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Electricity Generation by using Rooftop Ventilator

Prof. Sonia Parate[1], Miss Rahat Parveen[2], Mohammed Yunus[3], Mr. Akshay A Dhande[4], Mr. Snehal N Bhagat[5], Mr. Gunjan R Nandeshwar[6], Miss Madhuri P Ramteke[7]

Abstract: ***Wind energy is a renewable energy which can be adapted for many uses such as water Pumping , domestic air ventilation, and electricity generation because wind is clean energy without any pollution to environment. Wind energy is one of the types of renewable energy and it does not cause pollution. Therefore, presently, there is the technological development of applying wind energy for the electricity generation. Wind energy is used to replace fossil energy such as oil and coal, causing environmental Pollution .This paper presents the electric power generation by using Rooftop Turbine Ventilator (R.T.V).Various methods have been presented previously like Axial Flux PMSG, AC-Generator and AC Synchronous Generator which are driven by Rooftop Turbine Ventilator (R.T.V).This paper proposed the roof ventilator system equipped with a small AC electric generator. A ac generator was installed in 24-inch roof ventilator and carry around rotation of the generator by belt and pulley mechanism to the rotation axis of roof ventilator. The results of the study were found that roof ventilator would begin to generate a voltage of 10 - 12 volt at wind speed of 285-300rpm.***

I. INTRODUCTION

The solar ,wind, water, ocean waves can play important role in production of electricity But the some problems arises in the development of energy power generation like, high construction cost, difficulties in maintenance, space for plant installation and power distribution. Wind energy is a renewable energy which can be adapted for many uses such as water Pumping , domestic air ventilation, and electricity generation because wind is clean energy without any pollution to environment. All countries have becomes interested in the renewable energy sources. The solar ,wind, water, ocean waves can play important role in production of electricity .But the some problems arises in the development of energy power generation like, high construction cost, difficulties in maintenance, space for plant installation and power distribution. There are many technology developments to adapt the wind energy to generate the electric current in India and foreign countries to replace the energy from fossil, which is affecting the environment, such as oil, or coal, etc. Especially in European countries, there are windmills to be the great equipment to generate the electric current with many capacities (Megawatt: MW). The India is in the tropical zone. There is high humidity and warm weather present in all of year. Specially march, April, may .The day time temperature may be increasing because of high intensity of sunlight and high room temperature the ventilation is necessary in workshop's, industries or factory building .Therefore the rooftop ventilator's are used for ventilation purpose because this ventilator are work on without using electric energy. This technology is popularly installed on the roof in workshop's, industrial buildings ,ware houses and also in residences

A. What is roof top turbine ventilator ?

Wind turbo ventilator is a wind driven ventilator that is installed on the roof of building to provide effective ventilation .It is use in all types of industries, workshops, warehouse .The air ventilation works on the simple principle of wind assisted rotation and stack effect .The main function of the free spinning is to provide fresh air in roof space and living area. Air are free around 24 hours of a day on all year .The additional function of this product is to produce the electrical energy from the roof ventilator that will spin the wind is exist.

Roof ventilators have two types

Roof ventilator with motor driven

Roof ventilator with natural air driven

In this paper second type is preferred. Roof ventilator consist of stationary part and rotational part .The stationary part is composed of base and fixed shaft and rotational part is composed of fan blades and bush put on the fixed shaft on stationary part .Also there are two rotating principles of the ventilator. The first principle is hydromechanics that can air flow high temperature area to low temperature area to motivate blades to rotate. In that time when the turbine are rotates the high temperature air will be discharged from the room so the air density in the room can be reduced, then the outdoor cold air enters in the room to achieve the goal .The second principle is the air convector it relies on the breeze air to rotate its blades.

