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WIRELESS CHARGING STATION WITH MODERN TECHNOLOGY FOR ELECTRIC VEHICLE AT PARKING AREA

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ABSTRACT

Wireless power transmission (WPT) is popular and gaining technology finding its application in various fields. The power is transferred from a source to an electrical load without the need of interconnections. WPT is useful to power electrical devices where physical wiring is not possible or inconvenient. The technology uses the principle of mutual inductance. One of the future applications finds in automotive sector especially in Electric Vehicles. This paper deals with research and development of wireless charging systems for Electric vehicles using wireless transmission. The main goal is to transmit power using resonance coupling and to build the charging systems. The systems deal with an AC source, transmission coil, reception coil, converter and electric load which are battery.

KEYWORDS: Wireless power transfer; Resonance, Inductance, Electric vehicles, High frequency converters.

INTRODUCTION

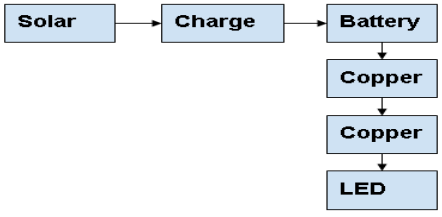
Mankind has been using automotive vehicles for transportation from one place to another. These vehicles use internal combustion(IC) engines to drive it. Due to the increased number of vehicles there is environmental pollution caused by IC engines and reduction in fossil

fuels. The latest innovations in the Automotive Industry are helping to improve fuel efficiency and reduce emissions. One such technological advancement is Hybrid vehicles which use both IC engines and electric motors to drive the vehicles or a car in simple words, helping to reduce the amount of emissions produced maintaining the performance of the engine.[1] However, in the future, the focus is on clean and green energy producing zero emissions. Design and manufacture of electric vehicles has led to major interest in current industry.[2] Since these vehicles run on battery the main drawbacks are high cost, short distance travel and long charging time. Consumers are constantly looking for a better solution to improve the travel efficiency. Hence wired charging systems were built at every gas station.[3] Wired charging also have some limitations like socket points, spacing occupied by the charging station, limited range of wire, vehicle has to change its orientation to connect to the charger.[4] These can be addressed by wireless charging systems for electric vehicles. This provides flexible and hassle free charging and also systems can be built at home, parking lot, garage etc.[5] Fig. 1 shows simplified diagram of car and wireless charging system implemented in automotive industry . Many wireless power transfer techniques are used to implement this technology.[6] These methods use coils to transmit power. Coil will produce a short range magnetic field, when a second coil is placed anelectric current will flow through it.[7] The magnetic field has transferred power from one coil to other called Induction. It is necessary to analyze these techniques based on the application to obtain optimumresults for the system to function correctly.[8] Table 1 shows different techniques with its advantages and disadvantages This work uses resonant coupling methods to achieve efficient power transmission.[9] The system is configured at the reasonable air gap based on the ground clearance of electric vehicle. This air gap is enough to provide good amount of coupling coefficient. The design of coils plays major role, factors like geometry, frequency and coil placement to deliver the maximum power with a uniform field distribution.[10]

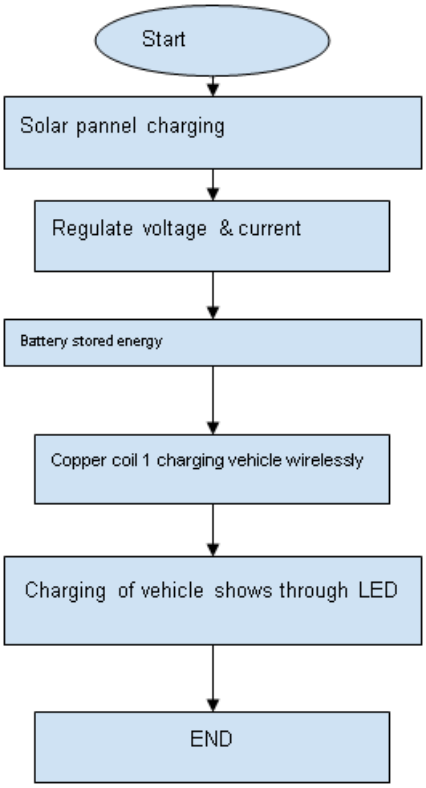
II. METHODOLOGY

Block diagram

The block diagram and flow chart shows the step by step block description and working of the Model.

