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On Road EV Charging System

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***Abstract* - Contactless Power Transfer (CPT) systems are applicable for charging electric vehicles (EVs) without any physical interconnection. These systems can be installed on roadways in order to charge the vehicles while driving. The implementation of such on-road charging systems in order to extend the driving range and decrease the EV battery size is investigated in this paper. The percentage of road that should be covered and the power transfer capability of the system are estimated. Some design considerations, such as the distribution and the length of the CPT segments over the road, are explained. Finally, the total power demand for all the passing-by vehicles using the system is calculated and the possibility of powering the EVs directly from renewable energy sources is discussed.**

Keywords: electric vehicles, charging electric vehicles, contactless power transfer, on-road charging, inductive power transfer, driving range extension, wireless charging.

I. INTRODUCTION

It is expected that 500 million electric vehicles (EVs) will be on the roads by 2030 [1]. The technology and infrastructure for charging of electric vehicles will be the key enabler for this mobility transition. EV charging facilities will be required at homes, workplaces, shops, recreational locations and along highways. The EV charging power has to be provided by the distribution network at low cost, with minimal reinforcement and at maximum reliability. Large penetration of EV can lead to increase in the peak demand on the grid and possible overloading of distribution network assets [2], [3]. Secondly, the current electricity grid is mostly powered by fossil fuels like coal and natural gas [4]. When EVs are charged from such a grid, a large part of the emissions are merely moved from the vehicle to the power plant. This makes EVs not truly green as one would expect. Hence it is important for the future that EVs are charged from sustainable sources of electricity like solar or wind [5]–[8]. At the same time, EV can play a decisive role with their ability to act as controllable load and as storage for the grid with fast response. Charging infrastructure for electric vehicles will be the key factor for ensuring a smooth transition to e-mobility. It is here that five technologies will play a vital role in the EV charging infrastructure: smart charging, vehicle-to-grid (V2G) technology, charging of EVs from photovoltaic panels (PV) contactless charging and on-road charging of EVs. The goal of this paper is to review these five technologies, provide examples of their implementation and recommendations for the future through the wireless link. The microcontroller validates and then perform specific task on the device.

II. METHODOLOGY

Electric Road Systems (ERS) include dynamic power supply to the vehicles from the streets they are driving on. The vehicle is installed with a battery pack to enable it to run in the absence of Electric Road System. As the battery pack is optimized for shorter range, both the expense and weight of the battery pack can be minimized with electric roads, it is conceivable to charge numerous vehicles simultaneously. Decrease of required battery capacity may be to the extent of 80%, which is further associated with advantages such as reduction in cost, materials assets and waste management.

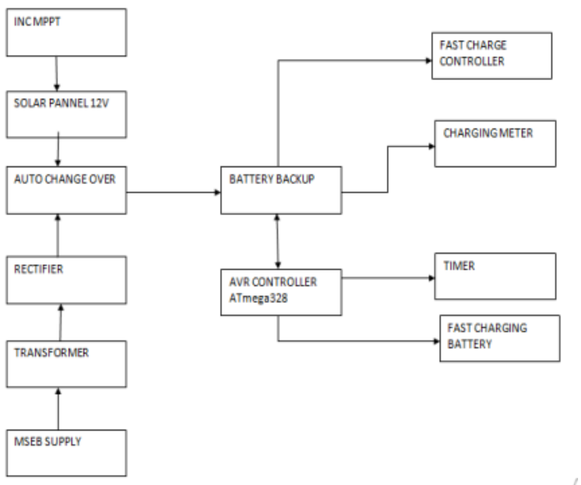

Figure 1: System Architecture

1. PV panel: The photovoltaic process converts energy from sunlight to electricity. We use low volume PV panel for our charging station.
2. Charge controller: The charging controller is a system capable of moving supply in one direction only, which means that the supply provided in the PV panel at night is small. The supply is then flows from high voltage to low voltage, and the voltage from the battery can be reverse flow to the PV side, which can beprevented with the use of the charging device. We

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use 10A/12V power charge controller for our loading station.

