



# “ELECTRICITY GENERATION USING SPEED BREAKER”

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**Abstract:-** — In the present situation power becomes basic need for human life. Energy is responsible for major developments of any country's economy. 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 diminishing. Moreover, these conventional energy sources are polluting and responsible for global warming. So, nonconventional sources are needed to be developed for power generation which are clean, environment friendly and sustainable. In this research we propose a renewable nonconventional energy source based on speed breaker mechanism. 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 demands.

**Keywords:- kinetic energy, speed breaker, rack & pinion, generator, non-conventional energy, street light.**

## I. INTRODUCTION

Now a day's power has become the major need for human life. Energy is an important input in all the sectors of any countries economy. The availability of regular conventional fossil fuels will be the main sources for power generation, but there is a fear that they will get exhausted eventually by the next few decades. Therefore, we have to investigate other types of renewable sources .The day-to-day increasing population and decreasing conventional sources for power generation, provides a need to

think on non-conventional energy resources Another major problem, which is becoming the exiting topic for today is the pollution. Power stations and automobiles are the major pollution producing places. So non-conventional power source is needed to reduce this problem. We proposed a nonconventional power

generating system based on speed breaker mechanism which generate electricity without using any commercial fossil fuels, which is not producing any polluting products . In this paper, our aim is to conserve the kinetic energy which convert into electricity that gone wasted, while vehicles move.

## II. LITERATURE REVIEW

observes customers pull in and out all day, and at least 100,000 cars visit the drive-thru each year. and a newly installed, mechanized speed bump(video) will both help them slow down and harvest some of that coasting energy. The weight of a car is used to throw a lever, explains Gerard Lynch, the engineer behind the Motion Power system developed for New Energy Technologies, a Maryland-based company. "The instantaneous power is 2,000 watts at five miles-per-hour, but it's instantaneous which means some form of storage will be required.

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

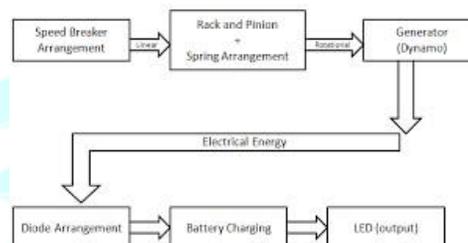
making the speed breaker as a power generation unit. The generated power can be used for the lamps, near the speed breakers. The utilization of energy is an indication of the growth of a nation. For example, the per capita energy consumption in USA is 9000 KWh (Kilo Watt hour) per year, whereas the consumption 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 side of the roads and thus much power that is consumed by these lights can be utilized to send power to these villages.

The rotor (rotating shaft) is directly connected to the prime mover and rotates as the prime mover turns. The rotor contains a magnet that, when turned, produces a moving or rotating magnetic field. The rotor is surrounded by a stationary casing called the stator, which contains the wound copper coils or windings. When the moving magnetic field passes by these windings, electricity is produced in them. By controlling the speed at which the rotor is turned, a steady flow of electricity is produced in the windings. These windings are connected to the electricity network via transmission lines. IIT Guwahati has evaluated the machine and recommended it to the Assam ministry of power for large scale funding. IIT design department says it is a „very viable proposition“ to harness thousands of megawatts of electricity untapped across the country every day. A vehicle weighing 1,000 kg going up a height of 10 cm on such a rumble strip produces approximately 0.98 kilowatt power. So one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every single minute. The figure will be huge at the end of the day. A storage module like an inverter will have to be fitted to each such rumble strip to store this electricity. The cost of electricity generation and storage per megawatt from speed-breakers will be nearly Rs 1 crore as opposed to about Rs 8 crores in thermal or hydro power station institute of technology, Kanpur.

### III. WORKING PRINCIPLE

A large amount of energy is wasted by the vehicles on the speed breakers through friction, every time it passes over it. Energy can be produced by using the vehicle weight and speed. So here we propose a smart speed breaker that generates power. The reciprocating motion of the speed breaker is converted into rotary motion using the rack and pinion arrangement. We design a smart speed breaker that can pass vehicles coming from both sides and yet generate energy from it. The system makes use of mechanical assembly with metal sheets with linkages that press down with spring arrangement. The system makes use of the speed breaker press and then uses a rack and pinion arrangement to press down and run generator

motor thus generating energy. The spring mechanism is the used to drive the speed breaker back into original position. It converts rotary motion into linear motion, but sometimes we use them to change linear motion into rotary motion. The pinion is fixed with the rotor of the DC generator. DC generator generates DC power which is stored in batteries same as in solar technology . The generated power can be used for the domestic purpose or commercially, which are present near the speed breake. This mechanism is very economical and easy to install. By doing proper arrangements we may generate high power electricity from road traffic.



### IV. COMPONENTS

- *Speed Breaker*

This is a normally used thing in everyday life. This element can be made from the composite of carbon fibre and rubber so that the speed breaker can sustain the heavy load of vehicles such as a container filled with some material in it. The speed breakers can be made such that the starting and ending slopes would be made up of concrete and cement mixture and the central part would be made up of the composite mentioned before.



Fig 1:- Speed Breaker

- *Springs*

Springs are used for compression and expansion. They absorb energy due to vibrations. springs are usually made up of hardened steels.



Fig 2:- Springs

battery pack will be introduced which will help us store the electric energy in to the battery pack. Also battery packs can be useful to transfer electric energy from one place to another.



