# MODELING AND SIMULATION RENEWABLE SOURCES BASED ELECTRIC VEHICLE CHARGING STATION CONTROLLING GRID WITH ANN CONTROLLER

**MANISHA. P 1*, Y. SHIVA KUMAR 2**

*1. M.Tech(PE) Student. 2. Assistant Professor*
*Dept of EEE, SRI SAI EDUCATIONAL SOCIETY'S GROUP OF INSTITUTIONS,*
*JNTUH, NALGONDA DISTRICT, TELANGANA, INDIA*

**ABSTRACT:**

The battery lifetime of an electric vehicle (EV) has significant impact on the development of EV. In this paper a method with Superconducting Magnetic Energy Storage (SMES) is used to improve the battery lifetime of EV. The SMES is stabilizing the EV charging system voltage to improve battery life and charge efficiency on a smart grid. To verify the influence of the controlled SMES improves the system transient stability, situations under load fluctuation and fault, and the SMES capacity for system compensation have been investigated. The results obtained from the analysis indicate the compensating instantaneous voltage dip in the grid and improving the power system quality. So SMES increasing the power quality and stability of the EV system. In extension we are using ANN controller to generate the triggering pulses. The ANN circuit will be control the input and outputs.

***Keywords: SMES, EV, ANN controller, BESS.***

## 1. INTRODUCTION:

The dawn from Electric Vehicles (EVs) is actually creating an extensive improvement in the auto sector. The variations in the production method, extra safety and security problems, and various needs for the components entailed, and also quickly have actually modified the technique the auto sector runs. These adjustments are actually additionally demonstrated in various techniques, including electricity sale, due to the fact that energy electronic devices possesses an essential task in both EV footing as well as electric battery charging procedures. Many researches on grip have actually been actually administered to supply lighter and also much smaller converters, smoother vibrant reaction, boost the productivity and also dependability from the devices, which are actually certainly not exceedingly far-off off the standard demands in a lot of electric motor disk treatments. The prompt demanding method from the electric batteries, nonetheless, signifies essential modifications along with regular high-power treatments due to the fact that, besides the motor vehicle, this procedure likewise entails the power network. On top of that, the low-voltage degrees from the electric battery loads improves the complication, as commonly these treatments need tool current (MV) degrees, thus establish a compromise in between the present tension from the shifting gadgets as well as the step-down attempt from the electric battery wall charger.

**ABOUT CONVERSION:** The condition EV is actually usually utilized to assign other car innovations, despite the fact that they possess some sizable variations. To make clear the principles made use of within this proposition the principal sorts of EVs on call today are actually determined as observes [1]: Crossbreed Electric Vehicles (HEV) This modern technology makes use of the electricity energy from electric batteries to enhance the gas productivity from their interior burning motor. The electrical energy to demand their electric batteries carries out certainly not arise from any kind of outside resource. Electric Vehicle (EV) These cars operate on a completely electricity motor which is actually powered through electric batteries. Refueling is actually carried out through connecting in the motor vehicle to the framework. The phrase electric battery EV is actually additionally utilized in the literary works for this style. Plug-in HEV (PHEV) As their title recommends, these motor vehicles may operate on fuel, just like the HEVs, as well as reenergize their electric batteries through connecting in the car to the network, much like EVs. The end result is actually enhanced steering variation as well as decreased gas use and also discharges. This argumentation is actually generally interested in EV modern technology, although the exact same guidelines put on PHEVs. Because of this, the rest this research specifically looks at the EV family members.

## 2. RELATED STUDY:

SMES is initially conceived as load leveling devices that is it is used to store energy in bulk and also to smoothening the utility's daily peak demand. In SMES, the electricity is stored by circulating a current in a superconducting coil. Because of no conversion of energy to other forms is involved, its efficiency is very high. SMES can respond very rapidly to absorb or receive power from the grid/load. Because of its fast response, SMES can provide benefit to a utility not just as a load-leveling device, but also for enhancing transmission line stability and power quality. So SMES can be viewed as a Flexible Transmission system (FACTs) SMES applications in Transmission Substation are; Transmission Stability, Voltage/VAR Support. Load Leveling. SMES applications in Generation System are; Frequency Control, Spinning Reserve, Dynamic Response The basic principle of SMES is to store energy in the magnetic field generated by a dc current flowing through the coiled wire. Magnetic field produces heat when normal wire is used for wounding the coil. The coil is a DC device, the charge and discharge are usually done through an AC utility grid, so a power conditioning system (PCS) is required as the interface. PCS can use a standard solid state DC/AC converter for transferring the power back and forth between the superconducting coil and load/grid. The PCS interfaces the superconducting magnet(DC) with the utility grid(AC).The DC/AC conversion is done using through inverter/rectifier composed of SCR and GTO arrangement with a specified duty cycle. The losses in PCS during idling and conversion are important for determining the plant efficiency. SMES system shows the difference depending upon the size and duty cycle. The core of the SMES is High Temperature Superconducting coil (HTS).Depending upon the size of application, the coil may be solenoid or toroid. Solenoid coil are much more cost effective for large SMES system.

