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A Single Power Conversion Converter based on Photovoltaic Systems for Electric Vehicles

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Abstract : Global warming and lack of fossil fuels are the main drawbacks of vehicles powered by oil or diesel. Power converter is a kind of electronic circuits for energy conversion, which converts electrical energy of the supply into the energy suitable for the load (e.g., voltage or current with suitable frequency and/or amplitude). This investigation proposes a bidirectional grid associated single-power-conversion converter with low input battery voltage for electric vehicle application. The bidirectional DC-DC converter can perform bidirectional power conversion between the low input battery voltage and a corrected sine wave because of its step-up/down voltage guideline capacities. Proposed model is more stable and give good efficiency then existing. Simulation is performed using MATLAB software.

IndexTerms **- Conversion, Converter, Power, Energy, Battery, Storage, Photovoltaic, Electric Vehicles.**

I. INTRODUCTION

The task of a power converter for electric vehicle is to process and control the progression of electric vitality by providing voltages and flows in a structure that is ideally appropriate for the client loads. Vitality was at first changed over in electromechanical converter for electric vehicles (for the most part pivoting machines). Today, with the advancement and the large scale manufacturing of intensity semiconductors, static power converter for electric vehicles discover applications in various areas and particularly in molecule quickening agents. They are littler and lighter and their static and dynamic exhibitions are better. A static converter for electric vehicle is a coincided system of electrical parts that goes about as a connecting, adjusting or changing stage between two sources, for the most part between a generator and a load.

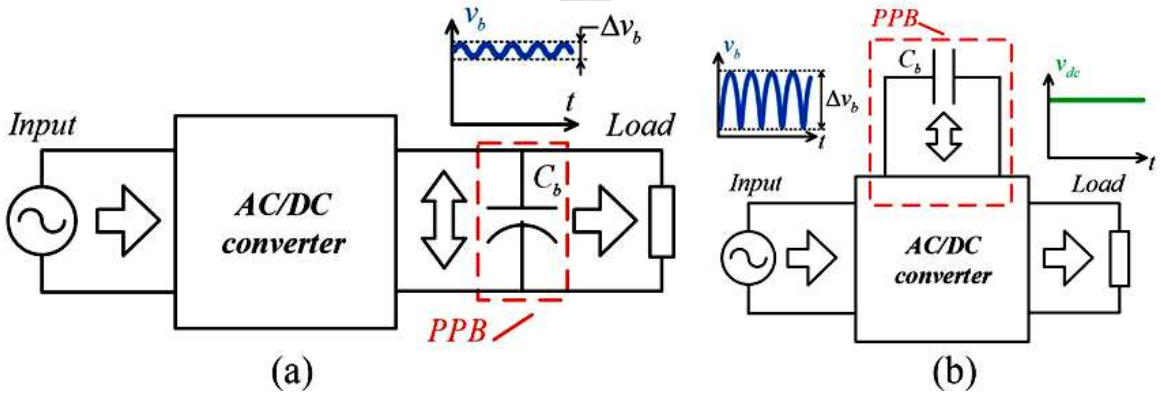

Figure 1: AC/DC Power converter for electric vehicle

Figure 1 shows control converter for electric vehicle, the definition a perfect static converter for electric vehicle controls the progression of intensity between the two sources with 100% effectiveness. The dc-dc switching converter for electric vehicles are the widely used circuits in electronics systems. They are usually used to obtain a stabilized output voltage from a given input DC voltage which is lower (buck) from that input voltage, or higher (boost) or generic (buck–boost). Most used technique to control

switching power supplies is Pulse-width Modulation (PWM). The conventional PWM controlled power electronics circuits are modeled based on averaging technique and the system being controlled operates optimally only for a specific condition. The linear controllers like P, PI, and PID do not offer a good large-signal transient (i.e. large signal operating conditions). There are usually two modes of operation for DC-DC converter for electric vehicles: continuous and discontinuous.

II. PROPOSED METHODOLOGY

The fundamental switches S_p and S_s in the present converter for electric vehicle work at an altogether higher recurrence than the grid recurrence fg. In this manner, the grid voltage vg can be considered as consistent during the switching time frame Ts, and the collapsed grid voltage v_o is expected as equivalent to the outright estimation of the grid voltage vg. The present converter for electric vehicle just has the following two subintervals: on-state of the essential principle switch Sp with off-state of the auxiliary fundamental switch Ss or off-state of the essential primary switch Sp with on-state of the optional principle switch Ss in both activity modes. It is expected that the obligation of the essential fundamental switch Sp characterizes the essential switch obligation D.

