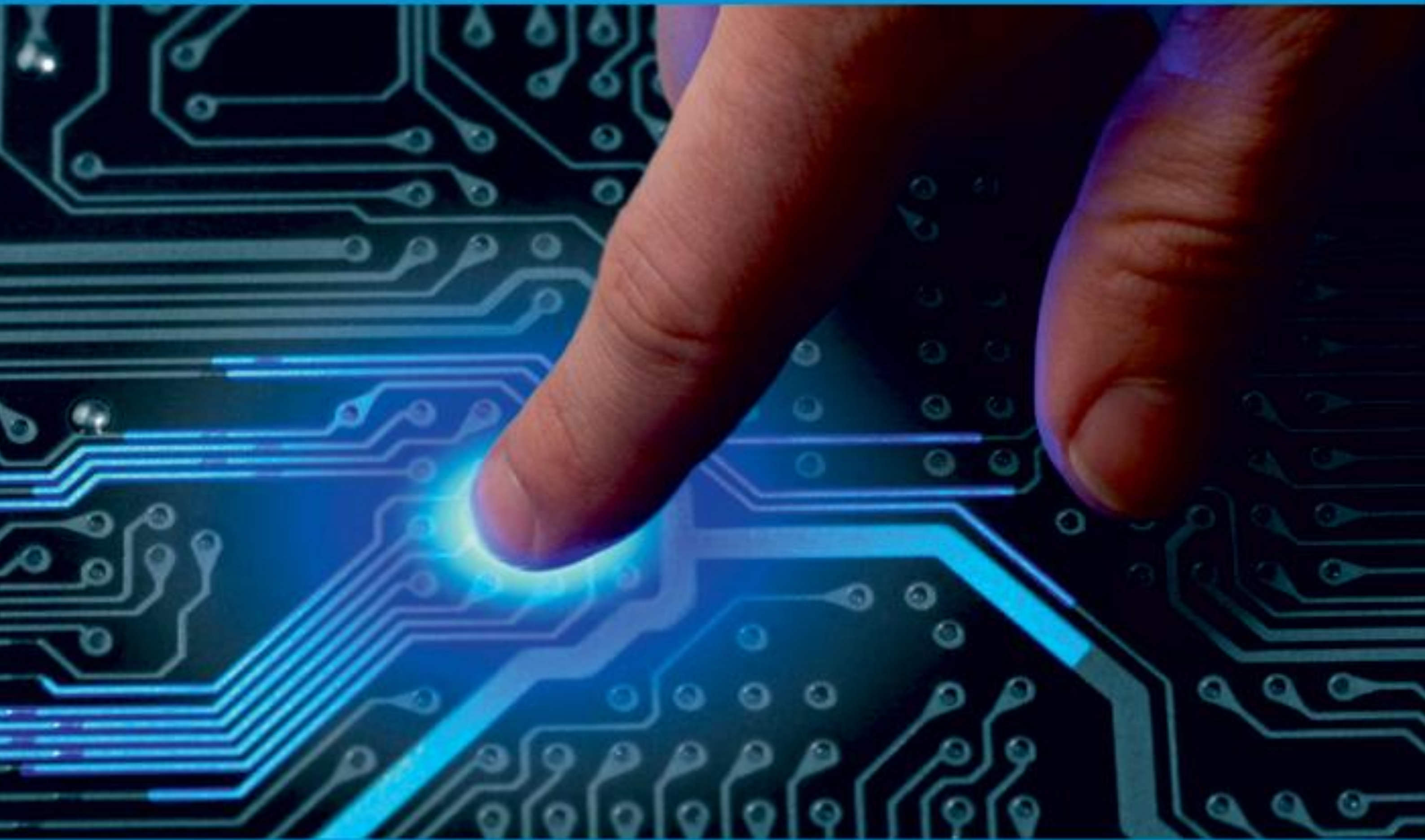
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 4, April 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104277 |