## 3. PROPOSED SYSTEM:

The tremendous development in the entrance of electric vehicles (EVs), has laid the way to headways in the charging foundation. Availability between charging stations is a fundamental essential for future EV selection to lighten client's "range tension". The current charging stations neglect to embrace control arrangement, designation and planning administration. To enhance the current charging framework, information in view of constant data and accessibility of stores at charging stations could be transferred to the clients to enable them to find the closest charging station for an EV. The spotlights is on an intuitive client application created through stage to apportion the charging spaces in view of assessed battery parameters, which utilizes information correspondence with charging stations to get the opening accessibility data. The proposed server-based continuous gauge charging foundation abstains from holding up times and its planning administration productively keeps the EV from stopping out and about because of battery deplete out. The proposed show is actualized utilizing a minimal effort microcontroller and the framework decorum tried.

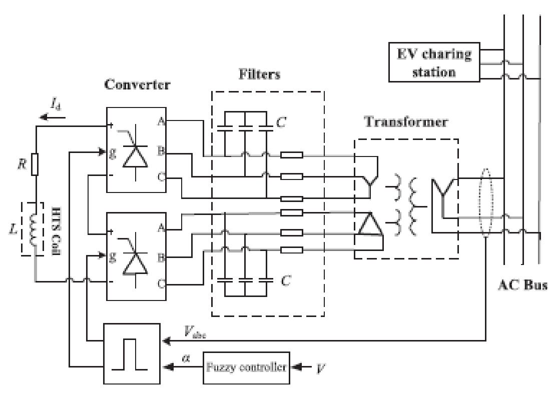


**Fig.3.1. Proposed system Block diagram.**

Lithium-ion batteries with high energy density are widely used in EVs. The Li-ion battery lifetime is an important factor, however, which limits the use by customers. The battery lifetime depends on certain factors, such as the number of charge/discharge cycles, the operation temperature, and the range of the charging voltage. In order to avoid damaging the battery and improve the battery life, the charging and discharging states of EVs must be strictly limited to 20%–80% of the nominal capacity. There is only one battery for every EV in the simulation to reflect the state charge characteristic of the Li-ion battery and analyze the impact of the charging load of EVs on a distributed power network. Assuming that there are 5 EV-charging-stations and 50 EVs in a certain area.

**4. SIMULATION RESULTS:**

When the number of EVs is 15 and the fault period is determined, the compensation effect of the voltage will be determined by the SMES capacity. The current upper limit is adjusted to accommodate different capacity SMES systems and the root mean square (RMS) voltage of the charger is shown in Fig. 4.1. When the capacity of the SMES unit is 10 kJ, for example, the relationship between the number of EVs and the compensation effect is shown in Fig.4.2. It is clear from the Figs.  and the that the SMES can reduce the voltage fluctuations due to the jump of the SG electromagnetic power when the fault occurs and recovers. From Figs, follows are obtained:

1) When considering the influence of the fault, the system with the SMES shows better stability than without SMES.

2) For a certain number of EVs, the greater the capacity of the SMES is, the better the compensation of the voltage drop will be.

3) If the capacity of the SMES is determined, the smaller the number of EVs is, the better the compensation effect will be.

