

Electric Power Generation by Speed Breaker Connected with Wind Turbines

L. Arockia Angel¹

Department of Electrical and Electronics Engineering
Parisutham Institute of Technology and Science
Thanjavur

Abstract: In the present situation power becomes essential requirement for human life. Energy is accountable for major developments of any country's wealth. Conventional energy sources generate most of the energy of today's world. But the population is increasing day by day and the conventional energy sources are withdrawing. Moreover, these conventional energy sources are polluting and accountable for global warming. So, nonconventional sources are needed to be developed for power generation which is clean, environment friendly and sustainable. In this research we offer a renewable non-conventional energy source based on speed breaker mechanism and wind mill. Our project is to enlighten the streets utilizing the jerking pressure which is wasted during the vehicles passes over speed breaker in roadside. We can tap the energy generated by moving vehicles and produce power by using the speed breaker as power generating unit. The kinetic energy of the moving vehicles can be converted into mechanical energy through rack and pinion mechanism and this mechanical energy will be converted to electrical energy using generator which will be used for lighting the street lights. Therefore, by using this mechanism we can save lot of energy which can fulfill our future demand.

Keyword:- Speed breaker, vertical axis wind turbine, alternator

I. INTRODUCTION

Energy demand continues to grow, year after year. In the present situation power major need for human life. But the extensive usage of energy has resulted in an energy crisis, and there is a need to develop methods of optimal utilization, which will not only ease the crisis but also preserve the environment from the negative impacts of global climate change. Energy conservation is the cheapest new source of energy. It is an attractive technology for optimal use of available sources. Electric power generated by speed breaker and wind mill in high ways.

Road power generation system (RPGS) is a system designed to capture the wasted kinetic energy from cars and trucks on the roadways, and converts it into helpful electrical energy. The produced electric energy can be used to feed the nearby places; also the energy can be stored in DC batteries. This system is designed as a practical, unconventional, and useful energy for generating electricity.

Wind energy is the fastest growing source of clean energy worldwide. This is partly due to the increase in price of fossil fuels. The employment of wind energy is expected to increase dramatically over the next few years according to data from the Global Wind Energy Council.

Power Generated from the speed breaker and vertical axis wind turbine which given into the synchronized alternator the output of the alternator given into the charger then charger output is given to battery then from battery to inverter then which given to the street light

II. WORKING PRINCIPLE :

The mechanism of speed breaker for generation of electricity by when the load acts on the speed breaker the rack comes down and the springs suspend.

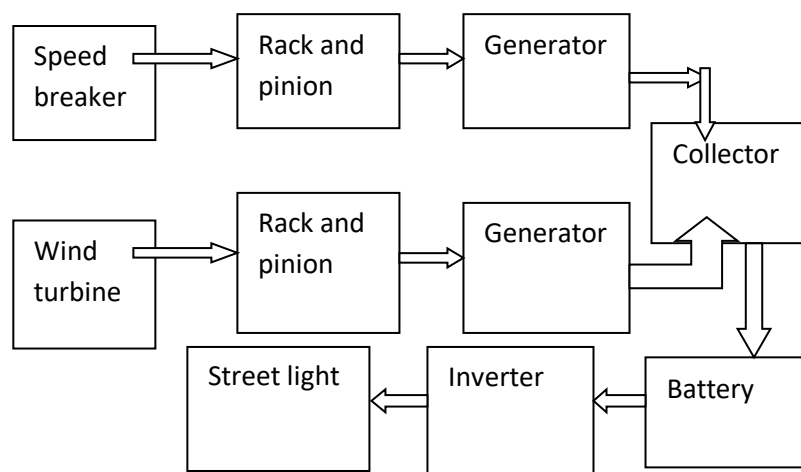
Due to this suspension of springs the main gear rotates and then rotates a sub gear attached to it. The gear of the generator is rotated with immediate rotation of the sub gear. The reciprocating motion of the speed breaker is converted into rotator motion (mechanical energy). The speed which is sufficient is fed into the

Generator. The rotor rotates within a magnetic stator and produces electromotive force. This generated electro motive force is used for charging battery and lighting.

The mechanism of VAWT is the kinetic energy of the wind is converted into rotating energy using vertical axis wind turbine which is either coupled directly or through gear. Rotational energy from the turbine is converted into electrical energy by the permanent magnet synchronous generator. After the synchronization of the two alternators output is given to the collector or charger then collector which is given into the battery. Then use power from the battery for street light.

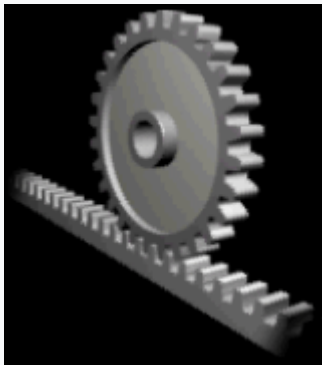
III. BLOCK DIAGRAM

Block diagram for power generated by speed breaker with wind turbine





Rack and pinion

Rack and pinion
animation

A **rack and pinion** is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion.

IV. SPUR GEAR

It is a positive power transmission device with definite velocity ratio. They consist of a disk with the teeth projecting radially. These gears can be meshed together to increase the speed and the torque.



