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A Novel Method to Generate Electricity Using Fast Moving Vehicles Train

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Abstract: ***In present scenario, the efficient way of utilizing energy resources is the biggest challenge to overcome the energy demand. Wind power has sufficient potential to compensate the demand in energy sector. The facts says that, in India the utilization of renewable energy sources is only 19.8%. Outstanding renewable sources are not appropriately used. In this discernment, there is a necessity to improve the effective way of utilizing wind energy sources. The proposed idea is to consume the wind potential from fast moving vehicle (train) and also increase the efficiency of the turbine by enhancing the wind flow through turbine blades. The introduced idea is capable of generating electricity which is two times greater than the existing wind turbines. This novel technique maximizes the wind to electrical energy conversion ratio and over comes the pressure imbalance on the existing blade designs. Horizontal axis wind turbine is placed in both sides of fast moving train. The proposed wind turbine consists cone shaped metal case is used in purpose of low head wind to run the turbine with higher efficiency than the conventional wind turbine. In addition to, the resistance offered by the turbine is nulled by the cone shaped metal case. In case of any obstacle is detected near sides of the train, the turbine is automatically closed to the train. The generated electricity is used to various loads in each compartment of the train. It is believed that introduced idea will bring a revolution in maximizing the utilization of wind energy.***

Keywords: Train, Horizontal Axis Wind Turbine, Generator, Cone Shaped Metal Case, Ultrasonic Sensor, etc.

I. INTRODUCTION

In this modern age more and more energy is required for daily consumption in all walk of life. In India 70% of electricity generated in thermal power plant .But this power plant is not stable one. Because after twenty years, coal will completely decade. So thermal power plant cannot able to generate the electricity. At the time, India will definitely depends on renewable energy like solar, wind, hydro power plant. Wind presents a vast source of renewable energy. So, gift of this wind should be utilized. The wind on earth surface are caused primarily by the unequal heating o the land and water by the sun. The differences in temperature gradients induce the circulation of air from one to another. It has been estimated that roughly 10 million MWs of energy are continuously available in the earth's winds. The utilization of some of this energy through various mechanical conversion devices has played a decisive role in the economic development of many countries where winds are strong and steady.

II. LITERATURE SURVEY

Example of Neeraj Kumar [1] production of electricity by using the concept of the rotation of wind turbine due to the wind caused by the moving train. Wind turbine is provided with ventilated casing to reduce the large air pressure. The mouth of casing is provided with valve to control the wind flow. The blade is mounted on the roof of the train and total mechanical support is provided .The electricity produced will run the various loads connected to the train cabin. The excess power is stored in battery for further use. This will help to cut down the usage of non-renewable sources which is on the verge of extinction and the entire process is non-polluting.

Example of Sushant N. Malave system [2] Highways can provide a required considerable amount of wind to drive a turbine due to high vehicle traffic. This energy is unused. Extensive research on wind patterns is required to determine the average velocity of the wind created by oncoming vehicles. The wind turbines will be placed on the medians therefore fluid flow from both sides of the highway will be considered in the design. Using all of the collected data, existing streetlights on the medians can be fitted with these wind turbines. Additionally, since the wind source will fluctuate, a storage system for the power generated will be designed to distribute and maintain a constant source of power.

Example of G. Prasanth, [3] wind energy produced by trains is very unique, as it does not depend on any natural energy resource. A moving train compresses the air in the front of it and pushes the air to its sides thereby creating a vacuum at its rear and its sides as it moves forward. To fill up this vacuum a mass of airflow rushes into the sides and the rear. The kinetic energy of the wind

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movement thus created is used to generate electricity. This paper deals with moving train compresses the air in the front of it and pushes the air to its sides thereby creating a vacuum at its rear and its sides as it moves forward. As a result, turbine is rotated is placed in a sides of the train.

