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Improved Solar Pv-Powered Srm Drive for Evs

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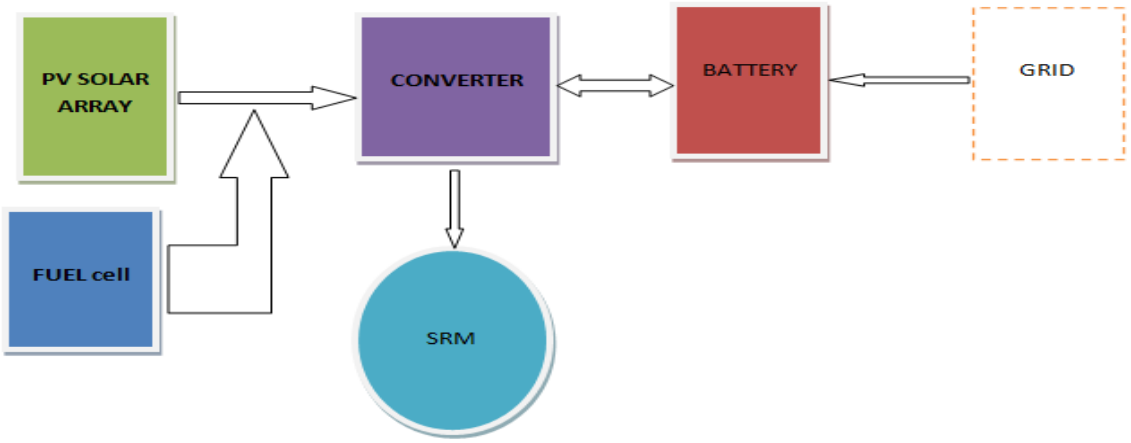
ABSTRACT

Now a day's need of hybrid electrical need is rapidly growing in the market because of use of renewable electrical source are applied on the circuit configuration as a additional source. This paper proposes an attractive inputs renewable electrical sources (RES) as a input. Proposed network operated with the PV cell, fuel cell and battery and also conventional grid as a source. So the reliability of the supply and the efficiency of the system get improved as a result. six modes of operation are described in the network and total circuit is simulated in the power graphical user interfacing environment in MATLAB software and results are analyzed in fast fourier transformation analysis.

INTRODUCTION

Electric vehicles are automobiles, which are powered by electrical engine and electrical energy. An electric vehicle (EV), also referred to as an electric drive vehicle, uses one or more electric motors or traction motors for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be selfcontained with a battery or generator to convert fuel to electricity. EVs include road and rail vehicles, surface and underwater vessels, electric aircraft and electric spacecraft. EVs first came into existence in the mid-19th century, when electricity was among the preferred methods for motor vehicle propulsion, providing a level of comfort and ease of operation that could not be achieved by the gasoline cars of the time. The development of electric vehicles is a very important and prospective process. Electric vehicles are powered by an electric motor instead of an internal combustion engine. Electric vehicles are 100% eco-friendly and they do not emit any toxic gases like CO2, N2 etc. which causes Global warming. But there are some downsides in the case of electric vehicles. Due to the limitation of current battery technologies, the driving range is very short. This will reduce the wide application of electric vehicles. In earlier, in terms of motor drives, high-performance permanentmagnet (PM) machines are widely used [4]. In PM machines there is no field winding and the field is provided by the permanent magnet. Most commonly rare earth materials are used. But they are very costlier. So by the use of PM machines it will also reduce the wide application of electric vehicles. To overcome these issues a photovoltaic panel and a switched reluctance motor can be used for power supply and motor drive [3]. By

