

# **A Survey on Design of Electricity Generation by Speed Breaker Using Rack And Pinion Mechanism**

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**ABSTRACT:** This project harvests energy from speed breaker by making gear arrangement and using electronic gadgets.. Electricity plays a very important role in our life. this paper attempt to show how energy can be tapped by use of common road speed breakers. Energy is the primary need for survival of all organisms in the universe. But in this fast moving world, population is increasing day by day and the conventional energy sources are lessening. Therefore to overcome this problem we need to implement the techniques of conventional sources for conservation of energy. For obtaining the electricity through the speed breaker using rack and pinion prototype mechanism is develop and studied. The kinetic energy of moving vehicle can be converted into mechanical energy of the shaft through rack and pinion mechanism. So that the shaft will be rotated with certain rpm these shaft are connected through a chain drive to the dynamo. This generated energy will be saving with the use of battery.

**KEYWORDS:** Rack and Pinion, Speed breaker, Dynamo, LED bulb, Chain Drive.

## **I. INTRODUCTION**

In the present scenario power has becomes major need for human life. Due to day-to-day increase in population and lack of the conventional sources, it becomes necessary that we must depend on non-conventional sources for power generation. While moving, the vehicles posses some kinetic energy and it is being wasted. This kinetic energy can be utilized to produce power by using a special arrangement called "power hump". The Kinetic energy of moving vehicles can be converted into mechanical energy through rack and pinion mechanism. The rotating shaft is connected to the electric dynamo and it produces electrical energy proportional to traffic density. All this mechanism can be housed under the dome like speed breaker, which is called hump.

The generated power can be used for general purpose like street lights, traffic signals. The electrical output can be improved by arranging these power humps in series. This generated power can be amplified and stored by using different electric devices. The maintenance cost of hump is almost nullified. By adopting this arrangement, we can satisfy the future demands to some extent. Whenever the vehicle is allowed to pass over the dome it gets pressed downwards then the springs attached to the dome is compressed and the rack which is attached to the bottom of the dome moves downward in reciprocating motion. Since the rack has teeth connected to gears, there exists conversion of reciprocating motion of rack into rotary motion of gears. Gear is mounted on a shaft and the output end of the shaft there is dynamo is to be connected. When the shaft rotated with a high speed then this motion will be transmitted to the dynamo and dynamo converts the mechanical torque into electrical energy.

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## II. LITERATURE SURVEY

A Padma Rao, A Kiran Kumar, S.Suresh, “Power Generation from Speed Breaker by Rack and Ratchet Mechanism”  
The cheapest and new source of energy is obtained by the conversion of one form of energy into other. The renewable source of energy becomes more popular because of non-polluting and easily available from the nature. One such energy is explained in this paper. The no. Of vehicles passed over the speed breaker on the road is increasing day by day. Such speed breakers are designed for heavy vehicles, thus increasing input torque and ultimately increasing the power as output. This paper mainly focused on work of newly developed rack and pinion mechanism. This is used to develop the power from speed breakers, its practical implementations.

Abhishek Gupta, Nikita Mittal, Pushendra Pal Singh, Ram Arora, Ramkishan Dhakar, Purab Chand, Piyush Mangal, “Electricity Generation from Speed Breakers” Electricity plays an very important role in our life. Dou to population explosion the current power generation has become insufficient to fulfil our requirements. In coming days, this will prove a great to the world, since it will save a lot of electricity of power plants that get wasted in illuminating the street lights. As the conventional source are depleting very fast, its high time to think of alternative resources. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country.

## III. PRINCIPAL OF WORKING

The principle of power generation from this mechanism is very simple. When vehicle passed over the speed breaker the load is applied on a power hump. The rack goes in downward direction and this reciprocating motion converted into the rotary motion of pinion. This pinion is connected to the chain drive to magnify the motion this magnified motion finally obtained at the shaft where the gear arrangement is placed. At the other end of output shaft dynamo is mounted which convert the mechanical torque into electrical energy.

