

A Research Paper on Wireless Charging Techniques

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ABSTRACT: Presently a days a cell phones turning into a fundamental piece of our life, this is one of the most significant vehicle for the correspondence, the cell phone batteries has consistently been an issue for reviving the charge. Mobile must be put to revive after the batteries has depleted out. Diverse PDAs has distinctive battery life relying upon the producer. To defeat this issue an innovation is presented which would charge the batteries forever without the need of chargers and free of the maker, a mobile collector basically utilizes the microwaves from source and gets the versatile battery charged. In this paper the primary design is appeared to make the energizing of cell phones anyplace you need without charger this is done just when there is an utilization of microwave, the microwave signal transmitted from transmitter utilizing a unique sort of receiving wires called opened wave direct radio wires at a frequency is 2.45GHZ. We need to include a sensor, rectifier circuit in our cell phone to carry out this responsibility effectively. This is perhaps the best innovation and for this reason behind proposing remote charging of cell phones by utilizing microwaves.

KEYWORDS: Cell phone, Charging, Magnetron, Sensor, Wireless connection, Microwaves.

INTRODUCTION

The idea of moving force without wires, be that as it may, has been around since the late 1890s. It was Nikola Tesla who longed for taking out the need of wires for charging gadgets or fuelling gadgets. He had the option to light electric bulbs remotely at his Colorado Springs Lab utilizing electrodynamic acceptance (full inductive coupling). The thing which is significant for this innovation are the microwaves which are being applied in different fields. A mobile client while having discussions imparts alongside the message signs, the microwaves from transmitter utilizing a radio wire to the collector utilizing rectenna [1]. At the less than desirable end these sign charges the collector in charging his/her cell phone without the requirement for lines or charging cables. So the comprehension of microwaves is significant.

ELECTROMAGNETIC SPECTRUM AND MICROWAVES

To charge cell phones microwaves have an incredible job which are influence of the electromagnetic range. The electromagnetic range which is the assortment of energies, has been utilized here for significantly progressively more extensive application. The microwave locale is one of the seven locales of electromagnetic (EM range) is utilized for this reason which fall in the scope of the EM range between radio waves and infrared waves [2]. Microwaves are the undetectable, super-fiery, short frequency waves. Microwave innovation is utilized for this reason in light of the fact that these waves are broadly utilized for highlight point telecommunication (i.e. non-communicate utilizes), in light of the fact that their little frequencies permits advantageously measured receiving wires to guide them in restricted shafts, which can be pointed legitimately at the getting reception apparatus .This permits close by microwave types of gear to utilize a similar frequency without meddling with one another ,as lower frequency radio waves do. Since they are more handily engaged into smaller pillars than radio waves permitting frequency reuse. Their nearly higher frequencies permit expansive transmission capacity and high information transmission rates. Microwaves are useful for transmitting data starting with one spot then onto the next in light of the fact that microwave vitality can enter murkiness, light downpour and day off, and smoke. Shorter microwaves are utilized in remote detecting. At much lower frequency, the frequency is huge enough that there is unimportant stage variety over the elements of the part. The more extended microwaves, those more like a foot long, are the waves which heat our nourishment in a microwave. Microwaves having frequency of 1mm to 1m, alludes to rotating current

sign with frequencies somewhere in the range of 300MHz and 300GHz [3]. Microwave segments are frequently appropriated components, where the period of a voltage or current are changes essentially over the physical degree of the gadget on the grounds that the gadget measurements are on the request for the microwave frequency.

