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Solar Wireless Electric Vehicle Charging System

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Abstract: *This research paper proposes solar wireless electric vehicle charging system Electric vehicles (EVs) have recently improved in terms of performance and range. There are many models on the market, and the number of electric cars on the road is growing rapidly. While current EVs are mostly charged via wires, companies like Tesla, BMW and Nissan have started developing wireless charging EVs that don't require large wires. The wireless connection (inductive) is not a physical connection, but effectively avoids the consequences of plugging and unplugging. In addition, wireless charging opens up new possibilities for dynamic charging - charging while driving. When implemented, the driving power of the electric car will not be limited and the need for battery capacity will be minimized. This was the first and it spread all over the world, mainly in England, Germany and South Korea. This article provides an informative review of wireless charging technologies for electric vehicles. describes and compares the main techniques of wireless charging such as charging topologies, coil design and communication. New ways to use superconducting materials in coil construction to charge more energy are explored and their effects on wireless charging are discussed. Additionally, health and safety issues related to wireless payment and related systems are covered. Economically, the costs of various wireless charging systems are also noted and compared.*

Keywords: Battery; Micro Controller; Embedded System; Transformer; Microprocessor; Electric Vehicle

I. INTRODUCTION

Electric vehicles have now hit the road worldwide and are slowly growing in numbers. Apart from environmental benefits electric vehicles have also proven helpful in reducing cost of travel by replacing fuel by electricity which is way cheaper. 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 coils 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 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. Thus the system demonstrates a solar powered wireless charging system for electric vehicle that can be integrated in the road.

II. MOTIVATION

The motivation for this research paper is to tackle two main issues 1) Long charging time - takes 1-3 hours to charge. 2) Electric charging stations outside the city and in remote areas where there is no electricity. Here we have created an EV charging system that solves both of these problems with a unique and innovative solution.

III. OBJECTIVES

Purpose of this project

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Here we have created an EV charger that solves two problems with a unique solution. This electric car has the following advantages:

- Wireless charging of the vehicle
- No need to stop for charging, charges while the vehicle is walking
- Charges by solar energy
- No external electricity required
- Coils are inserted way to avoid wear and tear

IV. PROBLEM STATEMENT

Electric cars are now on the road all over the world and their numbers are slowly increasing. In addition to their environmental benefits, electric vehicles have also been shown to help reduce travel costs by replacing gasoline with cheaper electricity.

However, there are 2 main problems with EVs:

- Long charging time - takes 1-3 hours to charge.
- No electricity at electrical charging stations outside the city and in remote areas

V. METHODOLOGY

The methodology for a research paper based on wireless power transfer using copper coil and solar energy.

- Capacitive wireless power transfer technology can operate efficiently on many frequencies and does not require ferrite. Therefore, capacitive wireless power train equipment can be smaller, lighter, cheaper, more reliable, and easier to place on the road.
- Additionally, the capacitive transformer is more prone to non-linear situations than the inductive wireless transformer. This is because the electric field is always more directional than the magnetic field.
- In this way there are two pairs of conductive plates. One pair of conductor plates is sewn to the road and the other pair is mounted to the vehicle chassis.
- There is a large air gap separating the two pairs for wireless power transfer. The inverter converts the DC input voltage to a high frequency AC output. It is fed into the mating network to increase the AC output voltage.
- This allows the main power to be transferred with a small current, increasing the voltage near the junction plate. Therefore, small areas are available. The second resonance matching network amplifies the current (low voltage) required to charge the EV battery.
- Also, the capacitive reactance of the connecting plate is reactively balanced by the two coordinates. Finally, the frequency generator connects the system to the EV battery.

VI. LITERATURE SURVEY

No.	TITLE	AUTHOR	ABSTRACT
1	SOLAR WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM	BRV Prasad, M Geethanjali, M Sonia, S Ganeesh	This paper describes the design of solar powered charging station for charging of electric vehicle describes design of solar powered charging station for charging of electric vehicle that solves the key downside of fuel and pollution. Electric vehicles have now hit the road worldwide and are slowly growing in numbers. Apart from environmental benefits electric vehicles have also proven helpful in reducing cost of travel by replacing fuel by electricity which is way cheaper. Well here we develop an EV charging system that solves with a unique innovative solution. This EV charging of vehicles without any wires, No need of stop for charging, vehicle charges while moving, Solar power for keeping the charging system going,
			The number of countries with electric vehicles on the road is

