Wireless Electricity for Charging Vehicle

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***Abstract*: The electrically energized devices produce the Electromagnetic radiations. Nowadays, the wireless electricity is a leading domain. The electromagnetic radiation renewable source of energy. EM waves includes radio waves, microwaves, infrared, (visible) light, ultraviolet, X-rays, and gamma rays. All of these waves form part of the electromagnetic spectrum. The main aim is to design a wireless emmision of electricity for charging vehicle. This application is simulated using MATLAB software.**

Keywords: Electromagnetic Radiation, Electromagnetic Spectrum, Mutual Induction, wireless electricity. wireless power transmission.

I. INTRODUCTION

Electromagnetic radiation (EMR) consists of waves of the electromagnetic (EM) field, which propagate through space and carry electromagnetic radiant energy. It includes radio waves, microwaves, infrared, (visible) light, ultraviolet, X-rays, and gamma rays. All of these waves form part of the electromagnetic spectrum.

Classically, electromagnetic radiation consists of electromagnetic waves, which are synchronized oscillations of electric and magnetic fields. Electromagnetic radiation or electromagnetic waves are created due to periodic change of electric or magnetic field as in fig.1. Depending on how this periodic change occurs and the power generated, different wavelengths of electromagnetic spectrum are produced. In a vacuum, electromagnetic waves travel at the speed of light, commonly denoted *c*. In homogeneous, isotropic media, the oscillations of the two fields are perpendicular to each other and perpendicular to the direction of energy and wave propagation, forming a transverse wave. The position of an electromagnetic wave within the electromagnetic spectrum can be characterized by either its frequency of oscillation or its wavelength. Electromagnetic waves of different frequency are called by different names since they have different sources and effects on matter. In order of increasing frequency and decreasing wavelength these are: radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, X-rays and gamma rays.

Electromagnetic waves are emitted by electrically charged particles undergoing acceleration,and these waves can subsequently interact with other charged particles, exerting force on them. EM waves carry energy, momentum and angular momentum away from their source particle and can impart those quantities to matter with which they interact. Electromagnetic radiation is associated with those EM waves that are free to propagate themselves ("radiate") without the continuing influence of the moving charges that produced them, because they have achieved sufficieThe objective of the paper is to design wireless electricity to charging vehicle in the remote places.Wireless power transfer is a generic term for a number of different technologies for transmitting energy by means of electromagnetic fields.

The distance from those charges. Thus, EMR is sometimes referred to as the far field. In this language, the near field refers to EM fields near the charges and current that directly produced them, specifically electromagnetic induction and electrostatic induction phenomena.

In quantum mechanics, an alternate way of viewing EMR is that it consists of photons, uncharged elementary particles with zero rest mass which are the quanta of the electromagnetic field, responsible for all electromagnetic interactions. Quantum electrodynamics is the theory of how EMR interacts with matter on an atomic level.Quantum effects provide additional sources of EMR, such as the transition of electrons to lower energy levels in an atom and black-body radiation.The energy of an individual photon is quantized and is greater for photons of higher frequency.A single gamma ray photon, for example, might carry ~100,000 times the energy of a single photon of visible light.

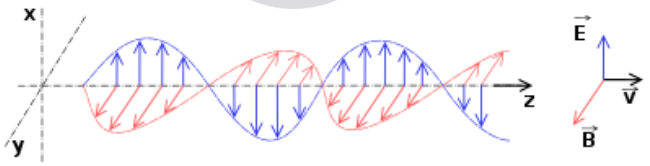


Fig.1: Electromagnetic wave propogation

The electromagnetic spectrum covers electromagnetic waves with frequencies ranging from below one hertz to above 10^{25} hertz, corresponding to wavelengths from thousands of kilometers down to a fraction of the size of an atomic nucleus.The fig.2 shows the electromagnetic spectrum.This frequency range is divided into separate bands, and the electromagnetic waves within each

frequency band are called by different names; beginning at the low frequency (long wavelength) end of the spectrum these are: radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays at the high-frequency (short wavelength) end.

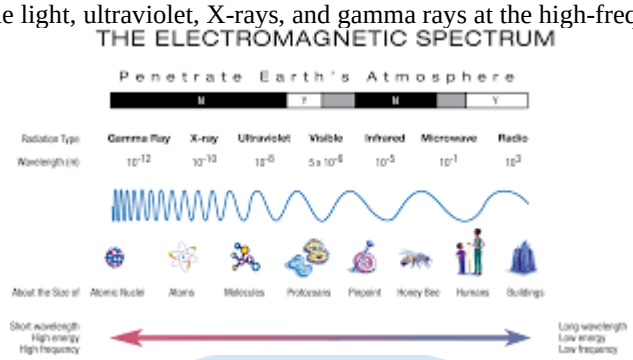


Fig.2:Electromagnetic Spectrum

II. WIRELESS ELECTRICITY

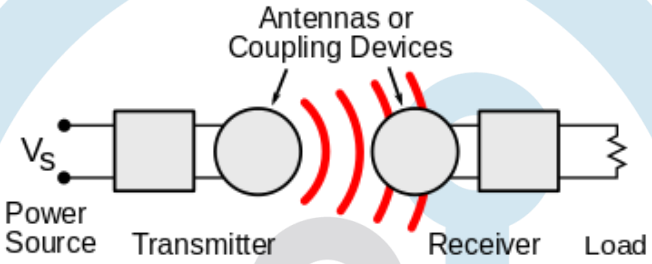


Fig.3:Wireless power Transmission

Wireless power transfer may be used to power up wireless information transmitters or receivers. This type of communication is known as wireless powered communication (WPC). When the harvested power is used to supply the power of wireless information transmitters, the network is known as Simultaneous Wireless Information and Power Transfer (SWIPT); whereas when it is used to supply the power of wireless information receivers, it is known as a Wireless Powered Communication Network (WPCN).Fig.4 shows the wireless charging vehicle.