Table 1: Spectrum of various EM waves

Region	Wavelength (Angstroms)	Wavelength (centimeters)	Frequency (Hz)	Energy (eV)
Radio	$> 10^9$	> 10	$< 3 \times 10^9$	$< 10^{-5}$
Microwave	$10^9 - 10^6$	$10 - 0.01$	$3 \times 10^9 - 3 \times 10^{12}$	$10^{-5} - 0.01$
Infrared	$10^6 - 7000$	$0.01 - 7 \times 10^{-5}$	$3 \times 10^{12} - 4.3 \times 10^{14}$	$0.01 - 2$
Visible	$7000 - 4000$	$7 \times 10^{-5} - 4 \times 10^{-5}$	$4.3 \times 10^{14} - 7.5 \times 10^{14}$	$2 - 3$
Ultraviolet	$4000 - 10$	$4 \times 10^{-5} - 10^{-7}$	$7.5 \times 10^{14} - 3 \times 10^{17}$	$3 - 10^3$
X-Rays	$10 - 0.1$	$10^{-7} - 10^{-9}$	$3 \times 10^{17} - 3 \times 10^{19}$	$10^3 - 10^5$
Gamma Rays	< 0.1	$< 10^{-9}$	$> 3 \times 10^{19}$	$> 10^5$

The table 1 above depicts data on various parameters of the electromagnetic waves which is explained below.

Radio: radio catches radio waves discharged by radio broadcasts, bringing your preferred tunes. Radio waves are additionally produced by stars and gases in space.

Microwave: Microwave radiation will cook your popcorn in only a couple of moments, but on the other hand is utilized by space experts to find out about the structure of close by universes.

Infrared: Night vision goggles get the infrared light transmitted by our skin and articles with heat. In space, infrared light causes us map the residue between stars.

Obvious: Our eyes distinguish noticeable light. Fireflies, lights, and stars all radiate noticeable light.

Bright: Ultraviolet radiation is discharged by the Sun and is the explanation skin tans and copies. "Hot" protests in space produce UV radiation also.

X-beam: A dental specialist utilizes X-beams to picture your teeth, and air terminal security utilizes them to see through your pack. Hot gases in the Universe likewise transmit X-beams.

Gamma beam: Doctors use gamma-beam imaging to see inside your body. The greatest gamma-beam generator of everything is the Universe.

MICROWAVE REGION

Microwave are the radio wave which has the frequency scope of 1 mm to 1 meter and the frequency is 3000 MHz to 300 GHz [4]. Microwaves have frequency that can be estimated in centimetres microwaves are useful for transmitting data starting with one spot then onto the next spot since microwave vitality can enter cloudiness, light downpour and, day off, and smoke. Microwave radiation is still connected with vitality level that is normally thought of innocuous aside from individuals with pace producers.

STRUCTURES

To achieve the undertaking of remote charging there ought to be a transmitting side which produces microwaves and a getting side which gets these microwaves and gets charged. In view of this we have we have transmitting and getting plan [5].

Transmitter Design

The side during the time spent remote versatile charging which goes about as the hotspot for microwaves is the transmitting plan. At transmitter there is a segment called as magnetron. A magnetron is a diode vacuum tube really acts as an oscillator to produce microwaves. To assist these microwaves with reaching to the goal or accepting end, at transmitter side use waveguide receiving wire which are somewhat pipe which assists with radiating out the waves into the air [6].