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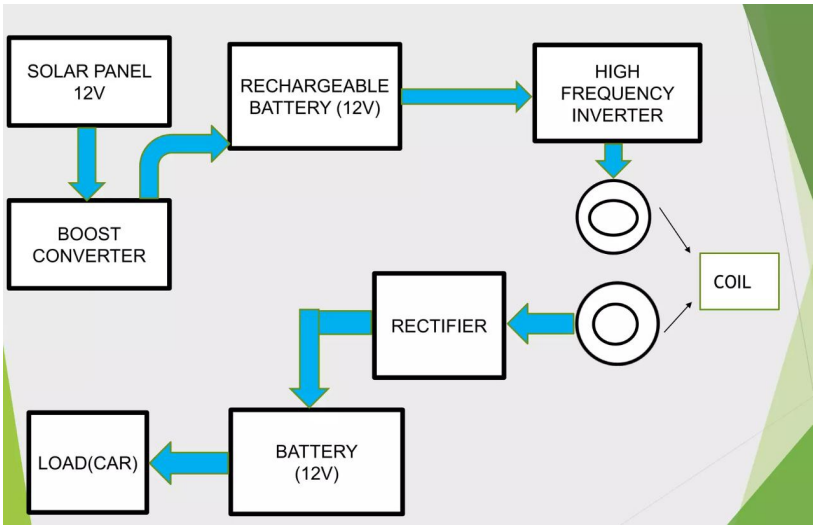
2	SOLAR WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM	Karim, Merazul Shafiq, Nahian Bin Zame, Tousif-ul Islam Hossain, MD.Sakib Shawon, Mehedi Azad	steadily rising. In addition to helping the environment, electric vehicles have proven useful in cutting down on transportation costs by substituting expensive fuel with much more affordable power. Here, we create a novel and effective answer to this problem by designing an electric vehicle charging infrastructure. There is no need to stop for charging because the EV can do so while it is in motion; the system is powered by solar energy; and there is no need for an additional power source.
3	**Wirelesschargingsystems for electric vehicles**	Muhammad Amjad , Muhammad Farooq-i-Azam	Electric vehicles require fast, economical and reliable charging systems for efficient performance. Wireless charging systems remove the hassle to plug in the device to be charged when compared with the conventional wired charging systems. Moreover, wireless charging is considered to be environment and user friendly as the wires and mechanical connectors and related infrastructure are not required. This paper reviews the methods and techniques used for wireless charging in electric vehicles. First, the general techniques for wirelesspower transfer are described and explained
4	An Overview of Solar-Powered Electric Vehicle Charging in Vehicular Adhoc Network	Farooque Azam, Neeraj Priyadarshi, Harish Nagar, Sunil Kumar & Akash Kumar Bhoi	With the rise of EVs, the demand of charging has necessitated the inclusion of renewable energy sources to supplement the grid. Intelligent transportation system (ITS) provides safety and comfort to the connected vehicle. Design of charging strategy to obtain optimal energy utilization poses the challenge to the researchers when both electric vehicle (EV) and charging stations are considered together in vehicular ad hoc network (VANET). Here, we first introduce the VANET environment in which the communication between EVs on the road, road side unit (RSU), and a traffic server takes place. Then, the overview of solar PV integration with grid to meet the demand in peak hour has been discussed.

VII. SYSTEM ARCHITECTURE



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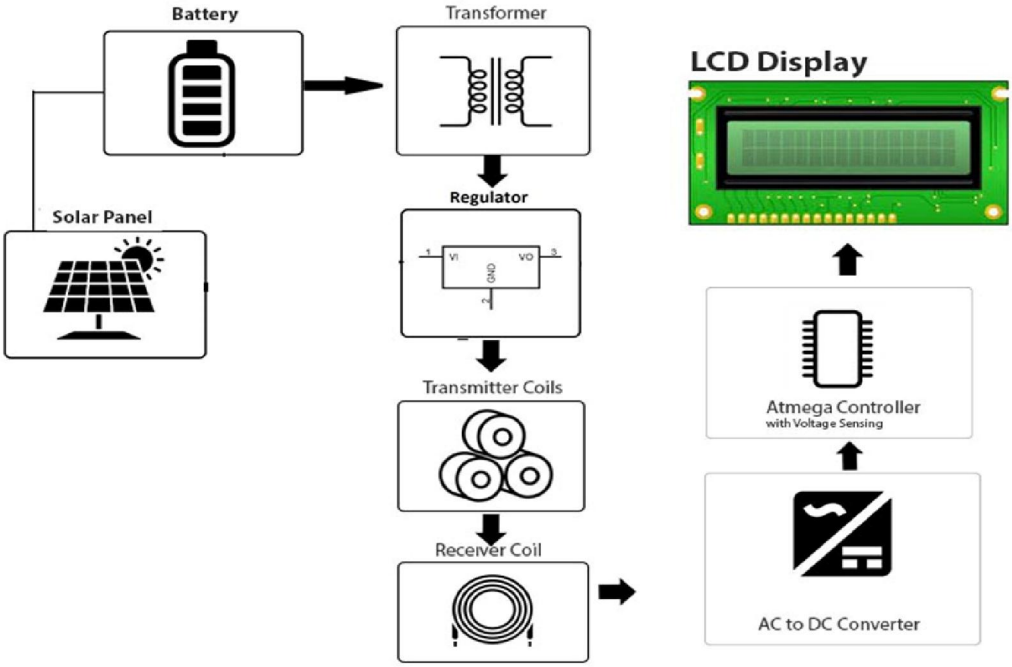
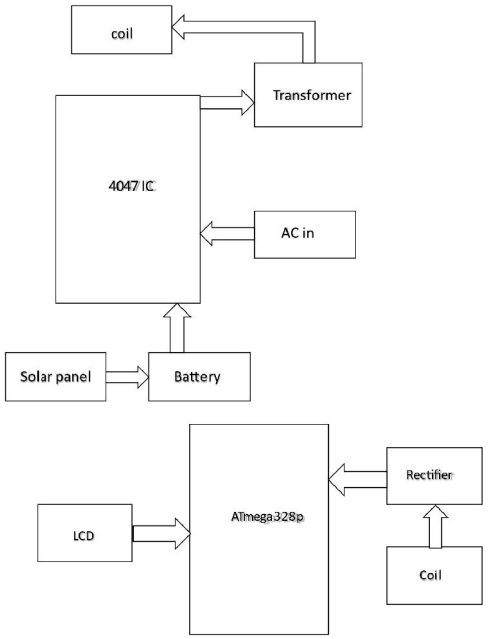
VIII. FRAME DIAGRAM



