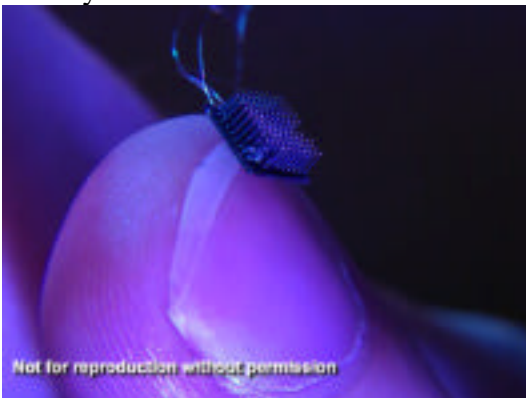


BRAIN-COMPUTER INTERFACE (BCI)

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A direct mind to computer interface is just that. It is the immediate connection through the thought process to a computer that processes the data, through means of intercepting action potentials and brain waves using electrodes and electrode arrays. Current methods of interface involve using signals from intermediate organs such as hands, feet, eyes, and mouth to control the signals, which are interpreted and analyzed. Such systems are beneficial to those able to utilize such organs, but what about those such as quadriplegics? A direct link between the mind's electrical signals and computers is under research and testing. What is called 'Imagined BCI' is a major step towards allowing the immobile to be mobile. Previous methods of neurofeedback are not enough to help the physically disabled. Electrode arrays are only a few square millimeters, containing hundreds of small silicon needles which read neuron activity. These arrays can be implanted onto nerves and even directly into the motor cortex, providing more exact methods of measuring brain activity.



Hundreds of billions of neurons exist in the brain and throughout the body, sending signals to each other by manipulating action potentials. Surrounding neurons are chemical ions

that enter and exit through the opening of semi-permeable membranes. When a certain voltage is reached, the neuron fires and releases the current towards another one. This induces some sort of action.

Previous applications of this technology relied on monitoring an able-bodied person's brainwaves and providing feedback in order for them to control their brain states.

Newer studies and tests involve interpreting able-bodied subjects' neuron patterns and creating algorithms to 'map' thought patterns. This leads to the ability to control certain computer programs with the same thought pattern.

Imagined BCI is similar to most methods, but differs in that the subject need only to imagine the desired motor function. This allows nerve damaged subjects such as quadriplegics to control computers to drive wheelchairs, prosthetic limbs, and also for blind or deaf people to see or hear somewhat.

With these advances, the link between the conscious thought of humans and the power of computers can be reached. People in need of assistance but lack motor skills now have help. The link is most important, and these methods are helping to strengthen it.

- <http://faculty.washington.edu/chudler/cells.html>
- <http://www.ibva.com/html/Win.htm>
- <http://www.ece.ubc.ca/~garyb/BCI.htm>
- <http://www.biomedical-engineering-online.com/home/>
- http://www.float.co.za/?cat_id=3&sub_id=59
- http://www.rdg.ac.uk/KevinWarwick/html/project_cyborg_2_0.html
- <http://www.sci.utah.edu/~gk/abstracts/bisti03/>