



Unlocking the Human Potential: Neural Implants

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Neural Implants?

Neural Implants (Input): Record and/or monitor neural activity.

Neural Implants (Output): Sending electrical impulses to specific neural circuits to restore/stimulate neural functions.

Brain Computer Interface (BCI): enables a direct communication pathway between neural activity and a external computer system. Able to translate neural input into signals that can control software or hardware.

The Promise of Neural Implants

- Billions worldwide suffer from conditions that can potentially be alleviated with neural implants
 - Epilepsy with responsive neurostimulation systems
 - Motor function loss with BCIs and neural prosthetics
 - Depression/Obsessive Compulsive Disorder with deep brain stimulation
 - etc.
- Limitations of current treatments
 - Many patients have varied responses to medications
 - Patients develop tolerance to treatment over time
 - Assistive devices do not fully replicate natural movement



Human Enhancement

- Cognitive enhancement
 - Increased memory retention
 - Accelerated learning
 - Enhanced problem solving
 - Mood regulation

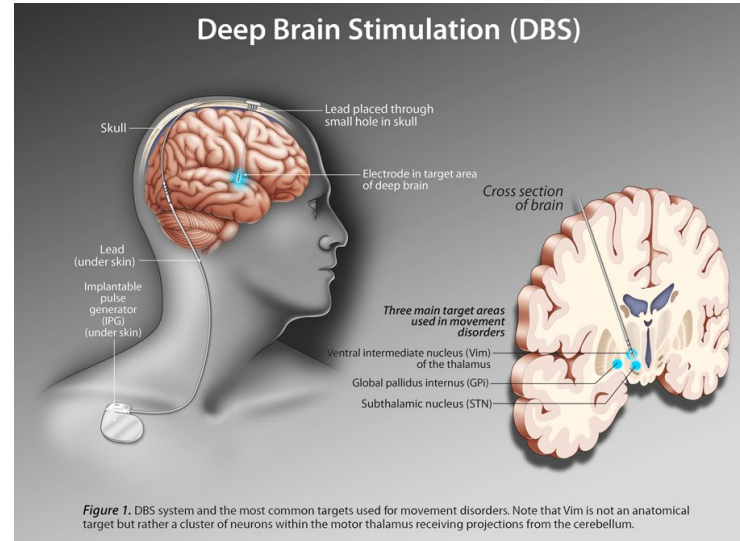
Nelson, McKinley, Golob, Warm, and Parasuraman (2014):
Transcranial Direct Current Stimulation can be used to enhance
vigilance in neurologically unimpaired participants



Current Neural Implant Applications

Neural implants have already been changing lives.

- Over one million people have cochlear implants as of 2022, allowing them to regain hearing abilities and allowing them a much better quality of life.
- Deep brain stimulation has been used as a treatment for Parkinson's for years.
 - Patients experience a reduction in tremors and motor function



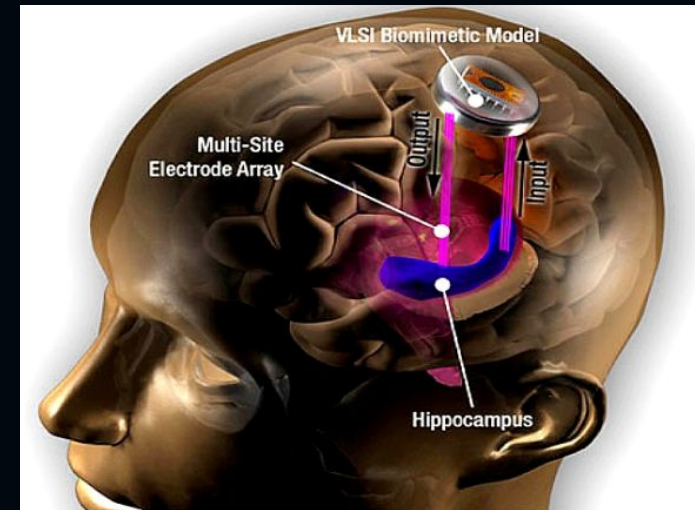
The background is a dark blue field filled with a complex, glowing network of white and light blue lines and dots. The dots, representing nodes, vary in size and brightness, with some appearing as large, out-of-focus bokeh lights. The lines, representing connections, form a dense web that flows from the left towards the right, creating a sense of depth and movement. The overall aesthetic is high-tech and digital, evoking themes of artificial intelligence, data networks, or neural pathways.

Compromising Humanity: The Hidden Dangers of Neural Implants

By Stanley Hoo

Access and Risks

- Neural implants in the long term
 - Insertion of implantable device results in tissue wound around the area, leads to giant cell body forming around the implant
 - Continuous growth of fibrous cells leads to device failure, can no longer record/modulate electrical signals when covered
 - Requires additional surgery to replace device
 - Costly and risky
 - If user changes their mind, very hard to remove
- Restricted to certain people
 - Mainly wealthy people will have access to neural implants, giving them big advantage over those who don't



Human?

- Control over your body
 - Neural implants can send or block electrical signals in your brain, affecting your behaviour
 - Can alter your memories
 - May change who you are as a person
 - Personality
 - Identity
 - Morals
 - AI driven neural implants can take away user control
 - Ex: AI algorithm may predict what users want to hear and not what is actually said, leading to misunderstandings



Mistakes

- Mistakes made by AI model can be detrimental
 - Ex: user is using it for vision to drive on the road
- Biases of AI model may leak into the info being transmitted to the user
- Difficult for users to learn what AI lacks



Privacy

- Neural networks may be able to access user thoughts, invading user privacy
- People may be able to hack into these systems, releasing all of this personal information to the public
- Data also coming from surrounding people



Dependence

- People may grow too dependent on these technologies
- In the case that a trial is stopped for various reasons, it is harmful to expose trial participants to the benefits of neural implants then immediately cutting them off
 - Ex: someone is allowed to experience sight for the first time then that is stripped away



An abstract graphic in the top left corner featuring a network of glowing blue nodes connected by thin lines, set against a dark blue background.

Questions?