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Design of Solar Charge Controller and Power Converter with the Multisim

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Abstract : Solar power is in the form of photovoltaic, also known as PV, which is a form of renewable energy that applies solar panels in producing electricity from the sun. It has a vital role in fulfilling the present need for clean and renewable energy to get rid of conventional and non-renewable energy sources that emit high levels of greenhouse gases. Solar energy is embraced because of its availability, easy accessibility, and effectiveness in the provision of power, chiefly in country areas. In solar charging, device charge entails a change of light power into electricity using photovoltaic or PV panels, which supply direct current electric power or DC. Here, the solar charge controller has a very crucial role to play regarding the voltages and the currents coming from the solar panels to take up the changing needs of a battery without overcharging the same. Certain devices, such as inverters, are required to transform the DC power produced by the solar panels into an AC to serve the normal electrical appliances and the current power network. This project was initiated for a project of a solar charge controller and power converter with the MULTISIM. The formation of this project begins with a literature survey to obtain basic knowledge about power converters, charge controllers, and photovoltaic systems. Fundamentals of the operation of solar panels include the process by which light is converted into electricity and a comparison of PWM and MPPT chargers with controllers. Knowledge of rectifiers is built to help achieve AC-to-DC and DC-AC change. Choosing a resistor, capacitance, MOSFET, and OP-AMP is done by the need of the system. The circuit diagrams of converters and charge controllers are designed using the Multisim program. Pulse width modulation, Bubba oscillator circuit, and inverter circuits are modeled and simulated. In the subsequent steps, the analysis of the simulation outcomes indicates the efficiency of the intended converter systems. The various outputs from the different configurations, with the transformer incorporated as well as without it, are then monitored for effective power conversion as well as power regulation.

Keywords : solar charge controller, MULTISIM, converter, inverter
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