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RESEARCH ARTICLE

WIRELESS CHARGING OF MOBILE PHONE USING MICROWAVE

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Abstract

Now a days a mobile phones becoming a basic part of our life .this is one of the most important medium for the communication, the mobile phone batteries has always been problem for recharging. Mobile have to be put to recharge after the batteries has drained out. In this paper the main purpose is shown to make the recharging of mobile phones anywhere you want without charger this is done only when there is a use of microwave, the microwave signal transmitted from transmitter using a special kind of antennas called slotted wave guide antennas at a frequency is 2.45GHZ. We have to add a sensor, rectenna circuit in our mobile phone to do this job successfully. This is one of the best technologies and for this purpose we are proposing wireless charging of mobile phones by using microwaves.

1. INTRODUCTION

The two main concepts which are base of this technique

1.1 Electromagnetic Spectrum

Electromagnetic spectrum is a range of all possible frequencies of electromagnetic radiation. When white light is shone through a prism it is separated out into all colors this is called a vibal spectrum light. Consist of a very small particles are called as photons is a bundle of energy.

light is travelling at the speed of 3,00,000 km/hr.as light hit something that means it may be bounce off, and it comes into our eyes and we can see object.

| Spectrum of Electromagnetic Radiation | | | | |
|--|-------------------------------|---------------------------------------|---|--------------------|
| 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 | $< 10^{-9}$ | $> 3 \times 10^{19}$ | $> 10^5$ |

Table1. Spectrum of Electromagnetic Radiation

Radio: Your radio captures radio waves emitted by radio stations, bringing your favorite tunes. Radio waves are also emitted by stars and gases in space.

Microwave: Microwave radiation will cook your popcorn in just a few minutes, but is also used by astronomers to learn about the structure of nearby galaxies.

Infrared: Night vision goggles pick up the infrared light emitted by our skin and objects with heat. In space, infrared light helps us map the dust between stars.

Visible: Our eyes detect visible light. Fireflies, light bulbs, and stars all emit visible light.

Ultraviolet: Ultraviolet radiation is emitted by the Sun and is the reason skin tans and burns. "Hot" objects in space emit UV radiation as well.

X-ray: A dentist uses X-rays to image your teeth, and airport security uses them to see through your bag. Hot gases in the Universe also emit X-rays.

Gamma ray: Doctors use gamma-ray imaging to see inside your body. The biggest gamma-ray generator of all is the Universe.

1.2 Microwave region

Microwave are the radio wave which has the wave length range of 1 mm to 1 meter and the frequency is 3000 MHZ to 300 GHZ. Microwaves have wavelength that can be measured in centimeters microwaves are good for transmitting information from one place to another place because microwave energy can penetrate haze, light rain and snow, clouds and smoke. Microwave radiation is still associated with energy level that is usually considered harmless except for people with pace makers.

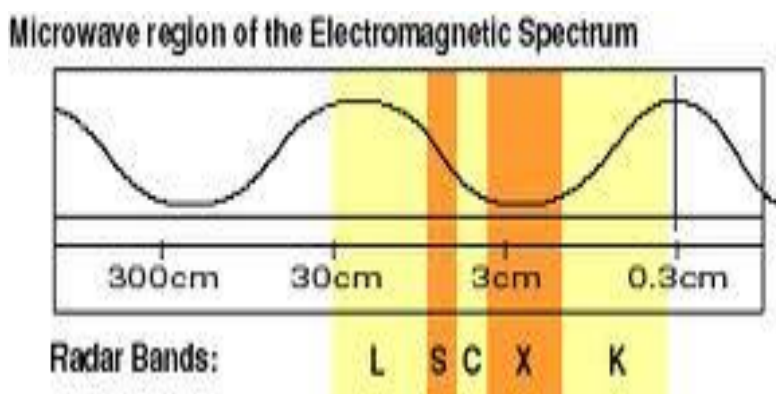


Fig. microwave region of electromagnetic spectrum

2. DESIGN

The system design of wireless charging of mobile phones using microwave consist of four parts are follows

2.1 Transmitter Design

Typically a transmitter design includes generation of a carrier signal, which is normally sinusoidal, optionally one or more frequency multiplication stages, a modulator, a power amplifier, and a filter and matching network to connect to an antenna. A very simple transmitter might contain only a continuously running oscillator coupled to some antenna system. More elaborate transmitters allow better control over the modulation of the emitted signal and improve the stability of the transmitted frequency. For example the Master Oscillator-Power Amplifier (MOPA) configuration inserts an amplifier stage between the oscillator and the antenna. This prevents changes in the loading presented by the antenna from altering the frequency of the oscillator.

