

Study of Different Topologies for Fast Charging Strategy for Electric Vehicles

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Abstract: Indeed, even with the present advances in high innovation, the notoriety of vehicles (electric) stays restricted and it is unfit to turn into a standard mode of transportation. The fundamental justification behind this is on the grounds that the battery pack's streams or limits, like its cumbersomeness, high weight (weighty), and gradualness accused of a short life expectancy and high poisonousness risk.

Among them are - because of these issues, slow charging speed becomes the main variable to consider. When it comes to purchasing an electric vehicle there are a couple of interesting points. In this manner, different charging procedures should be completely examined to track down the proper solution to these issues. In the present serious battery charging strategy, numerous charger makers guarantee to have the option to charge the batteries in just 1 hr or less. Different charging techniques, like consistent voltage, steady current and beat the charge, have been researched and contrasted all together with the augment the exhibition. Charging time changes relying upon the kind of battery pack.

Keywords: Lithium-Ion Battery: Inverter: EV: Smart Vehicle

I. INTRODUCTION

The change has begun in the energy interest due to further developing innovation all over the planet. With the effect of globalization, humankind has become more cognizant, and individuals turned out to be more inclined to earth energy sources rather than non-renewable energy sources. Plus, for transportation needs that are crucial for individuals, electric vehicles give eco-accommodating choices as opposed to petroleum product vehicles. At the point when these benefits are thought of, the electric vehicles (EV) are supposed to spread sooner rather than later.[1]

The prevalence of electric vehicles increased the importance of the studies made in this field. Mainly, for the more efficient and long-drive performance of EV's, the innovations in the inverter/converter and battery technologies boosted. Besides, important studies are performed on EV's charging technologies. Those studies show that the fast-charging stations designed for EV's cause an overload demand on the grid. In addition, there are some other studies on the interaction between the EV's and the grid in which the EV's are not only the load but also the source for the grid as a power supplier.[2], [3]

The charging of the EV's at different power levels is examined depending on the moving time, distance, and parking period. Also, an optimum power flow scenario is developed on the basis of a micro-grid structure that EV supplies building/grid loads.

II. LITERATURE OVERVIEW

Countless examinations managing EV charging applications have been introduced in the writing. The greater part of them center around the DC fast charger to settle one of the primary difficulties of EV charging time to expand the possibility of far reaching EV reception. The creators propose to construct level 3 chargers in working and shopping stopping regions to build EV use and client solace. Nonetheless, the level 3 charging mode incorporates direct current (DC) which furnishes fast accusing of high power limit.[4] Accordingly, DC fast charging adversely affects the lattice and causes voltage quality issues. The pinnacle request brought about by fast charging has issues particularly voltage strength, power quality, and transformer misfortunes, and activity life expectancy on the network. these sort of effects of charging stations on the power lattice in Bangladesh is dissected. Likewise, the DC fast charger produces sounds contortion in light of AC/DC redressing process and the music cause power quality issues on the matrix However, the planned charging and progressed charging system can further develop the heap profile and lessen this sort of impact a system model in which an accusing

estimating technique of twofold layer enhancement is utilized to diminish or potentially control voltage quality[5].[6] Moreover, high-power request is one more test for fast charging systems (FCS). Top interest builds the power cost and causes high charging costs. The energy stockpiling system (ESS) is proposed to decrease the charging cost of electric transports and electric trucks. ESS can assist with alleviating request charges and diminish top expense or low-use loads. There are additionally various ideas to address FCS challenges. In one of them, a construction of a mixture charge station provided by photovoltaic (PV) sun powered chargers are proposed for the DC fast charging. In another review, both sun powered charger and framework provided electrical charging station system is dissected by thinking about the Netherlands' weather patterns. the measuring examination is finished for the fast charging system which looks at the battery size in light of the power pace of the sustainable sources in the system. [7] Likewise, the impacts of DC fast charging on the framework ought to be examined considering extraordinary conditions of public matrices and another review has dissected the impacts of the fast charging on the German power system], a DC fast charging system is proposed which comprises of PV boards and second-life batteries that are utilized in a streetcar line. The examinations in the writing show that PV boards are used as nearby energy assets to diminish the impact of the DC fast charging station on the lattice. Because of the failure of energy age of PV boards around evening time, it is liked to utilize a cross breed system that likewise incorporates energy capacity systems. As the PV boards are neighborhood energy hotspots for charging stations, the got yield power is reliant upon the board proficiency and the quantity of boards. The expansion in the quantity of boards is another test due to the limitation in the arrangement region. In this way, another option is required. [7]

III. CONTENT AND CONTRIBUTIONS

A. Consistent Current And Constant Voltage (CC-CV) Method:

By expanding the worth of the current utilized at the CC stage to diminish battery charging time, but enormous current could abbreviate the existence of the cell or cause hopeless damage[3]. A straightforward examination in view of a simple battery model like the one displayed in fig. Because of the interior opposition of the battery cell, the higher current outcome in higher misfortunes. These misfortunes principally appeared as a climb in cell temperature as described[4]. Subsequently, fast charging requires appropriate warm administration to keep the battery temperature inside its adequate working reach.[3]

One more key issue to consider while Fast charging is deciding the suitable opportunity to complete the CC phase of the charging system. An enormous current method a high voltage drop at the battery's inner obstruction, inferring that the phone's genuine voltage is still a lot underneath its most extreme. This prompt the CV stage to begin sooner than anticipated, extending the generally speaking charging time. Expanding the CC Stage time, then again, it might make the cell over voltage, which is an unwanted state.

