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Future with Brain Computer Interface

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ABSTRACT

Brain computer interface is an emerging technology basically capable of bringing science fiction into reality. It merges brain and computer which is biology and technology to interact with them and make some technology which can be operated by human brain.

Index Terms- Neurons, Synapse, Electroencephalography (EEG), Invasive, Grey matter.

1. INTRODUCTION

Brain computer interface (BCI) is the technology which has variety of scope to discover new things yet. Most of the theories are being practiced and tested to bring it into reality in most of world top universities. It is the fusion of brain and computers.

2. WORKING

One of the biggest challenges facing brain-computer interface researchers today is the basic mechanics of the interface itself. The easiest and least invasive method is a set of electrodes -- a device known as an electroencephalograph (EEG) -- attached to the scalp. The electrodes can read brain signals. However, the skull blocks a lot of the electrical signal, and it distorts what does get through.

To get a higher-resolution signal, scientists can implant electrodes directly into the grey matter of the brain itself, or on the surface of the brain, beneath the skull. This allows for much more direct reception of electric signals and allows electrode placement in the specific area of the brain where the appropriate signals are generated. This approach has many problems, however. It requires invasive surgery to implant the electrodes, and devices left in the brain long-term tend to cause the formation of scar tissue in the grey matter. This scar tissue ultimately blocks signals.

Regardless of the location of the electrodes, the basic mechanism is the same: The electrodes measure minute differences in the voltage between neurons. The signal is then amplified and filtered. In current BCI systems, it is then interpreted by a computer program, although you might be familiar with older analogue encephalographs, which displayed the signals via pens that automatically wrote out the patterns on a continuous sheet of paper.

In the case of a sensory input BCI, the function happens in reverse. A computer converts a signal, such as one from a video camera, into the voltages necessary to trigger neurons. The signals are sent to an implant in the proper area of the brain, and computer which is possible by presenting neural network in our brain having electrochemical signals can be captured by electrode to convert the signal into digital signal which can be further processed for machine operations.

3. BACKGROUND

Every existing thing in this world has its past so as BCI:

1) 1924, Hans Berger recorded first alpha waves in brain which are EEG.
2) Jacques Vidal in 1973 stated 'BCI Challenge' which leads to his first application in BCI in 1977.
3) In 1990 Bidirectional adaptive BCI controlling Computer buzzer by a brain potential. 4)2015, the official BCI society was formed

If everything works correctly, the neurons fire and the subject receives a visual image corresponding to what the camera sees.

Another way to measure brain activity is with a Magnetic Resonance Image (MRI). An MRI machine is a massive, complicated device. It produces very high-resolution images of brain activity, but it can't be used as part of a permanent or semi-permanent BCI. Researchers use it to get benchmarks for certain brain functions or to map where in the brain electrodes should be placed to measure a specific function. For example, if researchers are attempting to implant electrodes that will allow someone to control a robotic arm with their thoughts, they might first put the subject into an MRI and ask him or her to think about moving their actual arm. The MRI will show which area of the brain is active during arm movement, giving them a clearer target for electrode placement.

4. APPLICATION OF BCI

Individuals who are severely disabled by disorders such as ALS, cerebral palsy, brainstem stroke, spinal cord injuries, muscular dystrophies, or chronic peripheral neuropathies might benefit from BCIs. To help determine the value of BCIs for different individuals, Wolpaw et al suggested that potential BCI users be categorized by the extent, rather than the etiology, of their disability. Evaluated in this way, potential BCI users fall into three reasonably distinct groups:

(1) People who have no detectable remaining useful neuromuscular control and are thus totally locked-in.
(2) People who retain only a very limited capacity for neuromuscular control such as weak eye-movements or a slight muscle twitch.
(3) People who still retain substantial neuromuscular control and can readily use conventional muscle-based assistive communication technology. It is important to distinguish between a BCI and its applications. The term BCI refers to the system those records, analyses, and translates the input (i.e., the user's brain signals) into device commands. In contrast, the term application refers to the specific purposes or devices to which the output commands are applied. Recent focus on the real-world applications of BCI technology is speeding the transition of BCI research from the laboratory to clinical products useful in everyday life. Although BCI applications could conceivably be clinical or non-clinical (e.g., computer games), this review discusses clinical applications only.

5. CONCLUSION

BCI contributors are increasing day by day new committees are formed to collaborate in this technology. As in the current serious research is being held in research centres because of Biological interfacing but the non-invasive approaches are being practiced by many scholars. BCI in 2050 will be the need of human race to control all the household appliances by just commanding through brain. BCI is contributing to make this world a better place to live.

6. REFERENCES

[1] G Vidal JJ. Real-time detection of brain events in EEG. Proceedings of the IEEE. 1977, pp. 633–641.
[2] Howstuffworks- https://computer.howstuffworks.com/brain-computerinterface1.htm
[3] Wikipediahttps://en.wikipedia.org/wiki/Brain%E2%80%93computer_interface
[4] IEEE- https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6162941