**SLIDE 2: INTRODUCTION**

* **A brain chip**, also known as a neural chip or neuro chip, is a technology designed to interface directly with the human brain and enhance its functionality.
* They are connected to the brain by implanting the microchips (more precisely: microelectrode arrays) into the neural tissue, allowing for direct communication with the brain's neurons.
* Brain chips can facilitate communication between the brain and external devices, allowing individuals to control prosthetic limbs, restore lost sensory functions, or interact with computers and other technology using their thoughts.

It can also enhance brain functionality.

* Elon Musk’s company Neuralink is one of the companies that is working on developing brain chips.

**SLIDE 3: NEURALINK**

* **Neuralink Corporation** is an American neurotechnology company that is founded by Elon Musk and a team of seven scientists and engineers.
* This company develops implantable **brain-computer-iterfaces (BCIs).**
* Neuralink was launched in 2016 and was first publicly reported in March 2017.
* **Neuralink (N1)** is a device that will be surgically implanted into your brain and with it, you’ll be able to communicate with machines and even control them.
* The chip, which is about the size of a coin and connected to the electrodes by wires that are 20 times thinner than human hair is planted, not inside the brain, but actually in place of a small part of your skull.
* Neuralink says the N1 is able to connect with 1,000 different brain cells, and that a patient might have as many as 10 N1 chips implanted.
* The chips connect wirelessly to a wearable device that hooks over the user’s ear, much like a hearing aid, and contains a Bluetooth radio and a battery.
* The Neuralink company have basically built a dedicated **robot the "R1"** solely for the purpose of precisely planting over a thousand electrodes into various parts of your brain automatically.

**SLIDE 4: DID YOU KNOW?**

Did you know that having a brain chip could allow someone who doesn't even

have eyes to see for the first time ever?

So, this is what you need to know about brain chips:

-The Good

-The Bad

- And the Ugly

**SLIDE 5: HOW?**

* So before getting to that in detail, just to get the obvious question out of the way, let me tell you **"How brain implants are possible?"**
* You may think out brain is such a complex organ with billions of neurons and non neurons (86 billion and 85 billion in a regular human brain respectively) and it is constantly moving... How any kind of implant is even possible?
* The only reason that any kind of brain implant is possible is that, our brains are basically naturally occurring electronic devices.
* Every single action that you take comes from your brain sending electrical signals through your nervous system to your various body parts.
* And so what neuroscientists realized is that, by inserting electrodes into our brain that can both record and send these pulses of electricity and then connecting those electrodes to a chip that can relay information to and from your brain we can effectively restore and even enhance our existing brain function .
* **That’s how a brain chip works!!**

**SLIDE 6: THE GOOD**

**The Neuralink N1: a real-world example of a brain chip:**

* The procedure of implantation is through an automated machine "R1". Because it's automated by Machine, the entire operation is done in less than 60 minutes.
* The invisibility and wireless charging of N1 from outside the body.
* Two main motivations for brain chips: **Restoration and Enhancement.**

**SLIDE 7: THE GOOD: Restoration**

* **Restoring vision** to the blind:

So let's say that you've been completely blind from birth, your brain works but your eyes or your optic nerves don't.

What the N1 chip allows you to do is:

1. to stick a camera onto your head
2. link that camera feed to your Smartphone which translates the video data into brain language.
3. The phone sends that data to the chip in your skull ~~which via electrodes~~, planted directly into your brain's visual cortex,
4. can then send electrical impulses to bypass the eyes and translate that camera feed directly into your brain.

* Neuralink has already tried rigging a pig's spinal cord with electrodes and it has legitimately allowed them to send a trigger from her brain and stimulate the movement of her limbs through it, which is basically them showing us we can restore the connection between your brain and your limbs or we can even **cure full body paralysis.**

**SLIDE 8: THE GOOD: Enhancement:**

* While first generation chips use 1024 electrodes which could simulate an image roughly equivalent to one shown in previous slide, there is already talk of a next-gen N2 chip with closer to 16,000 electrodes, which could produce something way closer to fully working vision.
* The idea of brain enhancement: improving clarity, zooming ability, and more advanced functions.
* Possibility of advanced communication and functions like internal picture storage, mood control.
* It even has the potential of digital resurrection after death.

**SLIDE 9: THE BAD:**

* Ethical concerns due to extensive testing on animals.
* The high death rate of test animals due to rushed experiments.
* Neuralink's potential violation in terms of hazardous pathogen transportation.

(Pathogens that could cause serious health issues in infected humans, such as bloodstream infections, pneumonia and severe brain damage, among other problems.)

* The importance of FDA approval for human trials and its implications.

(Neuralink just announced at the end of last year that they've applied for is FDA approval. If they get it human trials can start immediately and if they don't they can't.)

And so I don't think it's an exaggeration to say that the future of our entire species rests on this decision by the FDA!!

**SLIDE 10: THE UGLY:**

* Risk of hacking: potential damage to thoughts, feelings, perceptions, and memories.
* Potential of computer viruses infecting humans.
* Dependency on brain chips for social and professional success.
* The affordability issue: potential for socioeconomic inequality.
* Potential negative business practices.

What if Elon introduces subscription, where you have to pay a monthly subscription to retain access to your memories what if there's a bug and your chip sends a bad bit of code to your brain what if the company tries to encourage you to upgrade chips by slowing down your existing one but your legs just start lagging.

**SLIDE 11: CONCLUSION:**

* In conclusion, brain chips hold significant promise for restoring and enhancing brain function, but they also bring ethical, privacy, and societal concerns.
* Careful consideration, regulation, and transparency are necessary to ensure their responsible development and use in the future.