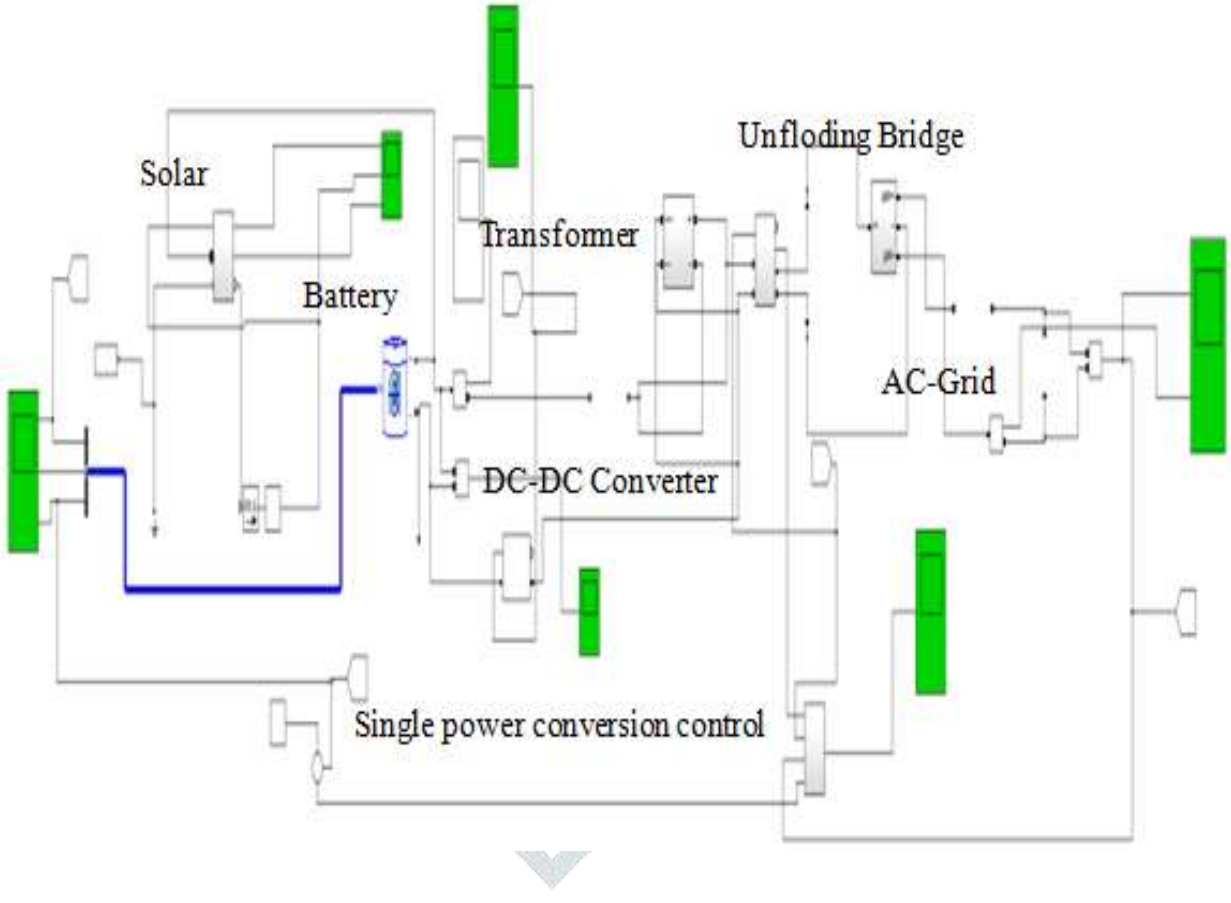

Figure 2: Power Conversion Converter for electric vehicle Model

The main component of present model is as followings-

- Bidirectional DC-AC converter for electric vehicle
- Unfolding bridge
- AC grid
- Single power conversion control