EV Charging Stations Management System

Atharva Patil[*1] , Manas Ohal[*2] , Mayuresh Kondalwar [*3], Rohit Mane[*4]

V.A. Upadhye[*5] , A. P. Shinde[*6]

Students, Dept. of Computer Technology, Bharati Vidyapeeth's JNIOT (Polytechnic), Pune, Maharashtra, India[*1,2,3,4]

Lecturer, Dept. of Computer Technology, Bharati Vidyapeeth's JNIOT (Polytechnic), Pune, Maharashtra, India. [*5]

Head of Department, Dept. of Computer Technology, Bharati Vidyapeeth's JNIOT (Polytechnic), Pune, Maharashtra, India. [*6]

ABSTRACT–Recent years have seen the introduction and launch of new electric vehicles by automakers like TATA and TESLA. Some stations are also set up to charge these vehicles. However, given the current circumstances, it takes these cars at least 15 to 30 minutes to charge. Other consumers must wait a long time if the station is full and all the available slots have already been taken. Our goal is to create a system that will address problems of this nature. We are working on a system that will link all of the electric vehicle charging stations together. Our technology allows users to search for stations in accordance with their preferences, which is helpful for people who wish to drive EVs large distances and saves time. The use of it will be quite simple. If the requested time window is available, your spot will be reserved for that time. Otherwise, the system will prompt you to enter a new timetable. To finalize their reservation via this technique, users must pay a portion of the whole fee online. Additionally, our system will offer the quickest map route to get to a particular station. Our solution will also give charging stations an interface to examine all open slots, as well as listings of booked slots, and to control slot scheduling. This system will be created for Android-based devices. We will use Google Maps API for direction sensing and time-slot allocation techniques to build this system. Our chatbot system will use voice instructions to operate software. The consumer can easily pay money with the aid of an online payment gateway. People can view and book the appropriate station quickly and easily by using the system, which will save them a great deal of time.

KEYWORDS: management, slot, EV vehicles, Google Map.

I. Introduction

Global warming and the depletion of fossil resources as a result of widespread energy usage have gained international attention in recent years. Installing renewable energy systems, which are independent of fossil fuels, is a successful solution to manage these issues. In Japan, the deployment of solar systems has accelerated since the government implemented Feed-in tariffs (Fit). The output power from more solar systems, however, is incredibly high and has a negative impact on the system frequency and distribution voltage. The Japanese government has started reevaluating the Fit system to address this issue. The fact that PV installation costs are declining each year makes the situation worse. As a result, it is anticipated that PV power will become much more affordable in the future. In this study, EV charging stations are suggested as an aggregator that almost solely buys power from PV systems on smart homes and offers it to EVs and smart homes. The EV charging station requires the use of a stationary battery for trading electricity.

II. Literature Survey

The fact that PV installation costs are declining each year makes the situation worse. As a result, it is anticipated that PV power will become much more affordable in the future. In this study, EV charging stations are suggested as an aggregator that almost solely buys power from PV systems on smart homes and offers it to EVs and smart homes. The EV charging station requires the use of a stationary battery for trading electricity. The three-port converter ensures that the solar panel is working at its peak efficiency and, depending on operational circumstances, also permits bidirectional power transmission between the propulsion engine and battery. The new method of current weakening enables operation across a broad speed range, which is needed for the solar racecar application. This technique involves operating the motor side inverter's dc bus voltage higher than the rated speed.

The function and impact of a small-sized superconducting magnetic energy storage (SMES) system in an EV charging station with a photovoltaic (PV) generation system are studied in this paper, which provides a practical application of

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104277 |

small-sized SMES. Small-sized SMES are currently commercially available. To better understand the features of SMES, a comparison of three quick reaction energy storage systems—the flywheel, capacitor (super-capacitor), and SMES—is also provided. A common dc bus is used to connect the SMES, PV generation system, and EV battery, each with associated converters. For grid-connection, voltage source converters (VSC) are utilized. With a quick power response trait, SMES is used to keep the dc bus steady. An energy management strategy is created to regulate the energy transfer among PV units, SMES, EV batteries, and the power grid throughout the long-term operation of EV charging stations. To test the functionality and efficiency of SMES, simulations of the EV charging station system are run in MATLAB/SIMULINK.

