Brain-Computer Interface

Chad Fair, *Biomedical Engineering, University of Rhode Island*

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Abstract— **A brain-computer interface (BCI) is a direct signal pathway between the brain and an external device used to assist in certain motor functions. Developed for disabled patients in order to restore hearing, sight, and movement by connecting brain signals to external machines.**

I. INTRODUCTION

THE brain is the most important organ in your body. It serves as the command center serving multiple purposes such as controlling the movement of your body, allows one to think, dream, and reason, and lastly gathers information acquired from your five senses: touch, taste, smell, sight, and hearing. The Defense Advanced Research Projects Agency (DARPA) first started to research brain-computer interface in the 1970's. The main focus of the project was to restore damaged hearing, sight, speech, and movement using neuroprosthetics to perform daily task. Brain-computer interface is revolutionary in the medical field because allows to user to control an apparatus simply by thinking about it.

II. METHODS

Brain-computer interface is a very complex procedure still being researched today. So far, scientists have created a device which is able to interpret brain signals called an electroencephalograph. This device is attached to the patient's skull and relays the signal to a specific computer program which then interprets the signal.
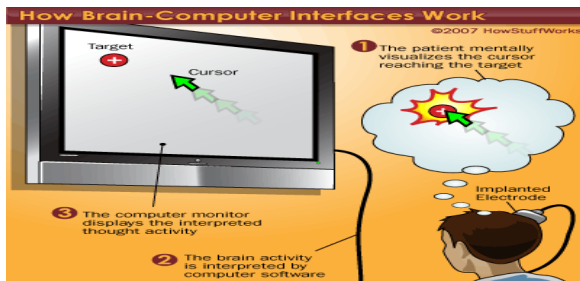
The interpreted signal is then sent to an external device whether it be a prosthetic or simply a monitor like seen in the figure above where the action is then executed. In the figure, the patient thinks about moving the cursor on the monitor and the brain relays the signal which is collected by the electroencephalograph. The signal is interpreted by the computer program and is then executed on the monitor.

III. RESULTS

Brain computer interface is slowly becoming a reality in the near future. Due to this invention being in the experimental phase, no clear results have surfaced but there have been significant breakthroughs which could lead to new possibilities in the future. The software is the reason for the lack of results. Due to the complexity of the human brain, it is nearly impossible for a computer system to interpret every signal sent by each individual neuron. The prototypes that are being used today cannot compute any significant results due to multiple issues. Today here are only two BCI's available to the public: Brain Gate and Second Life. Both of these systems have had tremendous results but there are still many problems that need to be worked out in order for them to achieve success in the future.

IV. DISCUSSION

Brain computer interface is a revolutionary idea which is starting to become a reality. Of course with any new invention, there will always be obstacles which need to be overcome in order for the invention to be classified as a success. Unfortunately, the concept of brain computer interface has yet to overcome these problems and is still in the experimental phase. One of the problems for BCI's is the cost. In today's world, BCI's are very complex and expensive. In today's economy, it's just too expensive for the average working person, making it not cost efficient. In the future, these complex systems will hopefully be available to the public and new methods are discovered which will make it more efficient. The two programs that are in use today, Brain Gate and Second Life, show that BCI's aren't as futuristic as you made them out to be. They are going to create an endless amount of possibilities in the future and revolutionize biomedical engineering and neuroprosthetics.

REFERENCES

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