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Power Generation Through Foot Step

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ABSTRACT

This concept is also applicable to some large vibration sources which can find from nature. This project also represents a footstep of piezoelectric energy harvesting model which is cost effective and easy to implement. Man has needed and used energy at an increasing rate for the sustenance and well being since time immemorial. Due to this a lot of energy resources have been exhausted and wasted. Proposal for the utilization of waste energy of foot power with human locomotion is very much relevant and important for highly populated countries like India where the railway station, temples etc., are overcrowded all round the clock. When the flooring is engineered with piezo electric technology, the electrical energy produced by the pressure is captured by floor sensors and converted to an electrical charge by piezo transducers, then stored and used as a power source. And this power source has many applications as in agriculture, home application and street lighting and as energy source for sensors in remote locations.we are representing the methodology of electrical power generation using human foot step. This is about how we can generate electricity using human's waste foot energy and applications for the same. When human walk in surroundings some force exerts on surface this force can be used to generate electricity. The idea of converting pressurize weight energy into the electrical energy is possible by piezo-electric crystal. The power generating floors can be a major application if we use piezoelectric crystals as an energy converting material. Whenever there is some vibrations, stress or straining force is exert by foot on floor then these crystals evenly converts it into electric power which can be used for charging devices viz laptop, mobiles, electronic devices etc.

Keywords: Inverter, DC Generator, Load, Battery, Foot Energy.

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I. INTRODUCTION

At present, electricity has become a lifeline for human population. Its demand is increasing day by day. Modern technology needs a huge amount of electrical power for its various operations. Electricity production is the single largest source of pollution in the whole world. At one hand, rising concern about the gap between demand and supply of electricity for masses has highlighted the exploration of alternate sources of energy and its sustainable use. On the other hand, human population all over the world and hence energy demand is increasing day by day linearly.

Accordingly, it is an objective of the present invention to provide a method of electrical power generation from this ever increasing human population that does not negatively impact the environment. This technology is based on a principle called the piezoelectric effect, in which certain materials have the ability to build up an electrical charge from having pressure and strain applied to them. Piezoelectricity refers to the ability of some materials to generate an electric potential in response to applied pressure. Harvesting of energy which means energy is already available, but is going to waste if not utilized. Embedded piezoelectric material can provide the magic of converting pressure exerted by the moving people into electric current. Now days, electricity has become a need of every single human, demand of electricity increasing day by day. This new generation needs lots of electrical power for their different operations. Due to this many sources are wasteland exhausted in a large amount. There are various ways to generate electricity. The human bio-energy being wasted if it can be made possible for utilization it will be very useful energy sources. The human waste foot energy is being use to produce electricity this would be a great evolution in electricity generation. The average human can take 3,000 - 5,000 steps a day. When we walk then some of energy is wasted in the form of vibrations we can convert this energy or vibrations into an electrical energy using piezoelectric crystals. The use of piezoelectric crystal is to produce the electric output from surrounding vibrations. These materials have the ability to absorb mechanical energy from their surroundings, usually ambient vibration and transform it into electrical energy that can be used to power other devices. Piezoelectricity refers to the ability of some materials to generate an electric potential in response to applied pressure Embedded piezoelectric crystals provide the ability to convert the human walking energy into the electric current due to the exerted pressure. This paper comprises of four section namely study of piezoelectric material, application of energy harvesting via piezoelectric material, locations for generating large scale electricity .

II. OBJECTIVE OF PROJECT

The main aim of this project is to develop much cleaner cost effective way of power generation method, which in turns helps to bring down the global warming as well as reduce the power shortages .In this project the conversion of the force energy in to electrical energy. The control mechanism carries the piezo electric sensor, A.C ripples neutralizer, unidirectional current controller and 12V, 1.3Amp lead acid dc rechargeable battery and an inverter is used to drive AC/DC loads. The battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. This 230 Volt A.C voltage is used to activate the loads. We are using conventional battery charging unit also for giving supply to the circuitry.

III. EXISTING SYSTEM

Other people have developed Rack-pinion and pulley (mechanical-to-electrical) surfaces in the past, but the Crowd Farm has the potential to redefine urban space by adding a sense of fluidity and encouraging people to activate spaces with their movement. The Crowd Farm floor is composed of standard parts that are easily replicated but it is expensive to produce at this stage. This technology would facilitate the future creation of new urban landscapes athletic fields with a spectator area, music halls, theatres, nightclubs and a large gathering space for rallies, demonstrations and celebrations, railway stations, bus stands, subways, airports etc.

