Abstract

With the decrease in energy consumption of portable electronic devices, the concept of
Energy Harvesting using Piezoelectric Materials

harvesting renewable energy in human surrounding arouses a renewed interest. This technical paper focuses on one such advanced method of energy harvesting using piezoelectric material. Piezoelectric materials can be used as mechanisms to transfer mechanical energy, usually ambient vibration, into electrical energy that can be stored and used to power other devices. A piezoelectric substance is one that produces an electric charge when a mechanical stress is applied. Conversely, a mechanical deformation is produced when an electric field is applied. Piezo-film can generate enough electrical density that can be stored in a rechargeable battery for later use. Piezoelectric materials have a vast application in real fields. Some of the latest applications are mentioned below. Currently, there is a need to utilize alternative forms of energy at passenger terminals like airports and railways across the world. Cleaner, more sustainable forms of electrical power are needed in order to keep costs lower, to maintain positive and productive relationships with neighbours and to insure a healthier environment for future generations. The use of piezoelectric devices installed in terminals will enable the capturing of kinetic energy from foot traffic. This energy can then be used to offset some of the power coming from the main grid. Such a source of power can then be used to operate lighting systems. The increasing prevalence and portability of compact, low power electronics requires reliable power sources. Compared to batteries, ambient energy harvesting devices show much potential as power sources. A piezoelectric generator can be developed that harvests mechanical vibrations energy available on a bicycle. The electrical energy thus produced can be used to power devices aboard the bike, or other portable devices that the cyclist uses. Electrical energy can also be generated from traffic vibrations (vibrations in the road surface) using piezoelectric material.

References


- Piezoelectric Harvesting in Airport Environment by Glynn Falcon, Faculty Advisor, San Jose State University


- Power Electronic Circuits for Vibration based energy harvesting using piezoelectric devices, by Heath Hoffmann, Associate Professor, Department of Electrical Engineering and Computer Science Engineering, University of Michigan.

- www.innowattech.co.il

- www.pavegen.com
- An efficient piezoelectric energy harvesting interface circuit by Ramdass, A. P. Chandrakasan
- Energy harvesting from vibration and walking with piezoelectric materials by Mikko Leinonen, Jaakko Palosaari, Maciej Sobocinski, Jari Juuti and Heli Jantunen University of Oulu, Microelectronics and Material Physics Laboratories
- The Piezoelectric Effect, PZT Application Manual

**Index Terms**

Computer Science
Electronic Design And Signal Processing

**Keywords**