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Harvesting Electrical Energy from Sound Energy

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Abstract— *Noise is also an important energy, but has been controlled for its harm. If noise can be made effective use of at the same time, there would be a large change in social life. Based on studies on converting sound to electricity over the years, some effective implements of electric generation using sound are put forward for the new situation of utilizing of noise.With the development of industry and transportation, new noise pollution is emerging, forcing technologists not only to try to remove noise originally but also to control noise on transmission. If the controls can be combined with recycling, it is not only a major breakthrough in pollution control but also a supplement for human's energy. The application of this technology has not been familiar to public and some aspects is not perfect There are various renewable sources of energy that have already been discovered and some are the implemented to great extent under suitable circumstance and these sources are solar, wind, biomass, water etc. As solar and wind energy have already tapped for energy generation.*

This paper presents conversion of sound energy to electrical energy. Largely ignored form of energy is available in the form of sound. Noise can be used as source for electrical energy generation. Using the principle of Faraday's electromagnetic induction, sound can be converted into electrical energy using the vibrations created by noise. Diaphragm is the main tool using as transducer to convert sound into vibrations. When diaphragm vibrates, the coil moves along with it. The movement of coil creates a varying magnetic field around it and emf is induced in the coil. This induced emf is nothing but electrical energy.

Keywords - sound, transducers, diaphragm, electromagnetic induction, magnetic field.

I. INTRODUCTION

The demand for electrical energy is rising rapidly. Till date, majority of power needs are met by using fossil fuels which are on the verge of extinction. Recent studies estimate that these fossil fuels will last only upto 2030[1][2]. Hence to keep up with this ever increasing power demand, we need to find alternative sources of energy .Renewable energy sources like solar, hydro and wind are already being used to cater our power needs. However their availability depends on weather conditions. The law of energy conservation states that energy cannot be created nor be destroyed; it can be converted from one form to another. By tapping this sound energy we are utilizing energy from unwanted noise pollution. Sound waves are mechanical energy and can be converted into electrical energy by using a suitable transducer i.e. diaphragm[1][3]. The proposed method generates electrical energy using principle of electromagnetic induction. Permanent Magnet, Use of conducting coil will provide the induced voltage. With the help of translational motion the above induction is performed. Rotational motion could be used for voltage generation with the help of gears and shaft.

II. SITE SELECTION

The standard level of noise at industrial area is 50-60 dB, Hospital area is 45 dB and Bus station area is 70 dB. However from survey we find that the average level of noise at industrial area is 88.59 dB, Hospital area is 70.57 dB and Bus station area is 100

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dB (approximately)[1][4]. There are many sources of noise in industries, traffic place, residential area, educational institute, medical institute. The major sources are given in table no. 01

Table 1
TYPES AND SOURCES

SR. NO.	TYPES	SOURCES
1	Industries	Finishing machines, Auto machines, Preparatory machines, Ring fan, Spreader machines, Rolling machines, Sewing Machines, etc.
2	Traffic places	Buses, Auto rickshaws, Motor vehicles
3	Public places	Railway stations, Bus stations, Airports

III. BLOCK DIAGRAM

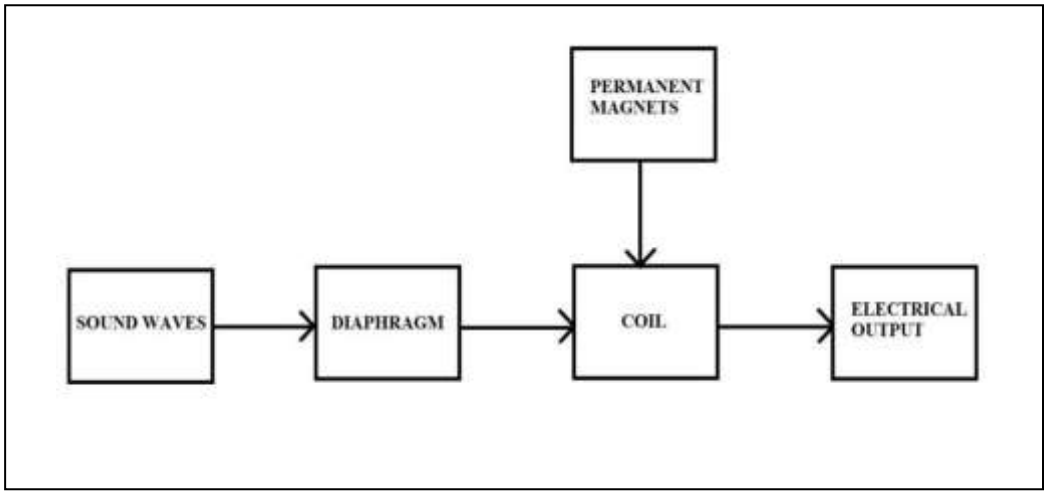

FIGURE 1: Block diagram

IV. METHODOLOGY

1.1 Using Linear Motion

In this method, we use a transducer for converting sound waves into electrical energy. The transducer used is a simple diaphragm which vibrates when sound waves are incident on it.This in turn causes movement of conductor attached to it . The conductor is placed in magnetic field produced by permanent magnet. A magnetic field is a vector field that describes the magnetic influence of electric charges in relative motion and magnetized materials. Due to motion of conductor, the magnetic field is varied and as a result emf is induced in it as per Faraday's law of Electromagnetic Induction. The formula is as given in Eq. (E.1)

Generated voltage = Velocity of conductor x Magnetic Field x Length of conductor .....Equation(1)

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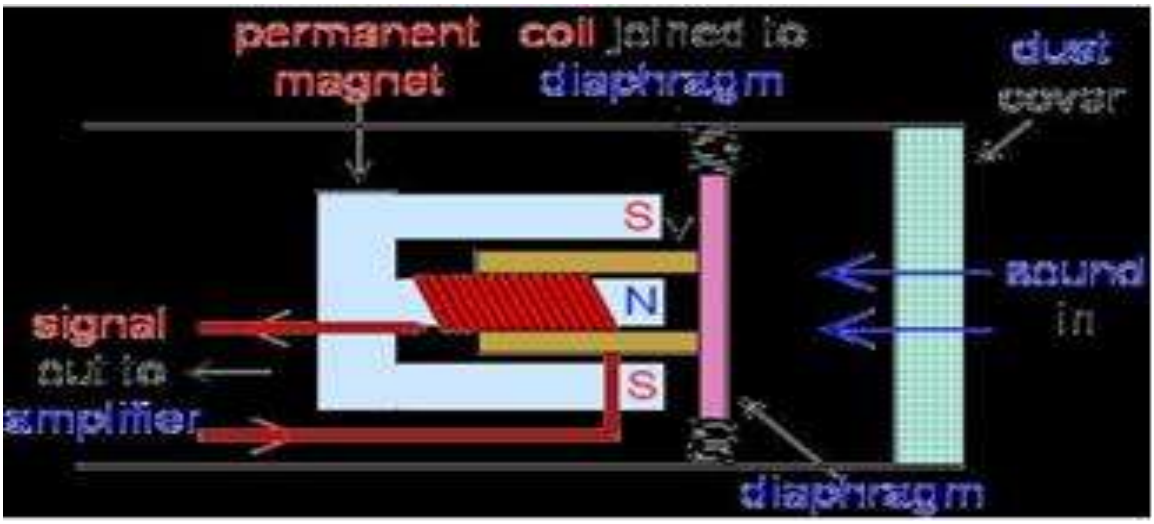

FIGURE 2: Circuit Diagram Translational Motion

1.2 Using Rotational motion

The basic principle is same as linear motion. However to maximize the output, we will be using a set of two gears. The gears used will be of different sizes. One rotation of the larger gear will result in 'n' no. of rotations of the smaller gear. he gear ratio expresses the ratio of the output torque to the input torque. Thus, we can multiply the torque supplied at the motor shaft (the input) by the gear ratio to find the torque at the wheel axle (the output). Transmitting power through a series of gears can also affect rotational speed. With this arrangement we hope to get better output voltage.

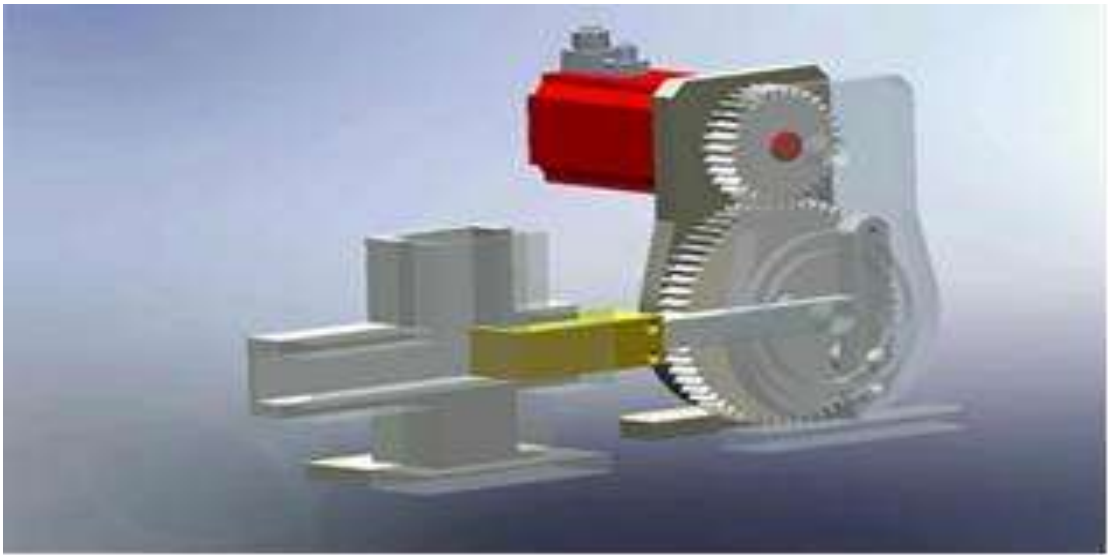

FIGURE 3: Rotational Motion

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V. RESULT FROM IEEE REFERANCE PAPER

Table 2
Result from reference paper

SR.NO.	Sound level(in dB)	Voltage(in Volt)
1.	87	0.60
2.	88	0.90
3.	89	1.0

VI. CONCLUSION

Sound has huge potential and can be used as clean alternative energy source. As noise increases, the output voltage also increases. By efficient conversion, the output voltage values obtained can be further enhanced. This technology is not used practically until now due to efficiency concerns, but present work in this field makes its future quite promising.

VII. FUTURE SCOPE

- This method can be used in areas where large amount of noise is generated.
- In future we cannot completely depend upon solar, wind and hydro so sound could also be a great source.
- It could also be used near industries, airport runways as the noise pollution is to a great extent there.

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