



Your Smartphone Could Soon Listen for Sleep Disorders

Researchers say they've come up with an accurate, simple way to monitor breathing while you sleep, no wearables required.

By Rachel Metz on December 12, 2014

Researchers are working on a more convenient way to track your breathing while you sleep: by putting a microphone-equipped pair of earphones and a smartphone on your bedside table. The technology could make tracking sleep disorders easier than visiting a sleep lab.

A team at Stevens Institute of Technology and Florida State University conducted a six-month study in which earbuds that included an in-line microphone were plugged into an iPhone that recorded sounds as six people slept. The researchers say that even with the earphones placed on a table next to the bed, they were able to use the microphone to monitor participants' breathing to within half a breath per minute of what could be recorded with a chest-worn respiration monitor and a microphone clipped to participants' collars.

[Yingying Chen](#), an associate professor at Stevens, says researchers plan to release a smartphone app related to their work next year.

Such an app could make it easier and cheaper to accurately keep tabs on the quality of your sleep than sensor-laden [wristbands](#) or devices that sit [on](#) or [beneath](#) the mattress. Despite immense growth in the capabilities and sheer number of consumer-gearable wearable activity trackers, they can be uncomfortable to wear or use, and accuracy varies.

Chen also hopes the work can help diagnose health problems like sleep apnea. Typically, such problems are studied at hospitals, where sensors are attached to a patient's body and snoozing is monitored by medical professionals. Chen contends that it can be hard for doctors to capture irregular patterns in this kind of setting.

In their study, researchers tested the sensitivity of the microphone on the earbuds for recording breathing rate, and also modified the earbuds to act as additional microphones that recorded in mono and stereo. The researchers filtered out ambient noise to focus on breathing and other actions that occurred during sleep, like snoring and coughing.

While the breathing rate was measured most accurately when the earphone was worn or kept next to a participant's pillow and multiple microphones were used, the study also shows it worked well with just the unmodified earphones on a bedside table.

[Andrew Campbell](#), a computer science professor at Dartmouth College who co-directs the [Dartmouth Networking and Ubiquitous Systems Laboratory](#), says the work is "very cool" but points out it could be difficult to measure respiratory signals if more than one person is sleeping in the same bed.

This problem could be overcome because many phones are now built with several microphones to aid in noise cancellation. "Ultimately if the microphone on the phone could evolve to do this sensing without the earbud, that would be great," he says.

A paper on the technology will be presented at the [IEEE Infocom conference](#) in April.

WHY IT MATTERS

More than 40 million people in the United States suffer from a chronic sleep disorder.