ET machines sought by astronomer

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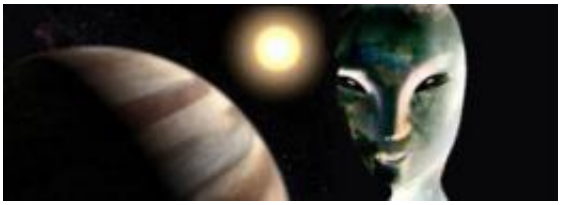


If we ever do receive a message from outer space, we'll want to know what kind of aliens sent it. SETI researcher Seth Shostak says we shouldn't expect them to be anything like us - in fact, they might not be biological at all, but instead, extraterrestrial machines.

People have always held a biased view of the world around them. It's an aspect of being human.

It took until the 17th century for us to reject Aristotle's vision of a universe where our Sun and the stars revolved around the Earth. Search for Extraterrestrial Intelligence (SETI) Senior Astronomer Seth Shostak points out that up until a century ago, the scientific community believed a vast engineering society was responsible for building an irrigation system on the surface of Mars. Discovering the Martians could, in principle, be done by simply turning an Earth-based telescope in the direction of the Red Planet. Now it seems that our best chance for finding Martian life is to dig deep into the surface in search of

subterranean microbes.

Our idea of extraterrestrial life has changed drastically in 100 years, but our search strategies have not kept up. In his upcoming paper "What ET will look like and why should we care?" for the November-December issue of Acta Astronautica, Shostak argues that SETI might be more successful if it shifts the search away from biology and focuses squarely on artificial intelligence. Shostak sees a clear distinction between life and intelligence: he says we should be searching for extraterrestrial machines.

"Continuing to hunt for our analogs - technically competent biological sentients - may be an enterprise with less than promising prospect, as it focuses on a highly transient prey," Shostak says.

Our own technological advances since World War II make a great case for his position. Medical advancements since the 1950s show human beings becoming more bionic as digital and mechanical breakthroughs have found their way into our bodies. The development of true Artificial intelligence (AI) is, by some estimates, just a few decades away. When considering Moore's Law—which shows a pattern of accelerating returns in technological improvement—Shostak is forced to believe humanity's main role in the universe might be the creation of its successor.

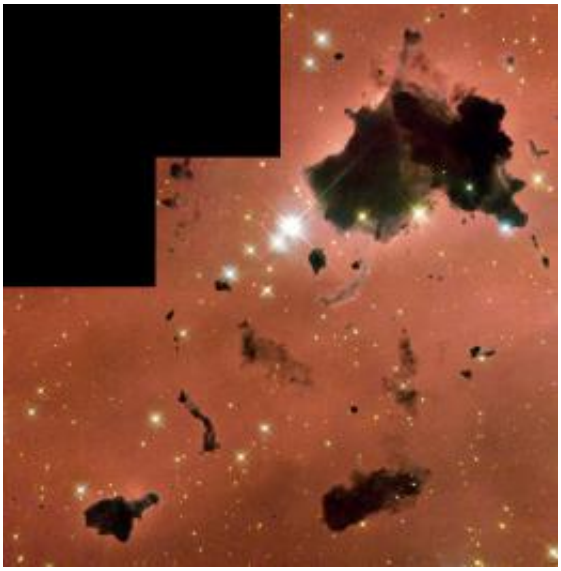
"The continued exponential growth in computer power implies that even consumer-grade computers will have the processing power of a human brain by the year 2040," he says.

If and when we do create true AI, it would surpass us quickly. An AI would have the power to self-direct its own evolution.

"If we build a machine with the intellectual capability of one human, then within 5 years, its successor is more intelligent than all humanity

combined," he says.

The window between a society's technological birth and its shift to artificial intelligence is amazingly small.



Dark clouds in the image are known as Bok Globules, areas of space that may be hospitable to extraterrestrial machine intelligence. Image credit: NASA and The Hubble Heritage Team (STScI/AURA)

"Once any society invents the technology that could put them in touch with the cosmos, they are at most only a few hundred years away from changing their own paradigm of sentience to artificial intelligence," he says. Because artificial sentience would almost inevitably outlast and outperform its fleshy, needy predecessors, Shostak concludes that any aliens we detect will be machines.

ET machines would be infinitely more intelligent and durable than the biological intelligence that invented them. Intelligent machines would in

a sense be immortal, or at least indefinitely repairable, and would not need to exist in the biologically hospitable “Goldilocks Zone” most SETI searches focus on. An AI could self-direct its own evolution. Every new instance of an AI would be created with the sum total of its predecessor’s knowledge preloaded.

The machines would require two primary resources: energy to operate with and materials to maintain or advance their structure. Because of these requirements, Shostak thinks SETI ought to consider expanding its search to the energy- and matter-rich neighborhoods of hot stars, black holes and neutron stars.

Data centers like this generate a lot of heat, and keeping them cool is a major challenge for modern computing. Intelligent computers would likely seek out a low-temperature habitat. Image credit: Rice University

Bok globules are another search target for sentient machines. These dense regions of dust and gas are notorious for producing multiple-star systems. At around negative 441 degrees Fahrenheit, they are about 160 degrees F colder than most of interstellar space.

This climate could be a major draw because thermodynamics implies

that machinery will be more efficient in cool regions that can function as a large “heat sink”. A Bok globule’s super-cooled environment might represent the Goldilocks Zone for the machines, says Shostak. But because black holes and Bok globules are not hospitable to life as we know it, they are not on SETI's radar.

“Machines have different needs,” he says. “They have no obvious limits to the length of their existence, and consequently could easily dominate the intelligence of the cosmos. In particular, since they can evolve on timescales far, far shorter than biological evolution, it could very well be that the first machines on the scene thoroughly dominate the intelligence in the galaxy. It’s a “winner take all” scenario.”

“While it’s not easy trying to figure the best SETI strategy to uncover these super sentients, it seems worthwhile to spend at least some of our SETI efforts trying to establish their presence,” he adds.

Provided by Astrobio.net

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