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Wireless Power Transmission for Electric Vehicle

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Abstract

Road transportation is majorly used transportation. Usage of car is drastically increased and the need for the petrol and diesel are increased. Now days due to this effect implementation of electric vehicles was started in our country. At a public parking facility, only electric vehicles (EVs) that are parked at dedicated parking spaces with charging points can enjoy charging services. Installing a charging point at each parking slot is very expensive.

As an alternative, this project proposes the novel idea in public transport facility, only electric vehicles (EVs) that can drive at dedicated with wireless charging path which can enjoy charging services. Installing a wireless charging path (WCP) as electric vehicle service road (EVSR). Laying EV service roads will be efficient for charging the EVs wirelessly while traveling. Charging mechanism of vehicles is done via WPT which reduces the requirement of cables, reduce the waiting time for also has generating system based on solar energy.

Keyword: Wireless charging path, Electric vehicles, Solar panel

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I.INTRODUCTION

The first wireless power transfer (WPT) via electrostatic induction means was demonstrated by Nikola Tesla over a century ago.

Now days electric vehicles are started increasing rapidly, this increase in EVs created crisis in the charging process. To overcome this crisis wireless power transmission (WPT) can be used. But the Dynamic wireless power transmission is more efficient and time saving than Static wireless power transmission.

By introducing WSN in dynamic charging the electric vehicles can charged in an efficient manner.

In this dynamic charging process the vehicle moving in the service road can be charged, were here the service road act as the charging station. In this electrical vehicle service road, the WSN act as a communication/interaction between the electric vehicle and the service road for the charging process to occur. And automatically gets the amount/money for the charging percentage by the EVSR system operation from the vehicle.

II.EXISTING SYSTEM

In the existing system, charging module is installed under slots of vehicle parking in public places. The drawback of this system is that an EV can only be charged when it is parked at a dedicated location which is installed with a charging point.

First, an electric vehicle must leave the dedicated parking slots immediately after being charged, so that the charging point can be used to serve another EV. This may not happen all the times.

Second, with increasing EV penetration, all parking spaces may require installation of charging point. This will increase the cost of providing charging infrastructure which may not be utilized 100% of the time.

III.PROPOSED SYSTEM

To overcome the drawbacks in the existing system, the proposed system reveals an automated mobile charger for EVs. When an electric vehicle is traveling in the electric vehicle service road (EVSR), request for charging the signal is sent from the slot to charger path road through wireless sensor network (WSN).

After receiving the signal by the charger via WSN it will check the vehicle information and the payment it will start charging if not it won't charge, the charger begins to charge EVs battery.

At the same time, EV checks the capacity of the factory of battery using voltage sensor. If the capacity of the battery is increased by 100%, EV sends a signal to charger through WSN to halt the charging process. The payment is done automatically based on the units has been taken.

IV.OPERATION

The operation of the dynamic power transmission process involves to section. First section is the charger hub section, here in this section the power transfer for the electric vehicle can be operated by a switch with the help of WSN module to connect with the car that comes in contact with the electric vehicle service road.

In this charger hub we can use various energy resources for the input power supply. Here we used solar power supply as the input power source.

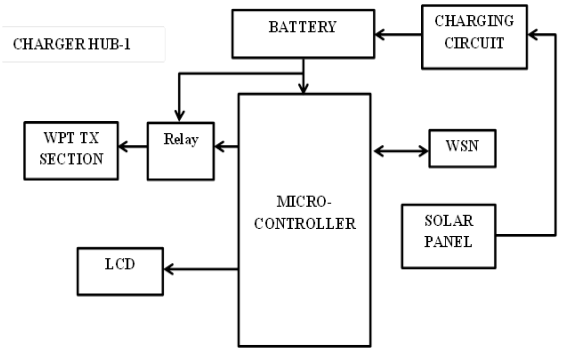

Figure.1 Charger hub-Charging Battery

And the next section is the electric vehicle section, in this section the power produced from the charger hub is transmitted through the TX coil and received to the EV section through RX coil and produced/stored in the electric vehicle. And the money can be automatically calculated and paid by the owner. And this whole process is done with the help WSN module.

