WIRELESS CHARGING LANE & STATION FOR E-VEHICLE

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ABSTRACT

In this system, an inductive wireless charging lane for electric vehicles and battery swapping/charging station is introduced. In recent years, under the background of global warming, electric vehicles (EVs) using clean energy are getting more attention among the developed and developing countries, since they can help reduce the emission of carbon dioxide. However, the traditional electric cable charging for EVs brings up some problems. For instance, EVs have to be parked in the charging stations equipped with electric chargers with cables in order to get powered and it usually takes at least a couple of hours to get full charged. To avoid the limitation of position and time, the wireless power transmission (WPT) is proposed for an alternative solution for EVs charging. Through inductive coupling effect, EVs can be charged continuously as long as they drive along the roadway, under which coupled coils are laid. The basic WPT system only consists of two coils, one connected to a load while the other connected to a source. In addition, most of the research only discusses about the structure of either the single transmission coils or single receiving coils. In the efficiency of wireless power transmission of inductive coupled coils is calculated in the condition of vertical and horizontal deviations. The complete system is smart and internet connected so user and the owner can easily monitor or track the system using Web application.

Keyword : *Wireless charging, electric vehicle, FEA*

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1 INTRODUCTION

In recent years, under the background of global warming, electric vehicles (EVs) using clean energy are getting more attention among the developed and developing countries, since they can help reduce the emission of carbon dioxide. However, the traditional electric cable charging for EVs brings up some problems. For instance, EVs have to be parked in the charging stations equipped with electric chargers with cables in order to get power demand it usually takes at least a couple of hours to get full charged.

In the present scenario carbon emission due to conventional IC engine vehicles has increased drastically. The electric vehicles(EV) have captured the attention of many developed and developing countries since they reduce carbon emission and effectively global warming. However, the traditional cable charging has some constraints such as EVs have to be parked and it takes at least two hours to completely charge the vehicle. In this system, charging of EV by wireless power transfer (WPT)is presented. Constraints of cables charging such as position and time are overcome by WPT. With the precipitous development of WPT technology, dynamic charging for moving electric vehicles became a reality. With the inductive coupling effect EVs can be charged without interruption. In many practical applications, multiple receiver and/or multiple transmitter configuration are of interest.

2. ARCHITECTURE AND DETAIL DESIGN

Our project is based on embed platform. The embed Software Development Kit (SDK) is an open source C/C++ microcontroller software platform relied upon by tens of thousands of developers to build projects fast. The embed Compiler is a powerful online IDE that is free for use with hardware implementing the embed SDK, and tightly integrated with the embed SDK and Developer Website. Under the hood, it relies on the industry standard ARM professional C/C++ compiler, pre-configured and tested to generate fast, efficient code without fuss.

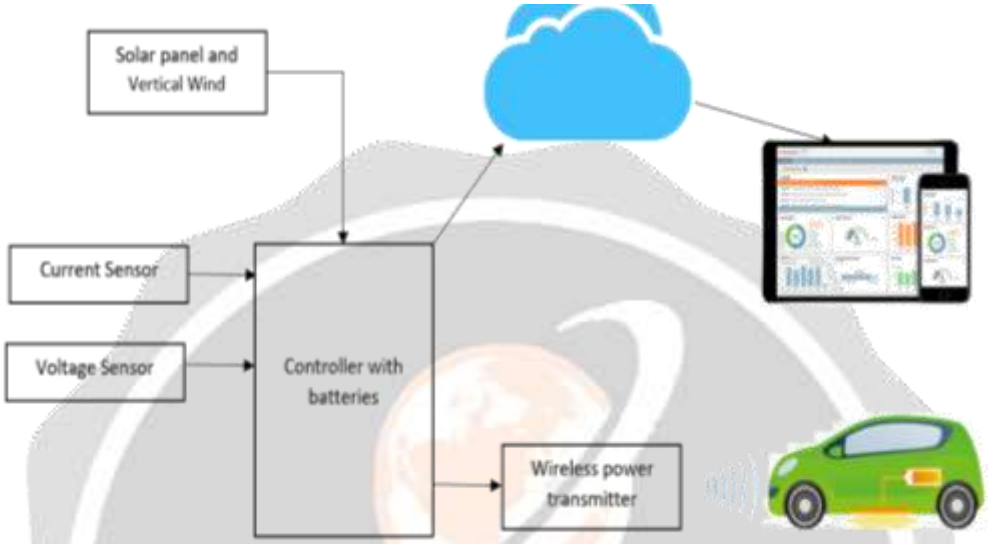

Fig : System Architecture

2.1 HARDWARE REQUIREMENTS

- ESP8266 Development Board (NODEMCU)
- inductive wireless charging module - transmitter
- inductive wireless charging module – receiver
- Vertical wind turbine
- Solar panel
- Voltage and current sensor
- Li-on batteries
- Cables and connectors

Fig . Snapshot

2.2 SOFTWARE REQUIRED

- Programming Language – C / Python / LUA
- Cloud – AWS, AZURE, FIREBASE
- Web Application – HTML, CSS, JS, JQuery, AJAX, Bootstrap.

3. OVERALL DESCRIPTION

The proposed system is device that generates the energy from solar panel and vertical axis wind turbine when vehicle passes and store that energy into batteries. Any electric vehicle can be charged on this electric vehicle charging lane.

3.1 PRODUCT FUNCTIONS

1. Generates energy from solar panel and vertical axis wind turbine.
2. Multiple vehicle can be charged at same time.
3. Health status as well as location can be monitored over internet.

3.2 USER CLASSES AND CHARACTERISTICS

In our system have mainly two users, first is the owner of electric vehicle and second the manufacturer of electric vehicle charging station.

Owner of electric vehicle: the owner or driver of electric vehicle can search nearest charging station on website and charge a vehicle at charging station.

Manufacturer or owner of charging station / lane: These are the persons or companies who setup a electric vehicle charging station. These user can monitor the health of charging station/Lane from remote place.

3.3 OPERATING ENVIRONMENT

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4. CONCLUSIONS

In this system, a simple prototype of wireless charging lane will present and through the experiment, it is showing that this lane can provide a scale-down model with wireless power transmission for EVs, which makes the idea of charging-on-the-way into reality preliminarily. Because of low transfer efficiency, future work focuses on the optimization of the wireless charging lane. In addition, some control strategy can also be introduced into the proposed system. For instance, coils will not be powered until the vehicle is detected by position sensors.

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