Biomechanical Energy Harvester Converts Human Motion Into Electricity

Jason Lomberg, Technical Editor

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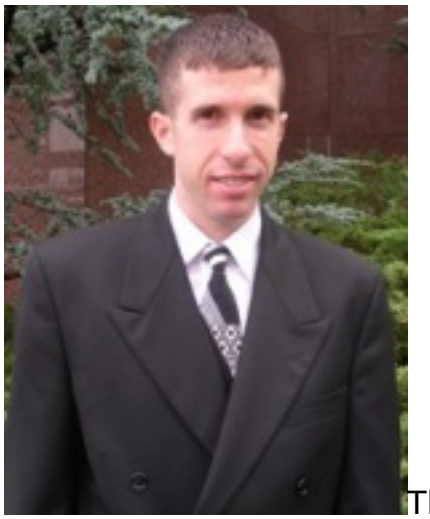

The inherent weakness of any portable device is its isolation from a constant power source, such as electricity. Thus, battery technology has evolved alongside the iPod and laptop computer. But batteries themselves are inefficient, because they either deplete themselves, or in the case of rechargeables, require electricity supplied from a power grid. But what if you could harness the energy produced by the natural motion of the human body? Bionic Power [2] is

endeavoring to accomplish that with its "Biomechanical Energy Harvester [3]."

The concept of biomechanical energy is nothing new. The idea dates back to bicycle generators, which have existed for over a century. It's the most fundamental of notions to turn the normally wasted electrical output of the human body into useable energy. Bionic Power is attempting to streamline this old concept into something small, lightweight, and efficient. They discovered that the most productive energy-harvesting site for walking is the knee joint. Thus, the Biomechanical Energy Harvester resembles a knee brace in appearance. It takes advantage of the leg's "negative" motion, or the "braking" phase of the leg's swing. According to Arthur Kuo, an associate professor of mechanical engineering at U-M, "The wearable mechanism works much like regenerative braking charges a battery in some hybrid vehicles."

Depending on terrain, speed, and intensity of motion, the human body generates anywhere from 3-7 w per step. The Energy Harvester is capable of receiving up to 7 w, which is then stored in a battery. The user would attach his own battery, depending on the voltage requirements. When you consider the device's practicality, you need to analyze its specs. The device weighs about three pounds (no small number for the knee joint), and a battery would increase that amount. The Energy Harvester is being marketed heavily for military application, but its design may prohibit its practical usage. Three pounds alone won't break the back of your average soldier (especially if it could eliminate heavier, bulkier electrical devices), but its knee-brace design is problematic. Soldiers wear knee pads into the field for obvious reasons. The extra weight, even three pounds, could put tremendous strain on their kneecaps.

At present, Bionic Power is trying to produce a prototype that meets mil-specs. They're trying to make it lighter still and more efficient. Ultimately, the Energy Harvester may find a niche market- the have-it-all electronic gizmo crowd. Fitness buffs may find the additional weight beneficial, and public figures may wish to be seen with it. But it's doubtful that Bionic Power will sell its idea to the military, a lucrative client for electronics manufacturers.

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