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"Electric Power Generation by Using Roof Top Ventilator"

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ABSTRACT

The modified roof ventilator that can generate electricity. The new modification of the roof ventilator system is by adding the extra fins to help it to spin faster and more efficient. Optimum design and performance of the system also discussed. This system is suitable to use for the low speed wind places. The system is containing the combination of the DC generator, roof ventilator, battery charger, and inverter. This system managed to produce 13V DC to 14V DC to charge the 12V DC batteries system. The operational concept of the system is the load will use the energy from the battery that charged using roof ventilator. The observed performances of system are the voltage and current of the roof ventilator, battery and the load.

Keywords : Roof top ventilators , electric generator, wind energy.

I. INTRODUCTION

Wind energy is one 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. In Auditoriums, Theaters, work places, etc. there were number of peoples gather, together due to this warm atmosphere gets form. This warm air is lighter than cold air, so it goes upward towards roof and gets thrown out in atmosphere through roof ventilators. This warm air is a natural source provided by human being. The ventilator sucks the warm air in the building and throws it to the outside of the building, then the inside building temperature and humidity are not too high.

Now-a-days, the world is talking about the green energy that can save the world from pollutions and green house effects. 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 project is to produce the electrical energy from the roof ventilator that will spin. The new idea of the additional fins is helps to improve the ventilator speed and electrical production.

Block diagram

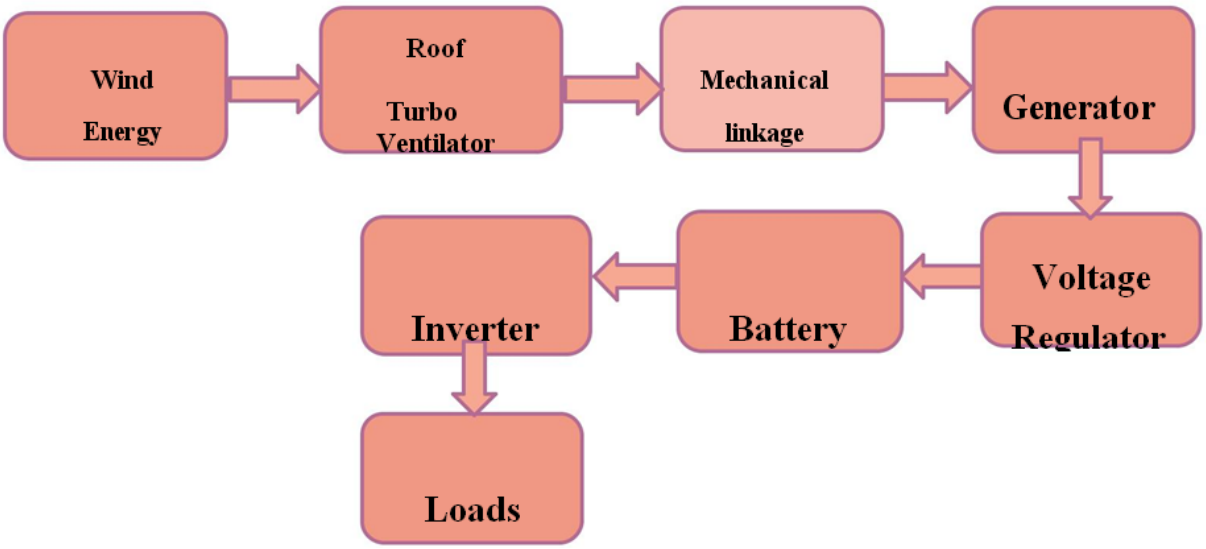

Figure 1. Block diagram of electrical power generation by using RTV

working diagram and principle :

