PROJECT REPORT

ON

ELCTRIC VEHICLE SMART CHARGING STATION

Submitted

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CONTENT

ABSTRACT

Electric vehicles (EVs) are becoming increasingly popular in many countries of the world. EVs are proving more energy efficient and environment friendly thanICEVs. But the lack of charging stations restricts the wide adoption of EVs in theworld. As EV usage grows, more public spaces are installing EV charging stations.On the other hand, if EVs are charged via existing utility grid powered by fossil fuel-based generation system, then it affects the distribution system and could not be environmentally friendly. As magnetic field has potential to generate theelectricity from tesla coil, the charging of EVs from magnetic Induction would bea great solution and a sustainable step toward the environment. This project presents a comprehensive analysis of smart EV charging systems and deployment of biofriendly vehicles in the world. Analytical methods were proposed to obtain information about EV charging behavior, modes of chargingstation operation, and geolocation of charging station users. The methodology presented here was time- and cost-effective, and very helpful to the researchersand students in this field.

So, with help of this project want to make theadvance EV power charging station.

CHAPTER – 1

INTRODUCTION:

In the whole world electricity transfer from power station to everywhere is through wire. Wireless power transfer technology can potentially reduce or eliminate the need for wires and batteries. Wireless transmission is useful to power electrical devices where interconnecting wires are inconvenient, hazardous, or are not possible.

Wireless power transfer technology reduces the use of electric wire which is made of copper and aluminium metal. The metal which are used to make electric wire will be extinct in future. If we implement wireless power transfer technology the use of electric wire will reduce. It would be beneficial if in future, we can implement wireless power transfer technology to transfer power from power station to everywhere without the need of wire.

Autonomous vehicle fleets provide another compelling reason to deploy wireless charging. When there is no one to plug in, but the vehicle can drive itself to a charging spot, wireless charging becomes not a convenience but rather a necessity.

This paper reviews the application of magnetic resonance based wireless power transfer to the charging of electric vehicles. It includes an overview of the technology for this application, some performance data from a state-of-the-art system, a review of activities in standardization of the technology, and a discussion of some remaining challenges to widespread adoption.

CHAPTER -2

BATTERY STORAGE SYSTEM

In foreign countries, European and American are promoting the construction of electric vehicle charging facilities with direct or indirect preferential subsidy policies. By 2020, China is expected to construct more than 12,000 centralized charging and replacement power stations and more than 4.8 million decentralized charging piles to meet the charging demand of 5 million electric vehicles in China. It is self-evident that in the next few years, the global electric vehicles and supporting charging facilities will mushroom to usher in the golden age of their development. However, due to the aging of the charging line, the complexity of operation and the entanglement of the charging pile, the safety and user experience are greatly compromised in actual use.

Transition away from fossil fuel burning internal combustion engines has left somewhat of a gap between the high power demands of combustion engine applications and the power that battery technology is able to supply.

Specifically in current electric vehicles, the size of the battery is frequently determined by the maximum power handling requirement, rather than the minimum range that vehicle must be capable of between charges, making this component of the vehicle the most expensive individual part. Furthermore, continued high power charging and discharging of batteries is known to reduce their life span from around a few thousand cycles, to only hundreds. Conversely, supercapacitors are superb at high power handling, typically withstanding power loads up to 100times that of lithium based batteries, and importantly without damaging the unit or reducing its lifecycle, which is generally rated at a minimum of 500,000 cycles for existing commercial products.

Need of Wireless Charging System:

1. Charging process is simple and automatic.
2. It doesn’t require any human input.
3. It is small in size and compact compared to a wired system.
4. Compared to a wired system, it requires less space and can be installed underneath the surface.
5. As it does not have any contact, there are no exposed electric connections.
6. It can avoid electrocution risk typically arising from power cords.
7. Newer WPT designs are getting better in efficiency.

CHAPTER – 3

Wireless Power Transfer System

Wireless power transfer (**WPT**), **wireless power transmission**, **wireless energy transmission** (**WET**), or electromagnetic power transfer is the transmission of electrical energy without wires as a physical link. In a wireless power transmission system, a transmitter device, driven by electric power from a power source, generates a time-varying electromagnetic field, which transmits power across space to a receiver device, which extracts power from the field and supplies it to an electrical load.

The technology of wireless power transmission can eliminate the use of the wires and batteries, thus increasing the mobility, convenience, and safety of an electronic device for all users. Wireless power transfer is useful to power electrical devices where interconnecting wires are inconvenient, hazardous, or are not possible.

Advantages of Wireless power Transfer system:

1. Charging process is simple and automatic.
2. It doesn't require any human input.
3. It is small in size and compact compared to a wired system.
4. Compared to a wired system, it requires less space and can be installed underneath the surface.
5. As it does not have any contact, there are no exposed electric connections.
6. It can avoid electrocution risk typically arising from power cords.
7. Newer WPT designs are getting better in efficiency.

CHAPTER – 4

PRINCIPLE OF OPERATION

WORKING MECHANISM:

Wireless EV charging is based on Inductive Power Transfer (IPT) technology, which transfers power between two coupled coils; a primary coil at a wireless charger is connected to the electrical grid, while a secondary coil is located at the EV such that there is a reasonably air gap between them.

