IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Offgrid & Hybrid Charging Stations For Electric Vehicle

Mr. Rohit Gaikwad[1], Mr. Rutwik Kamthe[2], Miss.Vaishnavi Patil[3], Mr. Shubham Kokate[4], Prof. Vandana.P. Tonde[5]

Students, Department of Information Technology[1,2,3,4]

Assistant Professor, Department of Information Technology[5]

Sinhgad Institute of Technology, Lonavala, Maharashtra, India

Abstract - In Recent years car companies like TATA, TESLA introduced and launches new electric cars in the market. For charging these cars some of the stations are also set up. But considering the current situation, these cars take at least 15 minutes to half an hour to charge. If station is full and all the slots are filled previously then other customers have to wait for a long time. Our idea is to develop a system which will solve these kinds of issues. We are developing a system in which we are going to connect all the electric car charging stations together. By using our system user can find the station according to their choice and it will be useful for those who want to travel for long distance with their EV cars and it will be time saving. It will be very easy to use. If the given time slot is available then your place for the given slot will be booked. Otherwise system will ask to enter the new time schedule. In this system user has to pay some percent of amount online to confirm their booking. Our system will also provide shortest map route to reach at given station. Our system will also provide interface for charging stations to view all available slots as well as booked slot lists and manage slot timing. We are going to develop this system for web based devices. To develop this system, we are going to use time-slot allocation techniques as well as Google maps API for direction sensing. Our chatbot system will Control software via vocal commands. With the help of online payment gateway user can pay money quickly. Also the feature of choosing offgrid & hybrid charging will be there. By using the system peoples will save their so much time and they can view and book appropriate station easily.

Key Words: Electric Vehicle, Slot, Map, Payment, Stations.

1.INTRODUCTION

Global warming and the depletion of fossil fuels due to excessive energy consumption have become urgent global concerns. To combat these issues, the installation of renewable energy systems, independent of fossil fuels, is crucial. In Japan, the government's implementation of Feed-in Tariffs (Fit) has led to rapid adoption of photovoltaic systems. However, the increased output from these systems has negatively impacted system frequency and voltage distribution. Consequently, the Japanese government is reevaluating the Fit system. Additionally, the cost of photovoltaic installation is decreasing annually, indicating a significant drop in future

PV power prices. This study proposes the use of EV charging stations as aggregators, primarily purchasing power from PV systems in smart houses and supplying power to electric vehicles (EVs) and smart houses. These charging stations require fixed batteries for electricity trading. In this project, we aim to provide a platform for customers to book charging slots at available charging stations according to their needs. The system offers various features, including an AI chatbot for command-based station bookings, mapping capabilities for direction sensing, digital payment options, as well as notifications, emails, and SMS alerts for each activity. Electric vehicles can be charged using different types of charging infrastructure tailored to specific locations and requirements. This chapter emphasizes the importance of considering local planning and implementation for EV charging networks, highlighting the technical aspects and standards of EV chargers.

1.1 Motivation

The motivation behind Charging Stations for Electric Vehicle projects is to drive widespread adoption of electric vehicles by addressing range anxiety, promoting environmental sustainability, fostering technological innovation, reducing dependence on fossil fuels, stimulating economic growth, and aligning with government policies for a cleaner and more sustainable transportation future.

1.2 Objective

Develop a widespread and accessible charging infrastructure. Mitigate range anxiety and promote electric vehicle adoption. Reduce carbon emissions through the use of clean energy sources. Foster technological innovation in charging solutions. Optimize energy distribution through smart grid integration. Raise public awareness and support government policies. Stimulate economic development and job creation. Ensure inclusivity and accessibility for diverse user groups. Facilitate collaborations between public and private entities. Enhance the overall user experience for electric vehicle owners

2. LITERATURE REVIEW

Paper 1 : A Comprehensive Review on Off-Grid and Hybrid Charging Systems for Electric Vehicles

Author : Gautam Rituraj 1(Member, Ieee), Gautham Ram Chandra Mouli And Pavol Bauer 1(Senior Member, Ieee) 1(Member, Ieee)

