

# Generation of Electrical Energy from Ravaged Energies of Environment

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**Abstract**—From years scientists are searching for the sustainable development energy. The ravaged energies present in our workplace e.g. light energy, sound energy can be converted into an accessible energy. In this paper effective method is used for producing electrical energy from the random sources of energy. We have observed that while sitting in a room or outside the room various types of energies is wasted e.g. energy from the lightning sources, ravaged energy produced while talking, listening songs, honking horns of the vehicles that energy can be converted into electrical energy with the help of a solar cell and piezoelectric transducers, Microstrip sound convertors, speakers etc. The proposed circuit was simulated in a pspice and it gives us a better and fruitful output. This output can be further used to run low power electrical equipments that is charging our cell phones, lightning purpose etc.

**Keywords:** Piezoelectric material, solar cell, speaker, Microstripconvertor, supercapacitor.

## 1. INTRODUCTION

As we believe in sustainable development as Indian cities are booming. Smart planning is necessary for development. Population is increasing tremendously. So to meet the present requirement of energy, conventional sources of energy is used for conservation of energy. The concept of sustainable development energy is useful for our present generation as well as future generations. At present research effort has been directed to find sources of green energy.

Non renewable sources of energy such as nuclear energy gives good source of output power but maintenance cost and initially set up cost is higher than conventional sources of energy. Interest in renewable sources of energy has been increased. In market place there is huge amount of waste energies in the form of sound, light, vibrations etc so these energy can be converted with the help of the transducers for ex speakers is used to convert acoustic energy to electrical energy, solar cell can also be used to get electrical energy.

Piezoelectric and solar cells are one of the thought provoking methods in generating an electrical signal. It plays a crucial role in generating power in microwatt to milli watt. Our paper includes how to get useful energies from unnoticed

energies. Then this energy will be stored by using rechargeable DC source.

## 2. PIEZOELECTRIC MATERIALS

The word piezoelectricity means electricity produced by pressure. The word piezoelectricity is derived from a Greek word “piezien” which means squeeze or press [1-2].

A piezoelectric material describes the relation between stress and strain produced mechanically and then converts it into electrically. The behavior of this material is mainly due to crystals present in it such as Rochelle salt, quartz; PZT (Lead Zirconate Titanate).PZT is preferred more. This conversion of mechanical energy into electrical energy is generally processed by convertors alternators type known as Dynamo. There are also other physical methods including piezoelectricity. In microphone we need to convert sound energy into electrical energy. As voice produces then air particles start vibrating back and forth generating electrical signals. If we use piezoelectric nanogenerator in place of simple piezoelectric it will gives us better output. As in piezoelectric nanogenerator it is based on nanotechnology. [5]

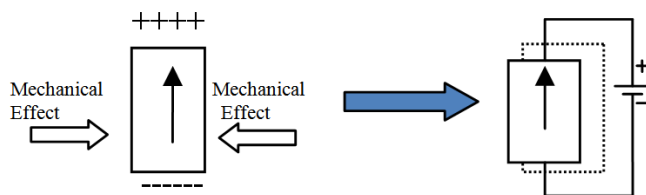


Fig. 1: Electromechanical conversion using Piezoelectric

As shown in above Fig. the electricity is produced by an applied mechanical force. In this the displacement of ions from their mean position caused by mechanical stress which result in generation of electricity i.e. in electric polarization.

## 3. SOLAR CELL

Solar energy is abundant and most readily available on earth. It is non conventional source of energy as it does not create

pollution and hence reduces the green house effect. The way we use solar energy in drying our clothes in the similar way solar panel absorbs sun radiation and convert them into electrical energy. Earth receives solar energy in terawatts. Solar cell used to convert solar energy into electrical energy for example solar photovoltaic cell which converts directly into DC which can be further stored in a battery and this stored energy can be used in night domestic lighting, street lightning, water pumping, railway signal.

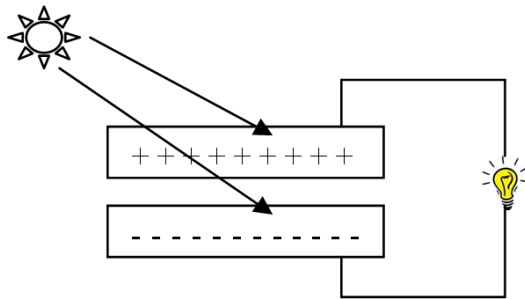


Fig. 2: Working of solar cell

The power given by the sun is totally free of cost. Solar cell can be used as long lasting sources of energy. It does not produce any pollution.[4]

4. SPEAKERS

Speakers is one of the methods to convert sound energy to electrical energy it works where there is high decibel noise for example in parties DJ’s sound etc.