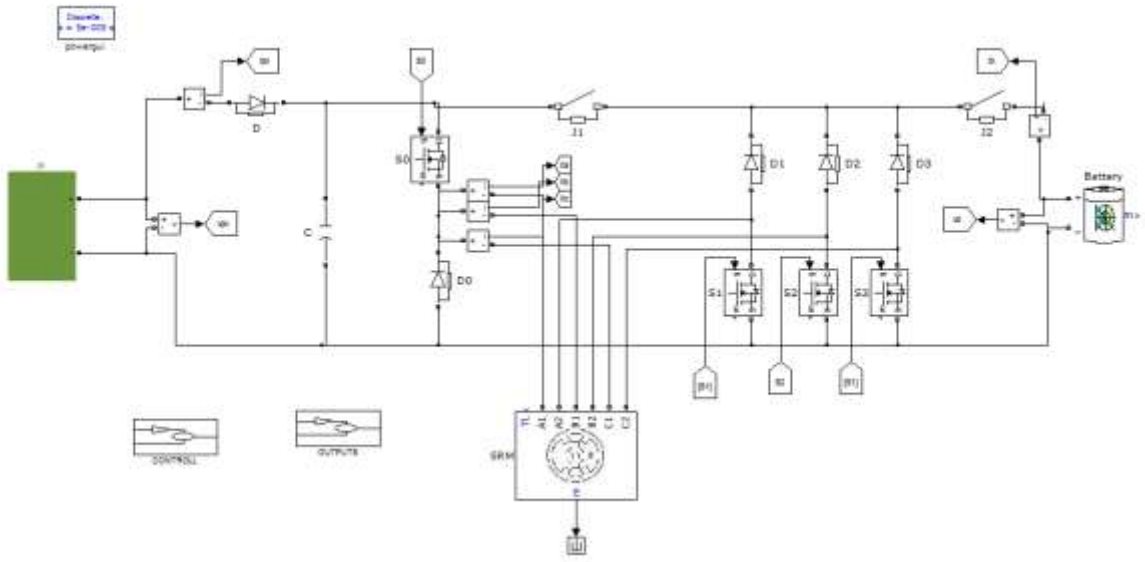
introducing PV panel on the top of the vehicle, a suitable energy source can be achieved. PV panel has low power density for traction drives; they can be used to charge the batteries. Also the SRM need no rare earth materials. The switched reluctance motor (SRM) is a type of a stepper motor, an electric motor that runs by reluctance torque [1]. Unlike common DC motor types, power is delivered to windings in the stator (case) rather than the rotor. This greatly simplifies mechanical design as power does not have to be delivered to a moving part, but it complicates the electrical design as some sort of switching system needs to be used to deliver power to the different windings. With modern electronic devices, precisely timed switching is not a problem, and the SRM is a popular design for modern stepper motors. Its main drawback is torque ripple.



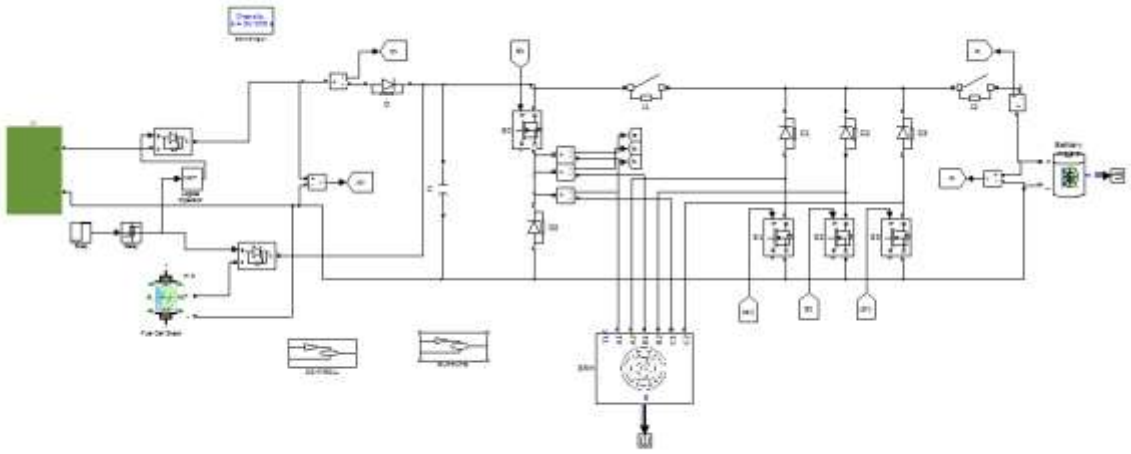
Block Diagram Representation

In order to decrease the energy conversion processes, one approach is to redesign the motor to include some onboard charging functions. The performance of battery modules depends not only on the design of the modules but on how the modules are used and charged as well. In this sense, battery chargers play a critical role in the evolution of this technology [2]. Generally, battery chargers are classified into the following two types: 1) The onboard type and 2) The stand-alone (off board) type. Because the onboard type of chargers should always be carried by the vehicle, the weight and space, as well as the cost, have to be minimized. Thus, it is normally not practical to have a high-power level of the onboard chargers with galvanic isolation. Although isolation is a very favorable option in the charger circuits for safety reasons it is usually avoided due to its cost impact on the system. Off board chargers are located at a fixed location. They are limited in their power output by the ability of the battery to accept the charge. The maximum power point tracking (MPPT)

and solar energy utilization are the unique factors for the PV-fed EVs. In order to achieve low-cost and flexible energy flow modes, a low-cost tri-port converter can be used to coordinate the PV panel, SRM, and battery



