



Hybrid System of Vertical Axis Wind Turbine & Piezoelectric Tiles

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Abstract: On keeping, prime focus on the crisis of three imperative components in the world like Energy. We have done an experimental investigation on the highways/expressways, so as to find the method that how these highways can be used as a hub of generating electricity by harnessing the available energy in a better efficient way. From wind energy, we are getting two types of energies:-1) Natural wind energy & 2) Impact wind energy and Piezoelectric crystals in speed breakers. But our experimental Investigation is concentrated on behaviour or characteristics of Impact wind energy as lots of advanced research work has already been done or going on the harnessing of Natural wind energy.

Keywords: Renewable Energy, Impact, Piezoelectric crystals.

I INTRODUCTION

A. WIND TURBINE

Vertical Axis Wind Turbine (or VAWTs) has the main rotor shaft arranged vertically. One advantage of this arrangement is that the turbine does not need to be pointed into the wind to be effective, which is an advantage on a site where the wind direction is highly variable, for example when the turbine is integrated into a building. Also, the generator and gearbox can be placed near the ground, using a direct drive from the rotor assembly to the ground-based gearbox, improving accessibility for maintenance.

B. TYPES OF WIND TURBINE

There are two types of Wind Turbine: -

- 1) Horizontal Axis Wind Turbine
- 2) Vertical Axis

Wind Turbine. Wind turbines can rotate about either a horizontal or a vertical axis, the former being both older and more common.

C. METHODOLOGY TO ATTAIN OBJECTIVES

- The wind turbine is of a vertical based turbine. Fabricated to rotate the shaft for slow wind speeds .The series connection of wind turbines which generates power from the 12-24V DC motor by the rotational motion of the shaft.

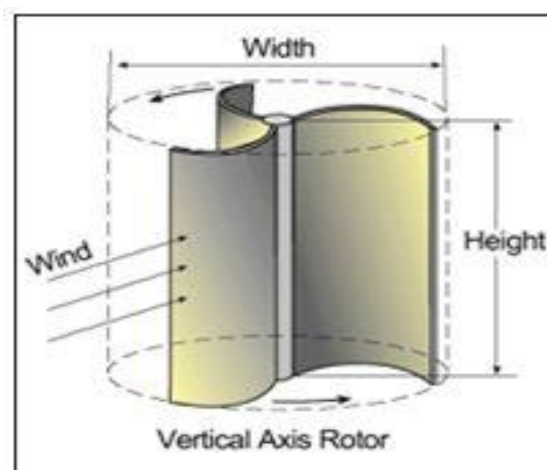


Fig 1saviours 3 blade turbine



- And this hybrid system consists of piezoelectric crystals placed on the roads with the help of composites on the speed breakers. And also there are Led flashers placed in the speed breakers.
- The impact wind from the vehicles makes the turbine blades to rotate and generate a voltage of about 150-240volts .and also the pressure energy of the vehicles while passing on the speed breakers creates compression on the piezo crystals and generate electric charge.
- This Hybrid system is used to power up the street lamps up to 8-10hrs a day averagely.
- And the new concept of placing the led caution flashers on the speed breakers creates a caution signal to the upcoming vehicles on the road.

B. PIEZOELECTRIC

If you want to capture energy and use it to power something, it’s true that you can get energy out of a speed breaks. A speed breaks pushes the cars wheels upwards, kinetic energy is converted to potential energy absorbed in its shock absorbers. Using piezoelectric sensors, you can generate power by converting some of that force into an electrical charge. You can produce high voltage, but pretty low current the core principle involves work: the application of force over a distance. A car force multiplied by the distance it depresses the piezo’s equals the amount of useful work that can be done and a car tire rolling over a piezo will depress it only a few microns.

