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Performance Analysis of Intelligent Control Technique Coupled Magnetic Technique for Power Transfer with Microgrid

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ABSTRACT: Wireless Power Transfer is an innovative technology in which power is transferred without physical contact. As technical knowledge is proceeding, the most of wired technology is also converting into wireless technology through different techniques. Electric Vehicles and plug-in hybrids may be fresh and feasible but it is not enough if it is forgetting to plug in the power source the night before. Electric Vehicles will automatically charge when it will park in the special parking space where the transmitter circuit has already been developed, when an electric vehicle parks on that place, charging will start automatically. A preceding review of a few methods for wireless charging discovered that Inductively Coupled Power Transfer System (ICPT) is an advantageous method for wireless charging of EVs(Electric Vehicles). This paper presents a IPT(Inductively Coupled Power Transfer) system which is appropriate for Vehicle to Grid (V2G) systems. For EV charging A WPT is a stable dynamic and effective system. Wireless power techniques fall into two categories, non-radiative and radiative. This research follows the non-radiative field using magnetic inductive coupling between coils of wire. After the usage of charging the DC Power is inverted and then the excess power is given to the Grid automatically. In this project mutual inductance technique is used between two coils. This paper will also enhance the feasibility, reliability and efficiency of the system.

I.INTRODUCTION

Vehicle-to-Grid innovation offers the best alternative resource for generating the electricity during the peak hours and electricity interrogation. V2G innovation empowers two-way power stream between the network and the powerful, high-limit impetus battery in an electric vehicle. That is, V2G empowers a harmony between power requests and flexibly, which is getting troublesome because of the presentation of discontinuous wellsprings of sustainable power source. The creators have appeared through framework recreations that bi-directional WPT is conceivable with a framework that meets the rising SAE (Journal of Transportation Safety) standard. In view of the outcome, the creators have additionally exhibited a bi-directional remote charging framework for V2G applications. In this work a current SAE good uni-directional framework was adjusted to empower bi-directional WPT with least effect on framework cost, while keeping up full similarity with the necessities of SAE standard. Consequences of framework execution over the full scope of working conditions are accounted for.

II.LITERATURE REVIEW

A. S. Mohamed and O. Mohammed 2018[1]Wireless charging technology presents an ideal fit for autonomous electric vehicles for realizing a fully automated system (vehicle and charger). This paper presents a planning optimization analysis for a pilot project of in-route wireless charging infrastructure serving fixed-route on-demand shared automated electric shuttles (SAESs) at Greenville, South Carolina, USA. A single-objective non-linear mixed integer system planning optimization problem is formulated. A comprehensive cost model representing the overall inductively charged SAESs system is developed, considering road construction, power electronics and materials, traction battery, and installation costs. The optimization problem is solved to determine the best combination of the system key design parameters (number and allocations of wireless chargers, charging power level, track length and on-board battery capacity) that show the most cost-effective solution and allow the SAESs to achieve charge-sustaining operation.

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Relevance to current Research

G. A. Covic and J. T. Boys 2013[2]Inductive power transfer (IPT) has progressed to be a power distribution system offering significant benefits in modern automation systems and particularly so in stringent environments. Here, the same technology may be used in very dirty environments and in a clean room manufacture. This paper reviews the development of simple factory automation (FA) IPT systems for both today's complex applications and onward to a much more challenging application-IPT roadway. The underpinning of all IPT technology is two strongly coupled coils operating at resonance to transfer power efficiently. Over time the air-gap, efficiency, coupling factor, and power transfer capability have significantly improved. New magnetic concepts are introduced to allow misalignment, enabling IPT systems to migrate from overhead monorails to the floor. However, the demands of IPT roadway bring about significant challenges.

Relevance to current Research

R.Bosshard and et all2012 [3] the optimization of Inductive Power Transfer (IPT) coil systems with respect to efficiency η and area-related power density α as required in Electric Vehicle (EV) applications. Based on analytical calculations and Finite-Element (FE) models, which are discussed and experimentally verified in detail, generally valid design guidelines for high-power IPT systems are derived and the η-α-Pareto optimization of a scaled 5 kW prototype system is presented. Experiments demonstrate a dc-to-dc conversion efficiency of more than 96.5% at a power density of 1.47 kW/dm2 with coils of 210 mm diameter / 52 mm air gap, including the losses in the resonant capacitors and the power converter. Field measurements validate the predicted stray field with a calculation error of less than 10%.

