

REVIEW ON POWER GENERATING USING HUMAN FOOT STEP WITHPIZEO ELECTRIC SENSOR AND TREADMILL

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ABSTRACT

This project is intend to produce electrical energy as a renewable energy. we discuss how piezoelectric effect enables us to convert the kinetic energy produced by the human footsteps to electrical energy that can be used for various applications and we generating power from treadmill where the rotation torque is converted in electrical energy and we are storing that power in a battery .So, These systems can be applied in the places like railway stations, gym's, malls, etc. where huge crowds pass every day.

Keywords: Piezoelectricity, harvesting energy, power generation by footsteps, treadmill, battery.

INTRODUCTION

The conversion of kinetic or walking energy in to electrical energy is the latest trend in electrical power generation and it is achieved by converting human's kinetic energy. However there are a unit different physical phenomena as well as piezo effect which will conjointly convert mechanical movements into electricity. [Miss. Salunkhe Arati L, Miss. Gaikwad Sayali S] The piezoelectricity exists in 2 domains, the primary is that the direct piezo electricity that describes the material's ability to remodel mechanical strain into electrical charge, the second kind is that the converse impact, that is that the ability to convert associate applied electrical potential into mechanical strain electricity ceramics belong to the cluster of ferroelectric materials. Ferroelectric materials area unit crystals that area unit polar while not an electrical field being applied. At this point of time, power has turned into a life saver for human populace. [Mr.A.Adhithan, K.Vignesh] Vitality is only the capacity to take every necessary step. In our life, Electricity is most generated voltage in usually utilized resource. Piezoelectricity impact alludes to the capacity of a few materials to create an electric potential. A

treadmill is a device basically used for running and to loss calories.in our project we are converting that energy into electrical energy.

PIEZOELECTRIC SENSOR

In the current technology, which is witnessing a skyrocketing of vigour bills and an exponential slash in the supplies of fossil fuels, there arises a must increase approaches for judicious use of vigour which lay emphasis on protecting the atmosphere as well[Clark, R. L., Saunders, W. R., and Gibbs, G. P]. One of the most novel methods to accomplish this is by way of energy harvesting. Vigour harvesting, or vigour scavenging, is a procedure that captures small quantities of vigour that may in any other case be lost as warmness, gentle, sound, vibration or movement[Shashank Priya,Jungho Ryu]. It makes use of this captured vigour to support affectivity and to enable new technological know-how, like Wi-Fi Sensor networks. Vigour harvesting also has the talents to switch batteries for small, low power electronic instruments. Piezoelectric substances can be utilized as a means of remodelling ambient vibrations into electrical vigour that can then be stored and used to power other devices. With the latest surge of micro scale devices, piezoelectric

Whereas recent experiments have shown that these materials may be used as power generators, the quantity of energy produced continues to be terribly low, therefore the requirement to optimize them. Piezoelectric materials have 2 properties that are outline as direct and converse result. Direct result is that the property of some materials to develop electrical amendment on their surface once mechanical stress is. In previous couple of years low power electronic devices are accrued chop-chop.[D., Horowitz, S., Nishida] The devices are utilized in an oversized number to comfort our daily lives.

With the rise in energy consumption of those transportable electronic devices home different renewable energy in human surroundings arise a replacement interest among US. In this project I attempt to develop an electricity generator. That may turn out energy from vibration and pressure on the market on some other term (like individuals walking).

The utilization of electricity materials so as to reap energy from individuals walking vibration for generating and accumulating the energy. This idea is additionally applicable to some giant voltage through the vibration and which sources which might notice from nature[Miss. Salunkhe Arati L, Miss. Gaikwad Sayali S].

POWER GENERATION METHODS

One of the foremost effective ways of implementing an influence harvesting system is to use mechanical vibration to use strain energy to the electricity material or displace associate degree magnetism coil. [Paradiso, J., and Gershenfeld, N] Power generation from mechanical vibration usually use close vibration round the power gather device as associate degree energy supply, then converts it into helpful electrical energy, so as to power alternative devices. The analysis in the following 3 sections has created use of mechanical vibration so as to quantify the potency and amount of power capable of being generated, additionally on power varied electronic systems, starting from digital natural philosophy to wireless transmitters.