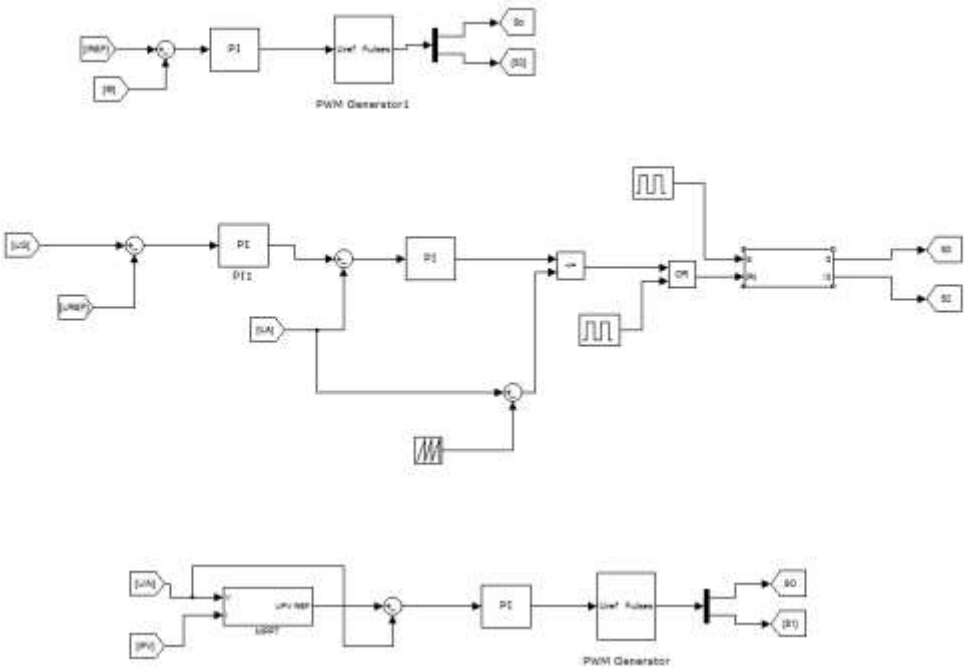
Existing circuit configuration



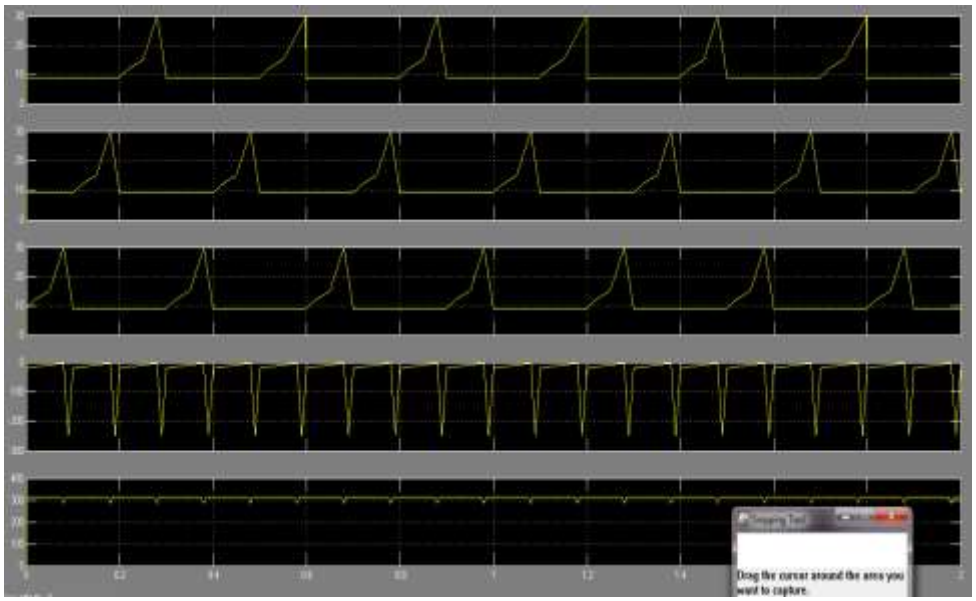
Proposed network topology

In this mode, the PV panel charges the battery directly by the driving topology. The phase windings are employed as inductor and the driving topology can be functioned as interleaved buck–boost charging topology. Fig: 9 PV fed charging mode For one phase, there are two states, as shown in Fig: 9. When S0 and S1 turn on, the PV panel charges phase inductance; when S0 and S1 turn off, the phase inductance