Relevance to current Research

F. Capitanescuand et all 2015 [4] Energy management in distribution systems has gained attention in recent years. Coordination of electricity generation and consumption is crucial to save energy, reduce energy prices and achieve global emission targets. Due to the importance of the subject, this paper provides a literature review on recent research on energy management systems and classifies the works based on several factors including energy management goals, the approaches taken for performing energy management and solution algorithms. Furthermore, the paper reviews some of the most proficient techniques and methodologies adopted or developed to address energy management problem and provides a table to compare such techniques. The current challenges and limitations of energy management systems are explained and some future research directions have been provided at the end of the paper.

Relevance to current Research

M. J. Neath and et all 2011 [5] Wireless charging of electric vehicle batteries is a major topic for academic and industrial research. The wireless charging is based on the inductive coupling between a primary coil, connected to the grid, and a secondary coil, connected to the vehicle battery. Wireless battery charging provides benefits in terms of comfort for the drivers, who should just park to start the charging operation, without needing to plug in the vehicle. Wireless charging is particularly convenient for E-bike users. For the bicycle charging, the inductive coupling should be implemented through a compact and light-weight solution. In this paper, different options of inductively coupled coils for E-bike charging are investigated in order to accurately evaluate the potential benefits in terms of efficiency and tolerance to misalignments.

III.METHODOLOGY OF PROPOSED SURVEY

The innovation of remote charging is the method to involve and its develop the more advantages at the same time wireless power transfer (WPT) and Inductive power move (IPT), implemented to the low power level, for example, applications in the restorative field or in little gadgets, for example, advanced mobile phones Along with the quickly developing enthusiasm for electric vehicles (EVs) and module half and half electric vehicles (PHEVs), remote charging is turning into another method for charging batteries. In this paper, the structure of a WPT framework for electrical transport quick remote charging stations will be introduced. The framework is composed by a two phase exchanging power supply, for example a

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multiphase delicate exchanging buck converter controlling the yield control and a high-recurrence resounding full-connect converter associated with an arrangement pay topology.

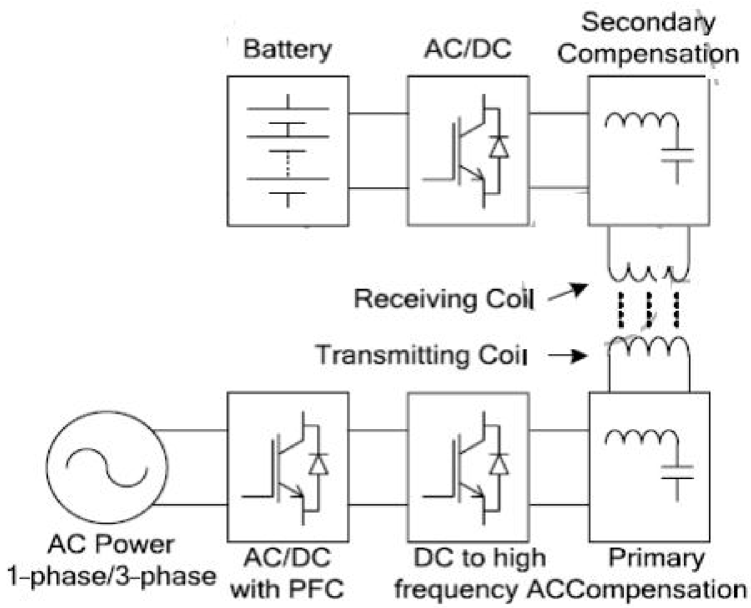

Figure.1 General IMC-WPT Block Diagram

In this proposed WPT framework the air conditioner supply is converter into low level de supply with the assistance of the air conditioner dc PFC circuit, after that the dc supply is given to the high recurrence exchanging gadgets. The exchanging gadget will triggers the essential side twisting by the delicate exchanging system.