POWER HARVEST USING PIEZO

The piezoelectricity exists in 2 domains: the primary is the direct piezoelectricity that describes the material's ability to transform mechanical strain into electrical charge; the second type is that the converse impact, that is that the ability to convert associate applied electrical potential into mechanical strain energy. [Saunders, W. R., and Gibbs, G. P] The direct piezoelectricity is liable for the material's ability to perform as a sensing element and therefore the converse electricity effect is in charge of its ability to perform as a mechanism. A fabric is deemed electricity once it's this ability to rework current into mechanical strain energy, and likewise to rework mechanical strain energy into electrical charge. Piezoelectric materials belong to a bigger category of materials called ferroelectrics. [Kymissis, J., Kendall, C] one in every of the process traits of a ferroelectric material is that the molecular structure is directed such that the fabric exhibits an area charge separation, known as an electrical dipole. Throughout the fabric composition the electric dipoles area unit oriented at random, however once the fabric is heated higher than a definite purpose, the Curie temperature, and a really sturdy field is applied, the electrical dipole.

EXISTING METHODS USED TO PRODUCE POWER FROM PIEZO ELECTRIC SENSOR

In this method of generating electrical the power they have used a running or jogging shoe as pressure and piezo electric sensor is placed in the bottom of the shoe. It converts the mechanical stress to electrical voltage. When the mechanical stress is applied to the sensor, electrical charge is accumulated on the crystal surface that can be extracted using a wire. In order to get maximum output from the sensor, it has to be set in its self-resonant frequency range. Piezoelectric sensor can be considered as an electrical equivalent of combination of resistance R , capacitance C and an alternating current source I connected in parallel [H. T., Smith, R. C., and Wang]

The output current that is generated from the piezoelectric sensor may be less, which may increase the time taken for charging a battery. But it can be used for charging an electronic device battery for emergency purpose where there is no direct source of electricity

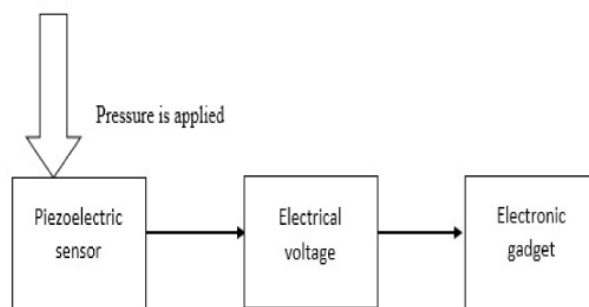


Figure 1. Block diagram

The load that is used for storing the harvested electrical energy is mobile phone battery. Many mobile phones use a battery which is made of the combination of chemicals Lithium-ion “Li-ion” that needs a DC voltage of 3.6V for charging. For power storage it is better to use rechargeable battery than a super capacitor as rechargeable battery has high energy stored per unit weight and a slower discharge response

The analysis of the voltage stored in the battery with respect to the force applied can be done and the efficiency of this work can be calculated. Efficient storage of the generated voltage can be achieved by using the circuit an array of piezosensors can be connected in series to get larger output and can be used for higher load applications. A rectifier-free piezoelectric energy harvesting circuit can be used for charging efficiently⁸.

Piezoelectric energy harvesting can be used as a cleanest form of alternate energy source in future. This work is an example illustrating one of its applications. It can also be used as an energy source for wearable electronics. [Chandrakasan, A. P]

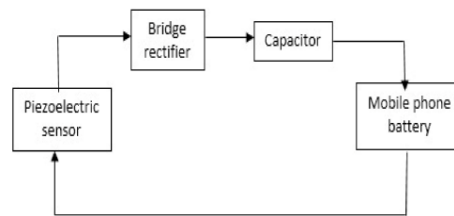


Figure 2. Proposed system

CONNECTION STUDY OF PIEZO ELECTRIC SENSOR

According to Kiran Bobby 2015 piezo tile capable of generating 40V has been devised. Comparison between various piezo electric material shows that PZT is superior in characteristics. Also, by comparison it was found that series- parallel combination connection is more suitable. The weight applied on the tile and corresponding voltage generated is studied and they are found to have linear relation.

To give higher voltage and current 3 PZT area unit connected asynchronous. A force device and meter is connected to the current series combination. As varied forces area unit applied on this affiliation and corresponding voltages area unit noted. Voltage and current generated across the series affiliation is measured. The voltage and current generated across the parallel affiliation is measured. From series affiliation obtained current is poor and from parallel affiliation obtained voltage is poor. To beat this downside rectifier in series-parallel affiliation is employed.

TREAD MILL POWER GENERATION

Using a treadmill with an incline makes walking or running even easier than running outside on level surface. This can be as a result of there's no wind resistance and a motorized treadmill assists with movement versus your own body pushing and pull itself. Mistreatment incline could be a good way to extend calorie burning and throughout every exercising on the treadmill. Most treadmills have incline settings anyplace from .5% to fifteen and hundred and twenty fifth is taken into account to be constant resistance level as an outside surface with no incline...