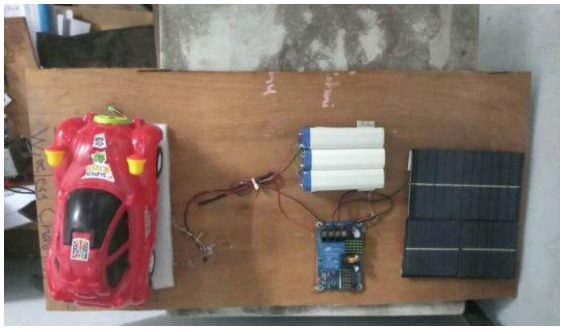


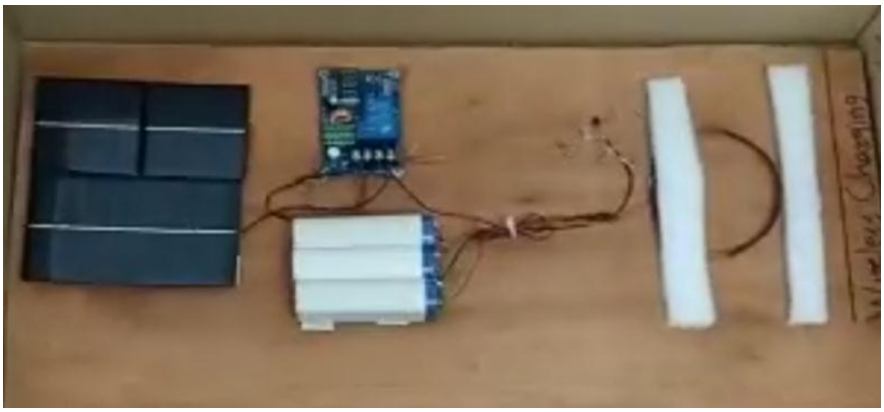
Flow Chart



III .Working

In this project the prototype model of wireless charging station with modern technology for electric vehicle at parking area has been build. The model consists of the solar panel of 5 w, charge controller circuit, wireless transmission circuit, 12 V lead acid battery, inductive coil and Light emitted diode for indication of charging of electric vehicle. The solar panel is placed at an angle of 30 degree in south north direction to extract the maximum power from the sun. This power is used to charge the battery which is connected in series. In between solar panel and battery charge controller is connected. The function of the charge controller is to protect the battery from overcharging and over discharging. When the battery gets overcharged the charge controller disconnect the supply form the solar panel and get connected when it is discharged. The battery energy is transferred to the inductive coil through wireless transmission circuit which is placed in the parking area. The two inductive coil has used for fast charging of the electric vehicle. When the vehicle park on the parking zone that is on the induction coil in the parking area the vehicle which is parked start charging. When the vehicle gets fully charged the indication of vehicle charging is shown by the indication that is placed on the vehicle itself by the LED display. The prototype model of the system is as shown in figure.





IV. RESULT

When the main DC supply applied the transmitter coi, it creates DC magnetic field that passes through receiver coil and this magnetic field move electrons in receiver coil causes DC Power output .This DC output is reflected and filtered to charge the EV's energy storage system.

V. CONCLUSION

This paper has dealt with Wireless Charging Systems for Electric Vehicle Batteries. An Inductive Power Transfer (IPT) system for an E-bike battery charging has been designed and assembled. The target is to build a prototype of toy car charging. After the magnetic design of the IPT coils, the electric model of the coupling structure has been gained and acquired from an electronic simulation tool, in order to complete the design of the whole system. From the experimental results, 79 % coupling efficiency for an about 100 W level arises. A magnetic characterization of the region surrounding the assembled prototype has been made as well

VI. Future scope

Based on the policy guidance and technologies that spring up. This section is supported to envision the future wireless WEVC, Nowadays global EV inventories expanding vigorously. Under the trend of industrial prosperity to potential orientation in WEVC consist of how to

guarantee a sustainable growth of EVs ownership and how to allow full play of scalable development of EVs, Moreover, arising new technologies material and theories could make WEVC even more competitive. The research and advancement in Power electronic device can lead to advance and fast charging features in WEVC. Flux leakage switching loss is another major source of energy waste in a WEVC.

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