Foot Step Power Generation Using Piezoelectric Transducer

Abdul kalam*,A.SINGH*,S.K.YADAV*,K.R.YADAV*

*University of Mumbai

Keywords: Piezoelectric sensor; Full-wave bridge rectifier; Lead acid

battery; Load (LED and USB charger)

Abstract:-It has the ability to produce electric power from mechanical reaction (force) and then it change to electric charges. This kind of technology can be used as the alternative electric power generator. It is impossible to replace the existing electricity generation, but at least to vary and reduce the dependency on the conventional electricity generation. Design concept used in this thesis is to use piezoelectric place at the walking area named as "Foot Step Power Generation System". When a human walking, jumping or dancing on the surface which contain the piezoelectric, it then will produce sufficient force for energy generation process. This system is very suitable applied at the public spotted area with many people such as walking corridor, shopping mall, in the office, schools and others. Therefore, the continued pressure will provide sufficient resources to be used to produce the electricity required. Keywords—new technology, piezoelectricity, piezoelectric material, generate power, force or pressure

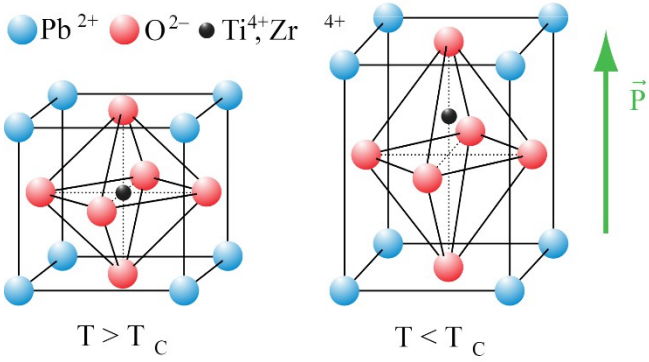
1.INTRODUCTION

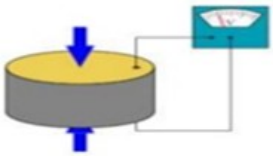
With the increasing number of human in a country, human need and use the energy to do work or more to a place and well-being ever since existed millions years ago. As a result, many resources have been wasted with impurity. So, non- conventional energy is very essential at this time on our nation. In the human body there is a source of energy which is the process of human nutrition eat and drink every day and time. Humans need to use energy to perform daily activities such as doing work and running. Unconsciously, the energy used is actually one of the energy wastes. Walking is common activity performed by person in he or she's everyday life. When a person is walking, the energy will be reduced due to the weight transfer to the surface of the foot during walking. Therefore, the energy of the person fromhe foot step can be converted to the electricity energy. This device can be places where there is continuous human traffic such as in city mall, railway station platforms, city footpaths and other places, the electricity generated from these devices can be used for lighting [1].

2.PIEZOELECTRIC TRANCDUCER

A piezoelectric transducer is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical signal. the unit cell contains a small positively charges particle in the centre. When a stress is applied this particle becomes shifted in one direction which creates a charge distribution, and subsequent electric field. These materials come in several different forms. The most common is crystals, but they are also found as

plastics and ceramics. Lead Zirconated Titan ate unit cell Piezoelectric sensors have proven to be versatile tools for the measurement of various processes. They are used for quality assurance, process control and for research and development in many different industries it was only in the 1950s that the piezoelectric effect started to be used for industrial sensing applications. Since then, this measuring principle has been increasingly used and can be regarded as a mature technology with an outstanding inherent reliability. It has been successfully used in various applications, such as in medical, aerospace, nuclear instrumentation, and as a pressure sensor in the touch pads of mobile phones. In the automotive industry, piezoelectric elements are used to monitor combustion when developing internal combustion engines. The sensors are either directly mounted into additional holes into the cylinder head or the spark/glow plug is equipped with a built-in miniature piezoelectric sensor. Tourmaline Piezo Electric Sensor One disadvantage of piezoelectric sensors is that they cannot be used for truly static measurements. A static force will result in a fixed amount of charges on the piezoelectric material]





Lead Zirconated Titan ate unit cell Tourmaline Piezo Electric Sensor

3.Result and finding

In 1 square ft. I used 12 piezo sensor.

As piezo sensors power generating varies with different steps, get

Minimum voltage=1 V per step

Maximum voltage=10.5 V per step

I took an average of 50 Kg weight pressure from single person.

Considering the steps of a 50 Kg weighted single person, the

average calculation is:

It takes 800 steps to increase 1 V charge in battery.

So, to increase 12 V in battery total steps needed

= (12 × 800)

=9600 steps

As I will implement our project in a populated area where foot step

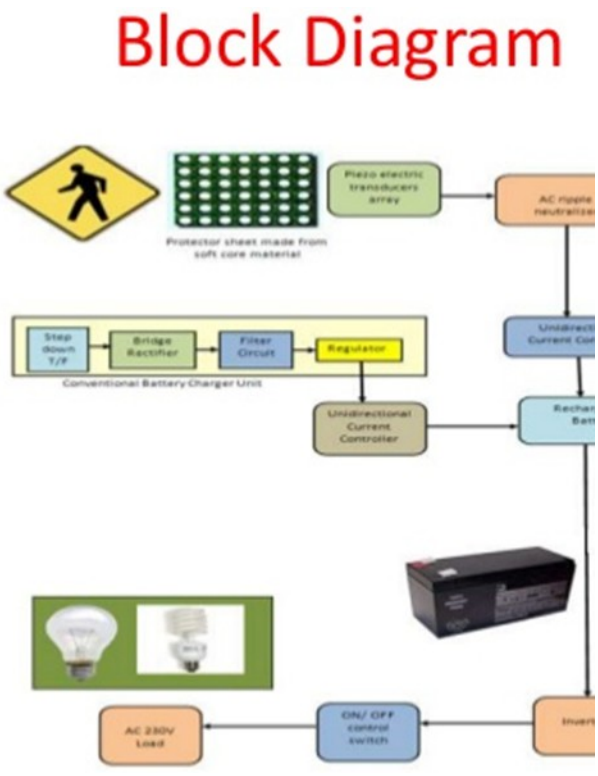
as source, will available, I took an average of 2 steps in 1 second.

For 9600 steps time needed

=9600/ (60 × 2)

=80 minutes. (Approximately)

4.BLOCK DIAGRAM



5.Advantages:

1. Very high frequency response.

2. Self-generating, so no need of external source.

3. Simple to use as they have small dimensions and large

measuring range.

4. Barium titan ate and quartz can be made in any desired shape

and form. It also has a large dielectric constant. The crystal axis

is selectable by orienting the direction of

orientation.

DISADVANTAGE

1. It is not suitable for measurement in static condition.

2. Since the device operates with the small electric charge, they

need high impedance cable for electrical interface.

3. The output may vary according to the temperature variation

of the crystal.

4. The relative humidity rises above 85% or falls below 35%, its

output will be affected. If so, it has to be coated with wax or

polymer material.

6.CONCLUSION

he piezoelectric generator is an inexhaustible, pollution-free and most important it is renewable energy device. It is not just only applied in offices, schools, and shopping malls but also at home when human can use it for exercise. The objectives of this thesis are met after looking at the principle of the

piezoelectric. The prototype designed in this thesis can contribute to the energy saving and meet the energy efficiency guideline.

7.REFERENCES

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