

NEUROCHIPS AND THEIR PROPERTIES

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Abstract

This article provides information about the history of the development of neurochips, the Neuralink project, the principles of operation, practical application and their impact on the future of mankind, namely the benefits and dangers.

Keywords: neurochip, interface, artificial intelligence, medical implant, artificial ear (cochlear implant), computer, robot.

Introduction

Neurochips are innovative devices that make it possible to create an interface between the human brain and technology. This technology plays an important role in health recovery, knowledge acquisition and even human empowerment by strengthening the connection between the human body and artificial intelligence. [1],[2]

Neurochips are a technology that has emerged as a result of scientific research. Their history is divided into the following stages:

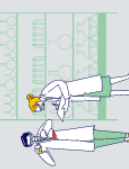
1. Primary research (mid-20th century): The study of the interaction of electronic signals and nerve cells ushered in a new direction in neuroscience and technology.
2. Medical implants (1990s): Artificial ears (cochlear implants) have been a successful example of neurological stimulation technology.
3. Modern neurochips (2010s and beyond): Elon Musk's company Neuralink and other research institutes began working to create technological interfaces with the human brain. The **Neurolink** company tried to cooperate with neurolaboratories in Russia and China, but due to US policies and laws, it was not possible. [1-5]

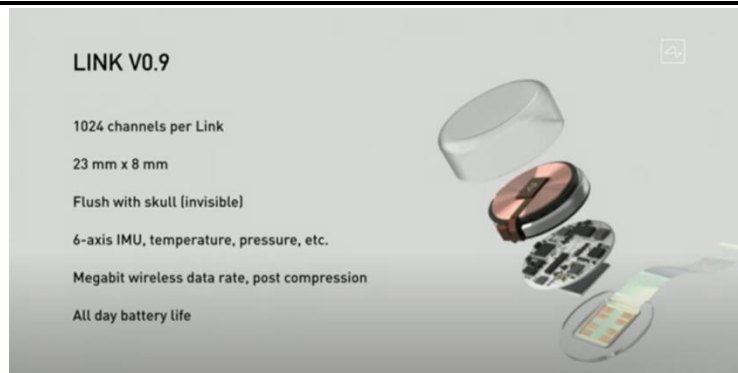
Neuralink loyihasi bu nima?

The Niurlink project was founded by Ilon Musk in 2016, and the company is engaged in the development of a special device that can transmit brain signals via Bluetooth. It allows you to control your computer or smartphone directly with the help of brain impulses .

Chips with such a capability were first demonstrated in 2019 (Figure 1).

[1] <https://www.youtube.com/watch?v=DVvmgjBL74w&t=24s>





1-shahl. Neyrochip

The receiving capsule should be fixed behind the ear as it is a hearing aid. Through it, filamentous electrodes pass to the brain. In total, up to 1500 electrodes are placed in the brain, each of which is made 4 times thinner than a human hair. For example, a single processor of 4 x 4 mm in size processes data from 10 thousand electrodes. The USB-C cable acts as the maximum bandwidth for data transfer (Fig.2). [6-10]
https://trends.rbc.ru/trends/industry/5f4ce51c9a79475172aea28#card_5f4ce51c9a79475172aea28_2

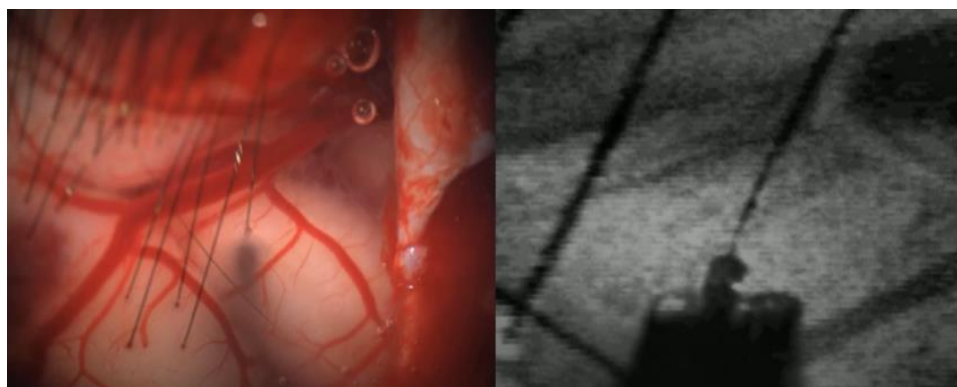


Figure 2. Implantation of an electrode into the brain via a chip

Why is Neurolink needed?

Neuralink's primary mission is to empower people with neurological disorders to work. According to Musk, the head of the company, the device allows you to regulate hormones and work the brain more efficiently. The chip also allows the music to be transmitted directly to the brain. It makes it possible that people can listen to music and even communicate telepathically at frequencies that we wouldn't normally be able to hear.

Neuralink scientists predict that neurochip implantation surgery will be done through robotization, even simpler than laser surgery of the human eye. It wasn't until 2019 that these trials were first conducted in rats and monkeys, and successfully completed. To conduct such tests on humans, it will need to obtain permission from the World Health Organization or undergo general discussion. [1]

The principle of operation of neurochips

The main purpose of neurochips is to record, analyze nerve impulses and, if necessary, send artificial impulses. The principle of their operation is as follows:

1. *Nerve signal assembly*: Electrodes detect signals in the brain or nervous system.
2. *Signal Analysis*: Chip microprocessors convert signals into data.
3. *Creation of impulses*: Based on the received information, the neurochip sends the desired response to the nervous system.
4. *Connectivity to the interface*: The neurochip interacts with peripherals (computers, robots, or prostheses). [3]

Application of neurochips

1. Medicine.

- Treatment of diseases;
- installation of artificial organs and prostheses;
- Restoration of vision and hearing capabilities.

2. Technological interfaces.

- Mind-based control: Neurochips allow human thoughts to be directly connected to a computer or smartphone. This creates interfaces where hand movements are not required. For example, in March 2024, Neuralink showed a man with a live chip playing chess on a computer. Thanks to the implant, the 29-year-old patient, who was paralyzed in his shoulder after a car accident, was able to control the cursor mentally.
- Cyborg Technology: Integrated with artificial intelligence and robotics, it is used to create a new generation of cyborgs.

3. Military and security

- In the military field, neurochips can help improve soldiers' ability to make quick decisions or manage high-precision techniques. [1],[2],[3]

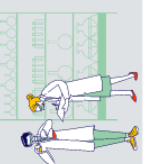
Usefulness and danger of neurochips

Usefulness:

- Neurochips, which improve the level of human mobility with limited mobility.
- Technologies that are directly connected to the human brain accelerate the processes of acquiring knowledge.
- Creates an opportunity to expand human abilities with the help of cyborg technology.

Danger:

- Information security: Through neurochips, the human brain can be "attacked." This runs the risk of controlling personal thoughts.
- Ethics issues: The misuse of technology can undermine human rights.
- Health risks: The long-term effects of the use of neurochips have not yet been fully studied. [11],[12],[3]



Conclusion

Elon Musk believes that the use of such chips will allow not only to expand the capabilities of the human brain, defeat severe diseases, and also compete with artificial intelligence.

Neurochips are bringing revolutionary solutions in modern technology and medicine. They make human life easier and empower them. Nevertheless, caution and responsibility are necessary when using this technology. Undoubtedly, in the future, neurochips will open the door of new opportunities for humanity, but the ethical and social questions of their use will also remain relevant. [1]-[11].

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