Brain-Computer Interface for Paralyzed people

Prelims – *Current events of National Importance*

Mains (GS III) | *Science and Technology | Developments and their applications and effects in everyday life.*

Why in News?

Researchers at the University of California, San Francisco (UCSF) have achieved a significant breakthrough in assistive technology for individuals with paralysis.

> *Research team consists of Nikhilesh Natraj, Indian Nikhilesh Natraj, a neuroscientist and neural engineer at the Weill Institute for Neurosciences, UCSF.*

- **The Methodology** - Researchers used ***brain-computer interface (BCI)*** that allows a paralyzed man to control a robotic arm simply by imagining the movements he wishes to execute.
- They used tiny sensors implanted on the participant's brain to read the intent to move, allowing them to track and analyze brain activity despite the participant being unable to physically move.
- To observe the changes of his brain patterns over time, the participant was asked to imagine moving different parts of his body.
- The participant's brain produce the signals for a movement when he imagined himself doing it, although he couldn't actually move.
- The BCI recorded the brain's representations of these movements through the sensors.
- The team looked at the patterns in the complex sensor data and noticed that even though the way movements were represented remained consistent, their positions in the high-dimensional space changed a bit each day.
- By keeping an eye on these changes and forecasting their progression, they managed to tackle the instability in BCI systems and created a complete signal processing and AI framework.
- The participant was then tasked with imagining himself making simple movements with his fingers, hands or thumbs while the sensors recorded his brain activity to train the AI.
- The read-out signals were then decoded to actuate a robotic arm.
- **Applications -** The participant can now perform tasks such as picking up and manipulating blocks, turning them, and relocating them, even managed to open a cabinet, retrieve a cup, and hold it under a water dispense.
- **Concerns -** Having established that it can be done is the first stage, a lot more work needs to be put into refining the technique and for it to be deployed among people who have paralysis.
- Especially, the system should be able to work fluidly in complex scenarios with many distractions, such as when going to a crowded grocery store.

Reference

The Hindu | Brain-Computer Interface

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