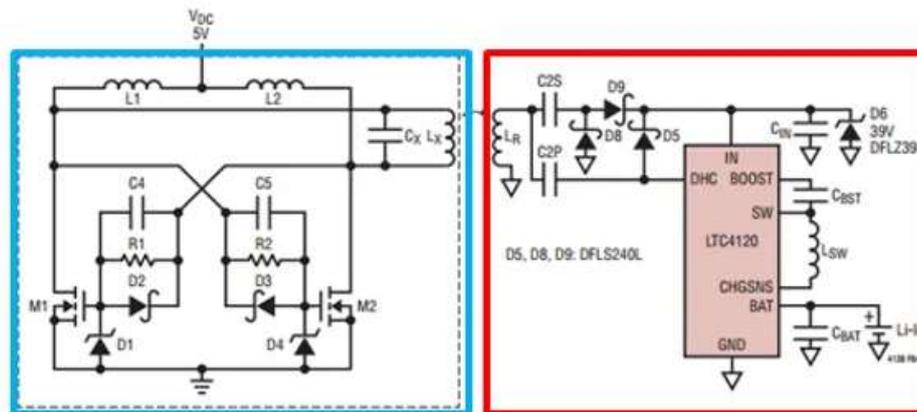


Figure 1: Transmitter and Receiver circuit of the device

Receiver Design

Accepting side procedure is minimal diverse as it is more than we might suspect it would be. It gets the signs, redresses it and devour them to get the less than desirable end battery charged. At getting end we need a sensor which identifies the nearness of message signals i.e. while an endorser is having discussions. The pretending part at the less than desirable end is the rectenna which is the term utilized for both the rectifier and the radio wire. To comprehend the idea plainly how the transmitter produces microwaves and how the beneficiary gets them, consider the segments of the framework.

Figure 1 represents the transmitter and receiver block diagram of the circuit.

PROCESS RECTIFICATION

Microwave vitality transmitted from space to earth clearly can possibly give clean electrical force on an extremely huge scope the point of the examination to make a minimal effort power rectifier for low & high power levels at a frequency of 2.45GHZ. The Scotty Diode microwave redressing circuit has the productivity is more noteworthy than 90%. Microwave can go through the media yet it additionally lose some vitality. So our key goal is to redress the circuit our goal is to redress the waves at the minimal effort. And furthermore we need to make the recognition progressively touchy. As realized that connect correction is more proficient than the single diode. Also, we utilize the Schottky diode to get the hitter impedance.

Sensor Hardware

The sensor hardware is straightforward circuit, which recognizes if the cell phone gets any message signal [7]. This is required, as the telephone must be charge as long as client is talking. Hence a basic F to V convertor would serve our reason. In India the working frequency of cell phone administrators is commonly 900 MHz of 1800 MHz for the GSM framework for versatile correspondence. In this way the utilization of basic F to V would go about as a changes to trigger the rectenna circuit to on. LM-2907-a basic n F to V converter use as it works between this predetermined rang. In this way on the

gathering of the sign the sensor hardware guides the rectenna circuit to ON and the cell phone starts to charge utilizing the microwave power.

SEGMENTS OF WIRELESS POWER TRANSMISSION SYTEM

Microwave generator

The microwave generator is the one which produces the microwave of favoured frequency. It produces the microwave by the association of steam of electrons and attractive field.

Transmitting Antenna

There are numerous kinds of opened wave control reception apparatus accessible. An electrical flow goes through the reception apparatus, instigating an attractive field, which wavers at the given frequency. The varieties in the current make slight varieties in the radio frequency. These radio waves transmit outward from the reception apparatus in a "bar" as per the receiving wire's plan.

Rectenna

A rectenna is an amending radio wire, a unique sort of receiving wire that is utilized to change over microwave vitality into direct flow power. They are utilized in remote force transmission framework that transmits power by radio waves. In late years intrigue has gone to utilizing rectennas as force hotspots for little remote microelectronic gadgets.

ADVANTAGES

- Wireless strategies are constantly invaluable than unwieldy, chaotic wiry systems.
- You can have a ton of choices if the office of remote charging of cell phones is by one way or another actualized.
- Charge the telephone by Bluetooth so okay of electrical stun or shorting.
- The need of various sort of chargers by various makers is completely disposed of.

DISADVANTAGES

- The transmitter and recipient additionally should be extremely ground-breaking gadgets as the separation builds the charging is very more slow.
- Wireless transmission of the vitality cause some extraordinary impacts to human body, on account of its radiation.
- It is all the more expensive reasonable prospects are not yet pertinent in this field.
- The other arrangement of segments that can be utilized for the transmission of intensity are:

The different segments are available both at the transmitting plan and at the getting structure. The fundamental parts at transmitting side are the Microwave generator (Magnetron) and the Transmitting reception apparatus .The segments at accepting end are the Rectenna and the tangible circuit.

