



## POWER PLANT- PORTABLE MICRO POWER GENERATION

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**Abstract :** This project gives an idea of "POWER PLANT- PORTABLE MICRO POWER GENERATION". In this project we considered wind as a renewable source of energy to generate electricity with the help of aeroleaves which are leaf-like structures of wind turbine. They are placed in the form of a tree called Wind tree. These aeroleaves are small vertical Axis Wind Turbine (VAWT) and able to generate power. They are also silent, so they could be installed along buildings, streets or even in people's backyards. The rotation of aeroleaves depends on wind speed and wind direction. VAWT will catch wind from all directions. When wind blows, aeroleaves rotate and energy is produced. In this project, the power generated from wind tree is eco-friendly, less noise, less polluted and can provide electricity to remote locations.

**Keywords -** Aeroleaves, Wind Tree, Renewable Sources, Vertical Axis Wind Turbine

### 1. INTRODUCTION

Wind energy plays an essential role to generate electricity. It is also reliable, efficient and low lost energy system with no pollution and natural resource. Wind energy is worldwide fastest growing energy system. In this project by using wind energy electricity is generated in a new form called as aero leaves. Aero leaves are nothing but many leaves-like structures of the wind energy are placed in the form of a tree called "Wind tree". In wind tree any other type of wind turbine can be used but vertical axis wind turbine has some specific advantages for high efficiency of power plant. VAWT main rotor shaft is arranged vertically because the plane of rotation is vertical. Also blades are vertical. The biggest advantage is they don't require a control mechanism. The PVC pipes or GI sheet are used for turbines and it appears like a normal leaf which is placed vertically. With tiny blades wind tree power plant is designed as small as possible and it works quietly or silently. These aero leaves are able to generate power in a confident and relaxed way. So they could be installed along buildings, streets or even in people's backyard. This aero leaves produce the energy depend on wind power flow and rotating. Power is generated with the help of generator. It's finding that energy generating through environment is so beneficial and also can provide power to remote areas. <sup>[1]</sup>

### 2. METHODOLOGY

#### 2.1 Concept of wind turbine

In the name suggest it was observed that by placing number of turbines on a single stand the power output could be increased. In wind tree concept the vertical axis wind turbines are used for power generation in which the multiple micro wind turbines are coupled in a single tree and this is because of reduced size of rotor blades. So they can be easily operate due to the impact of forced air. Each turbine is connected to a single generator by the help of generator power is generated and energy is stored with the help of battery. The main advantages of this wind tree is that: It is highly economical and eco-friendly. The figure.1 shows

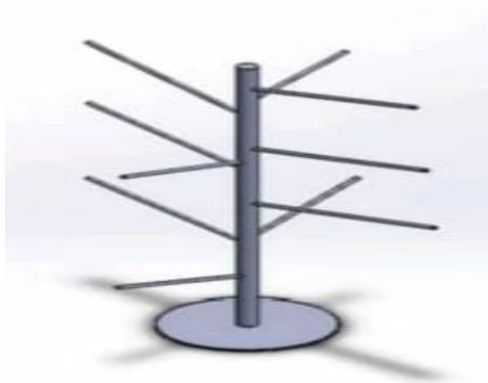


Fig.1 Stand

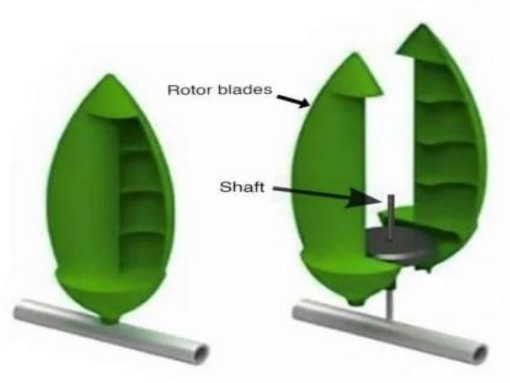


Fig.2 Aeroleaf

## 2.2 Vertical Axis Wind Turbine

VAWT the axis of wind turbine rotate in vertical direction with respect to ground. The blades of VAWT are vertical in arrangement.. The advantage of VAWT is they don't need a yaw control mechanism. They can capture wind from any direction. In VAWT gear box replacement and maintenance are simple and more efficient, Thus these are useful in sites where wind direction is random or there is presence of large obstacles likes trees ,hours etc. [7]

## 2.3 Block Diagram

In block diagram is compose of the Aeroleaf, Generator, wind turbine controller, battery and Load.

