

Wireless Charging of Electric vehicle Using Solar Roadways

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Abstract— Majority of the world's current electricity supply is generated from fossil fuels such as coal, oil and natural gas these traditional energy sources face a number of challenges including rising prices, security concerns over dependence on imports from a limited number of countries which have significant fossil fuel supplies and growing environmental concerns over the climate change risks associated with power generation using fossil fuels .Solar power generation has emerged as one of the most rapidly growing renewable sources of electricity. Solar power generation has several advantages over other forms of electricity generation. We have designed solar roadways which harvest electricity using solar panels as a solar roadway. On which the electric vehicles are running using solar energy, which is being transferred from solar roadways using wireless power transmission concept and to make the thin wireless transmission protocol), renewable, ecofriendly

1. INTRODUCTION

The ultimate goal is to store excess energy in or along-side the Solar Roadways. This renewable energy replaces the need for the current fossil fuels used for the generation of electricity. This in turn to reduce the greenhouse gases by half. The Solar Roadways system would might at present cost about three times what it costs to install an asphalt road, but would be more durable more easily replaced in a modular fashion and able to pay for itself by generating more electricity than our economy can consume. At just 15% efficiency far below what is expected a 100% Solar Roadways enabled driving infrastructure would produce three times total electricity demand. There are additional benefits as well which is a built-in smart grid, major new investment and job creation the economic benefits

inherent in global leadership in building the most advanced clean energy infrastructure. Every dollar invested in renewable sources ultimately generates returns because the resource is not burned and lost. The roadways can also communicate with drivers, alerting drivers with visual messages to the presence of pedestrians in a crosswalk. The most important element of the Solar Roadways technology is that its power-generation capacity demonstrates the base load viability of renewable energy sources. Clean energy technology existence can power the entire countries economy and more. But the required is a commitment to major investment and incentives in building the infrastructure. If up-gradation is done with this technology we can create jobs and a clean energy boom, spurring private investment on a massive scale with relatively little extra cost. A solar roadway is a road surface that generates electricity by solar power photovoltaic cells. One current proposal is for 12 ft x 12 ft (3.658 m x 3.658 m) panels including solar panels and LED signage that can be driven on. The concept involves replacing highways, roads, parking lots, driveways and sidewalks with such a system.

Now-a-day the world facing the most serious problem is the energy demand. Instead of this we had various techniques for the generation of energy which should be hazardous to our environment. So we step into the Non-renewable energy which will be eco-friendly to our environment. Our main demand will be the fuels used in automobiles and it causes the major impact to our environment so we introduce the hybrid version of Non-renewable energy in the vehicle as electric vehicle which acts eco-friendly to our environment. We use both the combination of

wireless power transfer and the solar energy which helps us the user for non-stop driving. In an electric vehicle the battery is too tough to design due to its high energy density and power density. Now-a-days there are many types of batteries used in the instruments but the lithium-ion batteries gives the most suitable solution for the electric vehicles. Recently the Wireless Power Transmission has been a most effective topic in the transportation system. This paper starts with a basic concept of Wireless Power Transfer and it gives a brief overview of Wireless Power Transfer system and it includes the Magnetic induction principles, Existing and Proposed system, High frequency power output, Solar panel and some other issues like safety considerations. By introducing the latest achievements in Wireless Power Transfer we hope that this will achieve in all over the world.

2. LITERATURE SURVEY

Following are the some of the latest research on this topic till date:-

Alanson P. Sample has given the knowledge about the adaptation of the magnetically coupled circuits in the Electric vehicles [EV] and its efficiency in the power transfer wirelessly. C. Kainan and Z. Zhengming analyzed the spiral coil using the circuit which makes the process will be much efficient and will be suitable for the adaptation of different voltages. S. J. Gerssen-Gondelach and A. P. C. Faaij, analysed the battery stand by time will be the most important task in designing the Electric Vehicle because it will decide the standardization of the vehicle.

AUTHOR - YEAR	TOPIC	SUMMARY OF KEY RESEARCH
Alark A. Kulkarni 2013	“Solar Roadways”- Rebuilding our infrastructure and Economy	In developing countries instead of implementing the higher targets roads to be developed per day such countries can reduce the target and develop solar road so they could improve economy with infrastructure.
Ninsha Miriyam Raju, Anjana Gopi, Anju Rajan, Sibi Benjamin 2016	Electrical Vehicle On-Road Dynamic Charging System with Wireless Power	A wireless dynamic charging system can charge EV batteries while the vehicles are moving and thereby greatly extend their cruising range. There will be no need to go to a charging station and EV users will not experience any range anxiety wherever such

	Transfer Technology Using Solar	infrastructure is available.
ASST.PRO F.INGAW ALE P.K.DESH MUKH S.P.GAIK WAD A.S.AAWA LE S.K.	A Review on Solar Roadways	The concept of solar road technologies, developed by solar roadways. The proposed work of review of solar energy system and it require the development, of strong. Transparent and self-cleaning glass that has the necessary traction and impact-resistance properties.
N.UthayaB anu, U.Arunkumar, A.Gokulakannan, M.K.Hari Prasad and A.B. Shathish Sharma	Wireless Power Transfer in Electrical Vehicle by Using Solar Energy	The various technologies related to wireless power transfer system, which is used to avoid the flux leakage and short circuits occurred due to the cables. This will be helpful for those who are doing research in the area of wireless power transmission. The wireless power transmission is used to operate the cars with high efficiency and improve the quality parameters. This project is in the progress of generating power source through renewal energy.

