Something old is new again: Ancient Chinese once used springy bamboo shoulder poles to transport heavy loads. Now, a researcher has designed a springy backpack that generates electrical energy through walking, eliminating the need to carry heavy batteries. Such a portable, efficient power source could be especially helpful to soldiers, scientists, or relief workers operating in remote areas.

Walking involves a lot of mechanical energy. From one step to the next, each hip, for example, rises and falls about 4 to 7 centimeters. Strap on a heavy pack, and even more energy is involved--a lot of it wasted. With a rigid pack, there's no way to access it, says muscle physiologist Lawrence Rome of the University of Pennsylvania in Philadelphia. So Rome created a suspended-load backpack that taps into this vertical movement.

Rome's pack uses springs to suspend the load from a fixed frame, allowing it to ride up and down freely during walking. As the pack bounces, it periodically runs a toothed rack across a gear attached to small generator on the fixed frame (see picture), thus converting the mechanical energy of walking into electrical energy.

A 38-kilogram pack can generate a maximum of about 7 watts, if the walker hustles, Rome says. At the more moderate pace of 5.5 kilometers per hour, a 29-kilogram load can generate about 4 watts, more than enough to operate a number of small portable devices at once, such as a cell phone, handheld GPS, PDA, and even night vision goggles, Rome and colleagues report 9 September in Science [1].

"It's a clever way to have power on the fly," says integrative physiologist Rodger Kram of the University of Colorado at Boulder. An added feature of the suspended-load backpack is that it doesn't just generate power--it also appears to more than double the metabolic efficiency of carrying any load, Kram notes. "So it may just be a better backpack."
Related sites

Video of the backpack in action (15 MB mpg file, works in RealOne Player) [2]
Lawrence Rome's Web site [3]

Links: