Wireless Mobile Charger

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Abstract— Wireless charging is a technology in which power is transmitted through an air gap to an electrical device for the purpose of energy replenishment. This technology will lead to advancement in wireless energy transfer. This article first presents an audit and fundamentals of wireless charging. We then provide the review of standards, that is, Qi and the tie for Wireless Power, and highlight their communication protocols. it entertains the concept of wireless charger network that aquiesce chargers to be connected to facilitate information collection and control. We exhibit the application of the wireless charger network in user-charger commission, which clearly shows the progress in terms of reduced costs for users to establish the best chargers to replenish energy for their mobile devices.

Key words: transmitter and receiver coil, inverter, Voltage regulator, 7805(MOSFET)

I. Introduction

Inductive coupling [1]–[3] is a regular method to realize the close-field wireless power transfer (WPT) for short-range applications up to a deuce of centimeters. Recently, magnetic resonant coupling (MRC) [5]–[7] has drawn convincing interests for implementing the near-field WPT due to its high power transfer competence for applications requiring lengthy distances, say, tens of centimeters to several meters. The transmitter and the receiver in an MRC-WPT system are arranged to have the same natural frequency as the system’s operating frequency, thereby greatly reducing the total reactive power utilization in the system and achieving high power transfer efficiency over long distances. The MRC-WPT system with a single couple of transmitter and receiver has been extensively studied in the literature for e.g. widen the end-to-end power transfer efficiency or the power delivered to the receiver with a given input power constraint [8]–[11]. However, there is defined work on considering the MRC-WPT system under the general setup with different transmitters and/or receivers. The system along with pair of transmitters and a single receiver or a single transmitter and two receivers has been plotted in [12]–[16], while their analytical results cannot be applied for a system with more than two transmitters/receivers. Additionally, to our finest knowledge, there has been no work on attentively establishing a mathematical framework to jointly design criterion in the multi-transmitter/receiver MRC-WPT system for its performance optimization. In this paper, as shown in Fig. 1, we deal with a point-to-multipoint MRC-WPT system, where one transmitter connected to a balanced energy source sends wireless power synchronously to a set of distributed receivers, each of which is connected to a given load. We broadened the results in [12]–[16] to derive near-form expressions of the transmit power drawn from the energy source and the power transferred to each load, in terms of different parameter in the system.. We then show that the near-far issue can be up till solved by jointly designing the receivers’ load resistances to control their received power levels, in comparison to the method of adjusting the transmit beamforming weights to control the received power in the distant-field microwave transmission based WPT [17], [18]. Specially, we first study the centralized optimization problem, where a main controller at the transmitter which has the full awareness of all receivers, including their circuit criterion and load requirements, jointly designs the changeable load resistances to minimize the total power absorbed at the transmitter subject to the given minimum accumulated power requirement of each load. Even though the formulated problem is non-convex, we develop an adequate algorithm to solve it optimally. Then, for ease of practical implementation, we consider the scheme without any central controller and devise a distributed algorithm for modifying the load resistances by individual receivers in an continual manner. In the distributed algorithm, each receiver sets its load resistance separately based on its local information and a one-bit observation shared by each of the other receivers, where the assessment of each receiver indicates whether the accumulated power of its load exceeds the required level or not.

II. Block Diagram

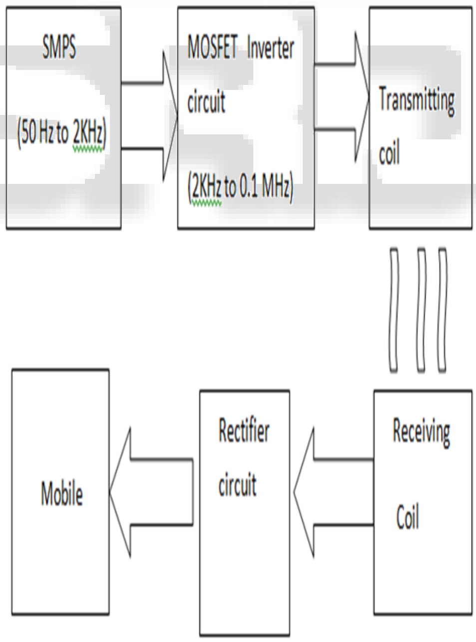

Fig. 1: Block Diagram

A. Block Diagram Description:

In this block diagram we using AC supply 230V 50 Hz, which is use to feed the transformer which is of 220/12v.The output of the transformer is connected to the bridge rectifier circuit. This rectifier circuit is used to convert the ac current to dc current. Then this current is supplies to the mosfet inverter which amplifies the current. This circuit is connected to the transmitting coil in this coil we are using almost 30 turns. Now according to faraday law current in the secondary coil, which is a receiver coil .now a Ac voltage is induced in this coil. The receiver section comprises of receiver coil, rectifier circuit. The AC current flowing through the transmitter coil construct a magnetic field. When we place the receiver coil with in a specific distance from this transmitter coil, the magnetic field in the transmitter coil broaden to this receiver coil, and it induces an AC voltage and generates a current flowing in the receiver coil of the wireless charger. We use a magnetic path for high value. The rectifier circuit in the receiver section transforms this AC voltage in to DC. Receiver coil have number of 50 turns (approx.).We have used copper wire thin conductor coil .It is almost same as the transmitter coil

