

A Review of Neuralink Brain Chip made by Elon Musk

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Abstract— Neuralink is modern technique of brain machine interface aims to revolutionize treatment for neurological disorders to improve quality of life of patients suffering from paralysis and epilepsy through advanced neurology. It is bidirectional communication method. In future, we can also use it for human to human thought exchange without any communication through brain chip. It is based on Artificial Intelligence Technology. According to Elon Musk, in future we can use this technology to transfer and store our memory on computer or transfer memory to robot. People will connect to each other through thinking process. The development of brain machine interface raises significant ethical questions regarding privacy, data security and the implication of merging human perception with technology. New advancement in Brain-Chip-Interfaces (BCIs) brings large framework in focus by improving single transmission between human nerve cell and chips. This is very useful innovation in medical field.

Index Terms- Artificial Intelligence, Neuralink, brain chip, NI Chip, Non-invasive BCI, Invasive BCI

I. INTRODUCTION

As we know now a day's everyone is using Artificial Intelligence for so many purposes including the medical diseases. Neuralink is modern technique of brain machine interface aims to revolutionize treatment for neurological disorders to improve quality of life of patients suffering from paralysis and epilepsy through advanced neurology .Neuralink Corp. is an American neurotechnology company is developed ,as in 2024 ,implantable brain computer interface(BCI).It was instituted by ELON MUSK and team of eight scientist and engineers. Neuralink was launched in 2016 and was first publicly reported in March 2017.Two neuroscientists Pedram Mohseni and Randolph Nudo tried to create an electronic brain chip to treat traumatic brain injury. They made significant progress and completed preliminary testing but did not receive enough funding or support from investors to continue. Musk approached them and offered tens of thousands of dollars for the company's name.

In January 2017, Musk approached Pedram Mohseni and Randolph Nudo, who owned the rights to the name "NeuraLink". These two neuroscientists strove to create an electronic brain chip to treat traumatic brain injury. They made significant progress and completed preliminary testing but did not receive enough funding or support from investors to continue. Musk approached them and offered tens of thousands of dollars for the company's name

II. METHODOLOGY

To fit the Neuralink chip and reach the brain, first of all, the doctor will make a small cut on your head. That means he will move the skin above your head to the side. When this skin is removed, a strong bone which covers your brain. That means your head bone, which is called the skull. Because this head bone is very strong, to make a hole in the doctor's face, a special drill machine is used. The white layer below the skull is called Durameter.The main function of the skull and Durameter is to save the soft and jelly-like brain. Now, doctors also cut the Durameter and remove it. And the part now is our brain,where this chip is implanted .The final touch is given to to the fitter jelly, R1 robot will do this. This robot will first make a detailed 3D map of the brain using its high-tech sensors and then identify the places where there are no blood vessels. It will choose some safe zones in the brain for surgery. Just like a sewing machine, this robot will fit the 64 threads in the Neuralink with great precision and cleanliness. Finally, after fitting all the threads, this device will be placed in the skull.

III. EXAMPLE OF NEURALINK

Neuralink is exactly like your smart phone.The news went viral in January 2024 that Neuralink has been implanted in the brain of the world's first human But even after the implant, no information about this patient was being made public And for this reason,

people started talking on social media that this implant has actually been done or not or Elon Musk is again doing some publicity stunt. Then suddenly, after few days, Neuralink put a video of this first patient i.e. Nolan playing chess on its official handle on X-platform. After watching this video, everyone was shocked because the whole body below Nolan's neck could not work. It means that Nolan is paralyzed below the neck, this will only be possible with the power of your brain.

How does Neuralink chip work?

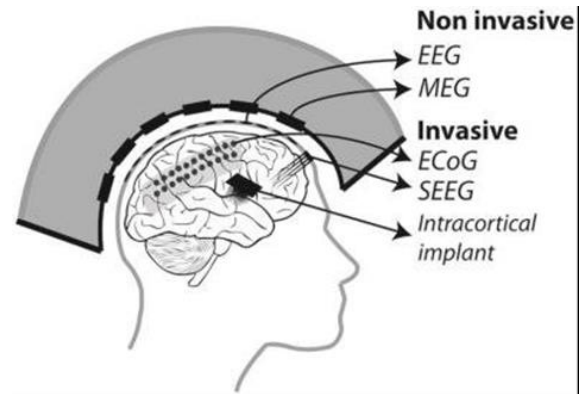
This technology is a big game changer for us humans. Neuralink is a BCI, Brain Computer Interface based technology. Through a chip, a person can directly make a real-time connection between his brain and computer. Meaning, you can understand real-time connection in this way. To understand it on a more basic level, BCI is a computer-based system that captures the signals in our brain, understands them and then translates them into binary codes. In simple language, binary codes are 0 and 1. Finally, the computer understands these binary codes and displays them on the screen. Imagine you are playing a video game. A traditional way that we have used is to play the game with the help of this controller. But, the second advanced way is that the video game starts running or jumping and that too only by your thinking.

