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SOLAR POWER BASED WIRELESS CHARGER

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ABSTRACT- The project focuses on a solar-based wireless charger utilizing inductive capacitance to transfer power wirelessly. It combines a solar panel, inductive capacitance coils, and a battery storage system. The solar panel harnesses sunlight to generate electrical energy, which is then wirelessly transmitted to devices through inductive capacitance coils. This technology eliminates the need for physical charging cables, streamlining the charging process and reducing clutter. Moreover, a battery storage unit stores surplus energy for use during low-light or nighttime conditions, ensuring a continuous power supply. By efficiently transferring power wirelessly, the system minimizes energy loss and contributes to a more sustainable and convenient charging solution for various electronic devices. This innovation represents a significant step towards eco-friendly and user-friendly charging technologies, merging the advantages of solar energy with wireless charging for a cleaner and more efficient power ecosystem.

Keywords- wireless charger, solar power, cords, TAM, photovoltaic cells, AC to DC, inductive charging, thermoelectric

1. INTRODUTION:

Today wireless charging is most emerging technology today due to increasing technology craze. Wireless charging is also known as wireless power transfer to charge the phones, here the power is transferred to load without interconnecting cords. In 2015 Samsung introduced wireless charging into galaxy s6 mobiles. Wireless charging is also called as inductive charging. Wireless charging mainly eliminates the cable required for charging. It reduces the wear and tear of the hardware ports also reduces the wire cost.

Compared to wire charging, wireless charging has more benefits as follows.

- It is user friendly, as there are no cables. Different mobiles can use the same charging pad.
- Better product durability i.e. water proof and dustproof
- Provides flexibility, where connecting cables for charging are costly.
- It does not have any radiation effects.

Wireless charging technology is gradually advancing towards two major directions, i.e., radiative wireless charging or radio frequency (RF) based wireless charging and inductive charging or coupling-based wireless charging. In order to transfer energy in the form of radiation, radiative wireless charging uses electromagnetic waves, most often microwaves and radiofrequency waves. The energy is transferred based on the electric field of an electromagnetic wave, which is radiative. Furthermore, radio frequency based wireless charging only works in low power areas because of the safety concerns associated with RF exposure. Inductive charging is based on mutual induction concept where magnetic field couples between two coils. Also the magnetic field

of An electromagnetic wave attenuates much faster than the electric field hence the power transfer distance is largely limited. We utilize inductive charging in our daily lives because it is safe and easy to use. Wireless charging technology has

numerous applications in the electrical, mechanical, biological, and other industries in addition to the electronics sector.

Technology of Wireless charging has various application not only in the IT industry but in electrical, mechanical, biomedical and many more for various uses. For Wireless power charging Total Available Market (TAM) is very high because of large number of smartphones and is estimated to grow by more than forty times in terms of revenue by 2018.Pike Research has predicted that the number of wireless power systems in mobile phones will grow from 3.74 million in 2012, to 27.63 million in 2016. According to Markets & Markets consultancy company research the wireless power mobile phone manufacturers have already started incorporating wireless charging features in their flagship smartphones as early as 2013. Wireless charging is already included in devices made by LG (Nexus 4), HTC (Droid DNA), Samsung (Galaxy S4), Nokia (Lumia 830), and LG. Wireless charging in smartphones is estimated to become as abundant as Wi-Fi and Bluetooth.

Harvesting Energy using renewable sources has been in the main concern of the research society in recent years. There are plentiful sources of renewable energy harvesting, and solar energy is one of the examples. However, solar cell has a drawback of that it can only produce power when sunlight is present Sensor mote is powered by solar energy collection module. In vibrational energy harvesting is presented and gathering energy from thermoelectric device attached to human is presented in. In Wireless charging system using RF energy harvesting is proposed. TV towers located 4.1 km apart provide 60μW of energy that can power a small electronic gadget. William C. has invented, developed, and proven the use of microwaves to transport power across free space. In Ambient RF energy harvesting with two systems has been studied. In the academia prototypes for such RF harvesters have been developed and commercial products have also been introduced by the industry.

Photovoltaic cells (PV) to convert light into electricity which is used in solar energized devices .Outdoor and indoor light sources can be used to produce energy by solar devices, even though indoor insolation electric levels produce around 2 to 3 orders of magnitude less electricity per unit area than outdoor sources .Solar devices can attain high energy densities when used in direct sun compared to other sources, but it does not function without light (e.g., highly shaded areas, ducts) .The electrical source for our suggested device is a solar cell.

2. LITERATURE SURVEY:

[1] This paper (1) is working about the inductive coupling. It is based on the principle of mutual inductive. The power is transferred from transmitter to receiver wirelessly. The wireless power transfer using the inductive coil is divided into 3 parts of components transceiver for transmission of the power via inductive coil and rectifier which convert AC to DC voltage

Main findings/Outcomes:

1. Efficiency: Determining the efficiency of the inductive charging system, which can affect energy transfer and overall performance.

2. Charging Distance: Identifying the optimal charging distance between the charger and the mobile phone for reliable power transfer.

3. Environmental Impact: Assessing the environmental benefits, such as reduced electronic waste, compared to traditional wired chargers.

[2] The idea behind the construction of a wireless solar charger for smartphones claimed that a communication link did not need to be attached to the power source. facility to charge it. The device mobile phone can charge wirelessly in a short range of distance. No need to sit around to the phone. The idea behind the construction of a wireless solar charger for smartphones claimed that a communication link did not need to be attached to the power source. The device is user-friendly and cost-effective.

Main findings/Outcomes:

The efficiency of the solar panels and wireless charging system, including the energy conversion rate and how effectively it charges smartphones.