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B. Methodology for Roof Top Turbine Ventilator (RTV)

For the generation of electricity by using Rooftop Turbine Ventilator (R.T.V).The following methods are most preferred**.**

1) Axial Flux Permanent Magnet (AFPM)
2) Permanent Magnet Synchronous Generator (PMSG
3) AC-Generator
4) AC Synchronous Generator

II. AC-GENERATOR

Performance of AC generator connected with wind turbine under varying wind speed. Different modes of operation can be used depending on the wind turbine configuration. They are classified in variable-speed and fixed-speed. For fixed-speed operation, the system is very simple and thus the cost is usually low. As a drawback, the conversion efficiency is far from optimal. Normally an asynchronous generator is used and it is directly connected to the grid. For the variable-speed operation, maximum efficiency is obtained; the system is controlled to maximize the power extracted from the wind. Among all these configurations, the trend is to use variable-speed wind turbines because they offer more efficiency and control flexibility. With permanent magnets there is no need for a DC excitation system. With a AC generator it is possible to operate at low speeds and without gearbox. Therefore the losses and maintenance of gearbox are avoided.

A. Block Diagram

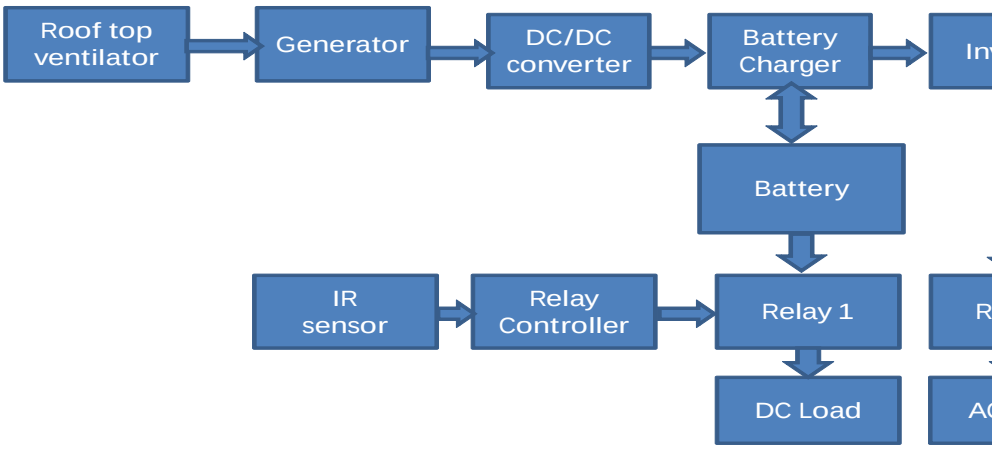

Fig.:- BLOCK DIAGRAM OF ROOFTOP VENTILATOR

III. WORKING CONCEPT

A. Roof top Ventilator

Wind turbo ventilator is a wind driven ventilator that is installed on the roof of building to provide effective ventilation.

1) It is used in all types of industries, workshops, warehouses. The air ventilation works on the simple principle of wind assisted rotation and stack effect .
2) The main function of the free spinning is to provide fresh air in roof space and living area.
3) Air is free around 24 hours of a day and all year .The additional function of this product is to produce the electrical energy from the roof ventilator that will spin when the wind exists
4) Roof ventilators have two types:
5) Roof ventilator with motor driven.
6) Roof ventilator with natural air drive

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7) Also there are two rotating principles of the ventilator
8) The first principle is hydromechanics in which air flows from high temperature area to low temperature area to motivate blades to rotate.
9) In that time when the turbine rotates, the high temperature air will be discharged from the room so the air density in the room can be reduced. Then the outdoor cold air enters in the room to achieve the goal
10) The second principle is the air convector it relies on the breeze of air to rotate its blades.

B. Generator

Permanent Magnet Synchronous Generator (PMSG) is used.

C. DC/DC converter

1) Topology and Operation of DC-DC Converters .
2) Control Scheme for DC-DC.
3) DC-DC Converter is a Voltage Regulator .
4) Use Switches, Inductor and Capacitor for Power Conversion.
5) Switched Mode Operation.

D. Battery Charger

1) It is used for battery charging.
2) Current control and voltage control devices are used to protect the battery from over charging and discharging.

