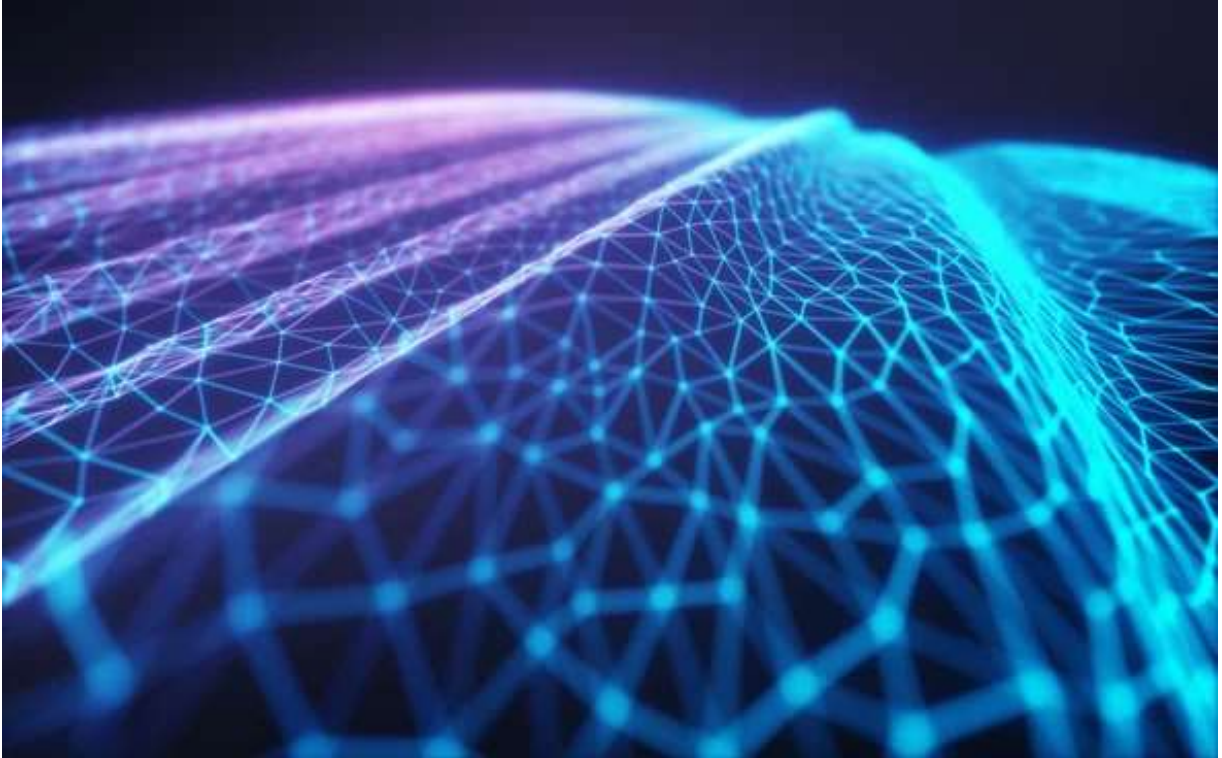


COMPUTING

A New Supercomputer Is the World's Fastest Brain-Mimicking Machine

The computer has one million processors and 1,200 interconnected circuit boards

By Mindy Weisberger, LiveScience on November 5, 2018



Credit: *Getty Images*

Scientists just activated the world's biggest “brain”: a supercomputer with a million processing cores and 1,200 interconnected circuit boards that together operate like a human brain.

Ten years in the making, it is the world's largest neuromorphic computer—a type of computer that mimics the firing of neurons—scientists announced on Nov. 2.

Dubbed Spiking Neural Network Architecture, or SpiNNaker, the computer powerhouse is located at the University of Manchester in the United Kingdom, and it “rethinks the way conventional computers work,” project member Steve Furber, a

professor of computer engineering at the University of Manchester, said in a statement. [Science Fact or Fiction? The Plausibility of 10 Sci-Fi Concepts]

ADVERTISEMENT

But SpiNNaker doesn't just "think" like a brain. It creates models of the neurons in human brains, and it simulates more neurons in real time than any other computer on Earth, according to the statement.

"Its primary task is to support partial brain models: for example, models of cortex, of basal ganglia, or multiple regions expressed typically as networks of spiking [or firing] neurons," Furber told Live Science in an email.

DOUBLE THE PROCESSORS

Since April 2016, SpiNNaker has been simulating neuron activity using 500,000 core processors, but the upgraded machine has twice that capacity, Furber explained. With the support of the European Union's Human Brain Project—an effort to construct a virtual human brain—SpiNNaker will continue to enable scientists to create detailed brain models. But now it has the capacity to perform 200 quadrillion actions simultaneously, university representatives reported in the statement.

While some other computers may rival SpiNNaker in the number of processors they contain, what sets this platform apart is the infrastructure connecting those processors. In the human brain, 100 billion neurons simultaneously fire and transmit signals to thousands of destinations. SpiNNaker's architecture supports an exceptional level of communication among its processors, behaving much like a brain's neural network does, Furber explained.

“Conventional supercomputers have connectivity mechanisms that are much less well suited to real-time brain modeling,” he said. “SpiNNaker is, I believe, capable of modeling larger spiking neural networks in biological real time than any other machine.”

ADVERTISEMENT

MIND OVER MATTER

.....

Previously, when SpiNNaker was operating with only 500,000 processors, it modeled 80,000 neurons in the cortex, the brain region that moderates data from the senses. Another SpiNNaker simulation of the basal ganglia, a brain area affected by Parkinson’s disease, hints at the computer’s potential as a tool for studying brain disorders, according to the statement.

SpiNNaker can also control a mobile robot called SpOmnibot, which uses the computer to interpret data from the robot’s vision sensors and make navigation choices in real time, university representatives said.

With all its computing power and brain-like capabilities, how close is SpiNNaker to behaving like a real human brain? For now, exactly simulating a human brain is simply not possible, Furber said. An advanced machine such as SpiNNaker can still manage only a fraction of the communication performed by a human brain, and supercomputers have a long way to go before they can think for themselves, Furber wrote in the email.



Sign up for *Scientific American's* newsletters.

[Sign Up](#)

“Even with a million processors, we can only approach 1 percent of the scale of the human brain, and that’s with a lot of simplifying assumptions,” he said.

However, SpiNNaker could mimic the function of a mouse brain, which is 1,000 times smaller than a human brain, Furber added.

ADVERTISEMENT

“If a mouse thinks mouse-sized thoughts and all that is required is enough neurons wired together in the right structure (which is itself a debatable point), then maybe we can now reach that level of thinking in a model running on SpiNNaker,” he said.

Copyright 2018 LIVESCIENCE.com, a Future company. All rights reserved. This material may not be published, broadcast, rewritten or redistributed.

ADVERTISEMENT

ABOUT THE AUTHOR(S)

Mindy Weisberger
