Electric Power Generation using Random Sound Energy

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Abstract- Waste form of sound energy known as noise can be used for some useful purpose by converting to different form of energy. Unwanted noise or random sound around us can be treated as a source of electric power after their efficient conversion using suitable transducer. Piezoelectric transducers are used for conversion of sounds into electric energy. The generated electric power will be used to charge a rechargeable devices.

I. INTRODUCTION

The need for an alternative source of energy is rising fast in this growing world. Until now, majority of power needs of the world relies upon the exploitation of the non-renewable fossil fuels [1]. Renewable energy sources such as hydropower, solar power and wind power require high financial investments but give lower power output with respect to its cost. Another source nuclear power plant gives a good source of power but the initial setting up and maintains costs are higher than other renewable sources [3].

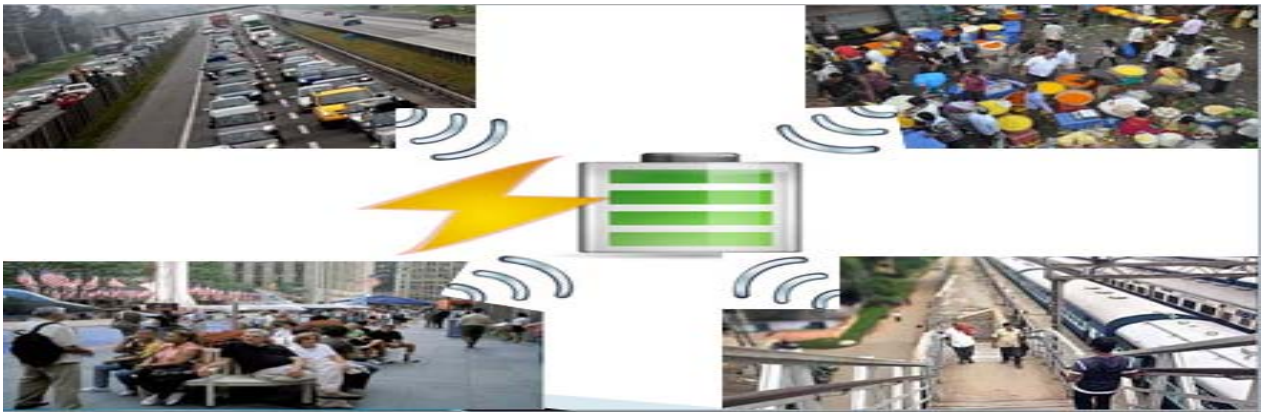

Figure 1: Aim of project

A relatively less discussed source of energy is available around us in the form of noises which can be considered as a source for electricity if it can be effectively converted into electric power. Piezoelectric materials are used to serve this purpose of energy conversion. It is one of the most interesting methods of obtaining the energy from

surrounding in the desired form. This deformations produced due to sound or vibrations by different means are directly converted to electrical charge via piezoelectric effect.

II. LITERATURE SURVEY:

Scientists are desperately searching for renewable and green sources of energy to produce electrical power. In past several years, researchers have begun using piezoelectric material for structural vibrations suppression. These materials transform mechanical energy to electrical energy and vice versa. The objective of this paper is to present an effective method for producing usable electrical energy from available sound energy from train wheels. We have observed that huge amount of sound energy is wasted in train movement (traction) System. In this paper an approach has been made to make fruitful application of the wasted sound energy. The proposed conversion circuit was tested in sound sources of train wheels and a comparison was made between other sources using this conversion circuit and a better result from train wheels have observed. The output of conversion circuit is around 12 volt which is sufficient to charge a rechargeable DC battery where a fully discharged 9 volt dc battery. [3]

This paper explores a relatively less popular source of clean energy. Noise (sound) energy can be converted into viable source of electric power by using a suitable transducer. This can be done by using a transducer by converting vibrations caused by noise into electrical energy. An application is proposed for the same, in which a speaker and a transformer are used to convert noise produced by industrial machines into electrical energy. The vibrations created by noise can be converted into electrical energy through the principle of electromagnetic induction. The received signal was stepped up using a transformer. A similar setup was placed at distance of 1 meter from the working generator or a induction motors. The demonstrated ideas probe into a clean and readily available source of energy [1].

