Backpack Creates Electric Power as You Walk

Experimental Device Uses Human Movement to Generate Electricity for Portable Equipment

Sept. 8, 2005 - A backpack that generates electricity from the up-and-down motion people make as they move may soon give new meaning to the words "power walking."

Researchers say the new backpack may one day eliminate the need for carrying heavy replacement batteries to power cell phones, laptops, or other portable electronics.

"The Suspended-load Backpack could help anyone with a need for power on the go, including researchers, soldiers, disaster relief workers or someone just looking to keep a mobile phone charged during a long trek," says researcher Larry Rome, a professor of biology at Penn State, in a news release.

The backpack works by converting the mechanical energy generated by the vertical movement of the cargo in the backpack into electricity during normal walking. A cargo weight of about 80 pounds produces enough electricity to power several portable electronic devices at once.

Putting the Power Into Walking

Although great strides have been made in developing portable electronics in the last decade, researchers say no significant advances have been made in creating portable and renewable sources of electricity to power them.

The limited energy and large weight of the batteries create significant problems for people with high electricity demands in remote areas, such as scientists or relief workers, who often must carry heavy batteries in addition to the other necessary supplies in their backpacks.

To solve this problem, researchers created a suspended-load backpack that exploits the weight of the backpack to generate electricity. They describe the technology behind the device in the Sept. 9 issue of Science.

The weight of the cargo is suspended in the backpack and generates electricity from the natural up-and-down movement of walking.

"As humans walk, they vault over their extended leg, causing the hip to rise 5-7 centimeters on each step."
Since the backpack is connected to the hip, it must be lifted 5-7 centimeters," says Rome. "It is this vertical movement of the backpack that ultimately powers electricity generation."

The vertical movement of the cargo compartment turns a gear connected to a generator at the top of the backpack. In experiments, people carrying a cargo weight of 44 to 84 pounds generated up to 7.4 watts of electricity, which is enough to simultaneously power an MP3 player, a PDA, night vision goggles, a handheld GPS device, image decoder, and Bluetooth at once.

"The need for electronic devices in remote areas is an increasing reality these days," says Rome. "Throughout history, humans have solved many problems by inventing passive devices to enhance the movements made by their muscles, such as springy bamboo poles to carry loads and skis to move through snow.

"The Suspended-load Backpack represents another passive device that may help solve a growing problem in the 21st century."

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