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SOLAR WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM

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Abstract: The automotive industry has undergone a transformation with the growing popularity of electrical vehicles, which provide an eco-friendlier and cleaner substitute for conventional fuel-powered cars. However, the scarcity of EV charging stations is impeding the widespread use of electric vehicles. This research offers a novel wireless EV charging technology that runs on solar energy as a solution to this problem, providing EV owners worldwide with affordable and environmentally friendly options. The wireless power transmission technology at the centre of the suggested system allows EVs to charge without the need for physical hookups. This technology improves user accessibility and safety while doing away with the need for cords. By using solar energy, one can lessen their reliance on traditional power sources increasing the cost- and environmentally-effectiveness of the charging. Comparing this strategy to the conventional plug-in EV charging techniques reveals a number of benefits. The system's ability to charge electric vehicles (EVs) while they are in motion further improves user convenience and reduces discharge time. Solar power offers a sustainable and renewable energy source, minimizing reliance on the power grid and environmental impact. Wireless charging also eliminates the need for physical connections, improving safety and convenience. The purpose of this study is to solve the shortcomings of the conventional electric vehicle systems and offer an innovative solution that will further the development of sustainable transportation. The combination of solar energy and wireless charging for electric vehicles not only promotes the use of sustainable energy. It also encourages the growth of an energy ecosystem that is more flexible and interconnected, paving the path for more environmentally friendly and effective city transport in the future.
Keywords- Electric vehicle, EV charging, solar power charging

I. INTRODUCTION

Numerous problems would exist on the earth without energy. Numerous everyday items, including cellphones, computers, cameras, sensors, bionic implants, satellites, and oil platforms, depend on electricity to function. When there are too many cables connected, using small power outlets can be hazardous and difficult, as Nikola Tesla initially indicated in 1891 while representing the first wireless power transfer system for charging. In 1884, Thomas Parker essentially unveiled the first electric automobile. Before 1859, there were no rechargeable batteries available for storing power. French physicist Gaston Plant solved this problem by creating the lead-acid battery, which had a few advantages. Electric vehicles are getting more and more prevalent throughout many countries. These automobiles can range in size from little to large, like electric bicycles or buses. An electric vehicle operates similarly to a conventional one, with the exception that it propels itself using an electric motor that receives electricity from a battery. [1 The new type of rechargeable battery is used because of its smaller size, greater energy storage capacity and lighter weight than standard lead-acid batteries. For users of plug-in electric vehicles, the charging process is cumbersome. Either the charger is plugged directly into the vehicle or the battery was removed for charging at some point. This demand charging process is generally simplified using inductive power transfer technology [1]. A non- moveable transmitter and one/ more moveable secondary receivers are linked through wireless path via Inductive Power Transfer (IPT) technology [1][7].
There are large air gaps between the primary source and the secondary load. Depending on the

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required performance, the power supply is decided as single-phase or three-phase. Power supply, transmitter (primary coil), receiver (secondary coil), microcontroller, battery, sensors and matching circuit are the basic components of Wireless power transfer system [10]. The IPT system has either a distributed or centralized topology depending on the magnetic structure of the coil. The source produces alternating current in low frequency at transmitter coil. Magnetic fields provide connection between one primary coil and several secondary coils. IPT systems are not affected by dirt, ice, water or chemicals, making them environmentally friendly in any situation and it is available abundantly [1] [4]. The advancement in power electronics has led to the discovery of many new applications on the IPT system, including wireless power for professional devices, wireless charging of batteries for electric cars through distance between air gaps, and handling of materials [1]– [7]. Other applications of the low power IPT system include lights, mobile phones, and medical implants [1] to [7]. The interconnection of the IPT system is typically weak. The transmitting coil and the receiving coil are separated electrically from each other. Below is a list of the benefits of the IPT system. This system demonstrates solar powered wireless charging system for EV.

II. RESEARCH METHODOLOGY

The solar panel gets charged from sunlight. Then this power is supplied to battery through boost converter. Then the DC supply is given as input to inverter from battery(12v). After this the inverter convert this 12v(DC) to 220v(AC). Now this AC supply is fed to transmitting coil. By induction power is transfer from transmitting coil to receiving coil. As we know that our load is DC so rectifier is used to convert ac supply to DC and then this power is used by our load.

