

Free Energy Creation from Foot Step Operation by Placing Tile in Public Place to Generate Power

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Abstract—The use of power becomes essential for every task in modern life. It is not dependent on the climate and the electricity presented in this study will not pollute the environment. The study suggests a new method for producing electricity by using piezoelectric sensors placed along walkways. These sensors may be used to charge batteries and provide force as needed. By converting the mechanical energy of people's movement on the floor into electrical energy, the footstep power generating approach using piezoelectric sensors generates electrical force. The advantages of the piezoelectric force generating system are that it is safe and secure to use, it poses no problems or discomfort to people walking on sidewalks, and it is a completely risk-free approach. Despite having both mechanical and electrical components, the footstep power generating system has very little electrical and mechanical losses. The electrical force can also be stored in a battery via this approach. The electricity generated by this method may be used to power street sign boards and road lights, as well as for activity purposes. Finally, for power-related reasons, the force that will be abandoned can be transferred to the national grid.

Index Terms—Piezo electric Sensor, Capacitor, Arduino, Diode Bridge.

I. INTRODUCTION

Power plays a crucial role in the nation's development. Power is defined as a collection of physical marvels associated with the flow of energy. To be more precise, there are two types of power: dynamic electricity, which can flow from one potential to another, and static power, which may be kept constant. As the population grows and new organizations and production lines are established, there is a growing interest in the demand for

electricity to operate various types of machinery. Power may flow from one area to another as current or flash in metal. In power plants, generators produce electricity.

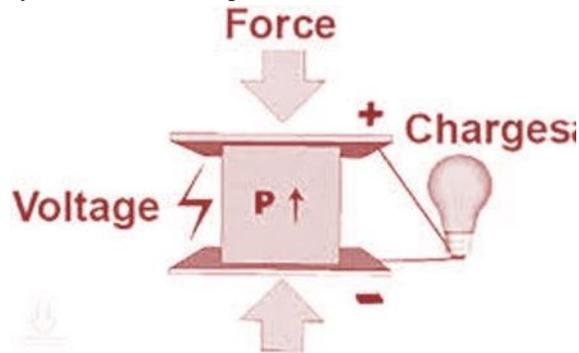
These generators themselves need a significant amount of information energy to produce electricity, hence they rely on the "NON-RENEWABLE" resources of energy to generate power with a defined end aim. Wind energy and solar cell panels are examples of "renewable" energy sources that may also be used to generate electricity. But these sources are limited to a certain area. For example, we may state that solar energy can only be used in places where the sun's focus is completely strong and constant.

Wind energy may be used primarily in coastal areas where wind speed and accessibility [1] are constant. Aside from that, human activities such as continuous driving of hand wrenches and small generators may also be employed to supply electricity; however, all of these wonders of power generation need continual human labor and testing. Furthermore, as the cost of the assets required to deliver power rises, so does the cost of electricity [2], and as a result, many poorer members of the general public continue to be unable to access power and are unable to operate even minor appliances.

As a result, there is a need to find a substitute approach for power generation that is distinct from existing tactics, with the objective of making it easily available to even the poorest and most vulnerable members of the population. There is a method of delivering power by using piezoelectric plates [3] that can generate voltage by utilizing power on them, which can then be used to charge a battery and so be

easily used to generate electricity. Walking is the most common type of human activity.

In this post, we'll explore an unconventional method of producing power by just walking or running on our feet. When a person walks, they lose energy to the path. It is possible to harness energy and convert it into something usable, like electricity. This system is based on the piezoelectric effect. This system's basic concept is as follows:



II. LITERATURE REVIEW

1. According to Ratnesh Srivastava, the number of low-power electronic gadgets has expanded dramatically over the previous several years. These technologies are widely utilized to improve our daily life. To fulfill this power need, we propose footstep power production. The primary goal of this system is to capture generally lost energy around a system and convert it into electrical energy.
2. R.Jai Rajesh: This paper suggests that voltage be generated utilizing footstep power. The suggested gadget functions as a tool by converting pressure into electricity [7], [8]. This article is quite beneficial in public places such as bus terminals, malls, rail stations, retail complexes, and so on. As a result, these gadgets are deployed in public areas where people are walking, and they must ride on them in order to pass through or survive. Such devices will then generate electricity in response to each foot movement.
3. P. Venkatesh: Based on the existing piezoelectric sensors, we have designed a footstep-based power generating system in this work. Since the beginning of human history, the human species has needed energy to survive and thrive, which has led to the depletion and

exhaustion of power supplies. For highly populous countries like China and India, proposals for the use and use of excessive energy in human feet are highly beneficial.

III. PROPOSED WORK

In this project, we connect 4 piezo sensors in series. These 4 series connections are linked in parallel.

$$1/C_{eq} = 1/c_1 + 1/c_2 + 1/c_3 + 1/c_4$$

We know, $Q = C V$
 $C = Q / V$

Hence,

$$V_{eq}/q = v_1/q + v_2/q + v_3/q + v_4/q$$

$$V_{eq} = V_1 + V_2 + V_3 + V_4.$$

The block has a piezoelectric sensor that will be linked to a voltage sensor. The voltage will then be increased and sent to the battery, which will light up the bulb. Whatever power is produced is shown on the LCD screen.