## IV. BLOCK DIAGRAM

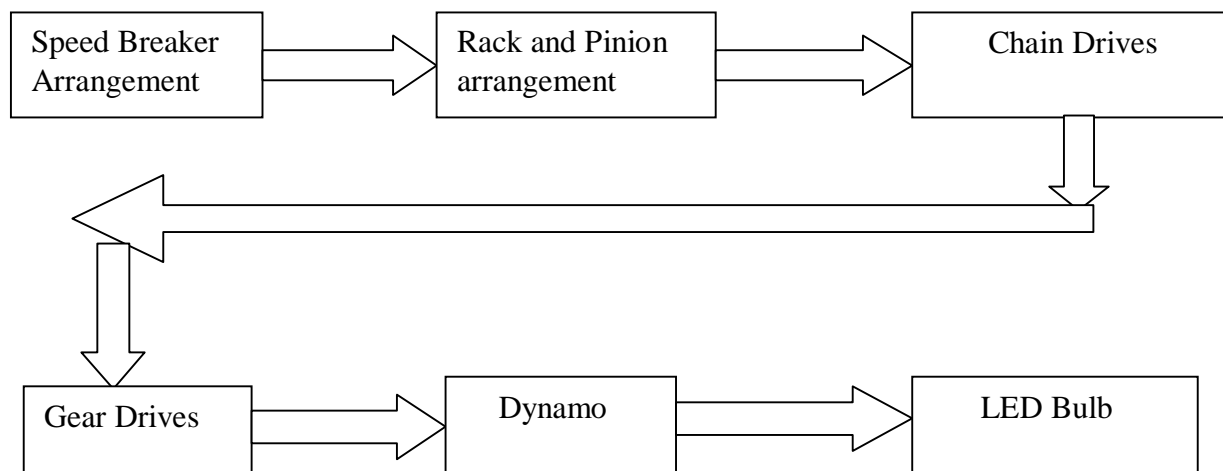


Fig. 1 Block Diagram of mechanism

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## IV.COMONENTS

### 1. Rack and Pinion

Rack and pinion mechanism in which the reciprocating motion of speed-breaker is converted into rotary motion in this mechanism the top part of rack is connected to speed-breaker and the lower part is linked with pinion. As the vehicle passes over a speed-breaker the rack moves in the downward directions which in turn rotate the pinion.

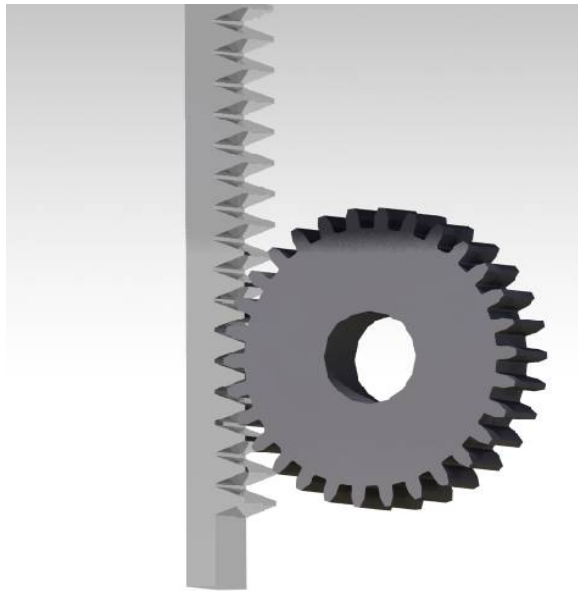


Fig. 2 Rack and Pinion

### 2. Gear

It is a positive power transmission device with definite velocity ratio in case of spur gear the tooth are cut parallel to the axis of shaft as the teeth are parallel to the axis of shaft, spur gear are used only when shaft are parallel. The profile of the gear tooth is in the shape of an involute curve.



Fig. 3 Gear

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### 3. Spring

A spring is defined as an elastic body, whose function is to distort when loaded and to recover its original shape when the load is removed. The various important applications of springs are as follows:

1. To cushion, absorb or control energy due to either shock or vibration as in car springs, railway buffers, air-craft landing gears, shock absorbers and vibration dampers.
2. To apply forces, as in brakes, clutches and spring loaded valves.
3. To control motion by maintaining contact between two elements as in cams and followers.
4. To measure forces, as in spring balances and engine indicators.
5. To store energy, as in watches, toys, etc.



Fig. 4 Spring

### 4. Shaft

Shaft is a rotating element, which is used to transmit power from one place to another place. It must have high torsional rigidity and lateral rigidity. The transmission shaft usually refers to a circulating cross-section, with support transmission element like gears, pulleys.

