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Integrated Dynamic Bidirectional Roadways EV Power Transfer System

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***Abstract*: One of the limitations for adoption of Electric vehicles (EVs) is the apprehension around the limited driving range. Proposed systems have explored charging EVs on the move, using dynamic wireless charging which able to provide power exchange between the vehicle and the grid in moving condition. This paper presents a novel replication method for electric vehicle (EVs) charging through wireless power transmission (WPT) system. With the proposed technique, the wireless charging system can use the most efficient coil to transmit power at the EVs by using transformer principle. To provide the optimal charging, our approach includes measurement of the transfer efficiencies of transmitting and receiving coil, to determine the most efficient one to use. The proposed system provides not only increase in charging performance, but also have much higher efficiency, low transmission cost.**

***Keywords*: WPT, Electric vehicle (EV).**

1. Introduction

To meet the increasing demand of electricity, it should be used in efficient and in controlled manner. Power system mostly have wired transmission because of this loss occurred very high about 30% of the total loss. A wireless power transfer can be effective option to curb these losses.

Latest deployment and challenging issues in the implementation of EVs infrastructural and charging systems in conjunction with several international standards and charging codes. I further analyse EVs impacts and prospects in society and standards regarding charging methods, grid integration, power quality issues, safety limitations, communication networks and equipment maintenance which are required for large-scale deployment of EVs [1]. In bidirectional wireless power in V2G system. There are different types of methods for wireless transmission. For Electric vehicles Inductive power transfer is appropriate method. Different experiments have been done on Tesla coils and E transformer core [2]. A large air-gap bidirectional WPT EV charger with SR-PWM method has been used. The proposed method has a simple structure without additional current chopper and it can cope with a large air-gap power transfer with constant frequency PWM. Using PWM suitable for bidirectional wireless chargers requiring for large air-gap and constant switching frequency [3]. Vehicle electrification is unavoidable because of environment and energy related issues. Wireless charging will provide many benefits as compared with wired charging. In particular, when the roads are electrified with wireless charging capability, it will provide the foundation for mass market penetration for EV regardless of battery technology. With technology development, wireless charging of EV can be brought to fruition [4].

2. Proposed Work

A. Scope

In Electricity generation and transmission system the wireless power transfer technique can be extremely useful. This wireless power transfer is basically works on the principle of Transformer. Tesla coils are to be used for wireless power transfer to charge stationary or moving vehicles. The concept can be used efficiently in electricity system to minimize cost, losses and maximize the efficiency. A bidirectional wireless power transmission system in which vehicle battery power is used to feed a grid system.

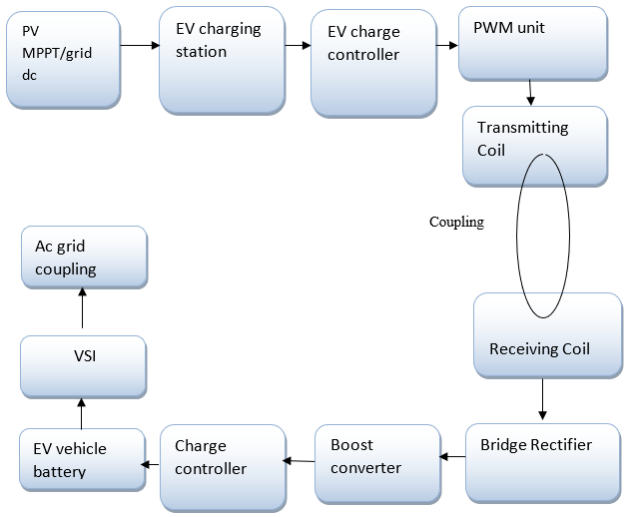

Fig. 1. Block diagram

This paper shows the design of contactless batteries charger with contactless bidirectional flow of energy to charge the batteries or discharge for vehicle application. It includes renewable energy and grid source which drives the voltage-to-voltage converter to transfer power using transmitting copper

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coil in air gap at some distance in form of flux. This flux links with the receiving copper coils followed by voltage-to-voltage converter to batteries as to charge or store the energy or store the energy. Using this which can prove vital role to avoid moving on heavy weight batteries, avoiding bulky wiring and its heavy installation cost. This system design includes the design of variable power transfer from 12v to 100v with current capacity of up to 5 amp and distance up to 1 meter minimum.

3. Objectives of Proposed Work

The key aim of this study is to increase the driving range of vehicle using wireless power transfer.

Carrying out the bidirectional power transfer.

4. MCU

The MPPT control circuit is implementing the microcontroller, that has eight 10-bits analog-to-digital (A/D) converters and two four PWM mode signals. The micro meter controls the converter of buck. It reads the panels of solar voltage or also current through the controller's port A / D or also determine the power of output. It also measures the power by reading the current or also voltage of the battery side in the same way or also sending corresponding signal of control to the converter of buck or also control the duty cycle of the converter by PWM signal via controller to the according decease, increase or turn off the DC-to-DC converter. For the use, it has a great blend of features, consumption of low power or also performance. A constant oscillation inherent to the algorithm is assumed to be present in the MPP.

5. Wireless Energy Charger

The wireless energy charger is composed of two independent parts: the transmitter and the receiver which are linked together by a magnetic field.

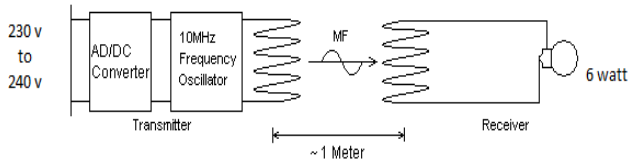

Fig. 2. Wireless energy charger

The transmitter will convert the 230-v ac from the power outlet to a 18 V DC voltage Across the input of the frequency oscillator and this will be composed of an ac/dc converter, a frequency oscillator and a copper coil. The frequency oscillator is the device that will create the magnetic field that will allow the transmitter and receiver coils to exchange energy. This device will be made of components such as resistors, inductors and capacitors.

In order to achieve the resonance frequency in the oscillator circuit the inductive reactance and the capacitive reactance of the resonator coil will equal such that.

$$wL=1/wC \ldots L=1/C$$

L is the inductance in Henry and C the capacitance in farad.

6. Conclusion

For increasing the driving range of the vehicle, the wireless power transfer technique is widely used by researchers due to its effective usability.

By carrying out the bidirectional power transfer makes the system more reliable.

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