

CONNECTICUT SCIENCE FAIR

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Top Winners in the 2012 Connecticut Science Fair

(Student information as of April 2012)

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Prototype Design of an Electricity Generating Shoe Utilizing a Pumped Air Turbine.

Connecticut Science Fair Awards

- Dominion's Millstone Power Station Physical Sciences Awards --- Finalist - Physical Sciences 7th Grade - CSF Medallion & Acrylic Award
- Barnes Aerospace Applied Technology Awards --- Middle School Finalist - Medallion and acrylic award
- CT Clean Energy Fund Alternative/Renewable Energy Awards --- 3rd Place Middle School - \$100 Cash and Trophy
- eesmarts/CT Energy Efficiency Fund Sustainable Resources and Practices Awards --- 3rd Place Middle School - \$200 Cash and Trophy
- Goodrich ISR Awards for Excellence In Engineering --- Finalist - Engineering Middle School - CSF Medallion & Acrylic Award
- IEEE, Connecticut Section --- \$100 Honorable Mention

Abstract

This project explores the novel idea of using air bellows integrated with the soles of a shoe. The gait motion of a person walking or running will depress the bellows. When depressed, the bellows release air that is directed by tubes to a small air turbine. The air turbine is connected to a generator by a shaft through a gear box. When the air turbine spins, it turns the generator and creates electricity. This electrical energy can be used to power small electronic devices or stored in batteries. The prototype generates .85 Volts DC and .043 amperes DC. The power generated is .037 Watts. A person wears two shoes. Therefore the energy generated by a person is twice this value and is .074 Watts. Based on the approximate 6 Watts of energy that a person dissipates per step, the conversion efficiency is approximately 1.2%. With improved components and the use of a higher density medium, a shoe could be developed to give 1 to 3 Watts of electricity. This would increase the efficiency of the shoe to between 17-50%. Although the amount of power generated by the shoes is small, it is sufficient to recharge small personal electronic devices. In addition, scientists are working on devices that collect and store energy. Coupled with such a device, if many people wear the shoes, the cumulative power generated would be enormous.

Biography