Abstract : In recent years, the research interest in off-grid (standalone mode) and hybrid (capable of both standalone and grid-connected modes) charging systems for electric vehicles (EVs) has increased. The main reason is to provide a seamless charging infrastructure in urban and rural areas where the electrical grid is unreliable or unavailable so that EV adoption can be increased worldwide. In this regard, this article reviews the state-of-the-art architectures of the off-grid and hybrid charging systems and investigates their various subsystems, such as single or multiple energy sources, power electronics converters, energy storage systems, and energy management strategies. These subsystems should be optimally integrated and operated to achieve low-cost and efficient EV charging. Moreover, each subsystem is explored in detail to find the current status and technology trends. Furthermore, EV charging connectors, their power level, and standards for all kinds of EVs (ranging from one-wheeler to four-wheelers) are reviewed, and suggestions are discussed related to the non-standardization of charging plugs. Finally, conclusions show the continuous efforts of the researchers in improving the systems in various aspects, such as cost reduction, performance improvement, longevity, negative environmental effect, system size minimization, and efficient operation, and highlight challenges for both charging systems.

Paper 2 : Smart Charging Management for Electric Vehicle Battery Chargers

Authors : Vitor Monteiro; J. G. Pinto; Bruno Exposto; Joao C. Ferreira; Joao L. Afonso

Abstract: This paper proposes a smart battery charging strategy for Electric Vehicles (EVs) targeting the future smart homes. The proposed strategy consists in regulate the EV battery charging current in function of the total home current, aiming to prevent overcurrent trips in the main switch breaker. Computational and experimental results were obtained under real-time conditions to validate the proposed strategy. For such purpose was adapted a bidirectional EV battery charger prototype to operate in accordance with the a forementioned strategy. The proposed strategy was validated through experimental results obtained both in steady and transient states. The results show the correct operation of the EV battery charger even under heavy load variations.

Paper 3: Shortest Route at Dynamic Location with Node Combination-Dijkstra Algorithm

Author : Achamad Fitro,Retn Kusumaningram

Abstract : Online transportation has become a basic requirement of the general public in support of all activities to go to work, school or vacation to the sights. Public transportation services compete to provide the best service so that consumers feel comfortable using the services offered, so that all activities are noticed, one of them is the search for the shortest route in picking the buyer or delivering to the destination. Node Combination method can minimize memory usage and this methode is more optimal when compared to A* and Ant Colony in the shortest route search like Dijkstra algorithm, but can't store the history node that has been passed. Therefore, using node combination algorithm is very good in searching the shortest distance is not the shortest route. This paper is structured to modify the node combination algorithm to solve the problem of finding the shortest route at the dynamic location obtained from the transport fleet by displaying the nodes that have the shortest distance and will be implemented in the geographic information system in the form of map to facilitate the use of the system

Paper 4 : Online Payment for Access to Heterogeneous Mobile Networks

Authors : Heiko Kospe, Scarlet Grosche

Abstract : This paper describes an architecture where access to heterogeneous mobile networks is granted on the basis of online payment methods. Access methods for GSM networks were designed for subscribed post-pay customers. With Intelligent Networks (IN) technology, operators can also offer services to prepay customers. Now online payment might provide additional means for network access. We suggest an IP based architecture which uses a Diameter application for cost control and a charging component for online payment.

3.CLASSIFICATION :

The project has three panels with chatbot feature :

1) User - To login in user panel first we need to login through login page by putting id and password . If the user is new, user can register also. This panel provides features like searching stations based on offgrid and hybrid stations then we can book slots. After booking we can use the online payment method. We can also see how many people and which slots are already booked. There is also a option to delete the booking. Also a additional option of user rview is provided.

2) Owner – The way we logged into user in the same way we can login and register as a owner. Here a owner can add different types of offgrid and hybrid charging stations for electric vehicle in the system easily.

3) Admin – Admin also needs an id and password to login into admin panel. If new we can register and then login. After logging in an admin has a bunch of features like they can view users, their bookings. If a user has cancelled a booking admin has rights to refund money. Also an admin can view slots remaining and histories of transactions too.

4. METHODOLOGY

4.1. Requirements Analysis: Conduct interviews and surveys with educators and students to understand their needs and expectations. Identify key features such as real-time communication, collaborative tools, secure authentication, and dynamic content delivery.

4.2. System Design: Design the overall system architecture, ensuring scalability and flexibility. Define the interaction flow between different components, such as user interfaces, Firebase services, and external APIs.

4.3. Development: Employed Visual Studio for development, adhering to Material Design principles for a cohesive user interface. Implemented a real-time communication chatbot feature and three panels ith additional features.

