

Power Generation from Piezoelectric Footstep Technique

^{*1}Muhammad Aamir Aman, ²Hamza Umar Afridi,

³Muhammad Zulqarnain Abbasi, ⁴Akhtar Khan, ⁵Muhammad Salman

^{1,2,3,4,5} Department of Electrical Engineering, Iqra National University, Pakistan

Email: aamiraman@inu.edu.pk

*Corresponding author: Muhammad Aamir Aman, E-mail: aamiraman@inu.edu.pk

Abstract

The production of electric power from the foot step movement of the peoples and the pressure exerted during walking which is fritter away, is the main theme of this paper. The mechanical power transformation into electrical power as the pressure exerted by the footstep and by using transducers is basically called as "Foot step power generation system". Power is produced by the power generating floor and it is basically the production of electrical energy from kinetic energy. As today electricity demand is increasing and it is unable to overcome this global issue by using the traditional power generating sources. Demand and supply gap is the major issue of energy crisis.

The main aim is to overcome the power crisis throughout the world although it is not enough to fulfill over excessive demand of electrical energy but it will be able to change and decrease reliance on old method of generating electricity. We can generate 1 megawatt of power if we have a 100 floor, as we are able to model a power production floor which can generate up to 1000 watt on just twelve footsteps means one unit and it is capable to generate 10000w power for just 120 footsteps. It can be installed on road side footpath, parks and jogging tracks and many other public place, airport etc. and have great impact of this and will create great difference in the electrical power generation system.

Keywords: Energy Crisis, Supply and demand, Renewable Energy, Piezoelectric, Electrical Energy, Footstep power generation system.

I. Introduction

The formation of electrical energy from the force exerted by footstep on the floor is illustrated in this research work. It will be surprising to know that the normal footstep movement on the floor can generate how much energy. As thousands of step per day is taken by each person. Electrical energy is generated by the footstep taken by the peoples as a result of walking. It is a fact that large amount of energy is lost by each person during routine walk which is the main source for this system.

The approach of this Electro-Kinetic energy floor is to convert kinetic energy into electrical energy by walking on floor. The energy that is produced from a person walking on floor is noise and pollution free. That type of energy is advantageous and even not need any type of fuel or power source to run. By implementation of this

renewable energy in today's world while the demand of energy is increasing day by day is the current solution of this modern world. In this research work a system is designed which generate power through non-conventional energy source technique such a walking on the gardens, grounds, and floors etc. This system is established in heavy populated areas [I].

Basic way of the 'Foot Step Power Generation' is based on the piezoelectric sensor to apply this system wooden plates up and down will be placed and adjusted on the piezoelectric sensor and moving spring. The force is applied when the person is walking on that mat and the magnet is fixed on the upper portion of the wooden sheet as a result of force, and moves into the cavity. However, the cavity is fixed on the bottom wooden sheet of the mat. A compatible system have been design to complete the procedure through which the load will run, Home appliances will work on alternating current output voltage. And the task is with the help of direct current to charge battery and then using inverter to convert direct current into alternating current for normal usage. At last, designing for the power generation of such types are very useful as compare to the demand of energy all over the world [I].

II. Background

Most of the researcher worked to convert the changing dynamic energy into the useful electrical energy by individuals traveling. In [II], reverse electro wetting technique is used wherein the flow of liquid on dielectric material coated. Electrical energy is produced by conductive substrate. Due to human locomotion if there is any vibration on above platform that will be cause to produce electrical energy.

Researchers of Hull University worked on transferring the motion of an individual into electrical energy. They had fixed the tiles in diverse stations in Japan and observed that the average weight of 60.00kg, 1.00 watt of power is generating in a second. In [I], different mechanism for generation of electricity from foot step power generation process has been given. Rick and pinion gear system attached dynamo with its gear mechanisms was used as shown in Figure 1.