Consistent Current And Constant Voltage (CC-CV) strategy has turned into a legitimate technique for battery charging, and utilizing another charger has turned into a successful one. Until the battery is completely energized a consistent current period in which a specific voltage likely exists. In which case both voltage and current reductions until full charge is committed.[8]

It is the conventional strategy for charging batteries, but it is restricted in Fast-Charging applications since battery polarization has turned into a worry. Regardless of being noticed, the Constant Current - Constant Voltage (CC-CV) technique was changed to incorporate various Constant Current (CC) stages. Proceeding to chip away at further developing battery charging. This strategy delighted offers huge enhancements in charging time, effectiveness, temperature, and slight improvement when contrasted with other charging techniques.[9]

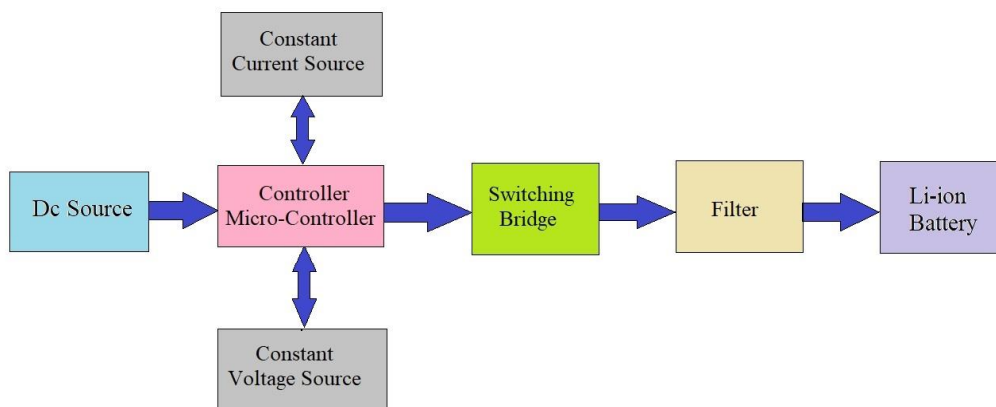


Fig.1 Constant Current and Constant Voltage

B.Pulse - Charging Method –

The beat charging technique is a typical Fast charging strategy for Li-particle battery packs in electric vehicles. Charge current is conveyed to the battery beats utilizing beat chargers. The charging rate (in light of avg. Current) can be precisely controlled by changing the beat width, which is typically around one sec.

A brief reprieve timespan of 30 milliseconds between beats during the charging system permits the compound cycles in the battery to be balanced out by looking at the voltage. The connection spreads all through the mass of the cathode restarting the charge.

This philosophy can likewise forestall the bothersome compound cycle, for example, gas creation, gem advancement, and passivation at the cathode surface. Right now, it is doable to charge the battery Faster while keeping away from gas damage.

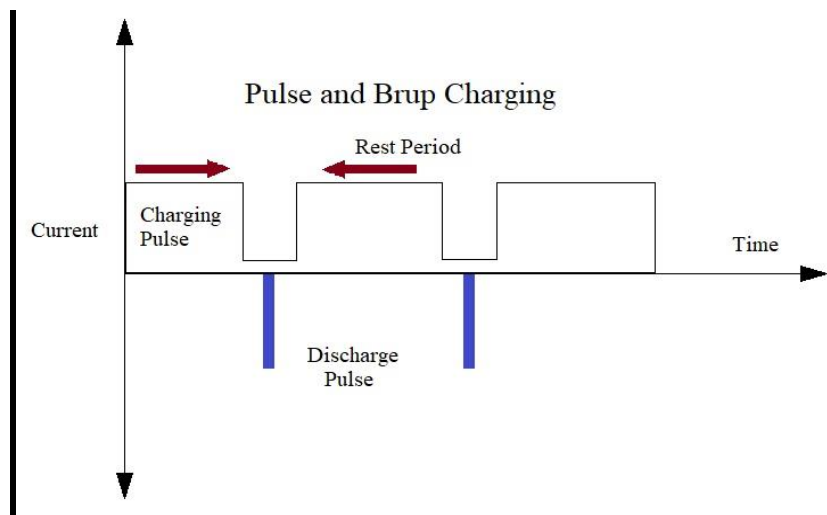


Fig. 1 A sample figure

IV. CONCLUSION

Fast charging for electric vehicles is reachable, be that as it may, the additional survey is supposed to improve the stream chargers accessible for more conspicuous efficiency. Later on, capable and safe charging for electric vehicles will be open. The warm organization should be the point of convergence of future surveys. It ought to be controlled comparably that the electric vehicle's inside can draw out the combination of high temperatures and Conduction of force. The technique and ventilation should be overall around planned to Improve the battery's show. As the temperature rises, the temperature increments, and the voltage level falls, achieving the battery's show is poor.

Various components that can make a battery to postpone down charging, for instance, the charging method, the battery inside hindrance, and scientific processes, require more investigation. We can remove them and redesign the charging system.

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