

Learn something new every day | Subscribe and treat yourself to a FREE gift

THIS WEEK 4 April 2018

Mind-reading headset lets you Google just with your thoughts

A mind-reading device can answer questions in your head. It works by picking up signals sent from your brain when you think about saying something



Arnav Kapur models the AlterEgo device he co-created
Lorrie LeJeune, MIT

By **Chelsea Whyte**

SILENTLY think of a question and I will answer it. That might sound like a magic trick, but it is the promise of AlterEgo, a headset that lets you speak to a computer without ever uttering a sound. It's not quite a mind reader, but it is close.

The device brings us a step closer to a world where we can interact seamlessly with

machines using only our thoughts. AlterEgo's creators believe that rather than embarrassingly saying things like "OK Google" or "Hey Siri" and then dictating an email or ordering a pizza, eventually we will just think it instead. AlterEgo is far from perfect, but shows what may one day be possible.

When you think about speaking, your brain sends signals to the muscles in your face, even if you don't say anything aloud. The current AlterEgo prototype (pictured above) has a hook that slips over the right ear and sensors placed at seven key areas on the cheeks, jaw and chin. The sensors can eavesdrop on these speech-related signals, before artificial intelligence algorithms decipher their meaning. The device can currently recognise digits 0 to 9 and about a hundred words.

AlterEgo is directly linked to a program that can query Google and then speak the answers back via built-in bone conduction headphones, which transmit the sound in a way that nobody else can hear. This means that the wearer can gain access to the world's biggest information source using only their mind. "It gives you superpowers," says Arnav Kapur, who created the device with Pattie Maes at the Massachusetts Institute of Technology Media Lab.



Soon, just thinking "Netflix" might be enough to bring your TV to life
Nino Mascardi/Getty

Testing it out

"Go ahead. Ask me something," says Kapur, as I sit with him for a demonstration.

I ask him to tell me the time in Wellington, New Zealand. I can tell he's concentrating. His face goes blank and his eyes focus. Very slowly, a computer screen displays what AlterEgo thinks he is thinking. The words "Wellington" and

then “New Zealand” appear. I don’t hear it, but AlterEgo whispers something to Kapur. He then looks up and says “9.48 am”. He’s right.

I ask him the population of Santiago, Chile; the square root of 360005 and the product of 7589 and 4523. His answers are correct each time, although they come haltingly. He reads out each digit with a beat in between, because that is how AlterEgo is feeding the information to him. It feels a bit like magic as he retrieves answer after answer, as if his brain has had a superhuman upgrade.

Kapur says it is like having a conversation with a smarter version of yourself, “and this second self of yours is really good at maths”.

However, it isn’t a perfect system. The questions I asked had to be centred around a predefined list of cities and basic arithmetic. And Kapur had to pause silently before thinking each question so the device didn’t get confused by our actual conversations. Still, it is incredible, and a little creepy.

Kapur and Maes believe that the more AlterEgo is used, the more accurate it will become. In an eight-person user study, AlterEgo recognised words and digits with around 90 per cent accuracy.



It isn’t the only device that is getting close to reading minds. James Gilbert at the University of Hull in the UK is working on one for people who have difficulty speaking. His prototype is for people who have lost their larynx because of cancer and is more accurate than AlterEgo. But it relies on magnets implanted in a person’s lips and tongue, so it is unlikely to be used outside a medical setting.

Other devices exist that feature obtrusive caps with electrodes to pick up brain signals. “Some of these things that previous groups have done look more like torture instruments than a consumer product,” says Gilbert.

The technology can't yet read someone's innermost thoughts. Even getting AlterEgo to recognise very deliberate internal speech was an uphill battle. Users had to train with the device for around 31 hours, learning to think in just the right way. This training also taught the algorithms underpinning the device to recognise different users' particular patterns of muscle activation.

More sophisticated devices that can better decipher thoughts may not be that far off. Both Facebook and Neuralink, Elon Musk's brain science venture, are attempting to build brain-computer interfaces that can turn thoughts into text by intercepting brain signals, rather than nerve signals. It isn't clear if there will be a way to choose the thoughts you share and those you would rather keep private.

Howard Chizeck at the University of Washington in Seattle says there are a few potential privacy issues, such as advertisers using your innermost feelings to market products or services to you. He also worries about the potential for governments to use your private thoughts against you in a court, superseding the fundamental right not to testify against yourself.

“His answers are correct each time. It feels as if his brain has had a superhuman upgrade”

Before I leave, Kapur tells me how he used AlterEgo to win a game of chess. Via his thoughts, he had access to a chess-playing computer program. At each turn, it whispered the best moves into his ear. “I felt so confident, I knew how to play chess so much better,” he says. In the future, maybe we will all have devices whispering into our ears, helping us decide the best moves as we go about our daily lives. As thoughts go, that one is just as exciting as it is terrifying.

This article appeared in print under the headline “Google with your mind”

Magazine issue 3172, published 7 April
2018