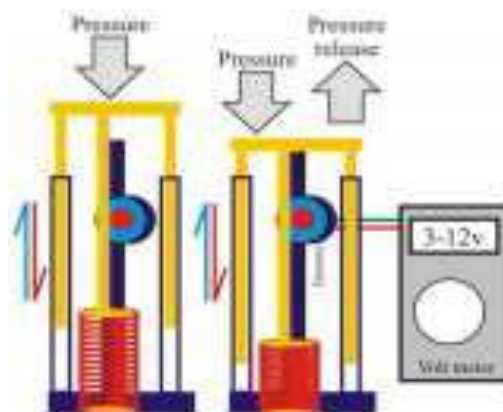


Figure 1. Generation by applying pressure

Figure 1, shows that gear is coupled with fly wheel that will turn and revolve the dynamo. Figure 1 clearly illustrates that power produced can be stored in batteries also monitoring and controlling the power produced is possible in this manner.

A single tile push by the footstep force will rotate twice the shaft. The shaft rotation will become smooth with the assistance of fly wheel that store temporary movement conveyed DC generator produced 12v, 40Amps at 100rpm, while shaft movement rotate the gear box that build it up 15 times. Inverters are used to utilize the stored generated energy in the batteries.

III. Literature Survey

III.a Purpose

To generate electrical energy from the footsteps there are several methods i.e. gear wheel and fly wheel to produce power. These are used in places where there is a lot of people's movement to generate power because the mechanical portion of this will work on the principle. Footstep from crowd on floor and piezo plate scheme that is used below the floor is done for the generation of power, piezo plate will be covered by the sheet and piezo sensor experience a vibrating force by the spring.

Electric power will be generate in form of electric current by the striking of piezo plate on the floor. Power generated by the footsteps is used for the additional features like light or street light used at the place of pedestrian's. Credit is given to the pedestrian for the energy which they produced [III].

IV. Literary study

Footsteps are used for the production of electrical power. Electrical energy produced by footstep is more than enough. Few methods will be described like steps of fly and gear wheel method for generating power in these step piezo plates are also used.

- The transformation of energy from mechanical into electrical is done to organize the electrical devices.
- Electrical system is arranged effectively to transfer mechanical energy into electrical energy in proper manner.
- Piezo is couple with the spring and by the assist of sheet arrangement is done by this technique; power will be generated by the force applied by the spring to vibrate piezo.
- 12 volt battery of lead acid is used to store rectified voltage passed through battery charger circuit produce by the footstep.
- Inverter and battery are linked. Inverter is design that converts 12 volts DC into 220 AC.
- Finally, ac output voltage is used for lightening up energy saver as well as it may also be used for charging the battery of laptops; also charge the handset and can be used for many other home appliances.
- If more output is needed increase the quality and ability of the inverter and battery also use more steps for more energy [IV].

IV.a Aspects

Electrical power energy form by changing mechanical energy into electrical energy by the transform ring i.e. movement of footstep on the floor, piezo plate is placed there and that is the key feature of power produced through footsteps by piezo. It is totally risk free method piezo electric power network is secured also safe for practice and this system will never create trouble and irritate people while using this, and never produce any problem [V] [VI].

Although this piezo electric power system have many mechanical and electrical part but it losses is very low. Even if the system is damaged or there is problem in some part so it can easily be replaced because the cost of this system is very low. Batteries in this setup have potential to store power. Power generation through footstep system is one of cheap and reliable procedure [VII].

IV.b Upcoming Extent

Now a day's there is a lot of focus on renewable energy resources due to rise in temperature on the surface of earth and such projects of footstep power production by piezo electric have broad aspects. Sterling plant biogas, solar energy and wind turbine are the other non-conventional energy resources used. But all of these non-conventional energy resources, if it is compare among the footstep electrical energy production through piezo electric sensor than footstep electrical energy production would be less costly, economical, reliable, and fruitful [VIII].

V. Block Diagram

Figure 2 shows the block diagram while circuit diagram is shown in Figure 3.

