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Generation of electricity using wind ventilator.

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Abstract:- Vertical axis wind turbines and horizontal axis wind turbines. They both have their advantages and disadvantages and the purpose of this project is to help you choose the right system for your application. Horizontal axis wind turbine dominates the majority of the wind industry. Horizontal axis means the rotating axis of the wind turbine is horizontal, or parallel with the ground. In big wind application, horizontal axis wind turbines are almost all you will ever see. However, in small wind and residential wind applications, vertical axis turbines have their place. The advantage of horizontal wind is that it is able to produce more electricity from a given amount of wind. vertical axis turbines are primarily used in small wind projects and residential applications. This niche comes from the OEM's claims of a vertical axis turbines ability to produce well in tumultuous wind conditions. Vertical axis turbines are powered by wind coming from all 360 degrees, and even some turbines are powered when the wind blows from top to bottom.

Keywords :- Wind Ventilator , Dynamo, PIC Microcontroller, Lead acid battery, Simple Generator.

|. INTRODUCTION

Nowadays, 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 wind ventilator is to provide fresh air in wind space and living area all year round 24 hours a day free of charge. The demand of electricity is increasing day by day. To achieve that demand different renewable and non-renewable energy sources are used to produce electricity. In other side by using conventional energy source the pollution is increasing and this creates global warming .This type sources are destroyable energy sources. Now all countries and associations are interested in the renewable energy sources. The main function of the free spinning wind ventilator is to provide fresh air in wind space and living area all year round 24 hours a day free of charge. The new idea of the additional fins is helps to improve the ventilator speed and electrical production. The human being not just can enjoy the benefits of the better air ventilation in the house, but also have extra electricity supply for load appliances such asradio, mobile phone charger,etc. The main component of the system is the DC motors. It will convert the kinetic energy from the warm air to the electricity for our usage. 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 wind ventilator is not functioning. If we want to drive an AC load then inverter is use to convert from DC to AC for our AC load usage.

||. PROBLEM STATEMENT

It is found that the electricity generation from energy sources like solar energy, tidal energy and some other sources have some disadvantages. For example energy harvesting from tidal energy requires construction of dam in sea which is very costlier.Alsoelectricity generation though solar ponds requires regular maintenance because salt crystals forms after vaporization of water. Same thing happens in case energy harvesting from geothermal energy. Therefore we have decided to develop a system which requires less area for assembly, having less maintenance and Maintenance cost & no adverse effect on environment.

|||. OBJECTIVES

1. To produce electricity by using wind ventilator.
2. To select a wind ventilator of suitable diameter of hub, number of blades and area of blades.
3. To fabricate a metallic stand for assembling of wind – top ventilator and dcgenerator.

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|V. LITERATURE REVIEW

Sirichai Dangeam This paper describe that the thailand is the country in the tropical zone.There are high humidity and warm weather all of year.For the results after install the generator in the ventilator on the wind of a building to charge the12Vbattery, and the minimum wind speed for enough charging to battery is at 20rpm.Chonmapat Torasaa, Nichanant Sermsrib This paper describe that 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.Ashvi Suresh, Basil Jacob,Lishana Fathima Sharaf, Gomathy S This paper describe that the wind energy is one 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 Wind top Turbine Ventilator (R.T.V).

V.DESIGN PARAMETERS USED FOR SHAFT, BEARING, BELT DRIVE

1. Design Of Shaft :-Material - Mild steel (40C8) Sut = 700 N/mm^2, Syt = 400 N/mm^2 (from Design data book) Design of shaft using ASME code.
Allowable shear stress = 0.30*Syt, Allowable shear stress = 0.18*Sut
When,Key way is used shear stress is reduce by 25% T = 0.30*400 =120 N/mm^2 .
T = 16/лd^3*√((kb*mb)^2 + (kt*mt)^2) Assume kb =1.5 And kt =2 ,
Twisting moment : Mt =(P*60)/2лN V =(лDN)/60.
2.Selection of Shaft Ball Bearing :- In selection of ball bearing the main governing factor is the system design of the drive i.e.; the size of the ball bearing is of major importance; hence we shall first select an appropriate ball bearing. As shaft diameter is 20mm to it &selected a pedestal ball bearing having shaft outer dia-20mm ball bearing to support the shaft of 20mm.
Total Axial load on bearings are = Weight of Blade + weight of shaft.
Equivalent dynamic load , Pe = V.Fa.Ka.
Bearing Life is :- $\mathbf{L^{10} = Lh10 * 60 * n / 10^6.}$
3.Design of Belt Drive :- Motor pulley diameter d = 20 mm, shaft pulley diameter D = 60 mm , Coefficient of friction = 0.23 Let, Thickness of belt = 5 mm , Width of belt = 6 mm
Mass of belt per unit length is given by; Density of belt material = 950 kg/m3m= 0.0285 kg/m.
Velocity of belt is given by; V = π(d+t)n / 60*1000 ; Tension in the belt is; P = (F1 - F2) V / 1000. ;
Centrifugal force in belt is given by ;
$FC = mV^2$.

