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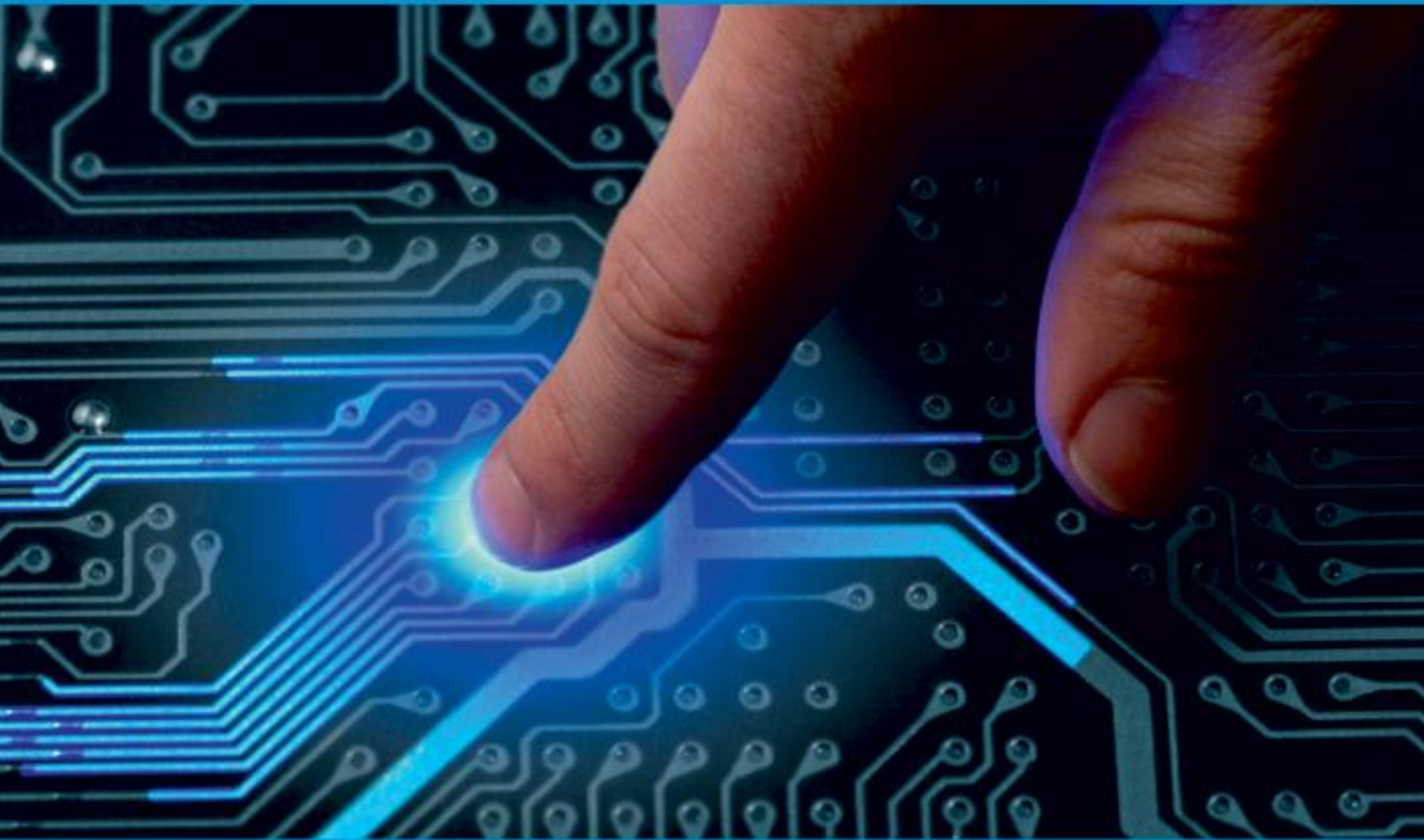

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Survey on Smart Management of EV Charging Stations

Ajay Shedge, Rasika Javanjal, Chintan Chaudhari, Omkar Mule, Prof. Sweta Kale

Department Of Information Technology, RMD Sinhgad School of Engineering, Pune, India

