

# Design and Fabrication of Power Generation System

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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, non-conventional sources are needed to be developed for power generation which is clean, environment friendly and sustainable. In this research we propose a renewable non-conventional 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.

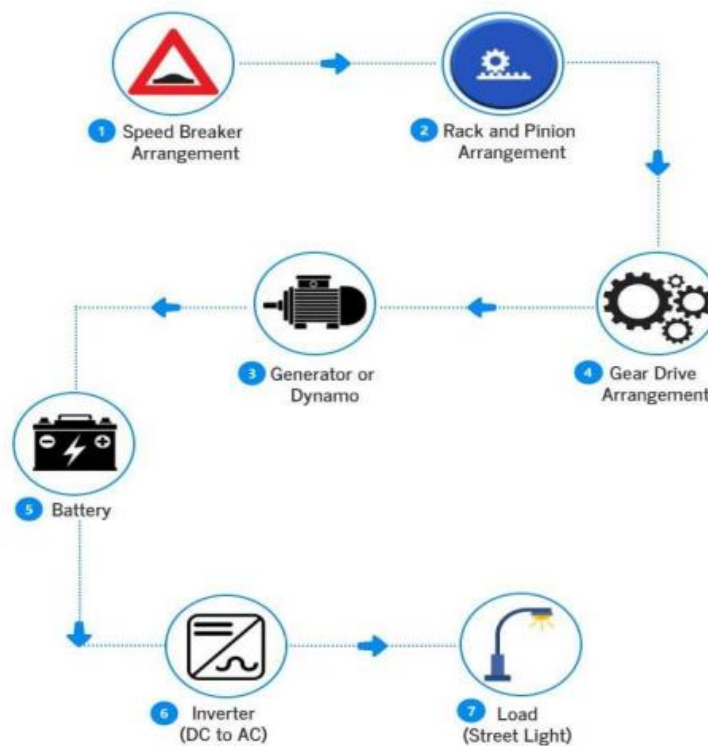
**Keywords:** kinetic energy, rack & pinion, generator, non-conventional energy, street light

## 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, provide 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 non-conventional power generating system based on speed breaker mechanism which generates 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 converts into electricity that gone wasted, while vehicles move.

## II. METHODOLOGY

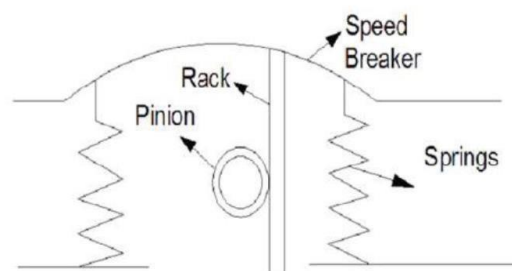
Power can be produced from conventional and non-conventional energy sources. In this paper we show energy conversion from kinetic energy to rotational energy and rotational energy to electrical energy respectively. This project explains the mechanism of electricity generation from speed breakers. It is a simple but optimum process to generate energy from speed breaker arrangements. There are a large number of vehicles running on the road. These vehicles are going over a number of speed breakers present on the road. We want to replace these traditional speed breakers with our proposed speed breaker. It is an Electro-Mechanical unit. This system utilizes both mechanical technologies and electrical techniques for the power generation and its storage. The generation will be proportional to the traffic density.



**Figure 1:** Block diagram of mechanism

### III. SYSTEM DESIGN & FUNCTION

While moving, the vehicles possess some potential energy due to its weight and it is being wasted. This kinetic energy can be used to produce power by using a special arrangement using a special arrangement called “power hump”. It is an electro mechanical unit. It utilizes both mechanical technologies and electrical techniques for the power generation and its storage. Whenever the vehicle is allowed to pass over the dome it gets pressed downwards, then the springs attached to the dome are 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 rotatory motion of gears but the two gears rotate in opposite direction so that shafts will rotate with certain rpm. These shafts are connected through a set of gears to the dynamos which converts the mechanical energy into electrical energy. The conversion will be proportional to traffic density.



**Figure 2:** Rack and Pinion mechanism

The charging circuit charges a battery. The Inverter circuit converts this DC voltage into AC voltage and a step up transformer stepped up the AC voltage. A dark sensing circuit is used to sense the night so that the street light lit on.

### IV. SYSTEM CONSTRUCTION

Speed breaker, spring arrangement, hydraulic press, rack and pinion combination, freewheeling and gear combination, generator, charging circuit, battery, dark sensing & switching circuit, inverter circuit and step up transformer used to the system in this research work.