4.4. Firebase Integration: Integrate Firebase Authentication for secure login processes. Utilize Firebase Realtime Database for instant data updates and synchronization. Implement Firebase Cloud Functions for serverless backend operations, ensuring scalability.

4.5. Shared Documents: Utilize Firebase Cloud Fire store for efficient data synchronization in collaborative document editing and whiteboard features. Implement real-time collaborative editing using operational transformation algorithms.

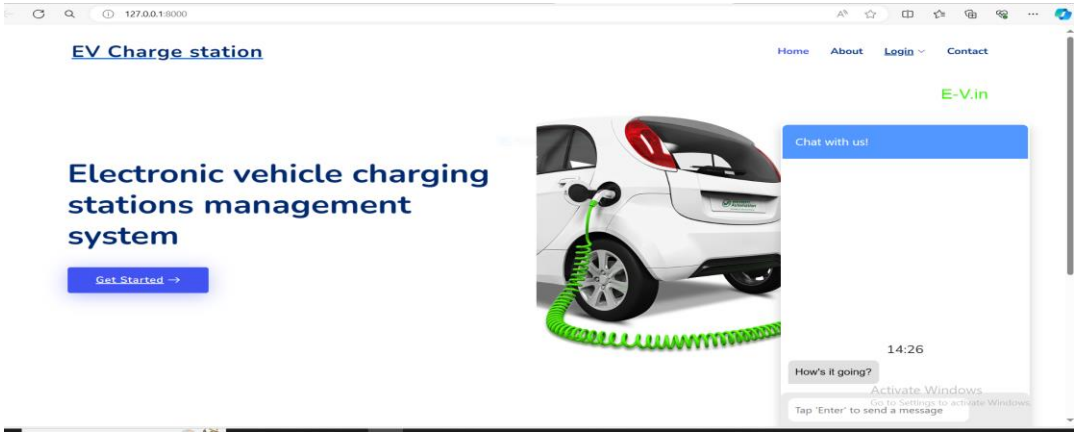
4.6. Testing: Conduct thorough unit testing for individual components, ensuring functionality and reliability. Use testing frameworks for comprehensive testing of web-specific functionalities.

4.7. User Acceptance Testing (UAT): Collaborate with educators and students to conduct UAT sessions. Gather feedback on usability, performance, and overall user satisfaction.

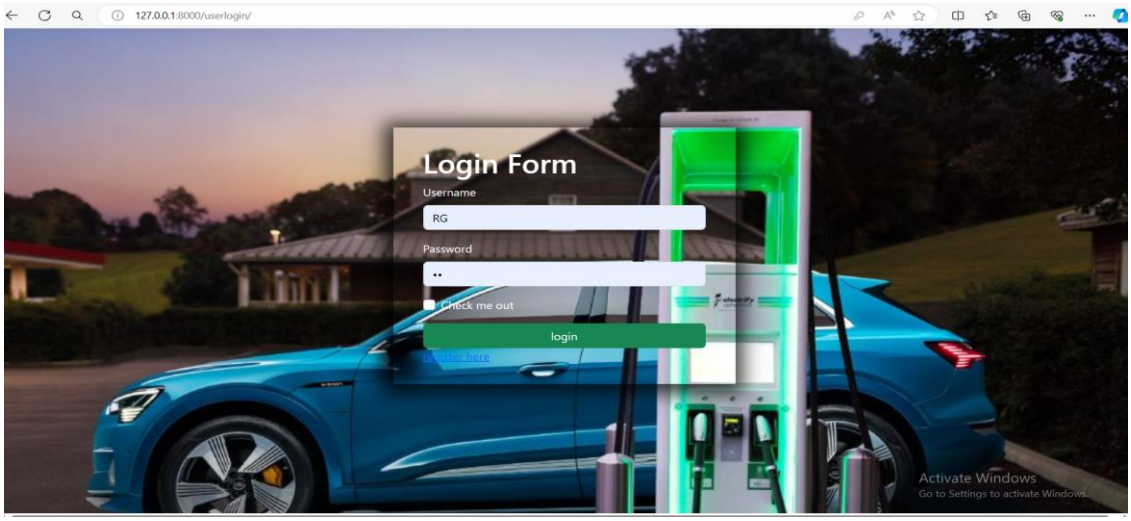
4.8. Continuous Monitoring and Updates: Implement Firebase Analytics for monitoring user engagement. Plan for regular updates to address user feedback, add features, and ensure compatibility with evolving technologies.

