Electrify Your Step: Converting Foot Traffic Into Renewable Energy Using Piezoelectric Transducers

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In order to decrease reliance on non-renewable energies that greatly pollute the earth, people need more renewable energy sources, such as piezoelectric energy harvesting, that can generate electricity from everyday actions. The essential design criteria included the following: (1) prototype must produce electricity when stepped on, (2) prototype must be able to store the electricity it produces, (3) prototype must be durable enough to withstand much pressure without any signs of damage, (4) prototype must be wheelchair accessible, (5) prototype must function after water is poured on it, (6) prototype must cost less than $15. All prototypes met all of the stated design criteria with the exception of being able to withstand much pressure without any signs of damage. After being under 200lbs of pressure for 10 minutes, prototype # 1's circuitry housing was permanently compressed and its piezoelectric transducers were cracked and deformed, rendering them useless, but prototype #2 was completely unharmed both internally and externally. Both prototypes were designed to charge a 1.2v NiMH battery using only foot traffic and both succeeded in doing so, but prototype #2 was far more efficient than prototype #1 and charged a 1.2v NiMH battery 0.011v, while prototype #1 charged the battery 0.004v. Based on the analysis, the next prototype would be thinner, wider, and have more piezoelectric transducers, allowing for far more electricity produced and more comfort within each step.

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