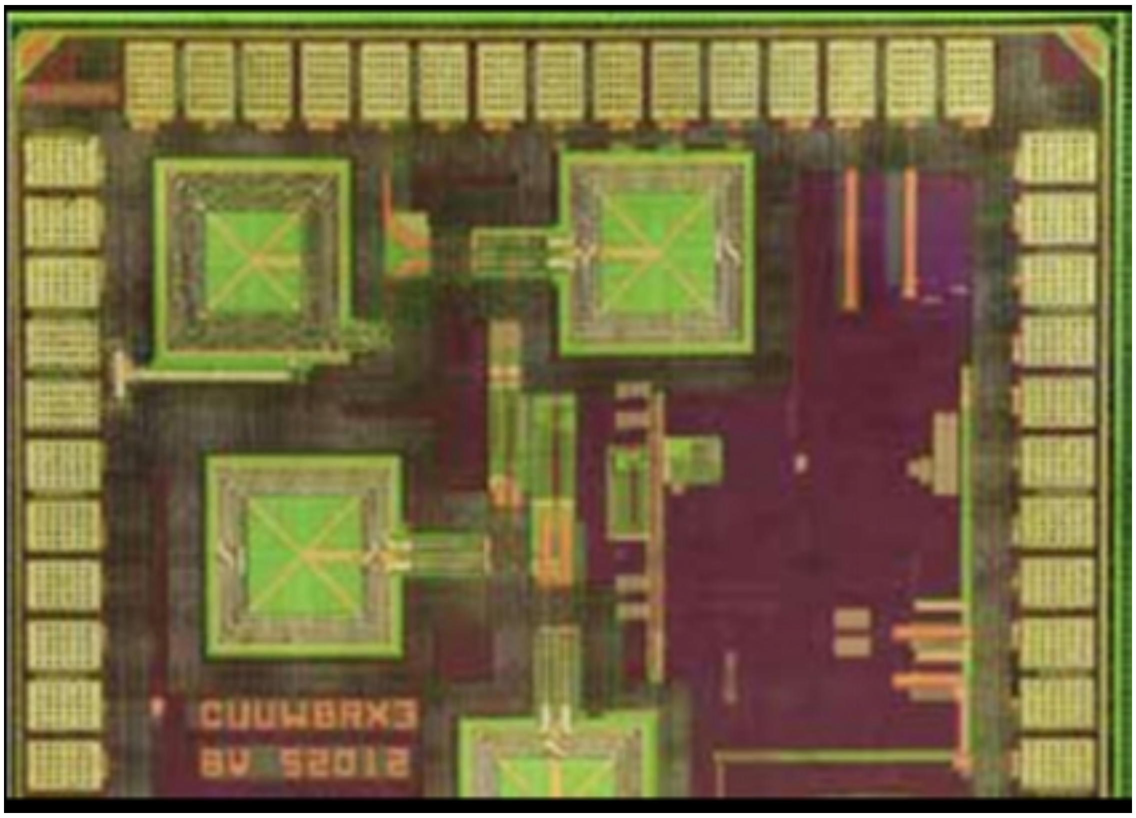
Self-powered electronics architecture touted by researchers

PORTLAND, Ore.--A new electronics architecture developed by researchers at Columbia University promises to cut power consumption of sensors by 100 times using daisy-chained intermittent operation, enabling future sensors to cut the power cord for monitoring vital signs, weather patterns and energy consumption, among other applications.

Self-powered electronics eliminates the need for batteries and the maintenance headaches of keeping sensors and other remote monitoring facilities online 24/7 year-in and year-out, according to the Columbia researchers that worked on the projection.

"Power consumption becomes very low as you pack more functionality into smaller spaces," said Peter Kinget, a professor at Columbia. "But nanoscale transistors are not as reliable and cannot sustain as large signal levels, requiring new design concepts."



Columbia University demonstration chip shows that by cutting power 100-times plus communicating only when necessary, ambient light can power battery-free standalone self-powered sensors.

Source: Columbia

Using daisy-chained intermittent operation--instead of always-on transmission--can enable many types of sensors to dramatically reduce power consumption while still providing the data needed to make them useful. Such applications include smart clothing that monitors vital signs and transmits a wearer's location during emergencies, sensors that monitor energy consumption from inside walls of new buildings, or sensors dropped from planes to collect and transmit data about weather patterns in remote regions.

The Columbia architecture chosen by Kinget uses tiny amounts of ambient light to generate nano-amps of current on-chip to power sensors that intermittently sample their environment whenever they have stored up enough energy to take a reading. Then instead of powering up a long-range wireless receiver, the device queries its environment to find its closest neighboring sensor, to which it sends it reading daisy-chain style for communication from node to node. Finally, since reliability cannot be guaranteed from such tiny devices, an algorithm is used to average multiple readings to achieve any desired level of accuracy.

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