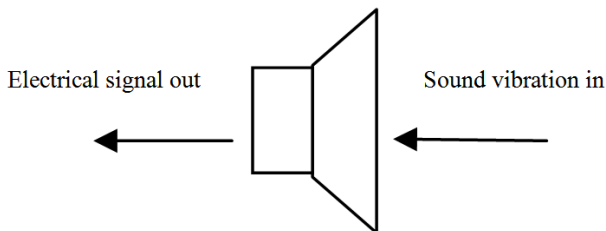


Fig. 3: Sound energy transducer

Speakers consists of cone, electromagnet (coil) and Permanent magnet. By using faradays laws the movement of the coil within the magnetic field causes induced e.m.f. The output signal from the coil proportional to the pressure exerted by the sound.

To convert low decibel sound we can use Microstrip sound convertor instead of speaker.

5. SUPER CAPACITORS

Super capacitors is said to be as ultra capacitors .They can stores 10 to 100 times more energy than electrolytic

capacitors. It can accept and deliver charges faster than the rechargeable batteries. Electrical energy stored in super capacitors are based on static double-layer capacitance (EDLC) and electrochemical pseudo capacitance

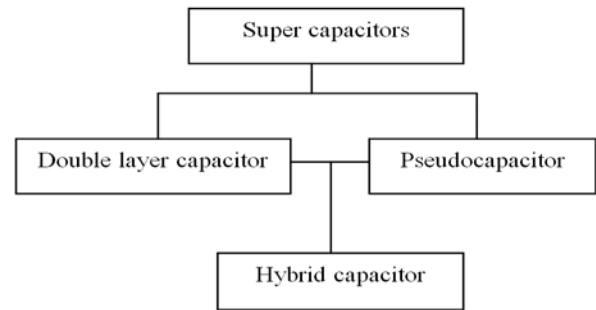


Fig. 4: Various types of Super capacitors

6. SYSTEM ARCHITECTURE AND WORKING PRINCIPAL

The goal of this arrangement is to convert energies from solar, sound etc with the help of transducers into usable electricity. In this various sensors are used such as solar cell which converts solar energy into electrical energy. In this we have used various types of transducers for example to convert solar energy to electrical energy we used solar cells which produces almost 3v, to convert sound energy to electrical energy we used speakers which produces output voltage equals to 2.5v instead of speakers we can also use Microstrip sound conversion which can even convert low decibel sound and produces 5v. There are also many more sensors which convert non usable energy for examples piezoelectric sensors which produces output in milli volts for example when we placed it in industries it gives normal voltage around 25 milli volts.

We used super capacitors along these sensors because super capacitor delivers charges faster than rechargeable batteries. After this we used adder by using operational amplifier followed by voltage quadruple circuit.

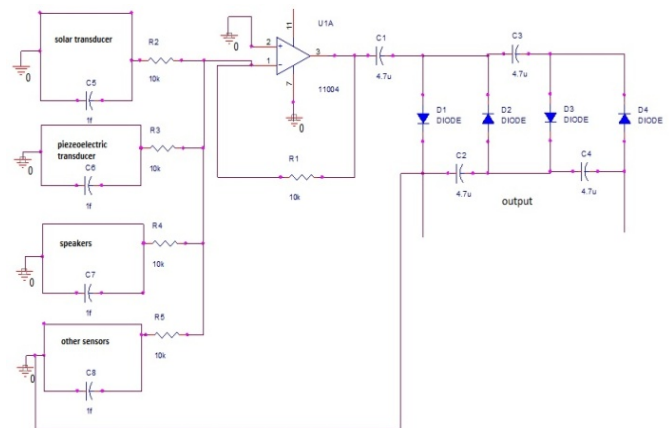


Fig. 5: Circuit diagram for conversion of various energies into electrical.

In this circuit if we use only one type of piezoelectric transducers then this circuit can only work in those places where there are vibrations and this circuit cannot be used for conversions of other energies.[3].so we tried to make a universal circuit.

## 7. RESULT

When we use this above circuit in the market. Two transducers will be active for example solar cell and speakers or Microstrip sound convertors in day time. when we used only speakers and solar cell we get output 4.6v. but if we use Microstrip convertor voltage will rise up to 8v.In industries if we used this circuit our three sensors will be active piezoelectric sensors, speakers, Microstrip convertors then we will get output 4v approx without using Microstrip convertor.

## 8. CONCLUSION

In this paper effective and efficient method is used to convert different forms of energy into usable energy. The performance of this circuit varies place to place. This produced energy can be further used to run low power applications.

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