[3] The main focus of this work is on small-scale wireless electrical power transmission using solar energy. The power is transferred wirelessly through an inductive coupling as a antenna.

Main findings/Outcomes: The panels take sunlight from the sun and convert it into electrical energy which can be stored in batteries. This stored energy charged in battery is further converted into AC source by the inverter.

[4] The architecture of wireless transmission for mobile systems (WPTM) is presented in this work, along with design specifications and a simulation of a quarter-wave printed monopole antenna that is most appropriate for the project.

Main findings/Outcomes: To build an architecture for wireless low power transmission system which is, simple, affordable robust and to identify promising directions for future research.

3. METHODOLOGY:

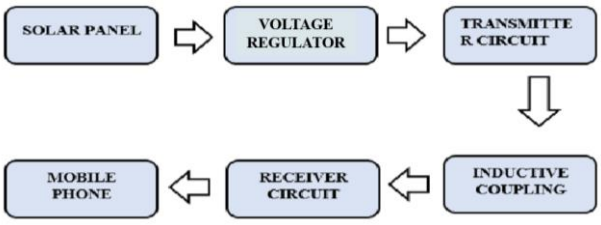


Fig.1: Diagrammatic Representation of Model

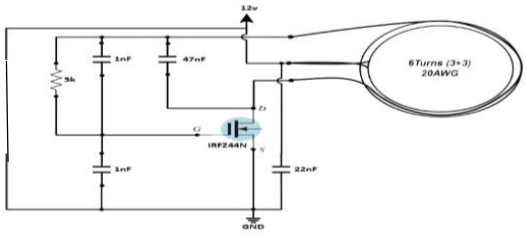
The basic structure of the model consists of a solar panel, battery, transmitter circuit, inductive coupling, and receiver circuit. The solar panel is used to avoid the use of non-renewable source i.e. to save electricity. Solar energy is transformed into electrical energy and sent to the battery. The electric energy from the solar panel is transferred to the transmitter circuit. The transmitter circuit consists of a transistor with capacitor and resistors. At the output of the transmitter circuit, the inductive coil is connected as well as at the receiver side also inductive coupling is connected. The principle of inductive coupling is used to transfer the power from the transmitter to the receiver section wirelessly. The principle of inductive coupling is based on mutual inductance. The mutual inductance occurs when the current flowing through the conductor will induce the voltage in another conductor which is placed near to it. At the receiver side, the voltage regulator will maintain the fixed 5v voltage from the output and this voltage will be sufficient to charge our mobile.

4: Hardware Description

A. Solar panel

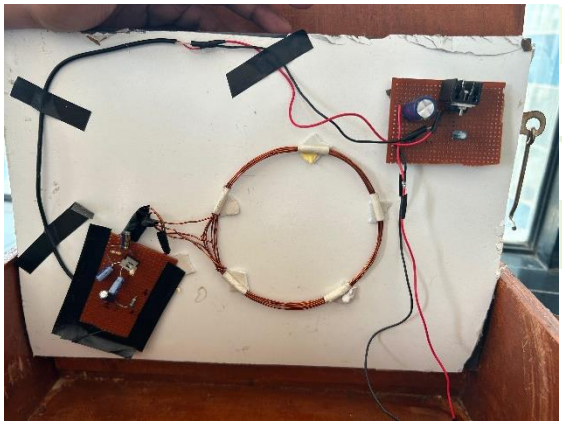
Solar panels convert solar energy into electricity. They employ the idea of the photoelectric effect, which is the release of electrons on solar panels in response to light. The cells that make up solar panels are silicon, which has an atomic number of 14. Two electrons, which are silicon's outermost electrons, move when light strikes a silicon cell. This starts the electrical current flowing. There are two distinct cell structures in silicon: polycrystalline and monocrystalline. Monocrystalline solar panels are produced in silicon wafer configurations using a single, massive silicon block. Since silicon cells are created by melting many silicon crystals together, polycrystalline solar cells are also silicon cells. Compared to polycrystalline silicon cells, monocrystalline silicon cells are more costly but also more efficient.

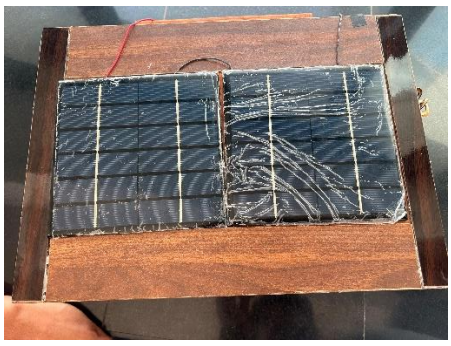
C. Transmitter



This is the circuit for the power transmitter. Depending on how you make the coil, it will affect the resonance frequency together with the 220nF capacitor that creates the LC tank. The diameter and amount of loops of the coil is important. In my case, for my tests the diameter was 8cm and I've used 6 loops with centre tap in the middle, so 3 loops before the middle point and 3 more after. This circuit will automatically establish the resonance frequency, and it will continue to do so even if the load changes. given that the MOSFET's gate is linked to the coil.each time the voltage oscillates, it will turn the transistor on and off and like that creating the oscillations. The LED serves only as a power-on indicator for the circuit.

5. Result





5. Conclusion:

Renewable solar energy can be utilized to generate power, for example. Wireless solar mobile charger it is a simple and portable and it is used in remote areas also and normally Wireless charger consumes a lot of power but we are using a renewable power source

6. Future Scope:

- The design of this solar based wireless charger is made for charging the mobile battery. but in the future, advancements and modifications can help this Wireless Mobile Battery charger to be used in different portable equipment such as laptops, walky-talky, digital cameras, etc.

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