

# Brain to Brain Communication

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**Abstract:** -- “Brain-Computing Interface” technology is used by the scientists that allow computer to analyze brain signals. This new technology in the field of research and development will bring a great benefit to the people who cannot speak and even blink. This will be first technology that would allow people to send words, images and thoughts directly to the minds of others, particularly people with a disability .Earlier we’ve looked at a system to allow people to control a robotic wheel chair with the power of thought. Similarly B2B communication technique will be used to transmit thoughts from one person to another via internet. This paper outlines on component used and working of B2B communication. We have also discuss its advantages and limitations.

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## I. INTRODUCTION

A BCI is a communication and control system which does not depends any way on the brain’s normal neuromuscular output channels. Rather than by peripheral nerves and muscles the user’s intent is conveyed by brain signals, and these brain signals does not depends for their generation on neuromuscular activity. Furthermore, a BCI establishes a real-time interaction between the user and the outside world, as a communication and control system. The user receives feedback reflecting the outcome of the BC’Is operation, and that feedback can affect the user’s subsequent intent and its expression in brain signals. For example, if a person uses a BCI to control the movements of a robotic arm, the arm’s position after each movement is likely to affect the person’s intent for the next movement and the brain signals that convey that intent. Thus, a system that simply records and analyzes brain signals, without providing the results of that analysis to the user in an online interactive fashion, is not a BCI. A brain–computer interface (BCI) or brain–machine interface (BMI) activates electronic or mechanical devices with brain activity alone. BCIs and BMIs allow direct brain communication in completely paralyzed patients and restoration of movement in paralyzed limbs through the transmission of brain signals to the muscles or to external prosthetic devices.

The two types of BCIs: Invasive BCIs use activity

recorded by brain implanted micro- or macroelectrodes, whereas noninvasive BCIs use brain signals recorded with sensors outside the body boundaries. A technique called “Brain-computer interfacing” is used by scientist which allow computer to analyze brain signals. Without the use of keyboards, telephone, mouse,mouth thoughts can be transmitted from one person to another person’s mind miles away, but through internet. A brain computer interface (BCI), sometimes called a direct neural interface or a brain–machine interface, is a direct communication pathway between a brain and an external device. BCIs are often aimed at assisting, augmenting or repairing human cognitive or sensory-motor functions.SS

## II. HISTORY

In 1875 Richard Canton recorded electrical signals produced by brain activity from the cortical surface in animals and from human scalp by Hans Berger in 1929. Human EEG was discovered by Hans Berger and speculated his first comprehensive review of his experiments with the “Elektrencephalogramm” in 1929 about the possibility of reading thoughts from the mathematical analyses sophisticated by tracing EEG. First human to human brain to brain interface, was built between two humans separated by the internet to communicate with each other by international researchers. BCI is no longer a new thing said Dr. James and Professor Kevin Warwick from University of Reading shown person to person communication via the nervous system.

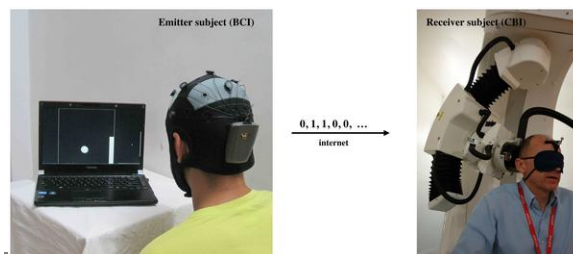
**III. COMPONENTS USED IN B2B COMMUNICATION**

