

Microcontrollebased Road Power Generation

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ABSTRACT

This paper introduces useful concept of present scenario, power is the major need for human life. There is a need to develop non-conventional sources for power generating due to the reason that our conventional sources of power are getting depleted day by day. The extensive use of energy has resulted in an energy crises over the few years. For meeting up the regular demand of energy we need to design a system that will produce electricity with technique of optimal utilisation of conventional sources for conservation of energy. This paper emphasizes on the idea how to utilize the energy which is wasted when the vehicle passes over a speed breaker. Lot of energy is generated when the vehicle passes over it. We can tap the energy generated and produce power by using the speed breaker as power generating unit. The kinetic energy of moving vehicles can be converted into mechanical energy at the shaft through rack and pinion mechanism. Then, this mechanical energy will be converted into electrical energy using generator which will be stored in the battery. The energy we save during the day light can be used in night time for lighting street lights. Therefore, by using this arrangement we can save lot of energy which can be used for the fulfillment of future demand.

Keywords: Kinetic energy, Speed Breaker, Electro-mechanical unit, Power Generation, Microcontroller, Energy conservation.

I. INTRODUCTION

In all the sectors of any country's economy, energy is an important unit. One of the most widely used form of energy is electricity, which can also be generated by converting kinetic energy of moving vehicles by making speed breaker as a generating unit called as Road Power Generation (RPG). Road Power Generation can be done by Roller mechanism, Spring mechanism, Crankshaft mechanism etc. But these mechanisms have some disadvantages. So this paper attempts to show an innovative concept of Road Power Generation using rack and pinion mechanism and controlling overall operation with the help of microcontroller to use this generated electricity in an efficient manner.

II. PROPOSED SYSTEM

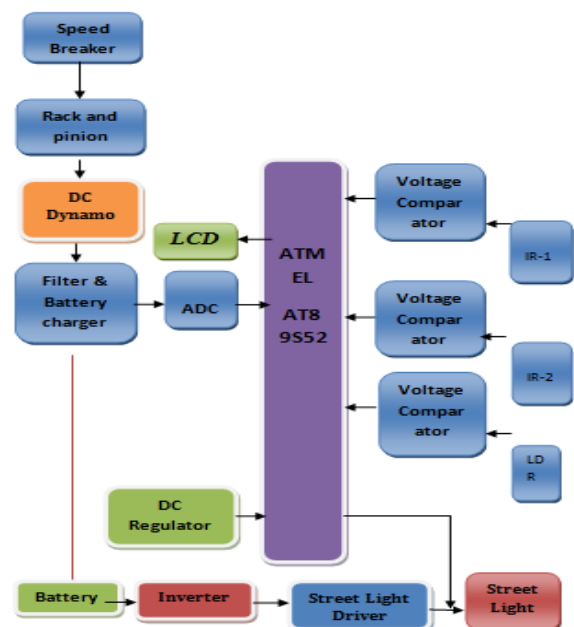


Figure 1. Block Diagram

III. EQUIPMENTS REQUIRED

- ✓ RACK AND PINION GEARS: The rack and pinion used to convert between rotary and translatory motion. The rack is the flat toothed part, while the pinion is the gear. Rack and pinion can convert rotary to linear or from linear to rotary motion
 - ✓ SHAFTS: It is a rotating element, which is used to transmit power from one place to another place. It supports the rotating element like gears. It must have high torsional rigidity and lateral rigidity.
 - ✓ SPRINGS: It is defined as 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.
- VOTAGE REGULATOR: It is an electrical regulator designed to automatically maintain a constant voltage level. Depending on the design, it may b used to regulate one or more AC or DC voltages.
 - LCD(Liquid Crystal Display): It is the technology used for displaying the output on the screen.
 - INVERTER: It is an electrical device used to convert power from DC to AC.
 - MICROCONTROLLER: A microcontroller (sometimes abbreviated μC , uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM.

The 8051 is the name of a big family of microcontrollers. The device which we are going to use is AT89S52 which is a typical 8051 microcontroller manufactured by Atmel™.

DC DYNAMO: It is a device, which converts mechanical energy into electrical energy. The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through “faraday's law of electromagnetic induction”. A dynamo machine consists of a stationary structure, called stator, which provides a constant magnetic field, and a set of rotating winding called the armature which turns within that field.