In such near-field charging technique, a transmitting coil of the wireless charger produces a magnetic field that transfers energy via induction to a nearby receiving coil of the EV. Some fraction of the magnetic flux generated by the transmitting coil that penetrates the receiving coil contributes to the power transfer. And the transfer efficiency depends on the coupling between the coils and their quality factor.

Mainly, there are **two types** of IPT for the wireless charging:

1. Static IPT is deployed when the vehicle is spotted in a parking lot.
2. Dynamic or Quasi-dynamic IPTs are deployed when the vehicle is either on move or a brief stop at the traffic red light respectively.

It should be noted that as the wired charging would be impossible while the EVs are in the motion, thus the WPT would be the only solution for the dynamic or quasi-dynamic charging.

Stationary Charging:

Wireless inductive EV charging transfers alternating current (AC) through a coil in the charging plate via a magnetic field to the car’s inductive ‘pick-up’.

A voltage converter in the car then turns the alternating current into direct current (DC) with, which in turn charges the battery pack.

A charging pad sits on the ground, connected to a wall-mounted power adapter. The car is parked over it. On the backside of the car there is a receiver when charger detects the receiver within range, it automatically starts charging**.**

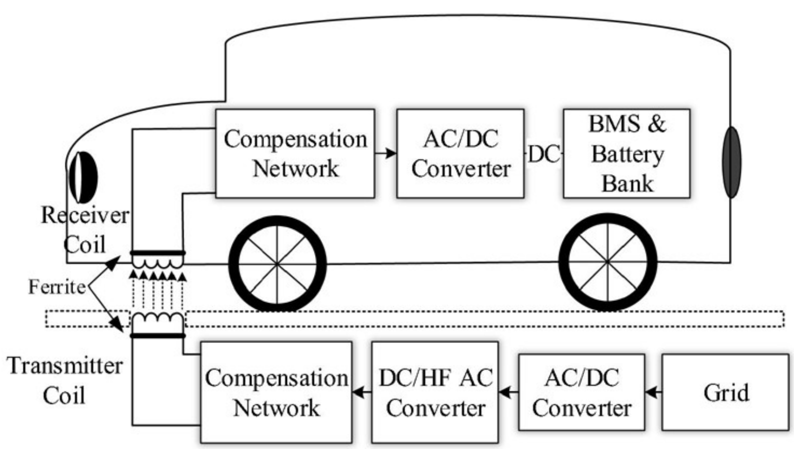
Dynamically Charging:

Similar to the Stationary charging system the EV's are charged through the resonant coil but, here the vehicle can be charged while moving on the road. A Charging Lane will be provided alongside the roads where the people can move to charge their vehicles while driving.

Dynamically charging system cannot be provided through wired system and their by the WPTs is required to provide this method of charging.

Every electric bus has a wireless charging receiver. According to Figure Wireless chargers are embedded in the hard surface of a road or under the road surface at regular intervals. When the bus is stopped no need to plug in or no need to connect with wireless chargers. It will automatically have charged. It's a motion bus. These kinds of buses are already tested in the UK, Italy, the Netherlands, and South Korea.

Block Diagram of Wireless Charging System



The basic operating principle of wireless charging is similar to transformer working. Wireless charging system consists of transmitter and receiver coils which is embedded with AC-DC and DC-AC converters. The AC mains from the grid is converted into high frequency AC and it is transferred through the transmitter coil which creates alternating magnetic field that cuts the receiver coil and receives the production of AC power output in receiver coil [1]. But the important factor to be considered here is that for efficient wireless charging, the resonant frequency has to be maintained between the transmitter and the receiver coil. To maintain the resonant frequencies, compensation networks are added at both sides of system. The AC power at the receiver side is rectified and filtered to produce stable DC, which is further utilized for charging the battery through BMS.

Fig : - INDUCTIVE WIRELESS POWER TRANSFER (IWPT)

IMPLEMENTATION ASPECTS

- The key challenge in Wireless power transfer system development which will allow the devices to broaden their range of possible applications and may open the door to the use of purely wireless systems for vehicles and other devices.
- Here this could be achieved when all the countries all over the world accept the Wireless power transfer system.
- Starting by the implement of the wireless charging points for vehicles to dynamically charging lane to charge the vehicle while moving.
- Electric buses are already tested in few countries like UK, Italy, Netherlands, and South Korea.

CHAPTER – 5

Future Plan of Action:

In future we can use electric appliances by using electricity without wire. In the below, discussing some potential scope of using wireless power transfer technology.

1. **Solar Power Satellite**: Satellite with solar panel is used to capture maximum amount of solar energy from the sun in the space.
2. **Wirelessly powered home appliances: In** future there will be a transmitting device inside home that will transmit power to all the home appliances.
3. **Wirelessly charging of electric vehicle on way:** In future there will be no need to stop and charge the electrical vehicles. On the way charging can be done.
4. **Universal power source in emergency.**
5. **Wireless Traction train:** In future train may get power wirelessly. There will be no need to connect the train with wire.

CONCLUSION

The electrification of transportation is underway and wireless charging is poised to play a significant role. Wireless charging systems provide a convenient hands-off method to charge electric vehicles at the same speed and efficiency as standard conductive AC chargers. A broad view of Wireless power transfer applications has been seen and wireless charging of Electric vehicles using WPTs technology and its types has been studied.

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