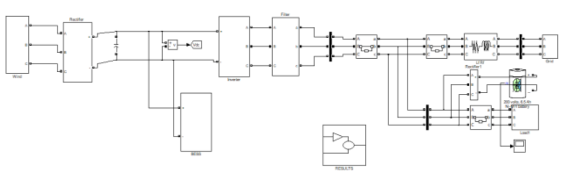

**Fig.4.1. Simulation circuit.**

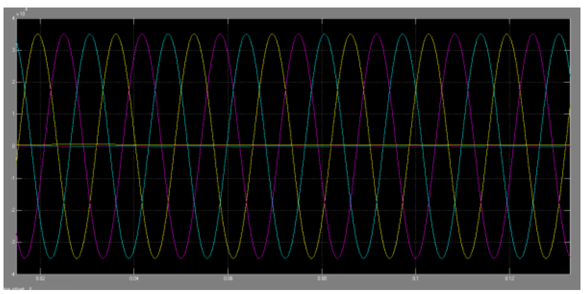

**Fig.4.2. Output results.**

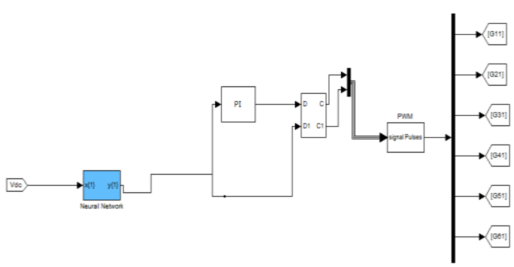


**Fig.4.3. ANN circuit with controller.**

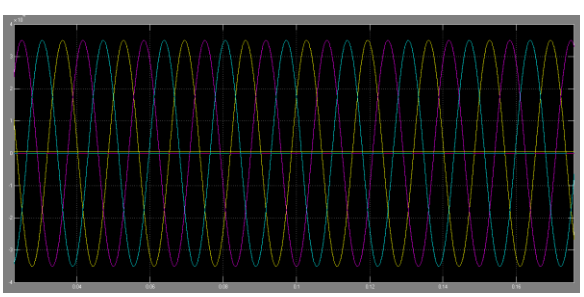

**Fig.4.4. Output voltage and current at LOAD.**

## 5. CONCLUSION:

The effect of using a SMES unit to improve the stability of a power distribution smart grid with EVs has been analyzed. The results obtained show that the use of a SMES unit can smooth the concussion voltage of the EV charging station right after the EVs are connected to the grid. If a fault occurs, the SMES unit is able to respond quickly to restore the load terminal voltage by compensating both active and reactive power of the system and improve system transient stability. The application of a SMES unit has also been confirmed to be able to effectively compensate the instantaneous voltage dip of the load terminal, stabilize power distribution networks with EVs, and improve their power quality.

## REFERENCES:

[1] K. T. Chau and C. C. Chan, "Emerging energy-efficient technologies for hybrid electric vehicles," Proc. IEEE, vol. 95, no. 4, pp. 821–835, Apr. 2007.

[2] S. P. Richardson, D. Flynn, and A. Keane, "Optimal charging of electric vehicles in low-voltage distribution systems," IEEE Trans. Power. Syst., vol. 27, no. 1, pp. 268–279, Feb. 2012.

[3] K. Qian, C. Zhou, M. Allan, and Y. Yuan, "Modeling of load demand due to EV battery charging in distribution systems," IEEE Trans. Power. Syst., vol. 26, no. 2, pp. 802–810, May 2011.

[4] P. Zhang, K. Qian, C. Zhou, B. G. Stewart, and D. M. Hepburn, "A methodology for optimization of power systems demand due to electric vehicle charging load," IEEE Trans. Power. Syst., vol. 27, no. 3, pp. 1628– 1636, Aug. 2012.

[5] K. Clement-Nyns, E. Haesen, and J. Driesen, "The impact of charging plug-in hybrid electric

vehicles on a residential distribution grid," IEEE Trans. Power Syst., vol. 25, no. 1, pp. 371–380, Feb. 2010.

[6] J. X. Jin and X. Y. Chen, "Study on the SMES application solutions for smart grid," Physics Procedia, vol. 36, pp. 902–907, 2012.

[7] C. A. Luongo, "Superconducting storage systems: An overview," IEEE Trans. Magn., vol. 31, no. 4, pp. 2214–2223, Jul. 1996.

[8] S. Kolluri, "Application of distributed superconducting magnetic energy storage system (D-SMES) in the entergy system to improve voltage stability," in Proc. IEEE Power Eng. Soc. Winter Meet., 2002, vol. 2, pp. 838– 841.

[9] H. A. Peterson, N. Mohan, and R. W. Boom, "Superconductive energy storage inductor-converter units for power systems," IEEE Trans. Power App. Syst., vol. PAS-94, no. 4, pp. 1337–1346, Jul. 1975.

[10] M. V. Aware and D. Sutanto, "SMES for protection of distributed critical loads," IEEE Trans. Power Del., vol. 19, no. 3, pp. 1267–1275, Jul. 2004.