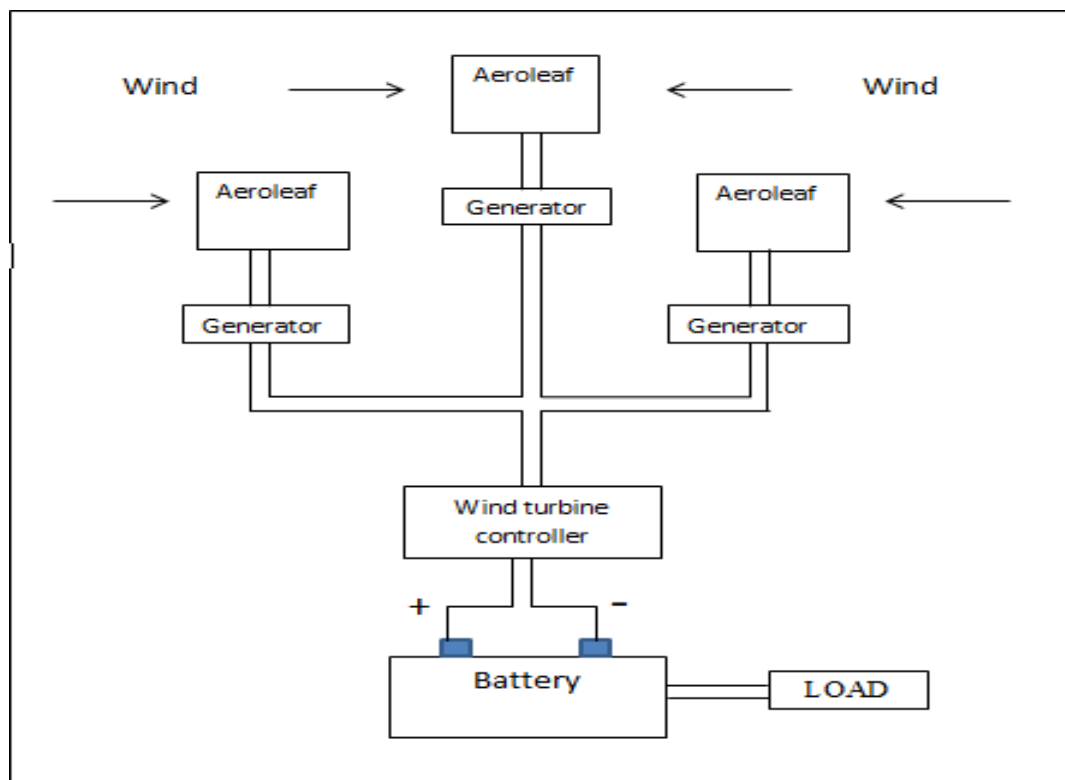


Fig.3 Block Diagram

## 2.4 WORKING

In this project wind energy is used to generate electricity with the help of aero leaf. This aero leaf are made up of fiberglass, wood, aluminium, PVC and design into specific shape as per the requirement. In concept of wind tree we are using number of generator which will be equal to the number of aero leafs. This model is basically work on the principle of “faradays low of electromagnetic induction”, which state whenever a conductor is placed in a varying magnetic field (or conductor is moved in a magnetic field) an EMF get induced in the conductor. The design of wind tree is capable of extracting maximum kinetic energy from the wind using to the structure of blade design. Aero leaf starts to rotate with minimum speed of 7km/hr. Wind flows through it, as aero leaf are coupled to the generator, mechanical energy gets converted into electrical energy because of the generator which consist of armature (magnet) and field coil. A gear box is attached between blade and generator in order to increase the number of rotation and unable the system to work smoothly each aero leaf along with generator are connected in series, so the generated voltage will get added. This result output is given to the battery and is stored, then it is used to drive the load.

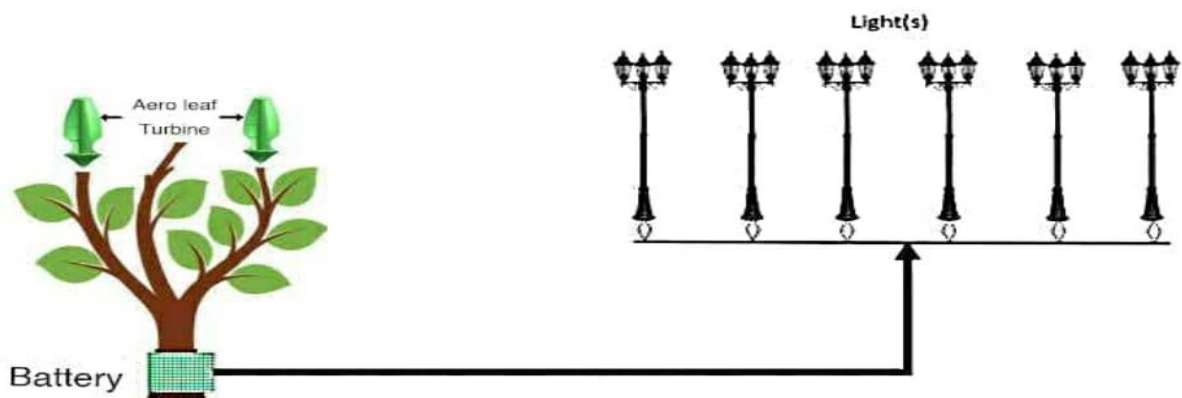


Fig.4 Working of wind tree

## 2.5 POWER CURVE OUTPUT

The below power curve indicates the generation of power per aero leaf depending on the wind velocity when the speed of aero leaf increases then the output power increases that is shown in curve.

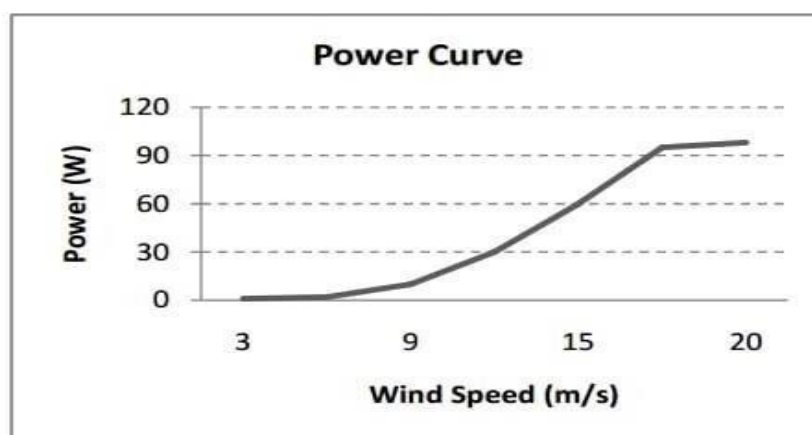


Fig 5 Power output

### 3. FIGURES AND TABLES

Sr.No	Component	Description	Rating
1	Rotor Blades	Tiny blades which can generate electricity even in slightest wind speed	15cm
2	DC Generator	Converting the rotating speed to an electrical	9V,1.1A,2500rpm
3	Battery	Charged electrically to provide a static potentials for power or released electrical charged when needed	9V,3A
4	Load(LED Panel)	Showing consumption from the battery	9V,900mA

Table 1- Components And Description

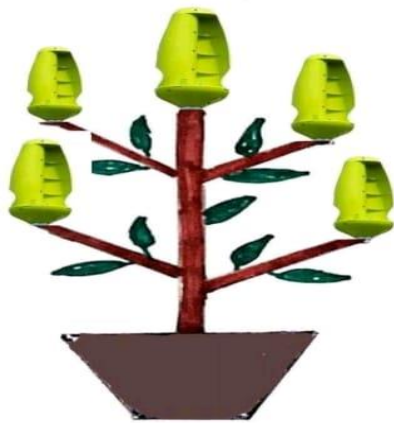


Fig.6 Scale Down Model of Wind Turbine



Fig.7 Scale Up Model of Wind Turbine



Fig.8 Model of Aeroleaf wind turbine

#### 4. CONCLUSION

We were able to get these important conclusion and suggestions from our many researches as well as from some past projects which will profit the future for advancement of power yield from our project we were able to come up with net new structure to improve the system and its efficiency To increase the use of VAWT the various associated problems have to be overcome first and problems are such as poor self-starting, low initial torque, low power co-efficient, poor building integration. In our project we are trying to designed VAWT model which offers feasible solution for energy requirement of remote places. The main role was played by wind turbine rotor blades to performs evaluation and extraction of energy from turbine by using VAWT which are placed in a location where suitable amount of wind is available along with by optimizing blade parameters use, high power generation can be achieved.

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