

# Energy-harvesting phone works without battery

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(Tech Xplore)—What would you say to a cell phone that works without a battery? A barest-bone keypad and LD light as quite unsnazzy components? If you cannot live without showy capabilities of

smartphones then you might have a good laugh—or consider this a step in a direction of further research you don't want to miss.

Researchers from the University of Washington showed one can work a phone without batteries in their device minus any bells or whistles. Their feat: "the team was able to successfully demonstrate a voice call from a battery-less phone to an Android smartphone," said *IFLScience*.

Their success was explained by Mark Harris, writing in *Wired*.

"HELLO, HELLO. I am calling from a battery-free phone.' Vamsi Talla's words in a cluttered lab at the University of [Washington](#) in Seattle are barely audible through pops and static. But the fact they can be heard at all, on a nearby Android smartphone, is revolutionary, because Talla's own cell phone has no battery at all."

As *Wired* said, this phone has a basic touch-sensitive number pad. Display? A little red LED that glows briefly when a key is pressed."

This device is still in its infant stages. *IFLScience*'s Alfredo Carpineti wrote, "The team is now working to improve the call quality and how the call happens. Currently, it works like a walky-talky, so you [press](#) a button to switch from speaking to listening. The team is also considering an e-ink display to send texts and possibly even a camera."

That sounds like an interesting future step. But how did they do it? How does the battery-free phone harvest energy?

Fundamentally, the team is using backscatter as a technique. A University of Washington news item earlier this year described it as an "approach that harvests ambient wireless signals to enable devices to communicate without draining battery [power](#)."

Carpineti said, "It basically uses the radio waves that already move

around us to communicate."

Harris said it allows a device to communicate by reflecting incoming radio waves, "a bit like an injured hiker sending an SOS using the sun and a [mirror](#)."

He said they reinvented "analog backscatter technology, which was last employed in spy kits during the Cold War. The battery-free cell phone sends digital signals when numbers are inputted in the keypad and then moves to completely analog for the voice transmission."

He said the signal "moves over an unlicensed frequency to a [base station](#) that connects to the digital cellular network via Skype." The station connects the cell phone to the network, and delivers the power to make it work.

(The prototype base station uses an unlicensed frequency, limited to low-power transmissions, said Harris. The phone relies on the signals for its energy harvesting. It has a range of 15 meters from the base station.)

For those interested in reading more about explorations into powering devices, check out the "Ambient Backscatter" discussion on the University of Washington site. "As computing devices become smaller and more numerous, powering them becomes more difficult; wires are often not feasible, and batteries add [weight](#), bulk, cost, and require recharging/replacement that is impractical at large scales. Ambient backscatter communication solves this problem by leveraging existing TV and cellular transmissions, rather than generating their own [radio waves](#)."

In the bigger picture *PhoneArena* looked at their work and where it may lead.

"The basic premise that a [phone](#) has to have a battery, and has to be charged on a regular basis, stays as valid as it was a few decades ago. There are efforts to escape that [paradigm](#), though, and a recent invention of a [cell phone](#) that can make calls without a battery, is an encouraging sign."

This would not be the first time Talla made news in exploring ways to harvest energy. In 2015, researchers published an online paper showing how [they harvested energy from Wi-Fi signals to power a simple](#) temperature sensor, a low-resolution grayscale camera and a charger for a Jawbone activity tracking bracelet. Talla was the lead author.

The UW team found that the peak energy in untapped, ambient Wi-Fi signals often came close to meeting the operating requirements for some low-power devices. The team optimized a router to send out superfluous "power packets" on Wi-Fi channels not currently in use.

Earlier this year, Talla was in the news; this time the University of Washington reported that Jeeva Wireless, a UW spinoff, raised money to commercialize a line of research based on backscatter.

Jeeva Wireless was co-founded by Vamsi Talla. "Relevant projects include [Passive Wi-Fi](#), a system that is capable of generating Wi-Fi transmissions using 10,000 times less power than conventional methods, and Interscatter, which enables implanted medical devices to communicate using Wi-Fi."

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