

BRAIN-COMPUTER INTERFACES

Not just science fiction anymore. Just like personal computers and smart phones, they will first consist of fairly primitive devices but successive iterations will rapidly develop into very sophisticated neurological instruments. Given the continually increasing speed of scientific discovery and development in general, this will probably happen sooner than we think.

Before we reach the level of technological development where we can directly connect the human brain to the internet (and to each other), a great deal of research is needed in three main areas:

1. “Wetware”, i.e., the brain. Neurosciences, including neurotechnology
2. Hardware. Continuing to develop bigger, faster supercomputers.
3. Software. Probably will eventually developed by AI. “Google’s AI is Learning to Make Other AI.” Google Brain, OpenAI, DeepMind.

Research in all three areas is proceeding at an increasingly rapid pace, supported by both public and private initiatives.

BRAIN Initiative

From Wikipedia, the free encyclopedia

“Understanding how the brain works is arguably one of the greatest scientific challenges of our time.”

The White House BRAIN Initiative (Brain Research through Advancing Innovative Neurotechnologies), is a collaborative, public-private research initiative announced by the Obama administration on April 2, 2013, with the goal of supporting the development and application of innovative technologies that can create a dynamic understanding of brain function. This activity is a Grand Challenge focused on revolutionizing our understanding of the human brain, and was developed by the White House Office of Science and Technology Policy as part of a broader White House Neuroscience Initiative.

DARPA

Established in 1958 as part of the U.S. Department of Defense, DARPA pursues opportunities for transformational change rather than incremental advances. It does so collaboratively as part of a robust innovation ecosystem that includes academic, corporate, and governmental partners. To fulfill its mission, the Agency relies on diverse performers from throughout this ecosystem to apply multi-disciplinary approaches to both advance knowledge through basic research and create innovative technologies that address current and predicted practical problems through applied research.

DARPA's budget is around 3 billion per year.

DARPA's New Brain Device Increases Learning Speed by 40%

IN BRIEF

An international team of scientists has created a non-invasive device that stimulates the brain to improve cognitive function. In tests on macaques, it reportedly increased the monkeys' learning speed by 40 percent.

Elon Musk Launches Neuralink to Connect Brains With Computers

Startup from CEO of Tesla and SpaceX aims to implant tiny electrodes in human brains



Neuralink is pursuing what Mr. Musk calls “neural lace” technology, implanting tiny brain electrodes that may one day upload and download thoughts.

Somewhere in his packed schedule, he has found time to start a neuroscience company that plans to develop cranial computers, most likely to treat intractable brain diseases first, but later to help humanity avoid subjugation at the hands of intelligent machines.

“If you assume any rate of advancement in [artificial intelligence], we will be left behind by a lot,” he said at a conference last June.

The solution he proposed was a “direct cortical interface”—essentially a layer of artificial intelligence inside the brain—that could enable humans to reach higher levels of function.

KERNAL



Earlier this year, former Braintree founder Bryan Johnson publicly announced his plans to forge Kernel, a company with the sole purpose of building hardware and software to augment human intelligence. Today, Johnson is investing \$100 million of his own money into the concept, looking to rapidly double the size of his team, shore up a portfolio of intellectual property and prepare for animal and human testing trials for a forthcoming device aimed at reducing cognitive deficiencies for sufferers of conditions like Alzheimer's and dementia.

Kernel is still very much in the planning stages, but the idea is rooted in the research of Theodore Berger, the company's chief science officer. The futuristic device, which Johnson says might actually not need to be implanted beneath the skull at all, is designed to facilitate communication between brain cells by hacking the "neural code" that enables our brain to store and recall key information. With proper implementation, such a device could correct faulty signals to mend a cognitive impairment.

Steve Hoffman: New Brain Computer Interface Technology
TED talk at CEIBS (China Europe International Business School) 18 minutes

<https://www.youtube.com/watch?v=CgFzmE2fGXA>

Peter Diamandis
Imagining the Future: The Transformation of Humanity
TEDx, December 2016

<https://www.youtube.com/watch?v=7XrbzIR9Qml>

7 Days of Artificial Intelligence

<https://www.youtube.com/watch?v=PRdcZSuCpNo>