4.9. Comprehensive Documentation: Document the entire development process, including system architecture, codebase, and deployment procedures. Create user manuals for both educators and students to facilitate seamless adoption

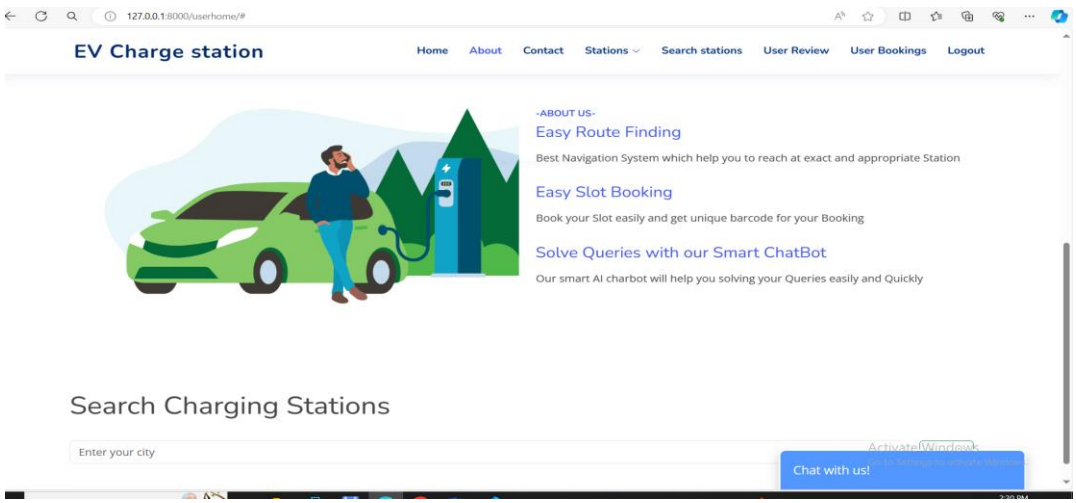
5. RESULT



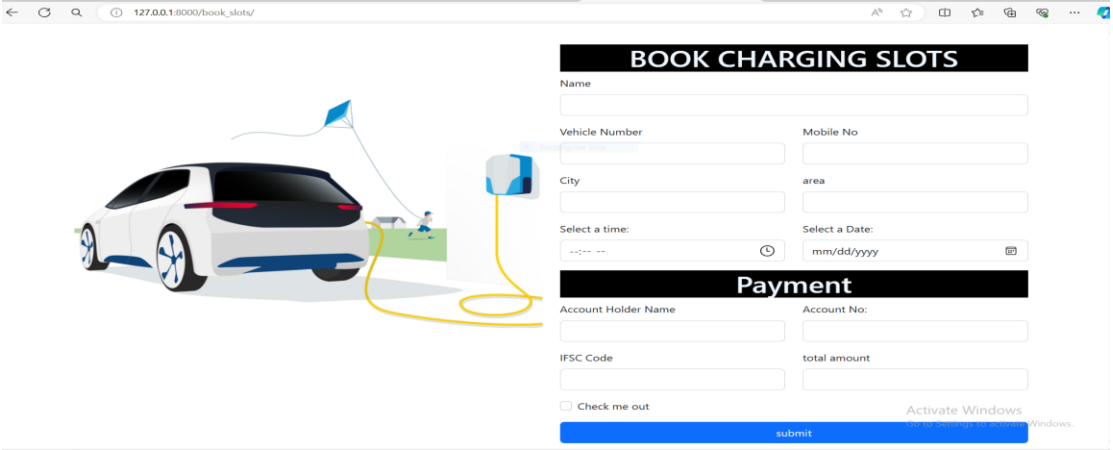
First Page



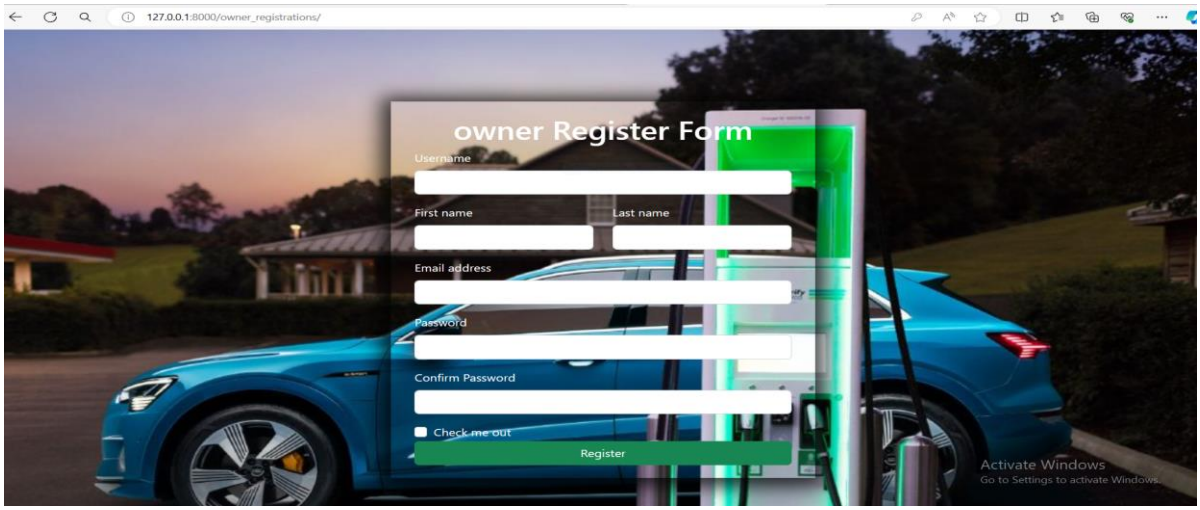
User login



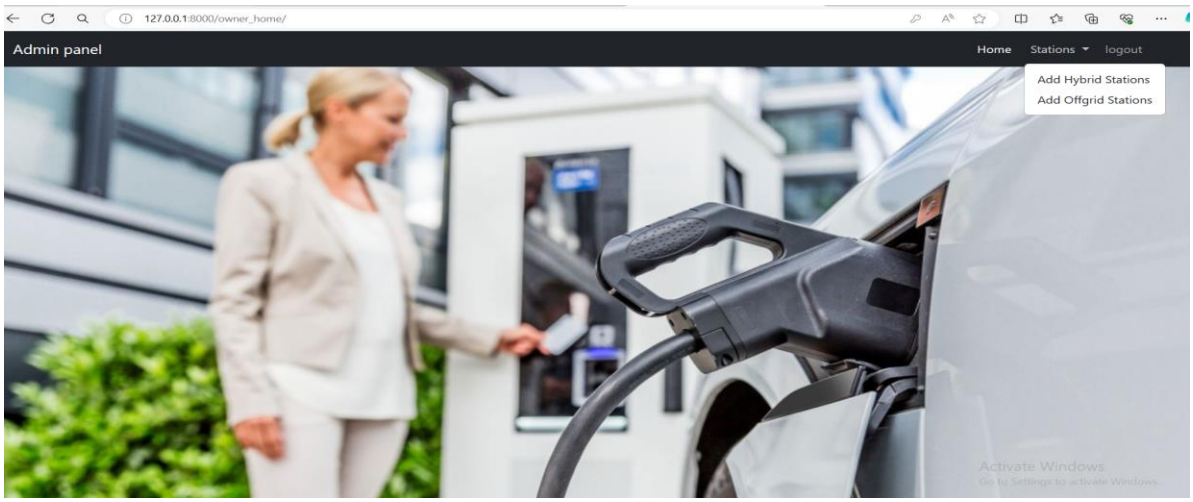
User panel



