

# POWER GENERATOR FROM MECHANICAL FOOT PRESS

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## **Introduction**

An innovative and useful concept of Generating Electricity from a foot press is our step to improve the situation of electricity .First of all what is electricity means to us? Electricity is the form of energy. It is the flow of electrical Power. Electricity is a basic part of nature and it is one of our most widely used forms of energy. We get electricity, which is a secondary energy source, from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources.

Many cities and towns were built alongside waterfalls that turned water wheels to perform work. Before electricity generation began slightly over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal-burning stoves. Direct current (DC) electricity had been used in arc lights for outdoor lighting. In the late-1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which can be transmitted over much greater distances than direct current. Tesla's inventions used electricity to bring indoor lighting to our homes and to power industrial machines.

Electricity generation was first developed in the 1800's using Faradays dynamo generator. Almost 200 years later we are still using the same basic principles to generate electricity, only on a much larger scale. Now we are throwing some light on the very new and innovative concept i.e. GENERATING ELECTRICITY FROM A FOOT PRESS.

Producing electricity from a foot press is a new concept that is undergoing research. India's installed capacity is nearly 20 per cent of China's capacity though both countries have billion plus people. There is roughly 12 per cent power deficit in the peak hours. Tariffs are set by the state governments so power firms are not allowed to pass on rising fuel costs to consumers. Banks are burdened with loans to loss-making state-run electricity distribution firms and are unwilling to lend to new projects that do not have assured fuel supply. India has nearly 10 per cent of the world's coal reserves but lack of environmental clearances and other disputes have hindered production. Shortage of domestic supply has resulted in costlier imports.

Coal fired power plants account for more than half of India's power generation. From 2001 – 2004, India's oil demand has been growing by 2.68% but it will grow by 6.33% from 2003 – 2004 (projection from Qtr 1, IEA, 2004)

# LITERATURE REVIEW

[Kumar et al.] in this research paper author studied three methods of foot-step power generation namely piezoelectric method, rack and pinion method and fuel piston method comparatively and found that the rack and pinion mechanism is more efficient with moderate cost of operation and maintenance.

[Afzal et al.] this paper is all about generating electricity when people walk on the Floor if we are able to design a power generating floor that can produce 100W on just 12 steps, then for 120 steps we can produce 1000 Watt and if we install such type of 100 floors with this system then it can produce 1MegaWattAs a fact only 11% of renewable energy contributes to our primary energy. If this project is deployed, then not only we can overcome the energy crises problem but this also contributes to create a healthy global environmental change.

[Raja et. al.] this research paper attempts to show how energy can be tapped and used at a commonly used floor steps. The usage of steps in every building is increasing day by day, since even every small building has some floors. A large amount of energy is wasted when we are stepping on the floors by the dissipation of heat and friction, every time a man steps up using stairs. There is great possibility of tapping this energy and generating power by making every staircase as a power generation unit. The generated power can be stored by batteries, and it will be used for slighting the building.

[Jose et. al.] in this research paper author manufactured a model made from stainless steel, recycled car tires and recycled aluminium, also includes a lamp embedded in the pavement that lights up every time a step is converted into energy (using only 5 percent of the generated energy). The average square of pavement produces about 2.1 watts of electricity. And according to author, any one square of pavement in a high-foot traffic area can see 50,000 steps a day. Based on this data, only five units of Pavegen pavement can be enough to keep the lights on at a bus stop all night.

## METHODOLOGY

The footstep arrangement is used to generate the electric power. Now a day's power demand is increased, so the footstep arrangement is used to generate the electrical power in order to compensate the electric power demand. In this arrangement the mechanical energy is converted into electrical energy

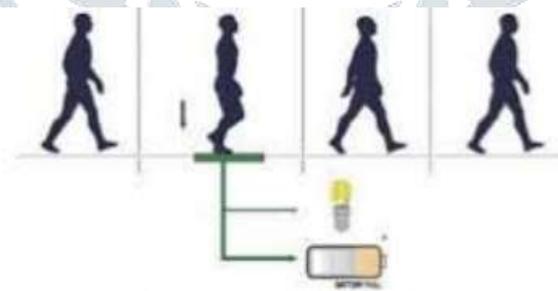


Figure 1: Schematic representation of the foot press power generator

Non-conventional energy using foot step is converting mechanical energy into the electrical energy. When the pressure is applied, the rack and pinion will convert mechanical energy into electrical energy. This electrical energy will be storing in the 12v rechargeable battery connected to inverter. We are using conventional battery charging unit also for giving supply to the circuitry.

In this project we are converting Mechanical energy into Electrical energy. We are trying to utilize the wasted energy in a useful way. By using Rack and Pinion arrangement we are converting to and fro motion of the steps into rotational motion of the dynamo. Through Dynamo the rotational energy is converted into electrical energy. This electrical energy output will be shown by glowing the LEDs. The output power is expected to be 3 to 4V in prototype.

## COMPONENTS USED

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This section is mainly placed in the crowded areas. This footstep arrangement is attached with spring section. Footstep section consists of

- Springs
- Foot – step
- Gearwheel arrangement
- Rack and Pinion section
- DC Generator
- LEDs
- Shaft
- Battery

## WORKING PRINCIPLE

The upper plate is mounted on two springs; the weight impact is converted into electrical power with proper control unit. The spring and rack & pinion arrangement is fixed below the foot step which is mounted on base. Spring system is used for return mechanism of upper plate after release of load. The shaft along with pinion is supported by end bearings. One end is connected with small belt pulley system and on the other end a flywheel is mounted. The dc generator is rotated with the help of this belt & pulley arrangement. The terminal of DC generator is connected to lightning LEDs The gearwheel arrangement is connected to the shaft which in turn is connected to the DC generator. The DC generator is connected to the battery and the LEDs

the working procedure is explained in step by step manner.

Step 1: When force is applied on the plate by virtue on stamping on the plate the force spring gets compressed.

Step 2: Due to this the rack moves vertically down.

Step 3: The pinion meshed with the rack gear results in circular motion of the pinion gear.

Step 4: For one full compression the pinion Moves one semicircle, when the force applied on the plate released the pinion reverses and moves another semicircle.

Step 5: The intermediate gear with more number of teeth will rotate as a result of motion of pinion.

Step 6: As a result the power is generated resulting in lightning up the LED's

Step 8: Now the voltage obtained is used for small applications.

## PRACTICAL POWER OUTPUT

Power can be calculated in terms of obtained voltage and current when the load is applied on the footsteps. The readings are noted by using the Multimeter. Power = Voltage Current Here, when the foot is depressed due to the applied load on the footsteps the calculated power is as follows.

For one step of 20kgs of load applied on the footsteps, the generated voltage is 2.6V and the average current produced is 12milliamps. Power = 2.6 Power generated per hour is  $0.0312 = 112.3$ Watts. Thus the obtained power for continuous load applied on the footsteps for one hour is 112.3watts.

## CONCLUSION

This concept falls under the subject of nonconventional energy resources, out of the many alternative energy resources one dependable source is solar energy, but it is quite costliest affair. Therefore alternative cheapest source is to generate electricity from foot step. This technology proven here is the ultimate inexpensive source of all known forms of energy. When it is implemented practically, depending up on the size & traffic flow, each foot step may produce tens of kilowatts power every day, this power can be utilized for many applications. If we are used this project at very busy stairs palace then we produce efficient useful electrical for large purposes. One important advantage of producing energy through this technology is that it does not pollute the environment.. Hence these foot step can be altered with this technology, there by all the street lights belongs to a particular city can be energized.

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