Dr. Robert Bruce (1952) - A cardiologist from University of Washington conducted research to monitor and diagnose various heart conditions and diseases. He gives the idea of treadmill for exercise. First experiment involved a single stage test in which person walked for 10 minutes on treadmill with a constant speed. Dr. Bruce published his first paper on treadmill in 1949 "analysed minute by minute change in respiratory and circulatory function of normal adult and patients with heart or lungs ailment.

Anyone UN agency plans to use a treadmill for weight loss ought to make certain that the model they get is supplied with a treadmill incline motor that's cut loose the belt motor and sometimes carries its own warrantee. The incline motor helps the treadmill to manoeuvre between high and low inclines simply. [Ottman, G. K., Hofmann, H., Bhatt A. C] Some treadmills even go with programs that modification the incline every which way so the exerciser's body doesn't get accustomed the incline of their travail. If the sporting goods is dynamic the incline themselves, it's vital to form changes slowly, such as .5% to a quarter each 2 minutes. Walking or running on a treadmill that's set to AN incline of twenty-two or additional can facilitate the sporting goods burn calories abundant quicker than if that they had set the machine to AN incline of a hundred and twenty fifth or less.

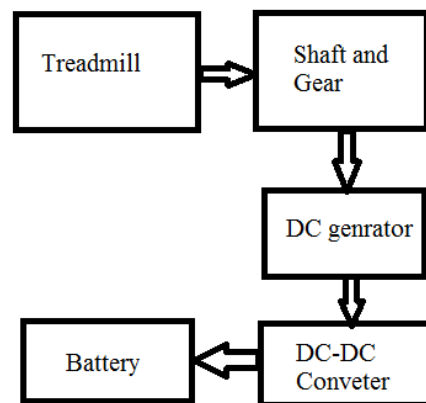


Figure 3. Block diagram of tread mill arrangement

PROPOSED SYSTEM

In our proposed system we are using piezo electric sensor as mat and it is boosted by the converter circuit and it is given to controller circuit it is for charging battery. The stored energy can be effectively used for various applications. Sometimes a controller is also attached after the rectifier as it optimizes the power in input to the capacitor. Super capacitors can also be used in place of conventional capacitors. The power can be directly applied to the electrical devices or can be a supplement of main power supply. One can determine the effectiveness of a system by comparing the input energy to the output results. However, when the amount of output energy produced versus input energy is high then the level of efficiency is also high. Microcontroller is used monitor the voltage and pressure applied to the piezo electric sensor. The regulated power supply is used to power the microcontroller. Tread mill is used for generating electricity by running on the tread mill belt and the power is given to battery. The load we using is an LED array

which is powered battery by using this type of power generation will be the future of the power generation .

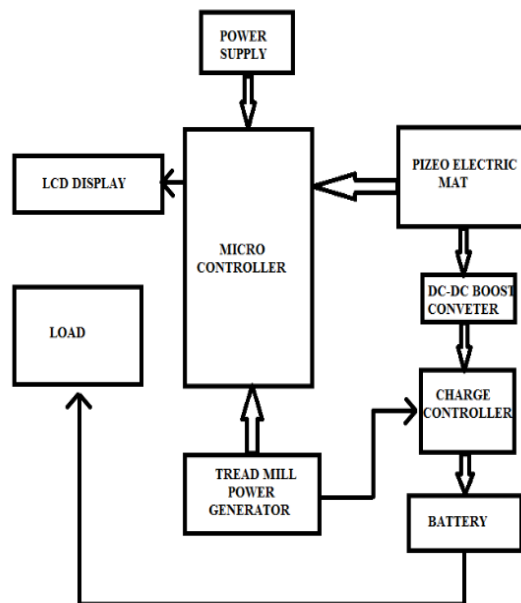


Figure 4. Proposed system block diagram

CONCLUSION

This technique produces electricity with the assistance of electricity components that create use of the energy of human footsteps. The converter employed in the circuit stores the charge for future applications. So as to extend the potency of the total system if super capacitors and converter square measure employed in place of the standard ones then a lot of charge will be hold on than the standard ones. The super capacitors store and discharge energy while not intense abundant energy. Thus, the need of constant increase of power will be met by putting in these systems in heavily packed places. This may doubtless not solely overcome the energy crises however conjointly build up a healthy encompassing.

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