

# No need for chip implants, OpenAI CEO wants to read human thoughts using... sound waves.

Merge Labs uses ultrasound to read the brain, a less invasive method than Neuralink, ushering in a new era in the treatment of depression and BCI.

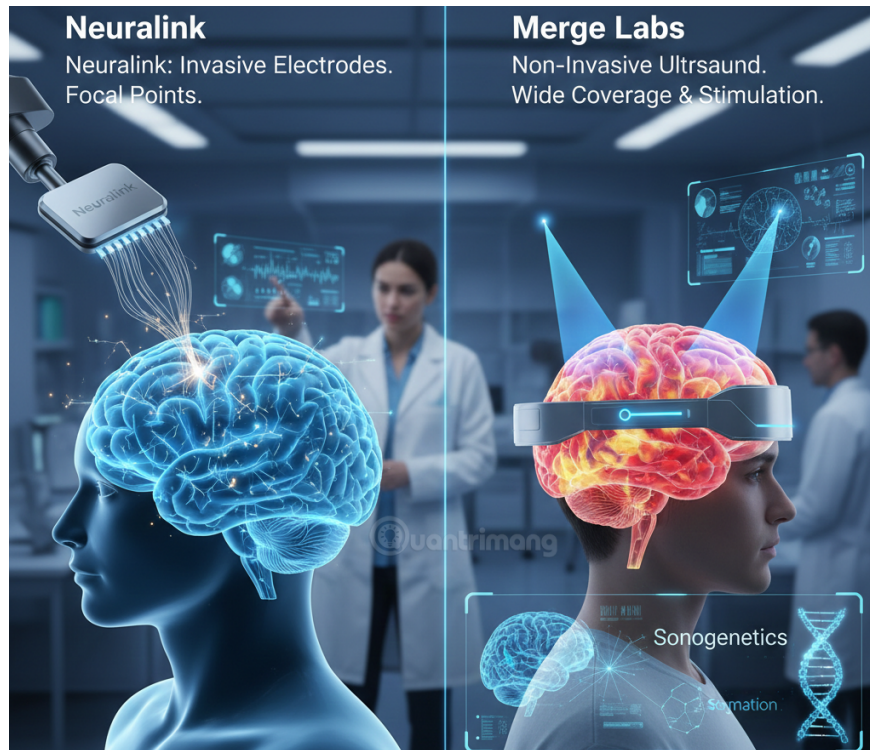
**Backed by OpenAI , startup Merge Labs is ambitious to change the way humans interact with computers. Instead of using invasive electrodes like Neuralink , the company opts for ultrasound to read and regulate brain activity.**

## 1. What is Merge Labs?

Merge Labs is a for-profit research lab that spun off from the non-profit organization **Forest Neurotech . What made this company stand out was its \$252 million** investment , with the involvement of Sam Altman (CEO of OpenAI).

The founding team includes leading experts in **Brain-Computer Interfaces (BCI)** such as Tyson Aflalo, Sumner Norman, and Mikhail Shapiro from the California Institute of Technology (Caltech).

## 2. Ultrasound technology: Minimally invasive but effective over a wide area.



The biggest difference between Merge Labs and Neuralink (Elon Musk's company) lies in their approach:

1. **Neuralink:** Implants electrode fibers deep into brain tissue to measure electrical activity.
2. **Merge Labs:** Uses **high-frequency ultrasound waves** delivered through sensors placed under the skull or through a small "window" in the bone.

According to neurologist Elsa Fouragnan (University of Plymouth), ultrasound waves can cover a large area of the brain and stimulate multiple locations simultaneously. This helps treat complex mental disorders such as depression instead of focusing on a single point.

### 3. Mechanism of Operation: From Images to Neuro-Control



Merge Labs' process is based on two core principles:

### **Blood flow analysis (Functional Ultrasound)**

When neurons are highly active, they require more oxygen, leading to changes in local blood flow. Ultrasound waves analyze the frequency and amplitude of the waves reflected from moving blood cells to create a map of brain activity.

### **Neurostimulation and Sonogenetics**

By focusing multiple ultrasound beams onto a single point, the pressure alters the reaction speed of neurons. Merge Labs is also exploring **sonogenetics** – a genetic engineering technique that helps specific cells respond more sensitively to sound waves.

## **4. Scientific Challenges and Limitations**



Despite its potential, this technology still faces significant hurdles:

1. **Time lag:** Measuring blood flow is an indirect indicator and lags behind the brain's instantaneous electrical activity. This makes real-time communication difficult, such as decoding language.

2. **Surgery is still required:** Although less invasive, this method still requires surgery to place the device under the patient's skull.

## 5. Potential for practical applications

Although still in its early stages, Merge Labs researchers have succeeded in:

1. Decoding the locomotion intentions in primates.
2. Brain activity was detected when people played the guitar or played video games.

In the future, this device could become a versatile treatment method for conditions such as epilepsy, tinnitus, addiction, and eating disorders without the need to place electrodes deep into the brain.

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