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Hybrid Power Generation using Roof Ventilators and Solar Tracking Mechanism

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Abstract: To build a hybrid power generation system this is more efficient & simple in design to harness energy from non-conventional or renewable sources of energy. The most important application field of this project is renewable energy sources. Wind and solar energy have been popular ones owing to abundant, ease of availability and convertibility to the electric energy. This work covers realization of a hybrid renewable energy system for a domestic application. Batteries in the system are charged by either wind power via an AC generator connected to the Rooftop ventilator or solar power via a Solar tracking mechanism which rotates the panel according to the position of sun for maximum utilization of solar energy. Solar tracking mechanism relies mainly on position of the sun, while the AC generator in the Rooftop ventilator relies mainly on the speed of the wind. Power resources and loads in the system are monitored and controlled in real time.

Keywords: Hybrid power generation, Roof Ventilator, Solar tracking mechanism and Renewable sources of energy.

I INTRODUCTION

Energy is playing an important role in human and economic development. One of the driving forces for social and economic development and a basic demand of nation is energy. Most of the energy production methods are one-way, which requires change of form of the energy. In Parallel to developing technology, demand for more energy makes us seek new energy sources. Researches for renewable energies have been initiated first for wind power and then for solar power. Efficiency of solar power conversion systems is 18%, whilst that of wind power is 55%. These efficiencies could be increased by 50% with solar tracking and wind direction adaptive motion methods.
India is large country and the rate of electrification has not kept pace with the expanding population, urbanization and industrialization and has resulted in the increasing deficit between demand and supply of electricity. This has not only resulted in under electrification but also put heavy pressure on the governments to keep pace with demand for electricity. People not served by the power grid have to rely on fossil fuels like kerosene and diesel for their energy needs and also incur heavy recurring expenditure for the poor people in rural areas. Wherever the rural areas have been brought under power grid the erratic and unreliable power supply has not helped the farmers and the need for an uninterrupted power supply especially during the critical farming period has been a major area of concern.

The first genuine for solar panel was built around 1883 by Charles Fritts. He used junctions formed by coating selenium (a semiconductor) with an extremely thin layer of gold. Crystalline silicon and gallium arsenide are typical choices of materials for solar panels. Gallium arsenide crystals are grown especially for photovoltaic use, but silicon crystals are available in less expensive standard ingots, which are produced mainly for consumption in the microelectronics industry.Norway's Renewable Energy Corporation has confirmed that it will build a solar manufacturing plant in Singapore by 2010 - the largest in the world. This plant will be able to produce products that can generate up to 1.5 Giga watts of energy every year. That is enoughto power several million households at any one time. Last year the world as a whole produced products that could generate just 2 GW in total.The development of solar cell technology begins with 1839 research of French physicist Antoine-Cesar Becquerel. He observed the photovoltaic effect while experimenting with a solid electrode in an electrolyte solution. After that he saw a voltage developed when light fell upon the electrode.

II WORKING OF HYBRID POWER GENERATION

In the hybrid power generation system, by using the roof ventilators with the stator and neodymium magnet arrangements as the rotor rotates due to change in magnetic field the power is generated. The stator coil consists of the 370 outer and 340 inner windings. It is connected to the battery to store the electricity generated from the roof ventilator. The solar tracking mechanism has the solar panel which rotates according to the sun's position and this is controlled by the microcontroller. It has the light dependent resistor sensors [LDR] which senses the intensity of sun

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light and change its direction according to sun's position and it is connected to the battery. The stored electricity in the battery is used to light up a bulb.

Fig.1 Working of Hybrid Power Generation

III RESULTS AND DISCUSSION

The system is focusing on the controller design. The constructed system has been tested and some data from hardware measurement have been collected and discussed. Typical solar panel has been used and the purpose only to prove the designed system is able to operate accordingly. Therefore the surrounding effects, for instance, weather condition are not seriously considered during hardware testing.

A. Voltage Output of the System

Fig 2 shows the system speed is directly proportional to system voltage. The system voltage is depends on speed. If roof ventilator speed increases then voltage of system will also increase. When the roof ventilator speed is around 120rpm then system voltage is 12V. As roof ventilator speed decreases system voltage also decreases.

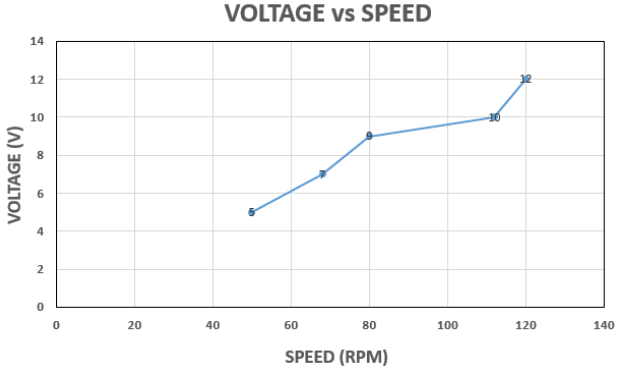

Fig. 2Voltage v/s Speed

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B. Current Output of the System

Fig 3 shows the system speed is directly proportional to system current. The system current is depends on speed. If wind speed increases then current of system will also increase. When the roof ventilator speed is around 120rpm then system current is 15mA. As roof ventilator speed decreases system current also decreases.

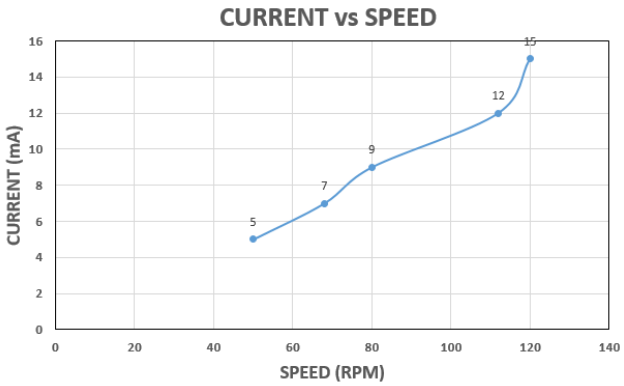

Fig. 3Current v/s Speed

IV CONCLUSION

Hybrid power generation system is good and effective solution for power generation than conventional energy resources. It has greater efficiency. It can provide to remote places where government is unable to reach. So that the power can be utilized, where it is generated so that it will reduce the transmission losses and cost. Cost reduction can be done by increasing the production of the equipment. People should motivate to use the non-conventional energy resources. It is highly safe for the environment as it doesn't produce any emission and harmful waste product like conventional energy resources. It is cost effective solution for generation. It only need initial investment. It has also long life span. Overall it is good, reliable and affordable solution for electricity generation.

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