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Generation of Electricity by Rooftop Turbo Exhaust Ventilator

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Abstract: *Renewable energy is crucial since resources are running out. One of the main renewable energy sources is wind power. In this essay, we will examine and evaluate several research studies onthe use of turbo ventilators in wind energy generation to produce electricity. Through the use ofnumerous electrical and mechanical approaches, this technology is practical and affordable. In this research, we also aim to increase the system's efficiency through the use of different materials in the construction of turbo ventilators. We have read the articles written by different authors on this subject. After comparing each concept, we came up with an effective model by fusing all of the designs into one*

Keywords: Turbo-Ventilator, Electric Generator, permanent magnet, Axial Flow, Wind Energy, Ventilation

I. INTRODUCTION

We are aware that the global need for electricity is rising daily. A variety of non-renewable and renewable energy sources are used to create power to meet that demand. On the other hand, the use of traditional energy sources leads to increased pollution, which in turn causes global warming. The conventional energy sources are destructible. Renewable energy sources have piqued the curiosity of nations everywhere. Waves in the ocean, wind, water, and sun can all be significant factors in the generation of electricity. However, when energy power generation grows, a few issues such as high building costs, challenging maintenance, lack of space for plant installation, and power distribution emerge. To address these issues, a micro power plant is beingdeveloped in India. The Indian

Methodology:

1. Considering the building's location and the direction of the wind, choose a suitable rooftopventilator.
2. Attach the rooftop ventilator to the building's roof.
3. Attach the rooftop ventilator to a generator so that it may produce electrical energy from themechanical energy it produces.
4. Attach the generator to an inverter so that it can change DC power into AC power.
5. To control the voltage and frequency of the electricity produced, install power conditioningequipment.
6. To keep track of the quantity of power produced and used, install a net metering system.
7. To reduce electricity costs, feed back any extra electricity produced into the grid.

Objectives:

1. The primary goal of the invention is to offer a system and a technique for producing powerfrom the byproducts of human activity.
2. The invention's other goal is to offer a system and a procedure for producing energy using the high wind pressure that a rooftop turbine ventilator produces.
3. To lessen the impact of automobiles on global warming.
4. To lessen the amount of gasoline used by cars to reduce pollution and make the world a greener place. Almost any kind of vehicle can use a wind turbine generator, but electric carsespecially

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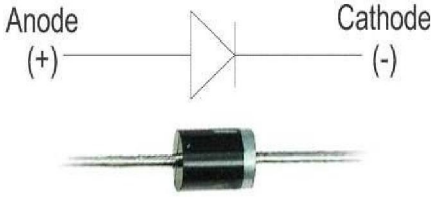
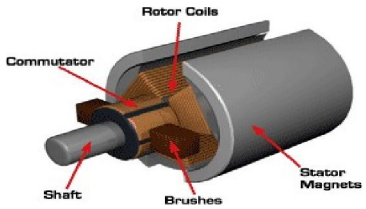
II. COMPONENTS USED

ROOFTOP VENTILATOR

DIODE



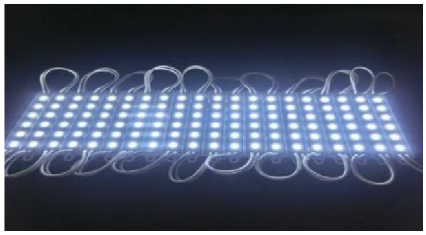
DC GENERATOR



MULTIMETER

BATTERY:

LED LAMP



III. CONSTRUCTION

The Turbo ventilator is mounted on the rooftop, its fins outstretched and open to ambient air. Thebase portion extends into the structure. A circular frame is affixed to the altered base. The Neodymium-Iron-Boron permanent magnetic discs are housed in this frame. The armature is made up of the stator, which is a wire-wound circular ring. In between the magnetic disks is where it is located. With this setup, a single armature produces twice the magnetic field. Variable field strengths can also benefit from this arrangement. The discs' heights can be changed to alter the air gap. Thus, this is a great tool for doing experiments.

