

# Advanced Brain Supervision

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**Abstract-** In Brain Gate Technology(BGT), BMI, is a straight disclosure lane between individual and an exterior gadget In one medium BMIs computer either send the signal or can accept the commands from the brain. While in two ways BMIs, it will allow both the brain and the external device to exchange information in both the direction but till now it is yet to be successfully implanted in human. The research on brain machine interface is introduced by biotech company cyberkinetics ,board of neuroscience at brown university, but the first working experimental implantation in human beings appeared in 1990s.They are made to putback the hearing damage, sight damage and movement with the recent advancement in technology, researchers attempt to produce the BMIs that augment human functions, with the help of this technology, it will provide wealth alternatives to individuals to interact with the environment.

**Keywords-** BGT, BMI, BCI, EEG



fig 1. Introduction to Brain Gate Technology

## I. INTRODUCTION

Today as we are in the 21st century,with the advancement in the technology, we have moved towards the next level in computer science i.e brain gate technology. In 2003 Bio-tech company cyberkinetics was introduced these automation(cerebellum enclosed device) department of neuroscience at Brown university.It was developed for the patients with spinal cord injury or have lost control over limbs or any other problem related to movements.Brain gate technology consists of hardware and software devices, which may be used as a telecommunication device.Itwill provide a facility to them to work as normal human. The electrode chip which is embeded into the brain, whichscan patient's brain

activity and change the computer commands into actions subsequently. Through this technology we can control a robot arm or a cursor on a screen. The main objective of brain gate technology is to work as a portal between the disabled person and an exclusive computer.

## II. WHAT IS BRAIN GATE TECHNOLOGY?

Brain gate is an electrode chip and performed in inner part of the cerebellum. The electrical signals are interchanged with neurons in brain that Body movements are effected by sending the signals to the brain .All signals are handled by software. Whenever the man lost his memory due to the accident or he had lost his any part of the body at that time the electrode chip is embededin his brain for functioning of the body .

## III. HISTORY OF BRAIN GATE

Researchon BCIs is going on for more than 30 year but substantial increment in working experimental took place in mid 1990s.Brain gate technology(BGT) was introduced by the bio-tech company cyberkinetics in 2003,department of neuroscience at Brown university.

## IV. OBJECTIVE OF BRAIN GATE

The objective of brain gate is to establish relationship between disabled person and computer, Which is trustworthy and fast .

## V. PRINCIPLE ON WHICH BRAIN GATE TECHNOLOGY WORKS ?

The principle of brain machine interface is that,"which intact with brain function and neural signals are interpreted and translated as per the user's thoughts into cursor movements".

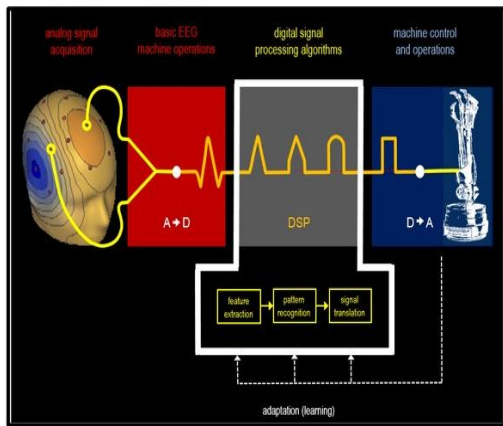


fig 2. Working of Brain Gate Technology

**VI. TECHNOLOGY USED:**

BCI connects the cerebellum or the nervous system with the computer machine. BCI are also known as direct neural interface or BMI is a communication interface, which provides a direct communication between animal and human cerebellum and other device. Two classification based on communicator passage:

- 1. First medium of BCI
- 2. Second medium of BCI

**1. First medium of BCI:**

One way BCI works in a single direction that is it can either send signals to the brain or take commands from it.

**2. Second medium of BCI:**

Two way BCI can perform both the actions in two way BCI. Information can exchange in between brain and external device can take place in both the directions successfully inserted in animal or human beings.

BCI is categorized into three types based on its features and are :

- Invasive BCI
- Partially invasive BCI
- Non invasive BCI

**VII. SEGMENTS**

7.1 The neural chip:

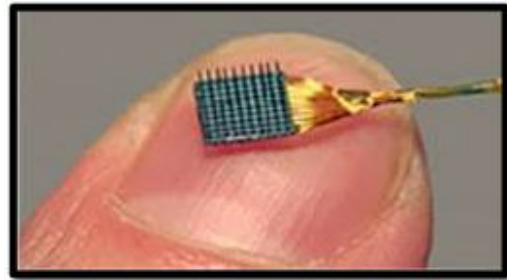


fig 3. Neural chip

A chip which is enclosed in the initial mechanism cortex along with silicon has square shape of 4mm with hundred hair thin micro electrode. It is responsible for controlling the movement.

7.2 The Adapter:

through this medium (pedestal plug) the signals are dispatched that is converted fiber optical channel to the computer connect to the skull. the cortical neurons fire in a distinctive pattern, When the user thinks, cursor moves up and down.

