# A Self-Adjusting Resonating Piezoelectric Vibration Energy Collector Based on a Cantilever Structure

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While our modern society has successfully electrified the majority of the globe, there remain areas where geography and terrain significantly hinder the installation of conventional electricity infrastructure, making access to electricity challenging. This abstract introduces an innovative approach to localized electricity generation through a Self-Adjusting Resonating Piezoelectric Vibration Energy Collector. This design targets the omnipresent but underutilized vibration energy from human activities to natural occurrences. By incorporating a cantilever and sliding mass structure with customized spring steel and friction control module, the device intelligently self-adjusts to resonance, thereby enhancing energy efficiency, according to simulation experiments, by 464.6% on average. Preliminary experiments and statistical analysis have also been conducted on the piezoelectric plates to identify the most effective amplitude and frequency parameters, aiming to maximize power output. Furthermore, the research applies this novel approach to real life. A wearable device is designed for walking or running conditions. Noticing that the vibration from walking exists not only in the vertical degree of freedom, this research designs another structure targeting horizontal vibrations and maintaining the self-adjusting resonating feature. Besides, another device for biking has been built. Each power-generating module generates around 1J every 5 minutes of walking, while several modules could be easily installed together due to the simplicity of the structure. This research not only proposes a sustainable method to extend electricity access to remote areas but also contributes to the broader application of renewable energy in overcoming geographical and infrastructural barriers.