

## EVERY SPEED BREAKER IS NOW A SOURCE OF POWER

ASWATHAMAN.V

ELECTRONICS AND COMMUNICATION  
ENGINEERING  
SONA COLLEGE OF TECHNOLOGY  
SALEM, INDIA.  
aswath9882@yahoo.in

PRIYADHARSHINI.M

ELECTRONICS AND COMMUNICATION  
ENGINEERING  
SONA COLLEGE OF TECHNOLOGY  
SALEM, INDIA.  
aswath9882@yahoo.in

**Abstract**—Man in his lifetime, uses energy in one form or the other. In fact whatever happens in nature, results, out of the conversion of energy in one form or the other? The blowing of the wind, the formation of the clouds and the flow of water are a few examples that stand testimony to this fact. 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.

This paper attempts to show how man has been utilizing energy and to explore prospects of optimizing the same. Researches show that the world has already had its enough shares of its energy resources. Fossil fuels pollute the environment. Nuclear energy requires careful handling of both raw as well as waste material. The focus now is shifting more and more towards the renewable sources of energy, which are essentially, nonpolluting.

Energy conservation is the cheapest new source of energy. This paper attempts to show how energy can be tapped and used at a commonly used system, the road-speed breakers. The number of vehicles passing over the speed breaker in roads is increasing day by day. There is possibility of tapping the energy and generating power by making the speed breaker as a power generation unit. The generated power can be used for the lamps near the speed breakers and this will be a great boon for the rural villages too.

My paper explains clearly, the working principle of the designed system, its practical implementation, and its advantages. Design of each component has been carried out using standard procedures, and the components have been fabricated and assembled. A similar model of the system has been modeled using Pro-E. Practical testing of the system has been done with different loads at different speeds. Taking the various criteria that determine the power generation, graphs have been plotted. The utilization of energy is an indication of the growth of a nation. One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy.

And this paper is best source of energy that we get in day to day life.

**KEYWORDS:** power generation, rack and pinion, energy conservation, rotation, speed breaker.

### I. INTRODUCTION

This paper attempts to show how energy can be tapped and used at a commonly used system- the road speed-breakers. The number of vehicles passing over the speed breaker in roads is increasing day by day.

A large amount of energy is wasted at the speed breakers through the dissipation of heat and also through friction, every time a vehicle passes over it. There is great possibility of tapping this energy and generating power by making the speed-breaker as a power generation unit. The generated power can be used for the lamps, near the speed-breakers.

### II. SCOPE OF THE PAPER

The utilization of energy is an indication of the growth of a nation. For example, the per capita energy consumption in USA is 9000 KWh (Kilo Watt hour) per year, whereas the consumption in India is 1200 KWh (Kilo Watt hour). One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy.

A recent survey on the energy consumption in India had published a pathetic report that 85,000 villages in India do not still have electricity. Supply of power in most part of the country is poor. Hence more research and development and commercialization of technologies are needed in this field.

India, unlike the top developed countries has very poor roads. Talking about a particular road itself includes a number of speed breakers. By just placing a unit like the "Power Generation Unit from Speed Breakers", so much of energy can be tapped. This energy can be used for the lights on the either sides of the roads and thus much power that is consumed by these lights can be utilized to send power to these villages.

### III. WORKING PRINCIPLE

The project is concerned with generation of electricity from speed breakers-like set up. The load acted upon the speed breaker - setup is there by transmitted to rack and pinion arrangements.

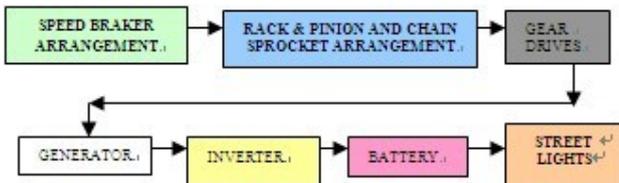
Here the reciprocating motion of the speed-breaker is converted into rotary motion using the rack and pinion arrangement. The axis of the pinion is coupled with the sprocket arrangement. The sprocket arrangement is made of two sprockets. One of larger size and the other of smaller size. Both the sprockets are connected by means of a chain which serves in transmitting power from the larger sprocket to the smaller sprocket. As the power is transmitted from the larger sprocket to the smaller sprocket, the speed that is available at the larger sprocket is relatively multiplied at the rotation of the smaller sprocket.

The axis of the smaller sprocket is coupled to a gear arrangement. Here we have two gears with different diameters. The gear wheel with the larger dimension is coupled to the axis of the smaller sprocket. Hence the speed that has been multiplied at the smaller sprocket wheel is passed on to this gear wheel of larger dimension. The smaller gear is coupled to the larger gear. So as the larger gear rotates at the multiplied speed of the smaller sprocket, the smaller gear following the larger gear still multiplies the speed to more intensity.

