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Improving power management in Smart phones through Wireless Charging

Romy Sinha
Asst. Prof, Dept of CSE, BKIT Bhalki, Karnataka, INDIA

(Corresponding author: Romy Sinha)

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ABSTRACT: Smart phone has become an important part in our today's life. We are operating everything through mobile phones whether it is making a call, chatting with friends or caring out other different applications such as online transactions and playing games. Their charging imposes a big issue to users because they have to recharge their smart phones daily or even multiple times per day. Most of the energy is required by the operating system. In this paper we discuss about whether we can charge the smart phones through different technique without requiring explicit effort from users. Here we use the concept of Wireless Charging which in coming days might improve the power management in smart phones.

Keywords: Wireless, charging, Resonance, Power Induction.

I. INTRODUCTION

Today's smart phones are very power consuming. They use powerful hardware including complex CPU, many GPU cores, large screen and high-speed wireless network interfaces, all with a high power consumption. They also run many energy-expensive applications such as games, HD video playback.. As a result, many users suffer from a short battery lifetime on their smart phones and thus they often have to recharge their smart phones every day. As people depend on their smart phones for everyday work and life, running out of battery becomes a very unacceptable situation for many users. To control such an unpleasant situation, users must keep a eye on the battery status of their smart phones and manually connect a charger to charge their smart phones when the battery is low. Every time they have to carry charger with them and while charging they are unable to use their smart phones for their purpose. To give a solution to this problem Wireless charging concept is introduced to improve the power management in smart phones.

Wireless charging is essentially the transmission of an electrical current from a power source to a receiving device without the use of a physical connection. Â The electrical Â current is then used to charge or re-charge the battery Â of the receiving device. In this circumstance the receiving device can be anything from a smart phone or wearable, to a large industrial forklift. Wireless charging works on the principle of electromagnetic induction. Coils of wire in the base station (the charging plate) create a magnetic field as the current passes through. This field can induce an electrical current in an adjacent coil of wire without actually touching it. If this wire is part of a battery charging circuit, then you have wireless charging. From smart phones and small electronic devices to mission critical equipment, Â wireless power maintains safe, reliable transfer of power to ensure all forms of device and equipment are always charged and ready to go.

II. WORKING OF WIRELESS CHARGING

Wireless charging *Â* is based on the Â principle of magnetic resonance or inductive power transfer (IPT) Â â€“ the process whereby electricity is transferred between two objects through coils.

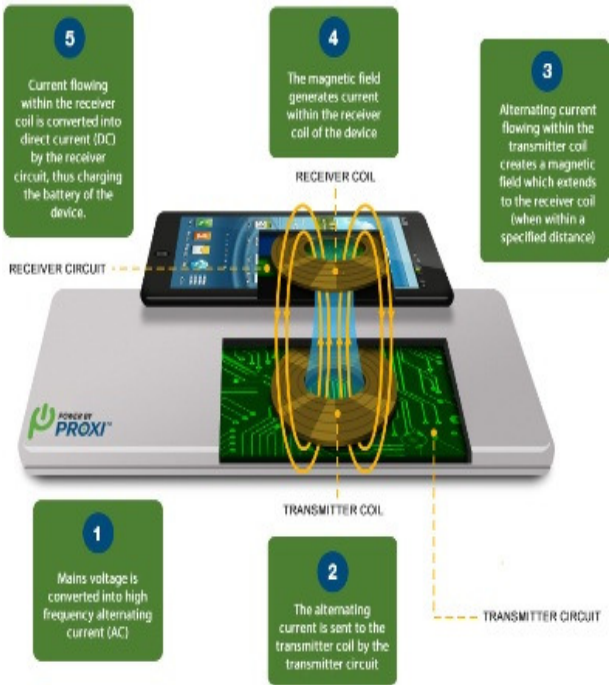

Fig.1. The process of wireless power transfer into5 key steps:

