# Design and Analysis of a Mechanical Device to Harvest Energy From Human Footstep Motion

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**Abstract:** Portable electronics is usually powered by battery, which is not sustainable not only to the longtime outdoor use but also to our living environment. There is rich kinetic energy in footstep motion during walking, so it is ideal to harvest the kinetic energy from human footstep motion as power source for portable electronic devices. In this paper, a novel mechanism based on dual-oscillating mode is designed to harvest the kinetic energy from footstep motion. The harvester contains two oscillating sub-mechanisms: one is spring-mass oscillator to absorb the vibration from external excitation, i.e. the footstep motion, and the other is cantilever beam with tip mass for amplifying the vibration. Theoretic analysis shows that the dual-oscillating mechanism can be more effectively harness the foot step motion. The energy conversion sub-mechanism is based on the electromagnetic induction, where the wire coils fixed at the tip end of the cantilever beam serves as the slider and permanent magnets and yoke form the changing magnetic field. Simulation shows that the harvester, with total mass 70 g, can produce about 100 mW of electricity at the walking speed of 2 steps per second.

**Key words:** energy harvesting, dual-oscillating mechanism, human motion

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