



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 4, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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Energy Generation through Foot Steps on Floor through Piezosensor

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ABSTRACT: Civil Engineering is a really fast developing field in today's world. Emerging of new technology in construction industry is very helpful for the society. A need for sustainable green energy is increasing, while the availability of energy itself is not comparable to the needs. One of most rapid activities in human life is foot stepping. A large amount of kinetic energy in term of press force are generated in every footstep activity at the cross-sectional space, lecture building, office, shopping Centre or market area. It is all about generating electricity when people walk on the Floor. Think about the forces exert which is wasted when a person walks. Idea is to convert the weight energy to electrical energy The Power generating floor in tends to trans- late the kinetic energy. Energy Crisis is the main issue of world those days.

KEYWORDS: Electricity, power generation, pressure, force, footsteps.

I. INTRODUCTION

Day to day, the population of a country increased and the requirement of the power is also increased. At a same time, the utilization of energy also increased in many forms. So, reforming the energy back to usable form is the major solution. A technology is developed and the use of electronic device also increased day by day. Power generating using conservative methods becoming deficient. This is a necessity arises to different power generation methods. At a same time, an energy is waste due to human locomotive. A sustainable green energy needs is increasing. Meanwhile the energy itself is not always available compare to the needs according to its sources. This will increase as many electric appliance's usage keep grow exponentially. One of most rapid activity in human life is footstep. Either the walking or jogging, running and dancing footsteps are activities needs a huge energy and residues in body heat of sweats as is shown. This potential waste energy can be recycled into another form of usable energy. 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. 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 has been designed 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.

II. RELATED WORK

What are Piezoelectric Wireless Sensors

Piezoelectric sensors are sensor that convert mechanical pressure into electrical currents. These sensors work using piezoelectric material is generates electrical charge when it deformed.

Piezoelectric sensors are also referred as vibration sensor, piezo sensors and strain sensors. This is commonly used in industrial applications and in robotics to sense vibration, impacts, and pressure. In the future, piezoelectric sensors will be able to sense temperature, humidity, and other environmental conditions. They will then transmit this data wirelessly to devices such as our smartphones, where they can be analyzed and used.

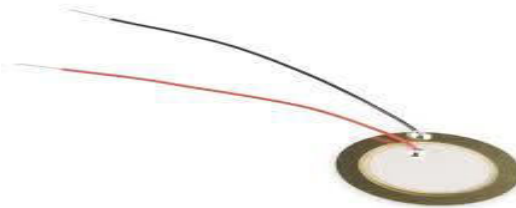


Fig.1 Piezosenser

Piezoelectric pressure sensors exploit this effect by measuring the voltage across a piezoelectric element generated by the applied pressure. They are very robust and are used in a wide range of industrial applications.

properties Of Piezoelectric Sensors

1. Large strain (charge) constant, permittivity, and pair constants.
2. Low quality factor.
3. High degree temperature extends the temperature and thermal stabile limit.
4. High charge gives, helpful for detect device or generator element.

Piezoelectricity Or Piezoelectric Effect

Piezoelectricity, also called the piezoelectric effect, is the ability of certain materials to generate an AC (alternating current) voltage when subjected to mechanical stress or vibration, or to vibrate when subjected to an AC voltage, or both. The common piezoelectric substance is **quartz**.

Quartz

Piezoelectric materials can turn mechanical stress into electricity, and electricity into mechanical vibrations. Quartz is an example of a naturally occurring piezoelectric crystal. Quartz crystals are made of silicon and oxygen atoms in a repeating pattern. Quartz is an example of a piezoelectric substance. When small amounts of pressure are applied to a quartz crystal, a small voltage is produced from the changing charge created by the moving electrons. Phonographs using the crystal utilize the piezoelectric principle to convert a movement of a needle to electrical signals which is after amplified and play by speakers.

Conversion Of Energy

Piezo electric materials are crystals it generates electricity when it gets compressed or vibrate. Energy from various vibration machines, objects in motion, or any other source of mechanical energy is not being capture. Therefore, the source of energy is dispersed and wasted. As good method to utilize this loss and piezo electric material used to absorb wasted energy and convert it to electrical energy. The energy that we apply and generate through foot step or vibration in a any public or private place can be convert into the electrical energy.

When we apply pressure or generation of energy it is in Kinetic energy to convert it in electrical energy, we need to first convert it into mechanical energy through piezosenser and then it will convert into the electrical energy for use