- FILTERS: Filters are the circuits which performs signal processing functions, specifically to remove unwanted frequency components from the signals.
- LDR: A photo resistor or light dependent resistor(LDR) is a resister whose resistance decreases with increasing incident light intensity. It is made up of high resistance semiconductor.
- LED: A light emitting diode (LED) is a semiconductor light source. LED's are used as indicator lamp in many devices and are increasingly used for other lighting.
- VOLTAGE COMPARATOR: It is an electronic circuit that compares two input voltages to know which of these voltage is greater.

IV. WORKING PRINCIPLE

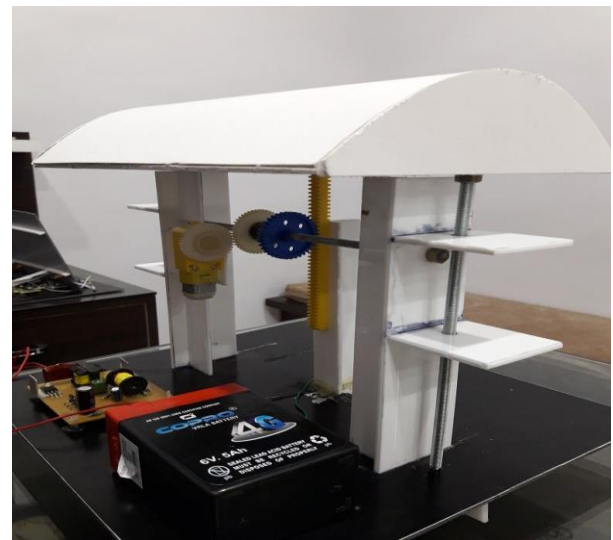


Figure 2

The working of this speed breaker arrangement for producing electricity is very simple. There are large number of vehicles running on the road. When these vehicles passes over the speed breaker it moves downwards due to its weight, than the springs that are attached to the speed breaker are compressed and the rack, which is attached to the bottom of the

speed breaker moves downwards in the reciprocating motion. pinion converts this reciprocating motion into rotary motion. so the shaft will rotate with certain rpm. The dc motor is connected to the shaft which converts mechanical energy into electrical energy and is stored in the battery. This stored dc power is converted into ac using inverter and is given to street light.

After generation the remaining operations are done using microcontroller. The supply for the working of microcontroller is given through dc regulator. The generated output is measured using microcontroller and is displayed on the LCD. The power generated is used in efficient manner by controlling the intensity of street light to 50% and 100% using LDR.

V. RESULT AND MODEL CALCULATIONS

- The weight of the load acting = 5 kg
- Height of the speed breaker = 5cm
- Workdone = Force*Distance
- Forc = Weight of the body = 5*9.81 = 49.05N
- Distance travelled by the body = Height of the speed breaker = 5cm
- Output power = Workdone/Seconds = (49.05*0.05)/60 = 0.04 Watts
- Power developed for 1 vehicle passing over the speed breaker arrangement for 1min = 0.04 Watts
- Power developed for 60minutes = 2.4 Watts

The proposed project was tested for generation of electric power. Different pressure was applied on speed breaker, the power generated were recorded.

Table 1

Sl.No.	Load(kg)	Power generated(watts)
1.	1	0.008
2.	2	0.016
3.	3	0.024
4.	4	0.032
5.	5	0.040

The above experiment indicates that when pressure was applied on speed breaker there was a corresponding increase in power. The results were encouraging.

VI. ADVANTAGES

- Pollution free power generation.
- Elimination of transmission system.
- Less area required and no obstruction to traffic.
- No need of man power during power generation.
- Low cost, easy maintenance and no fuel transportation problem.
- Electricity will be generated throughout the year.
- More efficient

VII. FUTURE SCOPE

In this world where there is shortage of electric power supply, this project will be helpful to solve some of the problems and RPG may be the possible answer for battery charging stations.

VIII. CONCLUSION

This method of Road Power Generation will prove a great benefit to the world, since it saves lot of electricity that is getting wasted in illuminating the street lights.

IX. REFERENCES

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