2.2 Receiver Design

We have to add a sensor and a Recten at the receiver side. The recteena actually convert the Microwave into the DC power. It's elements are usually arranged in a mesh pattern. A simple rectenna is constructed by using a schottky diode. Rectenna are very powerful to convert the Microwave in to the electricity. Actually the size of rectenna can

be reducing using the Nano technology. Another important part is the Sensor. As we know we are going to charge the phone while a person is talking. So here sensor is used to detect wither the phone is using microwaves or not.

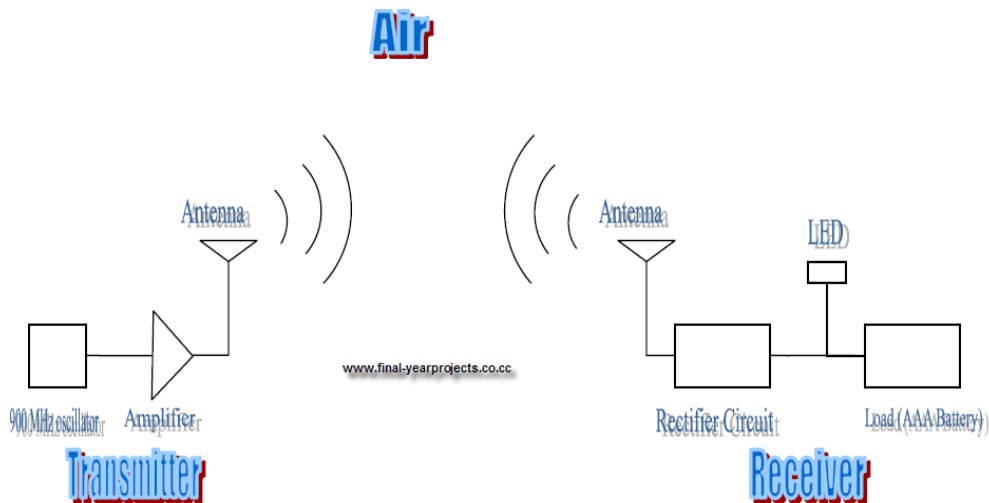


FIG: transmitter design and receiver design

2.3 THE PROCESS RECTIFICATION

Microwave energy transmitted from space to earth apparently have the potential to provide clean electrical power on a very large scale the aim of the study to make a low cost power rectifier for low &high power levels at a frequency of 2.45GHZ.the schottky Diode microwave rectifying circuit has the efficiency is greater than 90%.Microwave can travel through the media but it also lose some energy. So our key objective is to rectify the circuit our objective is to rectify the waves at the low cost. And also we have to make the detection more sensitive. As we know that bridge rectification is more efficient than the single diode. And we use the shotky diode to get the batter impedance.

2.4sensor circuitry

The sensor circuitry is simple circuit, which detects if the mobile phone receives any message signal. this is required, as the phone has to be charge as long as user is talking. thus a simple F to V convertor would serve our purpose. In India the operating frequency of mobile phone operators is generally 900 MHz od 1800 MHz for the GSM system for mobile communication. thus the use of simple F to V would act as a switches to trigger the rectenna circuit to on.LM-2907- a simple n F to V converter use as it operates between this specified rang. Thus on the reception of the signal the sensor circuitry directs the rectenna circuit to ON and the mobile phone begins to charge using the microwave power.

3. COMPONENTS OF WIRELESS POWER TRANSMISSION SYTEM

3.1 Microwave generator

The microwave generator is the one which generates the microwave of preferred frequency. It generates the microwave by the interaction of steam of electrons and magnetic field.

3.2 Transmitting Antenna

There are many types of slotted wave guide antenna available. An electrical current passes through the antenna, inducing a magnetic field, which oscillates at the given frequency. The variations in the current create slight variations in the radio frequency. These radio waves radiate outward from the antenna in a “beam” according to the antenna’s design.

3.3 Rectenna

A rectenna is a rectifying antenna, a special type of antenna that is used to convert microwave energy into direct current electricity. They are used in wireless power transmission system that transmits power by radio waves. In recent years interest has turned to using rectennas as power sources for small wireless microelectronic devices.

4. ADVANTAGES

- Wireless methods are always advantageous than cumbersome, untidy wiry networks.
- You can have a lot of options if the facility of wireless charging of mobile phones is somehow implemented.
- Charge the phone by Bluetooth so low risk of electrical shock or shorting.
- The need of different type of chargers by different manufacturers is totally eliminated.

5. DISADVANTAGES

- The transmitter and receiver also should be very powerful devices as the distance increases the charging is very slower.
- Wireless transmission of the energy cause some drastic effects to human body ,because of its radiation.
- It is more costly practical possibilities are not yet applicable in this field.

6. CONCLUSION

Thus this paper successfully show a novel method of using the power of the microwave to charge the mobile phones without the use of wired chargers. A novel use of the rectenna and a sensor in a mobile phone could provide a new dimension in the revelation of mobile phone.

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