B. *Working:*

In the wireless mobile charger the main thing is to transmit the electrical power without any electrical association. To transmit the electrical power we are using induction principal which is planted on the faraday’s law of induction. Faraday's law of induction is a basic law of electromagnetism to conclude how a magnetic field will interact with an electric circuit to produce an electromotive force (EMF)—a phenomenon known as electromagnetic induction. It is the fundamental operating principle of transformers, inductors, and various types of electrical motors, generators and solenoids.At of first we are using a step down transformer which converts the 220v to a low voltage of 12v .Now there is a rectifier circuit which is of bridge type.In the first half cycle diode 1 and 3 are in forward bias, forward biased diode works as a closed switches thus circuit is completed and we get the current at the load end ,at this time diode 2and 4 are in reverse biased and works like open switch .Now during the negative half cycle diode 2 and 4 are in forward biased and we get the current at the load end .A capacitor filter is used to filter the ripples from the obtained output after which it is fed to the inverter circuit which comprises of MOSFETs to amplify the incoming signal by producing high frequency current which is finally given to the transmitter coil. From transmitter coil the power will be transferred to the receiver coil through electromagnetic induction(here the current flowing in the transmitter coil is of alternating nature which is necessary to produce flux into the secondary)Through the receiver coil another bridge rectifier is connected, the difference in both the rectifier is that the latter one has voltage controller which permits the voltage up to 5v to pass through it ,the higher values are converted to signals below or equal to 5v.The output of this rectifier circuit is finally given to the device to be charged. diode 2and 4 are in reverse biased and works like open switch .Now during the negative half cycle diode 2 and 4 are in forward biased and we get the current at the load end .A capacitor filter is used to filter the ripples from the obtained output after which it is fed to the inverter circuit which comprises of MOSFETs to amplify the incoming signal by producing high frequency current which is finally given to the transmitter coil. From transmitter coil the power will be transferred to the receiver coil through electromagnetic induction(here the current flowing in the transmitter coil is of alternating nature which is necessary to produce flux into the secondary)Through the receiver coil another bridge rectifier is connected, the difference in both the rectifier is that the latter one has voltage controller which permits the voltage up to 5v to pass through it ,the higher values are converted to signals below or equal to 5v.The output of this rectifier circuit is finally given to the device to be charged.

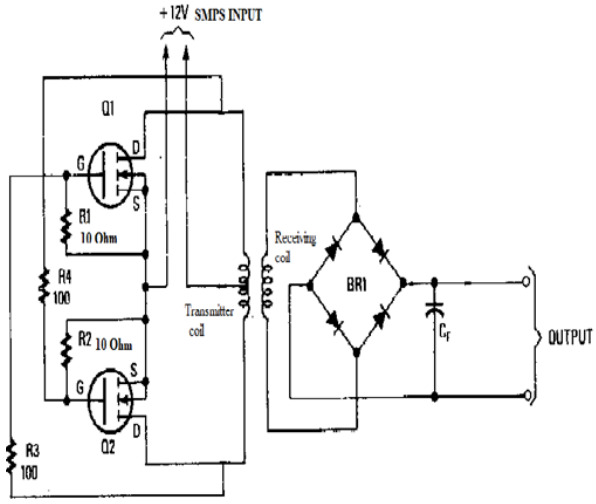

Fig. 2: Circuit of wireless mobile charger(push pull amplifier)

III. Applications

1) Electronic portable devices [19]
2) Electric Vehicles[19]
3) Theoretical applications: Aerial Vehicles and Solar Power Satellites[19]

IV. Advantages

1) It improves user friendliness as the hassle from connecting cables is eliminated. Different brands and models of devices can also use the same charger.
2) It provides better product durability (e.g., waterproof and dirtproof) for contact-free devices.
3) It enhances flexibility, especially to devices for which battery replacement or cable connection or charging is costly, hazardous, or infeasible (e.g., body-implanted sensors).
4) Wireless charging can provide on-demand power, avoiding an overcharging problem and minimizing energy costs.

V. Conclusion

Wireless power technology offers the possibility of removing the last remaining cord connections required to replenish portable electronic devices. This promising technology has significantly advanced during the past decades and introduces a large amount of user-friendly applications. In this article, we have presented a comprehensive survey on the paradigm of wireless charging compliant communication networks. Starting from the development history, we have further introduced the fundamental, international standards and network applications of wireless charging in a sequence, followed by the discussion of open issues and envision of future applications. In the previous inductive coupling model the achieved distance was less than 4cm and in the present model the distance has been enhanced to 5cm.

VI. Future Scope

Inductive Coupling: The increase of wireless charging power density gives rise to several technical issues, such as thermal, electromagnetic compatibility, and electromagnetic field problems. This requires highly efficient power conversion techniques to alleviate the power loss at an energy receiver and battery modules with effective ventilation architecture.

Resonance Coupling: Resonance coupling-based techniques, such as Witritiy and Magnetic multiple- input multiple-output (MIMO), have a larger charging area and are capable of charging multiple devices simultaneously. However, it also cause increased electromagnetic interference with lower efficiency compared to inductive charging. Another limitation with resonance coupling is the comparatively large size of a transmitter. The wireless charging distance is generally proportional to the diameter of the transmitter. Hence, wireless charging over a long distance typically requires a large receiver size.

Magnetic MIMO: in multi-antenna near-field beam forming, the computation of a magnetic beamforming vector on the transmission side mainly depends on the knowledge of the magnetic channels about the receivers. The design of channel assessment and feedback mechanisms is of paramount importance. With inaccuracy of channel estimation or absence of feedback, the charging performance severely depreciated.

Additionally, there is a hardware limitation in that the impedance matching hardware optimally operates only within a certain range [7] rectifier along with a voltage controller. The concept can be used in future for the wireless charging of devices.

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