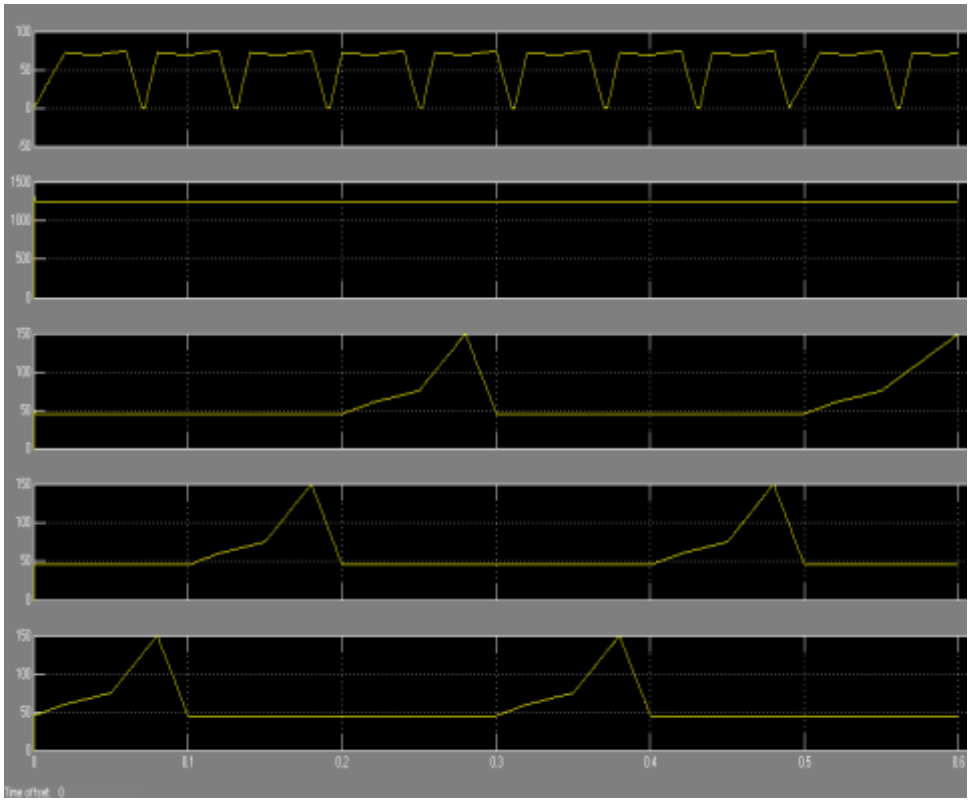
discharges energy to the battery. According to the state-ofcharging (SoC), there are three stages to make full use of solar energy and also it will maintain the battery healthy condition. During stage 1, the battery is in extremely in the lack energy condition, the MPPT control strategy is employed to make full use of solar energy. During stage 2, the constant-voltage control is adopted to charge the battery



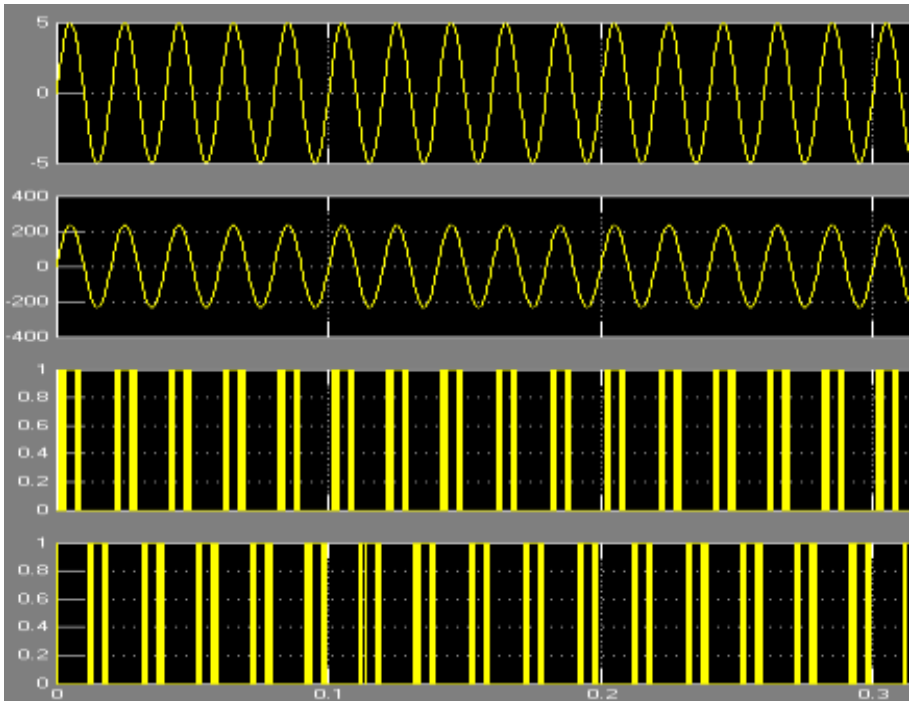
Control simulink model



Simulation results of driving-charging mode (mode 1)



Simulation results of single-source driving mode (modes 3 and 4).