For EVs to become more appealing and to have a wider acceptance, a network [3] of rapid charging stations appears to be required. Commercially accessible 50 kW rapid chargers can currently recharge a standard EV in roughly an hour. The standard now includes a 240 kW fast charging level, which can fully charge a normal EV in 10 minutes. These high power fast chargers are anticipated to become available soon. When several EVs are being fast charged at once, a charging station must provide power levels in the multi-megawatt range. Here, the topology of the charging stations is key to enabling future growth and delivering fast charging with the best possible service, at the lowest possible cost, and with the least possible grid impact. The topological survey of available charging stations in the literature is presented in this work. On the basis of grid support, power density, modularity, and other considerations, various charging station architectures are described, compared, and evaluated.

Different manufacturers are introducing electric vehicles (EVs) [4] as an eco-friendly substitute for cars with internal combustion engines, with a number of advantages. In the upcoming years, EV sales are anticipated to increase significantly. Unplanned charging of these vehicles, however, can place a lot of strain on the power infrastructure. The timing of EV charging is a big and difficult subject that has recently attracted a lot of study attention. This study includes the most recent research in the field of smart grid scheduling algorithms for EV charging. The works are initially divided into two general categories—unidirectional versus bidirectional charging—and then each category is further divided into subcategories based on whether scheduling is distributed or centralized and whether mobility considerations are made or not. The important findings in this field are then reviewed after the suggested classification. There are also some intriguing research problems that can be solved.

A unique non-isolated three-port DC/DC converter called Boost Bidirectional Buck Converter (B3C) and its control mechanism based on three domain control are developed in this study in order to interface one PV port[5], one bidirectional battery port, and one load port of the PV-Battery DC power system. The suggested B3C's power flow and working principles are carefully examined, and the DC voltage relationship between the three ports is then inferred. High efficiency is achieved by the suggested converter's high integration and single-stage power conversion from the photovoltaic (PV) and battery ports to the load port. Since the current flowing through all three ports is constant, electromagnetic noise can be reduced. Additionally, the control and modulation method for B3C has been suggested to simultaneously implement bus voltage regulation, battery management, and Maximum Power Point Tracking (MPPT). According to the load power, the operation can switch automatically between conductance mode and MPPT mode. Finally, examples of experimental validations are provided to show the viability and efficacy of the suggested topology and control method.

III. PROPOSED SYSTEM

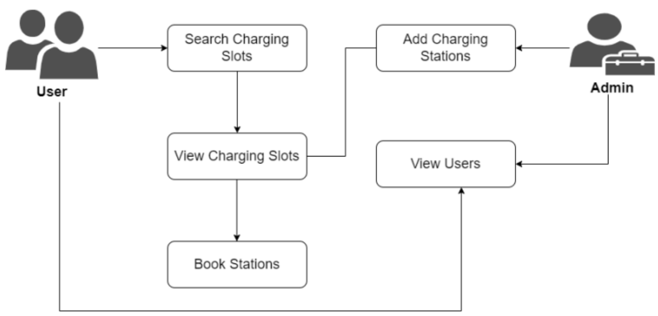


Figure 1. System Architecture

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 4, April 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1104277 |

The function and impact of a small-sized superconducting magnetic energy storage (SMES) system in an EV charging station with a photovoltaic (PV) generation system are studied in this paper, which provides a practical application of small-sized SMES. Small-sized SMES are currently commercially available. To better understand the features of SMES, a comparison of three quick reaction energy storage systems—the flywheel, capacitor (super-capacitor), and SMES—is also provided. A common dc bus is used to connect the SMES, PV generation system, and EV battery, each with associated converters. For grid-connection, voltage source converters (VSC) are utilized. With a quick power response trait, SMES is used to keep the dc bus steady. An energy management strategy is created to regulate the energy transfer among PV units, SMES, EV batteries, and the power grid throughout the long-term operation of EV charging stations. To test the functionality and efficiency of SMES, simulations of the EV charging station system are run in MATLAB/SIMULINK.

