

# Sound Energy to Electrical Energy

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**Abstract:** Pollution is the world's biggest problem. Noise pollution is one of the biggest problems in our lives. A noise pollution causes a lot of problems for us. In the cities car noise is a very common problem. However, this noise can be used to generate energy. Especially in busy cities, in industrial areas, market noise, train stations, etc. Sound as a form of mechanical energy, can be converted to electrical energy using piezoelectric materials. This study aims to use sound by using piezoelectric materials as a modifier to produce sustainable green energy that can be used to reduce energy consumption from non-renewable sources and to use this energy in street lighting. Research has shown that using sound using piezoelectric material is effective.

**Keywords:** piezoelectric material, Sound Energy, noise pollution, Electricity.

## 1. Introduction.

Nowadays Electricity is a very important part of our lives. We cannot even imagine a day without it. A sound is the power of a machine and it travels in the direction of waves. Sound waves propagate in the form of longitudinal waves in the middle such as liquids and gases while in a solid state their waves travel in a long and flexible manner. Most of the noise around us is unpleasant and undesirable sound waves exist in the form of sound. Noise pollution is an invisible danger. Noise pollution affects millions of people every day. Noises above 85 decibels are dangerous to humans and animals sitting around. People who are exposed to loud noise

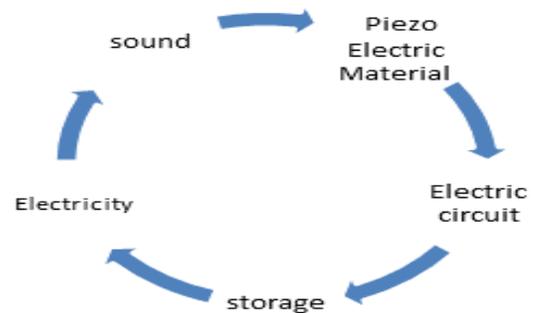
may have diseases such as high blood pressure, sleep disorders, depression and heart disease. In air at normal temperatures and pressures, the corresponding sound waves range from 17 m to 17 mm. The main reason for the increase in pollution levels in many cities is the lack of city systems and the bazillion racing cars on the road. The law of thermodynamics states that sound is mechanical energy that may be transformed to electrical energy. Sound may be transformed to electricity. Electrical energy may be converted from acoustic energy to heating with pie-making components in a variety of ways. This work focuses on the utilization of sound in the transformation process to create stored green energy using pipe equipment. It's used to cut non-renewable energy use. Electricity, as compared to other application sources, may be extremely beneficial to human life. A crucial component of environmental pollution is the existence of noise in a noise-like environment. Sound is used to create electricity [1], which can cause another invisible energy source to be irritated, which is advantageous to non-renewable energy sources such as coal, green energy, oil, and so on. As a result, requiring another source of energy that not only provides electricity but also makes a lot of noise in order to use it to generate energy may lead to the discovery of another hidden energy source that might help non-renewable energy sources. [2].

In this research made with the objective of creating a working body for converting sound energy to electrical energy using the technology and resources available to us. Sound is abundant in nature, and it may be converted into useful electrical energy. The properly transformed energy aids in the reduction of global electric energy constraint. Noise pollution is a common occurrence in emerging economies. This

research aims to transform the decibel levels of undesired noise into usable energy for two purposes: as a sustainable energy source that saves electrical energy for future use and as a noise level indicator utilizing a microphone and Arduino. Sound vibrations create pressure waves, which are transformed into electrical energy using a Piezoelectric sensor. This energy travels via a bridge rectifier and a capacitor before being stored in a Lithium-ion battery for later use, all while showing and validating decibel levels (dB) on an app named "Sound Meter," which was made possible with Arduino. This is a renewable energy source that is also very cost effective, making the product accessible to the public. The goal of converting sound to electricity is to lower the amount of energy consumed by alternative energy sources such as solar and inverters. Sound is a non-continuous kind of energy that is difficult to harvest, but with the assistance of piezoelectric material, it may be overcome. In comparison to conventional solar systems, this system is more efficient and less expensive; the power rating may be increased or lowered depending on the application. The thesis first will provide a framework for project completed during the project and technical details. The report will also outline future activities that can be approved as current job development. We have tried our best to keep the report simple but technically accurate. We hope we will succeed in our endeavour.

This research represents how smart energy can be used in future situations. There are various ways to use this force or vibration to convert it into electrical energy. Our main project will explain how energy can be used on a daily basis. This will solve the big problem that people have been facing for so long. It is a new invention that has not been studied or measured on a large scale. In the future noise pollution will be a much bigger problem than now so why not use it to our advantage [3]. We all know that there is a massive energy scarcity worldwide, and we need power to consume a lot of electricity and complete our everyday work. It is difficult to fathom our lives without electricity; our lives would come to a halt. As a result, there is a pressing need to create power more quickly and to develop new ways to generate electricity. On the other side, we can observe that there is a lot of noise on the streets, at airports, and in industries in today's society. Consider the possibility of converting these pollutants into power.

## 2. Methodology and Implementation



### 2.1 Method for conversion of noise

Method for conversion of noise pollutants into electricity. Piezoelectric crystal used for the conversion of noise pollutants to inexperienced electricity and into electric power. Piezoelectric crystals are the crystals which convert mechanical stress to electric power. The stress carried out to piezoelectric fabric through sound will be transformed into electricity [4].

### 2.2 Practical Approaches

The term piezoelectricity describes the accumulation of electric charges in positive stable compounds (inclusive of crystals, positive ceramics and organically inclusive of bone, DNA etc.) in response to applied mechanical stress. The Piezoelectric effect is the lining electromechanical interplay among the mechanical and the electric nature in crystalline substances with no inversion symmetry. Piezoelectric substances are the crystal which converts mechanical stress to electric power [5][6]. Piezoelectric substances are transducers; their crystals should convert mechanical stress to energy, the crystals are shaped obviously e.g. quartz and artificially ZnO, Niobate Lead etc. The sound power might be transformed into energy the usage of piezoelectric fabric. Piezoelectric powered substances are transducers; their crystals should convert mechanical stress to energy, the crystals are shaped obviously. quartz, bone, DNA while artificially ZnO, lithium niobate Lead Meta niobate the sound power might be transformed into energy the usage of piezoelectric powered fabric [7]. Certain unmarried crystal substances show the subsequent phenomenon: while the crystal is robotically strained, (right

here sound power) or while the crystal is deformed via way of means of the software of an outside stress, electric powered expenses seem at the crystal surfaces; and while the path of the stress reverses, the polarity of the electrical price is reversed. This is known as the direct piezoelectric powered effect, and the crystals that showcase it are classed as piezoelectric crystal. Converting sound power to energy via way of means of piezoelectric powered fabric tool might be made so one can gather the sound wave which might be travelling close to it and that sound wave will be used to purpose a stress because of strain created via way of means of its oscillation within the piezo-crystal and with the intention to create the disturbance in its atoms ensuing with inside the glide of electrical precept the floor of the crystal for this reason sound power might be transformed [9]. And for this reason this sound power might be used to carry out diverse duties via way of means of changing it into beneficial electric powered power.

#### Component & model

- Piezoelectric Transducer
- Bridge rectifier
- Inverter
- Transformer
- Battery
- Led 5 watt bulb

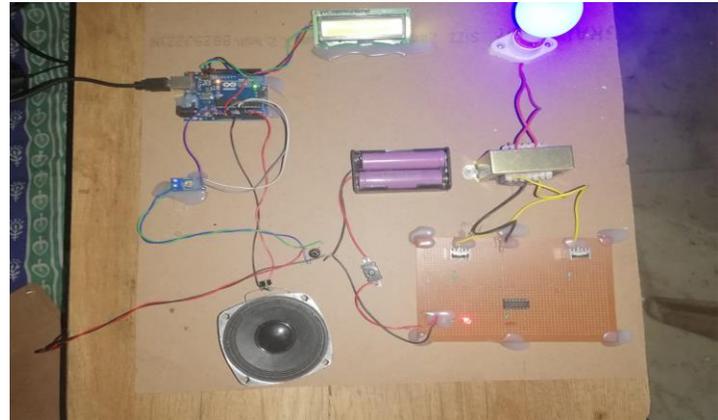
For showing the generated electricity amount we also use

- Arduino
- Voltage sensor
- LCD Display

In arduino we use c programming for analyze the reading.

We also downloaded sound meter APK for taking sound reading. In that APK it shows the sound reading in Db.

### 2.3 Working Model



### 3 Result & discussion

Sound is form of pressure or vibration. When sound created it made some pressure or vibration which compresses the air.

We know that,

0 decibels is equal to (0.000020 Pa) micro pascals.

So if we assume that we produce 55 db in somewhere.

When human are talking normally decibels level stay between 55 to 65 db.

It means, it produce =0.0011 micropascals.

We also know that ,1 V of the voltage produced per 1 pascal of pressure.

From 0.0011 micropascals, 1.1000 volt generate.

1 volt is 1 watt when amp circuit is 1.

If we use 5 amp circuit, 1.1000 volt generate 5.5 watt.

We have discussed the new side of converting sound energy into electricity, which is made possible by the Piezoelectric effect. As sound energy is produced in all parts of the world and is part of nature it can be used to produce continuous electrical energy. Electricity generation is highly dependent on a decibel level of sound power and sound-receiving diodes. Electricity demand is expected to increase by 40% by

2040. Therefore, generating electricity with the help of a piezoelectric effect on our daily lives can make a huge difference [10].

#### 4 Future Scope

If we can convert sound energy into active energy it can help us reduce global energy shortages and can help human development and reduce CO<sub>2</sub> as a source of energy is one of the cleanest energy sources. It will be known that road noise pollution converts into electricity and turns on street lights, signals and various other electrical appliances. Air pollution from airborne noise can be used to generate electricity. Electricity generated at a nuclear power station can grow as noise from nuclear fission may be used to generate additional electricity. Industrial noise pollution can be used to generate electricity and operate on a specific low-power machine. Its scope is endless [11].

#### 5 Conclusion

As sound has so much power, it may be converted into electrical energy for numerous applications. Because sound energy is electrical energy, mechanical energy may be transformed to electrical energy using the law of thermodynamics. Sound effects may take numerous forms.[12].

Method 1 - Doing things using a curtain (diaphragm) magnet and conductor

Method 2- Ways to convert Sound Power> Heat Power and Temperature> Electric Power

Method 3- Piezo-like transducers electrical equipment that changes the type of machine> electrical power and vice versa

Piezoelectric crystals whose crystals convert energy used into electrical energy. The complexity used in piezoelectric materials with sound can be converted into electrical energy. There is still much work to be done in this regard.

- Its efficiency is not very good so good upgrades are required.
- It costs less. As a set everything will be done.
- Could not be used in areas where decibels of sound are too low.

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