Grid charging (mode 5).

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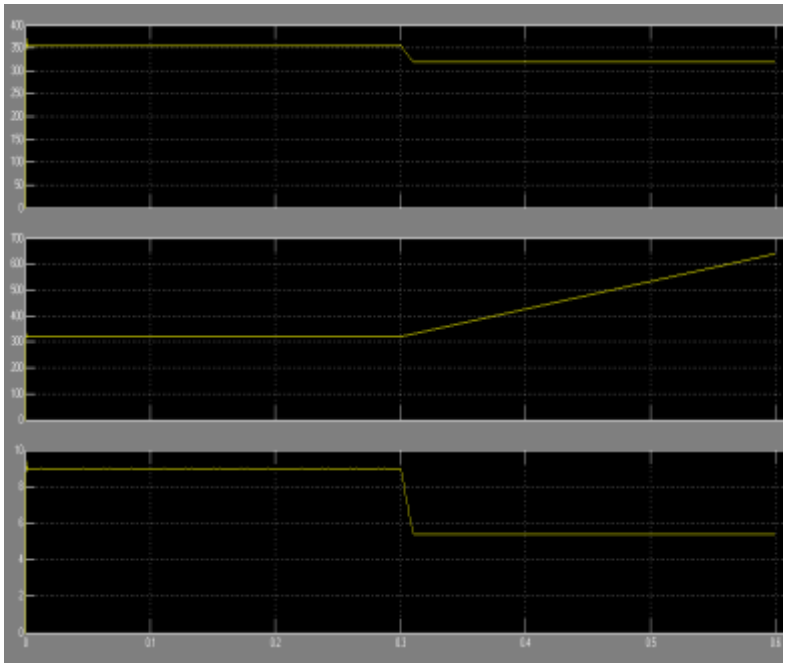
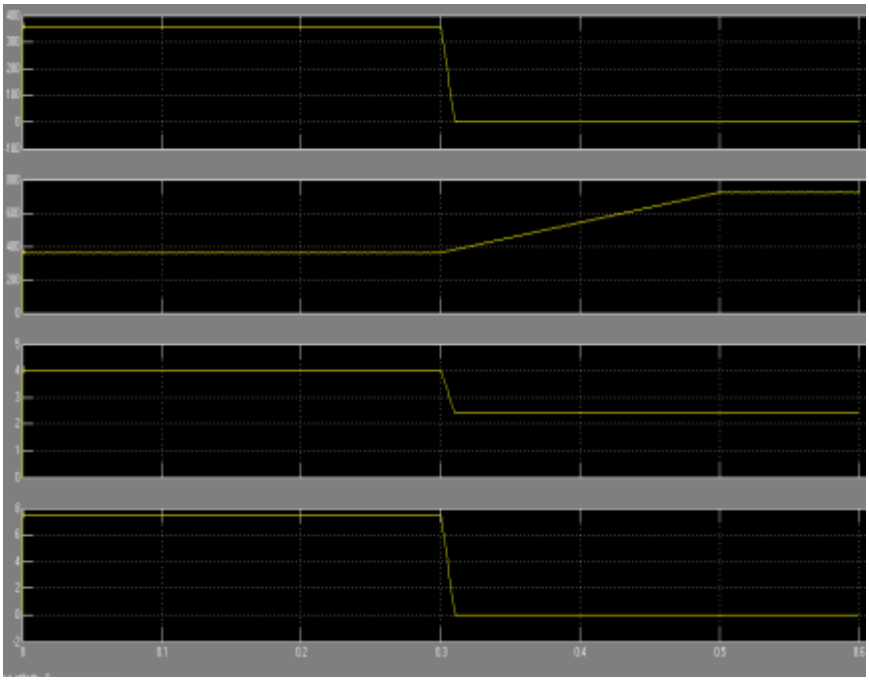


PV charging mode 6 (stages 1–2).



PV charging mode 6 (stages 2–3).

CONCLUSION

Fuel cell , Photovoltaic solar system, battery and grid connected

Hybrid Electric system is developed in the proposed circuit configuration. So the reliability of the supply and the efficiency of the system get improved as a result. Total circuit is simulated in the power graphical user interfacing environment in MATLAB software and results are analyzed in fast fourier transformation analysis. SRM motor drive shows high efficiency and reliability characteristics than compare with the existing system

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