Fig: Construction
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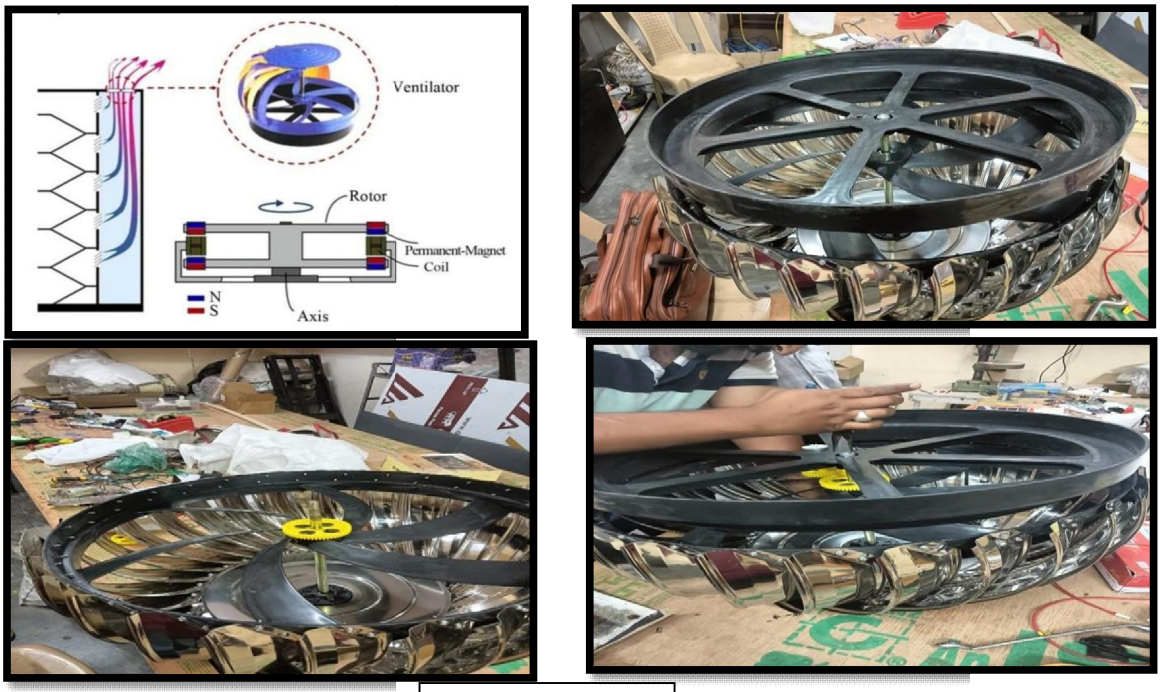

Fig: Construction

The step-up transformer unit, which is located on the base floor, receives the wires from the stator armature. It can be used in AC mode after stepping up or it can be converted to DC modeand stored in a battery. This research examines the ---application of LED lighting. However, other low-power applications may be taken into consideration, such as electric scooters, tablets,and charging.

IV. WORKING

A cost-efficient and efficient ventilator system is the Turbo Ventilator. Turbo ventilators function using the pressure and temperature differential that promotes natural convection. Rooftop mounts are used for turbo ventilators. The rotating parts' impellers are open to the external environment. They are powered solely by wind and don't require electricity or any otherexternal power source to spin.

Fig: Working of Turbo Ventilators

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The purpose of turbo ventilators is to replace hot air with cooler air, thereby lowering the interiortemperature of the building. The hot air that forms inside the structure has a lower density and is lighter in weight. As a result, they tend to naturally convect upward to the roof. These hot gases are removed from the atmosphere by the revolving turbo ventilators. This produces an area of low pressure surrounding the ventilator. Fresh, cold air with a higher density enters the building through the turbo ventilator as a result of this pressure drop. This cycle is maintained, and the ventilator's rotation is further aided by the movement of hot and cold air. Thus, without requiringany power, the turbo ventilator operates continuously to reduce interior temperature by 3–4 degrees Celsius.

Ventilators with turbos move freely. Electricity can be generated by the ventilator's rotation. Thisconcept is connected to wind turbines, which use an electric generator powered by the wind to generate electricity. In a similar vein, we can generate electricity by connecting the electric generator to the turbo ventilator.

Devices that transform mechanical labor into electrical energy are called alternators or electric generators. Faraday's law is the foundation for how a generator operates. According to Faraday'sLaw, emf is induced in a conductor whenever it moves in a magnetic field. The rotor and stator are the two main components of an electric generator. The stationary part is called a stator, and the rotating moving part is called a rotor. Permanent magnets were used as the stator and armature in early generators, which are composed of The generator that produces an AC electromagnetic field. They have a low magnitude, that is, less than 10V. For this reason, a step-up transformer is connected to them. The input voltages in the step-up transformer are increasedto a higher output voltage by mutual induction of the coil windings. This can be used straight away to power LED lighting bulbs. Storing it as DC in batteries is an additional option.

V. RESULTS

The following values of current and voltage were experimented on using the variable of speed as shown in the following tabular representation.