III. SIMULATION AND RESULTS

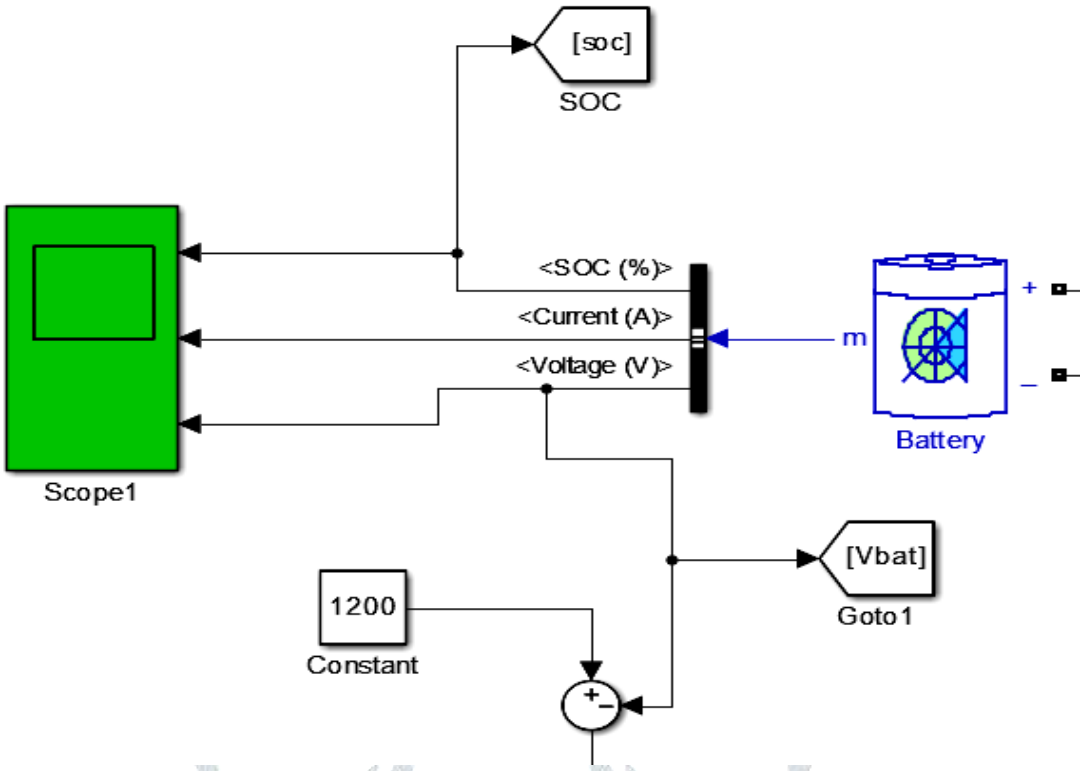

Figure 3: Battery Circuit

Figure 3 is indicating battery circuit, it actualizes a conventional battery that model most mainstream battery types. Uncheck the "Utilization parameters dependent on Battery type and ostensible qualities" parameter to alter the discharge attributes.

