

Neuralink and Brain Control Machine

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Abstract: *Neuralink* is the technology which mainly works on brain controlling machines. Neuralink was introduced by Elon Musk in the year of 2016. Musk had a plan to develop a technology which has high Brain Computer Interface (BCI) and Brain Machine Interface (BMI) have now considered as the medical prosthetics then merging with Artificial Intelligence (AI). The neuralink was first experimented on pigs and yet the research is going on to test it on the monkeys before testing on the humans. Recently BMI has got the recognition in medical applications such as treating people with spinal cord injury, BMI letting bedridden people to operate their computers by moving mouse cursor using their brain. BMI had huge impact on mind reading technology, controlling basic behaviors of human brain and also detecting human emotions. This project has both advantages and disadvantages based on its applications.

Keywords: Brain Machine Interface, Brain Computer Interface, Medical Prosthetics, Artificial Intelligence (AI), Mind Reading Technology.

I. INTRODUCTION

Since 2016, when neuralink technology introduced by Elon Musk it is gaining lot of attention from different technological fields. Neuralink technology belongs to BMI company which works on devices designed to cooperate with human brain to eventually increase memory and interface with computer systems. This company released their computer brain interface during 2019 summer.

Neuralink technology is cooperation with medical applications and technology. It is the way of introducing tiny computer chips to the brain which has the ability of handling brain neuron signals and electrically stimulating the brain to interact with computer to work more effectively by the help of artificial intelligence.

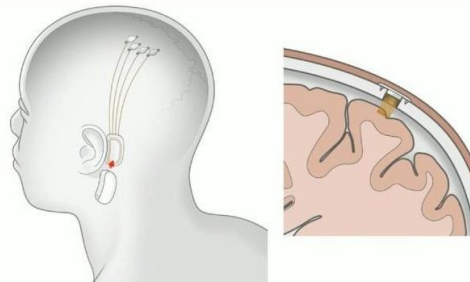


Figure 1: BMI introduced as a chip into the human brain to stimulate brain activity

So far, in 2019 Elon Musk was stated that he has been hoping to introduce neuralink device into the human brain by 2020. But no such activity has recorded so far. As everyone knows Elon Musk with his brilliant marketing ideas he attracted many companies and turned this idea to create a variety of medical equipments which stimulate brain's nerve cells to treat patients with mental illness. Since the brain controlling machine technology developing attempt from 1950 many more people were kept attempting since past for severe medical conditions like tremors, paralysis disease and depression. When neuralink technology introduced it has helped in enhancing the research on brain machine and further more.

1.1 Musk's Neuralink

Efforts of controlling human brain electrically has started few years ago in *Richard Anderson's* Caltech lab. Anderson's lab worked on brain controlling machine to treat mental illness patients. As it is a risk involved process to develop such

device this brain controlling machine idea did not draw more attention. But when Musk introduces this technology as expected his idea of developing BMIs drew attention of many due to decrease in gap between human and machines.

BCIs and BMIs are actually work between human brain and electrical machine. By taking all the crude information taken by all the past researches and experiments Musk and his team started working on neuralink and represented a solid information about the technology and its applications. They also stated that 'The interface needs medical help and its significant medical potential since it is related to mental human health'.

What makes Musk's Neuralink different from normal brain controlling machines?

Well, the normal basic brain controlling device which have been developing since decades have emphasized the technology in medical benefits but Musk plan of developing BMIs are not only going end only as medical applications. "The quest for the a fantastic future" is the expression of Elon Musk about the neuralink label. He admitted that with the medical help he and his team planning to elaborate the technology into the day to day life of humans by allowing their brain to communicate with their changing behaviour, feelings and emotions. Memories of brain get triggered whenever the specific neuron related gets stimulated, this is the actual principal behind the neuralink and it depends on AI for further more applications. According to Musk's overview the computer's intelligence is pretty much more than the humans, if we introduce thus neuralink technology it is helpful to maintain humans artificial intelligence and one's capabilities. This technology have further more applications like video gaming which completely hallucinating the player like being in the artificial game character. As estimated this technology can be achieved by taking people into complete strange and virtual world.

1.2 Public Overview and Imaginary Risk

As the result of all these research achievements neuralink got both positive and negative impacts. Neuralink has discovered the risk involved in this process. neuralink got much more complexities than Musk's other companies and brands. As this technology actually includes electrical signals stimulating the brain signals people imagines the electrical signals damaging could keep the one's brain at risk. A fear of opening a layer of skin to insert a electrical strange foreign chip into the brain can easily make people to feel sick. Inserting a machine and letting it to operate one's brain and able to know one's thought can interrupt one's privacy easily. Many people will think that this process represents the loss of their self laws (self governing). This device probably bring good intelligence levels, improves decision making ability, helps one to control their emotions, thoughts and feelings at the same time this technology let the other people to know about their feelings which is considered as interrupting one's privacy issues. This technology practically have lost of advantages and at the same time it has lot of risks which includes creating immense amount of pain, creates suffering due to addiction, it takes off one's social being and disconnects person from the society, people believed that this technology lets people to live in virtual world rather than the present one.

Apart from all the disadvantages introducing this neuralink device to the brain of patients who are suffering from the mental disabilities, paralysis, depression is okay, because it improves one's mental health and it helps for well being but introducing a electrically operating chip and a so called computer virus into one's healthy brain is not considered as fun at all. This originally makes people to step out of these technologies.