The centre unit of control is microcontroller which drives the DC motor as specified with in the limit.

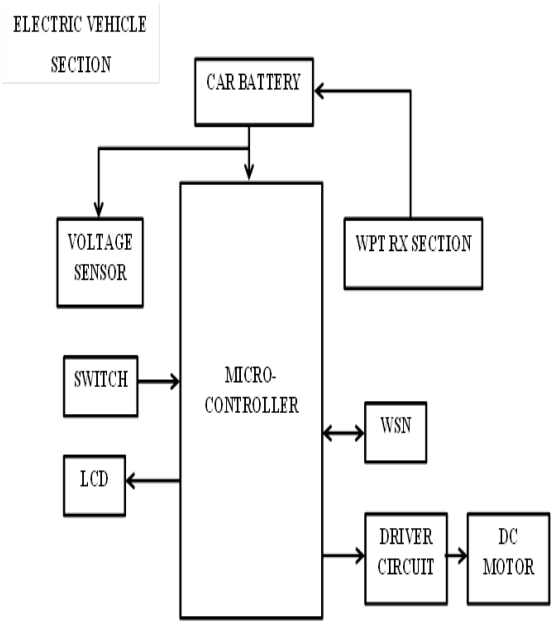

Figure.2 EV controlled by microcontroller

V. HARDWARE COMPONENTS

Table.1 Panel Specification

COMPONENTS REQUIRED	SPECIFICATION
WSN Module	WSN 4510
WPT Module	IEC61980
SOLAR PANEL	3WATT IN-3P
DC MOTOR	12V, 52.24W
VOLTAGE SENSOR	Zmpc101B 170640, 0-25V
LCD	Power supply +5v,

VI.SOFTWARE USED

- ZIGBEE Module
- Embedded C

ZIGBEE

- ZIGBEE is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used for wireless networking. It is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power wireless M2M networks. ZIGBEE (CC2500) is a low cost true single chip 2.4 GHz transceiver designed for very low power wireless applications.

- The RF transceiver is integrated with a highly configurable baseband modem.

Figure.3 ZIGBEE unit

VII.BENEFITS

- It saves time for the charging of electric vehicle in the electric vehicle service road.
- It does not need a separate space/spot for the charging to occur, were the service itself act as the charging pad.
- It is more efficient than the static charging method.
- External resources can serve as the input power supply for the charging hub section.

VIII.CONCLUSION

The project presented a dynamic wireless charging system that comprises a wireless charging system and a wireless communication system. The wireless communication system enables the system to function as the ZIGBEE and provide energy without human intervention.

The inverter, using a loosely coupled transformer, satisfies the ZVS condition, which provides the charging system with high efficiency at an optimum coupling coefficient through the design method. Therefore, we utilize this method to calculate the maximum distance between two devices which helps in charging process between electric vehicle and the service road.

And after the conditions are met for the power transfer process the electric vehicle gets charged and the amount can be collected for the considerable amount of charging.

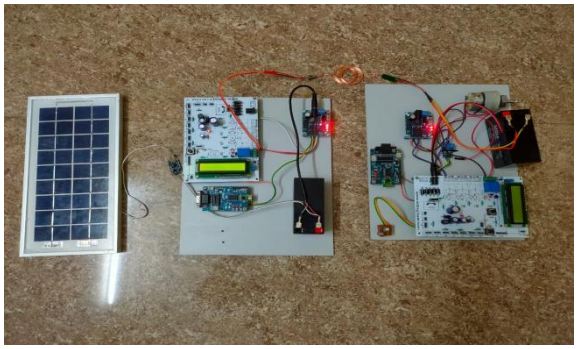

Figure.3 Hardware Implementation

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