

An Overview of Charging System in Electric Car

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Abstract- From the view of greenhouse effect and usage of inefficient Internal Combustion engines, an transformation to the electric vehicles for the mode of transportation is required. A main drawback in the electric vehicles is the draining of the battery and the battery charging station. A different types of charging system is studied, by implementing in the automobiles the internal combustion engines will be replaceable.

Keyword: Inductive charging, solar powered electric vehicles, charging stations, MPPT.

I. INTRODUCTION

The Electric vehicle are the Eco-friendly vehicles, used for transportation. It is also called as EV. The electric car is an automobile that is propelled by one or more electric motors by using the energy stored in the rechargeable batteries. The first electric car appeared in mid-19 century, were high cost, low top speed and short range of battery lead to the decline of Electric car.

The electric vehicles are cheaper to maintain and does not emit the any carbon content to the atmosphere. In 21st century due to high emission of hydrocarbon content in the atmosphere, more requirement of the Electric vehicle occurred.

Generally the electric car consist of rechargeable battery, traction motor and battery management system. .



Figure1: Block Diagram of EV

The block diagram in the figure1 shows that a rechargeable battery which is powered by the supply from the grid by connecting a wire in between the power supply socket and the vehicle. A 3phase induction motor is used as a traction motor. The current is induced in an induction motor via a inverter, which controls the rotating speed of the induction motor (speed can be varied from 0-18000 RPM). Thus the inverter acts as a brain of the electric car. Where the synchronous speed is more that the rotor speed of the induction motor. The output shaft is connected to the wheel via a single speed transmission system. This is one of the major advantage when compared to that of the IC engines.

During the time of regenerative breaking the synchronous speed is less than the rotor speed of the induction motor. Hence the induction motor will act as a Generator.

The main drawback in this charging system is that the vehicle has to come back to the charging station to charge the battery.

A. Inductive Charging Of Battery

Inductive charging of electric vehicles is also called as wireless charging system. The wireless charging of the battery can reduce the size of the battery, reduces the amount of the cables and the power adopters.

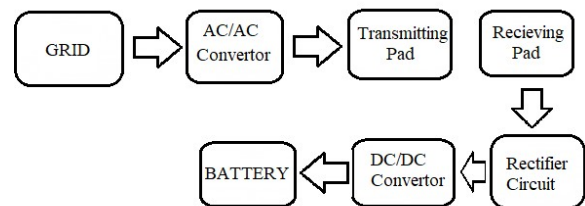


Figure 2: Inductive charging

The power delivering from a power source to an electronics device, without using a conductor the battery is charged. This is called as Inductive charging or Wireless charging of a battery. Here the power is transmitted from Transmitting Pad to the receiving pad by the process of Electromagnetic induction or magnetic induction.

The transmitting pad is laid on the ground, the power is fed from the grid through the AC/AC convertor. The receiving pad is mounted on the chassis of the vehicle. When the transmitting pad and the receiving pad is aligned, the current is induced in the secondary coil/ receiving pad. The receiving pad is connected to the rectifier circuit to get a DC output. To maintain a constant DC voltage level, the DC-DC convertor or a voltage regulator is been used. The rechargeable battery is charged with a constant DC voltage. Normally Lithium ion battery is used.

To overcome the problem of short range of battery, the transmitting pads are used in the Vehicle parking slots, domestic place, traffic signal junction etc., where the battery will be charged with in a small instant of time.

B. Solar Power System For Electric Vehicles

In solar powered system consist of solar panel, Maximum Power Point Tracking controller (MPPT) and Battery as shown in the figure3.



Figure3: Solar Power system in automobile.

In this system the solar panels is mounted on the top of the automobile(Car), throughout the day time the photovoltaic cell present in the panel will obtain the energy and battery will be charged with a constant voltage via a Maximum Power Point Tracking controller (MPPT). The MPPT will maintain a voltage of 13V then the output of the MPPT is fed to the voltage booster circuit

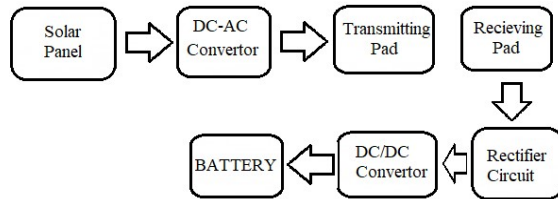


Figure 4: solar power system in the charging stations.

Similar to the inductive charging a solar panel is used in the place of power grids, that is, power is obtained from the solar power stations where the solar panels are stationary. The power from the solar panel is fed to DC-AC converters and it is given as an input to the transmitting pad.

The power from the transmitting pad to the receiving pad is transmitted to Magnetic Induction and the battery is charged.

II. CONCLUSION

In summary, the electric vehicles are more efficient and Eco-friendly when compared to that of the IC engine vehicles. In electric vehicles, the source required to charge the battery is very much vital. A passenger vehicle battery will be discharged as it travels, which is a major drawback in conductive type of charging. Whereas in inductive type, the battery will be charged in traveling itself i.e., by positioning the transmitting pad in traffic signal, parking slot etc. A solar energy, a renewable source of energy is most substantial for charging of the electric vehicles

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