

DESIGN OF POWER GENERATING UNIT USING SPEED BREAKER

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ABSTRACT

In today's life power plays a vital role. There is a need to develop non-conventional energy sources due to depleting conventional energy sources of power. This paper emphasis one such where kinetic energy changes to electrical energy by replacing the traditional speed breakers as vehicle pass over the speed breaker, the spin the rollers which are connected to a DC motor or generator for electricity generation. It is an effective method of producing electricity. Also the cost of development of model is low. The generated power can be used like traffic signal, streetlight and solar panels.

KEYWORDS: Non-Conventional Energy, Speed Breaker, Traffic Signal, Kinetic Energy.

The proposed design presenting the electricity generation using speed breaker. For obtaining the electricity generation using speed breaker mechanism a prototype model is studied and developed.

For finding this research work is discussed in this paper, the generator used here is permanent magnet D.C. generator. The generator voltage is 12 volt D.C. This voltage is stored to the battery. The battery is connected to the inverter circuit. The inverter is used to convert D.C. voltage to A.C. voltage is used to activate the light, fan etc.

Energy is the primary and most universal measure of all kinds of work done by human and nature. Everything what happens in the world is the expression of flow of energy in one of its forms.

Energy in the form of electricity plays an important role in the life of human being. Most people use energy for input to their input bodies or to the machines and thus think about crude fuels and electric power. Electricity is the one of the greatest wonders of science. Electricity has practically revolutionized the world of ours.

Computers are also used as calculators sum up totals and make other calculations with the very accuracy. Books and newspapers are printed in billions overnight. There is not a single phase of human life which is not depend on electricity for its progress. Because of this role of electricity the modern age is called the "age of electricity."

This project "Power Generation Using Speed Breakers" depicts that how voltage can be generated from the busy traffic. The principle used here is that the kinetic energy of vehicle on speed breaker is converted into electrical energy. In this arrangement lever fitted to a ratchet-wheel type mechanism which in turn rotates a geared shaft loaded with recoil spring. The output of this

shaft is coupled to a generator to convert kinetic energy into electrical energy.

With few roads and plenty of vehicles on roads with heavy traffic is imminent and is among the other problems Bangladesh faces. Instead of viewing this as a problem, it could be turned as a blessing for the country. This project aims to harness the potential energy of the moving traffic and convert it into electrical energy that can be used.

Our primary aim is focused on the speed breakers that are placed on the roads. The mechanism work as such that; when a passing vehicle slow on a speed breaker the speed breaker would dip vertically downwards due to the weight placed on it. This vertically translation movement is then converted into rotational movement by means of a mechanical system which then can be used to drive a dynamo to generate electricity. The whole process of generating electricity will be remarkably simple, pollution free, and will come at a minimal cost design concept.

DESIGN AND CONSTRUCTION

Kinetic energy being wasted while vehicles are moving. This kinetic energy is used for the generation of electrical energy using some special arrangement called "cam shaft arrangement". This techniques utilize both mechanical and electrical technologies for the generation and storage of electrical power.

Whenever vehicle is allowed to pass over the speed breaker it pressed downward direction, then the cam shaft which is connected with the speed breaker starts moving. Because the motion of the cam shaft the rack which is connected with the cam shaft starts moving. Since the teeth of the rack connected to gears and there is two gears they rotates in a opposite direction. The function of flywheel which is mounted on the shaft is regulating the

fluctuation in energy and to make the energy uniform. This shaft is connected through the motor which converts mechanical energy into electrical energy.

The generated electricity is stored with the help of super capacitor, who has the greater energy charging capacity than the normal capacitor . Capacitor use static electricity (electrostatics) rather than chemistry to store energy . Inside a capacitor, there are two conducting metal plates with an insulating material called a dielectric in between them- it's a a dielectric sandwich , if you prefer charging a capacitor is a like rubbing a balloon on your jumper to make it stick. Positive and negative electrical charges build up on the plates and the separation between them, which prevents them coming into contact , is what stores the energy .Inverter can also be used with transformers to change a certain DC input voltage into a completely different AC output voltage but the output power must always be less than the input power: it follows from the conservation of energy that an inverter and transformer can not give output more power. A battery is connected for the storage of energy produced by the charger. Batteries have two electrical terminals (electrodes) separated by a chemical reaction happen involving both the electrodes and the electrolyte. These reaction converts the chemical inside the battery to other substances, releasing electrical energy as they go. This storage power is used in various purpose like in traffic light, street light etc.

The generated electricity is stored with the help of super capacitor, who has the greater energy charging capacity than the normal capacitor



Figure 1

RESULTS

We need electricity in various things. This is a suitable mechanism for generating electricity. As we know our conventional sources are depleting very fast we need to use non-conventional sources for efficient use. The advantage of this project is it does not require any external sources. In this project a new ideas is used to get electricity from speed breaker. This technique will help to save our natural resources.

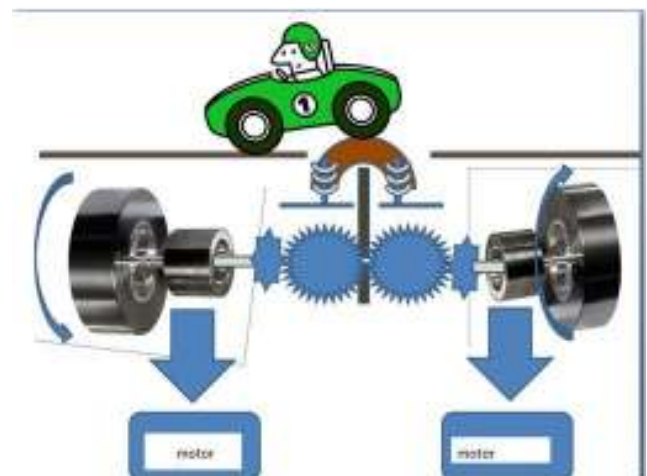


Figure 2

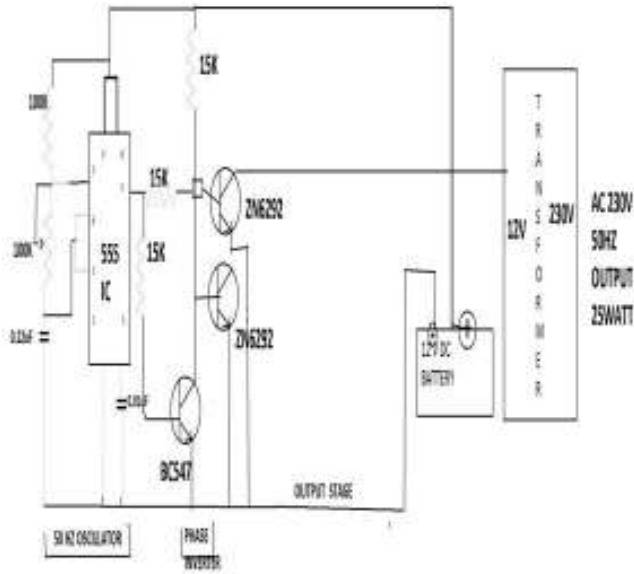


Figure 3

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CONCLUSION

This methods have many Advantages such as Low budget electricity production, Less floor area. No obstruction to traffic .Easy maintenance .Suitable at parking of multiplexes, malls, toll booths, signals, etc

Uses: Charging batteries and using them to light up the streets, etc

As coin has two faces in the same way there are also some disadvantages such as

Disadvantage-

1. Mechanical moving parts is high and therefore there are very large frictional losses and therefore require more maintenance.
2. Initial cost of this arrangement is very high.
3. The overall efficiency is quite low electric output as compared to other technique

FUTURE SCOPE

The shortage of light can be reduced at some extent. Wastage of energy of vehicles passing on roads can be minimized. Such speed breakers can be designed for heavy vehicles, thus increasing inputs weight and ultimately increasing output of generator. More suitable and compact mechanism to enhance efficiency.

It may be used for light vehicles also. Pollution free power generation. 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 , One might conclude that to be materially rich and prosperous , a human being needs to consume more and more energy.

Wastage of energy of vehicles passing on roads can be minimized. India, unlike the top developed countries has very poor roads .Talking about a particular road itself include 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.

APPLICATION

To provide electricity in villages near to highway, to fed the power directly to smart grid.

It can be placed in commercial building i.e. theatre, mole, public/private parking etc

This technique can be used in all roadway speed brake.

Street light, Road Signals, Sign Boards on the roads etc.

As a charging station for electric vehicles.

REFERENCES

- Power plant engineering by A.k. Raja, AmitPrakash Shrivastav, Manish Dwiwedi [New Age International Publisher]
- Power System stabilizers ,By Mitsubishi Corporation-A Release Notes from Mitsubishi Co.
- Power System Dynamic and Control, K.R. Padiyar , Interline Publishers Bangalore.
- Sharma, P.C., “Principles of Renewable Energy Systems”, 2003.

- Nota R., Barelds R., "Engineering Methods for Road Traffic and Railway Noise After validation and fine-tuning", Harmonoise, 2005.
- Awasthman V. and Priyadharshini M., Every Speed Breaker is now a source of Power 2010 International Conference on Biology, Environment & Chemistry ipcbee vol.1 (2011) racist press, Singapor.
- Shakun Srivastav, Ankit Asthana-"Produce Electricity By The use of Speed Breakers, "Journal of Engineering Research & Studies, Vol.2, No.1 April-June 2011.
- International Journal of Scientific & Engineering research, Volume 4, Issues 6, June-2013, ISSN 2229-5518.
- Piyush Bhagdikar, Shubham Gupta, Navneet Rana, R. Jegadeeshwaran, Generation of Electricity with use of Speed Breaker (IJAET May 2014)
- B. Santosh Sharma, V. Jyothi, D. Sudhir, Design of Power Generation Unit Using Roller Mechanism (IOSR-JEEE, May-June 2014, 55-60)