III. BACKGROUND OF THE PROPOSED DESIGN

The proposed system consists of new-fangled horizontal axis wind turbine, ultrasonic sensor, generator, watt governor. The moving train compresses the air in the front of it and pushes the air to its sides thereby creating a vacuum at its sides of the train. Ultrasonic sensor is fixed with both sides of engine. New-fangled horizontal axis turbine starts rotate due to wind opposes the blade. This Ultrasonic sensor senses any obstacles in train across two sides. If sensor detects the obstacles, watt governor block the turbine rotates and automatically turn the turbine in close position using servomotor. The main reason for using this sensor to prevent the damage of turbine due to road side obstacles and two train crossing at a same time. Cone shaped metal is fixed in front of horizontal turbine, to increase the speed of turbine and also which nullify the air resistance created by the turbine. Hence speed of the train is not affected due to placing these turbine. Horizontal turbine is coupled with generator. If turbine rotates at high speed, required electricity is obtained by using generator. Generated electricity supplies the various loads like fans, light, Air Cooler in each compartment of train.

IV. PROPOSED DESIGN

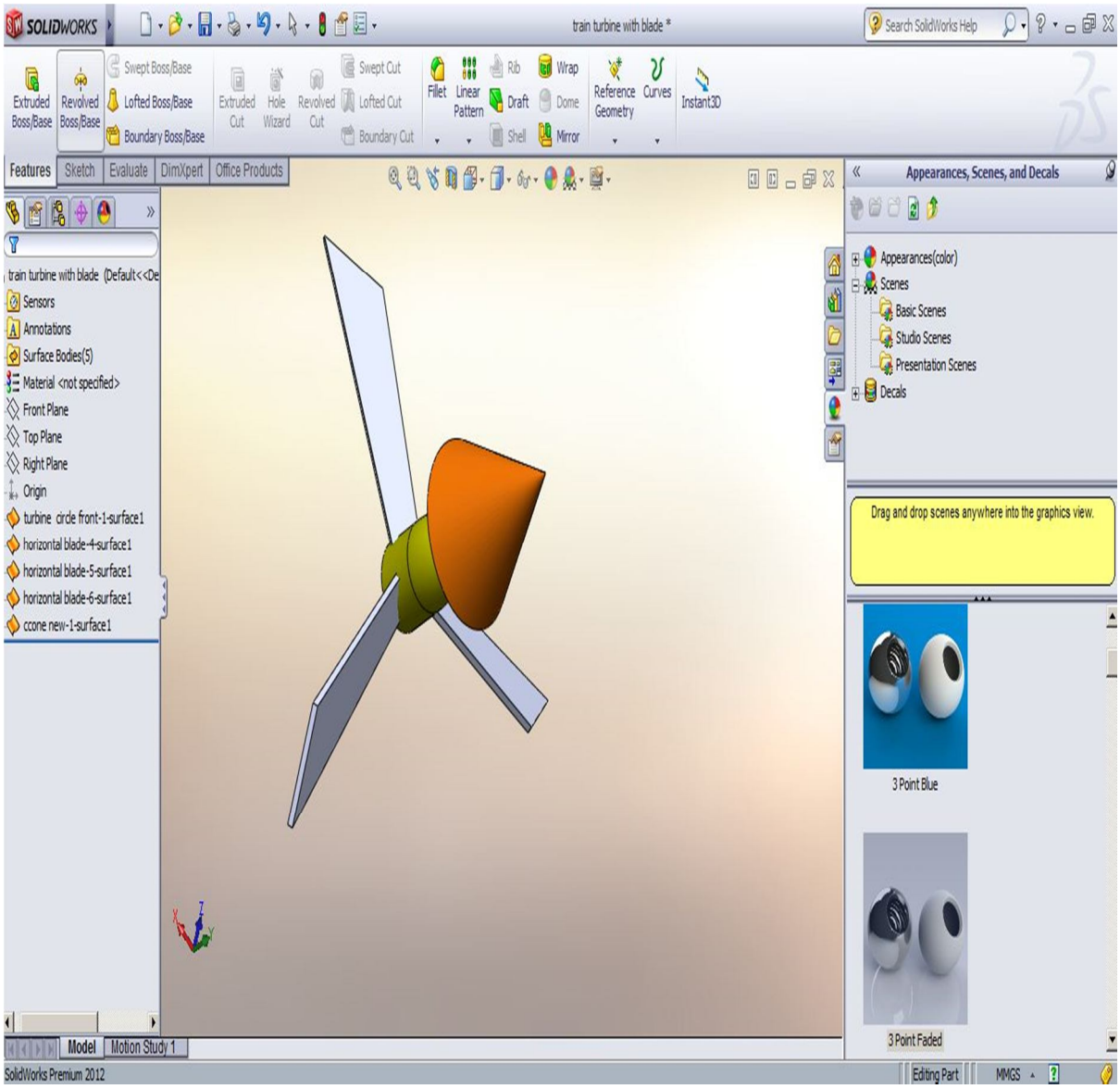


Fig-1: Design of the Proposed Horizontal Axis Wind Turbine

