A Review of "Wireless Power Sharing": Today's Generation's Power Sharing System

Miss. Swati Umakant Dode[1], Prof. R. A. Agrawal[2]
Department of Computer Science & Engineering
[1, 2] SSGBCOET, Bhusawal, (M.S.)-425203

Abstract-*Wireless power sharing is a concept which enables users to share their Mobile Battery power between devices, at ease; this concept composes, sharing of power wirelessly from one device (mobile) to another without any fundamental losses. As per the proposed literature, wireless transmission of power in handled devices is possible by Qi wireless charging pad, Wireless Power Transfer (WPT), Inductive Coupling, Resonant Inductive Coupling, and Microwave (Radio wave) Transmissions and many more. It allows us to transfer power at longer distances. As we are familiar that Mobile Battery Power is one of the key resources, so here we present a review of how we can efficiently use and share this resource.*

Keywords-Wireless power transfer (WPT), Qi Wireless charging pad, Inductive Coupling, Resonant Inductive Coupling, Microwave (Radio waves) Transmission.

I. INTRODUCTION

Today's one of the biggest issue in power system is loss of power occurs during the transmission and distribution of power and due to this your phone's battery is depleted down into the red zone. And there's not electrical plug in sight. [2] But now a day's mobile and wearable devices could engage in "Power-Sharing" by wirelessly charging each other. This innovation could help peoples can easily recharge their mobile or wearable gadgets; particularly for tasks such emergency phone calls. Mobile and wearable devices are now virtually used everywhere, but their battery lives remain limited. In early day's a number of devices are exit to provide extra power to mobiles and wearable's such as power packs, mobile hand generators, and solar cells. But although external power pack's have become popular, they add size and weight and mobile hand generators and solar cells produce only limited amounts of power.[1]

"When mobile phones first came out, the people's are really found them liberating because they didn't have to be attached to a wire, but they actually still do have to be attached to a wire when they recharge", said study co-author Mike Fraser, a scientist at the University of Bristol in England. So now we're seeking to liberate mobile phones again, to help them manage power without plugging in [2]. To overcome all this problem new technique is invented which is based on the "Wireless Power Sharing" from one device to other trough applications.

Figure 1: Wierless Power Sharing

It's an idea of charging a battery of a phone through another mobile phone using some application. Suppose, an android phone is 100% charged and an android phone is 20% charged. Now with the help of some application one can share its power of phone to another one.

II. LITERATURE REVIEW

A very critical problem in every mobile phone is user can face now a days is the battery life. The mobile users can assist each other; one way this can happen is through Wireless Power Sharing. User's having a social relationship can share their energy via Wireless Power Shearing application or batteries to improve the data transmission performance. The main idea behind this paper is about sharing power between two devices. [4] The mobile power understanding is an active research area during the last few years. That indicates concern around the battery life. Sir Nicolai Tesla was the first one to propose and research the idea of wireless transmission in 1899, since than many scalars and scientists have been working to make his dream as reality.

In 1899: Tesla continues wireless power transmission research in Colorado Springs and writes, "The inferiority of the induction method would appear immense as compared with the disturbed charge of ground and air method.
In 1961: William C. Brown publishes an article exploring possibilities of microwave power transmission.
In 2009: Sony shows a wireless electrodynamics induction powered TV set 60w over 50cm.
In 2007: Nilanjan Banerjee, Ahmad Rahmati, Mark D. Corner, Sami Rollins and Lin Zhong [3] conducted a study of user charging habits for 56 laptops and 10 mobile phone users.

Their results tinted the large variations in user charging routine, including how users would often recharge their device when they still had high charge levels.

Paul wororgan, Jarrod Knibbe, Mike Fraser and Diego Martinez Palencia [2]: This paper focuses on review that, power shake draws on this trend in charging habits and the challenges of running out of power, providing an different technique to support opportunistic charging as a possible to alleviate user’s concern around battery life. Ferreira et al [5] found that, from 12 Smartphone’s participants, all experienced a period of time where the device was without power, and most displayed opportunity charging behaviors [6]. Dhir et al [7] report similar battery life concern from a series of focus groups of 27 users in Alice, South Africa, with several participants experiencing significant frustration at running out of battery around phone chargers to avoid this situation. In addition, I introduce a concept in which devices can cooperate with each other by transferring energy wirelessly. However, in this paper’s main focus is about wireless power devices, rather than Smartphone’s and energy is shared in order to improve the systems performance.

III. HOW ACTUAL SYSTEM WORKS

“Wireless charging is one of the numerous methods of charging batteries without the use of cable or device specific AC adaptors.” or “wireless power are a convenient method of transferring energy from one physical device to a second physical device without contacts.” New technology not only lets you control the balance of power levels of your device, but allows you to share your charge called power share, this technology consists of flexible coils and docking aids embedded in the device that deliver on-the-go, fast wireless power transfer. This allows devices to be powered or batteries to be charged. Developed by researchers at the University of Bristol, it is a circuit design based on the QI standard and uses a class E amplifier for a transmit circuit and a QI based receive circuit. Wireless charging involves at least two coils one in the power transmitter, and one in the power receiver. When an electric current passes throughout the power transmitter coil, it creates an electromagnetic field that can transfer charge to another coil. Power transmission is best at close distances. The scientists said.

