ABSTRACT

The charging station for battery-powered electric vehicles has been proposed with grid and solar energy integration. The photovoltaic (PV) array serves as the primary energy source. The proposed three-port DC/DC converter includes a full converter as well as a diode rectifier for fast and slow charging. The pulses required for the boost converter, inverter, and three-port converter are generated by the microcontroller. The produced pulses are then amplified and supplied into the boost converter. The inverter then supplies the stepped-up voltage to the three-port converter. The proposed converter has fewer components with this three-port configuration, resulting in lower system cost and volume as compared to individual charger systems. To manage the output power of the fast and slow charging ports concurrently, a simple control mechanism based on phase shift and frequency modulation was created. This project work covers the suggested converter's operating principles, analysis, parameter design suggestions, and simulation results. A simulation model was created in MATLAB Simulink to validate the performance of the proposed converter. The developed simulation model is tested under various loading circumstances. Experimental execution of Grid integrated solar powered charging station for battery operated electric vehicles is portrayed. The three-port converter is comprised of a full converter and a diode rectifier. The full converter is used for fast charging, while the diode rectifier is used for slow charging. It demonstrates their potential to reduce reliance on fossil fuels, reduce environmental impact, and aid in the transition to electric mobility. With a full converter and diode

rectifier, the proposed circuit aids in both fast and slow charging. Numerical verification results show a unique course of action in the circuit with a theoretic foundation. The simulation and experimental data are also shown to demonstrate the usefulness of the proposed technique.