

Generating Electricity using Piezoelectric Material

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Abstract: - Electricity is the basic need of everyone. And the idea of harvesting an alternative energy surfaces a new interest due to rise in energy consumption. We are trying to develop a piezoelectric generator. It can produce energy from the mechanical energy (like pressure or vibration). It shows how we can use piezoelectric materials to produce energy from applying pressure for generating the energy. This idea can also be used where large pressure, vibration sources are available.

Keywords: *Piezoelectric sensor; rectifier; battery; Load (LED).*

I. INTRODUCTION

In this fast developing world the major problem and issue which we are facing is lacking of energy. Whereas there is a solution for it, we can use renewable energy sources to solve this crisis which the whole world is facing. As we know there is a limit to the natural energy sources. Hence the last hopes on which we can depend is on renewable energy or introduce the substitute energy sources from the nature; therefore the researchers are trying to find out the way to create the substitute energy sources from nature. The energy sources that are derived from natural sources that replenish themselves over short periods of time are known as renewable energy. Energy harvesting is a method of capturing energy from the surrounding energy sources and converted into usable electric power. This technology is already been started to use in the form of windmill, geothermal and solar energy. Thus in this project we are doing piezoelectric energy harvesting i.e. energy generation from pressure and vibration by using piezoelectric material.

are known as direct and converse effect. The direct piezoelectric effect is present when an electric charge appears on the opposite faces of the material when mechanical energy (like pressure or vibration) is applied on them, whereas converse effect is present when material is deformed when an electric charge is applied. It is shown in the recent research and experiments that these materials can be able to use as power generators, though they need to be optimized as the amount of energy produced is very low.

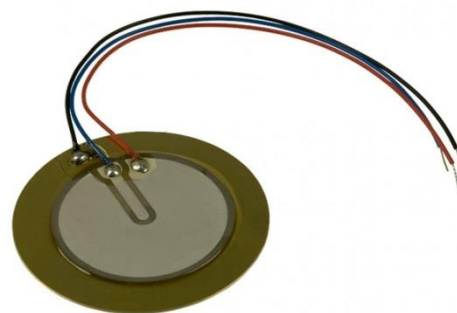


Fig.1: Piezoelectric Transducer/Sensor

II. LITERATURE REVIEW

Piezoelectric Sensor

Alternative renewable sources of energy are the future of today's world and Piezoelectricity is one of them. Most of the researches are now doing on piezoelectric materials. It seems that the piezoelectric material has very unique properties. The piezoelectric materials have a unique property its produce electrical energy from mechanical energy (like they can convert pressure, vibrations in to electricity). Piezoelectric materials have two properties that

Rectifier

The piezoelectric sensor generates AC output, and to light up the LEDs constant supply of voltage is needed. So rectifier circuits is used which convert an output AC voltage to a DC voltage. Thus LEDs can light up without damaging with the help of rectifier.

Battery

The energy generated by piezoelectric sensor is not continuous due our installation so a battery is used to store the energy.

Loads

Load is LED Lights connect in parallel; we are using small LED light with 20 mA and 1.8 - 2.2 V.

Circuit Diagram

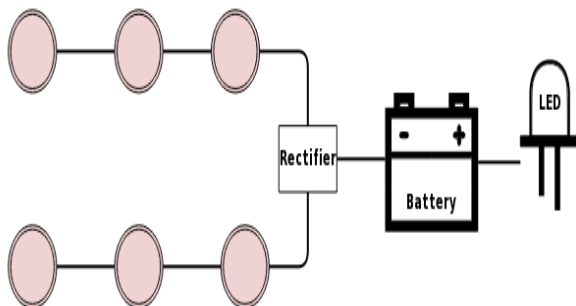


Fig.2: Circuit Diagram of Piezoelectric

Advantages

1. Frequency response is high.
2. External source is not needed.
3. Easy to use.
4. Material like Quartz and PZT can be shaped in desired form.

Disadvantages

1. They cannot be used for static measurements.
2. High Impedance conductor needed..
3. The output may get affected by long use at high temperatures..
4. Some material are water soluble and get dissolve.

III. CONCLUSION

In this paper, we seen that Piezoelectricity is an alternative resources for renewable energy, thus can also help in decreasing global warming. The Piezoelectric materials can convert almost any kind of mechanical energy to electrical energy. Due to its unique ability we can use piezoelectric materials in many applications.

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