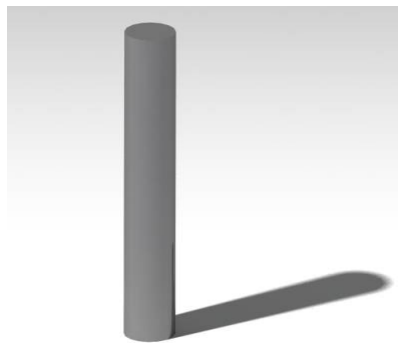


Fig. 5 Shaft

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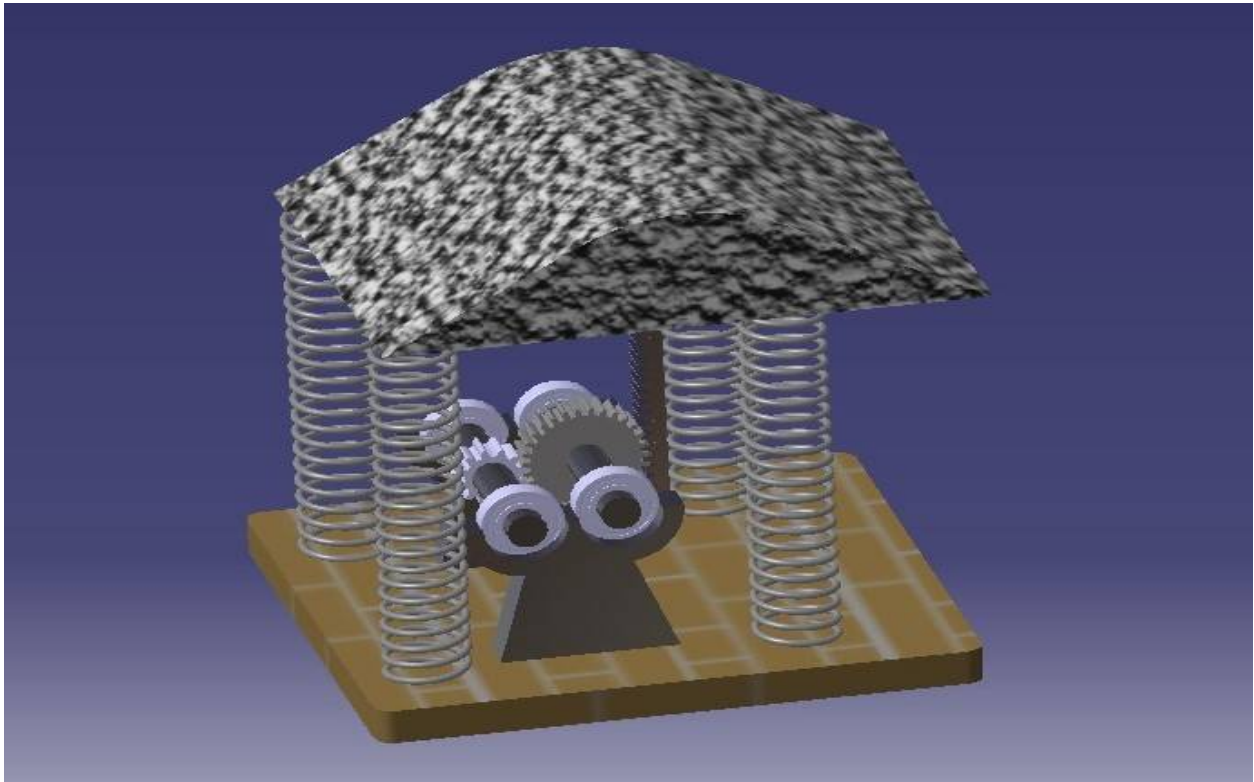


FIG. 6 CAD MODEL

## IV.ADVANTAGES

1. Non conventional source of energy.
2. No consumption of any fossil fuel.
3. No manual work necessary during generation.
4. Eco-friends in nature.
5. 24 hours applicable.
6. Low installation cost.
7. Low maintenance cost.
8. Simple in construction.
9. Less space is required.
10. No fuel transportation problems.
11. Pollution free power generation.
12. Energy available all year round.
13. Maximum utilization of energy.
14. No fuel storage is required.
15. It will work with light weight and heavy vehicles.
16. Load to the piston cylinder arrangement is freely got by movement of vehicles.

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## V.APPLICATION

This technique can be used in most of the places such as

1. Street lights.
2. Road signals.
3. Sign boards on roads.
4. Digital advertise boards on roads.
5. Lighting of the check post on the highways.

## VI. CONCLUSION

Energy generation and its intelligent use is very important in now days, because the pollution and population is increased day by day. So it is important to use non conventional or renewable energy sources. In this project we are recover the problems related to pollution and excessive use of conventional energy sources. This method of power generation is pollution free, no use of fossil fuels and there storage problems. Initially it increases the energy conservation from non conventional sources.

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