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Fig-2: Placing of the Turbine with Train

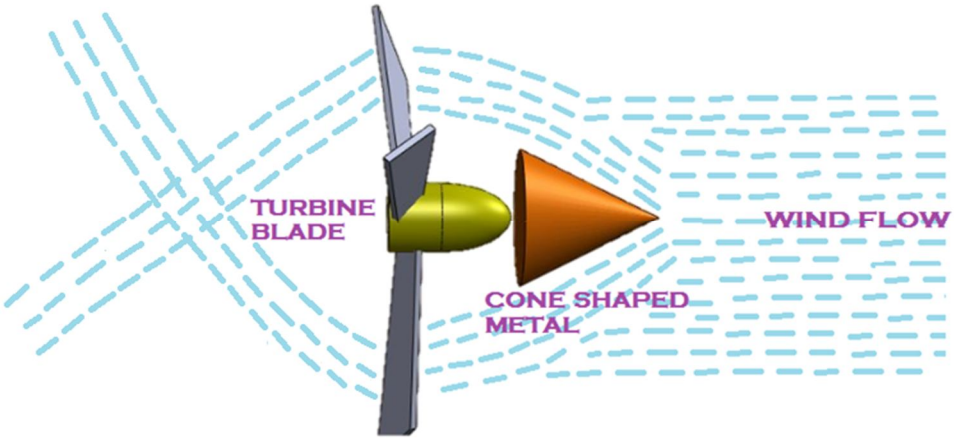


Fig-3: Proposed Turbines Air flow

Hardware used in the proposed design and its detailed description is given below.

A. A New-Fangled Horizontal Axis Wind Turbine

A wind turbine is a device that converts the kinetic energy of the wind into mechanical energy. This mechanical energy can be used for specific tasks (such as grinding grain or pumping water) or for driving a generator that converts the mechanical energy into electricity that is supplied to the power grid or individual users. In Horizontal Axis Wind Turbine, the shaft is mounted horizontally, parallel to the ground. HAWTs need to constantly align themselves with the direction of the wind. This type of turbine uses a tower as a base and the components are at an optimum elevation for wind speed. As such, each tower takes up very little space since almost all of the components are up in the air. In proposed turbine consists of cone shaped air elevator for enhancing the air flow directly towards the blade.

B. Watt-governor

A watt-governor or speed limiter, is a device used to measure and regulate the speed of the machine, such as turbine. Watt-governor which uses weights mounted on spring-loaded arms to determine how fast shaft is spinning, and then uses proportional control to regulate the shaft speed.