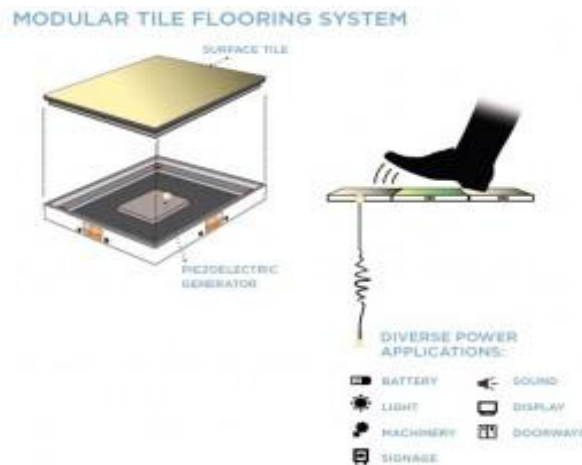
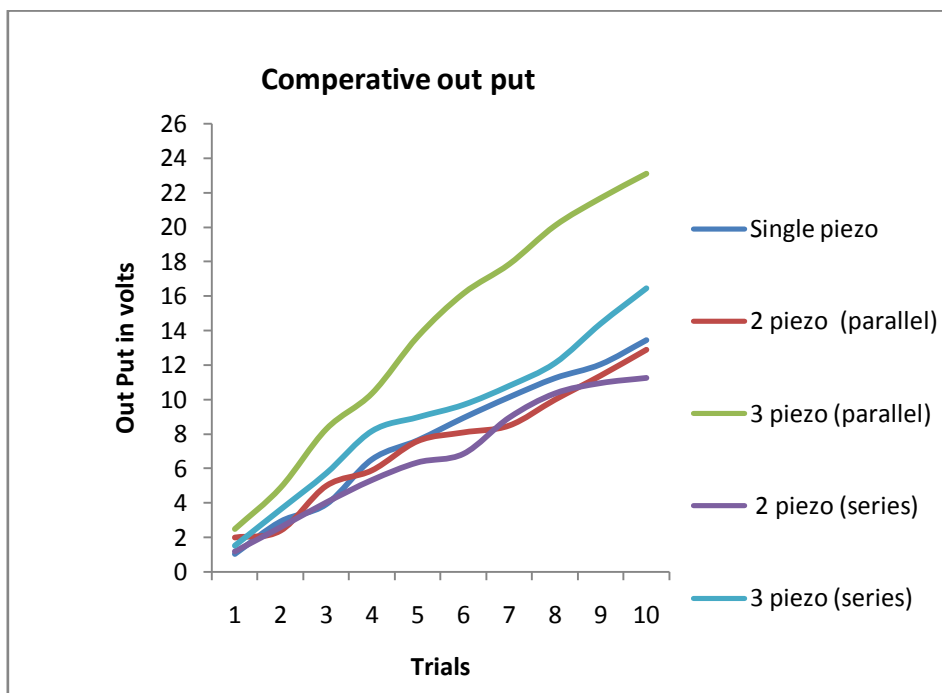
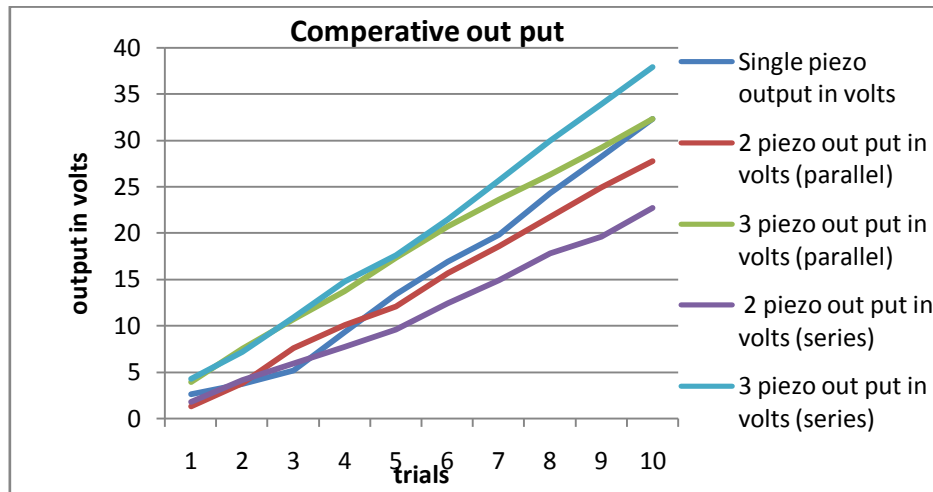


Fig 3: Piezoelectric tiles



Graph 1: Output power at weight 500 grms



Graph 2: Output power at weight 1500 grms

C. TECHNICAL DETAILS:

- Rotational axis- vertical axis wind turbine
- Performance power-250w
- Voltage-12~24volt DC
- Initial wind speed-1.5-5m/sec
- SMF batteries-150AH
- Backup-2hrs
- Output 1kwh/day
- Frame width 4 feet
- Frame high 1feet

II APPLICATIONS

- These frame unit of wind turbines can be placed in the walls of the houses
- Replacing the windows
- These frames of wind turbines can be placed at the barry gates of the expressways.
- Can also be placed at the terraces of buildings, and placed near the railway lines to tap the wind generated by the moving train.
- Can also be installed on the compound walls
- Installed above tall buildings or sky scappers

III CONCLUSION

Wind energy on highways has a lot of potential in it and if properly harnessed then it can help solve the energy crisis in the world. The study of this System and its characteristics showed that how it can be properly designed and used to get the optimum output. The power electronic circuitries have helped the concept of wind power a lot. Without them this concept would have been too expensive and farfetched. The proposed work successfully demonstrates the possibility of harnessing the energy potential available on highways: - rotational energy due to impact & natural wind energy due to vehicular motion & naturally, vibrational energy due to impact & natural wind energy due to vehicular motion, of moving automobiles.

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