

A Review Paper on Converting Noise Energy into Electrical Energy

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Abstract: We all are know now we have to emphasize to conservation of electricity for next generation but now everywhere is enormous scarcity of energy and electric power has very deeply drastic to imagine our life without of electronic applications. Now in this era, we have less amount of conventional sources and we have to preserve it for our next population. So we will need boom production of electrical energy though non-conventional sources. Now in our world there is lots of pollution and noise pollution is one of them it produce high frequency and vibration. And we knows sound is a mechanical energy and by the use transducer we are capable to convert this energy into electricity. Here we use a sensor which is converts mechanical strain and force into electric energy and it is piezoelectric. We would be use this device to convert electrical energy. A piezoelectric transducer has very high dc output impedance and it can modeled as a proportional voltage source and filter network. And the voltage source is directly proportional to the applied force. And we get signals, and output signal is then related to this mechanical force as if it had passed through circuit. And we use this to convert electricity and a day is no long to we charge our mobile phone during walk on road and also we produce a huge amount of electricity through this mechanical energy.

Keywords: Piezoelectric, transducer, diaphragm, sound energy.

1. Introduction

Now we are in 21st century and in this era energy harvesting technology, extracting unused or wasted energy from our environment are utilise and making energy. In this modern world there is lot of noise pollution in roads, airports, industries. We all are knows the “law of conservation of energy” state that energy cannot be created nor be destroyed. It change one form of energy to another form of energy. Sound or popularly known to us as noise is one of the widely available energy sources which have its range extending almost to infinity. We all are known sound energy is a mechanical energy which travel in the form of wave, mechanical wave that is an oscillation of presser which need medium (like air or water), composed of frequencies which are within the range of hearing. Pressure created by the sound could be used to convert it into electric energy or other form of energy. A transducer is a device that converts one form of energy to another. Usually a transducer concerts a signal in a one form of energy to a signal in another. Application of sound energy as the source of electricity can be much beneficial for the human existence as compared to other source. This is because the sound is present in the environmental pollution. The concentration of noise to use it for power generation can also lead to discovery of another hidden sources of energy which can act as a boon to non-renewable sources such as coal, crude oil etc. which are on line of extinction.

Sound or popularly known to us as noise is one of the widely available energy sources which have its range extending almost to infinity. Sound is a mechanical wave that is an oscillation of pressure which need medium to travel i.e. it could not travel through vacuum as it need medium.

The noise is considered to be a great contributor in the increasing pollution which is studied under the category of noise pollution. Humans has frequencies from about 20 Hz to 20,000 Hz.

When sound wave travel through a medium mater in the medium is periodically displaced and thus oscillates with sound wave. The sound wave displace back and forth between the potential energy of compression or lateral displacement strain of the matter and the kinetic energy of the oscillation.

Sound energy is a mechanical energy could be converted into electricity but it is not highly efficient as the loss of conversion will be more whereas the other method is converting sound energy to electricity by piezo electric material, piezo electric material are the crystal which convert mechanical strain to electric energy by such method.

2. Introduction of Sound

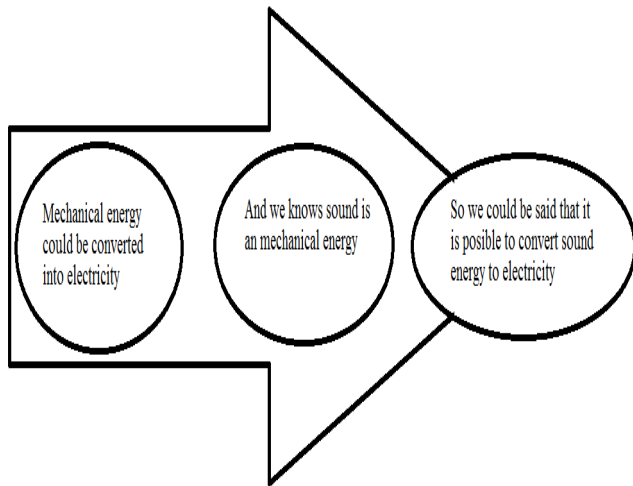


Figure 1 : Transformation of Energy

3. Methodology

3.1 Method 1

The first method is that suppose we create a thin layer like or like a diaphragm which will be fluctuated by the pressure by the sound wave. We will be attached to it between two magnetic bars or pole and fluctuation in the curtain will create a movement in the conductor which will affect the magnetic field and as per the faradays law the emf is induced in the conductor causing the current to flow to conductor.

$$\varepsilon = -d\phi B/dt$$

Above equation is “faradays law of electromagnetic induction” which is state that the induced electromotive forced in any closed circuit is equal to the negative of the time rate of change of the magnetic flux through the circuit. And the help of faraday low the emf is

Generated voltage (emf) = (Velocity of conductor) X (Magnetic field) X (Length of conductor)

By the sound wave could be converted into electricity and as high frequency is high movement will be fast due to it and generate electric energy.