7.3 The compiler:

it is transformed to digital data and fly back by fiber-optic cord to a machine learning. where the signal travels to the shoe box sized amplifier mounted in the user's wheel chair

7.4 The thinking machine:

Using custom decoding freeware, the thinking machine cerebellum action and compose the disclosing result.

**VIII. PROCESS**

It is the cerebrum – thinking machine relationship which consist of an inter neural signal detector and outer processor, in which the sensor has tiny chip which includes 100 microscopic electrodes that notice brain cell electrical activity.

The power train cortex area that charge action where the chip is enclosed on the covering of cerebrum. Under the user the outer processors convert optic movement into an output signal on command. A cord attached the sensor to an outer processor in a cart that involves thinking machines, in the pilot version of the agent(device). Making a communication and will convert the cerebrum action by using custom decoding freeware which will arrange the alleyway.

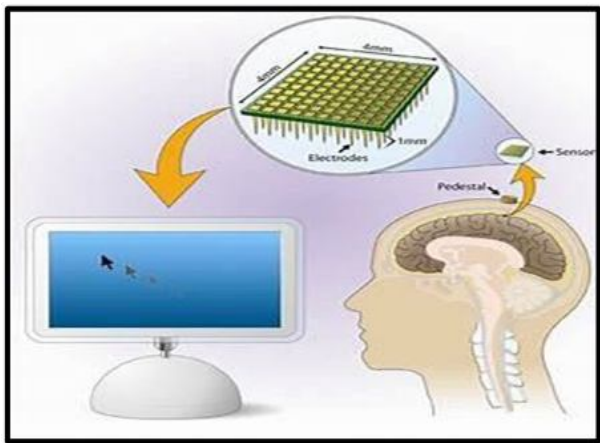


fig4. Working of Brain Gate Technology

**IX. HOW THE INFORMATION IS TRANSFER?**

- with the help of fiber optic to the external processor(digitizer),this potential difference is possessed by the electrodes which is transmitted. a potential difference is created, when a work is being done through any part of body.
- It is feed into the computer when the digitizer converts the signal into 0's and 1's.
- with the help of Brain Gate, a new path is created for the generation of order from the brain to the computer
- they will start working after the digitizer is connected to the computer then following to the thought make in the motor cortex of the brain.

**X. RESEARCHES ON HUMAN BEINGS**

Mathew-Nagel,was the first person to use the technology of Brain Computer Interface(BCI) to restore the functionally lost due to paralysis.

On 7 december, 2004 , Brain Machine Interface(BMI) was successfully inspected on a human by the Cyberkinetics. The report describes the first partaker in the trials, a 25 yr old man who had continued a spinal cord injury due to inactivity in all the four limbs. Over an interval of nine months he participated in 57 session during which the brain gate chip that was implanted in the brain of the patient, record the activity in his motor cortex and then use his imagination for several computer based assignment such as, emotive a computer cursor, opening an e-mail, outlining the circular shapes and playing the simple ping- pong game.



fig 5. Research on humans

**XI. RESEARCHES ON ANIMALS**

- At first, BCI was implanted in rats, then the signals which were taped from the cerebral cortex of the rat to operate the Brain Computer Interface(BCI) to execute the movements.
- The investigators at the University of Pittsburgh, had tested on a monkey that can feed himself with a robotic arm simply by using the signal from the brain.



fig 6. Research on Rat



fig7. Research on Monkey

**XII. SOFTWARE REQUIRED FOR BRAIN GATE**

It create the communication and translate the brain performance using custom decoding software as output using robust algorithms and diagram matching approach to arrange a

connection. The algorithm that are needed for the translation are encoded in C, java and Matlab.

### **XIII. APPLICATIONS AREAS OF BRAIN GATE TECHNOLOGY**

- In the cataloguing of Enterprise Encryption Gateway(EEG) signal.
- multimedia communication.
- In appraisalment of the Spike detection algorithm.
- Mobilizing the control of mobile robot by human Enterprise Encryption Gateway (EEG).
- As a brain controlled switch for allochronic control.
- In the evaluation of Machine learning algorithms.

### **XIV. CHALLENGES FACED BY BRAIN GATE:**

- It is very costly
- Information transform rate is limited, 20 bits/min is the latest technology.
- Trouble In transformation and information.

### **XV. FURTHER CONCERNS**

- Emphasis should be on improving the information transform rate.
- Stronger algorithm should be implemented.

### **XVI. WITH THE BRAIN GATE TECHNOLOGY YOU CAN:**

- Turn on or off the lights.
- Check or read E-mails on your own.
- Play games in the computer.
- Watch and superwise your Television.
- Control a robotic arm easily.

### **XVII. CONCLUSION**

Innovation in medical field is the main discovery of brain gate. The impressive breakthrough offers hope that people who are paralyzed will one day be able to freelydetermine factitious member, analog or wheelchairs.

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