

What is neural lace?

Summary: Neural Lace is a next generation brain-computer interface (BCIs) that could change the way people think and communicate, and even be the answer to debilitating neurological disorders.

Entrepreneur Elon Musk famously said that people need to become [cyborgs](#) in order to ensure our relevance in the age of artificial intelligence. At the [World Government Summit](#) 2018 in Dubai, Musk said: "Over time I think we will probably see a closer merger of biological intelligence and digital intelligence." If this prediction comes true, it would define a new paradigm for humans and the world we live in.

As an extension of this belief, in 2017 he launched [Neuralink](#), a medical research company that aims to unite the human brain with intelligent computers using the concept of 'Neural lace'. Neural lace is a form of [Brain-Computer Interface](#) (BCI) which facilitates a direct communication pathway between an enhanced or 'wired brain' and an external device. In practice, neural lace is an ultra-thin mesh with a collection of electrodes capable of monitoring brain function and facilitating direct computing capabilities from thought. It is inserted through the skull using a tiny needle containing the rolled-up mesh which unravels spanning the brain. Once in place, the interface uses signals from the brain to enable communication and control applications through thinking alone. As part of the rapidly advancing field of artificial intelligence (AI), neural lace technology could allow people to become an "AI-Human symbiote" enhancing cognition as our brains become part of the AI and change the way we go about our lives.

While the concept of inserting computers into our brains sounds futuristic, BCIs have been around for a while, with several already utilised in the field of neuroprosthetics, for example. However, most BCIs are one-directional, such as those enabling motor control and communication tools for people. For instance, [Bill Kochevar](#) became the first person to use a BCI neuroprosthetic to restore movement in his arm after being paralysed below the neck. He underwent brain surgery to implant sensors in the motor cortex area responsible for hand movement and once the implant was linked to a computer, he trained to be able to move his arm through thought.

Neural lace takes the concept of BCI further by enabling a two-way communication link. As such, neural lace has several potential applications. For example, it could allow you to 'talk' to people in your network through thought, sending instructions or signalling for help. It could also transform data systems, allowing access to infinite databases of information without needing to actively look something up. Neural lace also has the potential to revolutionise education, allowing the user to access manuals and training instantly, taking 'learning on the job' to an entirely new level.

Neural lace could also transform the medical world. It also has the potential to treat neurodegenerative disorders such as Parkinson's disease by allowing sufferers to regain their ability to eat, walk and even talk. This is because the BCI technology allows signals in the brain to circumnavigate the diseased part of the brain, connecting healthy signals to devices or prosthetics.

So far, researchers working with neural lace have tested the mesh-like structure on live mice with few negative impacts reported once full autopsies have been performed, and further studies are underway.

Critics of the concept worry about the security of downloading and uploading directly to the brain and cite Musk's ambitions as stemming from paranoia. "Musk's goals of cognitive enhancement relate to healthy or able-bodied subjects because he is afraid of AI and that computers will ultimately become

more intelligent than the humans who made the computers,” explains BCI expert Professor Pedram Mohseni of Case Western Reserve University, Ohio, [who sold the rights to the name Neuralink to Musk](#).

However, beyond medical applications, the potential benefits of neural lace in bringing human and machine closer are building in credibility and popularity. Ultimately, neural lace could enable people to communicate with computers on almost any task as the mesh enables the brain to wirelessly connect to a computer that is then networked to any object linked to the Internet of Things. This could include household appliances, vehicles, machinery and more.

The extent to which neural lace will play a role in the future of communication and the treatment of neurological diseases remains to be seen, but its potential cannot be argued. So far, according to [the Wall Street Journal](#) (WSJ), Neuralink has raised \$27 million to develop the concept and is targeting \$100 million. While clarity on future strategy and technology within Neuralink remain a closely guarded secret, it is a company paving the way for the advancement of AI. From addressing the side effects of serious illnesses to the ability to upload and download our thoughts, the technology has the potential to change our world completely.