

# Road Power Generation (RPG) by Flip plate Mechanism

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**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.

In this paper the electricity is generated through the flip plate mechanism. For obtaining the electricity through the flip plate mechanism a prototype model is developed and studied. Findings from this research work are discussed in this paper. This research work used a permanent magnet D.C. generator thereby generating 12 Volt D.C. This D.C. voltage is stored to the lead 12-volt battery. Electricity stored in battery is used to activate the light, fan etc. By increasing the capacity of the battery power rating is increased.

**Keywords:** Flip Plate, Flywheel, Lead Acid Battery, Permanent Magnet D.C. Generator, Flywheel.

## INTRODUCTION

Electricity is one of the most widely used forms of energy. Today also there is great scarcity of electricity. In this study an innovative concept of Generating Electricity from moving vehicles is presented i.e. Road Power Generator by Using Flip Plate Mechanism. Producing electricity from a Road power generator is a new concept that is undergoing research. The number of vehicles on road is increasing rapidly and if we convert some of the kinetic energy of these vehicle into the rotational motion of generator then we can produce considerable amount of electricity, this is the main concept of this project.

Today our whole life style is dependent on electricity. With the increasing population the use of electric power is also increasing. But we know that the resources to generate electricity are limited, and this has lead to the energy crisis. During this scenario we need to generate electricity from the things used in day-to-day life[6]. In this project the speed breakers present on roads are used to generate electricity. As we know that vehicles on road are increasing day by day which will help us to generate electricity as these vehicles pass through the speed breakers? This electricity generated can be used for different purpose such as lighting of signals and streetlights on road etc.

## SYSTEM OVERVIEW:

The principle of the electric power generation using Flip plate mechanism is very simple. It is based on the same principle as in the case of electricity generation in case of hydroelectric power plant, thermal electric power plant, nuclear power plant, geothermal energy, wind energy, tidal energy etc. In all of the above power plant mechanical energy is converted into electrical energy. In this setup also mechanical energy is converted into electrical power using a D.C. generator. Here the vertical motion of the top of the Flip Plate is converted into the rotational motion, which in turn rotates the generator and generates electricity.

## WORKING PRINCIPLE

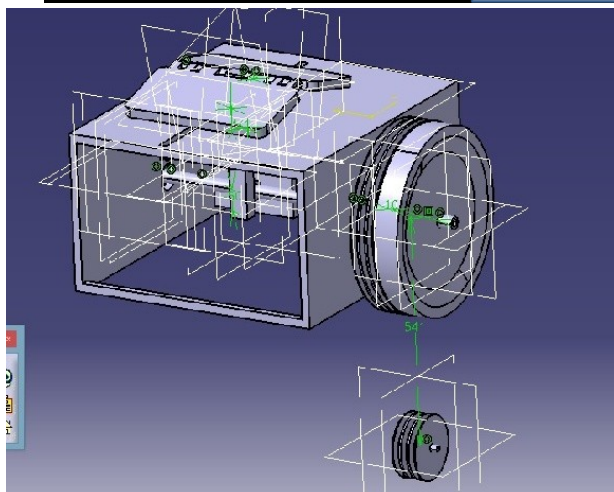
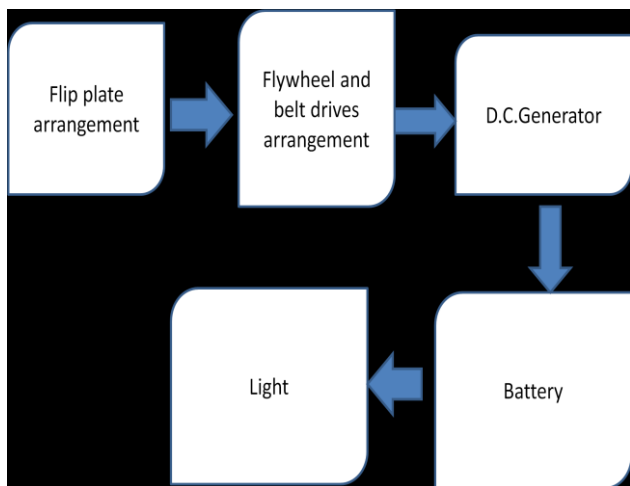
Road Power Generation (RPG) is a system design to capture waste and kinetic energy from all vehicles. This device converts the kinetic energy of the vehicles into electric energy. This is done by moving plate installed on the road, this plate captured very small movement from the road surfaces and it transferred to a key way flywheel system. From hundreds of wheel lies a single flywheel having used to driving machinery. The RPG included the method of driving one flywheel to another, once it reached predetermining velocity. The RPG flywheel system has been developed to achieve large amount of moment of inertia in relatively small space. The captured energy is converted into electricity which is fed into power grid.