IV. CONCLUSION

Through this research, we have learned efficient methods for scheduling reservations and allocating charging station time slots. We acquired knowledge in creating virtual personal assistants (VPA). Through the modification of the combination node algorithm to the dynamic location typically used in mobile phones and online transportation, this research has provided the concept for a shortest route search system. Along with that, we learned how to integrate a payment gateway into a system.

REFERENCES

1. V. Rallabandi D. Lawhorn J. He and D. M. Lionel "Current weakening control of coreless afpm motor drives for solar race cars with a three-port bi-directional dc/dc converter" 2017 IEEE 6th International Conference on Renewable Energy Research and Applications (ICRERA) pp. 739-744 Nov 2017.
2. Y. Liu Y. Tang J. Shi X. Shi J. Deng and K. Gong "Application of small-sized smes in an ev charging station with dc bus and pv system" IEEE Trans. on Applied Superconductivity vol. 25 no. 3 pp. 1-6 June 2015.
3. M. Ahmadi N. Mithulananthan and R. Sharma "A review on topologies for fast charging stations for electric vehicles" 2016 IEEE International Conference on Power System Technology (POWERCON) pp. 1-6 Sep. 2016.
4. J. C. Mukherjee and A. Gupta "A review of charge scheduling of electric vehicles in smart grid" IEEE Systems Journal vol. 9 no. 4 pp. 1541-1553 Dec 2015.
5. H. Zhu D. Zhang B. Zhang and Z. Zhou "A nonisolated three-port dcdc converter and three-domain control method for pv-battery power systems" IEEE Trans. on Industrial Electronics vol. 62 no. 8 pp. 4937-4947 Aug 2015.
6. A. Hassoune M. Khafallah A. Mesbahi and T. Bouragba "Smart topology of evs in a pv-grid system based charging station" 2017 International Conference on Electrical and Information Technologies (ICEIT) pp. 1-6 Nov 2017.
7. B. Honarjoo S. M. Madani M. Niroomand and E. Adib "Non-isolated high step-up three-port converter with single magnetic element for photovoltaic systems" IET Power Electronics vol. 11 no. 13 pp. 2151-2160 2018.
8. S. Bai D. Yu and S. Lukic "Optimum design of an ev/phev charging station with dc bus and storage system" 2010 IEEE Energy Conversion Congress and Exposition pp. 1178-1184 Sep. 2010.
9. H. Zhu D. Zhang B. Zhang and Z. Zhou "A nonisolated three-port dcdc converter and three-domain control method for pv-battery power systems" IEEE Trans. on Industrial Electronics vol. 62 no. 8 pp. 4937-4947 Aug 2015.
10. H. Zhu D. Zhang Q. Liu and Z. Zhou "Three-port dc/dc converter with all ports current ripple cancellation using integrated magnetic technique" IEEE Trans. on Power Electronics vol. 31 no. 3 pp. 2174-2186 March 2016.
11. SunTech Power STP235-20-Wd [online] Available: https://www.freecleansolar.com/235W-solar-panels-Suntech-STP235S-20-Wd-mono-p/stp235s-20-wd.htm.
12. CREE C3M0065090D MOSFET [online] Available: https://www.wolfspeed.com/c3m0065090d.
13. Infineon IPW90R120C3 MOSFET [online] Available: https://www.infineon.com/dgdl/lnfineon-IPW90R120C3-DS-v01_00-en.pdf?fileld=db3a3043183a955501185000eld254f2

INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.379

doi cross ref

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING