POWER GENERATION FROM WASTED ENERGY OF MOVING VEHICLE USING SPEED BREAKER

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Introduction:
Energy is the primary and most universal measure of all kinds of works of human beings and nature. Everything that happens in the world is the expression of the flow of energy in one of its forms. Most people use the energy for input to their bodies or to the machines and thus think about crude fuels and electric power. Energy in the form of electricity plays a very important role in the life of a normal man. Electricity is one of the greatest wonders of science. Next to man, it is the most important and revolutionary creation in this world of ours. It has practically revolutionized the world, the gradual but excessive use of electricity has come to bring about a stupendous change in the industry. With it, our modern gigantic tools are working. Computers also calculate and sum up the totals and make other calculations with the utmost accuracy.

Objectives:
- The utilization of energy is an indication of the growth of a nation.
- 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.
- 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.

Methodology:
The Speed Breaker are required to absorb the shocks produced when the vehicles pass over the speed breakers. From Fig. 1, the vehicle load acted upon the speed breaker is transmitted to Bicycle Pedal arrangements through springs mounted on the system, where the weight creates force on the springs. The sprocket arrangement is made of two Sprockets. One of the sprockets is larger in dimension than the other sprocket. Both the sprockets are connected with chain which transmits the 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 dimensions. The gear wheel with the larger diameter is coupled to the axis of the smaller sprocket. Hence, the speed that has been increased at the smaller Sprocket wheel is passed on to this gear wheel of larger diameter. The smaller gear is coupled to the larger gear. Therefore, as the larger gear rotates it increases the speed of the smaller gear which is following the larger gear and multiplies the speed to more intensity. Though the speed due to the rotary motion achieved at the larger sprocket wheel is less, as the power is transmitted to gears, the final speed achieved is high. This speed is sufficient to rotate the rotor of a generator and is fed into 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. 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 and can be used in night time for providing power to street lights.

Fig. 1: Block Diagram of Proposed System

Construction Details:
The working of the electro-mechanical unit is facilitated by considering 3 systems:

- Damper system
- Motion Conversion system
- Energy Conversion system

Fig. 2: Constructional details of Electro-Mechanical Unit

**Damper System:**
Damper system is required to support the speed breakers. The speed breaker is made up of materials like recycled plastic, vulcanized rubber etc consists of a spring which is required to push the speed breaker upwards when it is acted upon by the weight of the vehicle downwards. They are also required to absorb the shocks produced when the vehicles pass over the speed breakers.

**Motion Conversion System:**
This system is required to convert the basic vertical reciprocating motion of the damper system into rotary motion of the shafts. For this a bicycle pedal mechanism is used. The vehicle load acted upon the speed breaker is transmitted to bicycle pedal arrangements. This vertical motion is converted to rotary motion and transmitted to a sprocket arrangement.
Energy Conversion System:
In this system the mechanical energy available at the smaller gear (i.e. at the output of the motion conversion system) is converted to electrical energy by means of a dynamo or generator. The smaller gear is coupled to the dynamo or generator. The conversion will be proportional to traffic density. A dynamo or generator consists of a stationary structure, called the stator, which provides a constant magnetic field, and a winding called, the armature, which rotates within that field.

Structure Design:
The structure of the model is designed by solid works software using proper dimension of the model. As shown in the Fig. 3 the design of the structure is made by using following parameters.
1. Structure is made up of Metal Square of 20mm &25mm.
2. The dimension of the structure is 660mm length, 610mm width and 605mm height.
3. The anglers are joined by means of welding.
4. The overall weight of the structure is around 50kg.
5. The chain sprockets, gearwheel, freewheels and flywheel are attached to the structure by means of bearings, shafts etc.
6. The overall construction is robust and it can withstand a load more than 80kg.

Results and Conclusion:
The energy generated from speed breaker can be used for any kind of load by using necessary circuitry. In this system, we have developed a model to generate small amounts of power for localized applications. The model is successfully tested and implemented which is the best economical, affordable energy solution to common people.

The system consist of one humps and is made up of metal rods of 1cm thickness. The iron rods are joined by means of welding. The dimension of the hump is 20cm height and 28cm wide. The bicycle peddle is connected to the hump. The up and down motion of the hump is caused by mechanical spring as shown in the Fig. 4. Since today’s electricity crisis is increasing rapidly, so we have to develop a nonconventional power producing unit which can overcome the crisis of electrical energy, which can use the waste energy i.e. kinetic energy of the vehicle due to the friction between the tire of vehicles and road. This will support the power generating method and will tackle the problem of the energy crisis to some extent.
**Scope for future work**

Harnessing of non-conventional energy sources has played a significant role in the power generation sector. In this project, we have developed a model to generate small amounts of power for localized applications. This design model is successfully tested and implemented which is the best economical, affordable energy solution to common people. As India is a developing country where energy management is a big challenge for huge population, by using this project we can drive vehicle’s loads. Many such units implemented in highly populated areas in our country can save us a significant amount of energy.

This system shows a process to utilize conventional sources in a more effective manner without using natural resources. As it is known that, utilization of energy indicates the growth of a nation, so this represents a country’s technological advancement also. In the near future, due to the increasing rate of electricity shortage in developing countries like Bangladesh this kind of research will prove a great boon to the world, because it can capture a lot of electrical energy from wasted energy which can be easily used for minor needs like lighting roads lights. This research indicates that power generation is depended on the number of vehicle passing over the speed breaker. The number of vehicles used by the human beings is increasing day by day So, this kind of mini power plant system is very beneficial for country like Bangladesh to meet their future electricity demand. Similarly these road hump units can be implemented in all busy roads of our country. These units would take the energy generated by vehicle movement, in crowded settings and turn it into electricity.