MAGNETRON

Magnetron is a diode vacuum tube gadget that really produces the microwaves at the transmitter .It shares a considerable amount for all intents and purpose with a cathode-beam tube that makes the photos in an old style TV set, however the magnetron doesn't have a similar reason as TV. Rather than making pictures, it creates microwaves while the supporter is available to come in to work discussion [8].The working is magnetron is significant as it gives the peruse to all the more likely comprehend the magnetron. There is a halfway put metal bar in magnetron which is called the Cathode (yellow in shading). The cathode is encompassed by a ring like structure called anode (red), When the magnetron is provided the force or when it is turned on ,the cathode bubbles off the electrons and speed across to the anode in straight lines (dark bolts) much like the electron bars towards the phosphorus screen. The magnetron anode is has openings or spaces into it called the depressions or resounding pits .An incredible magnet is set underneath the anode to produce an attractive field along the length of the cylinder corresponding to the cathode .The nearness of attractive field cause the electrons to feel a

power and follow a bended way rather than straight path (blue hover), zooming around the space between anode.

Transmitting Antenna

The transmitting reception apparatus (blue external bolt) are the structures which pass on the microwaves from transmitter to the sky from where accepting reception apparatus gets these signs. The transmitting receiving wire is join to the Tuner which coordinate the impedance of the transmitting radio wire and the microwave source. Directional Coupler encourages the sign to engender a specific way. It spread the Microwaves in a space and sent it to the beneficiary side.

Rectenna

At the less than desirable end we additionally need a receiving wire for accepting the microwaves from sky and the radio wire utilized here is unique kind of radio wire as in it acts both as the receiving wire and as the rectifier as in light of that it is named as the Rectenna. It gets the microwaves as reception apparatus and corrects them as rectifier. The microwaves experience power misfortune while proliferating through air, the rectenna corrects them at the collector side to pick up the force once more. Also the significant work done by a rectenna is to change over the current actuated by the microwaves in radio wire to coordinate current (DC). A dipole reception apparatus and a diode (a schlocky obstruction diode) make a rectenna. The correction procedure ought to be proficient and definite, so an amending component which costs less ought to be utilized. Diode utilized for correction is a schlocky diode which is utilized especially for having low turn on voltage, low voltage drop and fast.

Sensor Circuit

Sensor circuit is a sensor utilized at beneficiary side which is required for the discovery of message signals while accessible if the need arises on the grounds that microwaves are accessible during that time and cell phone needs to get charged as long as the sensor distinguishes the message signals. The sensor yields the nearness of message signs to the rectenna for example the sensor works before rectenna as a pointer of the nearness of microwaves.

DISADVANTAGES

This framework needs a gadget rectenna which ought to be of sub-atomic size in any case the cell phones would get cumbersome. The accusing proficiency diminishes of the expanded separation between different sides. The charging gadgets have been discovered warming up rapidly than the immediate contact power. Likewise the microwaves are exceptionally hurtful and can cause difficult issue in people like waterfall. The work for improving the effectiveness is going on.

PRACTICAL IMPLEMENTATION

The attractive inductive charging innovations led by the Qi consortium and cell phones like Nokia Lumia 920 have made that big appearance [9]. The remote force consortium's inductive Qi standard is well on the way to be natural to you, as it controls a range of cell phones extras and items. The PMA standard which is presently collapsed into Air Fuel has additionally showed up in various cell phones. Remote charging is additionally spreading out from its underlying foundations to turn out to be significantly progressively valuable to buyers'. The innovation has correspondence conventions worked in to guarantee the right force move between gadgets. At home, a solitary center point to spare space, cash and helpfully charge every one of your gadgets from one center remotely.

CONCLUSION

Along these lines this paper effectively shows a novel strategy for utilizing the intensity of the microwave to charge the cell phones without the utilization of wired chargers. Along these lines this strategy gives incredible favourable position to the cell phone clients to convey their telephones any place regardless of whether the spot is without offices for charging. A tale utilization of the rectenna and a sensor in a cell phone could give another measurement in the disclosure of cell phone.

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