Piezoelectric Power Generation Using Tiles

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***Abstract*- energy and power are the one of the basic necessities regarding this modern world. As the demand of energy is increasing day by day, so the ultimate solution to deal with these sorts of problems is just to implement the renewable sources of energy. But these renewable energy sources must have to be adopted in practical manner by keeping an eye on all aspects regarding the research work. So then these techniques should be applied in order to get the desired output. In case of our project we have used the technique of power generation through footsteps as a source of renewable energy that we can obtained while walking on to the certain arrangements like footpaths, stairs, plate forms and these systems can be install elsewhere specially in the dense populated areas .The basic working principle of our project 'footstep power generation system' is based on the piezoelectric sensor.**

***Index terms*- piezoelectric sensor, Piezoelectric power generation using tiles, Battery, LED, Piezoelectric material**

1. INTRODUCTION

Nowdays various are method to generate electricity there are number of methods by which electricity can be produced, out if such methods footstep energy generation can be an effective method to generate electricity. Walking is the most common activity in human life. When a person walks, he loses energy to the road surface in the form of impact, vibration, sound etc, due to the transfer of his weight on to the road surface, through foot falls on the ground during every step. This energy can be tapped and converted in the usable form such as in electrical form. This device, if embedded in the footpath, can convert foot impact energy into electrical form. Human-powered transport has been in existence since time immemorial in the form of walking, running and swimming. However modern technology has led to machines to enhance the use of human power in more efficient manner. In this context, pedal power is an excellent source of energy and has been in use since the nineteenth century making use of the most powerful muscles in the body. Ninety-five percent of the exertion put into pedal power is converted into energy. Pedal power can be applied to a wide range of jobs and is a simple, cheap, and convenient source of energy. However, human kinetic energy can be useful in a number of ways but it can also be used to generate electricity based on different approaches and many organizations are already implementing human powered technologies to generate electricity to power small electronic appliances.

2. LITERATURE SURVEY

There are few methods to generate electrical energy from footsteps. Gear wheel and fly wheel are techniques to generate electrical power. This method also work on this principle and in it mechanical part are used because it is placed on where the number of peoples are more and energy produced by their movement on the floor. Power would generated by footsteps of crowd on the floor. Piezo plate scheme is located beneath the floor then the then there will be sheet covering the piezo plate and also spring will be there for vibration force on piezo. The piezo plate will be in chunks in the floor. This plate will generate power in the type of electric current. The power produced by pedestrians can also be used as additional features such as to lightning up street light or the light that used at that place for pedestrians. So the pedestrians should give credit the energy which produced by their movement. To generate electrical power using footsteps one step will be enough at this level to produced electrical energy. As studied few

methods from which power is generated. Following are the steps of fly and gear wheel method. As piezo plate is also involves these steps. First step is by proper arrangement of electrical components and equipment which transforms the mechanical energy in to electrical energy. After the arrangement of electrical system which transforms mechanical energy to electrical energy, then the spring is attached with sheet to piezo so the spring arrangement is done, spring vibrate the piezo. When load using the power then this spring is used to vibrate the step by force then power is produced. Then the voltage that produced through steps is rectified and after battery charger circuit this D.C voltage is stored in the lead acid battery of 12 volt. This lead acid battery is further attached to the inverter. The invert is such designed that it inverts the voltage from battery which is 12 volt D.C to 230 volt A.C. So this A.C voltage is used in different appliances such as for charging the laptop battery and also to charge the handset, it can also be used to lightening up the energy savor. If we need more power from this technique then used more steps for more electric current and also then ability of battery and inverter should be increased then output power will be increased

3. COMPONENT

3.1. Piezoelectric Sensor: - A piezoelectric sensor is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical signal. 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.

