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Korea develops mind-reading system for decoding brain signals

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To help people with movement or sensory impairments



Researchers from the Korea Advanced Institute of Science and Technology (KAIST) have developed a mind-reading system for decoding neural signals from the brain during arm movement.

The method, described in the journal Applied Soft Computing, can be used by a person to control a robotic arm through a brain-machine interface (BMI).

A BMI is a device that translates nerve signals into commands to control a machine, such as a computer or a robotic limb. There are two main techniques for monitoring neural signals in BMIs: electroencephalography (EEG) and electrocorticography (ECoG).

The EEG exhibits signals from electrodes on the surface of the scalp and is widely employed because it is non-invasive, relatively cheap, safe and easy to use. However, the EEG has low spatial resolution and detects irrelevant neural signals, which makes it difficult to interpret the intentions of individuals from the EEG.

On the other hand, the ECoG is an invasive method that involves placing electrodes directly on the surface of the cerebral cortex below the scalp. Compared with the EEG, the ECoG can monitor neural signals with much higher spatial resolution and less background noise. However, this technique has several drawbacks.

Such drawbacks can be overcome by the new mind-reading system that is based on a machine-learning system for analysing and predicting neural signals called an ‘echo-state network’ and a mathematical probability model called the Gaussian distribution.

The next steps will be to improve the accuracy and efficiency of the decoder. In the future, it could be used in a real-time BMI device to help people with movement or sensory impairments.