



Electricity Generation Using Piezoelectric Sensor

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Abstract: In the present scenario, the requirement for energy has been increasing in a distressing rate and the availability of the energy sources are not abundant for sustainable development and the need of the hour is to establish an economical pollution free inexhaustible energy sources to compensate the energy demands. Since, walking is the most common activity in human day to day life, where a person walks he exhausts energy to the ground which goes as a waste. In order to preserve and make use of this energy we are converting it into electrical energy using piezoelectric effect. Piezoelectric effect is utilized by piezoelectric sensors producing output energy in the form of AC voltage. Here we propose an advanced footstep power generation system that uses piezo sensors to generate power from human footsteps. The piezo sensors are mounted below the platform to generate voltage from footstep. The sensors are placed in such an arrangement so as to generate maximum output voltage.

1. INTRODUCTION

Power assumes a critical part being developed of the country. Power is characterized as a set of physical wonder connected with the stream of charge. There are two sorts of power to be specific Static Power, that can be held steady and Dynamic electricity which can spill out of one potential to another. With the upgrading population and foundation of the fourth coming organization and production lines there have been an awesome interest for the need of power so as to run the machines and types of gears. Power can spill out of one section to another either as flash or current in metal power is created in the power stations by generators. This generator themselves require extensive measure of info energy to deliver power which thus relies on upon the "NON RENEWABLE" assets of vitality to create power with a specific end goal to run them.

"Renewable" assets of vitality, for example, solar cell panel, wind energy can likewise be utilizing to collect power. However, this sources are constrained to a specific region for eg. we can say that SOLAR ENERGY can be utilized just at the spot where the sun focus is entirely great and continuous. Wind energy can fundamentally be utilized as a part of the seaside territory's the place the wind pace and accessibility is all the time present. A side from all their human movement such as nonstop driving of the hand wrenches and little generators can be additionally use to deliver to power however all this wonder of producing power requires a consistent human exercise and checking.

In addition, step by step because of expansion in the expense of the assets required to deliver power there is an awesome increment in the expense of electricity, due to this reasons till today numerous weaker segments individuals of the general public can't get power and are not in any case ready to work even little apparatuses.

In this topic we are generating electrical power as non-conventional method by simply walking on footsteps. The aim is to find a suitable and efficient source of electric energy by using our surroundings. We have used mechanical energy produced from our footsteps in order to produce sufficient and reliable amount of electric energy. Using non-conventional sources and stores it for usage. The system will have piezoelectric sensors that will convert the measurements of acceleration force and pressure into electric signals. I will fully depend on the human footsteps pressure and convert it into useful power.

2. WORKING

When a person is in running or walking motion, the piezoelectric plates inside the tiles will be compressed under the weight of the walker. Presses will be used to ensure that all of the weight is directed to compressing the Piezoelectric sensor. Compression caused by the movement of foot, an alternating voltage is generated proportional to the compression force applied. Since an irregular pulsating voltage is produced there is need for rectification. A full wave bridge rectifier with a capacitor filter is employed for the work of rectification. The 3300 uF smoothing capacitor filters the DC component of the output by charging and discharging momentarily. When the charge from the capacitor exceeds 3 V,

A 1N4007 diode is connected which allows the current to flow in one direction but not the other. The produced current passes through resistance and lights up the bulb. We can control the flowing current with the help of the switch.

3. LITERATURE REVIEW

Earlier development in the piezo electric circuit involved concentration ion small vibration and hence small strains. Also, few of them required external voltage supply and their where number of loses in the system which amounts to low voltage output. In December 1929, scientist in US Navy perform various researches on piezo electric crystals. There focused was primary on the dimension of crystals. This research proved that by changing the dimension and orientation of crystal the output considerably changed. They designed the crystal named “Curie cut” or “Zero cut” best on the changes made in the angles of the crystal thus, this proves that the crystals designed with such dimensions are effective in controlling oscillations of a 50watt vacuum tube. So, they act as a voltage controlling devise tool. In 1985, the concept of using handwriting dynamics for electronic identification was performed in Sandia Laboratories A piezoelectric sensor pen for obtaining the pen point dynamics during writing was studied.

Design equation where derived and details of an operating devise where studied. Typical output waveforms obtain from the operation of the pen and showed the dissimilarities between dynamics of a genuine signature and an attempted forgery. So, this also shows high sensitivity of piezo material towards marginal pressure change. In 2000, various applications of piezoelectric in wireless sensing was studied and experimented. Numerus industrial and military application require remote sensing of various machines and equipment’s operating parameters in location where traditional power sources may not be available and long periods of unattended operation are required. Quite often, however, some source of vibrating energy may be present in operation of the machine in question. Hence piezoelectric source is efficiently utilizing to generate power for the operation of a microcontroller and radio transmitter acquire sampled machine data. Various techniques for the efficient conversion, use and storage of piezoelectric power are discovered and used in general energy harvesting data transmitter design.

In 2005 United States Defense Advance Research Project Agency(DARPA) initiated an innovative project on energy harvesting which attempts to power battlefield equipment’s by piezoelectric generators embedded in soldier’s boots. However, this energy harvesting sources put an impact on the body. DARPA’s effort to harness 1-2 watts from continuous shoe impact while walking was abandoned due to the discomfort from the additional energy expended by a person wearing the shoes.

In this project the concentration is mainly on the use of the piezoelectric crystals and films I high vibration system with efficient arrangements to get higher efficiency. Moreover, the amplification level designed will be such that the output rating of system will be considerably higher than previous system.

4. ADVANTAGES

- Power generation is simply walking on step.
- No need fuel input.
- There is a non-conventional system.
- No moving parts so, it’ll have long service life.
- Compact yet highly sensitivity.
- Self-generating no external power required.

5. CONCLUSION

In this project, we are generating electrical power as non conventional method by simply walking or running on the footstep. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using footstep is converting mechanical energy into the electrical energy. By using the energy conservation theorem and Piezo sensors we are proposing a new method for power generation. Proposal for the utilization of waste energy of foot power with human loco motion is very much relevant and important for highly populated countries like India and China where the roads, railway station, bus stands, temples, etc. are all over crowds and millions on people move around the clock.

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