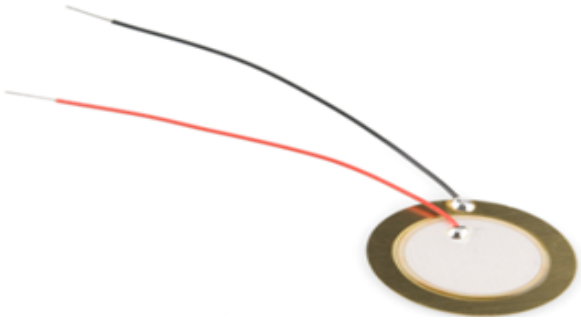

Fig 1. Piezoelectric Sensor

3.2. Battery

Battery (electricity), an array of electrochemical cells for electricity storage, either individually linked or individually linked and housed in a single unit. An electrical battery is a combination of one or more electrochemical cells, used to convert stored chemical energy into electrical energy. Batteries may be used once and discarded, or recharged for years as in standby power applications. Miniature cells are used to power devices such as hearing aids and wristwatches; larger batteries provide standby power for telephone exchanges or computer data centers. Lead-acid batteries are the most common in PV systems because their initial cost is lower and because they are readily available nearly everywhere in the world. There are many different sizes and designs of lead-acid batteries, but the most important designation is that they are deep cycle batteries. Lead-acid batteries are available in both wet-cell (requires maintenance) and sealed no maintenance versions. Lead acid batteries are reliable and cost effective with an exceptionally long life. The Lead acid batteries have high reliability because of their ability to withstand overcharge, over discharge vibration and shock.

Fig 2. Battery

3.3 Voltage Regulator:- As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used. The first number 78 represents positive supply and the numbers 05, 12 represent the required output voltage levels. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible.

Fig 3. Voltage regulator

4. WORKING

The piezoelectric material convert the pressure applied to it into electrical energy the source of pressure from the weight of people walking over it the output of piezoelectric material is not a steady one. So a bridge circuit is used to convert these variable voltages into a linear one. Again an ac ripple filter is used to filter out any further fluctuation in the output the output dc voltage is then store in rechargeable battery.

5. BLOCK DIAGRAM

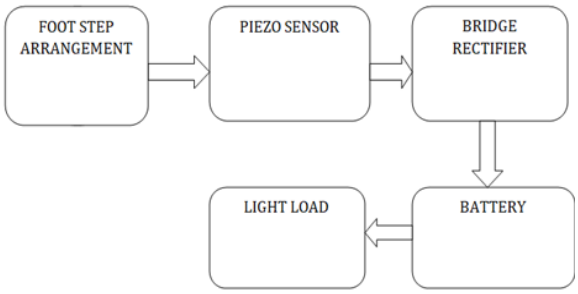

Fig 4 Block Diagram

6. CIRCUIT DIAGRAM

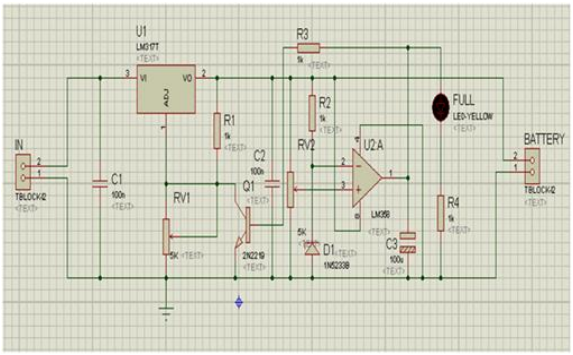

Fig5. Circuit Diagram

7. ADVANTAGE

1. Power generation is simply walking on step.
2. No need fuel input.
3. This is a Non-conventional system.
4. No moving parts - long service life.
5. Self-generating - no external power required.

8. DISADVANTAGE

1. Only applicable for the particular place.
2. Initial cost of this arrangement is high.
3. Output affected by temperature variation.
4. Initial cost of this arrangement is high.
5. Care should be taken for batteries

9. CONCLUSION

This project is the best economical, affordable energy solution to common people. This can be used for many application in city areas where want more plant. It saves the energy. Now a days energy conservation is most important and using this project we can save more amount of energy.

REFERENCES

[1] Electronic devices and circuit theory by Robert L.Boylestad and Louis Nashlsky
[2] What is piezo and piezo electricity. Online availablehttp://whatis.techtarget.com/definition/piezoelectricity
[3] hahttp://www.scribd.com/footstep-power-generation-system.html