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A Breath Test for Monitoring Glucose Levels

This e-nose can detect glucose levels with 90 percent accuracy

BY MICHELLE HAMPSON

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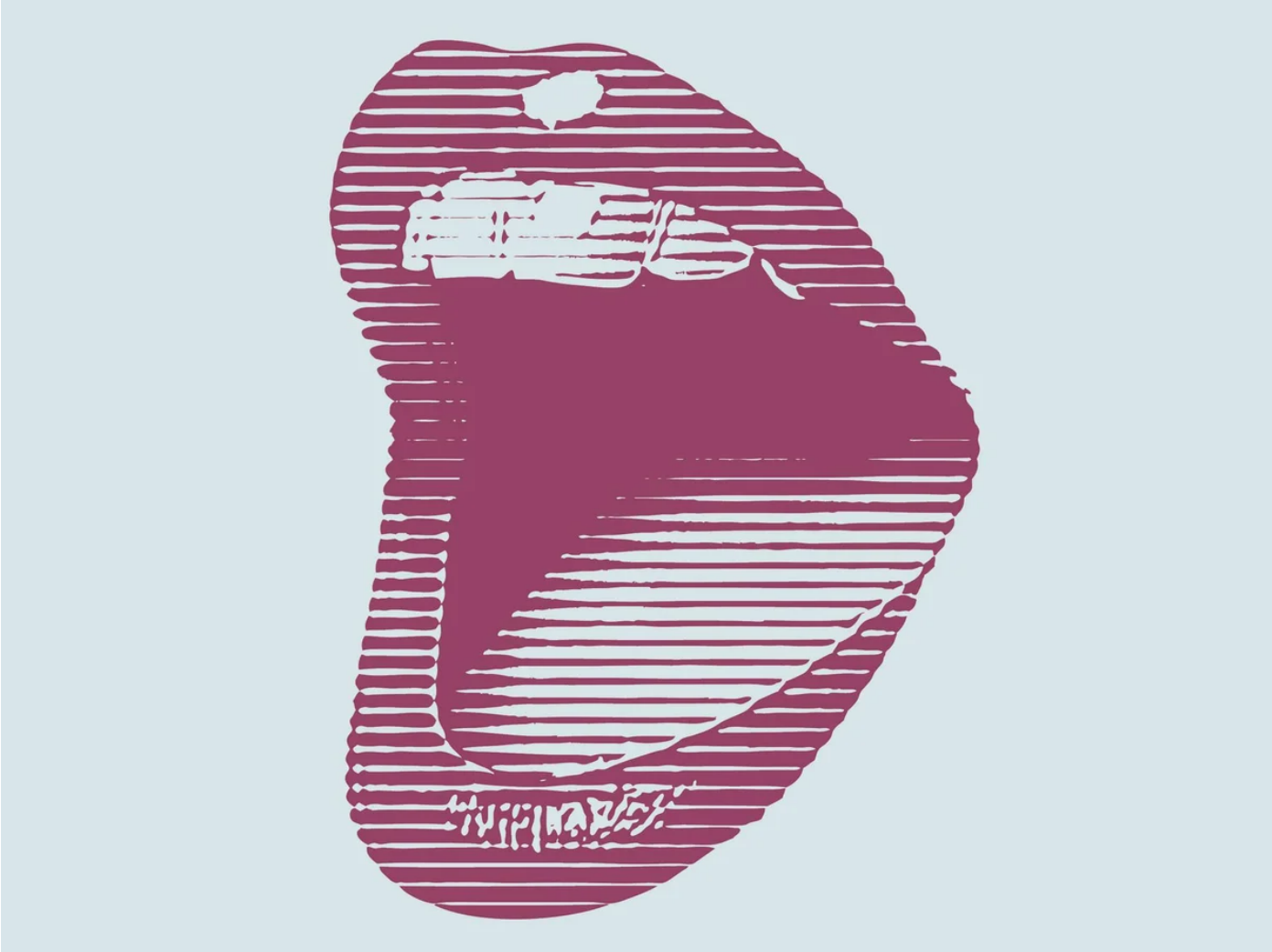

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Diabetes is a very common condition affecting roughly 10 percent of the U.S. population—and, according to the World Health Organization, there are 422 million people living with diabetes around the world. To manage the disease, people must test their blood glucose levels several times a day, which often involves finger pricks and can be burdensome and painful.

In recent years, some noninvasive, wearable devices for measuring glucose have hit the market, but these devices are typically expensive and still depend on direct sampling and interaction with blood. However, a newly designed e-nose that can measure glucose levels based on a person's breath could offer people with diabetes a different noninvasive and low-cost solution. The e-nose is described in a study published 7 June in *IEEE Sensors Journal*.

E-noses are devices that detect and analyze chemicals in the air in real time, determining the nature of the substance at hand. They are being designed for a wide range of tasks, including sniffing out good whiskey, monitoring crops, and detecting lung cancer.

Qiliang Li is a Professor in the Department of Electrical and Computer Engineering at George Mason University who's been interested in developing similar technology for measuring glucose levels on a person's breath. Although glucose isn't exhaled in breath, the concentration of acetone and other ketones in the exhaled breath is associated with human metabolic conditions, including diabetes.

ABOUT THE AUTHOR

Michelle Hampson is a freelance writer based in Halifax. See full bio →

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Michael Wolfe IEEE LIFE MEMBER

Back in the '90s, the London Economist announced a new glucose sensor that did not require blood or strips. The patients placed their arm on the device and it detected their blood sugar. The 'inventor' was a great salesperson, and convinced the Economist that many of these would be purchased by the NHS since they saved the cost of strips, which are expensive, and patients were more willing to test their blood. Of course, it turned out to be a scam. The measurements were random, and had no correspondence with the actual blood sugar level.
It will be interesting to find out if this is another scam or a major advance in blood glucose mensuration.

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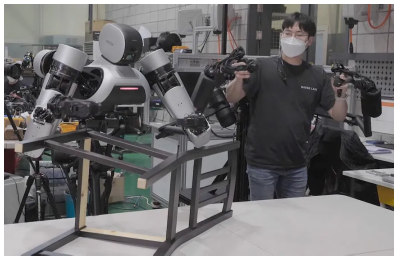

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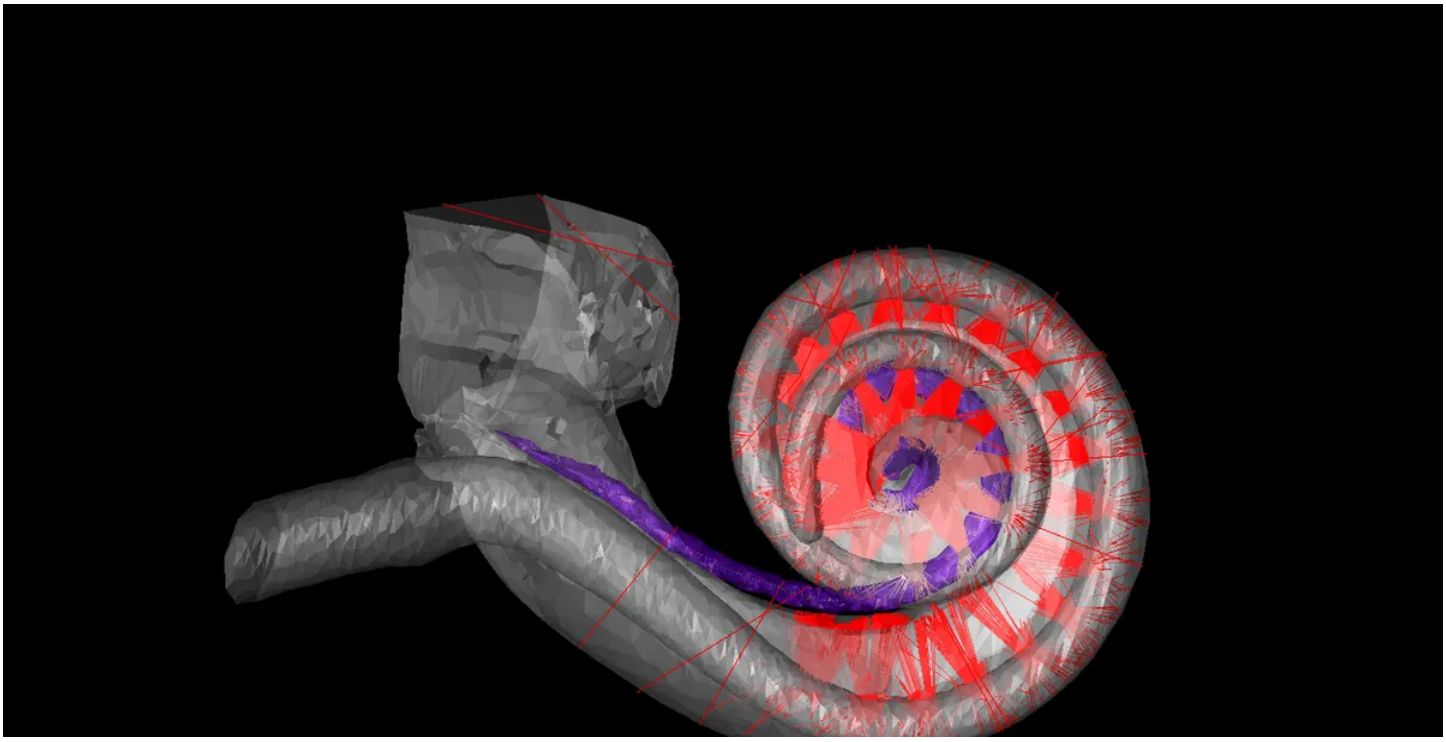

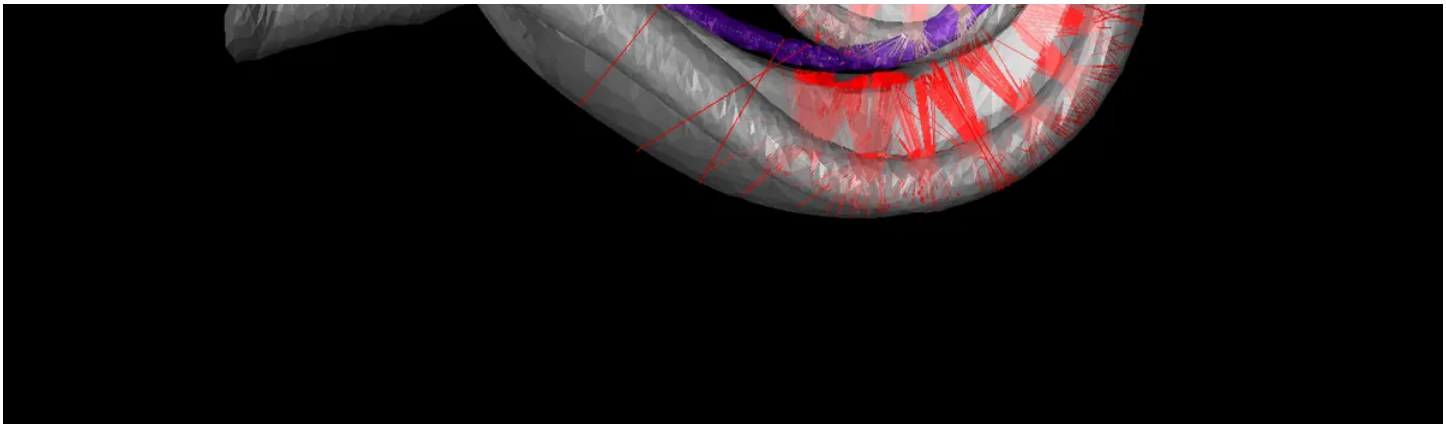

Human hearing depends on the cochlea, a snail-shaped structure in the inner ear. A new kind of cochlear implant for people with disabling hearing loss would use beams of light to stimulate the cochlear nerve. LAKSHAY KHURANA AND DANIEL KEPPELER

There's a popular misconception that cochlear implants restore natural hearing. In fact, these marvels of engineering give people a new kind of "electric hearing" that they must learn how to use.

Natural hearing results from vibrations hitting tiny structures called hair cells within the cochlea in the inner ear. A cochlear implant bypasses the damaged or dysfunctional parts of the ear and uses electrodes to directly stimulate the cochlear nerve, which sends signals to the brain. When my hearing-impaired patients have their cochlear implants turned on for the first time, they often report that voices sound flat and robotic and that background noises blur together and drown out voices. Although users can have many sessions with technicians to "tune" and adjust their implants' settings to make sounds more pleasant and helpful, there's a limit to what can be achieved with today's technology.

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