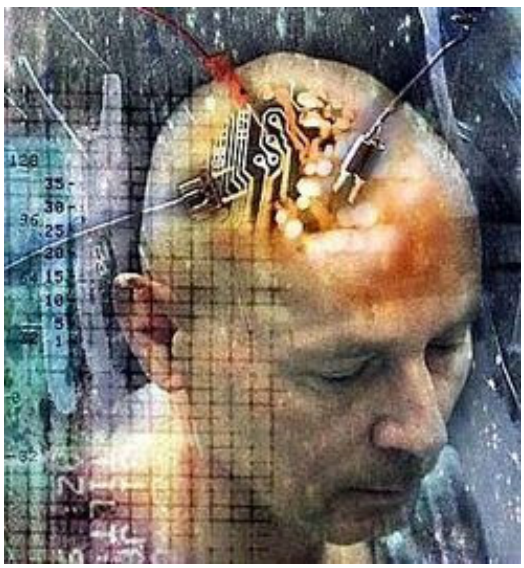
IBM's New Supercomputing Chip Works like the Human Brain

By Khrysi Briggs on August 8, 2014 · 11:21 am

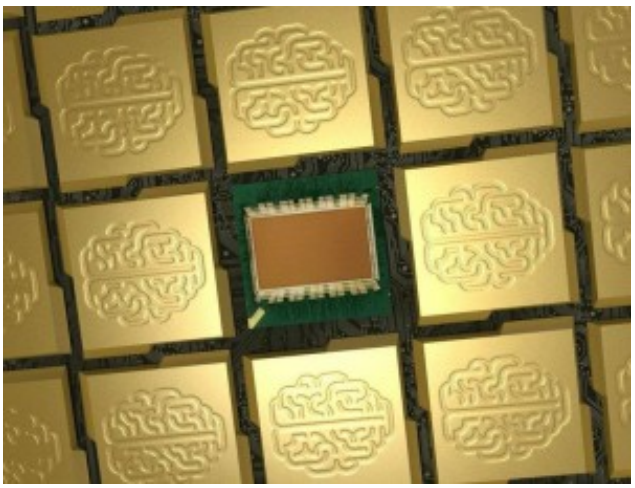


Ah, cognitive computing… it's been one of the most thrilling topics in technology for years. The notion that one day we could actually build a computer that possesses the same power and efficiency as the human brain is fascinating. For as long as digital technology has existed, scientists have dedicated countless years of their lives to trying to build computers that functioned more like the squishy three-pound organ resting just below our stubborn skulls. IBM has taken us one step closer this week with their new next-gen computer chip, True North, which is designed to mimic the performance of the human brain.



IBM has made astounding progress since the inception of their first prototype of the human brain-inspired SyNAPSE chip nearly three years ago. SyNAPSE, which stands for Systems of Neuromorphic Adaptive Plastic Scalable Electronics, was developed by IBM along with Cornell Tech and iniLabs and funded by the Pentagon's Defense Advanced Research Projects Agency (DARPA) as part of a decade-long effort by IBM to build a brain-inspired computer. The first-generation chip made huge waves when it was initially introduced, proudly boasting what (at the time) was a mind-boggling 256 neurons on it. The new chip? Well, it manages to fit one million neurons onto a space about the size of a stamp – pretty impressive. But the upgrades don't stop there. Whereas the first generation chip had 262,144 programmable synapses, the new one has 256 million. Also, the first generation chip had just a single neuro-synaptic core, while the new one has 4,096. Strictly speaking in numbers, this little guy is beyond impressive. And, it's efficient – to run all that, the chip requires only 70mW (Milliwatts) of power. Just to give you some perspective, that is roughly the

same amount used to run a hearing aid.



IBM's latest venture has earned them a spot on the cover of the journal Science, and the honor is well-deserved. The way the world views conventional computing has, effectively, just been turned on its head. For one, the new SyNAPSE chip is so disruptive to the current computing landscape that IBM has had to create a new programming language to go along with it. This makes sense when you consider that the notion of "cognitive computing" means that a bit of inorganic matter will be attempting to mimic the interactions of neurons and synapses in biological brains. IBM has tackled this notion of organic problem solving, which the brain does by using hypotheses, past experiences and trial and error, with advanced algorithms and silicon circuitry. Some of the real-world effects we could see from all this? For starters, assistive glasses for the visually impaired, small spheres that could aid in search and rescue missions, and solar-powered leaf-shaped fire and environmental sensors that could send out massive life-saving disaster alerts – just to name a few.



The human brain truly is the world's most sophisticated computer, so it should come as no surprise that a project dedicated to cracking the cognitive computing code would entice an organization like DARPA to spend a mouth-dropping $53 million to fund it. From everything we've seen so far, it appears the money was well spent. Just to further put things into perspective, take a look at our last successful venture into technologically recreating the human brain. Just last year, scientists used one of the world's most powerful supercomputers to match just one percent of one second's worth of human brain activity - it took an astounding 83,000 processors and was hailed as a huge success. IBM's Chief Scientist Dr. Dharmendra S. Modha best sums up the magnitude of the accomplishment with this simple analogy: "You can carry our board in your backpack. You can't carry four racks of conventional computers in your backpack".

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