

## Brain Computer Interface

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There is no way of knowing what could happen in our futures. We could suddenly be in a freak accident and damage various nervous tissue. The result could be devastating to our way of life. The ability to move, see, and hear are all functions of our nervous system. This then places a heavy barrier on the person who has lost a functional ability.

Brain Computer Interfaces (BCI) are designed to break down that barrier. The purpose of a BCI is to create a direct link from the brain to a computer. With this direct link we can look to create solutions for people who lack the ability to move, see, or hear due to nervous system damage. For instance, if someone were to suffer amputation of their left arm, a BCI can be developed in cooperation with an artificial limb to enable movement.

To understand how BCI's work, some background information is needed. The Nervous system is broken down into two divisions, the central nervous system (CNS) and the peripheral nervous system (PNS). With BCI's the main concern is the CNS. The CNS houses three types of neurons, sensory, motor, and interneuron. When a nerve reacts to something it sends out a voltage along a shaft called the axon. It is the motor neurons that are pinpointed for the operation on BCI's.

There are three different types of BCI's. There is an invasive BCI, a partially invasive BCI, and a non invasive BCI. In an

invasive BCI, an electrode is inserted directly into the gray matter of the brain and used to measure the electric signals that the neurons generate. This method is considered invasive due to the difficulty of surgery and direct connection with the brain.

In a partially invasive BCI the BCI is located just inside of the skull of the cranium. This method is less extreme than the invasive BCI, but still provides ample signals for the computer to interpret. Because the electrodes are inside of the cranium, the signals are less distorted. Partially invasive BCI's also have advantage over invasive BCI's is that there is a much less chance of scar tissue occurring in the brain due to indirect connection.

The third BCI produced is the non invasive BCI. This BCI resides outside the cranium and allows for ease of use. Signals are measured from outside of the cranium and therefore produce an increased level of interference. These BCI's are cheap and easy to manufacture, but require more training in order to use them.

The future for BCI's looks bright. Much research is being done to enhance the capabilities of BCI's. Pretty soon BCI's will be on the market and be able to assist persons in need.

Sources

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