

Kinetic Paving Technology's Energy Use Review

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ABSTRACT

The consumption of electricity nowadays is growing more and more, necessitating the development of various energy production philosophies. We must use sources like the sun, wind, and pressure to produce energy for that reason. Because they can connect mechanical and electrical devices, piezoelectric materials make ideal power generation equipment. In this research article, human footfalls are used to represent the production of electricity. This article discusses applications for and methods for generating energy from human waste foot energy. When people move about, they produce force on the surface, which is used to create electricity. By using a piezoelectric crystal, the concept of transforming pressurised weight energy into electrical energy is made practical. The environment and the populace ought to gain from this energy.

KEYWORD:-Energy harvesting, clean and green energy, and piezoelectric and pyroelectric technology.

INTRODUCTION :

In the modern world, electricity is now a necessity for every single person, with demand rising daily. Electrical power is increasingly needed by the younger generation for a variety of purposes. For that reason, several resources are lost and used up extensively. There are numerous additional ways to produce electricity. Human foot energy is the energy we waste the most. This energy that we can use to produce energy would be a fantastic advancement in the production of power. The typical person may walk between 3,000 and 5,000 steps each day. The foundation of this technology is a concept known as the piezoelectric effect, which states that some materials have the capacity to accumulate an electrical charge when pressure and strain are applied to them. Piezoelectricity is the ability of some materials to produce an electric potential in response to applied pressure. This process is known as energy harvesting, which refers to the use of energy that is already there but would otherwise be wasted. Piezoelectric material that is embedded in a surface has the magical ability to transform the pressure that moving individuals exert onto it into an electric current. This essay is divided into four sections: a study of piezoelectric materials, applications of piezoelectric materials for energy harvesting, places for producing huge amounts of power, and a conclusion.

II. PIZO-ELECTRICT MATERIAL

The brothers Jacques and Pierre Curie noticed that certain materials produce electric current when they are deformed, which led them to discover the piezoelectric effect in 1880. Piezoelectric materials are those that transform mechanical strain or stress into electrical current or voltage. Human motion and vibrations are common instances of force or strain, as are various types of mechanical strain. The best way to harvest energy from materials is to use the reverse piezoelectric effect, which is a reversible process in which materials exhibit

both the direct piezoelectric effect and the direct piezoelectric reverse effect. The direct piezoelectric effect is the internal generation of an electrical charge as a result of an applied mechanical force.

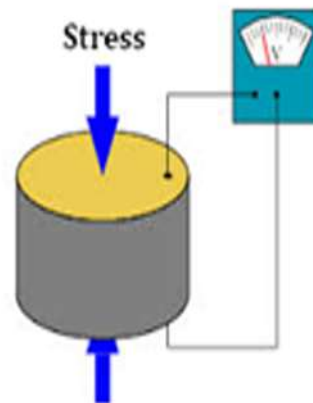


Fig.1 Piezo-electric effect

III. APPLICATION OF ENERGY COLLECTION VIA PIEZOELECTRICT MATERIAL.

A. Flooring Tiles:

created energy, which can then be transferred based on the situation. By placing special flooring tiles at its two busiest stations in its capital cities, Japan has already begun testing the application of the piezoelectric effect for energy generation. In front of the ticket turnstiles, tiles are laid. As a result, each time a passenger steps on a mat, a slight vibration is produced that can be converted into energy.



Fig.2 Flooring of Piezoelectric material

B. Road Side to Power Street Lights

building unique roadways that can be driven over and generate electricity. We can use the electrical generator to produce electrical energy with the aid of traffic on the existing roads. A novel use of power harvesting methodology is the idea of building particular kinds of roads that produce electricity. By placing tiny piezoelectric crystals in the road, this technology operates. Even though a single car only produces a little amount of energy, a 1 km stretch of such a road might produce about 400kW—enough power to fuel eight small cars. Such a system would provide enough electricity if it were deployed on only one section of British highway.

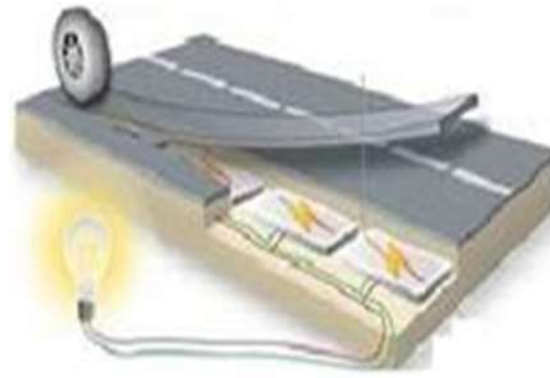


Fig.3 Roads using Piezo Material.

IV. LOCATION FOR GENERATING LAGER SCALE ELECTRICITY:

C. Roads and Highways:

When an aeroplane takes off or lands, the runways are put under a lot of strain. We can transform this mechanical energy if we arrange the piezoelectric clusters here. Placing a stacked structure that is made up of numerous layers of piezoelectric clusters and has the ability to withstand extremely high pressure can increase the system's efficiency. If one takes into account the entire number of landings on the runway, a significant quantity of energy might be created. The maximum takeoff weight for the Airbus aircraft (A380) is 560 tonnes, which can yield 224 KV. Up to 12207–16276 houses could be powered by the nearly 8138 kWh of energy that could be produced.

D. Power Generating Airport Runway

When an aeroplane takes off or lands, the runways are put under a lot of strain. We can transform this mechanical energy if we arrange the piezoelectric clusters here. Placing a stacked structure that is made up of numerous layers of piezoelectric clusters and has the ability to withstand extremely high pressure can increase the system's efficiency. If one takes into account the entire number of landings on the runway, a significant quantity of energy might be created. The maximum takeoff weight for the Airbus aircraft (A380) is 560 tonnes, which can yield 224 KV. Up to 12207–16276 houses could be powered by the nearly 8138 kWh of energy that could be produced.

E. Schools, Colleges, shopping malls and Gyms:

In malls and schools, piezoelectric flooring will result in increased energy production. The entrances to shops and schools can have piezoelectric tiles installed. Using the vibrations produced by equipment in a gym or office while seated in a chair, it is proposed that this energy might be stored in batteries by placing piezoelectric crystals in the chair.

V. CONCLUSION

Albert Einstein was correct when he said this. Energy can only be transformed from one form to another; it cannot be created or destroyed. In many nations, including Japan, Israel, and the Netherlands, this method of producing electricity via the use of piezoelectric material has already been initiated. The use of piezoelectric materials is pollution-free and environmentally benign. It is a simple process that produces power at a low cost. This approach has promise for the future of producing environmentally friendly electricity. We also use this technique in public areas like parking lots, bus stops, and home entryways. This technique will make use of various electricity generation places.

VI. REFERENCES

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