V|. COMPONENTS

1. Wind Ventilator :- Rooftop ventilators are generally placed on the roofs of industries, workshops, ware houses etc. for ventilation. They do not want electricity for its working .Being an eco-friendly green product RTV helps in reducing the carbon footprint and aid in energy savings. They are maintenance free. They do not produce any noise during its operation. There are different sizes of wind turbo ventilators that range from 14″ to 36″.Due to the fact that they are located at the highest point of the wind, they are able to give off optimum ventilation. They also have to be strong and anti-corrosive.Size Impeller Dia. :22" ,Net Diameter :28"Throat Diameter, Weight :7.2 Kgapprox,. Bushing :Teflon Bushing(noiseless) Blades :32 Nos. 0.5 mm Aluminum Blades, Bracket :M S galvanized, Top Cover :Stainless steel, Ring :Stainless steel.

Fig.1.Wind Ventilator.

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2. Simple Generator :- A simple generator is similar to an electric motor. With a motor, we put electrical energy in and get rotational energy out. With a generator we put rotational energy in and get electrical energy out. As with the motor, the current direction changes with each half turn of the generator. The generator produces alternating current because slip rings are used in place of a split - ring commentator. The slip rings keep a continuous connection with the wire around the armature (continued).Ifasimple electric motor with a split - ring commentator is used to generate electricity, you do not get alternating current. A different type of electrical output is produced.

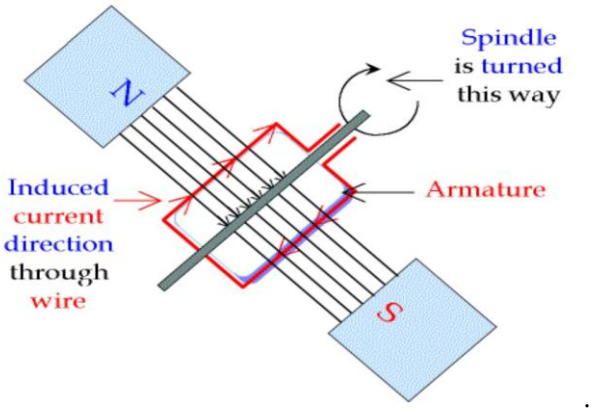

Fig.2.Simple Generator.

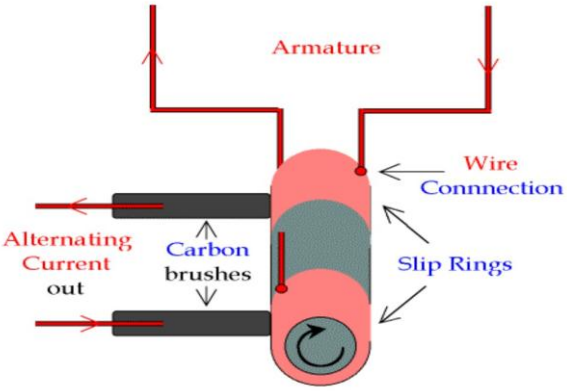

Fig.3.Current Direction.

3.Battery :- In isolated systems away from the grid, batteries are used for storage of excess solar energy converted into electrical energy. Batteries seem to be the only technically and economically available storage means.It has following properties Low cost, Long life, High reliability, High overall efficiency Low discharge, Minimum maintenance. We use lead acid battery for storing the electrical energy from the solar panel for lighting the street and so about the lead acid cells are explained below.lead-acid cells are often used in a series combination of three for a 6-V battery and six for a 12-V battery. The lead acid cell type is a secondary cell or storage cell, which can be recharged.

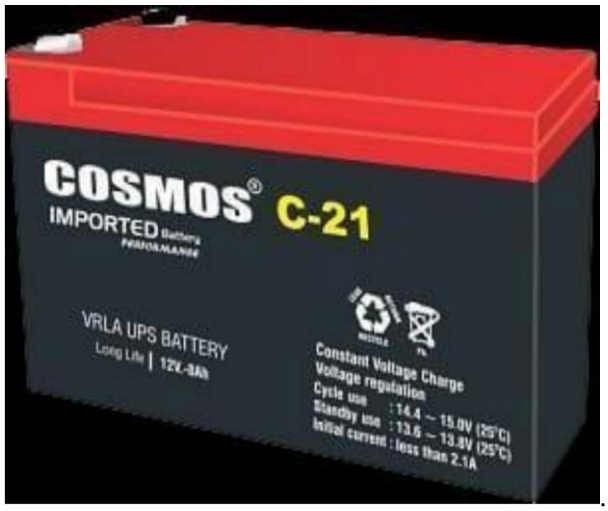

Fig.4. Battery.

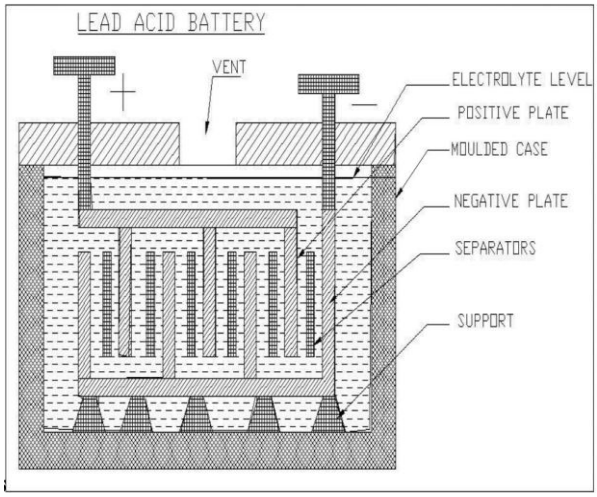

Fig.5.Construction of Lead-acid Battery.

4.PIC Microcontroller :- The name PIC initially is referred to Peripheral Interface Controller.The PIC microcontroller is a low cost 'computers on a chip' manufactured by Microchip. They allow electronic designers and hobbyists impart intelligence and logic to a single chip for special purpose applications and products. PIC microcontroller is the first reduced instruction set computing based microcontroller fabricated in complementary metal oxide semiconductor,that uses separate bus for instruction and data allowing simultaneous access of program and data memory. Components required Power supply , PIC16F877A microcontroller, Resistors ¼ watt (1kΩ x2), Capacitors (22pF x2), Electrolytic capacitor(1µF), Push button switch (for resetting thePIC), Crystal(4MHz), LED.

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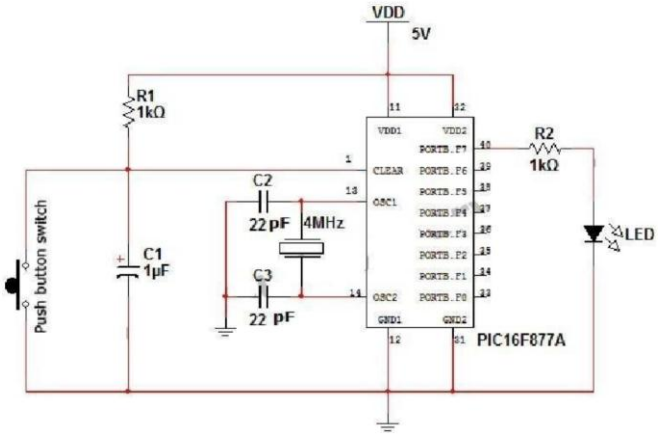

Fig.6. Basic Connection Diagram of PIC Microcontroller.

5.Liquid Crystal Display :- LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits.