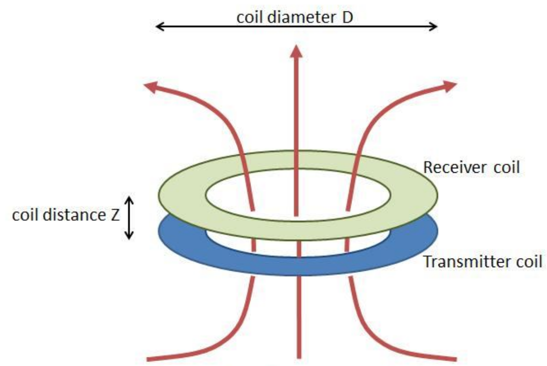

Figure 2: Tightly coupled coils: much smaller than D

The researchers experiment with a variety of power transmitter and receiver coils. They also devised electromagnetic shielding made of Ferrite plates and copper tape on the back of coils in order to prevent any transmitted energy from reaching human tissue. Flexible coils were also possible, and potentially embeddable in watch straps.

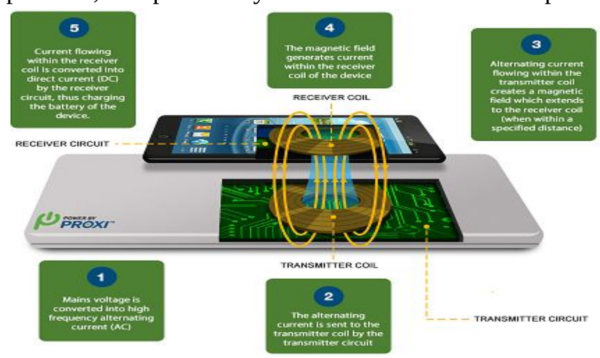

Figure 3: the process of Wireless Charging and Power Transfer between Devices

In experiments, Power coil is fit into small devices, met wireless power transfer safety guidelines, and performed about as well at power transmission as commercial alternatives, such as the QI wireless charging pad, transferring about 3.1 watts of power. They estimated that about 12 seconds of charging would support 1 minute of additional talk time, While 2 minutes of charging would support about 4 minutes of video watching.

IV. ARCHITECTURE OF WIRELESS POWER SHARING

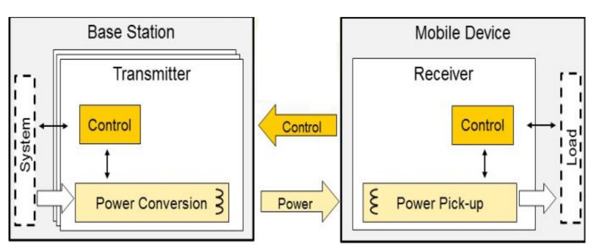

Figure 4: Architecture of wireless power sharing

A. Shielding the Transmit Coil:

The proximity of the copper shield can have a significant effect on performance. Increasing the thickness of the ferrite plate helps to direct the field away from tissue behind the coil, aiding guideline compliance, but it increases the form factor of our WPT device. We performed a series of empirical measurements of power throughput and current density, varying the thickness of the ferrite plate on the transmit coil from 0mm to 3mm (adding additional layers of 0.2mm, relative permeability of 230 at 97kHz). A 0.1mm layer of copper tape is used throughout. It is worth noting that changing the thickness of the ferrite plate affects the inductance of the coil. The circuit was re-tuned to 97 kHz after each change, consistent with the circuit design equations given in. We used the TDK WR483245-15F5-G receive coil, taking three measurements at each step. [2]

B. Shielding the Receive Coil:

Although a significant part of the EM field is turned into a current by the receiver, shielding is still necessary (and still impacts transfer). Similarly to our exploration of the transmit coil, we measured the power throughput and current density to the back of the receive coil, whilst increasing the thickness of the ferrite shielding. We increased the ferrite shielding on the receiver's side in steps of 0.2 mm with a last layer of 0.1mm of copper tape, as before. The transmit coil was kept constant throughout and included a 1mm ferrite plate and 0.1mm copper tape (i.e. optimum safe form factor from previous experiment).[2]

V.CONCLUSION

Wireless power transfer not only revolutionizes current technology but it also provides a remedy to the classic power problem. The concept of power that can be transferred a shielding arrangement that allowed for safe WPT even for continuous on body use. We performed experiments to characterize the scope of application of this technique, demonstrating safe power transfers with charging rates (i.e. throughput and efficiency) in line with commercial QI chargers. It also allows thin form factors, flexible formats and it is used to charge conservative tasks and extend the duration of on-going power ambitious tasks. It eases mobility of device by providing an alternative to predictable charging methods by derive power from various other sources through sharing by the technique and implementation derived in this paper will amaze this illusionistic world.

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