II. MATERIALS AND METHODOLOGY

BMI technology is the powerful way of building meaningful interaction between users and systems. The BCI system records the brain waves stimulation and sends to the computer software which is already developed the data processing takes place in the system and again system sends its modified signals back to the brain. There are many such technologies like this which are used for mind reading mainly a recent technology called Whole Brain Emulation (WBE) also known as mind copying or mind transfer, this is the process of scanning the brain and copying that information into the computer. The computer then process the data during that stage but it is not possible to track brain action at every single second by using this method. Among these technologies the ECG (electroencephelogram) is the base principle of BMI's.

The core BCI is converting the ECG signals into brain control instructions. There are five brain signals based on different frequency ranges. Selectively the ECG signals of frequency 8-30HZ is used in BCI technology.

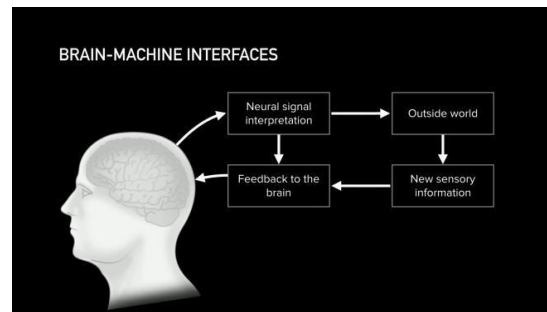


Figure 2: Working of Neuralink

Preprocessing is a procedure of transforming raw data into a format that is more suitable for the user. It actually includes the process of removing the noise from the data to increase the rate of accuracy. The algorithms used in this process include linear filtering, artifact reduction, principal component analysis and etc.

2.1 Present and Future Applications of Neuralink

In the process of developing neuralink, a handful of team members of this project took internet as their flat form to explain the process and applications of this brain machine interface and neuralink. The applications mainly include

A. For Visual Orthotic

As per report of neuralink team stated that this project has that ability to provide a visual prosthesis for people who have retinal injury or myopia through eye injury. This idea is to eventually seal a cornea directly into the visual cortex and stimulating the signals to recognize the objects. Practically this happens by adjusting the frequency and wavelength firmly to the sensor to have an artificial eyesight.

B. Telepathy

From the view of one of the main chip designers at neuralink telepathy can be the next frontier for neuralink. Musk stated to put this technology of words into efforts it needs a lot of efforts and ideas. This plan basically depends on sending one's true thoughts and communicating with each other's brains. Telepathy is commonly known as non-linguistic communication or non-verbal sharing of thought with one another.

C. Oscilloscope for Brain Interface

Oscilloscopes allow visual information of printed circuit boards (PCBs). Similarly, the neuralink device can process many functions of the brain. "The side effect of the device is you will end up learning a lot about how the brain actually works" stated one of the team members of the neuralink project.

D. Unlocking Hidden Creativity

As debated in case of telepathy our communication system are not efficient as expected when it comes to translating. As one of the forefront researchers said that there is a lot of untapped creativity present in each one of us. As for the instance when a person has some plan for some project that you had it in your mind which is non-explainable but when you close your eyes it is easy for you to imagine the exact output you are expecting from the project in such cases neuralink helps to decode your thoughts and helps you to present it out. This all can be done with the help of artificial intelligence.

E. Abolishing Pain

One of the neurosurgeons who were there at the moment the neuralink event stated about the pain which is leading many to suffer and causing many mental health problems like depression etc. In today's world mental illness is the most common disease most in teens. Even the treatment given to cure this pain is also painful to endure. But this can be easily cured by letting one to forget the things which are causing pain, depression and other mental issues through neuralink device.

III. TECHNOLOGY VS REALITY

As there are many advantages brain machine interfaces and neuralink got many disadvantages and risks technically, medically and also from the peoples side. As many are afraid to use this device knowing it can take off their personal space and privacy. Of course technically many ideas are far away from today's developing technology. The main perspective of this project is understanding human brain and its thoughts by electrical signals what if brain needs more than electrical signals to process it completely depends on brains neural signals. In computer the hardware and software are completely different and they have that capability of working separately but as in human body both are same the hormones are included in brain functions. Hormones are main reasons of brain stimulation at most of the times so if one wants to control the brain he must control those hormones too.

By keeping all these constraints as misleads this technology facing many problems. The machine needs to work on users consciousness as it depends on brain and brain is the reason of ones consciousness, it is not that easy to give conscious to a body machine alone is not enough to cope up with all these problems. It has many disadvantages to human health like causing addiction, anti socialism and much more. However, this idea seems too easy to stimulate brain with a chip but the assumptions of disadvantages and failures can cause nightmare scenarios.

IV. CONCLUSION

In our present society, if we truly concern about someone's liberty, individual space and privacy we need to give a high standards throughout brain machine interfaces. The words 'threat' and 'responsibility' are very much critical while dealing with this technology. As there are many advantages over this technology there are disadvantages too. Hence to deal with this technology all the medical and technical aspects are taken care properly. By detecting the problems arise after installing device early and working on solving them can decrease the maximum level of risk. By considering only advantages ones health and life cannot be ignored hence proper medications can be taken before inserting anything physically or mentally into the human body.

But also interrupting into others privacy conditions and disabilities but when it comes to the healthy brain it must be taken care properly without a single error then only this technology gains some value.

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