Running Hamsters Can Power Nano Devices (Video)

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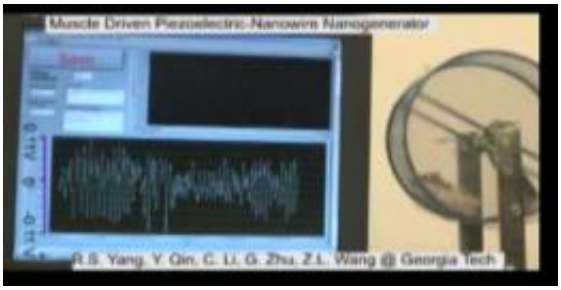

Researchers at Georgia Tech have designed a nanogenerator that can harvest irregular biomotions, such as the erratic movements of a hamster running. Image credit: Zhong Lin Wang.

(PhysOrg.com) -- Among the vast number of untapped energy sources are finger taps, heartbeats, and even hamsters running on exercise wheels. In a recent study, researchers from Georgia Tech have shown that when hamsters run or scratch themselves - even if they do so erratically - the motions can drive a nanogenerator that produces an electric current.

The electricity generated from such tiny, irregular biomotions is currently quite low (about one nanowatt), but Zhong Lin Wang, a professor of materials science and engineering at Georgia Tech, predicts that power generation can be increased to drive some tiny nano-sized devices. Wang and his colleagues have published their study in a recent issue of *Nano Letters*.

While other generators can harvest biomechanical energy from regular motions at a specific frequency, the Georgia Tech team's generator is the first that can harvest small, irregular motions. Most biomotions - such as walking, stretching, and a heart beating - are irregular movements.

Taking advantage of the piezoelectric effect, the team's nanogenerator consists of a series of zinc-oxide nanowires mounted on a flexible plastic surface. When the plastic bends, the wires also bend, creating an electric potential that drives a current through the wires to an external electrical circuit.

Video: Running hamster generate energy

Many motions can cause the plastic to move. For instance, a hamster wearing a small jacket attached to the generator could harvest energy from the rodent's movements as it runs and scratches. The researchers also attached the nanogenerator to a person's index finger, and when the finger tapped on a hard surface, the generator could harvest that biomechanical energy.

The researchers hope to increase the generator's power by adding more piezoelectric wires. If the team could increase the nanogenerator's power output so that it could generate about one microwatt, the device could power implantable nanosensors that require a permanent power supply. These nanosensors, which perform tasks such as detecting pathogens or cancer proteins, could be powered by the patient's own biomotions, eliminating the need for the sensors to be surgically replaced. In other applications, the generator could be woven into the fabric of a human jacket to harvest energy for powering portable electronic devices.