The optional side of the framework comprises of the auxiliary winding which can get the moved power from essential side. From that point onward, the power is changed over to the dc structure with the assistance of AC-DC converter and moved to the battery charging reason.

The proposed wireless power transfer systems closed loop and open loop system simulation results are obtained. The MATLAB simulink software used to simulate the supply.

Here in the system, 120 v input supply applied to the rectifier unit and 75 V of output voltage is obtained.

The full wave rectifier circuit design is taken and the rectifier unit built with diode and capacitor as a filter .

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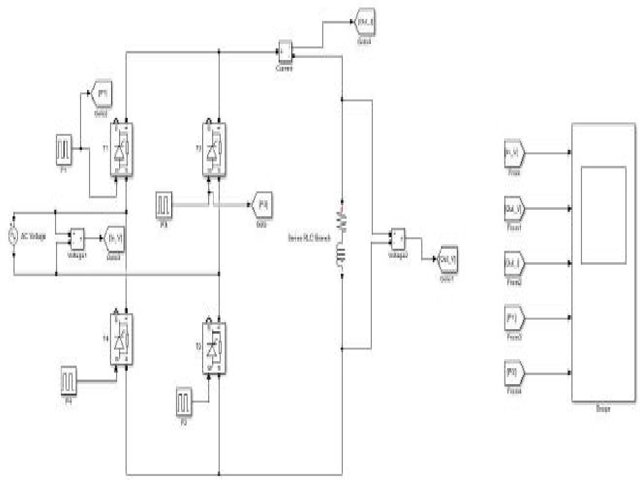

Figure.2 Simulink Rectifier Design

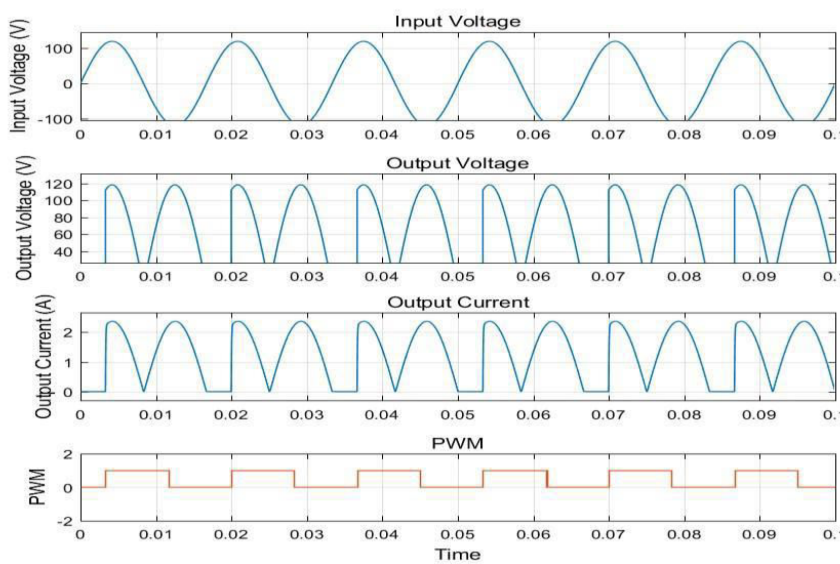

Figure.3 Simulink Rectifier Result

IV. CONCLUSION AND FUTURE WORK

The proposed Electric Vehicle to Grid hardware was designed and tested efficiently. The new control technique (Adaptive Neuro Fuzzy) was proposed for ICWPT. The performances of Neuro Fuzzy control system was tested in matlab. The challenges related to inductive magnetic WPT in V to G were emphasized. The maximum wireless power transfer capacity of the proposed hardware is 70 watts. In both transmitting and receiving side inverter control system was introduced. Transmitter section is designed with variable frequency tuning option which increases the WPT distance. Receiver section designed with constant switching frequency which reduces the risk factor to integrate the receiving power to the Grid.

The time limitations of the technology such as its shorter range and longer charging durations have been discussed throughout out the study, and a handful of future research possibilities have been emphasized.

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