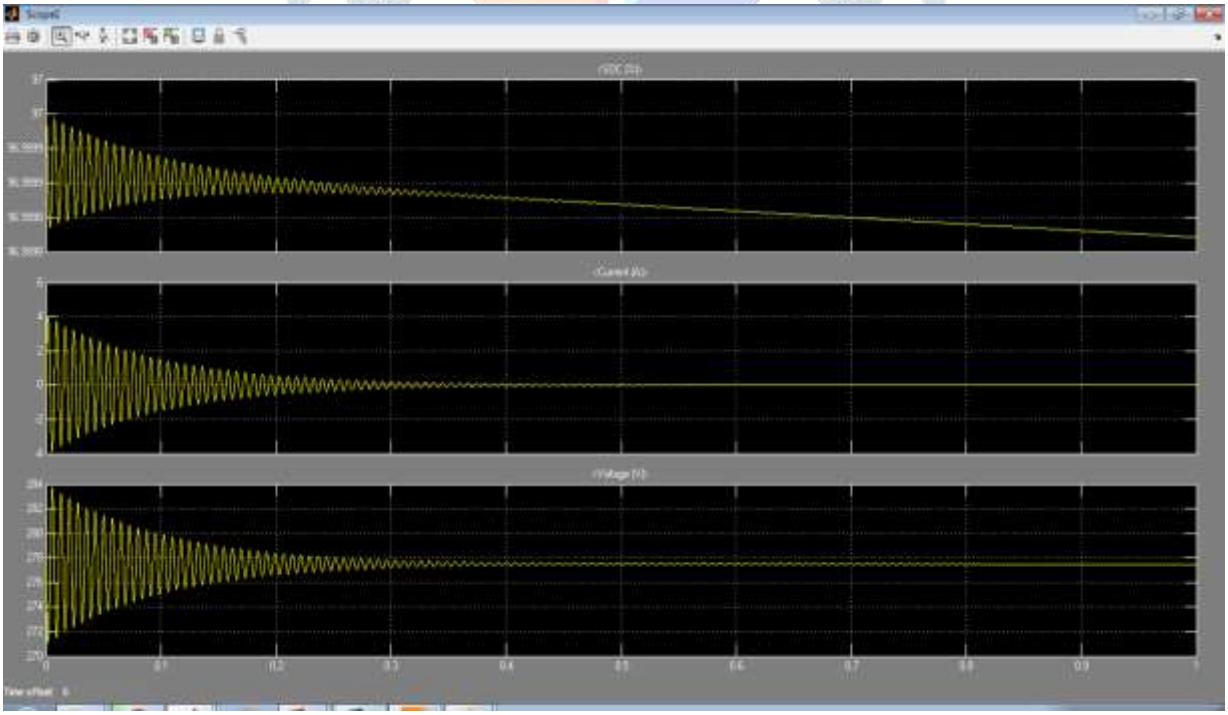

Figure 4: Battery Output

In figure 4, it is clear that the state of charge (SOC), voltage and current of output performance of applied battery.

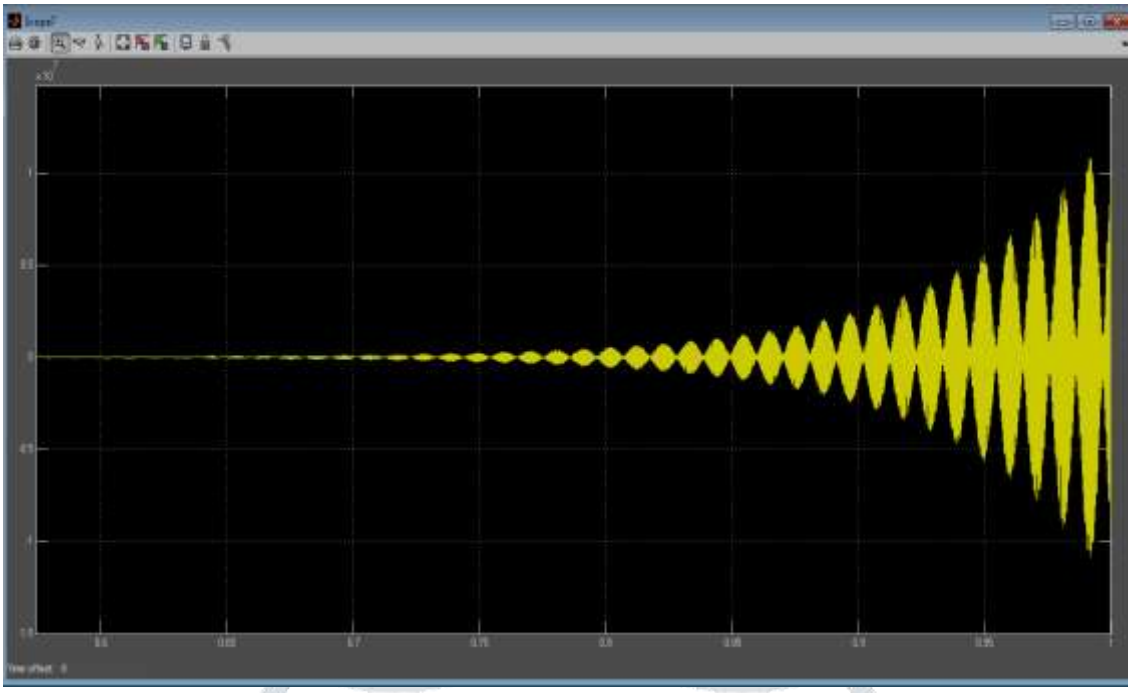

Figure 5: Battery Charges

Figure 5 shows battery charges state from input source. SOC characteristics shows the charging and releasing (i.e) It expanding implies Charging and it diminishing methods Releasing Additionally this will occured on - Terminal voltage is lower than the battery voltage.

IV. CONCLUSION

This research work involved investigating a bidirectional grid connected single-power-conversion converter with a low-input battery voltage and a control system for electrical vehicle applications. In present model, output of battery performance increased. Value of output battery is 55V so it can be used in electric vehicle battery charger. Present model can be used in high voltage direct current (HVDC) applications. The state of charge of battery is 97% so battery efficiency will be better. Therefore present model gives 5 % better result in terms of AC voltage, rated power and 2.2% better in term of state of charge.

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