IV. LITERATURE SURVEY

Vibration Energy Harvesting:

Vibration-based energy harvesting has received growing attention over the last decade. The research motivation in this field is due to the reduced power requirement of small electronic components, such as the wireless sensor networks used in structural health monitoring applications. The ultimate goal in this research field is to power such small electronic devices by using the vibration energy available in their environment. If this can be achieved, the requirement of an external power source as well as the maintenance requirement for periodic battery replacement can be minimized. It appears from the literature that the idea of vibration-to-electricity conversion first appeared in a journal article by Williams and Yates in 1996. They described the basic transduction mechanisms that can be used for this purpose and provided a lumped-parameter base excitation model to simulate the electrical power output for electromagnetic energy harvesting. As stated by Williams and Yates, the three basic vibration to electric energy conversion mechanisms are the electromagnetic electrostatic and piezoelectric transductions. Over the last decade, several articles have appeared on the use of these transduction mechanisms for low power generation from ambient vibrations. Two of the review articles covering mostly the experimental research on all transduction mechanisms are given by Bee byte. al. Comparing the number of publications appeared using each of these three transduction alternatives, it can be seen that the piezoelectric transduction has received the greatest attention especially in the last five years. Four review articles have appeared in four years [2004-2008] with an emphasis on piezoelectric transduction to generate electricity from vibrations. The main advantages of piezoelectric materials in energy harvesting (compared to using the other two transduction mechanisms) are their large power densities and ease of application. When Vibration input is applied; usable voltage output can be obtained directly from the piezoelectric material itself based on the direct piezoelectric effect. In electrostatic energy harvesting, for instance, an input voltage is required so that it can be alternated due to the relative vibratory motion between the capacitor elements .The voltage output in piezoelectric energy harvesting emerges from the constitutive law of the material which eliminates the requirement of an external voltage input. In addition, unlike electromagnetic devices, piezoelectric devices can be fabricated both in macro-scale and micro-scale owing to the well-established thin-film and thick-film fabrication techniques .Typically, a piezoelectric energy harvester is a cantilevered beam with one or two piezoceramic layers. The harvester beam is located on a vibrating host structure and the dynamic strain induced in the piezoceramic layer(s) generates an alternating voltage output across the electrodes covering the piezoceramic layer(s).

Need of Energy Harvesting:

Advanced technical developments have increased the efficiency of devices in capturing trace amounts of energy from the environment and transforming them into electrical energy. In addition, advancements in microprocessor technology have increased power efficiency, effectively reducing power consumption requirements. In combination, these developments have sparked interest in the engineering community to develop more and more applications that utilize energy harvesting for power.

Energy harvesting from a natural source where a remote application is deployed, and where such natural energy source is essentially inexhaustible, is an increasingly attractive alternative to inconvenient wall plugs and costly batteries. This essentially free energy source, when designed and installed properly, is available maintenance-free and is now available throughout the lifetime of the application. Such systems can be more reliable than wall plugs or batteries. In addition, energy harvesting can be used as an alternative energy source to supplement a primary power source and to enhance the reliability of the overall system and prevent power interruptions.

Human Powered Piezoelectric Generation:

The use of piezoelectric generators to power human-wearable systems has been extensively studied. Human motion is characterized by large amplitude movements at low frequencies and it is therefore difficult to design a miniature resonant generator to work on humans. Coupling by direct straining of, or impacting on, a piezoelectric element has been applied to human applications and these are detailed below. Studies have shown that an average get walking human of weight 68 kg, produces 67Wof energy at the heel of the shoe. Whilst harvesting this amount of energy would interfere with the gait, it is clear that extracting energy from a walking person presents a potential energy harvesting opportunity. The theoretical limits of piezoelectric energy harvesting on human applications based upon assumptions about conversion efficiencies have suggested that 1.27W could be obtained from walking. One of the earliest examples of a shoe-mounted generator incorporated a hydraulic system mounted in the heel and sole of a shoe coupled to cylindrical PZT stacks.