**A. Speed Breaker**

It is the top portion of the system which is made of iron in curved shape. The main function of this speed breaker is to sustain the pressure of vehicle and squeezes it when vehicle passes through it.

**B. Spring Arrangement**

A spring is an elastic body whose function is to distort when loaded and to recover its original shape when the load is removed. It cushions, absorbs or controls energy either due to shocks or due to vibrations. There are four helical springs below the speed breaker which are squeezed when vehicle pressurizes upon it and it bring the speed breaker at previous state.

**C. Rack And Pinion Arrangement**

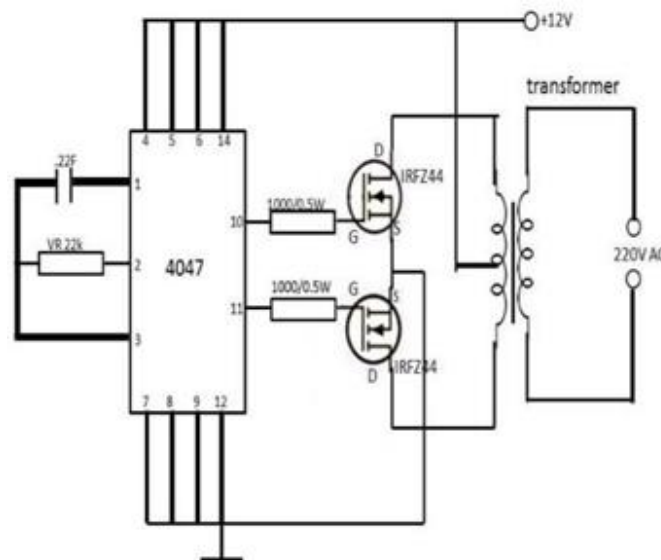
Rack and pinion can convert rotary to linear or from linear to rotary motion. Rack is a linear gear and pinion is a circular gear. Applied force on rack is converted to rotation by pinion. The mechanical force is converted into rotational force.

**D. Generator**

The device which converts mechanical energy into electrical energy is called generator. An AC generator is used for producing alternating current which contains an assembly of stationary (stator) and moving parts (rotor). The rotor is connected with the gear. The torque which generated by gear rotates the rotor of the generator. The rotor creates a moving magnetic field around the stator, which induces a voltage difference between windings of stator and produce the alternating Current (AC) output of the generator.

**D. Charging Circuit**

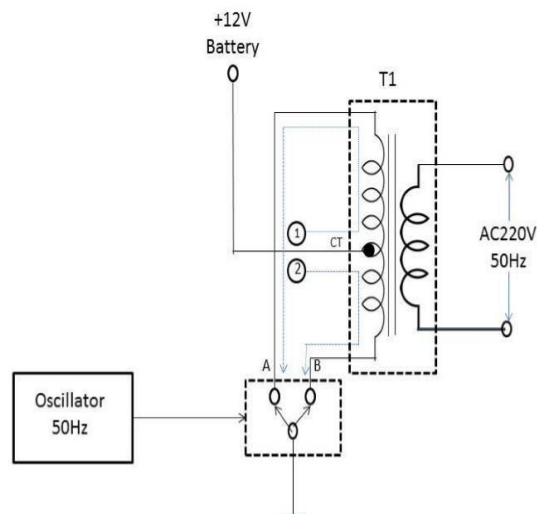
Charging circuit is used to charge the battery. Figure 3 shows the charging circuit.



**Figure 3:** Charging circuit

**E. Inverter Circuit and Step-up Transformer**

Inverter convert DC voltage to AC voltage and step up transformer is a type of transformer which stepped up the AC voltage. In this system inverter circuit converts 12V DC to 15V AC. Step up Transformer makes the voltage to 250 V AC from 15 V AC.



**Figure 4:** Inverter circuit and Step up Transformer

## V. ADVANTAGES

- Non-polluting power generating source.
- Simple construction, mature technology.
- Less floor area required and no obstruction to traffic.
- No need of manual work during power generation.
- Low installation and maintenance cost.
- Power generation using non- conventional energy sources.
- Easy for maintenance and no fuel transportation problem.
- Simple construction, mature technology, and easy maintenance.

## VI. CONCLUSION

The listed system is non-conventional and the way of power generation technique is also eco friendly. It has advantage that it does not utilize any external source. By using this system we will be able to reduce power crisis and load shedding. The stored electricity could satisfy the daily requirement for street lighting. We can also use it for signal system on road, tollbooth or any other useful work.

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