

# Weekend reading, season two, edition one

## Elon Musk presented a pig with a chip in its brain

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### Abstract

Elon Musk proudly presented piglet *Gertruda*, who had a coin-sized chip, that uses moonshot technology, inserted into her brain at a neurology clinic. Musk wants to develop an interface between the brain and computers to study the functioning of the human brain and help people with dementia.

Gertrude is one of three pigs revealed to the public on Friday during a live video broadcast, with one pig not having an interface chip installed and the other who had its chip removed, showing the successful process of chip removal, leaving just a minor scar.

At the beginning of the presentation, the pig was scared and did not want to cooperate, but soon after it was revealed what the chip was actually doing. Shown besides the camera feed, filming the pig was a graph representing brain activity of sensoric organs. The neurological activity in her brain was shown on the graph. The processor in the brain sent signals indicating neurological activity when Gertrude was looking for food. Every time her snout touched something, viewers of the presentation could hear an audible beep, indicating the successful response from the chips probes.

A four-by-four-millimetre chip in the brain works using moonshot technology, a system of micro-sized probes. Tiny probes with more than 3,000 electrodes run from the chip, which is placed in the brain and monitor the activities of about a thousand neurons. The electrodes are thinner than the thickness of the hair. The device transfers the collected data to a computer via a wireless system, where scientists analyse it or feed it into a real-time diagnose software, like shown.

"It's like a Fitbit (smartwatch) in the head with small wires," the billionaire explained. Elon Musk will begin testing the interface on humans with his startup company Neuralink. The goal is to allow individuals with neurological problems to control their phones or computers with their thoughts. In further stages of development, the interface could also help to improve conditions due to dementia, Parkinson's disease, or spinal cord injury, reports the BBC.

"The device fits nicely on the skull. It can be placed under the hair, so it's not noticeable," Musk said.

Many have wondered why the product develops on pigs if it is intended to be used on people. "Pigs are quite similar to humans. If we want to develop something for humans, then pigs are a good choice," Musk explained.

"If the device has lasted in the pig for two months and is still working, then that's a good sign that it's durable enough for humans."

The presentation of Neuralink came a year after Musk first introduced the founding of the company. In July last year, he presented a sketch in which a computer chip was connected to very thin wires with electrodes inserted into the human brain by a surgical robot. The implant in the sketch was able to be connected wirelessly to a small control unit located behind the ear that communicates with the computer. However that idea was dismissed as the implant would be too noticeable and people would not want that. The new edition, *Neuralink 1.0*, has way better specifications than the older sketch model and is the go-to installation for the first production release.

Amongst other medical advantages, the Neuralink team already works on connecting the human mind with artificial intelligence, which would bring vast improvements over everyday life and with symbiosis help sustain humanity.

### My opinion

**I think that** the development of appliances that help people with physical or mental disabilities is a crucial step in providing better live quality for everyone and for socially including disabled people with normal people.

Although on one side the advantages are significant, however, on the other side, many are concerned about security and privacy risks of installing such a device in their bodies. So not only that the installation poses a significant risk, there may be and probably are critical implementation issues, especially with the devices connected to the internet via phones that are long known to be the potential entry point for hackers. I speculate that hijacking a users phone would make the attacker in control of pain levels of victims, making them experience significant pain, if not even worse; controlling their mind and interaction with the world. Critical security vulnerabilities may even cause death if exploited by the evil.

## Glossary

- **implementation** — the process of putting a decision or plan into effect; execution.
- **moonshot** — an extremely ambitious and innovative project.
- **exploit** — a software tool designed to take advantage of a flaw in a computer system, typically for malicious purposes such as installing malware.
- **vulnerability** — the quality or state of being exposed to the possibility of being attacked or harmed, either physically or emotionally.
- **electrode** — a conductor through which electricity enters or leaves an object, substance, or region.
- **probe** — a blunt-ended surgical instrument used for exploring a wound or part of the body.

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