with details such as station name, contact number, and charging cost per unit. This confirms that the location-based search functionality is working correctly.
- Admin Data Management:** The admin can successfully add, update, or delete station details through the admin dashboard. The updates are instantly reflected in the user interface, ensuring real-time data accuracy in the system.
- Responsive Web Interface:** The system provides a clean and responsive interface accessible from both desktop and mobile browsers. The layout automatically adjusts for various screen sizes, ensuring a smooth user experience across devices.



Figure 7.1 Output Screenshots

8. Conclusion

This project showcases a practical solution to one of the significant obstacles hindering EV adoption – the absence of easily accessible information regarding charging infrastructure. The Web-Based EV Charging Station Finder System offers a structured, efficient, and userfriendly method for locating nearby stations. It aligns with sustainability objectives by promoting the use of EVs. Future Enhancements: - Updates on real-time station availability. - GPS integration for location-based recommendations. - Charging suggestions based on routes for long-distance journeys. - Development of a mobile application for both Android and iOS. - Multilingual support to enhance accessibility. - A user feedback and rating system to elevate service quality.

9. References

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