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Wire less Charging Station free Energy Transfer

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Abstract *– This paper presents Electric vehicles are today's zero emission vehicular technology which are considered as the future of automotive industry. The batteries of the vehicles get charged in order to drive the vehicle. The methodology of charging the electric vehicle currently is through plug-in method where the charging station charges the battery of an electric vehicle. However, an alternative method for charging the battery of an electric vehicle is through Wireless Power Transfer where it can be as a Static or Dynamic charging systems. Static Charging System can be implemented to charge the batteries of the electric vehicles when the vehicle is parked in static mode. Dynamic Charging System can be implemented to charge when the vehicle is in motion. This method of wireless charging of electric vehicle is done through inductive power transfer where wireless transmission of power is achieved by mutual induction of magnetic field between transmitter and receiver coil. The state of the battery is monitored using Battery Management system (BMS).*

INTRODUCTION

Now a day's world is shifting towards electrified mobility to reduce the pollutant emissions caused by non renewable fossil fuel vehicles and to provide the alternative to pricey fuel for transportation. But for electric vehicles, traveling range and charging process are the two major issues affecting its adoption over conventional vehicles. With the introduction of Wire charging technology, no more waiting at charging stations for hours, now get your vehicle charged by just parking it on parking spot or by parking at your garage or even while driving you can charge your electric vehicle. Basic principle of wireless charging is same as transformer working principle. In wireless charging there are transmitter and receiver, 220V 50Hz AC supply is converted into High frequency alternating current and this high frequency AC is supplied to transmitter coil, then it creates alternating magnetic field that cuts the receiver coil and causes the production of AC power output in receiver coil. But the important thing for efficient wireless charging is to maintain the resonance frequency between transmitter and receiver. To maintain the resonant frequencies, compensation networks are added at both sides. Then finally, this AC power at receiver side rectified to DC and fed to the battery through Battery Management System (BMS).

1.2 Static and Dynamic Wireless Charging Based on the application, Wireless charging systems for EV can be distinguished into two categories, 1. Static Wireless Charging 2. Dynamic Wireless Charging 1. Static Wireless Charging As the name indicates, the vehicle gets charged when it remains static. So here we could simply park the EV at the parking spot or in garage which is incorporated with WCS. Transmitter is it ted underneath the ground and receiver is arranged in vehicle's underneath. To charge the vehicle align the transmitter and receiver and leave it for charging.

LITERATURE REVIEW

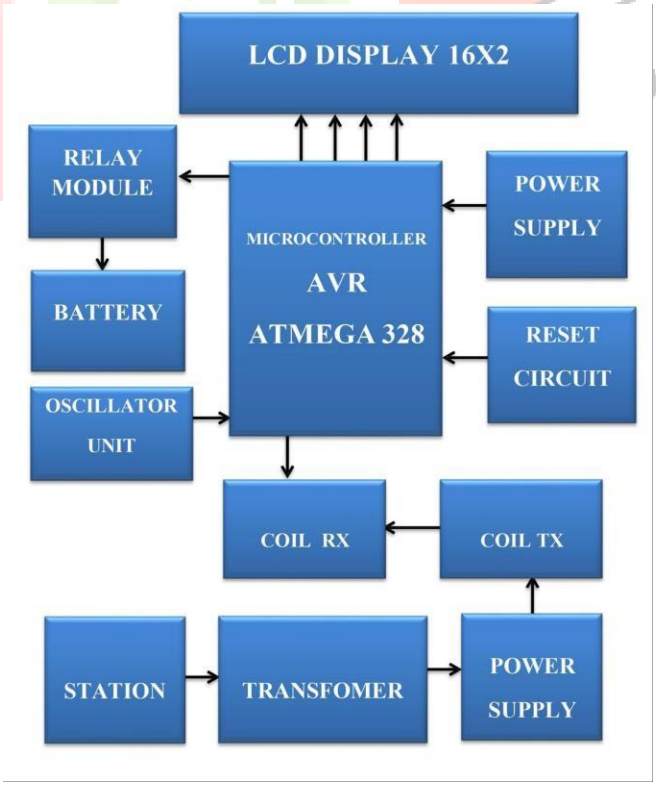
Now a day's world is shifting towards electrified mobility to reduce the pollutant emissions caused by non renewable fossil fuel vehicles and to provide the alternative to pricey fuel for transportation. But for electric vehicles, traveling range and charging process are the two major issues affecting its adoption over conventional vehicles. With the introduction of Wire charging technology, no more waiting at charging stations for hours, now get your vehicle charged by just parking it on parking spot or by parking at your garage or even while driving you can charge your electric vehicle. As of now, we are very much familiar with wireless transmission of data, audio and video signals so why can't we transfer power over the Air. Thanks to great scientist Nikola Tesla for his limitless amazing inventions in which wireless power transfer is one of them. He started his experiment on wireless power transmission in 1891 and developed Tesla coil. In 1901 with the primary goal to develop a new wireless power transmission system Tesla started developing the Warden Tower for large high-voltage wireless energy transmission station. The saddest part is to satisfy Tesla's debts; the tower was dynamited and demolished for scrap on July 4th 1917