There are two types of BCI

- Non-invasive BCI
- Invasive BCI

1] In non-invasive BCI, this type of cables are used to connect the brain to the computer. It is used basically in the medical field only, like, to detect a disease.

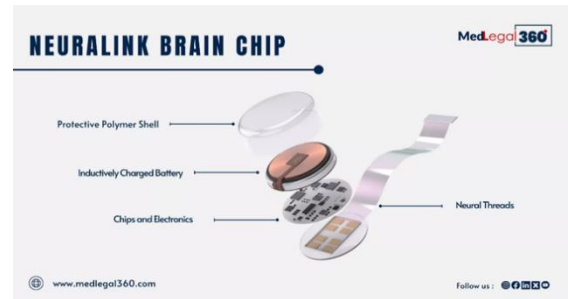
2] In an invasive BCI chip is inserted in the brain. Neuralink is no other than an example of an invasive BCI. Invasive BCI can be used to increase human power along with medical field. Like we saw in the chess example, giving a paralyzed person a new life.



Structure of Neuralink Chip

Neuralink wants to achieve something similar through its telepathy device. the name of this first version of telepathy is N1 Implant is so small that it's size is just 5 Rs.

- The first section is of Biocompatible Enclosure,
- The second section is of battery,
- The third section is of chip
- The last section is of polymer thread.



The first section, i.e. this Biocompatible Enclosure is a protective cover which is made of a material called Polyimide. The most special thing about this material

is that it does not create any swelling or damage in the human body. This battery is based on wireless charging technology. Now, understand this technology with the help of an example. To charge this iPhone, as soon as we placed it on the charging pad, it started generating electromagnetic current. The current in this iPhone placed on the charging pad will pass through this way and will start charging the battery. As soon as any one sat under this charging pad, its device also started charging. One downfall of this battery, which Nolan has told, is that the battery life of N1 implant is only 8 hours and it has to be charged again and again. The last section is of these polymer threads. One implant has a total of 64 threads. The most unique thing about these threads is that this thread is 1.4 times thinner than the red blood cells present in a human's blood and 20 times thinner and more flexible than a human's hair.

How information translate on brain?

In the human brain, more than 100 billion neurons are connected to each other in this way. Now this neuron changes any information to a secret code. These electric signals go from one neuron to another neuron and start forming a communication network. During this communication, the electrical activity in the neurons is called action potential or neuron spike. When these neurons fire, an electric field is formed. This electric field can be detected through electrodes. In simple words, electrodes are those materials that allow electricity to pass through the body. And yes, the N1 implant which we have see about earlier, each thread of it has 16 electrodes like this. Which means, in total, 1024 electrodes. So basically, whatever you feel, these 1024 electrodes are very easily detected. These threads of Neural ink catch this electric signal and send it to the N1 chip. And then this N1 chip is the one which understands these signals. In simple words, this N1 chip is the heart of this implant, because this is the chip that works as a translator between the brain and the computer. For this, this chip first converts the electric signals to binary code, i.e. 0 and 1, and then sends this information directly from the brain to the computer via Bluetooth.

It means it moves slowly. Along with this, these threads are so thin that it is almost impossible for a human to put these threads correctly without any

mistake. This is the reason why a robot was used to put these threads.

ADVANTAGES

- It is used in treatment for neurological disorders to improve quality of life of patients suffering from paralysis and epilepsy through advanced neurology.
- Human to machine Communication.
- Used to store memory of human.

DISADVANTAGES

- Neuralink is also an electronic device so criminals can also hack
- It is like a computer or a phone, if a computer virus is inserted in this device which is fitted in your brain then illegal use of human memory will done
- Criminals can enter our brain and can change our thoughts, feelings and even our memories
- Animal testing- Neuralink had tested it on many animals before its human trials.

FUTURE ENHANCEMENT

- In future talk after getting Neuralink, you don't need to speak or use any device. We can only communicate with each other through our thoughts.
- According to Elon Musk, thanks to Neuralink, you can store, upload or download any memory in your brain.
- With the help of Neuralink, any human can transfer his memories to a computer or a robot. That means, a kind of digital immortality can be achieved which means that person can become notable digitally.

CONCLUSION

- In future Elon Musk's wanted to use this technology to increase our human powers many times. This concept is called trans human in scientific language.
- The more integration and upgrades of artificial intelligence in this chip will happen with time, its unbelievable results will come in front of us.

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