- ♣ **Brain Computer Interfacing:** A brain computer interface (BCI), is also called as direct neural interface or a brain machine interface (BMI). It is a direct communication between the brain and an external device. It is often aimed at assisting, augmenting or repairing human cognitive or sensory motor functions.
- ♣ **Electrodes:** It is an electrical conductor used to make contact with a nonmetallic part of a circuit (e.g. an electrolyte, a vacuum or a semiconductor)
- ♣ **EEG:** Electrical activity of the brain is recorded by the **Electroencephalography**. It is placed along the scalp. EEG measures voltage fluctuations results flow of ionic current within the neurons of the brain. EEG is used to diagnose sleep disorders, coma, encephalopathies and brain death. But as well as the technology's susceptibility to noise, extensive training is required to another substantial barrier to use EEG as a brain computer interface before users can work the technology.
- ♣ **LED lamp:** A **light-emitting-diode lamp** is a two lead semiconductor light source of p-n junction diode which emits light. It is a solid-state lamp that uses light-emitting diodes (LEDs) as the source of light. Multiple diodes are used together, since the light output of individual light-emitting diodes is very small compared to incandescent and compact fluorescent lamps. LED lamps can be made interchangeable with other types. Most LED lamps must also be included internal circuits to operate from standard AC voltage. Since LED lamps offer long life and high efficiency its initial cost is higher than that of fluorescent lamps.
- ♣ **Internet:** Dr. James said that his innovation was the transmission of the signals to another person through the Internet.

- ♣ **Personal Computer:** Pc is used to pick up the stream of binary digits and also it can decipher whether a zero or one was transmitted.

**IV. WORKING PRINCIPLE**

This system is used to share thoughts from one brain to another without any talking or without moment of body. International researchers made a device that allows to share a information between two person. The researchers tested the device by placing them 8000km (5000miles) apart one in France and other in India. The device connects directly to the users scalps and impulses from the sender were picked up with EEG as well as by image guided and robot assisted transcranial magnetic simulation (TMS). The signal was encoded and sent through the internet to the user on the other end. Once it reached its target destination, the code was delivered to the recipient by a computer interface. The device worn by the recipient stimulates phosphenes, even though actually any light does not enter the eye it appears as flashes of lights. The phosphenes are delivered in a pattern, which needs to be deciphered by the recipient who wears a blindfold to block out other visual stimuli. Using this method users could able to transfer two words called "ciao" and "hola" with some errors. This EEG method is the best choice at this stage as it is noninvasive.



**V. APPLICATION AREAS**

- ♣ **Gaming and Entertainment :** In future gamers will be able to drive the cars, trucks, etc., by just saying turn "left" turn "right" and "brake" etc. BCI also can be used to enjoy your music with home theater by handling an entertainment

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system with your thoughts which will make a remote control obsolete.

- ♣ **Communication and control** : BCIs provide options for communication and control for people with devastating neuromuscular disorders (such as amyotrophic lateral sclerosis, or ALS, brainstem stroke, cerebral palsy, and spinal cord injury).
- ♣ **Military defense system**: DARPA (Defense Advanced Research Projects Agency) has been interested in Brain-Machine-Interfaces for a number of years for military applications like wiring fighter pilots directly to their planes to allow autonomous flight from the safety of the ground. DARPA looks to develop a high-res brain computer interface.

**VI. ADVANTAGES**

Help people with severe debilitating muscle wasting diseases, or with the so-called 'locked-in' syndrome, to communicate. Help in direct brain communication in completely paralyzed patients. Help to those who suffers from disorders like Brain stroke. Help in contact with the patient who is conscious but couldn't able to speak. Help the people to communicate each other easily who is def and dumb.

**VII. LIMITATION**

- ♣ **Electrodes** : Attachment of Electrode inside the skull or even implanting in the brain. But Dr James admitted that this opened up many ethical problems.
- ♣ **Liability** : Under normal circumstances, we are fully responsible for our actions is agreed by most people. However, incorrect actions may be produced simply by incorrect detection of correct intent, if our intent was effected by a brain-computer interface.
- ♣ **Privacy** : The capacity to induce information into the brain may provide us with the ability to base our actions on a better assessment of the environment. Because this information is provided by a computer, it could be accessed

and modified by third parties, which may allow them to influence our actions .

- ♣ In terms of the speed, accuracy and robustness of the technology, there is long way to go.