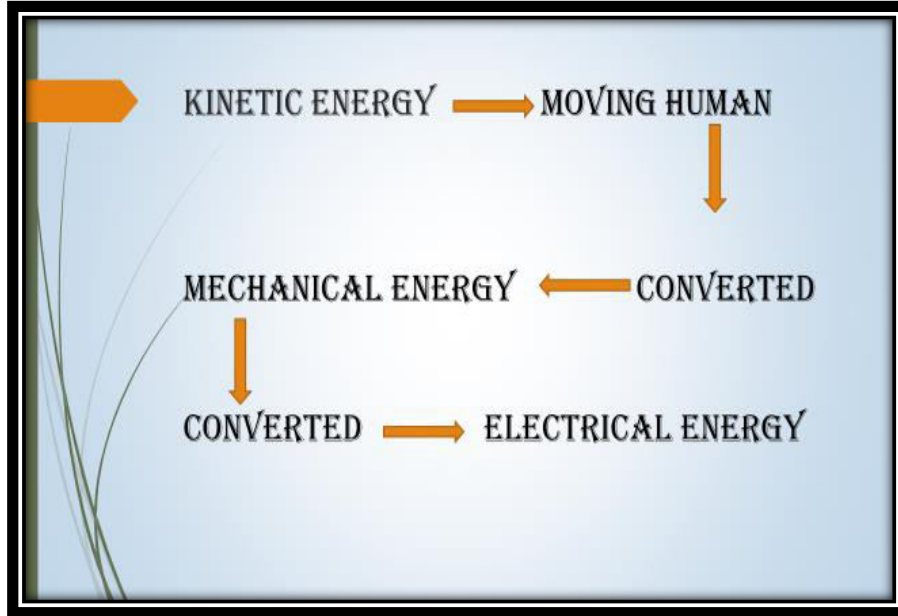


Fig.2 Conversion of Energy

III. METHODOLOGY

Piezoelectricity is found in crystalline materials that possess non-centrosymmetric. This effect induces an electric polarization proportional to an applied mechanical stress or a mechanical strain proportional to an applied electric field. During vibration, piezoelectric materials that convert the mechanical pressure into electrical charge and voltage by the piezoelectric effect. A power output of particular piezoelectric energy harvester depends on intrinsic or extrinsic factors.

Intrinsic factors include a frequency constant to the piezoelectric elements, piezoelectric or properties of a material, or the temperature and stress depend on the physical properties. Factors compared to the input vibration to frequency, acceleration of a base structure, or the amplitude to the excitation. Different configurations to the piezoelectric harvesters or their features. That combination of a mechanical or architecture and the material properties allow for variations to a frequency operating range of a power output.

IV. EXPERIMENTAL RESULTS

Result on non-uniform vibration (clapping)

Milli volt	Remark (Average) Milli Volt
0.8	1.15
1.3	
1	
1.5	

Table 1 clapping



Result on non-uniform vibration (Tapping)

Milli volt	Remark (Average) Milli Volt
1.8	1.75
1.9	
1.2	
2.1	

Table 2 Tapping

Result on uniform vibration (vibration of mobile)

Milli volt	Remark (Average) Mili Volt
2.5	2.5
2.5	
2.5	
2.5	

Table 3 vibration of mobile



Fig.3 Voltage of mobile vibration by volt meter



Energy generation as per area

Average Weight of human = 60 kg (As per research)
 Electricity generated by one piezosenser = 0.0018 V = 1.8 MV
 Let's consider a room of Area = 10x10 ft. = 100 sq. ft
 Size of one tile = 2ft x 2ft
 So, we use 25 tiles
 We will attach 20 piezosenser on each tile
 Electricity generation on 1 step on one tile = energy of 1 sensor x no of sensor
 1) $= 0.0018 \times 20$

2) Electricity generation by 1 step on one tile = 0.036 V

Electricity generation on 1 step on all tile in room (25 steps)
 = one tile energy x no of tile
 = 0.036 x 25
 =0.9 V

Electricity generation in a room (25 steps) = 0.9 V

Assume Approximate Foot-step of one person = 2000 steps/day
 Electricity generation through per person = no of foot step per person x energy per step
 = 2000 x 0.9

Electricity generation through per person = 1800 V
 Assume efficiency = 50 %
 = (50 x1800) / 100

Electricity generation through per person per day = 900 V

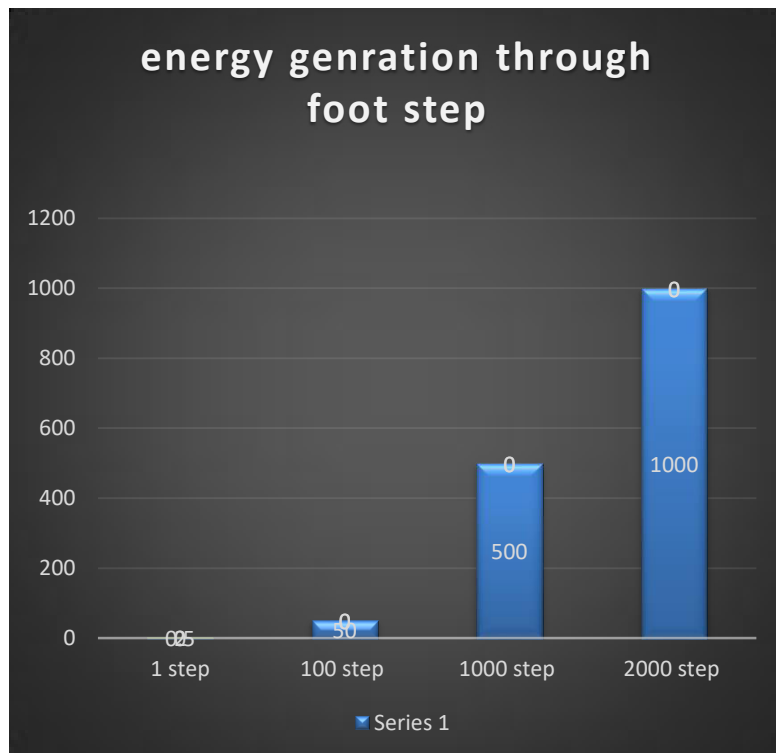


Fig.4 Energy generation chart



|| Volume 12, Issue 4, April 2023 ||

| DOI:10.15680/IJIRSET.2023.1204349 |

V. CONCLUSION

Piezoelectric sensors are more accurate, more durable, and more flexible than traditional sensors.

They are also more convenient and more cost-effective.

In the future, they will be able to detect more than just vibration and pressure.

They will be able to detect environmental factors such as temperature, humidity, and light.

Energy generate through one person is nearby 900V for per person and the amount of people increase and the amount of foot step increase the electrical energy generation is higher. It can be applied in different public places and it can generate high amount of energy and we can supply electricity to public use.

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