In this project the two flip plates are mounted on the road surface and these plates are followed by the rack and pinion arrangement. Pinion is mounted on the shaft which is attached to the frame via bearing. Frame is installed under the road. The flywheel with pulley is mounted on the shaft and second pulley is mounted on the D.C generator and these two pulleys are connected with the help of v belt.

As wheel of the vehicle reaches upper most position of the plate, plates get slide through guide, simultaneously rack moves downward provide torque to pinion. The pinion transmitted this torque to shaft. Shaft is supported by two bearings attached on wall of frame. The shaft having pulley and flywheel arrangement on shaft through one way bearing. This arrangement functions to enhance rotation of flywheel for small motion of shaft.

The bigger pulley has 2 belts coupled with smaller pulley mounted on the D.C. generator shaft. The d. c. Generator converts the rotation of smaller pulley into electricity.

**BLOCK DIGRAM**



Simulated mechanism through CATIA

**CALCULATIONS**

Assuming the weight of the two wheeler = 270Kg.  
 Assuming the location as toll booth  
 Assume Average speed of the vehicle = 20km/hr  
 Maximum height of the plate = 10cm  
 We know that,

For mechanical system the power is the combination of force and movement. Therefore power is the product of a force on an object and its velocity.

**Output Power calculations:-**

Let us consider,

The mass of a vehicle moving over the flip plate = 270 Kg.

Height of the plate from surface = 10 cm.

Work done = Force x Distance

But, Force = mass x acceleration due to gravity  
 = 270x10  
 = 2700N

Therefore,

work done / sec = (2700x 0.10/60)  
 = 4.5 watt (for one pushing force)

Therefore, power developed for 1 vehicle passing over the flip plate for one minute = 4.5 watt

Power developed for 60 min (1 hr) = 270 watt/hr

Power developed for 24 hrs = 6048 KW/day

**APPLICATIONS**

Power generation using speed breaker system can be used in most of the places such as:

1. This technique can be used in all highways.
2. This technique can be used in all roadways Speed brake.
3. This mechanism of generating of electricity can be placed on the actual speed breaker of the roads.
4. The power is Generated when the vehicles pass through it. Which in can be stored in the battery.
5. This power can be used in many Places after using the inverter, which enhances in the voltage from 12 volts to 230 volts.
6. This power can be used in the following:
  - Street Lights.
  - Road Signals.
  - Sign boards on the roads.
  - Lighting Of the bus stops.
  - Lighting of the check post on the highways etc.

**CONCLUSION**

Road Power Generation is a new type of unconventional source of energy. This uses wasted energy of moving vehicles. It converts kinetic energy developed from moving vehicles to electric energy. RPG is possible answer for battery charging station and also for the lightning of the street light. The higher frequency of passing vehicles provides higher capacity of

#### SCOPE FOR FUTURE EXPANSION

This project is designed for road power generation is specifically used on highways, entrance and exit of school, college and companies. Entrance and exit of malls. It can be installed at toll booths, bus stands, airports and railways parking zone electricity generated by road power generation.

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