**VIII. FUTURE**

- ♣ It will provide a new way to communicate without the need of telephones and keyboard.
- ♣ According to Dr Ian Pearson, "In 30years, you'll think of a message and it will appear on your wife's mobile phone".

**IX. CONCLUSION**

Brain-to Brain communication will help people who suffers with "Locked -In" syndrome, with severe debilitating muscle wasting diseases. It can also be used in our military defense system. One person can chat brain-to-brain at speed of thoughts with the person miles away. The technology will cut down the verbal communication in coming era. A broadband connection, however, would be essential.

**REFERENCES**

[1] Jonathan R. Wolpaw<sup>1</sup> and Niels Birbaumer(2005). Brain-computer interfaces for communication and control available at [http://www.braincommunication.org/pdf/BCI\\_Chap\\_Rehab\\_book.pdf](http://www.braincommunication.org/pdf/BCI_Chap_Rehab_book.pdf)

[2] Niedermeyer E. and da Silva F.L. (2004). *Electroencephalography: Basic Principles, Clinical Applications, and Related Fields*. Lippincot Williams & Wilkins. Available at <http://en.wikipedia.org/wiki/Electroencephalography>

[3] Brain- Computer Interface Allows Person-To-Person Communication Through Power Of Thought, Posted on Science Daily (Oct. 6,2009) available at <http://www.sciencedaily.com/releases/2009/10/091006102637.html>

[4] Introduction to a brain-computer interface as a way to communicate posted by Keith Palmer(Emporium Books) on August 17,2010

available at  
<http://www.educause.edu/blog/Bookworm/Introductiontoabraincomputerin/211656>

[5] Dennis J. McFarland, Jonathan R. Wolpaw, *Brain-Computer Interfaces for Communication and Control*, Communications of the ACM Vol. 54 No. 5, Pages 60-66 available at  
<http://cacm.acm.org/magazines/2011/5/107704-brain-computer-interfaces-forcommunication-and-control/fulltext>

[6] The Times of India, Jaipur, Friday October 23, 2009: Chat brain-to-brain at the speed of thought.

[7] Je Del R. Millan, Pierre W. Ferrez, NON-INVASIVE BRAIN-MACHINE INTERACTION, International Journal of Pattern Recognition and Artificial Intelligence Vol. 22, No. 5 (2008) 959-972 available at  
[http://www.cs.colostate.edu/~anderson/cs640/pmwiki/pub/millan\\_ijprai08.pdf](http://www.cs.colostate.edu/~anderson/cs640/pmwiki/pub/millan_ijprai08.pdf)

[8] Gerwin Schalk, *Brain-computer symbiosis*, Journal of Neural Engineering Vol 5 (2008) P1-P15 available at  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2722922/>  
Garima Singh et al./ International Journal of Computer Science & Engineering Technology (IJCSET) ISSN : 2229-3345 Vol. 3 No. 9 Sep 2012 413

#### **Internet Reference Sites**

- <http://www.dailymail.co.uk/sciencetech/article-1220529/Scientists-develop-allows-brain-brain-communicationhumans.html#ixzz0fUUh7VI1>
  - <http://en.wikipedia.org>
  - <http://www.telegraph.co.uk/technology/news/6331511/British-scientists-develop-brain-to-brain-communication.html>
  - [http://en.wikipedia.org/wiki/LED\\_lamp](http://en.wikipedia.org/wiki/LED_lamp)
  - [http://en.wikipedia.org/wiki/Brain%E2%80%93computer\\_interface](http://en.wikipedia.org/wiki/Brain%E2%80%93computer_interface)
  - <http://en.wikipedia.org/wiki/Electrode>
  - <http://www.timesonline.co.uk/tol/news>
  - <http://www.eurekalert.org>
  - <http://www.gizmag.com/go/3503/>
- Garima Singh et al./ International Journal of Computer Science & Engineering Technology (IJCSET) ISSN