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VIDYUT Generation via Walking : Analysis

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Abstract

The objective of analysis described herein was to develop an approach that maximizes the power transferred from foot step into electrical energy. Consumer reliance on wearable electronic devices has grown significantly in the past decade. With increasing use come demands for decreased size and enhanced capabilities, necessitating new ways to supply electric energy to electronics devices. The feasibility of harnessing electric energy using foot steps has been analyzed by various methods. Continuing in that spirit, this paper compares regulation schemes for conditioning the electric energy harnessed by foot step electricity converter (mechanical method), pavgen slabs, liquid droplets embedded in shoe sole, piezo ceramic source embedded in a shoe insole has been analyzed .Development of various methodologies' for renewable energy resources is necessary in this modern era so still some more aspect need to be explored.

Introduction

Man has needed and used energy at an increasing rate for his sustenance and well being ever since he came on the earth a few million years ago. Due to this a lot of energy sources have been exhausted and wasted. So, non-conventional energy is very essential at this time to world. Walking is the most common activity in day to day life The average human takes 3,000-5,000 steps a day. Seems like a lot, but most health experts would tell you to average 10,000 a day. Each step produces only enough electricity to keep an LED-powered street lamp lit for 30 seconds. So this is the very innovative thought in a commercial way for reduce the cost of power used in daily life. The purpose of this analysis is to analyze various methods of foot step power generation such as footstep power using foot step electricity converter device, using pavgen slabs (recycled rubber),using liquid droplets and metal electrode embedded in shoe sole ,using piezoelectric material. in piezoelectric shoe insert and complementary conditioning electronics for unobtrusive, parasitic harvesting of the compression energy normally absorbed by an insole during walking. The process of acquiring the energy surrounding a system and converting it into usable electrical energy is termed power harvesting [1].

Literature Review

The most common methodology of shoe power generators include

1. Foot step electric converter device (Mechanical method)
2. FOOTSTEP ELECTRICITY GENERATION USING PAVEGEN
3. FOOTWEAR EMBEDDED HARVESTERS\
4. PIEZO ELECTRIC SHOE

- **FOOT STEP ELECTRIC CONVERTER DEVICE-**This device, if embedded in the footpath, can convert foot impact energy into electrical form. The downward movement of the plate results in rotation of the shaft of an electrical alternator fitted in the device, to produce electrical energy. The electricity generated from these devices can be used for street lights. This is a mechanical arrangement so efficiency is not so good and wear tear problem is there. If the weight is less then 50kg then this device will not work[1-3].

fig1: footstep electric converter device

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FOOTSTEP ELECTRICITY GENERATION USING PAVEGEN- The recycled rubber "PaveGen" paving slabs harvest kinetic energy from the impact of people stepping on them and instantly deliver tiny bursts of electricity to nearby appliances. The slabs can also store energy for up to three days in an on-board battery, according to its creator [17]. Paving slabs that convert energy from people's footsteps into electricity are set to help power Europe's largest urban mall, at the 2012 London Olympics site[2-3].

It’s limited due to cost of installation and complex designing process.

Fig:2 pavgen slabs

FOOTWEAR EMBEDDED HARVESTERS- This works as follows: droplets of liquid are placed between electrodes coated in dielectric film. Both droplets and electrodes are connected to an external electrical circuit. External movement causes the interface between the droplets and the electrodes to decrease which releases an electrical charge which flows back into the electrical circuit, generating an electrical current [1-3].
Limited due to maintenance cost is high and life time of droplets.

Fig:3 footwear embedded harvester

PIEZO ELECTRIC SHOE- The piezoelectric effect a material’s capacity to convert mechanical energy into electrical energy, and the inverse—is observable in a wide array of crystalline substances that have asymmetric unit cells. When an external force mechanically strains a piezoelectric element, these polarized unit cells shift and align in a regular pattern in the crystal lattice. The discrete dipole effects accumulate, developing an electrostatic potential between opposing faces of the element. Relationships between the force applied and the subsequent response of a piezoelectric element depend on three factors: the structure’s dimensions and geometry, the material’s piezoelectric properties, and the mechanical or electrical excitation vector[4-15].

The output is not stable always and weight of the shoe is not normal.

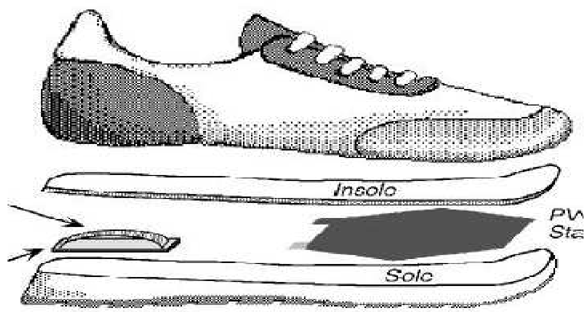

fig:4 piezoelectric shoe

Conclusion

During the course of analysis, we assembled knowledge and data for Electricity-Generation for low power devices. This paper presents an adaptive approach to harvesting electrical energy from footsteps. Different methodologies for generation of electricity by walking is reviewed and analyzed. We analyzed that some of the methodologies are not feasible in some conditions due to too much complexity in real time portable charging and some are feasible but they are in an analysis stage. Shoes of the future will be capable of charging devices

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