In this work, a relatively less explored source of green energy is proposed. Random sound energy around us can be treated as a source of electric power after their efficient conversion using suitable transducer. An effective way of producing usable electric power from available random sound energy is presented here. Piezoelectric transducers are used for conversion of sounds into electric energy. The produced electric energy from multiple piezoelectric transducers are stored in multiple super capacitors which are then summed up and amplified through adder and voltage multiplier circuits. The resultant electric power was used to charge a rechargeable DC battery so as to store this energy [2].

Random sound energy or unwanted noise around us can be treated as a source of electric power after their efficient conversion using suitable transducer. A device is used to measure and store the sound pressure level. Transducer is used for conversion of sounds into electric energy. The resultant electric power will be used to charge a rechargeable DC battery so as to store this energy. The proposed idea can give a new source of green energy and can contribute in global search for renewable energy [4].

This paper presents the work done on the conversion techniques and methodologies of converting sound energy to its electrical counterpart, and focuses on the future of this type of energy sources . In the experimental work, a piezoelectric generator lead zirconate titante (PZT actuator) is used to extract sound energy from the loudspeaker from various distances and then to convert this energy into electrical energy. The maximum voltage generated by the piezoelectric generator occurs when its resonant frequency is operating near the frequency of sound. The result shows that the maximum output voltage of 28.8 mVrms was obtained with the sound intensity of 80.5 dB resonant frequency of 65 Hz at 1 cm distance in the first mode [5].

This paper presents the work done on the conversion techniques and methodologies of converting sound energy to its electrical counterpart. It focuses on the feasibility and the ground zero application of the same So one can imagine if we were able to convert the sound energy to electricity then we can charge our mobile phone just by talking to our friends on mobile itself[6].

III. CONCEPT

SOUND ENERGY:

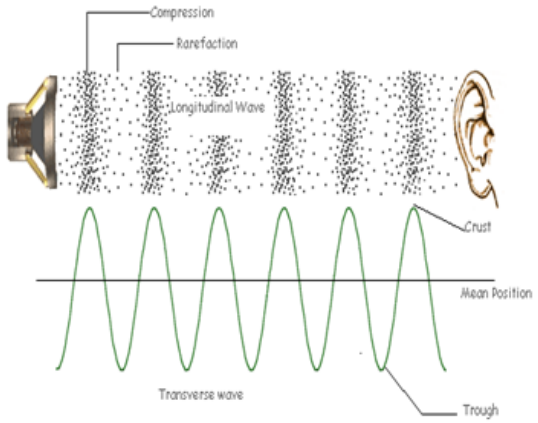

Figure 2: sound energy

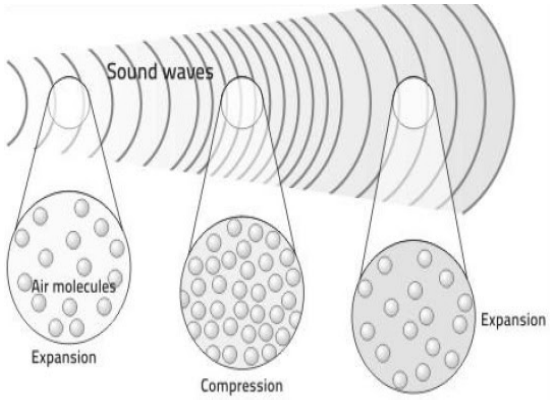

Figure 3: sound waves

As sound energy is a mechanical energy it could be converted into electricity as mechanical energy could be converted into electricity by the law of thermodynamics. Sound energy could be easily converted into heat energy which could be easily converted into electricity but it is not highly efficient as the loss in conversion will be more whereas the other method is converting sound energy to electricity by piezoelectric material, piezoelectric materials are the crystal which converts mechanical strain to electric energy by such method[5].

Sound is produced when something vibrations in air are called traveling longitudinal waves, which we can hear. Sound waves consist of areas of high and low pressure called compressions and rarefactions, vibrates. The vibrating body causes the medium (water, air, etc.) around it to vibrate.

PIEZOELECTRIC MATERIAL: The word piezoelectricity means electricity resulting from pressure. Piezoelectricity is the charge that accumulates in certain solid materials stress. Piezoelectricity is the ability of some materials (notably crystals and certain ceramics) to generate an electrical potential in response to applied mechanical stress. This may take the form of a separation of electric charge across the crystal lattice.