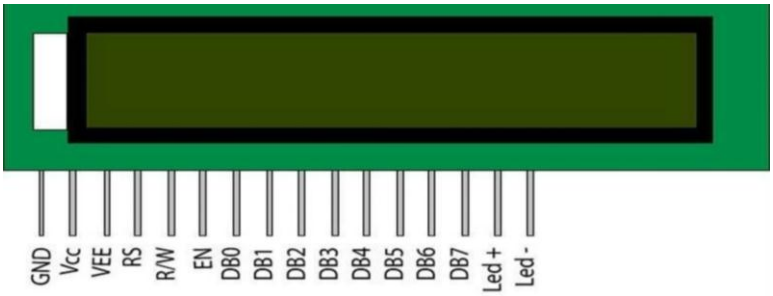

Fig.7. Basic connection diagram of PIC Controller Pin

V||. ACTUAL PROTOTYPE

Fig.8.Actual Prototype

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V|||. WORKING

1.To design the air ventilation ball to generate the electric current, the concept was designed to modify the ventilated ball with the diameter 24 inches to install the 18 watts DC generator.The simple process and cheapest expense are considered, and the DC generator will also not close the ventilated holes. For further purposes, the DC generator is connected to ventilated ball and also connects to external battery charger to supply the electric current for Light Emitting Diode (LED) lamp.
2. Install DC generator in the air ventilation ball and generator in the ball close to the axis. Put the gear in the proportion 1:4 to the air ventilation ball axis and rotor axis of the electric generator to allow the movement of electric generator axis while the wind blow the ventilation ball.
3. From the results of the invented air ventilation balls, the balls cannot generate the sufficient electric voltage for the batteries charger. So, the DC step-up converter must be added to increase the electric voltage. The DC step-up converter using Astable Multivibrator Circuit by Timer Integrated Circuit (IC) No. LM555 to create the square wave signal and bias to transistor for convert DC voltage from DC generator to the square wave signal. The high voltage square wave signal made by Step-upTransformer. And convert the high voltage square wave signal to be the DC voltage again by Bridge diode.

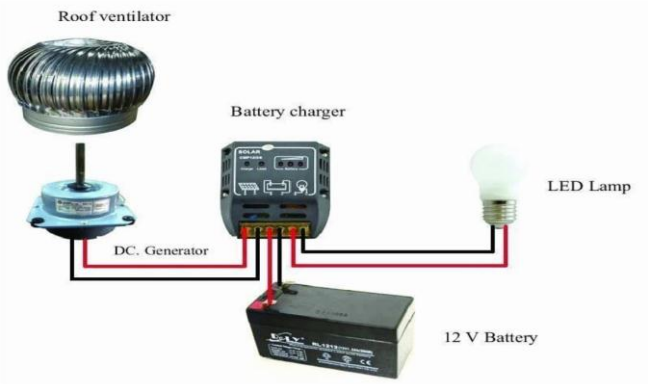

Fig.9.Working or Component Sequence.

|X. RESULT ANALYSIS

The maximum speed of ventilator is limited to 500rpm, there is mechanical vibrations at 500 rpm and above, which slightly affect the system stability.A Roof Top Ventilator mounted on the roof, no such vibrations willoccur at these low speed. A maximum voltage of 20 V DC is obtained at a ventilator speed of 500rpm.

SR.NO	Speed (RPM)	Voltage (V)
1.	300	12
2.	282	10
3.	200	9
4.	175	7
5.	170	5

Table.1. Result Analysis.

X.ADVANTAGES

1.It is accurate.
2.The system is non programmable.
3. battery back-up is provided.
4.Cost is less.
5.Construction is very simple and Suitable.

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X|. DISADVANTAGES

1.Less amount of energy produce.
2.It can change with respect to season.

X||. APPLICATIONS

1.In educational organization.
2.In hospital.
3. In industries.
4.It Can be used to control street light schedule.
5.It is used an electrical substations because light load seding in time scheduler.

X|||. CONCLUSION

This explains the brief idea about generation of electric power using wind ventilators.It gives the scope for future development of the system and encourages use of renewable energy at smallscale. This also gives us a brief idea about how to create an optimized model by improving the air flow rate thus increasing the available energy at the output. The observation illustrates that the output voltage and current is directly proportional to the wind speed rotational speed of the wind ventilator. This project has a very good future scope for further improvements and developments in the industrial as well as the domestic applications.

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