3. SYSTEM DESIGN

3.1 BLOCK DIAGRAM

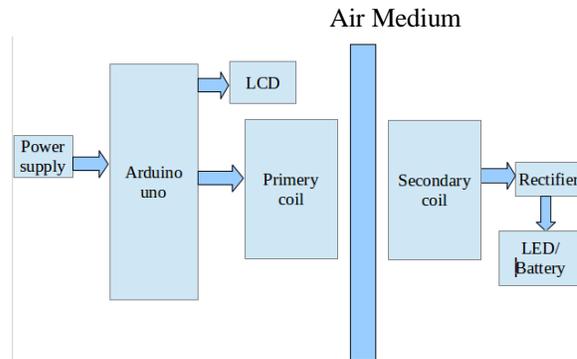


Figure3.1:- Block diagram of designed System

Block diagram consists of aurdino controller, LCD display, LED battery, power supply etc. Primary coil is fixed at solar panel which is used while formation of solar road. Secondary coil is fixed at the base of car moving on road. Whole setup works on the basis of wireless power transmission (WPT) Concept. LED will glow when energy us transferred from primary coil to secondary coil.

3.2 FLOW CHART

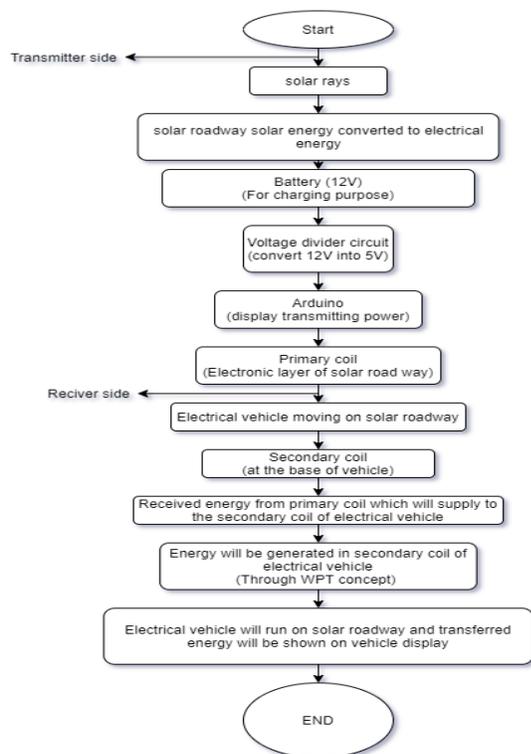


Figure 3.2:- Flow chart of designed system

4. PERFORMANCE ANALYSIS



Figure 4.1:- Practical setup of Designed System



Figure 4.2:- Primary coil placed on Solar Roadway

Figure 4.1 shows practical setup of designed system. Car is moving on solar road way made-up of solar plate. Primary coil is mounted on this roadway as shown in figure 4.2. Secondary coil is fixed at the base of car. This system works on the principle of wireless power transmission (WPT).

Solar energy is incident on solar roadway where solar energy is converted to electrical energy. Battery if 12V is used in this system which will store this energy. With the help of voltage divider circuit 12V is converted to 5V. The said voltage is supplied to whole circuit.

Whenever car moves on solar roadway and pass through primary coils fixed on solar roadway, energy is transmitted from primary coil to secondary coil through WPT Concept. With the help of this electrical energy, car will run on the roadway. Transferred energy will be displayed on the vehicle display.

5. ADVANTAGES, DISADVANTAGES & APPLICATION

5.1 Advantages

- Renewability and life-span
- Military and rescue assistance
- Lighting up of road

5.2 DISADVANTAGES

- Maintenance costs
- Seasonal efficiency
- Needs a town planning

5.3 APPLICATION

- Charge portable EV charging station
- Signal parking lots
- an intelligent, secure highway infrastructure that pays for itself.
- secure, decentralized, self-healing power grid.
- Snow & ice management
- Traffic management

6. CONCLUSION

In this paper, we are presenting the various technologies related to Wireless Power Transfer system, which is used to avoid the flux leakage and short circuits occurred due to the cables. This will be helpful for those who are doing research in the area of wireless power transmission. The Wireless Power Transmission is used to operate the cars with high

efficiency and improve the quality parameters. The system designed in this paper is in the progress of generating power source through renewal energy.

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