ABSTRACT: In recent years, automotive companies like as TATA and TESLA have introduced and launched new electric vehicles into the market. Some charging outlets are also available for these vehicles. However, given the current condition, charging these autos takes at least 15 minutes to half an hour. If the station is packed and all of the slots have already been occupied, other consumers will have to wait a long time. Our plan is to create a system that will address these difficulties. We are working on a system that will connect all of the electric car charging stations. Our method allows users to select stations based on their preferences, which is beneficial for individuals who wish to travel large distances in their EV vehicles while saving time. It will be quite simple to use. If the requested time slot is available, your reservation will be confirmed. Otherwise, the system will prompt you to enter a new time schedule. To finalise their appointment, users must pay a percentage of the whole fee online. Our system will also display the shortest map route to the chosen station. Our solution will also give charging stations with an interface to view all available slots as well as booked slot lists and manage slot scheduling. This system will be created for Android-based devices. We will leverage time-slot allocation techniques as well as Google Maps API for direction sensing to create this system. Our chatbot system will use voice instructions to control software. Users can instantly pay money through an internet payment channel. People will save a lot of time by using the system, and they will be able to conveniently view and reserve appropriate stations.

KEYWORDS: Smart management, charging slot, EV Cars, Map.

I. INTRODUCTION

Global warming and the depletion of fossil resources as a result of mass energy consumption has become an increasingly recognised global challenge in recent years. Installing renewable energy systems that do not rely on fossil fuels is a viable countermeasure to these issues. Since the introduction of Feed-in Tariffs (Fit) by the Japanese government, the use of solar systems has grown fast. The output power from an expanded number of photovoltaic systems, on the other hand, is exceedingly enormous and has a negative impact on the system frequency and distribution voltage. In order to solve this issue, the Japanese government has begun to review the Fit system. To make matters worse, the cost of PV installation is reducing year after year. As a result, the cost of PV power is likely to fall dramatically in the future. As an aggregator in this study, EV charging stations that nearly solely purchase power from PV systems on smart houses and sell power to electric cars (EV) and smart houses are proposed. The EV charging station must use a fixed battery for electricity trading.

II. RELATED WORK

Current weakening control of coreless afpm motor drives for solar race cars with a three-port bi-directional dc/dc converter:This paper [1] proposes the use of a coreless axial flux permanent magnet machine, which has the attributes of low stator mass, negligible core loss and virtually zero cogging torque, as the propulsion motor. A three-phase inverter with its dc bus fed from a three-port DC/DC converter, which accepts inputs from a solar panel and battery powers the propulsion motor. Galium nitride (GaN) devices are used in the threeport converter, allowing very high switching frequencies thereby reducing the size of the transformer which provides galvanic isolation between the two sources and output. The three-port converter ensures operation of the solar panel at its maximum power point and also allows bi-directional power flow between the propulsion motor and battery depending on operating conditions. Operation over a wide range of speeds, which is required by the solar race car application, is achieved by the new approach of current weakening. This method involves raising the dc bus voltage of the motor side inverter at speeds exceeding the rated.

Application of small-sized smes in an ev charging station with dc bus and pvsystem : As small-sized[2] superconducting magnetic energy storage (SMES) system is commercially available at present, the function and effect of a small-sized SMES in an EV charging station including photovoltaic (PV) generation system is studied in this paper, which provides a practical application of small-sized SMES. The comparison of three quick response energy storage

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systems including flywheel, capacitor (super-capacitor) and SMES is also presented to clarify the features of SMES. SMES, PV generation system, and EV battery are connected to a common dc bus with corresponding converters respectively. Voltage source converter (VSC) is used for grid-connection. With characteristic of quick power response, SMES is utilized to maintain the dc bus steady. During the long-term operation of EV charging station, an energy management strategy is designed to control the energy transfer among PV units, SMES, EV battery, and power grid. The EV charging station system is modeled in MATLAB/SIMULINK and simulation tests are carried out to verify the function and performance of SMES.

A review on topologies for fast charging stations for electric vehicles:Having a network [3] of fast charging stations seems necessary in order to make EVs more attractive and to achieve larger uptake of them. Currently, 50 kW quick chargers that can charge a typical EV in about an hour are commercially available. However, a 240 kW fast charging level which can charge a typical EV in 10 minutes has been introduced in standards. It is expected that this high power fast chargers will be available in near future. A charging station must supply charging power in multi-megawatt levels when multiple EVs are being fast charged simultaneously. Here, charging station topology plays a crucial role in enabling future growth and providing fast charging with best quality of service, lowest cost and minimum grid impact. This paper presents a topological survey of charging stations available in the literature. Various charging station topologies are presented, compared and evaluated based on grid support, power density, modularity and other factors.