The design of a solar charging station for electric cars is thoroughly explained, along with how it solves the two main problems of fuel and pollution. There are more and more electric cars on the roads today. Electric cars have proven to be effective in lessen the travel cost by switching from fuel to EV's, which is much less expensive, with the environmental benefits. However, in this case, we are developing a charging system for electric cars that provides a unique, solution. There are no cables involved, solar energy is used to maintain the charging system, and no external power source is required. The vehicles can be charged while they are moving. The development of the system involved the use of LCD Displays, batteries, solar grid, control circuits, primary and secondary copper coils, AC to DC converters, At mega processors and inverters. The system uses solar panel for power the battery through the charge controller, then the battery will store DC power. That DC power is converted into AC for transmission.

METHODOLOGY

Basic Overview The basic principle of IWC is Faraday's law of electromagnetic induction. Here wireless transmission of power is achieved by mutual induction of magnetic field between transmitter and receiver coil. When the main AC supply applied to the transmitter coil, it creates AC magnetic field that passes through receiver coil and this magnetic field moves electrons in receiver coil causes AC power output. This AC output is rectified and filtered to Charge the EV's energy storage system. The amount of power transferred depends on frequency, mutual inductance and distance between transmitter and receiver coil. In this system we have two main things i.e. transmitter & receiver coil. Initially we give power supply to the primary side of 12v with the help of adapter. This i/p is given to the regulator IC (7805) which convert 12v into 5v & give it to the microcontroller. Before that we used one diode just because by mistake we made wrong connections then diode will be in reverse bias and no current will flow through circuit which will protect the circuit from damage. Generally, diode is in forward bias. Then that input power is given to filter capacitor to remove hysteresis loss when it occurs. Also used storage capacitor to store the power & used it when we need excess power supply. Then there is a potentiometer which is used to control duty cycle. PIC 12F683 microcontroller is used. This microcontroller needs 5v constant dc supply which is given by the IC (7805). There are different resistors which are used to control the current flow. Pin 5 of the microcontroller is given to the transistor (BC 547) then 8v power supply is given to the MOSFET which will convert the dc current into ac & give it to the primary side coil that is transmitter coil. as current flows through it, flux generated in primary coil & According to the faradays law of electromagnetic induction, flux in primary coil cuts the secondary coil flux and EMF will induced in secondary coil also & we get ac o/p in secondary side which is pulsating. To convert it into pure ac again we used filter capacitor. Finally, this ac o/p is converted into dc with the help of bridge rectifier & fed to the battery of EV. We can also connect the external load to the receiving end of system if needed.

Block Diagram



RESULT AND DISCUSION

The system makes use of a battery, transformer, regulator circuitry, copper coils, AC to DC converter, At mega controller and LCD display to develop the system. The system demonstrates how electric vehicles can be charged while moving on road, eliminating the need to stop for charging. The solar panel is used to power the battery through a charge controller. The battery is charged and stores dc power. The DC power now needs to be converted to AC for transmission. For this purpose, we here use a transformer. The power is converted to AC using transformer and the regulated using regulator circuitry. This power is now used to power the copper coils that are used for wireless energy transmission. A copper coil is also mounted underneath the electric vehicle. When the vehicle is driven over the coil's energy is transmitted from the transmitter coil to EV coil. Please note the energy is still DC current that is induced into this coil. Now we convert this to DC again so that it can be used charge the EV battery. Once As we are using non-renewable sources of energy, fuels such as coal, petrol and diesel will soon disappear. Future transport infrastructure will be limited. As a result, we choose electric vehicles for mobility. Greenhouse gas emissions from vehicles are increasing due to current fuel technologies and gasoline engines. Plug-in for the electric vehicles is used to create environmentally friendly transportation and reduce greenhouse gas emissions to some extent. The adoption of PEVs is rapidly increasing, although there are some problems with batteries, such as slower charging, insufficient energy storage capacity, size and weight. New technology is presently provided for the growth of EVs and overcome battery related issues. Many consumers have not adopted BEVs as a priority due to charging issues. The concept of a Wireless Power Transfer (WPT) system is initiated and developed to alleviate the problems related to batteries, greenhouse gas emissions and to solve the problem of magnetic field radiation. Since customers can go further by charging their electric vehicles, many charging stations have been installed along the roads. This eliminates the need for a high-capacity battery and replaces it with a smaller battery, making the battery lighter.