C. Generator

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The basic understanding of a generator is that it converts mechanical energy to electrical energy. Generators are utilized extensively in various applications and for the most part have similarities that exist between these applications. Over the years, alternating current has been the common choice of power supply. AC is popular because the voltage can be easily stepped up or stepped down using a transformer. Due to the inherent properties of a transformer, DC voltage cannot be altered using this type of equipment. Transformers operate due to a changing magnetic field in which the change in magnetic flux induces a current. With the AC flux generator design, its operability is based on permanent magnet alternators where the concept of magnets and magnetic fields are the dominant factors in this form of generator functioning. These generators have air gap surface parallel to the rotating axis and the air gap generates magnetic fluxes perpendicular to the axis.

D. Ultrasonic Sensor

Ultrasonic transducers are transducers that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle similar to that of transducers used in radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively. Active ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions, convert it to an electrical signal, and report it to a computer.

E. Servomotor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is some signal, either analogue or digital, representing the position commanded for the output shaft. The motor is paired with some type of encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position. As the positions approach, the error signal reduces to zero and the motor stops.

V. BLOCK DIAGRAM

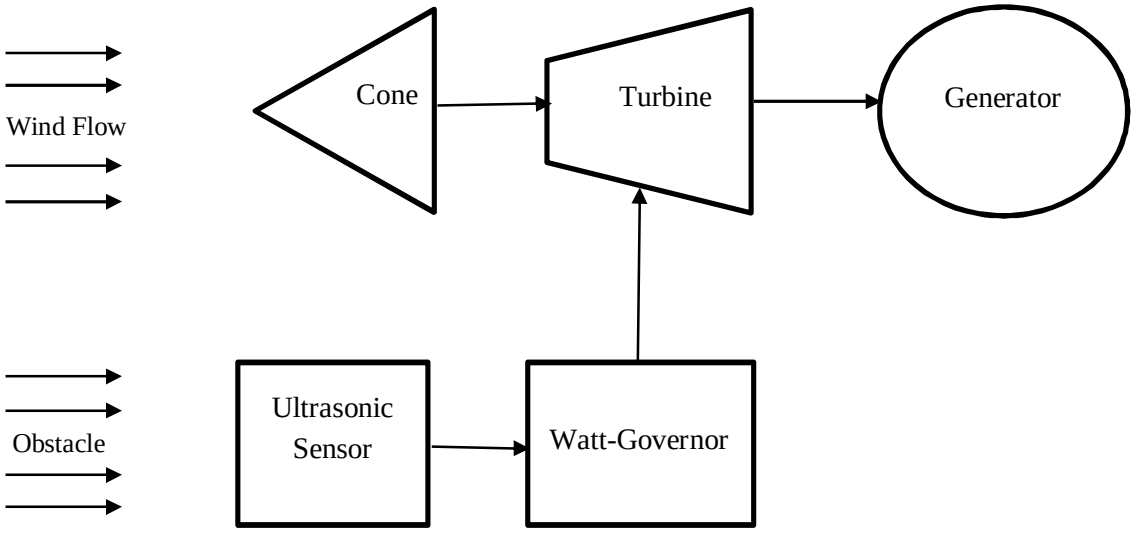


Fig.4 Block diagram of our proposed system

The wind flows through the geometrical size of cone metal which is fed directly towards the blades of the wind turbine. The turbine

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coupled with watt-governor and generator. The generator which converts mechanical energy into electrical energy. If any barrier happens across the turbine, the ultrasonic sensor sense that hindrance it will automatically provide the signal to the watt-governor. Watt-governor is used to limit or regulates the speed of the turbine and automatically closes the turbine inside the train through servo motor.

