

Transcript

Anisha: What are BCIs?

Anika: Brain computer interfaces are a computer-based system that works by acquiring brain signals, analyzing them and translating them into commands that carry out desired actions.

Anisha: This technology has been around since 1973 when Vidal used BCI as an early attempt to evaluate the feasibility of using neuronal signals in a person-computer dialogue that enabled computers to be prosthetic extension of the brain.

Anika: Brain computer interfaces were initially focused on helping paralyzed people control assistive devices using their thoughts. The main goal of brain computer interfaces now is to restore useful function to people disabled by conditions such as cerebral palsy, stroke, spinal cord injuries, and lateral sclerosis.

Anisha: Brain computer interfaces can only use signals from the central nervous system since they don't use the brain's normal output pathways of peripheral nerves and muscles.

Anika: Researchers are currently improving BCIs and seeing how it can affect different environments such as the workplace, or at school.

Anisha: How do BCIs work?

Anika: BCIs can be used as a neurofeedback tool and helps improve cognitive performance. It uses brain signals and machine learning algorithms to detect engagement levels and more insights. They have multiple uses...

Anisha: They can detect that your attention level is too low given the importance of the task at hand, they can help adapt lighting based on how stressed you are or keep you from driving if you're feeling

drowsy. Additionally, it helps on your daily tasks and can help you figure out what to do first based on your attention level.

Anika: An IEEE Spectrum Article discussed that “when we perform mental tasks like picturing a shape or singing a song in our heads, our brains generate unique neuronal electrical signals. An EEG would read those brain waves using noninvasive electrodes that record the signals. The unique patterns can be used like a password or biometric identification.”

Anisha: What are the security risks in collecting data from brain devices?

Anika: If used in the workplace, your supervisors would be able to see the data from your brain computer interface. The companies that manufacture them would give access to a specific BCI HR dashboard, displaying your brain data in real time, allowing your employers to see how focused you are and adapt to your workload accordingly.

Anisha: Workplaces like where you operate dangerous machinery like in the army will require BCIs to monitor their workers for safety reasons.

Anika: Currently, BCIs aren't even developed enough for everyone to use, experts believe that about “15-30% of individuals are inherently not able to produce brain signals robust enough to operate a BCI.” This could lead to wrong results and bad decisions from companies or schools.

Anisha: There are also many psychological factors such as memory load, fatigue, and competing cognitive processes that change how BCIs work on different people, as well as basic characteristics such as lifestyle, gender, and age.

Anika: Even when used with the best of intentions, companies could risk becoming overly dependent on using brain data to evaluate, monitor, and train employees, and there are risks associated with that.

Anisha: Another concern is that just like any technology, BCIs can be hacked. If hackers can access a BCI headband they can create and send manipulated or false EEG data. This can greatly influence how employers and school faculty evaluate their students and employees.

Anika: While BCI technology can be very useful medically in the long run they are currently not safe to use.

Anisha: Using BCI for tasks such as increasing precision in neurosurgery, neural engineering, and neural decoding is beneficial to advance the field of medicine and research but there should be extensive trial to prove its efficacy before industrial use.

Anisha: Stakeholders affected with the use of BCIs are employers, doctors, and employees. Employers want to gain more insight from their workers, doctors want to use them for enhancing medical work and employees will be using them for data gathering.

Anika: Elon Musk's company Neuralink has had some breakthroughs with BCI technology. According to Neuralink fewer than 20 people in the US have received a BCI implant for restorative medical purposes on a research basis.

Anisha: External components can create the potential risk of infection and aren't practical in an outside setting yet.

Anika: Musk conducted a pig experiment using BCI technology to demonstrate recent findings. The pig had an implant in its brain and a screen above the pig stream electrical brain activity of the pig being registered by the device.

Anisha: The future goal is to use this BCI system to read and write from brain neurons and translate human thoughts into commands.

Anika: Deciding whether BCIs are worth the invasion of privacy is difficult. Medically speaking, this would be a critical innovation for those with neurological disorders. Alternatively, in a workplace it would be considered an invasion of privacy due to the numerous security threats, but in an education setting, BCI would come in handy for teachers when aiding their students.

Anisha: Implementing BCIs in the real world isn't just a concern for those with the BCI but also for those with the access to that data. In the future, this technology would certainly require policies and regulations to be put in place if we were to go farther with it. While this technology is still improving to achieve better work efficiency and medical precision, there are many factors that are yet to be considered.

Citations

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