Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 45 No. 1 (2024)

Power Generation using Footpaths

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Abstract: **-** This Paper introduces Producing energy without any supply or external source is the major idea and best innovation in our future. So, with the help of a piezoelectric sensor, it is possible to generate power with our footsteps. The main idea of the work is to place the piezoelectric tiles under footsteps, we can produce energy that can be stored in a rechargeable battery and, later the stored energy can be used in public places like street lights, mobile charging, etc. The amount of energy stored can be displayed in a liquid crystal Display. So, using such a concept the power can be availed and deployed by converting mechanical energy to electrical energy.

Keywords*: Power Generation, Power saving, Recharging battery.*

1. Introduction

As technology is developed and the use of gadgets, electronic devices also increases. Power generation using conservative methods becoming deficient. There is a necessity for a different power generation method. At the same time, energy is wasted due to human locomotion and many ways. To overcome this problem, the energy wastage can be converted to usable form using the piezoelectric sensor. This sensor converts the pressure on it to a voltage. So by using this energy-saving method which is the footstep power generation system, we are generating power. This project is used to generate voltage using footstep force. The proposed system works as a medium to generate power using force. This project is very useful in public places like bus stands, theaters, railway stations, shopping malls, etc. So, these systems are placed in public places where people walk and they have to travel on this system to get through the entrance or exists. Then, these systems may generate a voltage on each step of a foot. For this purpose, the piezoelectric sensor is used to measure force, pressure, and acceleration by its change into electric signals. This system uses a voltmeter for measuring output, LED lights, a weight measurement system, and a battery for better demonstration of the system. In another way, we are also saving natural energy resources.

2. Objectives

The objective of implementing power generation technologies on footpaths is to harness the untapped potential of human movement to generate clean and renewable energy. By strategically integrating innovative systems such as piezoelectric tiles, kinetic energy harvesting pads, and footstep generators into urban infrastructure, we aim to create sustainable pathways toward reducing reliance on traditional fossil fuels. This initiative aligns with broader goals of mitigating climate change, enhancing energy security, and fostering resilience in urban environments.

Furthermore, by converting foot traffic into electricity, these technologies can contribute to the diversification of energy sources, decentralizing power generation and promoting localized energy resilience. In densely populated areas with high pedestrian activity, such as city centers, transportation hubs, and recreational spaces, footpath power generation systems have the potential to make a meaningful impact. They not only offer an opportunity to offset carbon emissions but also serve as a visible reminder of the importance of energy conservation and sustainable practices in everyday life.

Moreover, beyond the direct generation of electricity, the deployment of these technologies on footpaths can also serve educational and awareness-building purposes. They provide tangible examples of renewable energy integration and offer opportunities for community engagement and involvement in sustainable initiatives. By

showcasing the practical applications of clean energy technologies in public spaces, footpath power generation projects can inspire individuals to adopt more environmentally conscious behaviors and advocate for broader sustainability efforts in their communities. Ultimately, the objective is to harness the power of human movement to create cleaner, greener, and more resilient urban environments for generations to come.

3. Methods

A Piezoelectric Sensor requires no external voltage or current source; it can generate an output signal from the strain applied. This makes them a popular choice for many applications. The use of them is growing significantly throughout different industries and they are sometimes incorporated into other sensors. A piezoelectric sensor senses mechanical changes in the environment and produces a usable electrical signal output, which can be used to measure the mechanical changes or generate displacement with the electrical output. Piezo sensors take on two forms to accomplish this: active and passive. A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device. The Power Bank Module is a supermini power bank mainboard compatible with a 3.7V-4.2V lithium battery. On-board micro USB port for battery charging and USB type A female output port supporting DC 5V 1A input and 5V 1A output. Just connect it with an 18650 battery then you can get a portable power bank. Most automotive battery containers and their covers are made of polypropylene. For a typical 12-volt car battery, the case is divided into six sections or cells shaped somewhat like one row in an ice-cube tray. The cover will be sealed to the top of the container when the battery is finished. 3.7V is the voltage of ternary lithium batteries, not all lithium batteries are the same voltage, lithium iron phosphate is 3.2V. General lithium cobalt oxide, a ternary positive electrode with graphite anode can obtain a full charge voltage of about 4.2V, while lithium iron phosphate can only reach 3.6V.

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4. Results

The implementation of power generation technologies on footpaths aims to convert the kinetic energy from pedestrian movement into clean and renewable electricity, thereby reducing reliance on traditional fossil fuels and mitigating climate change. By strategically integrating innovative systems such as piezoelectric tiles and kinetic energy harvesting pads into urban infrastructure, we can diversify energy sources, enhance energy security, and

foster resilience in densely populated areas. These initiatives not only contribute to localized energy generation but also serve as visible reminders of the importance of sustainability while offering educational opportunities and inspiring community engagement in broader efforts toward a cleaner and greener future. This is proposed to overcome the usage of power banks because we used to charge the power bank first and then we can charge the phone but using this prototype we can easily charge the phone without external energy so that we can easily charge the phone by walking itself.

5. Discussion

It is concluded that the innovative technology capitalizes on the constant kinetic energy of pedestrian traffic to generate electricity, offering numerous benefits, from reducing the strain on conventional power grids and enhancing urban infrastructure to providing localized energy solutions in remote areas. While challenges remain in terms of efficiency and cost-effectiveness, ongoing research and development efforts, coupled with a growing emphasis on environmental sustainability, are likely to drive the widespread adoption of footpath energy generation, ultimately contributing to a greener and more energy-efficient future.

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