A review of charge scheduling of electric vehicles in smart grid : Electric vehicles (EVs)[4] are being introduced by different manufacturers as an environment-friendly alternative to vehicles with internal combustion engines, with several benefits. The number of EVs is expected to grow rapidly in the coming years. However, uncoordinated charging of these vehicles can put a severe stress on the power grid. The problem of charge scheduling of EVs is an important and challenging problem and has seen significant research activity in the last few years. This review covers the recent works done in the area of scheduling algorithms for charging EVs in smart grid. The works are first classified into two broad classes of unidirectional versus bidirectional charging, and then, each class is further classified based on whether the scheduling is centralized or distributed and whether any mobility aspects are considered or not. It then reviews the key results in this field following the classification proposed. Some interesting research challenges that can be addressed are also identified.

A nonisolated three-port dcdc converter and three-domain control method for pv-battery power systems : In order to interface one PV port[5], one bidirectional battery port and one load port of PV-Battery DC power system, a novel non-isolated three-port DC/DC converter named Boost Bidirectional Buck Converter (B3C) and its control method based on three domain control are proposed in this paper. The power flow and operating principles of the proposed B3C are analyzed in detail, and then the DC voltage relation between three ports is deduced. The proposed converter features high integration and single-stage power conversion from both photovoltaic (PV) and battery ports to the load port, thus leading to high efficiency. The current of all the three port is continuous, so the electromagnetic noise can be reduced. Furthermore, the control and modulation method for B3C has been proposed for realizing Maximum Power Point Tracking (MPPT), battery management and bus voltage regulation simultaneously. The operation can be transited between conductance mode and MPPT mode automatically according to the load power. Finally, experimental verifications are given to illustrate the feasibility and effectiveness of the proposed topology and control method.

III. OPEN ISSUES

A lot of work has been done in this field thanks to its extensive use and applications. This section mentions some of the approaches that have been implemented to achieve the same purpose. These works are mainly differentiated from the techniques for smart management of EV charging stations systems.

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IV. Proposed System

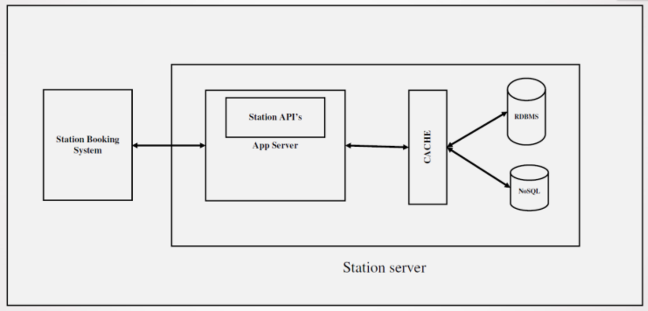

Figure 1. System Architecture

As small-sized superconducting magnetic energystorage (SMES) system is commercially available at present, thefunction and effect of a small-sized SMES in an EV chargingstation including photovoltaic (PV) generation system is studied inthis paper, which provides a practical application of small-sizedSMES. The comparison of three quick response energy storagesystems including flywheel, capacitor (super-capacitor) and SMESis also presented to clarify the features of SMES. SMES, PVgeneration system, and EV battery are connected to a commondc bus with corresponding converters respectively. Voltage sourceconverter (VSC) is used for grid-connection. With characteristicof quick power response, SMES is utilized to maintain the dc bussteady. During the long-term operation of EV charging station,an energy management strategy is designed to control the energytransfer among PV units, SMES, EV battery, and power grid. TheEV charging station system is modeled in MATLAB/SIMULINKand simulation tests are carried out to verify the function andperformance of SMES.

V.Conclusion

We learned effective reservation management and efficient charging station time slot distribution through this study project. We discovered how to create a Virtual Personal Assistant (VPA). This study proposed a shortest route search method by adapting the combination node algorithm to the dynamic location utilised in general, such as a mobile phone for online transportation. Along with that, we learned about the integration of a payment gateway into a system.

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