Fig 5:- Battery

- *Rack and Pinion Gear*

This is one of the simplest types of gears and can be manufactured according to one's own need. As the name suggests this type of gear has two components namely Rack which is a straight gear with tooth in only one direction, the second component is the Pinion which is a round shaped gear and will roll upon the rack to perform its task. The alignment of this gear will be in vertical direction.



Fig 3:- Rack and Pinion Gear

- *Wire*

A wire is a flexible metallic conductor, especially one made of copper, usually insulated, and used to carry electric current in a circuit Without wires electricity would be unavailable for everyone, making them a necessary component to modern life. Depending on their purpose, wires can have varying sizes and compositions.



Fig 6:- Wire

- *DC Generator*

A DC generator is a device which converts mechanical energy into electrical energy. In this case the work of the DC generator remains the same and for that the shaft of the DC generator will have a pinion gear on its edge. The pinion gear will be meshed with the pinion gear of Rack and Pinion arrangement. As the first pinion gear will rotate the second gear will also rotate with the shaft of the DC generator. This will induce EMF (Electro Motive Force) in the DC generator and electricity will be produced.



Fig 4:- DC Generator

- *Bolts and Nuts*

The bolt consists of a head and a cylindrical body with screw threads along a portion of its length. The nut is the female member of the pair, having internal threads to match those of the bolt. Washers are often used to prevent loosening and crushing.



Fig 7 :- Bolts and Nuts

- *Battery*

It is very difficult to store electricity for a long time into any kind of storage. To deal with this issue a

- **LED light**

LED stands for light emitting diode. LED lighting products produce light up to 90% more efficiently than incandescent light bulbs. An electrical current passes through a microchip, which illuminates the tiny light sources we call LEDs and the result is visible light. To prevent performance issues, the heat LEDs produce is absorbed into a heat sink.

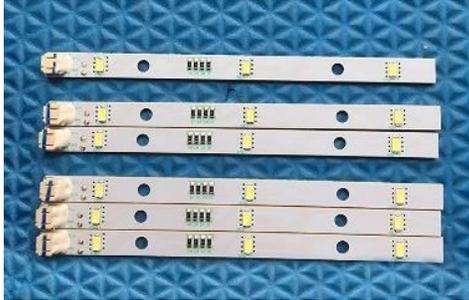


Fig 8:- LED light

## V. ADVANTAGES

Here are some of the advantages of using this type of Power Generation program: -

- No consumption of any fossil fuel.
- No manual work necessary during generation.
- Eco-friendly.
- 24 hours applicable.
- Low installation cost.
- Low maintenance cost.
- Simple in construction.
- Less space is required.
- Pollution free power generation.
- Energy available all year round.
- Maximum utilization of energy.

## VI. APPLICATIONS

- Street lights.
- Road signals.
- Sign boards on roads.
- Digital advertising boards on roads.
- Lighting of the check post on the highways.

## VII. POWER CALCULATIONS

Let us consider,

The mass of any vehicle travelling over the speed breaker= 300Kg (Approximately)

Height of speed brake = 15 cm

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

Here, Weight of the Body = 300 Kg x 9.81 = 2943 N

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

Power = Work done/Second =  $(2943 \times 0.15)/60 = 7.3575$  Watts

Output Power developed for 1 vehicle passing over the speed Breaker arrangement for one minute = 7.3575 watts

Power developed for 60 minutes (1 hr) = 441.45

watts Power developed for 24 hours = 10.5948 Kw

This power generated by vehicles is more than sufficient to run four street lights in the night time.

## VIII. FUTURE SCOPE

- The future scope of this project is to improve the sustainability of the speed breakers that is by using various materials for the manufacturing of speed breakers.
- Improvement of power generation system by using other types of power generators can also be implemented.

## IX. CONCLUSION

"Electricity plays a very important role in our life". Due to population explosion, the current power generation has become insufficient to fulfill our requirements. In this project we discover technology to generate electricity from speed breakers in which the system used is reliable and this technique will help conserve our natural resources. In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, it's 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.

## X. REFERENCES

- [1] K. Kolhe and A. Pandhare, "Electric Power Generation System from Speed Breaker by using Rack and Pinion mechanism," International Journal of Current Engineering and Technology, p. 8, 2017.
- [2] Ullah, K. & U. -. Zaman and K. M. A. & Hosen, "Electrical power generation through speed breaker.," 2016.
- [3] D. V. Rao, K. P. Rao, C. Rao and R. Umamaheswara Rao, "Design and Fabrication of Power generation System using Speed Breaker," International Journal of Current Engineering and Technology,, vol. 4, 2014.
- [4] A. A. A. A. e. al, "Power generation through road speed breakers— An experimental approach," Advances in Science and Engineering Technology International Conferences (ASET), 2018.
- [5] sharma and pc, "Non-conventional power plants," Public Printing Service, 2013.
- [6] A. R. Pathan, A. Garate, K. N and SonaliRetharekar, "Power generation through speed breaker".
- [7] A. P. Rao, A. K. Kumar and S. Suresh, "Power Generation from Speed Breaker by Rack and Ratchet Mechanism,"

International Journal of Current Engineering and Technology,  
2014.

[8] M. H. Mamun, M. Rahman, M. Atiqur and Abdullah,  
"Smart Home Automation System using Arduino and  
Android Application," 2020.

[9] Nathan David, A. Chima, A. Ugochukwu and E. Obinna,  
"Design of a Home Automation System Using Aurdino,"  
International Journal of Scientific & Engineering Research,  
vol. 6, no. 6, 2015.