1. Mains voltage is converted into high frequency alternating current (AC).
2. The alternating current (AC) is sent to the transmitter coil by the transmitter circuit. Â The alternating current then induces a time varying magnetic field in the transmitter coil.
3. Alternating current flowing within the transmitter coil inducesÂ a magnetic field which extends to the receiver coil (when within a specified distance).
4. The magnetic field generates current within the receiver coil of the device. Â The process whereby energy is transmitted between the transmitter and receiver coil is also referred to as *magnetic* or *resonant coupling* and is achieved by both coilsÂ resonating at the same frequency.
5. Current flowing within the receiver coil is converted into direct current (DC) by the receiver circuit Â which can then be used to charge the battery. Through the process described above, power can be transferred safely over an Â air gap and also through any non-metal object which might exist between the coils i.e. wood, plastic, granite. Â The addition of extra (or larger) transmitter coils can also extend the range at which the power can be transferred.

III. RESONANT" WIRELESS CHARGING"

For centuries, scientists have known that resonance causes objects to reverberate when energy of a certain frequency or pitch is applied. In resonance charging, two copper coils are used. One coil, attached to a power source, is the sending unit. The other coil, attached to the device to be charged, is the receiver. Both coils are tuned to the same electromagnetic frequency. When objects of the same resonant frequency are placed close to one another, the energy produced can be transferred from one to the other. Researchers have been studying the potential of "non-radiative" objects with what they call "long-lived resonance." When an electromagnetic field is activated between these objects, the energy produced remains fixed in these objects, rather than being dispersed in space. The idea of using lasers to wirelessly charge objects was considered. However, it is not very practical as lasers require an unobstructed line of sight and can also be dangerous. The energy produced between objects with long-lived resonances has little to no effect on the environment or biological organisms, making this method of charging much safer. The distance at which the energy can be transferred is increased if the transmitter and receiver coils are resonating at the same frequency. This resonant frequency refers to the frequency at which an object naturally vibrates or rings – much like the way a tuning fork rings at a particular frequency and can achieve their maximum amplitude. Greater transfer distances and higher efficiency can be achieved through A *resonance* â where by the transmitter and receiver coils oscillate (or resonate) at the same frequency. Whatever the application, the removal of the physical connection delivers a number of benefits over traditional cable connectors, some of which aren't always obvious.

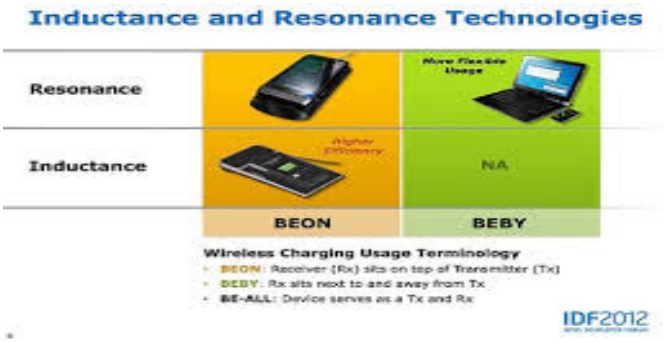

Fig. 2

IV. BENEFITS OF WIRELESS CHARGING

Wireless charging has number of benefits over wired chargers. Some of the benefits are as follows:

1.Greater convenience and ubiquity for charging of everyday devices.

2. Reduce cost associated with maintaining mechanical connectors.

3. Safe powering or charging devices that need to remain sterile or hermetically sealed (waterproof).

4. Prevent corrosion due to elements such as oxygen and water.

5. Eliminate sparks and debris associated with wired contacts.

V. WIRELESS CHARGING FOR SMART PHONES

Wireless charging of smart phones and tablets involve the use of a charging pad which acts as the transmitter, transferring power to aÂ *miniaturized* A wireless receiver integrated into the Smartphone Miniaturized receivers are integrated directly into the device, removing the need for external housing covers or sleeves on devices.

Fig. 3. Wireless pad for charging smart phones.

VI. CONCLUSION

In this paper we proposed and a new approach that enables automatic smart phone charging. Through wireless technique and also it improve the power management in smart phones besides improving smart phone charging, the power problem may also be addressed from the opposite direction: reducing the power consumption of smart phones. Much research has been done in this direction, including improving the operating system power management reducing the power consumption of hardware components and optimizing the power performance of applications.

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