IX. BLOCK DIAGRAM



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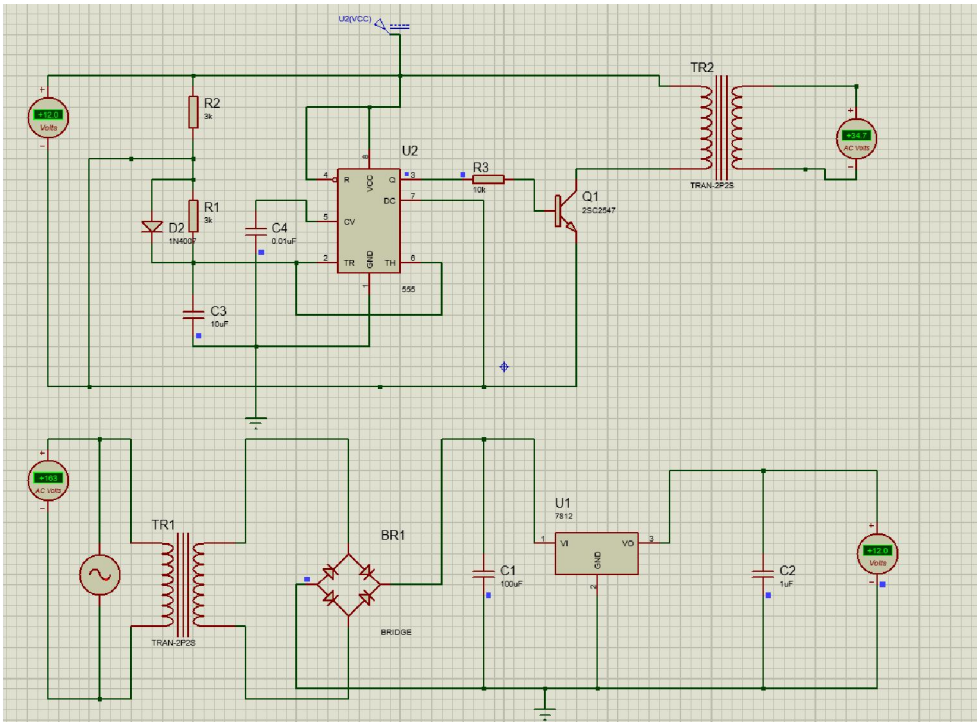
X. CIRCUIT DIAGRAM



XI. TOOLS FOR DEVELOPMENT

11.1 Software Requirements Specification

- Arduino

11.2 Hardware Requirements Specification

- RECTIFIER
- FILTER
- VOLTAGE REGULATOR
- TRANSISTOR
- LED
- 1N4007
- RESISTOR
- CAPACITOR
- Atmega 328p
- 4047IC
- Coil
- Rectifier
- 16*2 LCD display

XII. ADVANTAGES

- Wireless charging of vehicles without any wires
- No need to stop for charging, vehicle charges while moving
- Solar power for keeping the charging system going
- No external power supply needed
- Coils integrated in road to avoid wear and tear

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XIII. RESULT

Power is converted to AC using a transformer and controlled using an electronic regulator. Electric current is used to power the copper used for wireless transmission. A copper coil is also placed under the EV. When the car is driven on the steering wheel, the power is transferred from the transmission to the electric steering wheel. Note that the power is still the DC current induced in this coil. Now we change it back to direct current to charge the electric car batteries.

XIV. ACKNOWLEDGMENT

It gives us great pleasure in presenting the preliminary project report on 'Solar Wireless Electric Vehicle Charging System. I would like to take this opportunity to thank our internal guide and TPO of our E&TC Department , Prof M.K. Bhosale provided all the help and guidance we needed. We are grateful to him for his kind support. His advice is very helpful

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