

Brain-Computer Interface (BCI)

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Brain-Computer Interface (BCI) Latest News

Researchers at the University of California, San Francisco (UCSF) have developed a stable Brain-Computer Interface (BCI) that allows a paralysed person to control a robotic arm using only their thoughts, over 7 months, with minimal recalibration.

What is a Brain-Computer Interface (BCI)?

- A **Brain-Computer Interface (BCI)** is a system that enables **direct communication between the brain and an external device**, such as a **computer or robotic limb**.
- It **decodes brain signals** and translates them into commands to **control machines, bypass damaged neural pathways**, and restore lost functions in persons with **neurological disorders**.
- Earlier BCI systems could only **translate brain signals into text**, and that too with **limited vocabulary, slow processing speed**, and **reduced accuracy**.

How Does It Work?

- **Sensor implantation:** Electrodes were surgically placed on the **motor cortex** (brain region controlling movement).
- **Signal interpretation:** The system decodes **neural signals of imagined movement**, using **machine learning** to predict changes over time in signal patterns.
- **Virtual training:** The user was first trained using a **virtual robotic arm**, allowing refinement of mental control.
- **Real-world application:** The participant performed complex tasks like **picking up blocks, opening a cabinet, and holding a cup under a water dispenser**, indicating **precise, consistent control**.

Applications of BCI Technology

- The BCI also has potential for **restoring speech** in individuals with conditions like **brainstem stroke** or **Amyotrophic Lateral Sclerosis (ALS)**.
- Fine electrodes and artificial neural networks can decode intended speech and generate **text output, Audible speech, and a speaking avatar**.
- One study showed a patient with ALS communicating at **62 words per minute**, 3.4 times faster than previous BCI systems.

Brain-Computer Interface (BCI) FAQs

Q1. What is a Brain-Computer Interface (BCI)?

Ans. A Brain-Computer Interface (BCI) is a system that allows direct communication between the brain and an external device by interpreting brain signals, often for assistive technologies or medical applications.

Q2. What are the main applications of BCI?

Ans. BCIs are used in neuroprosthetics, communication for disabled individuals, gaming, cognitive training, and even military research.

Source: TH

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