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Solar Wireless Electric Vehicle Charging System

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Abstract: *The design of a solar charging station for electric cars is thoroughly explained, along with how it solves the two main problems of fuel and pollution. There are more and more electric cars on the roads today. Electric cars have proven to be effective in lessen the travel cost by switching from fuel to EV's, which is much less expensive, with the environmental benefits. However, in this case, we are developing a charging system for electric cars that provides a unique, solution. There are no cables involved, solar energy is used to maintain the charging system, and no external power source is required. The vehicles can be charged while they are moving. The development of the system involved the use of LCD Displays, batteries, solar grid, control circuits, primary and secondary copper coils, AC to DC converters, At mega processors and inverters. The system uses solar panel for power the battery through the charge controller, then the battery will store DC power. That DC power is converted into AC for transmission.*

Keywords: *Electric vehicle, EV charging, solar power, copper coils, At mega controller.*

I. INTRODUCTION

A solar wireless electric vehicle charging system project is an innovative solution that aims to provide an efficient and sustainable way of charging electric vehicles (EVs). The project is based on the idea of using solar energy to power wireless charging stations, which can be installed at various locations, such as parking lots, residential areas, and public spaces. The need for such a project arises from the increasing popularity of electric vehicles, which are becoming an essential component of the transition to a low-carbon economy. However, the lack of charging infrastructure and the limited range of EVs pose significant challenges to their widespread adoption.

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 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.

Background

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A Solar Wireless Electric Vehicle Charging System Is A Technology That Uses Solar Panels To Generate Electricity And Wirelessly Charges Electric Vehicles. The Charging System Typically Consists Of A Solar Panel Array, A Power Converter, And A Wireless Charging Pad. A Solar Wireless Electric Vehicle (EV) Charging System Is A Technology That Enables The Charging Of Electric Vehicles Using Energy From Solar Panels, Without The Need For Wires Or Cables. The System Is Designed To Be Convenient, Efficient, And Environmentally Friendly.

The solar panels generate electricity from sunlight, which is then stored in batteries or directly used to charge the EV. The wireless charging system uses electromagnetic induction to transfer energy from the charging pad, which is connected to the solar panels and power storage, to the EV's battery.

II. METHODOLOGY

Figure 1 shows the approach of the work. The Solar panels are devices that convert sunlight into electricity. They are made up of photovoltaic cells that absorb photons from the sun and release electrons, creating a flow of electricity.

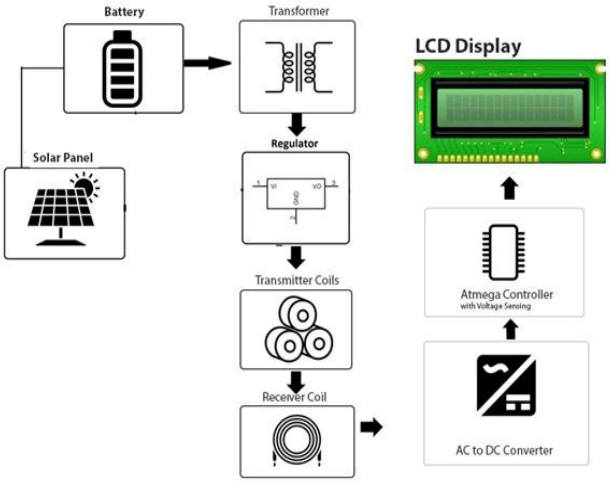

Figure 1: Block diagram of the approach of Solar Wireless Electric Vehicle Charging System

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.

III. IMPLEMENTATION

- Solar panels: The solar panels are the primary source of energy in the system. They convert sunlight into electricity, which is then stored in a battery.
- Battery: The battery is responsible for storing the energy generated by the solar panels. It provides a steady flow of power to the charging system, even when there is no sunlight available.
- Charge controller: The charge controller is responsible for regulating the flow of power from the solar panels to the battery. It ensures that the battery is not overcharged or discharged, which can damage it.
- Inverter: The inverter converts the DC power generated by the solar panels and stored in the battery into AC power, which is compatible with the electric vehicle's charging system.
- Wireless charging pad: The wireless charging pad is where the electric vehicle parks to recharge its battery. It uses electromagnetic fields to transfer energy from the charging system to the vehicle's battery, without the need for physical cables.

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The system makes use of a solar panel, battery, transformer, regulator circuitry, copper coils, AC to DC converter, Atmega controller and LCD display to develop the system. The system demonstrates how electric vehicles can be charged while moving on road, eliminating the need to stop for charging. The solar panel is used to power the battery through a charge controller. The battery is charged and stores dc power. The DC power now needs to be converted to AC for transmission. For this purpose, we here use a transformer.