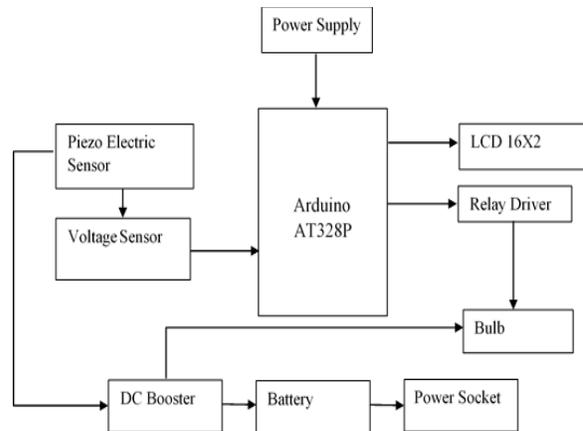


Fig. 1. Block diagram of proposed system



Fig. 2. 3D design of proposed system

IV. PROBLEM STATEMENT

Utilizing the waste energy produced by human mobility is essential in nations with high population densities. India and China, where millions of people move through the street's day and night, clogging roadways, train stations, temples, parks, and other

public areas. Therefore, a mechanism that transforms that step energy into electrical energy ought to be necessary.

V. COMPONENTS USED

Although Pierre Curie discovered the piezoelectric phenomenon in 1880, industrial sensing applications did not begin to exploit it until 1950. A piezoelectric sensor produces AC at the output by converting mechanical stress into electric charge.

The term "Piezoelectric Effect" refers to a material's capacity to transform mechanical stress into electrical charge. The Greek term "piezein," which meaning to push, press, and squeeze, is where the phrase "piezoelectric" originates. Because the piezoelectric effect is reversible, an electrical charge is produced at the output when mechanical stress is applied to the piezoelectric material. The sensor compresses or stretches when an electrical charge is applied.

Features and Details

Operating temperature: -20°C to +60°C; Storage temperature: -30°C to +70°C; Impedance: ≤500Ω; Voltage: ≤30Vp-p

- Low temperature of soldering
- 5V/ με is the strain sensitivity.
- Material: Quartz, which is usually utilized

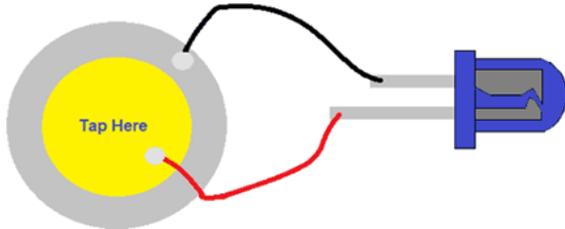


Fig. 3. Piezo with LED

How Are Piezoelectric Sensors Used?

The simplest way to utilize a piezoelectric sensor is to push the sensor's top and connect the positive and negative terminals to your circuit. When pushing, mechanical pressure produces an output voltage that is then sent into the circuit. As seen in the circuit below, you can easily connect an LED to the piezoelectric sensor. The LED will flash whenever you push the sensor.

Applications include: sound production and detection; high voltage generation; electronic frequency generation; microbalances; ultra-fine

focusing of optical assembly; and commonplace uses such as cigarette lighters.

Table 1. Compare of piezo material

Sucrose	Gallium orthophosphate (GaPO4)	To tra
Tendon	Potassium niobate (KNbO3)	do pie
Silk	Lead titanate (PbTiO3)	kg To ge
Enamel	Lithium tantalite (LiTaO3)	til tin se
Dentin	Langasite (La3Ga5SiO14)	For be
DNA	Sodium tungstate (Na2WO3)	The pu

Natural Piezoelectric Material	Synthetic Piezoelectric Material
Quartz (most used)	Lead zirconate titanate (PZT)
Rochelle Salt	Zinc Oxide (ZnO)
Topaz	Barium Titanate (BaTiO3)
TB-1	Piezoelectric ceramics Barium titanate
TBK-3	Calcium barium titanate

VI. RESULTS



Fig. 4. Working of project

Table 2. The Weight and the Voltage readings

Subject	Weight (kg)		Time (sec)		
	5 sec	10 sec	15 sec	20 sec	
Subject 1	45	1.98 V	2.15 V	2.80 V	3.78 V
Subject 2	50	0.83 V	1.23 V	2.38 V	3.12 V
Subject 3	55	1.76 V	2.73 V	4.66 V	5.65 V
Subject 4	60	2.75V	4.59 V	5.31 V	6.06 V

find the voltage output of a six-cell piezoelectric transducer coupled in series-parallel, research is not utilizing foot presses or pumps. The piezoelectric tile is tested on subjects weighing 45

, 50 kg, 55 kg, and 60 kg, as shown in Table 1. To evaluate the piezoelectric tile's ability to generate voltage, they are requested to tread on the tiles and do pumping or foot press exercises. The voltage recorded—five, ten, fifteen, and twenty seconds—determines the voltage that is produced. For every weight, the graph plots the relationship between the time required and the voltage produced.

The greatest voltage is produced when a human steps on the piezoelectric tile for approximately 20 seconds, as seen in the figure. It is also possible to draw the conclusion that each individual applies a different amount of force. The force exerted on the piezoelectric tile determines the voltage that is produced. Theoretically, a larger person stepping on this piezoelectric tile would produce a greater voltage than a smaller person.

VII. CONCLUSION

A piezoelectric tile may produce more voltage over an extended period of time. More force or footfall is imparted to the tile the longer it takes. The voltage produced and the time required are found to be linearly related. These piezoelectrics are especially well-suited for use in congested spaces like dance floors, railroad ticket counters, paved streets, and staircases. Additionally, the piezoelectric tile may be used on the treadmill or for skipping exercises. The street light, the stairway lighting, and low-power appliances may all be powered by the energy produced by this piezoelectric tile.

VIII. FUTURE SCOPE

The electric power is produced using a foot-step configuration. This structure is utilized to create electrical power in order to fulfill the high energy demand, which is rising. This configuration transforms mechanical energy into electrical energy. Piezoelectric effect has already begun to be experimented with for energy generation; they use it on walking tiles. Utilizing wasted energy is very relevant and crucial for densely populated nations in the future.

(Periodical style)

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