

Energy Utilization of Kinetic Paving Technology Review

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Abstract: *In fact, it can now be said that having access to electricity is a basic human requirement. The population growth, on the other hand, is one of the elements that can lead to an increase in the amount of energy needed. Within India Electricity is produced using a very small number of natural resources. In order to save energy, one should use only what is required or even make an update that can maintain current electrical energy. In addition to energy conservation, it would be preferable to easily produce additional energy. Walking is one among them, along with other daily human activities that provide energy. With a population of 140.76 billion, India is the second most populous country in the world. As a result, additional infrastructure, transportation services, and urbanisation have been created. Dependence of the economy on imported fossil fuels like oil, gas, and petroleum for its energy needs. The over use of fossil fuels results in high greenhouse gas emissions, which disturb the ecological balance and create climate change. Thus, energy production using technology for energy harvesting is crucial to enhancing the ecological balance. As a result, kinetic pavement technology was developed, which generates electricity when people walk on it. The advantages of this technology allow for the creation of electricity that may be utilised to power the kinetic paving's surroundings. Regarding lighting in paving, it can serve as lighting décor or a source of power for nearby structures. In areas with high pedestrian activity, kinetic paving is used. The people and the environment should benefit from this energy*

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

I. INTRODUCTION

Walking is one among them, along with other daily human activities that provide energy. As a result, kinetic pavement technology was developed, which generates electricity when people walk on it. The advantages of this technology allow for the creation of electricity that may be utilised to power the kinetic paving's surroundings. Every year, energy consumption increases dramatically, increasing the demand for fossil fuel reserves in turn. Natural resources are being depleted as a result of excessive energy use, and it has been noted that this rate of depletion is 100,000 times greater than that of replenishment. The one and only reason why scientists have been researching into different green and renewable energy alternatives is this. This prompted us to explore for other green and sustainable energy options. In the middle of a metropolis, it is simple to get kinetic energy from people moving around. Walking can be used to generate kinetic energy, which can then be converted into electrical energy. These technologies could produce a sizable source of energy if they are applied to metropolitan roads and pavements. A switch from conventional fossil fuels to the energy produced by integrated piezo- and pyro-electric pavements offers a clean, green, and sustainable energy harvesting method that will not only reduce carbon emissions but also encourage future generations to use a more practical and dependable source of energy.

Where the material is flexible, the top layer of the paving is made from recycled mattresses, running surfaces, or tyres. Because there is no need for excavation and because kinetic paving must be installed in an area with a high pedestrian level, installation is quite simple. When a person walks on this dynamic pavement, it When a person steps on one of the paving blocks, the piezoelectric device will be pushed down by the kinetic energy and produce 2-4 watts of electrical energy per step. This electrical energy will be directed towards a street lighting that becomes a beautiful representation of light and a USB connector that can charge a phone. Due to urban population density, each square can walk 50,000 steps each day, which is enough to keep the bus stop's lights on all night. The fact that this research exists should make

it easier to provide electricity for facilities to the nearby structures. Also, it is anticipated that the presence of kinetic paving will encourage young people to walk more, which will increase electricity energy income and serve as a scientific opportunity to apply the idea of future health. The research method used is the installation of kinetic paving in areas that have a high pedestrian level such as educational institutions, sidewalks, parking lots and commercial areas.

II. PRINCIPAL, MATERIALS AND FUNCTIONS

Several academics have researched various sources of vibration energy to be harvested, including strain from beam elements in crucial buildings, human motion, and ocean waves. A sustainable way to produce electrical energy is by capturing the mechanical loading that is created in the ground as compressive pressures as people walk across the floor. Williams created the original version of the kinetic energy harvester generic model. Kinetic energy harvesters, sometimes referred to as vibration power generators, generate electricity utilising one or a combination of piezoelectric, electromagnetic, electrostatic, or magneto strictive materials as the driving force. The characteristics of these transductions, as well as the benefits and drawbacks of each process, have all been extensively examined by academics. The goal of this study is to concentrate on the capture of kinetic energy from walking. Due to the relatively strong impact forces produced when walking, heel-strike generators utilising piezoelectric and electrostatic devices with few MW power outputs have drawn attention. Piezoelectric materials are mostly used for heel strike devices since they are easy to incorporate into shoes.

Sr no	Materials	Functions
1.	An electrostatic sensor	energy collector
2.	Piezoelectric power source	energy efficiency
3.	Panel made of 95% recycled rubber	mine body tile
4.	upper sheet	defending layer
5.	anchoring plate for force	foundation and load transfer
6.	spring core electrode	reducing impact
7.	Iron-sulphur battery	power reserve
8.	a dust shield	void accumulation of water and dust
9.	slandering aluminium	insulator of heat

Types of floor mechanism

- A. MAGNETIC TRANSDUCER
- B. MICRO-GENERATOR
- C. STATICAL CAPACITOR
- D. PIEZOELECTRIC EFFECT,

Types:

- Winery ground
- a floor of sustainable energy
- Paving stones
- Porcelain tiles

A. PIEZOELECTRIC EFFECT:

A UK company that specialised in pavement slab design provided the first inspiration for the design concept. a material's capacity to produce electricity in reaction to mechanical stress. widely employed technology. As a transducer, a piezoelectric material such as PZT, PVDF, etc. is utilised. When you slop on the floor tile, the kinetic energy is transformed into electrical energy.

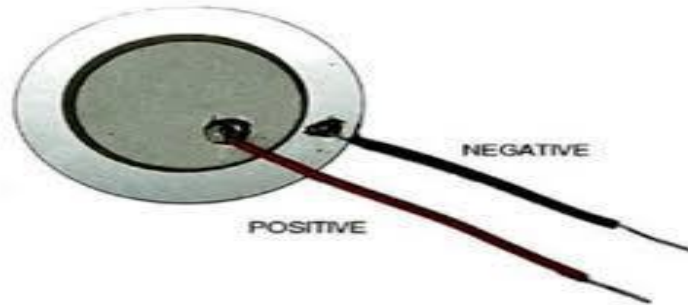


Fig 1: Piezoelectric Effect

B. MAGNETIC TRANSDUCER:

A magnetic element and a conductive element are both present in transducers. The floor's surface is connected to one of the components. The conductive element interrupts the magnetic flow when pressure is applied to the floor surface. As a result, the conductive element induces current.

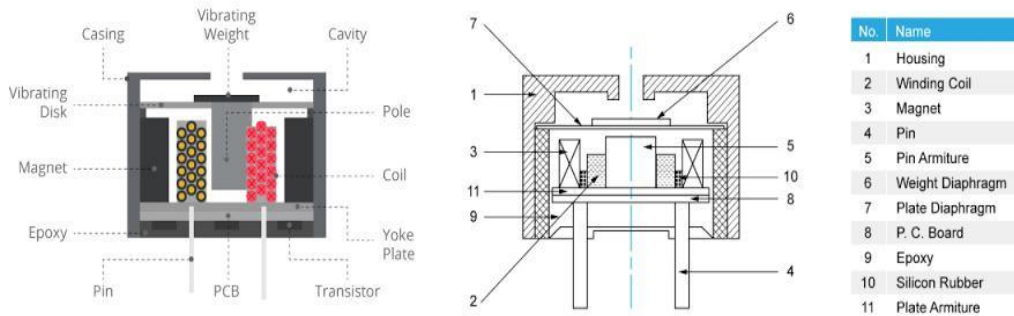


Fig. 2: Magnetic Transducer

C. MICRO-GENERATOR:

a particular kind of generator that uses power from renewable resources. They can generate energy and recognise minute vibrations. It is a mechanical setup. The rotor spins and convert kinetic energy into electric energy when I apply force.

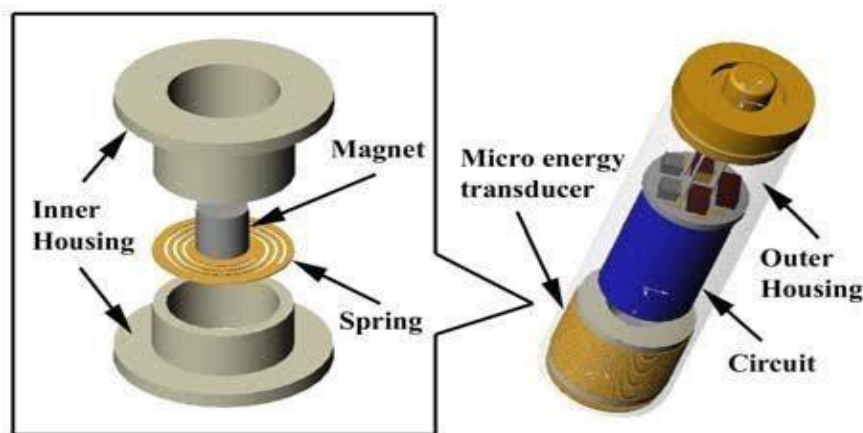


Fig. 3: Micro-Generator

D. STATICAL CAPACITOR:

On each floor tile lies a capacitor. Via springs, one layer is connected to the tile surface. The space between the layers can be changed by pushing on the tile surface. Induced charges exist in the layers. It is possible to extract these charges and attach them to an outside circuit.



Fig. 4: Statistical Capacitor

III. CONCLUSION

Harvesting renewable energy from pavement has drawn a lot of attention from around the world. Solar energy, piezoelectric energy, thermoelectric energy, and geothermal energy are examples of renewable energy that is frequently employed in pavement. Geothermal energy harvesting is one of the oldest technologies and has the best conversion efficiency of these renewable sources of energy. According to the study's findings, humans can still produce energy as easily as feasible by making use of available resources. Piezoelectric harvesting equipment can offer a long-lasting, self-sufficient power supply that needs neither replacement nor upkeep. When compared to conventional energy sources like batteries, autonomous operation can lower the price of replacing batteries. The usage of kinetic paving is particularly beneficial in the production of electrical energy, a substitute energy source for buildings and structures. This material technology known as kinetic paving will be able to compete on the global market. For the cloud community, kinetic paving serves as a teaching tool for energy conversion and material science. Alternative energy sources like kinetic paving may be used to power exterior features like USB ports, streetlights, and building electricity supplies. With a focus on sustainability and the future, kinetic paving is another advancement in the realm of materials technology.

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