SL. No.	Turbine Speed [rpm]	Voltage [V][volt]	Current [I][amp]	Step-up Voltage [V]	Power Output[Watts]
1	10	2	0.026	2	0.052
2	20	2.5	0.052	2.5	0.130
3	30	3.1	0.078	12	0.916
4	40	3.12	0.104	12.2	1.27
5	50	3.16	0.130	12.7	1.65
6	60	3.21	0.156	20.1	3.14
7	70	3.24	0.182	20.8	3.79
8	80	3.28	0.208	20.9	4.35
9	90	3.32	0.234	30.2	7.07
10	100	3.33	0.260	30.6	7.96
11	110	3.36	0.286	30.7	8.78
12	120	3.4	0.312	50	15.6
13	130	3.43	0.338	50.1	16.93
14	140	3.47	0.364	50.3	18.31
15	150	3.58	0.390	50.4	19.66

Table: Observation Table

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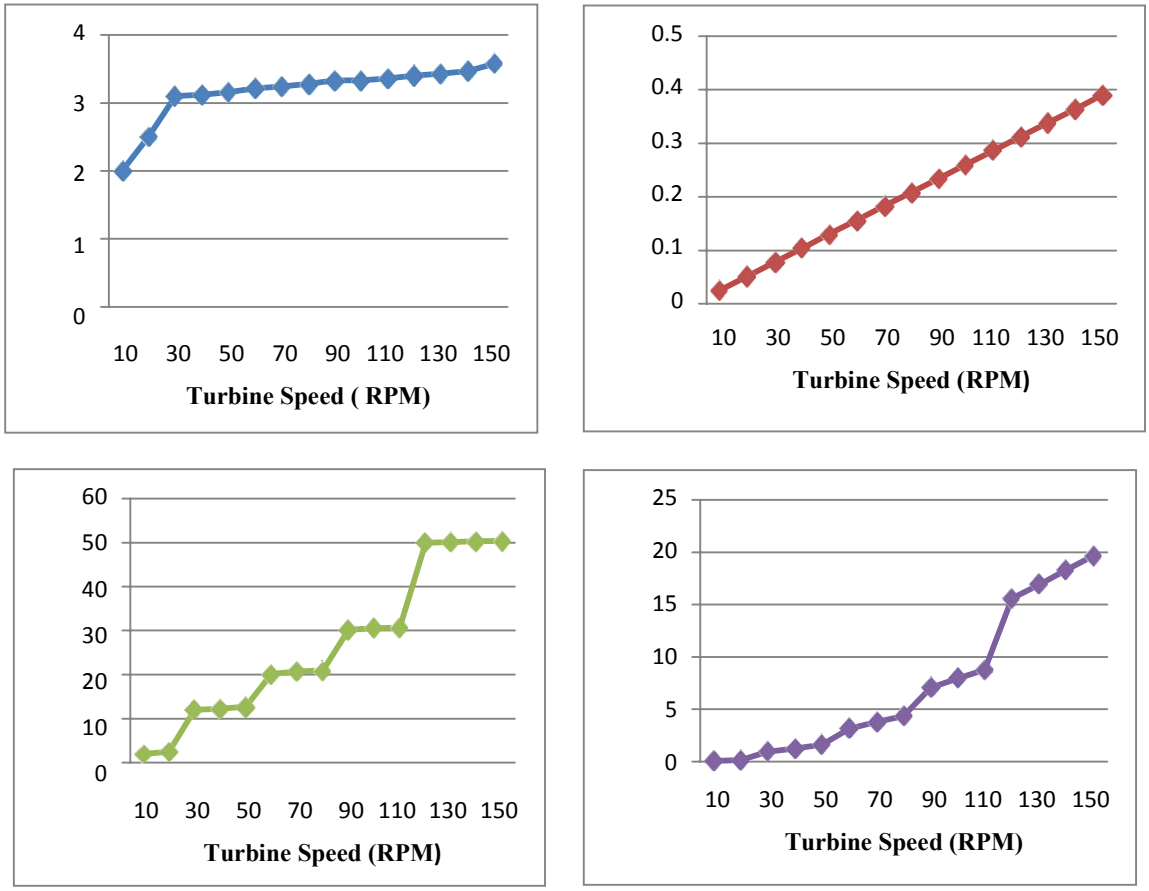

VI. SCOPE FOR FUTURE WORK

Every year, the world's need for energy grows as a result of technological advancement. But how can energy be produced most effectively without destroying the environment or using up fossil fuels? Additionally, the best way to solve this issue would be with renewable energy. Wind power is one of the most promising renewable energy sources currently available.

When compared to the use of fossil fuels, wind energy has numerous advantages. The first is that wind turbines do not emit greenhouse gases into the atmosphere after they are constructed.

Additionally, wind energy doesn't release additional pollutants into the air or water.

The need for renewable energy sources is growing to ensure a sustainable future. Wind energy is a resource that is increasingly

VII. CONCLUSION

The RTV's first mechanical capability in terms of technological viability is its ability to operate at low wind speeds starting at 0.4 m/s and make use of the low-speed wind that is available. This indicates that low-speed wind resources can provide kinetic energy for the RTV to harvest.

Second, even though it produces very little power, the RTV can start generating electricity at a self-starting speed of 0.4 m/s. It is possible to increase power output in the low-speed wind range by doing more research.

It might not be economically feasible for a single RTV unit to generate 20 watts of power or more. Nonetheless, it might work well for sophisticated home lighting applications. It is advised to increase the quantity to lower the cost per kWh.

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