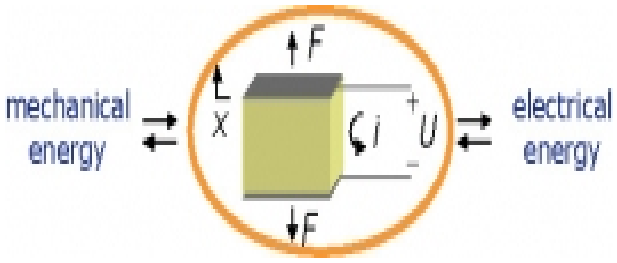

Figure 4: concept of piezoelectric material

Piezoelectricity is the ability of certain crystalline materials to convert mechanical energy into electrical energy and vice versa .The direct piezoelectric effect is that these materials, when subjected to mechanical stress, generate an electric charge proportional to that stress. An example of the use of the direct effect is found in gas lighters. Piezoelectric sensors, like acceleration sensors and pressure sensors, also exploit the direct effect .The inverse piezoelectric effect is that the same materials become strained when an electric field is applied, the strain again

being proportional to the applied field. An example of the use of the inverse effect is found in buzzers. Piezoelectric actuators, which can be used for micro-positioning, also rely on the inverse effect.

BLOCK DIAGRAM OF SYSTEM:

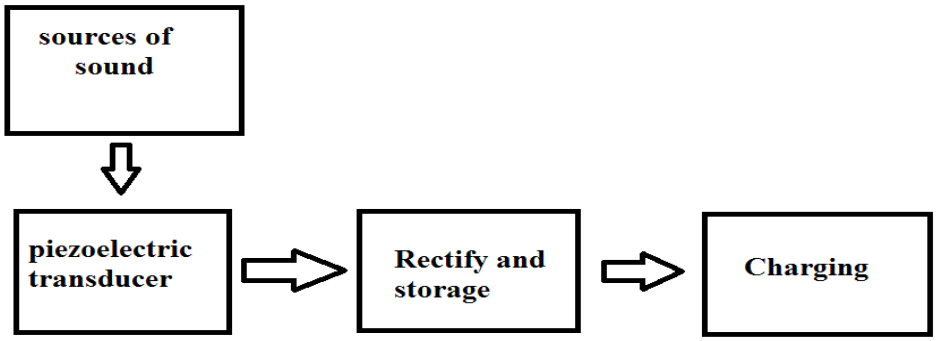

Figure 5: Block diagram of system

This shows the basic block diagram of our project. Here we can see first block is sources of sound it acts like input to system where we are taking lots of random sounds from surroundings such as railway noise , loud music , traffic sound ,etc.
After that we are using piezoelectric transducer its takes sounds as input and converts it into equivalent charges.
As charge generated by sensor or transducer is of random nature so we rectify it by using rectifier and stored for further process.

IV. ALGORITHM

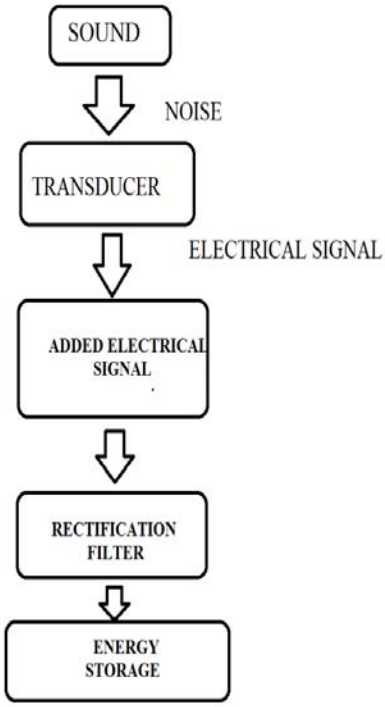

Figure 6: algorithm of system

- Different public platform are used as different sources of sound .some of them on which we are working are railway stations, industry, marketing areas etc.
- From these sources we will collect random noise as input for the system and we will process on these input to convert random sound into electrical energy using piezoelectric material.
- To serve any application we need stable dc supply so for this purpose we are rectifying and filtering electrical signal.
- This energy is stored for further utilization or charges the gadgets.

V.CONCLUSION

The design of the proposed energy conservation system for mobile phones has been presented in this paper. The design presented here will be quite effective in providing an alternate means of power supply for the mentioned devices during emergency. Further, the approach presented in this paper can be extended too many other applications where there is scope for similar kind of energy conservation.

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