

# PIEZOELECTRIC MATERIALS USED FOR PORTABLE DEVICE SUPPLY

G. Poulin, E. Sarraute, F. Costa, J.-C. Faugière

SATIE – ENS Cachan, Cachan, France

## **Abstract:**

The focus of this paper is to study the feasibility of a piezoelectric generator harvesting the mechanical energy of human movements, in order to supply portable electronic devices which power is in the range of [10 $\mu$ W; 1mW], for example: hearing aid devices, microchip of identification badges, electronic textiles. The piezoelectric generator consists of three stages: a mechanical application device which transforms the voluntary movement of the user into a high dynamic constraint; the piezoelectric device which is the parallel association of 20 identical PZT ceramic bars polarized in 31-mode; and a static converter that converts the electrical energy in a suitable form to the targeted portable application. In this paper, the two first stages are described. On the one hand, the low frequency model of the piezoceramics is presented. On the other hand, the mechanical application device is described and experimental measurements are interpreted. With a 5Hz and 2N constraint, the power delivered by the 20 simultaneously constrained piezoceramics reaches 13,2 $\mu$ W with a 100k $\Omega$  load.

**Keywords:** Mechanical energy harvesting, Functional applications, PZT, Sensors, Structural applications.