

Electricity Harvested from Radio Waves Could Power the Smart Home of the Future

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Freevolt harvests waste energy from radio waves to power devices Photo: (c) John Rensten

By Sophie Curtis

Freevolt, a new technology that harvests electricity from disused radio waves, could be used to power wearables, sensors and beacons

A new method of harvesting electricity from unused radio frequency waves has been unveiled today by Lord Paul Drayson, the former minister for science and chief executive of Drayson Technologies, at The Royal Institution in London.

The patented technology, known as [Freevolt](#), turns ambient radio frequency waves into usable electricity to charge low-power electronic devices, such as sensors and beacons used in smart connected homes, [wearable devices](#) like the Fitbit or Jawbone UP, and the broader “[internet of things](#)”.

[Lord Drayson](#), who served as science minister between 2008 and 2010, said that companies have been trying to work out how to harvest energy from WiFi, cellular and broadband networks for many years, but radio waves only provide a small amount of energy, so it is difficult to achieve a high enough level of efficiency.

The Freevolt harvester uses a multi-band antenna to harvest energy from multiple radio frequency sources at different frequencies and at almost any orientation at the same time, increasing the amount of energy that Freevolt can produce.

“It is the nature of broadcast transmissions that, when you broadcast, only some of the energy is received and used. The energy that is not received goes to waste. It’s only nanowatts of energy, but the energy is everywhere,” said Lord Drayson.



Freevolt-powered devices

“What we’re doing is using that fact to power very small low-energy devices. The radio frequency transmissions come from wireless networks, and as our hunger for information goes up, the amount of data that we want to transmit is going up exponentially, and therefore this is growing all the time.”

The output from the Freevolt system can feed into many energy storage devices – which today for the majority of electronic devices is a battery, but in the future could include other options such as a super-capacitor.

The first commercial application of Freevolt technology is the CleanSpace Tag air sensor, which monitors air pollution (carbon monoxide) and feeds this data back to a smartphone app, allowing users to see exactly what they are breathing, wherever they are.

The data can also be anonymised and merged with current air pollution data from static sensors installed around the UK, to create a detailed map of air quality all over the country, and identify the cleanest routes and areas available.

“Recent news reinforces what many of us have been saying for a long time – air pollution is a critical concern to every individual’s health. Now, more than ever, people want to understand the state of the air around them,” said Lord Drayson.

“Information on air pollution is available, but many people don’t know how to access or use it. People are demanding more immediate and localised data on the quality of air that surrounds them. They will trust information that they collect and interpret themselves; this is what CleanSpace, and the CleanSpace Tag, provides them.”



Cleanspace Tag and app

Cleanspace is currently being manufactured in the UK and is available for purchase for £65 through the [Crowdfunder website](#). This includes a £5 donation to a CleanSpace charity partner – British Lung Foundation, EarthWatch or Sustrans.

However, Drayson Technologies does not intend to keep Freevolt to itself. The technology is available for licence globally from today, and a developer competition will follow shortly, giving other companies the opportunity to incorporate it into their products.

The launch of Freevolt was attended by senior figures from Vodafone, Hailo, Apple and Morgan Stanley, among others, suggesting that some of the world's biggest companies recognise the potential of the technology.

While the Cleanspace Tag is about the size of a smartphone, Lord Drayson said the technology could be made big enough to cover an entire wall in a house, or small enough to fit into a wristband or be integrated into fabrics – although the bigger the rectifier, the more energy it can harvest.

“You could have a smart label in your jacket powered by Freevolt, and a wearable device in the collar that is measuring biometric signals – these are all things that require small amounts of power,” said Lord Drayson.

“As electronic circuits are becoming more and more efficient all the time, the amount of power that they need to work is going down, so the sweet spot for us gets bigger.”