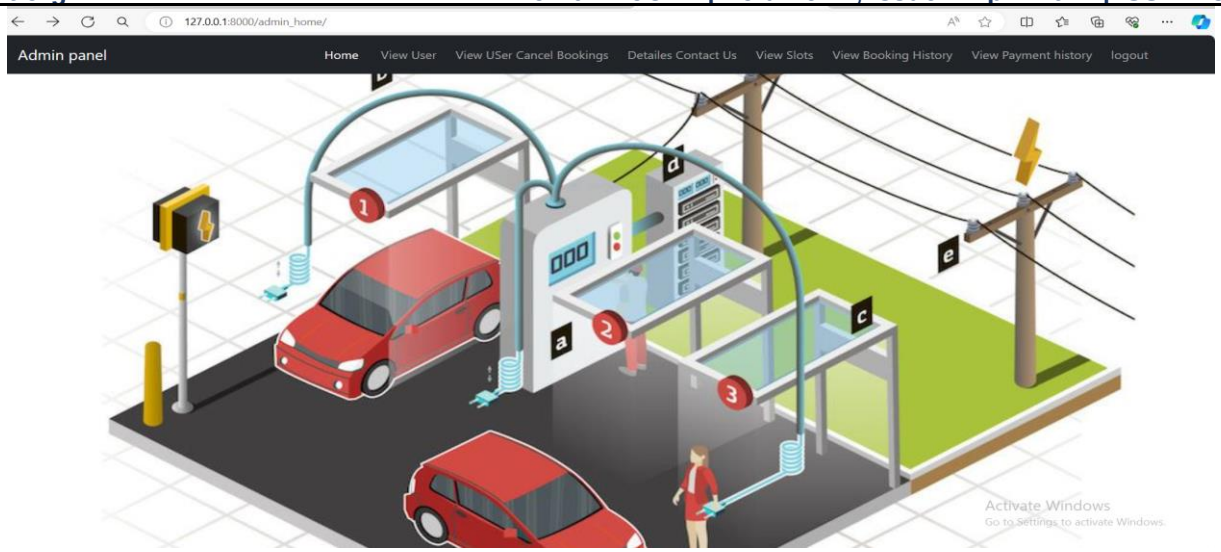
Slot Booking and Payment



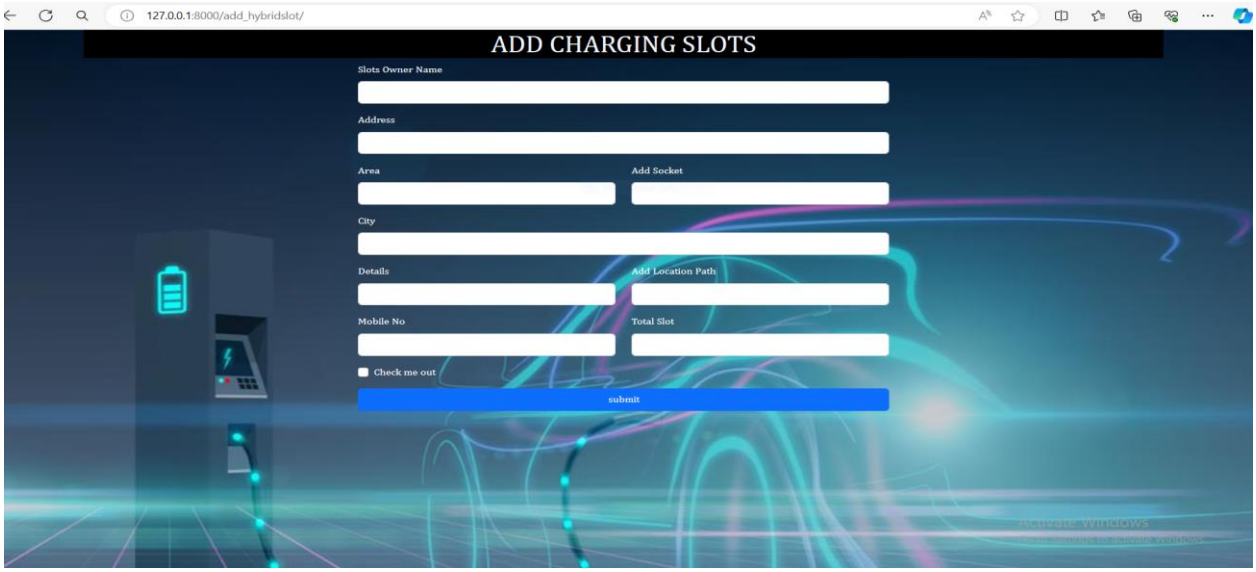
Register form



Owner Panel



Admin Panel



Owner adding slots

6. CONCLUSION

The paper includes all about project “Offgrid & Hybrid Charging Stations for Electric Vehicle” with approach of web application development. The project is created to bring an ease in day to day to life foe electric vehicle users. The system also proposes the booking of charging slot according to the type of charging socket to car. This system also contains the chatbot for query solving as well as GMAPS API for direction sensing. User can pay onlinre and also get refund. Owner can add stations and Admin can look after whole system. In all the we based application we have created is easy to use and adaptable with all featues

7. REFERENCES

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