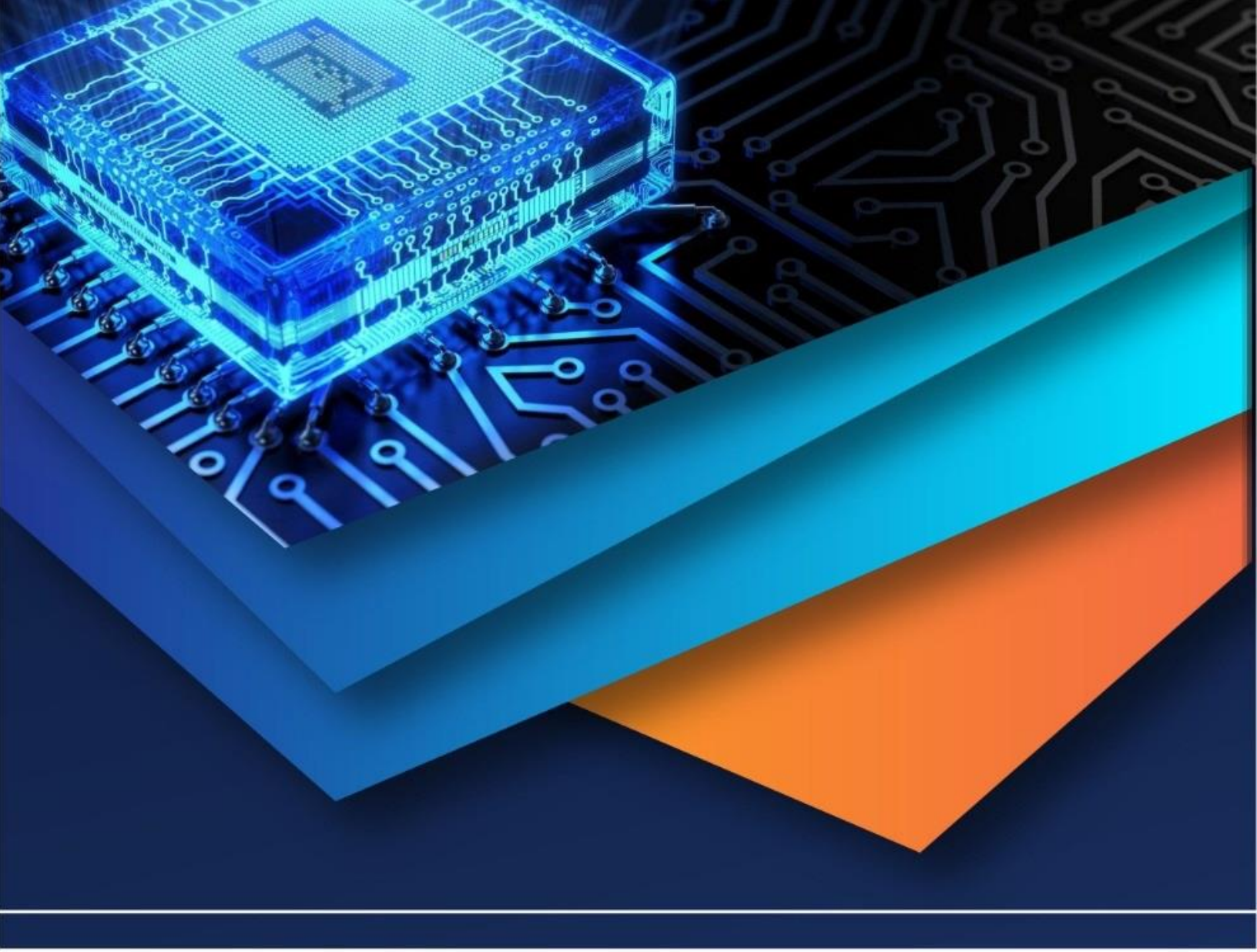
VI. CONCLUSION

India is one among the highest population country in the world. At present the Statistics says that, in future we need 350-380MW to satisfy the electricity demand. If India wants to become a superpower by 2020, we must improve the power sector. Otherwise India would not able to achieve superpower. To overcome the electricity demand in India our proposed idea will definitely compensates and contribute the increases the electricity consumption. In addition to our proposed idea have a peculiar characteristic which gives continuous power supply with affordable cost.

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