

Energy Harvesting and Potential

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Energy can be harvested from many ambient sources with the most abundant being solar radiation. Other forms of ambient energy and particularly those found in the human body are thermoelectric, photovoltaic, electrostatic, and electromagnetic energy.

Thermoelectric is currently the most abundant source in the human body that is guaranteed. The heat transfer from a position of hot mass to a position of cooler mass is how thermoelectricity can be created. The human head has the majority of heat escaping which also means that it is the best location for devices to create energy.

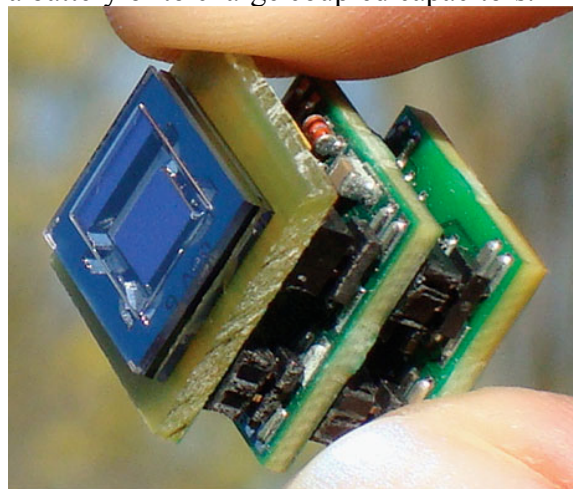
Photovoltaic energy can come from a variety of sources and even those that are invisible to us. Artificial light is a great source for energy but not as explosive as solar radiation for powering devices. Current devices are generally made from silicon and doped with a variety of exotic materials.

Electrostatic energy is incredibly abundant in our atmosphere but hard to gather in the human body. Although contact with objects has the possibility of generating large amounts of electrostatic current to quickly charge or power a device.

Electromagnetics are where a motor or device is used to power a device and generally requires close proximity to generate or transfer energy. Making use of devices such as mass drivers and piezoelectric motors, electromagnetics are becoming more feasible to generate usable energy for small implantable devices.

Currently our society has a variety of sources that generate ambient energy that isn't guaranteed but can still generate energy over time. Radio towers, cell phone towers, and television stations produce massive amounts of energy so that everyone within the proximity can use it.

Currently there are devices being made to use some of these techniques to power devices and remove that battery life from them. The majority of these devices are being made for the military to listen and transmit data every few minutes. Two of the more popular methods are using radioisotopes and vibrations to either charge a battery or to charge coupled capacitors.



There are many challenges that come from creating devices to run on ambient or local energy sources. Hopefully in the future devices will become smaller, and energy farming will become more efficient. Piezoelectric devices may eventually be able to tune to the most powerful frequency. High energy electromagnetic radiation may become more readily available. Some day we may no longer have a need for batteries.

Works Cited:

Sandra Upson "Putting wireless power to work", June 2008, IEEE Spectrum, <http://spectrum.ieee.org/energy/renewables/putting-wireless-power-to-work>
Sally Adee "Wireless Sensors that live forever", February 2010, IEEE Spectrum, <http://spectrum.ieee.org/semiconductors/devices/wireless-sensors-that-live-forever>