# VERTICAL AXIS WIND TURBINE FOR POWER GENERATION IN HIGHWAY LIGHTING

S. RajKumar[1], S.San Anil[2], V. SivaRam Chandar[3], Mr.S.Krishna Kumar [4]
[1]Department of Electrical Engineering
[2]Department of Electrical Engineering
[3]Department of Electrical Engineering
[4] Associate Professor, Department of Electrical Engineering
Prathyusha Engineering College, Tamilnadu.
[1] ragastus96@gmail.com, [2] sananil07@yahoo.com ,[3] sivachandru97@gmail.com ,
[4]Hod.eee@prathyusha.edu.in

## Abstract

In recent years, worldwide energy crisis is emerging accompanied by high global emission and hence research and development activities are carried out in the field of wind and solar energy which are of renewable energy resources. The vertical axis wind turbine replaced the horizontal axis wind turbine because HAWT are not used for household purposes but VAWT can operate in low wind condition and also serves for household purposes. This design should have the higher efficiency when compared to the HAWT and contribute to its steady growing popularity for the purpose of mass utilization in the near future as a reliable source of power generation. The Vertical axis wind turbine is used to generate the DCpower and fed to the power grid. A Vertical axis wind turbine does not need to be oriented into the wind. A power transmission mechanism can be mounted at ground level for easy access. For generating the power it depends on the wind velocity. But we assure that Vertical axis wind turbine can generate the fixed D.C. output which does not depends majorly on the velocity of the wind.

**Keywords:** vertical axis wind turbine, blade design, inverter, battery source, bearings, DC generator.

## 1. Introduction:

The highly emerging clean energy in the world is wind energy. This requirement only due to the hike in rate of fossil fuels. According to Global wind Energy Council, in next few years the employment for the wind power generation should be increased if this system is implemented. A major problem facing with the technology is deviation in the wind power. Due to rapid moving of the vehicles in the highways there will be the availability of constant wind power, so the purpose of this project is to contribute the clean energy in a useful way for worldwide. The VAWT are classified a three air foil shaped blades are arranged in vertical shaft where the blades projected outwards to face the wind direction and it requires normal wind velocity to run and the another type of turbine is one where the blades arranged vertically with S shape. The direction of air flow does not affect the direction of rotation in the turbine. An explicit way of reusing the wind energy obtained by vehicles moving at high speeds on our national highway.We already know that the air turbulence will generated by the

vehicles moving at particular speed especially by trucks. This can be done by mounting the VAWT at the middle of the roads that will be driven by the wind which is generated by the moving vehicles. Meanwhile we never recover the energy produced by a trucks, but even a small energy could be a significant source of power. In the national and state highways, the average vehicle speed are recorded approximately 80 kilometer per hour. The generated energy will be fed back to the substations to power up the villages nearby or to the power grid. The power production estimation will be increased as increase in wind turbulence speed exponentially.

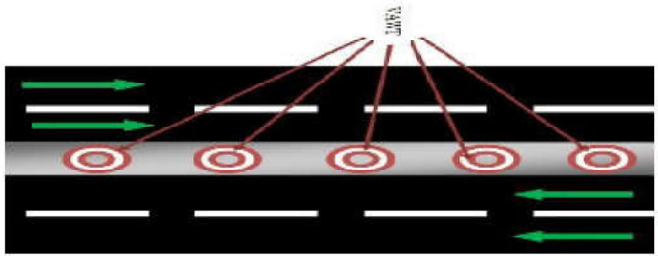


**FIG 1.Turbine in Highway Divider.**

We hope that, if VAWT based wind stream created over the highway divider, it will create an average annual wind speed falls the baseline of 30 kilometer per hour. The highway vertical axis wind turbine is represented in FIG1. Rotation in the downwind sector will generates lesser power. The torque is only caused by the lift forces .In one revolution, a mass production of positive torque but there is also a small negative torque generated by a single rotor blade.