V. PROPOSED SYSTEM

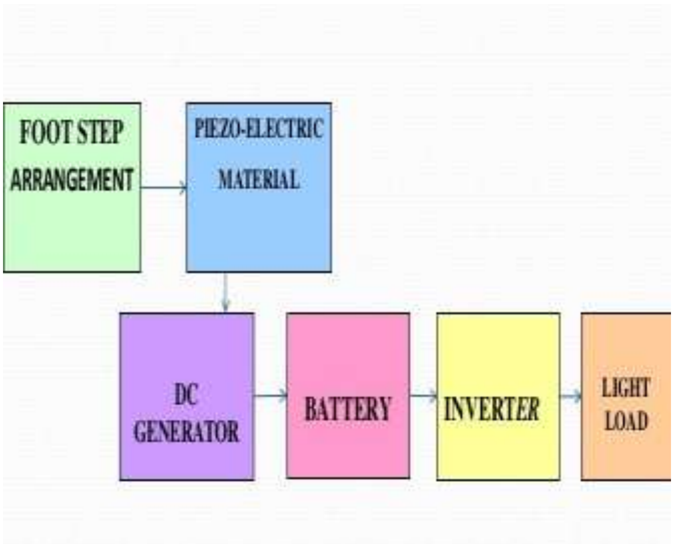

Fig.1 Block diagram of power generation using foot step

WORKING

The working is based on the concept of capturing the unused energy surrounding any system and converting it into electrical energy that can be used to extend the lifetime of that system by providing energy through backup. The piezoelectric plates will be placed under the non-conducting material (hard rubber) and the pressure created by the pressure such as footsteps (in PZR) and waterfall pressure (in PZW) will produce energy which can be stored and utilized as mentioned. The figure illustrates the piezoelectric arrangement. The piezoelectric elements are in their various forms and configurations are designed to operate near resonance. Resonance may vary as a function of number of properties of Piezo materials being employed. These may include the size, shape, density and other physical parameters of a particular configuration for elements being used. Electrical contacts or coupling elements used in the figure are coupled to suitable electrical leads, which are electrically coupled to the piezoelectric element. The polarity of charge depends upon whether element is under compression or tension as a result of applied force. If the element is subjected to an applied compressive force its polarity will be positive and due to applied tensile force it will be negative.

The high voltage dc which is output of piezo bank is stored in the battery .but there is reverse current flow from battery to piezo bank so due to this reverse current is prevented by using bridge wave rectifier .bridge wave rectifier block the reverse dc which advantageously coupled to storage element which can be a battery or a capacitor. This is embodiment of single piezo electric unit. For large scale production, multiunit piezo electric Array is utilized by plurality of elements. More preferable stack Array arrangement passes the applied force through all layers forming piezoelectric elements in the Array thus causing the voltage to rise.

The Array consists of the given type of subsystem embodiments which are eclectically coupled at nodes so as to form a voltage additive series circuit arrangement. The summed electrical charge is input to the regulator by the way of nodes. This output is stored in one or more electrical charge element. Finally the generated, regulated, conditioned and stored. Electrical charge of the system is available for use by external circuitry. The conditioning circuitry is preferably of relatively low impedance to more efficiently capture the generated charge.

As per application inverter is connected to battery .Inverter circuit is able to convert DC current in AC. Inverter is convert stored DC current in AC and we can ues AC current for general application. An inverter is connected to battery to provide provision to connect AC load. The voltage produced across the tile can be seen in a LCD. The inverter used in this circuit uses theSG3525PWM circuit. It is used to convert the DC voltage stored in the battery to AC voltage. These pulse trains are used to switch transistors configured in common emitter mode producing pulse trains of 12V, which is capable of switching a MOSFET. P55N MOSFET is used in the inverter circuit. The sources of the two MOSFETs used in the inverter circuit are supplied with a 12V supply. When the MOSFETs are switched on by the outputs of the transistors, two output pulses of 12V are obtained. These pulses are connected to a step up transformer from whose high voltage side; we obtain the 220V AC supply and this output of inverter is given to the load.it may be used for charging devices viz laptop, mobiles, electronic devices etc.

VI. RESULT

Fig 2. Hardware Setup

VI. CONCLUSION

The project is successfully tested which is the best economical, affordable energy solution to common people. This can be used for many applications in city areas where want more power. By using this project we can drive D.C loads according to the force we applied on the piezo electric sensor.. The final prototype design does fulfill the objective of generating electricity from piezoelectric disk. Due to the low cost design of the piezoelectric system it is a practical product which could increase the operating period of most common products. The data collected is capable of extending the operational lifespan per charge of portable electronic devices.

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