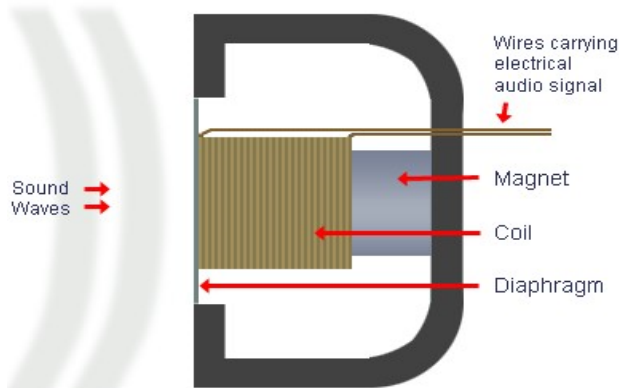


Figure 2 : Noise Energy Generating Device

3.2 Method 2

Another method of converting electricity by using of piezoelectric materials Zinc oxide, Lead zirconium titanate, Barrium titanate.

By piezoelectric effect we can be generated electricity directly from sound energy.

The mechanical energy of sound is applied directly to a crystal with strong piezoelectric characteristic. And generate a small amount of voltage in response to the application of that mechanical energy by crystal. Here we applied force on the crystal. A force will generate a small voltage for the duration of the squeeze. When the crystal is released, another small voltage will be produce in the opposite polarity.

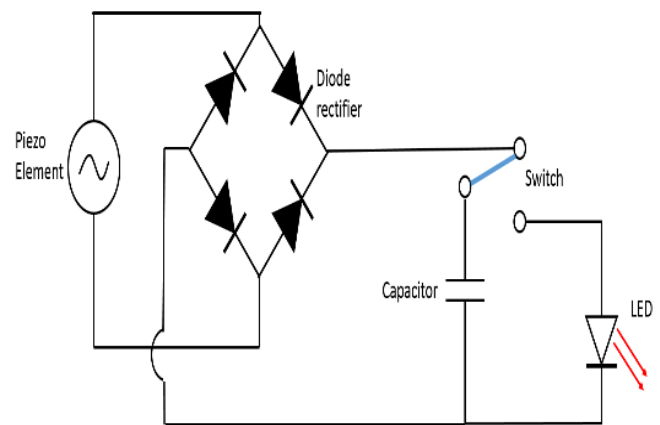


Figure 3 :Circuit Diagram of Piezo Element

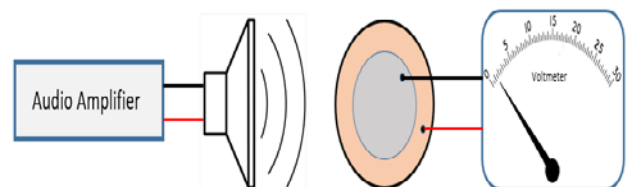


Figure 4 :Schematic of the experimental setup

4. Piezo Electric Material

The piezoelectricity was discovered in 1880 by French physicists Jacques Curie and Pierre. The piezoelectricity found a useful applications such as production and detection of sound, generation of high voltage, high frequency generation etc., and the piezoelectric effect describes the relation between a mechanical stresses and an electrical voltage in solid.it is also reversible. Piezoelectric materials are transducers its crystals could convert mechanical strain to electricity, the crystal is found naturally.

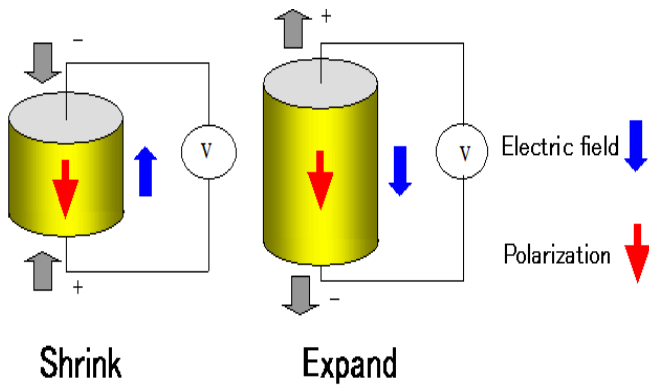


Figure 5 : A piezoelectric disk generates a voltage by change in shape in greatly exaggerated.

5. Future Scope

- In this world so much industries and they produce lot of noise we could be used to produce electricity.
- Nuclear power station also produce noise during fission so we could be used to get electric energy.
- Other application field includes the lightening of the street lamps and traffic lights just by extracting the sound energy of noise that is produced by the vehicles on the road.in this way we are not only reduce the noise pollution and but also utilize it as a source of electricity by conversion.

6. Conclusion

- For the various purpose using we converts the sound energy into electrical energy.
- Piezo electric crystals are the crystals which converts mechanical strain to electric energy.
- There are so many method by which we converts sound energy into electricity as
 - Method 1- by converting sound energy into heat energy then electric energy
 - Method 2- by using piezoelectric materials converting mechanical energy into electricity
- Due to not usable up till now of this technology, efficiency concerns but presently work on this field makes its future quiet promising.

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