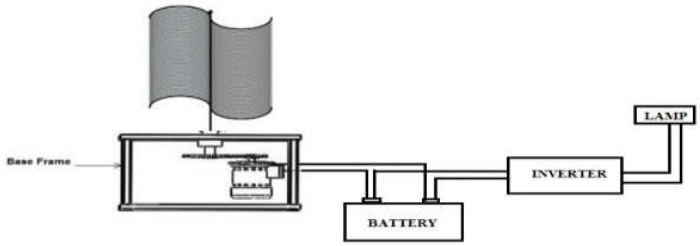
## EXISTING MODEL:

In the existing model, the vertical axis wind turbine with the darrieus type blade have been used .Those type of blades are projected outwards the turbine shaft which will not gives a continuous rotation. The optimum utilization of these design is not effective. The efficiency of this type of turbine is comparably low when compared to the savonius type of wind turbine. These turbines were facing difficult to start even at the moderate wind speed.

## PROPOSED MODEL:

The proposed model designed with the savonius blade at the angle inclination of 60 degree for each blade to the entire structure gives the continuous rotation in clockwise direction. This turbine is placed in the divider which can be rotated by vehicles moving in both the direction.so continuous rotation is achieved efficiently. The noise produced by this type of design is comparably low. Cost of this turbine is very low with simple blade structure.

FIG 2.BLOCK DIAGRAM OF VAWT




## OBJECTIVE:

- To optimize the renewable energy.
- This model has an ability to rotate at gusty wind where the horizontal wind turbine cannot harvest this energy.
- To reduce the maintenance cost savonius type of turbine is considered.
- To make use of wind energy from moving vehicles in highways.
- To achieve maximum energy from the compact size VAWT.

## WORKING:

When we keep the vertical axis wind turbine on the highway divider, due to the motion of the vehicles air flow toward the direction of vehicle and tends to rotate our vertical axis wind turbine, by the rotation of turbine our dc generator also rotating with VAWT through coupling .We know that dc generator convert mechanical energy into electrical energy. So here by the rotation of turbine is transferring to dc generator then our dc generator convert mechanical energy into electrical energy. For efficiency of power generation we can use gears.The generated electrical energy is stored in the battery to give a continuous power supply. Then the DC energy is converted to the AC power by the use of inverter. The power supply from the inverter is enough to switch on the lamp.

## ADVANTAGES:

- High efficiency than other VAWT
- Low cost turbine
- Easy fabrication
- Compact in size
- Portable

## RESULT:

With the lowest cost investment on wind turbine, maximum output voltage can be obtained from offshore wind. The maximum output voltage produced in between 18v to 20v which is sufficient to charge the battery, hence store the energy for future use. As vehicle moves continuously in highway roads, we can achieve continuous output voltage from this module.

## CONCLUSION:

The device developed in the reported project has shown that the power can be produced with wind energy. The device generates 3-12V potential difference with the wind energy supplied by a blower. The blower takes electrical power to rotate. The study shows that there is great potential in wind energy to generate power.

The data of the wind flow is measured and recorded on both sides of the highway roads which are produced by the vehicles. The wind turbine are designed and located according to the collected data. Similarly, a single turbine is not enough to generate the electricity, so the multiple turbines are integrated and connected to the grid for supplying street lights and public appliances. This design is simple to construct and environmental friendly. This type of turbine is smaller in size compared to the HAWT.

A careful selection has to be made for the blade profile so that the losses will be minimum and the power generation can be enhanced. Since the wind energy is not constant at all the time so the operation of the wind machine will be intermittent and the power production rate will also vary; the component should be design in such a manner so that the losses should be at minimum.

The wind energy will be the most economical power in the future. The rate of fossil fuel differs very much in retail with the production. There will be a "weather change" in the marketplace, or a "killer application" somewhere that will put several key companies or financial organizations in a position to profit. They will take advantage of public interest, the political and economic climate, and emotional or marketing factors to position wind energy technology (developed in a long lineage from the Chinese and the Persians to the present wind energy researchers and developers) for its next round of development.

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