Generator

In a DC motor, an armature rotates inside a magnetic field. Basic working principle of DC motor is based on the fact that whenever a current carrying conductor is placed inside a magnetic field, there will be mechanical force experienced by that conductor.



Vertical axis wind turbine



vertical axis wind turbines the rotational

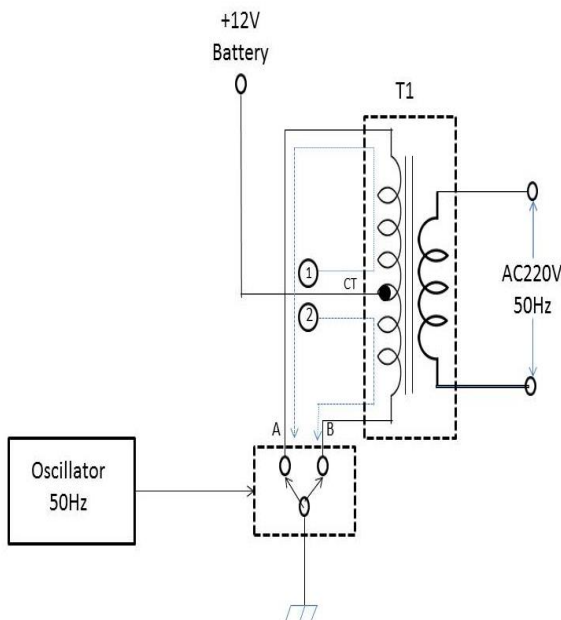
axis of the turbine stands vertical or perpendicular to the

ground. As mentioned above, vertical axis turbines are primarily used in small wind projects and residential applications. Vertical-Axis-Wind-Turbine This niche comes from the OEM's claims of a vertical axis turbines ability to produce well in tumultuous wind conditions.

t Vertical axis turbines are powered by wind

coming from all 360 degrees, and even some turbines are powered when the wind blows from top to bottom

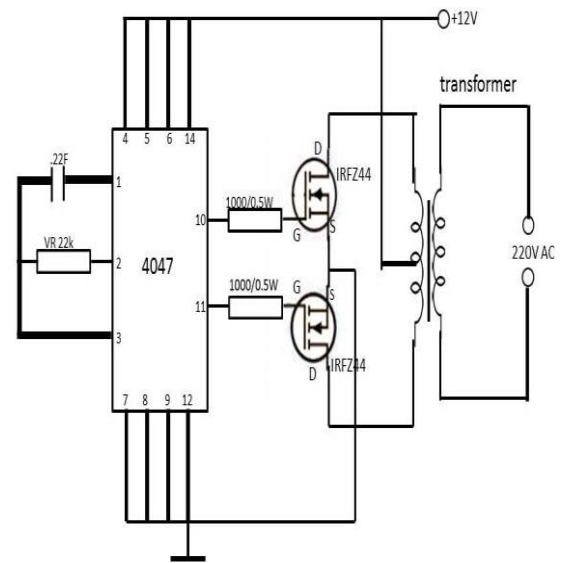
V. CHARGE CIRCUIT



VI. INVERTER AND STEP UP TRANSFORMER

Inverter circuit & step-up transformer Inverter convert DC voltage to AC voltage and step up transformer is a type of transformer which stepped up the AC voltage. In this system inverter circuit converts 12V DC to 15VAC. Step

up Transformer makes the voltage to 250 V AC from 15 V AC



Model calculation

Let us consider, the mass of any vehicle travelling over the speed breaker = 133612.2 Kg

*(Average weight of the bus = 30000 pound

30000 pound converted into 133612.2 kg)

Height of speed breaker = 15 cm

Work done = weight of the body x distance travelled by the vehicle

Weight of the body = 13620 Kg x 9.81 = 133612.2 N

Distance travelled by the body = Height of the speed breaker = 15cm

Power = Work done / Second = (133612.2 x 0.15) / 60 = 34.05 Watts

Output power developed for 1 vehicle passing over the speed Breaker arrangement for one minute = 34.05 watts

Power developed for 60 minutes (1 hour) = 2043 watts.

Power developed for 24 hours = 49.032 Kw

Vertical axis wind turbine

Speed of Turbine (RPM)	Output Voltage (AC)
150	65
200	75
275	87

VII. ADVANTAGE

Vertical axis wind turbine

- Cheaper to produce than horizontal axis turbines.
- More easily installed compared to other wind turbine types.
- Transportable from one location to another.
- Equipped with low-speed blades, lessening the risk to people and birds.
- Function in extreme weather, with variable winds and even mountain conditions.
- Permissible where taller structures are prohibited.
- Quieter to operate, so they don't disturb people in residential neighborhoods

VIII. SPEED BREAKER

- Power generation with low cost and using non-conventional energy sources which will help us to conserve the conventional energy sources to meet the future demand.
- By using this method, electricity will be generated throughout the year without depending on other factors
- Easy for maintenance and no fuel transportation problem.
- Pollution free power generation
- Less floor area required and no obstruction to traffic
- No need of manpower during power generation.

IX. CONCLUSION

This system is environmental friendly. The working model of our project is combined energy source with speed breaker system and vertical axis wind turbine system which is a good and effective solution for power generation, basically this system involves the combination of two energy system, suppose anyone source fails to generate another source will keep generating the electricity and will give the continuous power to the load. The renewable energy sources such as solar and wind energy are used to generate the electricity.

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