3. Transformer: The MSEB supply is supplied to the step-down transformer that can turn the voltage down. We step down the voltage by 12V, 10A for our Charging Station
4. Rectifier: The step-down voltage is provided to the rectifier that converts the voltage of the AC to DC. The rectifier level for our charging station is up to 10A.
5. Auto Change over Unit: Supply from PV panel & supply from rectifier is provided to auto-change over turn, the supply stability can be retained. We may use any one supply according to requirement.
6. Battery Bank: The battery bank is supplied by Auto Turn Over Unit. The supply is transferred to the inverter when the battery bank is filled. If all supply (MSEB & Solar) is disrupted, the battery bank is used here, so it offers backup security for supply
7. Inverter: We use AC charge controller based on micro-controller so we need AC supply, so the inverter is used to convert DC supply to AC supply. The inverter supplies the Load Controller with an ac.
8. Transformer: AC supply is required to step-down; the step down transformer for each charge controller is used for that purpose.
9. Circuit Breaker & Relay Circuit: The relay circuit detects the system fault and sends the circuit breaker warning. The circuit breaker breaks the circuit & provides device security
10. Charge Controller: The charge controller based on a microcontroller used to control the supply of charges. When EV charging has stopped it trips the supply. For charge controller we use a separate classification to charge each EV car.
11. Timer: Timer can have precise time period estimation to determine how much time an Electric Car takes to charge.

III. CONCLUSION

Our project's main objective is to make an electric vehicle battery fast charging and smart controlling. In this device we used the strategy of hybrid power supply to keep the supply continuous. We will also install the battery safety control package which will monitor the battery's safety. It also detects defective cells by controlling parameters of the cells. This program is always great for the climate, if there are many EV's sold in the region. As we know India is a country with a huge network of highways. Unless country wishes to improve EV's success, it needs as many charging stations as possible to be built. Installing charging station is much faster, and good deployment experience would definitely boost existing network status.

REFERENCES

[1] www.nsgm.gov.in/sites/default/files/EV in India and its Impact on Grid.

[2] Hengbing Zhao, Andrew Burke, ”An intelligent solar powered battery buffered EV charging station with solar electricity forecasting and EV charging load projection functions,” 2014 IEEE International Electric Vehicle Conference (IEVC), December 2015, pp. 1–7.

[3] Yongmin Zhang, Lin Cai, ” Dynamic Charging Scheduling for EV Parking Lots With Photovoltaic Power System,” 2017 IEEE 86th Vehicular Technology Conference (VTC-Fall), 2017, pp. 1–2.

[4] G.R.Chandra Mouli, P.Bauer, M.Zeman, “System design for a solar powered electric vehicle charging station for workplaces,” Applied Energy Volume 168, 15 April 2016, pp. 434–443.

[5] S. Akshya, Anjali Ravindran, A. Sakthi Srinidhi, Subham Panda, Anu G. Kumar, ” Grid integration for electric vehicle and photovoltaic panel for a smart home,” 2017 International Conference on Circuit ,Power and Computing Technologies (ICCPCT), April 2017.

[6] Gautham RamChandra Mouli, Peter Vanduijsen, Tim Velzeboer, Gireesh Nair, Yunpeng Zhao, Ajay Jamodkar, Olindo Isabella, Sacha Silvester, Pavol Bauer, Miro Zeman, ” Solar Powered E-Bike Charging Station with AC,DC and Contactless Charging,” 20th European Conference on Power Electronics and Applications (EPE’18 ECCE Europe), 2018, pp. 1–10.

[7] Wajahat Khan, Furkan Ahmad, Mohammad Saad Alam, ”Fast EV charging station integration with grid ensuring optimal and quality power exchange,” International Journal of Engineering Science and Technology, 2017.Volume 22, Issue 1, February 2019, pp. 143–152.

[8] www.pluginindia.com/blogs/bharat-ev-specifications-for-ac-and-dccharging-everything-you-need-to-know

[9] www.heroelectric.in/optima-1/

[10] Mukesh Singh, Praveen Kumar, Indrani Kar, ” A Multi Charging Station for Electric Vehicles and Its Utilization for Load Management and the Grid Support, ” 2013 IEEE Transactions on Smart Grid, 2013, pp. 1026– 1037.

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