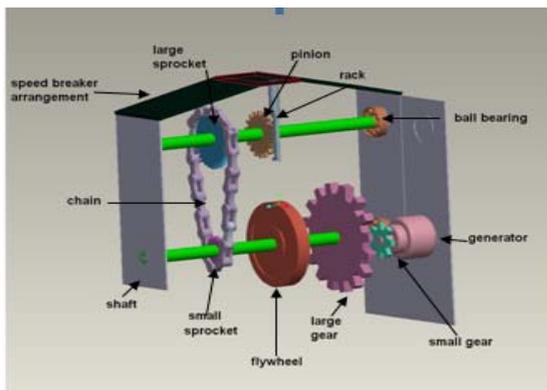
Hence, although the speed due to the rotary motion achieved at the larger sprocket wheel is less, as the power is transmitted to gears, finally the speed is multiplied to a higher speed. This speed which is sufficient to rotate the rotor of a generator is fed into to the rotor of a generator. The rotor which rotates within a static magnetic stator cuts the magnetic flux surrounding it, thus producing the electric motive force (emf). This generated emf is then sent to an inverter, where the generated emf is regulated. This regulated emf is now sent to the storage battery where it is stored during the day time. This current is then utilized in the night time for lighting purposes on the either sides of the road to a considerable distance.



**A. BLOCK DIAGRAM:**



**B. CONSTRUCTIONAL DETAILS:**



**C. OUTPUT POWER CALCULATIONS:**

Let us consider,

The mass of a vehicle moving over the speed breaker = 250Kg (Approximately)

Height of speed brake = 10 cm

Work done = Force x Distance

Here,

Force = Weight of the Body

$$= 250 \text{ Kg} \times 9.81$$

$$= 2452.5 \text{ N}$$

Distance traveled by the body = Height of the speed brake

$$= 10 \text{ m}$$

Output power = Work done/Sec

$$= (2452.5 \times 0.10) / 60$$

$$= 4.0875 \text{ Watts (For One pushing force)}$$

Power developed for 1 vehicle passing over the speed breaker arrangement for one minute = 4.0875 watts

Power developed for 60 minutes (1 hr) = 245.25 watts

Power developed for 24 hours = 5.866 Kw

This power is sufficient to burn four street lights in the roads in the night time.

**IV. EXPERIMENTAL INVESTIGATION**

The experimental investigation is performed by placing the speed breaker arrangement in a pit with a depth of 75 Cm. Vehicles move over the speed breaker arrangement and the voltage generated is measured by a multimeter and the various readings are plotted in a graph.

The graphs are drawn for various parameters as shown below

1. Voltage generated (Vs) speed of vehicle

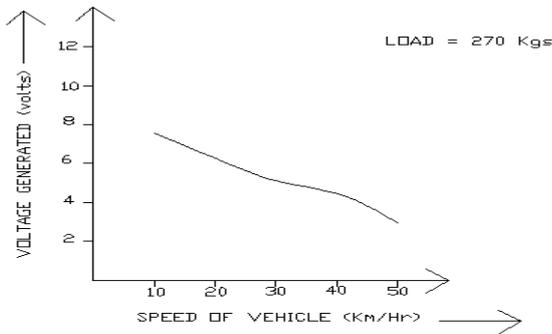
## 2. Voltage generated (Vs) Load

### A. VOLTAGE GENERATED (VS) SPEED OF VEHICLE:

READINGS: (TABLE 1)

LOAD = 270 Kg (Vehicle load + man weight)

Speed of vehicle (km/hr)	Voltage generated (volts)
10	7.93
20	6.28
30	5.03
40	4.66
50	3.03

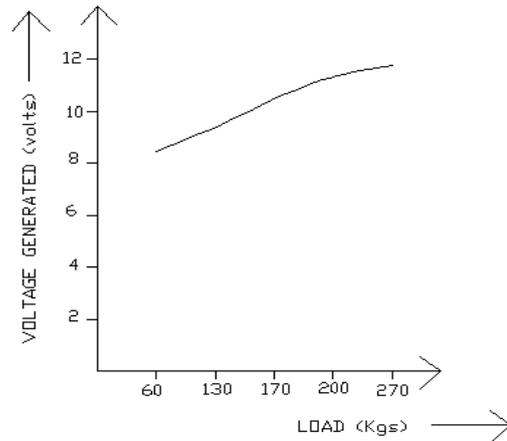


### B. VOLTAGE GENERATED (VS) LOAD:

Speed of vehicle=10km/hr

READINGS: (TABLE 2)

Load(kgs)	Voltage generated(V)
60(man load)	8.33
130	9.45
170	10.22
200	11.23
270	11.81



## V. ADVANTAGES

- Pollution free power generation.
- Simple construction, mature technology, and easy maintenance.
- No manual work necessary during generation.
- Energy available all year round.
- No fuel transportation problem.
- No consumption of any fossil fuel which is non-renewable source of energy.

## VI. CONCLUSION

The utilization of energy is an indication of the growth of a nation. One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy.

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