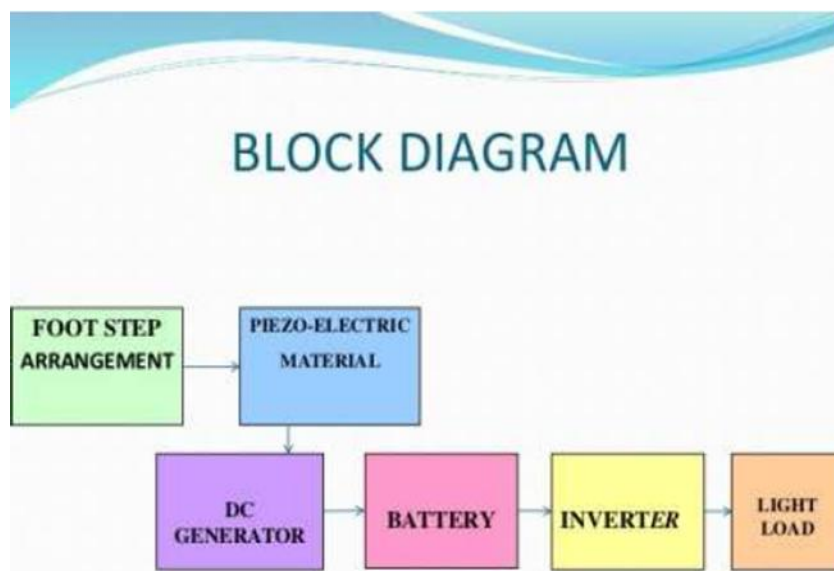


Figure 2. Block Diagram of Power Generation by applying Footstep pressure

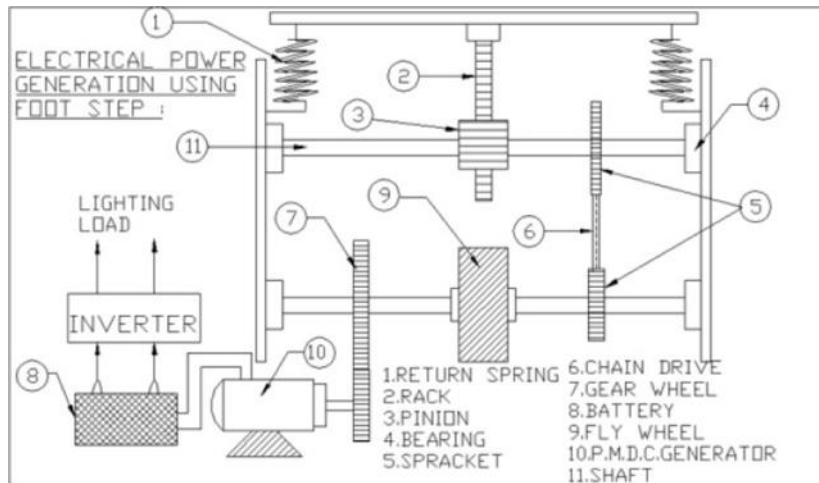


Figure 3. Circuit Diagram of Footstep Power Generation

VI. Operational Description

In Figure 3, it is shown that the flywheel is attached with gear wheel of the system. That is further connected to rotate the shaft and shaft is coupled with the P.M.D.C. Generator to generate DC current which is stored in the batteries.

When a person move on the tile of the floor, it will exert force on the tile that will rotate the shaft under the tile, clutch bearing is used to limit the turn and underpinned by holders. By the single tile push the primary shaft will almost rotate twice. Gear box shaft is turn by the movement of the individuals and the pressure provide by shaft gear box buildup fifteen times then the movement became uniform with the association of fly wheel, temporarily motion is stored and it will be send to DC generator which generate 100RPM 12V 40A.

To run home electrical appliances load, inverter will be used with batteries to convert DC into AC as generated energy is stored in the batteries. However, for full protection and room control microcontroller based home mechanization framework is used. Iron bars are used to put whole frame work also known as channels.

VII. Utilization

- Public squares
- Roads
- Educational centers like Schools, Colleges and Universities
- Public Parks
- Truck parking
- Metro station
- Lift system
- Streets
- Markets

- Footpaths
- Parking slots

VIII. Conclusion

Footsteps are the main source of power generation. There is no need of energy from conventional source of energy and there is zero percent of pollution in this type of power generation. There is no need of any kind of power from mains and it is important to the areas, all tracks where footsteps are used to generate non-conventional energy such as electricity. The contribution of Non-conventional energy to our primary energy is 11% that is a common fact. If this project is activated it will not only add and overwhelm the energy deficit problems but this will also form sound global environmental change.

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