

# Powering pacemakers with heartbeat vibrations

February 1 2012

---

Sick hearts may help to keep themselves beating longer with a device that could harvest energy from heartbeat-induced chest cavity vibrations.

Though pacemakers require only small amounts of energy (about 1 millionth of a Watt), their batteries have to be replaced periodically, which means multiple surgeries for patients. Researchers have searched for ways to prolong [battery life](#) – trying to generate energy to power a [pacemaker](#) using blood sugar, or the motion of the hands and legs – but these methods either interfere with metabolism or require a more drastic surgery, such as passing a wire from the limbs to the chest area.

Aerospace engineers from the University of Michigan in Ann Arbor have developed a prototype device that could power a pacemaker using a source that is surprisingly close to the heart of the matter: vibrations in the chest cavity that are due mainly to heartbeats.

The authors describe the technique and their progress developing it in a paper recently published in the AIP's *Applied Physics Letters*. In their method, vibrations in the [chest cavity](#) deform a layer of piezoelectric material, which is able to convert mechanical stress into electrical current. Tests indicate that the device could perform at heart rates from 7 to 700 beats per minute (well below and above the normal range), and that it could deliver eight times the energy required for a pacemaker. Furthermore, the authors write, the amount of energy generated is always larger than the amount required to run a pacemaker, regardless of heart rate. Though the team has yet to develop a prototype that is biocompatible, they say that the potential to package this energy

harvester with pacemakers gives it an advantage over competing methods.

**More information:** "Powering Pacemakers from Heartbeat Vibrations Using Linear and Nonlinear Energy Harvesters" is published in *Applied Physics Letters*.

Provided by American Institute of Physics

Citation: Powering pacemakers with heartbeat vibrations (2012, February 1) retrieved 2 May 2024 from <https://phys.org/news/2012-02-powering-pacemakers-heartbeat-vibrations.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--