

Energy Utilization of Kinetic Paving Technology

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Energy Utilization of Kinetic Paving Technology

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Abstract. Nowadays, electricity has become a priority in daily life and can even be considered as a primary human need. On the other hand, the excessive use of electricity or energy and the increase in population is one of the factors that can increase energy requirements. In Indonesia, the use of electricity comes from very limited natural resources. Therefore, energy savings should be implemented, either by using as necessary or even making an update that can sustain existing electrical energy. Apart from saving energy, it would be better to create new energy with minimal effort. Like producing energy from daily human activities, one of it is walking. The result is the creation of Kinetic Paving material technology that when people step on it will produce electricity. The benefits of this technology can create electricity that can be used for the environment of this kinetic paving. As for lighting in paving as lighting art or as a source of energy for surrounding buildings. Kinetic Paving is applied in pedestrian traffic spaces. This energy is expected to help the community and the surrounding environment. This is an update that should have been implemented. When natural resources are getting low and energy prices are getting higher, we need all these reforms.

1. Introduction

The population in Indonesia is increasing each day. Therefore, the needs are also increasing. One of them is the need for electricity. Electricity is now a primary need in daily life because many things are done every day using electricity. The use of electricity in the house or other building functions is not effective where the excessive use of electrical energy. So that the energy spent is very much and not proportional to the energy produced. So that resources are increasingly depleting. Therefore, we need technology that can create its energy. [1] To produce electrical energy, the easiest method is the result of the transformation of kinetic energy. The kinetic energy that is easily obtained in the middle of the city is the movement of the human itself. It can be concluded that human energy in walking can be used as kinetic energy which will be a source of electrical energy. Indonesia is one of the countries with quite a large number of young people. Youth tend to have more outside activities than other groups. So that at some point the place is quite active with the activities of this young man . This can be an advantage in terms of creating electrical energy from kinetic energy.

Previous research has shown that excessive use of energy will lead to the extinction of natural resources and the possibility of fossil fuels and oil will be depleted around the 21st century. [2] What is needed in this research is kinetic paving which is connected to a USB port and street lights. The top surface of the paving uses materials from recycled mattresses, athletic tracks or tires where the material is flexible. Installation of kinetic paving is quite easy because there is no need for excavation and it must be in an area with a high pedestrian level. This kinetic paving works when the pedestrian



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walks on one of the paving blocks, the piezoelectric will receive a kinetic force and push down the electromagnetic generator and produce 2-4 watts / s of electrical energy per step. This electrical energy will be channelled to a USB port that serves to charge a cell phone and to a street lamp that becomes an aesthetic visualization of light. With the density of the urban population, every single square can get 50,000 steps a day and enough to turn on the lights at the bus stop all night long [3].

The existence of this research is expected to be able to help supply electricity for facilities to the surrounding buildings. And with the existence of kinetic paving, it is expected that young people will be more active in walking which will affect electricity energy income and as a science and invitation to apply the concept of future health for each individual. 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.

2. Method

This research method used a descriptive method as a description of the energy benefits of kinetic paving. To complete this research, literature studies from national and international reference books as well as journals are also used with related discussions on paving, energy, and energy saving.

3. Results and Discussion

3.1 Paving Block

Paving blocks or a type of brick but made of concrete that functions as a floor covering. Paving blocks have a variety of shapes, but with a lock when installed interlocking between 1 paving with other paving. The installation is quite easy and has aesthetic value so that the paving block is always an alternative to outdoor floor coverings [4].

3.2 Energy Saving

Energy-saving or energy saving is an effort that emphasizes to conserve energy use which mostly comes from non-renewable natural resources. Saving energy is also an effort to reduce the yield of waste energy in the form of CO₂ which is quite dangerous for the surrounding environment. Usually, this energy-saving effort is by utilizing resources that can be renewed or which always exist indirectly or naturally [5].

3.3 Kinetic Energy

Kinetic energy is the energy possessed by an object or device whose movements affect the energy produced. The more movements, the greater the energy produced [6]. Kinetic energy movement can be vibration or displacement. However, it has a rhythm, strength, and speed of movement that takes many forms [7].

3.4 Piezoelektrik Material

Piezoelectric is a material in the form of crystals and consists of many chemical elements contained in it [8]. This material is gaining in popularity because it has a fairly high energy effect, high strength and is resistant to humidity and extreme temperatures which is above 100°C [9]. The excess effectiveness of this material depends on its geometric shape, structure, and thickness [10].

3.5 Kinetic Paving

Kinetic Paving is an object or device that utilizes or collects pressure from footsteps and is transformed into energy. The energy is stored or directly channelled to something that requires energy around the kinetic paving. Paving kinetic will be placed in crowded centre such as in stations, malls, pedestrian ways or sports facilities that cover the floor using the pavement [6].

3.6 Utilization of Paving Kinetic

Paving kinetic when viewed on environmental aspects, there are many positive aspects. Starting from the energy source, namely the power from the footrest that previously did not mean anything, but after the existence of this paving kinetic technology, the power from the footing is very meaningful because of the source of kinetic energy for this technology (See Figure 1 and Figure 2).



Figure 1. Kinetic Paving in the street



Figure 2. Detail of Kinetic Paving

Paving kinetic is also a substitute for energy from non-renewable natural resources. Although not as a whole, minimizing will be better. So that CO₂ emissions will be reduced and air pollution will be reduced. Transformed energy can also be additional energy for outdoor facilities or buildings. With the existence of kinetic paving, it becomes a source of public education to encourage people to walk more frequently instead of using vehicles ineffectively and producing more CO₂ emissions. Kinetic paving is also a sustainable material so it can be used in a very long term as a technological marker of highly advanced kinetic paving (See Figure 3).

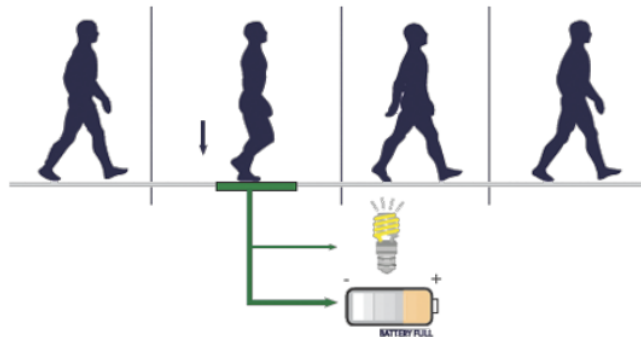


Figure 3. Diagram of Kinetic Paving

4. Conclusion

The results of this study are that energy can still be produced by humans as easily as possible by utilizing existing resources. The use of kinetic paving is very useful in producing electrical energy which is an alternative energy for facilities and buildings. This kinetic paving will become a material technology that will compete with the international market. Kinetic paving is also an educational medium for the cloud community regarding energy conversion and material technology. Kinetic Paving can be an alternative energy that helps outdoor facilities such as USB ports, street lights, and electricity supplies in buildings. Kinetic paving is also a progress in the field of materials technology with a sustainable and futuristic approach.

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