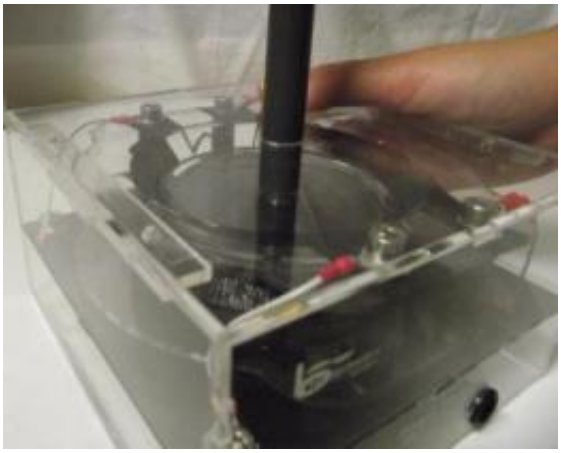
Replacing batteries may become a thing of the past, thanks to 'soft generators'

April 6 2011



This image shows a hand-pumped soft generator the researchers are using to demonstrate it. Credit: N/A

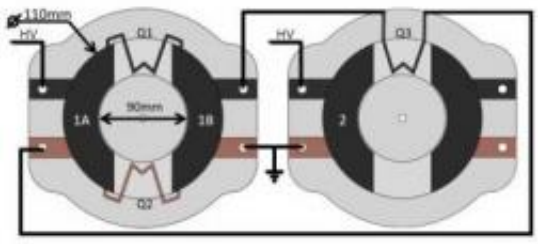
Battery technology hasn't kept pace with advancements in portable electronics, but the race is on to fix this. One revolutionary concept being pursued by a team of researchers in New Zealand involves creating "wearable energy harvesters" capable of converting movement from humans or found in nature into battery power.

A class of variable capacitor generators known as "dielectric elastomer generators" (DEGs) shows great potential for wearable energy harvesting. In fact, researchers at the Auckland Bioengineering Institute's Biomimetics Lab believe DEGs may enable light, soft, form-

fitting, silent energy harvesters with excellent mechanical properties that match human muscle. They describe their findings in the American Institute of Physics' journal Applied Physics Letters.

"Imagine soft generators that produce energy by flexing and stretching as they ride ocean waves or sway in the breeze like a tree," says Thomas McKay, a Ph.D. candidate working on soft generator research at the Biomimetics Lab. "We've developed a low-cost power generator with an unprecedented combination of softness, flexibility, and low mass. These characteristics provide an opportunity to harvest energy from environmental sources with much greater simplicity than previously possible."

Dielectric elastomers, often referred to as artificial muscles, are stretchy materials that are capable of producing energy when deformed. In the past, artificial muscle generators required bulky, rigid, and expensive external electronics.



This is a schematic of the physical layout of the soft generator. Credit: N/A

"Our team eliminated the need for this external circuitry by integrating

flexible electronics—dielectric elastomer switches—directly onto the artificial muscles themselves. One of the most exciting features of the generator is that it's so simple; it simply consists of rubber membranes and carbon grease mounted in a frame," McKay explains.

McKay and his colleagues at the Biomimetics Lab are working to create soft dexterous machines that comfortably interface with living creatures and nature in general. The soft generator is another step toward fully soft devices; it could potentially be unnoticeably incorporated into clothing and harvest electricity from human movement. When this happens, worrying about the battery powering your cell phone or other portable electronics dying on you will become a thing of the past. And as an added bonus, this should help keep batteries out of landfills.

Provided by American Institute of Physics