The power is converted to AC using transformer and the regulated using regulator circuitry. This power is now used to power the copper coils that are used for wireless energy transmission. A copper coil is also mounted underneath the electric vehicle. When the vehicle is driven over the coil's energy is transmitted from the transmitter coil to EV coil. Please note the energy is still DC current that is induced into this coil. Now we convert this to DC again so that it can be used charge the EV battery.Once As we are using non-renewable sources of energy, fuels such as coal, petrol and diesel will soon disappear. Future transport infrastructure will be limited. As a result, we choose electric vehicles for mobility. Greenhouse gas emissions from vehicles are increasing due to current fuel technologies and gasoline engines [6].

Plug-in for the electric vehicles is used to create environmentally friendly transportation and reduce greenhouse gas emissions to some extent. The adoption of PEVs is rapidly increasing, although there are some problems with batteries, such as slower charging, insufficient energy storage capacity, size and weight [1]. New technology is presently provided for the growth of EVs and overcome battery-related issues. Many consumers have not adopted BEVs as a priority due to charging issues [8].

The concept of a Wireless Power Transfer (WPT) system is initiated and developed to alleviate the problems related to batteries, greenhouse gas emissions and to solve the problem of magnetic field radiation [10]. Since customers can go further by charging their electric vehicles, many charging stations have been installed along the roads. This eliminates the need for a high-capacity battery and replaces it with a smaller battery, making the battery lighter [1].

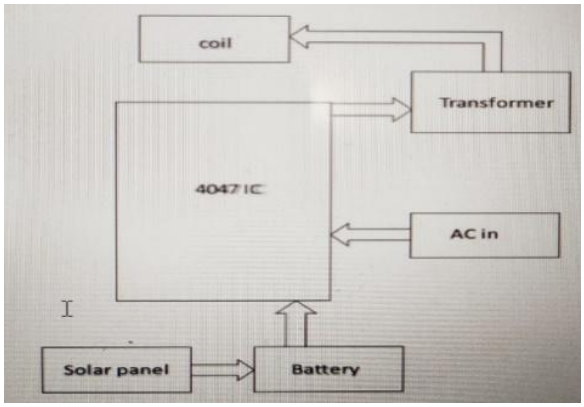

Figure 3: Block Diagram of Project

IV. RESULT

The system makes use of a solar panel, battery, transformer, regulator circuitry, copper coils, AC to DC converter, Atmega controller and LCD display to develop the system. The system demonstrates how electric vehicles can be charged while moving on the road, eliminating the need to stop for charging [15]. The solar panel is used to power the battery through a charge controller. The battery is charged and stores dc power. The DC power now needs to be converted to AC for transmission. For this purpose, we here use a transformer

The power is converted to AC using a transformer and regulated using regulator circuitry. This power is now used to power the copper coils that are used for wireless energy transmission. A copper coil is also mounted underneath the electric vehicle. When the vehicle is driven over the coil's energy is transmitted from the transmitter coil to ev coil. Please note the energy is still DC current that is induced into this coil[16]. Now we convert this to DC again so that it can be used to charge the EV battery. We use AC to DC conversion circuitry to convert it back to DC current. Now we also measure the input voltage using an Atmega microcontroller and display this on an LCD display [17]. Thus, the system demonstrates a solar powered wireless charging system for electric vehicles that can be integrated in the road

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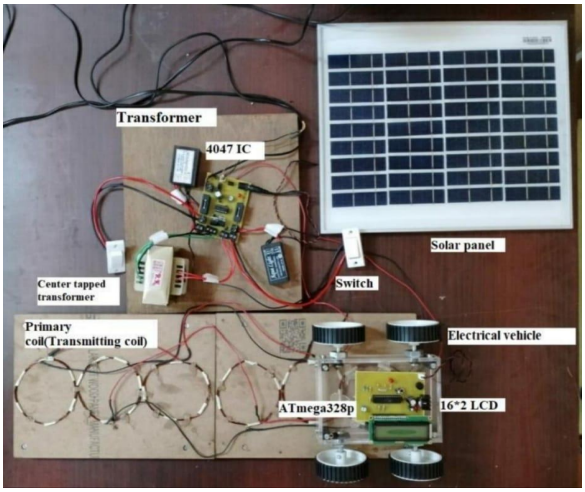

Figure 4: Charging of Electric Vehicle Using WPT

V. CONCLUSION

In conclusion, solar wireless EV charging systems offer numerous advantages over traditional EV charging methods. They are environmentally friendly, cost effective and easy to install and maintain. They also provide greater flexibility and convenience to electric vehicle drivers as they allow charging in locations that may not have access to the power grid. However, implementing solar wireless charging systems for electric vehicles requires careful planning and execution. A comprehensive feasibility study, site survey and system design are necessary to ensure the system is optimized for the intended use. In addition, choosing the right technology and methodology can help ensure the success of the project

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