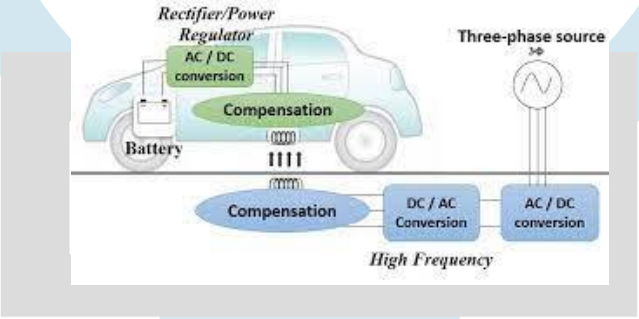


Fig.4:Wireless Charging Vehicle

Electromagnetic power transfer is the transmission of electrical energy without wires as a physical link. In a wireless power transmission system, a transmitter device, driven by electric power from a power source, generates a time-varying electromagnetic field, which transmits power across space to a receiver device, which extracts power from the field and supplies it to an electrical load.

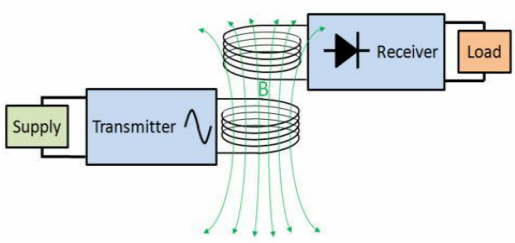


Fig.5:Magnetic coupled

III. METHODOLOGY

There can be many techniques for wireless electricity.Nowadays,the following three methods are most prominently used in trending applications for wireless electricity for charging vehicles.Those methods are magnetic resonance,magnetic coupling and microwaves.

There are certain loopholes of those methods.To overcome the loopholes,the pre-processing is done in which the frequency of the radiated wave is determined using Phase Lock Loop(PLL).Fig5 shows the representation of mutual induction.

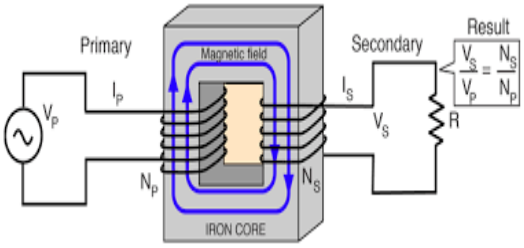


Fig.5: Representation of Mutual Induction

IV. RESULTS AND SIMULATION

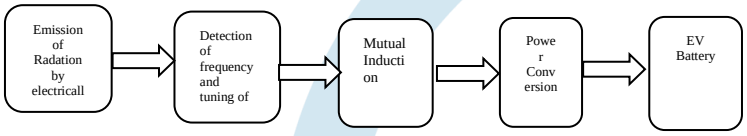


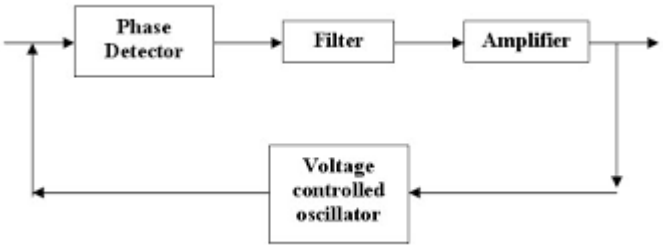
Fig.6:Block representation of overall work proposed

The proposed study is having the steps as followed:

- PLL(Phase Lock Loop):The final/yield signal is created by the control framework PLL.
- Tuning circuit for antenna: After the detection of the source frequency ,the designing of antenna then followed by tuning is done to get maximum.
- Transfer of power:To do this the reactance of capacitor and the inductor should be canceled out,then that will be purely resistive circuit.
- Conversion of Power:steeping up of power levels or the amplitude of input tapped signal is included.

The power Converter can be designed:

- Full bridge rectifier:It is designed to achieve certain conditions.
- Buck-Boost Converter:To design the buck-booster by considering the voltage of the battery.



V. CONCLUSION

In the proposed work it is being discussed about the electromagnetic radiations.The electrically energized devices produce the Electromagnetic radiations. Nowadays,the wireless electricity is a leading domain.The electromagnetic radiation renewable source of energy.

EM includes radio waves, microwaves, infrared, (visible) light, ultraviolet, X-rays, and gamma rays. All of these waves form part of the electromagnetic spectrum.The main aim is to design a wireless emission of electricity for charging vehicle.This application is simulated using MATLAB software.

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