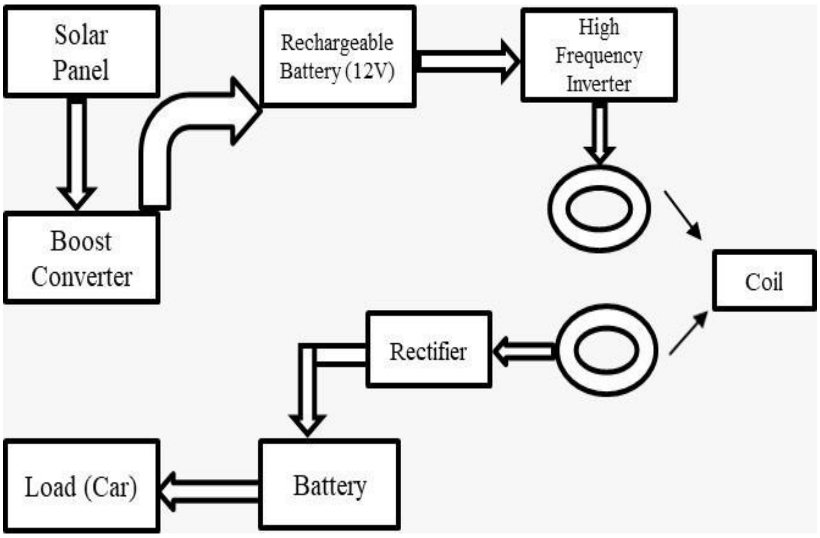

Figure 1: General operating block diagram of solar wireless Electric Vehicle Charging system.

III. LITERATURE REVIEW

The idea of wireless power transfer using the IPT method has been known for a while and is currently garnering increasing attention. The primary component of this dissertation is the literature review, and a thorough analysis of the field has been conducted as shown below.
J. C. Ferreira, V. et.al [1] "presented a double-coupled system (DCS) for electric car battery charging. An intermediate coupler is located between the primary coil and the secondary sensor and acts as a switch. Efficiency is increased by sharing all the losses between the branches overall.

P. Venugopal, P. Bauer [2] Describe a new design approach where design factors are considered in the selection of coreless IPT parameters such as ideal number of coils, compensation capacitors and frequency. If the right design is chosen, there is a chance to deliver high power with high efficiency.

S. R Kutwad, S. Gaur et.al [3] Explain a two-way IPT system that uses weak magnetic couplings to enable easy wireless power transfer between two sides that are separated by an air gap. It is challenging to design and regulate a system without an accurate mathematical model. State variables created a dynamic model. This model is a common tool for controller design as well as steady-state and transient analysis of IPT systems.

B. Revathi A. Ramesh, et.al [4] it is possible to extend the power transmission distance between the transmitter and the receiver coil by installing intermediate repeaters in the IPT system, accordingly. It is carefully determined where the repeater should be placed between the transmitter and the receiver. For producing the same amount of electricity, the efficiency of the two alternative setups varies greatly. If the repeater is placed closer to the transmitter than the receiver, the efficiency will improve. A gap of 10-15 cm between the road surface and the bottom of the electric vehicle is significant for larger vehicles such as trucks or buses, so certain techniques are required to increase the charging distance depending on the gaps. To achieve this, repeaters are inserted

IV. CONCLUSION

The wireless charging system used to recharge the battery of an electric vehicle uses the idea of IPT. A drive circuit is used between the transmitting coil and the receiving coil, which uses a MOSFET and a microcontroller as a switch. To reduce power wastage and the magnetic field radiation problem, power transfer is enabled by turning on the transmitter circuit when the vehicle is present and turning off power transfer when the vehicle is not. The transmitted power of the system is controlled by an AC switch in the designed excitation circuit. The use of an electric car battery charger to test an inductive power transfer system is shown. A practical prototype system with 67% efficiency level is built and the results are confirmed. The system provides reliability, longevity and safety.

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