Future Scope

Wireless electric car charging is a modern technology in which electric vehicles are charged without using physical cables. Energy is transferred through electromagnetic fields between a charging pad on the ground and a receiver attached to the vehicle. This technology has a very bright future because it makes charging easier, safer, and more efficient.

1. Smart Cities Development

Wireless charging stations can become an important part of smart cities. Charging pads can be installed in:

- Parking areas
- Traffic signals
- Highways
- Shopping malls

This will help electric vehicles charge automatically while parked or moving.

2. Dynamic Charging Roads

In the future, roads may contain wireless charging coils beneath them. Cars will charge while driving, reducing the need for large batteries.

Benefits:

- Longer driving range
- Less charging time
- Smaller battery size
- Reduced vehicle weight

3. Eco-Friendly Transportation

Wireless charging supports green energy and reduces pollution. It can be connected with:

- Solar energy
- Wind energy
- Renewable power grids

This helps create a cleaner environment and reduces dependence on fossil fuels.

4. Fully Automatic Charging

Future electric cars may park themselves and start charging automatically without human effort. This

technology is useful for:

- Self-driving cars
- Public transport
- Taxi fleets
- Delivery vehicles

5. Reduced Maintenance and Improved Safety Since

there are no physical wires:

- Less wear and tear
- Lower maintenance cost
- No electric shock risk
- Better performance in rain and dust

6. Faster and Efficient Charging Technology

Research is improving charging efficiency and power transfer speed. Future systems may support:

- Fast wireless charging
- High power transfer
- Long-distance charging

This will make wireless charging more practical for daily use.

7. Integration with Internet of Things (IoT)

Wireless charging stations can use IoT technology for:

- Smart monitoring
- Automatic billing
- Mobile app control
- Energy management

Users can check charging status in real time.

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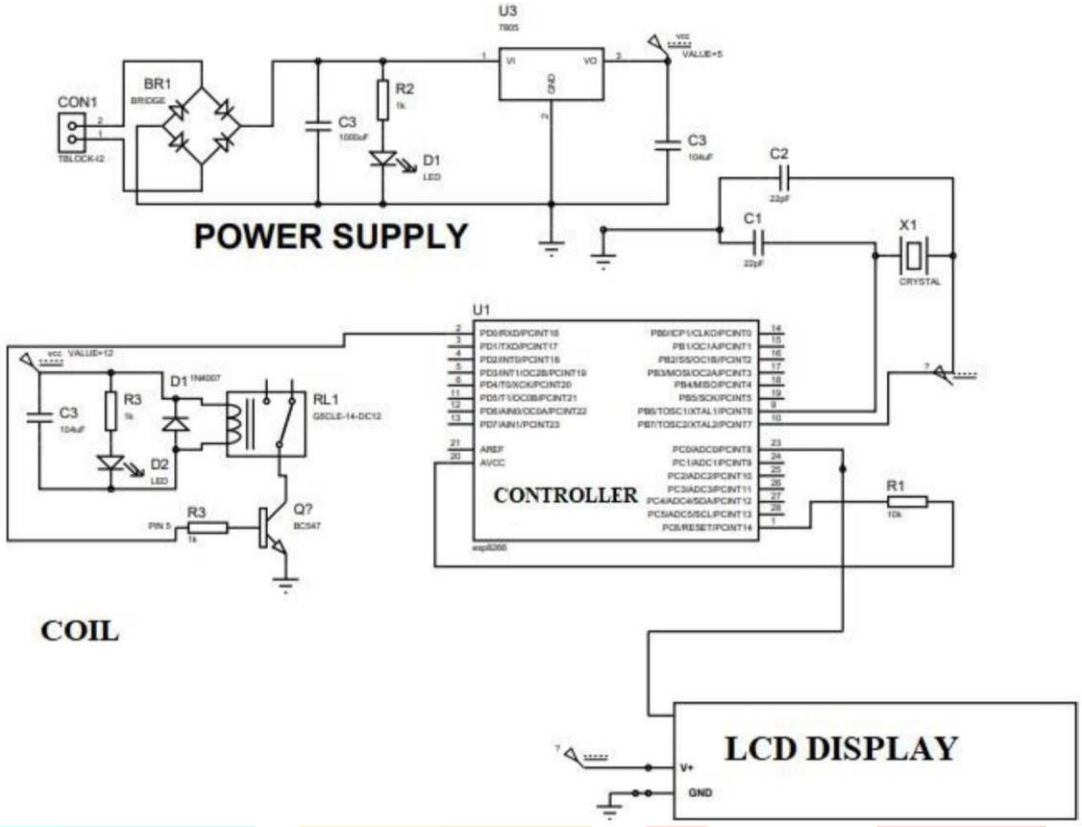

