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Solar & Wind Hybrid Energy Generation System

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ABSTRACT

Expanding technology rendered humanity dependent on energy as the drive for global industrialization began in the late 18th century, and as the energy crisis progressed, electricity became a most basic human need, from house to industrial activities. As a result, the project's purpose is to generate energy without consuming nonrenewable resources or polluting the environment. Because renewable energy generation on its own has disadvantages that hybrid systems must overcome. Wind and solar energy have grown popular due to their abundance, ease of availability, and conversion to electric energy. This project comprises the creation of a hybrid energy system for a number of applications that uses solar and wind power in a designed circuitry..

Keywords:HybridEnergy,SolarSystem,WindEnergy,RenewableEnergy,CleanEnergy,ElectricalEnergyGeneration

1. Introduction

With rising concerns about global warming and the depletion offossil fuel supplies, many people are seeking for sustainable energy alternatives to helptheplanetsurviveforfuturegenerations.Windandsolarenergy,inadditiontohydropower,havethegreatestpotentialtosatisfyourenergyneeds.[1]Wind energycansupplysignificant quantities ofelectricity onits own, but its presence is very unpredictable, since it can appearand disappearat anytime. Solar energy is also available throughout the day, although the amount of solar irradiation varies owing to sun intensity and the unexpected shadowscreated by clouds, birds, trees, and other objects. The intermittent nature of wind and solar systems makes them unreliable. The system's power transferefficiency and reliability may be greatly enhanced by integrating these two intermittent sources and using maximum power point tracking (MPPT)algorithms. [2-3] When one energy source is unavailable or inadequate to fulfil load needs, the other energy source can compensate. Several hybridwind/PV power systems with MPPT control have been designed and addressed in academic papers. To execute MPPT control for each of the renewableenergy power sources, most systems in the literature employ a separate DC/DC boost converter coupled in parallel at the rectifier step. A simplified multi-input structure that combines sources from the DC end while still attaining MPPT for each renewable source has been proposed.The suggestedconstructionisahybridofthebuckandbuck-boostconverters[4-5].

- ***Objective Scope***

  - The main objective of this project is in Remote areas implementing power systems units at each apartment.
  - Street lightings covering a large area.
  - off grid applications.
  - Traffic signaling and in many applications.

BlockDiagram

The system's block diagram shows a solar panel, buck converter, and battery. Solar panels convert solar energy into electrical energy. The solar panel'susual voltage rating is 12V. The PHOTOELECTRIC EFFECT is utilized to convert solar energy to electrical energy. When light strikes a material, theelectrons in the valence band absorb energy and get excited. They run over to the conduction band and are let free. Some come to a point where a Galvanipotential accelerates them into a new substance. This produces an electromotive force and, as a result, electric energy. A buck converter is a dc-dcconvertermadeoutofaMOSFETswitch(IRF250N),aninductor,acapacitor,andadiode.

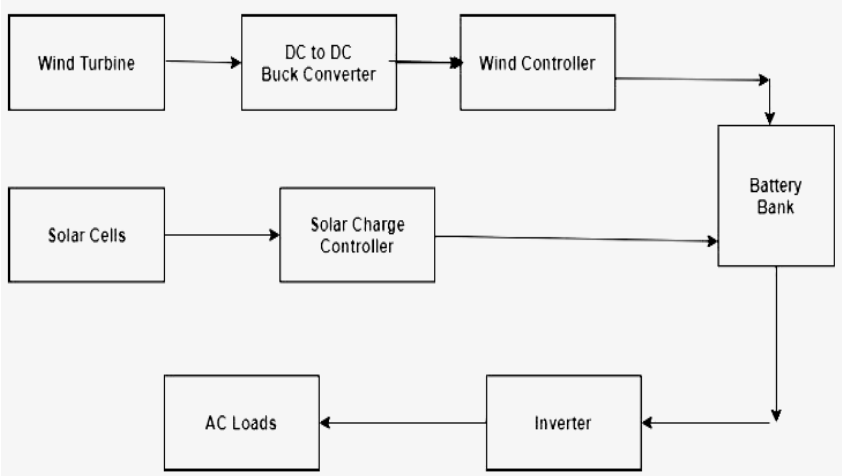

Fig.1-(a)BlockDiagram

Abasic electromagneticrelayconsists ofa wire coilaroundasoftiron core,anironyoke thatoffers a low resistancechannelformagnetic flux, amoveable iron armature, and one or more sets of contacts (there are two in the relay pictured). The armature is mechanically connected to one or more setsof movable contacts and is hinged to the yoke. It is maintained in place by a spring so that there is an air gap in the magnetic circuit when the relay is de-energized. One of the two sets of contacts in the relay shown is closed, while the other is open. Depending on the function, other relays may have more orfewer sets of contacts. A wire connects the armature to the yoke on the relay shown. The circuit is maintained between the armature's moving contacts andthe circuit track on the printed circuit board (PCB) through the yoke, which is connected to the PCB. When an electric current is sent through the coil, itcreates a magnetic field that attracts the armature, and the resulting movement of the moveable contact forms or breaks a connection with a permanentcontact (depending on the structure). If the contacts were closed when the relay was de-energized, the movement opens the contacts and breaks theconnection, and if the contacts were open, the movement opens the contacts and destroys the connection. When the current to the coil is shut off, a forceabout half as strong as the magnetic force returns the armature to its relaxed state. A spring is usually employed to createthis force, however gravity isalso often used in industrial motor starters. Most relays are designed to work rapidly. This minimizes noise in low-voltage applications and reduces arcingin high-voltage or current applications. When a coil is charged with direct current, a diode is commonly put across the coil to dissipate the energy from thecollapsing magnetic field during deactivation, which would otherwise cause a voltage spike that might damage semiconductor circuit components. Insidethe relay casing of certain automobile relays is a diode. A contact protection network (snubber circuit) made up of a capacitor and a resistor in series mightabsorb the surge. A tiny copper "shading ring" can be crimped to the end of the solenoid if the coil is meant to be powered with alternating current (AC).This creates a little out-of-phase current, which raises the minimum draw on the armature during the AC cycle. Instead of a solenoid, a solid-state relayswitches the regulated load usinga thyristor or other solid-stateswitching device actuated by the controlsignal.Toseparate control and controlledcircuits,an opt coupler (a light-emittingdiode (LED)linked withaphototransistor)canbeemployed.

Result

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