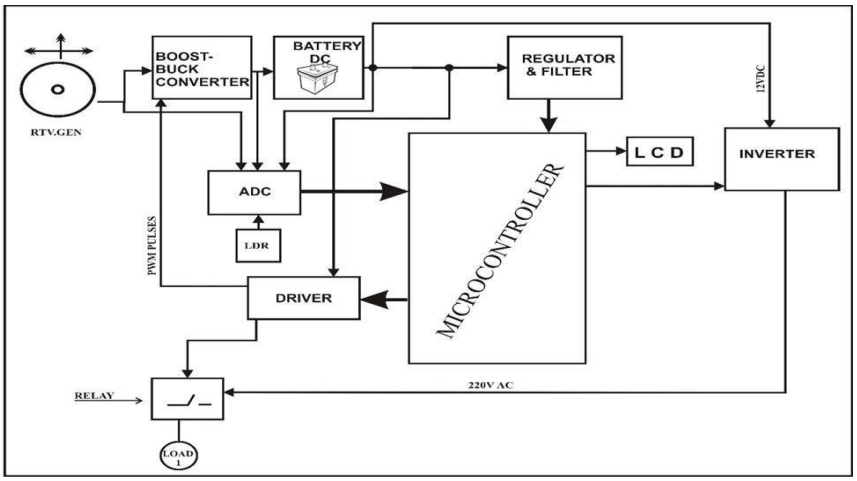

Figure 2. Working diagram of electrical power generation by using RTV.

- The presence of wind in industry, house, theaters etc. will sufficient to rotate the RTV. This RTV will be rotate the generator. This generator will generate some amount of voltage.
- The battery we used is 12v & the requirement of battery is constant i.e.12v.
- How to identify the boost/buck conversion?
- Battery is less than 12v then boost conversion are used.
- Battery is high than 12v then buck conversion are used

- ADC converter through battery will charged sufficiently or not will also check, that's why we check the battery output.
- What is ADC converter?

In our project, we read the three voltages by ADC convertor i.e. 1)Generator voltage

2)Buck/Boost voltage
3)Battery voltage.

• Microcontroller is used for some conditions to be checked & performed. The controller is worked on the some amount of voltage & it will also required to the some amount of constant voltage. Microcontroller will be confirmed that ADC converter will checked the voltage levels & that time we seen or we decided is battery sufficiently charged or not. If the battery will not charged then we performed buck/boost operation / conversion.

• Inverter has convert 12v DC through 220v AC & it goes through switching relay to load. Load will be any kind of load. Ex. Charger, bulb etc.

• Switching relay used because, suppose the voltage is less than 12v DC then the inverter output is also less than 220v AC & that time switching relay will off & the voltage is constant the switching relay will ON.

• So, for to operated the switching relay we used driver circuit. Driver circuit is nothing but the voltage amplifier circuit. This circuit will convert the output of micro-controller to 12v for to operate the switching relay.

II. CALCULATION – SELECTION PROCEDURE

Determine Volume of space to be ventilated
Volume (ft3)+ L x W x H,
Where L+ Length, W= width, H=Ht. of building
Select air changes per hour inside working area from table
A Calculate required ventilation rate Q (cfm)
Q(cfm)= Volume (ft3) x Air change Rate/ 60
Determine number of ventilators = Ventilation Rate Q/ Exhaust Capacity

Example:
Building dimensions with L=100ft,W=60ft,H=20ft.
Volume (ft3)=120000 ft3.
Air change rate selected =12 times per hour.(from Table-A)
Calculations required ventilation rate Q(cfm)
Q(cmf)= volume (ft3) x air change rate
Ventilation rate Q(cfm) = 120000x12 = 24000 cfm/60
Refer table B,select suitable table model from table is wind-e 22" Exhaust capacity = 1084, 1 ventilator per hour.

Under wind velocity of 5mph,temp. diff. of 5 degrees, stack height =20 ft. Air turbine ventilators required quantity = 24000 cfm / 1084 =22 Nos. Selection is 22 Nos. of wind-e 22"

Table 1. Recommended Air changes rates

Typing of building	Air change per hour	Typing of Building	Air change per hour
Assly Hall	6-12	Factories(Heavy)	10-30
Auditorium	4-12	Laundry	12-30
Bakeries	12-20	Paper Mill	8-30
Boiler Room	15-60	Textile Mills	4-12
Brewery	8-30	Packing Room	8-30
Class Room	10-15	Transformer Room	12-30
Engine Room	12-30	Paint Shops	10-30
Factories(Light)	6-12	Warehouse	4-6

Table 2. Performance Data

Wind Velocity(Mph)			5			8			10		
Temp. Diff. °C			3	5	10	3	5	10	3	5	10
Model No.	Throat size (inc)	Stack height	**Exhaust Capacity in cfm**								
Wind-e	22	10	939	1000	1102	1436	1498	1600	1792	1854	1958
		20	1005	1084	1216	1503	1582	1714	1859	1938	2070
		30	1058	1154	1314	1556	1652	1812	1915	2010	2168
		40	1107	1216	1398	1605	1714	1896	1961	2070	2252

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