

Design and Specification of Building Integrated DC Electricity Networks

https://www.youtube.com/watch?v=3_FJffQWTl0

Abstract— As convention fossil fuel energy sources diminish and the world's environmental concern about acid deposition and global warming increases, renewable energy sources (solar, wind, etc) are attracting more attention as alternative energy sources. ^¾These are all pollution free and one can say eco friendly. ^¾These are available at free of cost.

In India, there is severe power shortage and associated power quality problems. ^¾ The quality of the grid supply in some places is characterized by large voltage and frequency fluctuations, scheduled and UN scheduled power cuts and load restrictions. ^¾ Load shedding in many cities in India due to power shortage and faults is a major problem for which there is no immediate remedy in the near future since the gap between the power demand and supply is increasing every year.

The Hybrid Solar, Wind and Grid Power Generation System for DC Appliances is designed to provide a reliable power supply for DC loads using multiple energy sources. The system combines solar energy, wind energy, and grid power as input sources. The generated energy is supplied to a battery through a charging circuit for energy storage. The stored battery voltage is then supplied to a DC-DC boost converter to obtain the required voltage for operating DC appliances such as LEDs and a DC motor.

A NodeMCU acts as the main controller and monitors the battery voltage. The system uses relays to control the connected DC loads. Through the Blynk IoT application, the user can remotely monitor the battery voltage and switch the DC appliances ON or OFF. The proposed system provides better energy utilization, remote control, and continuous power availability by combining renewable energy sources with the grid.

Objectives:

- To develop a hybrid power generation system using solar, wind, and grid energy.
- To store the generated energy in a rechargeable battery.
- To boost the battery voltage using a DC-DC boost converter.
- To operate DC appliances such as LEDs and DC motors.
- To control the DC loads remotely using the Blynk IoT application.
- To monitor battery voltage using NodeMCU.
- To use relays for automatic ON/OFF control of DC loads.
- To improve the utilization of renewable energy.
- To provide a reliable power supply for DC appliances.

Major building blocks used in project:

- Wind turbine.
- Solar panels.
- Grid
- Rechargeable battery.
- Charging Circuit
- DC dynamo.
- DC-DC Boost converter.
- Relays.
- NodeMCU.
- Blink APP.
- DC motor.
- LEDs.

Software's used:

1. Embedded Linux programming.
2. Arduino IDE for compiling and dumping code into Microcontroller
3. Express SCH for Circuit design.

Block diagram:

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