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Live happily ever after with a piece of hardware in your head

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It sounds like something from a science-fiction movie, but brain chips are on the brink of becoming reality for humans. Some would say that this will lead to a complete paradigm shift, so what is it exactly? A brain chip is a type of neurosurgery where a wireless implant is placed just below the skull. Such proximity to the brain allows for more precise data collection, and more specific responses. This leads to countless possible applications: think about curing Alzheimer, Parkinson, or Obsessive-Compulsive Disorder (OCD). Even more far-fetched, the brain chip could be used as an extra remote control to read, walk, talk or even feel. Those new possibilities may advance the health and technology sector with immense steps, which is why we opt for supporting the development of such brain chips for humans.

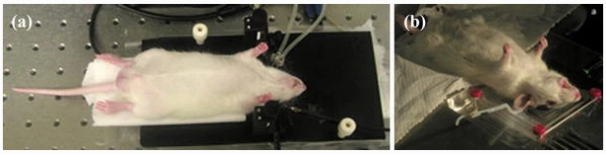
When brain implants meet art (source)

Where we are currently at

Brain chips are actually already tested and utilized in some situations. More specifically, three levels of brain-chip implants are used, involving either neurons, tissue, or the brain.

At the first level, micro-devices are implanted to interface with single cells, the neurons. The devices at this level are already in use. These micro-devices send electrical currents through brain stimulation. This technology helps suppress or terminate seizures, which is a technique increasingly used in the treatment of severe epilepsy.

Along with that, the implementation of brain chips so far occurs in animal studies at larger scale. Studies like this show how brain chips can be used to study the brain with higher resolution, and are paving the way for brain chips to be used as communicators between the nervous system and neuro-prostheses in humans.



Placement of rats on chips during animal studies (source)

Presently, the first human trails with brain chips have taken place, though further experiments must be carried out before the chips can be adopted at a larger scale. Multiple companies are occupied with this, all with slightly different applications. The most mentioned company is Neuralink, probably because of their famous co-founder Elon Musk. The company's main focus is to create an implant that enables people to perform actions by using their thoughts to control a computer. Another company, Blackrock Neurotech, is dedicated to create a device that helps individuals with neurological disorders to carry out tasks like walking, or speaking. Generally, those brain technology companies all strive towards the same goal: creating new clinical solutions that improve human lives.

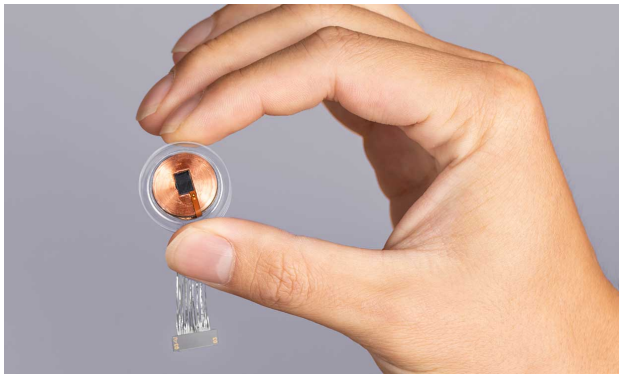
Why use brain chips?

The most important reason to use brain chips is the fact that they may solve a lot of brain-related diseases. This includes severe diseases such as schizophrenia, but also more common ailments, such as memory loss due to aging. A touching example is Pancho, who was left completely paralyzed and unable to speak after a car accident. The placement of a brain chip in combination with a language-prediction program enabled direct communication with his brain. This allowed him to speak again after more than 15 years of silence. He is one remarking case of how such a technique can enhance quality of life.

Next to enhancing its quality, such a technique could even save a life. Inner Cosmos is a company that aims to create a 'digital pill for the mind', that could cure depression. It again works by implanting a chip, which then re-balances brain networks using micro-stimulations. Depression is known to be the largest chronic disease in the world, which can eventually lead to suicide. An efficient cure can therefore save a lot of lives. Optimistically, the first trial surgery was successful, giving hope that this technique will be more widely used in the near future.

The paralyzed patient Pancho (source)

It should also be considered that advancements in science will continue to move forward, and it is important that we prepare for them, rather than fight them. As Elon Musk explains in Lex Fridman's podcast, it is crucial to anticipate with science, due to the threat of singularity. Singularity refers to the hypothetical future where artificial intelligence becomes so powerful that it becomes unpredictable. Basically, as Musk says: "We will not be able to be smarter than a digital supercomputer, so, therefore, if you cannot beat 'em, join 'em." History has taught us that advancements are continuously happening, so there should be more emphasis on good regulation, rather than prevention.



A Neuralink brain chip (source)

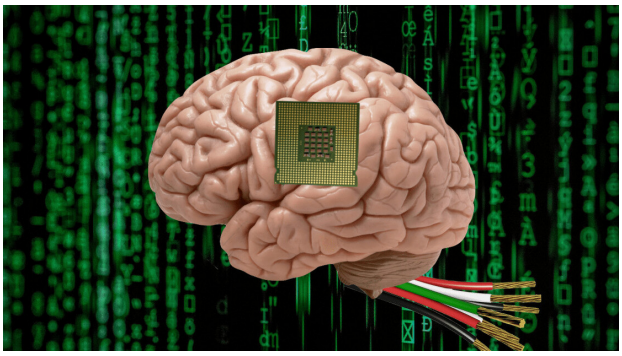
The dark sides of innovation

As good as this all may sound, one must always consider the disadvantages of a new technology, in order to proceed with caution. The first disadvantage is that the implant requires brain surgery. No surgery comes without risks, and brain surgery is no exception to that. However, the medical field continues to advance with leaps and bounds, thus these risks are ever decreasing. Moreover, the chips are designed to aid people with certain impairments, which means that, at the cost of a small risk, the technology would increase their life quality.

Another concern from the general population, is the source of this technology. As mentioned before, research into brain chips is primarily done in the private sector, with one of it's biggest investors being Elon Musk with Neuralink. People often question the intents of research done in the private sector. However, with 70% of the expenditure of science coming from the private sector, one cannot deny that the advancement of the scientific field would stagnate without it.

Furthermore, there is a concern that humanity could become dependent on technology. This misconception can be attributed to the misunderstanding of the concept of technology. According to Britannica, a world renowned encyclopedia, technology is "the application of scientific knowledge to the practical aims of human life". Thus any invention that makes people's life easier is a technology. Even if we become more dependent on it, this increased practicality in many aspects of life can give us more space to advance and evolve as a species.

Lastly, and possibly the biggest concern, is that of criminal use of brain chips. The fear is that someone will hack into these brain chips and control people's actions. There are a number of reasons why this reality is far-fetched. The objective of these brain chips is to, for example, treat paralysis or blindness. These devices modulate neural activity over the brain, they control the movement of a prosthetic device through signal derived directly from the brain, and use this to control the movement of, for example, a prosthesis. Since brain signals are needed, the individual needs to 'think' about moving their prosthetic limb, the same way a person would with a regular limb, over which hackers do not have control. Moreover, most brain chip projects work with a hardware system that is fully encased in the body, and in order to hack a hardware system, a person needs physical contact with the device. As the device would be implanted in the brain, this type of hacking is out of the picture.



The concern of human dependence on technology (source)

What does our future hold?

After careful consideration, and given the advantages and disadvantages of brain chips, we believe they will be a major part of our future with a positive impact. Even given some disadvantages, innovation is unstoppable. So our energy is better spent regulating it and making it as safe as possible. This way we can embrace the technology and use it to advance medicine and technology, changing people's lives for the better.