CONCLUSION

Wireless charging of electric vehicle has the potential to revolutionize the road transportation from the automotive industry. With the advancement of electric vehicle technology, wireless charging technique is expected to increase significantly by next decade. The main agenda of this paper is to give an overview of various wireless charging techniques out of which inductive wireless transfer has proven to be the best method of wireless charging. This paper also attempts to review about the application of static and dynamic wireless charging and how battery plays an important role in the electric vehicle. Here, the battery size is effected by wireless charging techniques which lowers the overall cost of the electric vehicle. The electric vehicle batteries which were to take quite a lot time to charge up to the rated value will be charged within less time comparatively as their battery capacity is reduced. However, simplicity and minimum driver intervention are key features that win out time-and time again and when these features are coupled with high power transfer efficiency, wireless charging of electric vehicle is a winning combination.

ADVANTAGE

Elimination of Physical Charging Stations: On-road wireless charging eliminates the need for conventional charging stations, offering a seamless and integrated charging experience.

Seamless Integration into Existing Roadways: The technology seamlessly integrates into existing road infrastructure, making it a feasible option for urban and highway environments.

Enhanced Convenience for EV Users: Drivers no longer need to plan pit stops for charging, as the vehicle gains power continuously while in motion.

REFERENCES

[1] Pinto, J. G. Bidirectional battery charger with Grid-to-vehicle, Vehicle -to-Grid and Vehicle-to -Home technologies, IEEE 2020.

[2] X. Zhou, S. Lukic, S. Bhattacharya, and A. Huang, “Design and control of gridconnected converter in bidirectional battery charger for plug-in hybrid electric vehicle application,” in Proc. IEEE Vehicle Power and Propulsion Conference (VPPC), 2019, pp. 1716.

[3] Bugatha Ram Vara prasad Deepthi n. Satyavati v. Satish Varma r. hema Kumar, “Solar charging station for electric vehicles,” Int. J. Adv. Res. Sci. Commun. Technol., vol. 7, no. 2, pp. 316–325, 2021, Doi: 10.48175/IJARSCT-1752.

[4] Irene-Maria Tabakis, MinasDasygenis and Magda Tsolak, 2017 Panhellenic Conference on Electronics and Telecommunications (PACET) “A monitoring system for people living with Alzheimer's disease”

[5] R. Das, K. Thirugnanam, P. Kumar, R. Lavudiya, M. Singh Mathematical modeling for economic evaluation of electric vehicle to smart grid interaction IEEE Trans Smart Grid, 5 (2020), pp. 712-721, 10.1109/TSG.2013.2275979

[6] K .Kumar, K. V. V. S. R. Chowdary, P. Sanjeev Kumar and R. Prasad, "Analysis of Solar PV Fed Dynamic Wireless Charging System for Electric Vehicles," IECON 2021.

[7] R .Kavin, D. Arvind, S. Dhanush, D. Ajay and K. Karpaganathan, "Dynamic EV Charging by Wireless Power Transfer," 2022

[8] M. A. Al Mamun, M. Istiak and K. A. Al Mamun "Design and Implementation of A Wireless Charging System for Electric Vehicles" 2020 [9] P. Lopes, P. Costa and S. Pinto "Wireless Power Charging on Electric Vehicles" International , 2021.