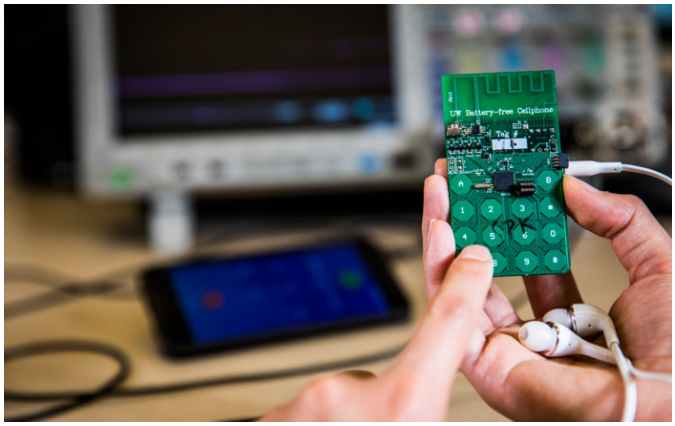
Written by Marco Attard
14. July 2017

University of Washington researchers present a world first-- a mobile phone that needs no battery to make calls, since it uses so little power it runs on a "few microwatts" harvested from ambient radio signals or light.



In fact, the phone needs just 3.5 microwatts for continuous operation, and makes both regular and Skype calls. The prototype shown by the researchers is built using off-the-shelf components, receives and transmits speech, and communicates with a base station. To achieve such power savings, the team eliminated the need to convert the analog signals making sound into digital data. Instead, the battery-free phone uses the vibrations in a microphone or speaker caused when the user speaks into a phone or listens to a call.

Even the antenna uses no almost no power, since it converts vibrations into changes in standard analog radio signals emitted by a cellular base station, encoding speech patterns into reflected radio signals. To transmit speech, the phone uses vibrations from the microphone to encode speech patterns in the reflected signals. To receive speech, it converts encoded radio signals into sound vibrations picked up by the speaker.

However, the transmission and receiving of radio signals requires a custom base station-- even if such technology should be easy to integrate into standard network infrastructure or wifi routers.

“You could imagine in the future that all cell towers or wifi routers could come with our base station technology embedded in it,” team member Vamsi Talla says. “And if every house has a wifi router in it, you could get battery-free cellphone coverage everywhere.”

As mentioned earlier, the battery-free phone still needs some power to run. The researchers built prototypes using two energy sources, one harvesting ambient radio signals transmitted by the base station, the other carries a tiny solar cell the size of a grain of rice. Other battery-free forms of power can be implemented, such as ambient temperature or an accelerometer.

The next step for the research team is to improve the operation range of the battery-phone, which currently stands at around 15m. They are also looking into conversation encryption, and even video streaming via a low-power eInk display.

Go First Battery-Free Cellphone Makes Calls by Harvesting Ambient Power