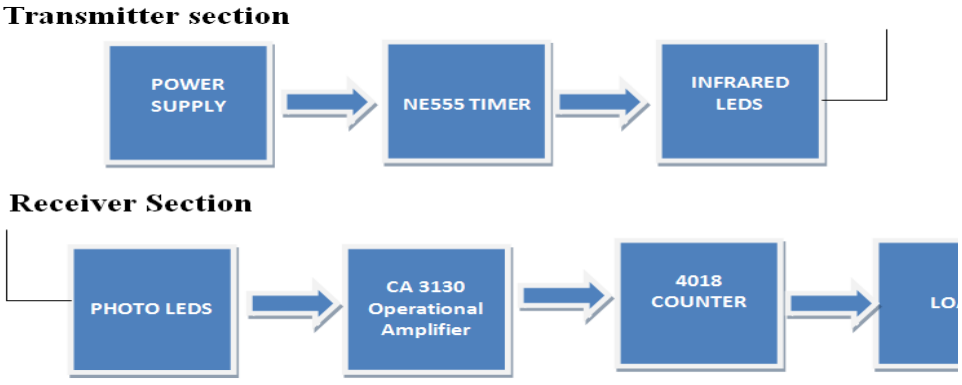
E. Inverter

1) Inverter are used in pv system to convert dc power from batteries into ac power.

F. Load

1) Loads are applications in which we use the generated energy like led, bulb, electric fan etc.

Block Diagram of Infrared Remote Control Switch



IV. BLOCK DIAGRAM EXPLANATION

A. The main function of this remote control switch is to control any load (TV, Radio, Stereo, Fan, Light, etc.). In this circuit, we are using one switch for operating the transmitter. With this we can switch on or off the TV, motor, radio or any other home appliances.

B. We can even control the volume of TV, radio and many more by adding extra circuitry to the actual circuit. Here in the transmitter section, we have NE555 timer which is configured in astable mode and infrared LEDs whose infrared rays are directed by the concave lens and the source of power is from 9V battery.

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C. Switch in the circuit plays the key role in the transmitter circuit. When the switch is closed, the power from the battery turns on the NE555 timer which will act as an astable multivibrator. The infrared LEDs which are connected to the output of NE555 will get high and produce the infrared beam through the concave lens. When the infrared beam from the transmitter is reached by the receiver section, the photo LEDs will receive the infrared beam and charge the capacitor which will increase the input voltage of one pin of operational amplifier and high output is generated. This high output is given to the 4018 Counter as input and counter will drive the load through a relay to switch on or switch off accordingly

V. SYSTEM PERFORMANCE OF ROOF TOP VENTILATOR

The main function of the free spinning roof ventilator is to provide fresh air in roof space and living area all year round 24 hours a day free of charge. The additional function of this product is to produce the electrical energy from the roof ventilator that will spin when the wind exist. The progress and tests of the system have been fully demonstrated. The consumers not just can enjoy the benefits of the better air ventilation in the house, but also have extra electricity supply for load appliances such as radio, mobile phone charger and aquarium oxygen pump. The main component of the system is the Auxiliary Current (AC) generator. It will convert the kinetic energy from the wind
to the electricity for our usage. The generated electricity then will go through the AC-DC regulator to convert it to Direct Current (DC) voltage. This free electricity has to use the battery charger to allow the charging process running. This to ensure that there will be no back-flow current if the roof ventilator is not functioning. Inverter is use to convert from DC to AC for our AC load usage. This is a standard roof ventilator in the market with diameter size, 22 inch. This size has 30 curves blade to
capture the wind kinetic energy. This product, research process involved the study how to generate the electricity from the spinning roof ventilator. AC generator is a solution where it manages to meet the objective of the product. The important specification of the generator is the torque must be low to enable it to start at the low speed. The rubber belting is attached to the moving object of the roof ventilator. The AC generator is connected to the belting area by using a small plastic wheel. When the wind blows on the fins and generates enough drag forces, the roof ventilator will rotate . The
plastic wheel of the AC generator and the moving roof ventilator will spin synchronously to generate
electricity.

VI. APPLICATIONS

A. DC Generator
1) Electricity generation
2) Roof ventilator.

VII. ADVANTAGES

A. Wind energy is used to replace fossil energy for electricity generation
B. Roof top ventilation system equipped small system
C. 24*7 day generation

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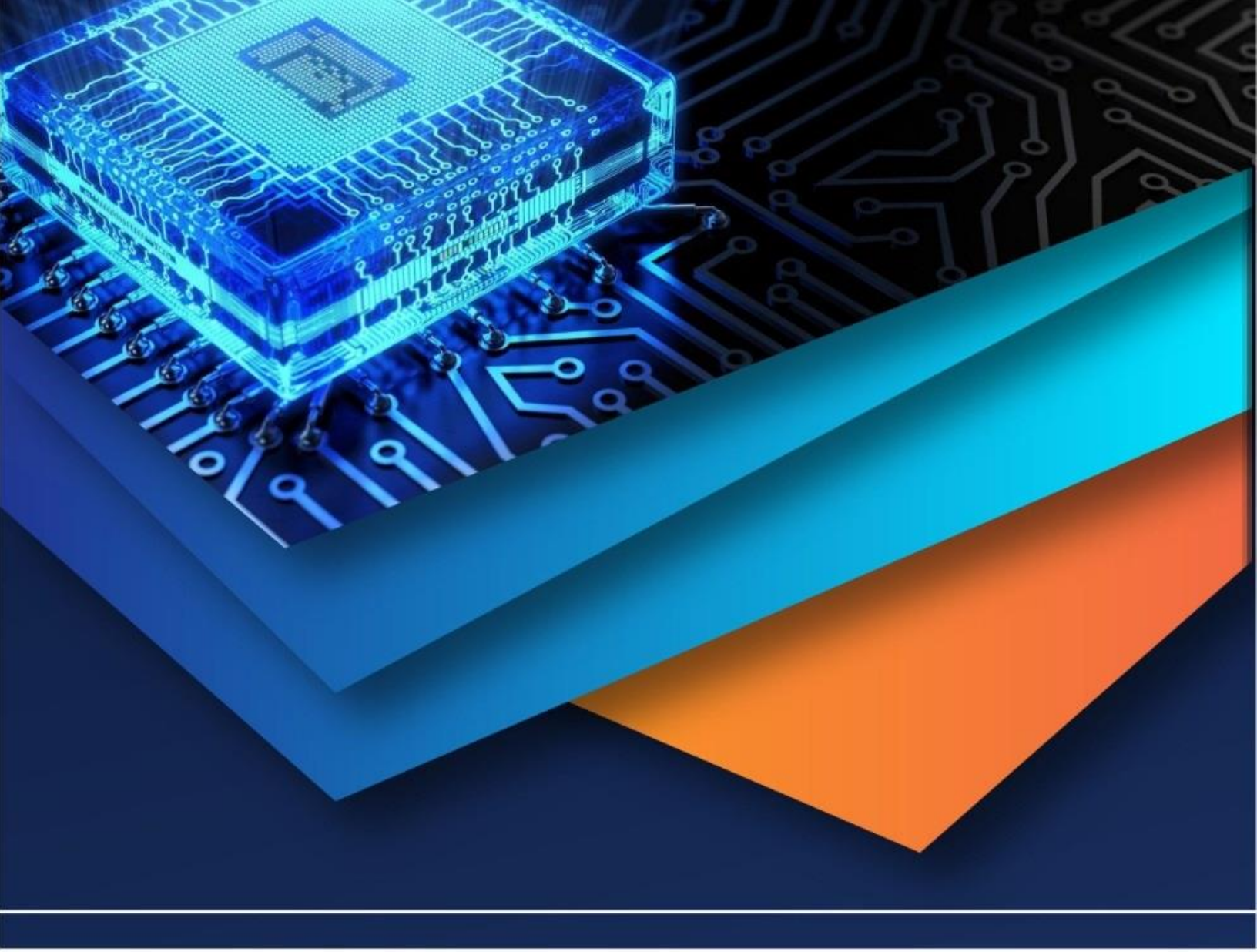

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