TECH Trek

In search of . . .

Early in the movie *Contact*, we watch as Dr. Ellie Arroway monitors the sounds of the cosmos through a pair of headphones. "The background is awash of empty static and a faint beeping, fading in and out of reception. Ellie slowly swims up to consciousness. After a moment her eyes open. She sits up . . . " [1] At this moment we are aware she is listening to something other than random noise.

Watching this movie was a thrilling experience, but wouldn't participating in the ongoing search for extraterrestrial intelligence be even more exciting? As fantastic as this seems, it may soon be possible to join the search from school or home. The SETI@home project (Search for Extraterrestrial Intelligence) is planning to launch a grand experiment to harness the spare power of hundreds of thousands of computers via the Internet. The project will launch in April 1999 and will run for two years.

All together now

Without outside help, SETI's computers can only scan the surface of data received from radio telescopes. To overcome this problem, SETI scientists would like to tap into the huge reservoir of the estimated 30 million computers connected to the Internet. "SETI@home may indeed detect a signal that would otherwise be missed."[2]

By last August, 115,000 participants had volunteered on the SETI@home website, *setiathome.ssl.berkeley.edu*.[3] The website shows the current status of the search, provides various educational materials and links to SETI, astrobiology, and astronomy sites, and offers free software for downloading.[2]

Simply software

If all goes according to schedule, volunteers will be able to download the free software early this spring—versions will be available for Windows, Unix, and Macintosh platforms. The minimum computer requirements are 32 Mb of RAM and 24 Mb of hard disk space; there is no minimum computer speed or Internet connection speed required.

The SETI@home software works automatically when your keyboard is idle, much like an ordinary screensaver. It receives and analyzes data captured by the Arecibo radio telescope in Puerto Rico, the largest and most sensitive radio telescope in the world.[2] When first downloaded, the program includes an initial batch of data from Arecibo for your computer to start working on.[4]

Although the program will run like a screen saver, you won't see any flying toasters or colorful fish. Instead, users will be able to visualize the experiment in progress by choosing from three modes described in the SETI@home website. In **Science Mode**, the analysis on the local machine is shown in real time, and the significance of each result is explained. **Sky Progress Mode** shows how the entire experiment covers the sky and summarizes all the potentially interesting results found so far. The background for this visualization will be an image of the bright stars in that region of the sky, but participants may choose more abstract representations. **Earth Progress Mode** focuses on the people participating in the experiment. A spinning globe portraying the Earth is shown, highlighted at the locations where each individual or organization is currently participating. The total number of computers involved is displayed in real time, and participants who have been involved the longest or have analyzed the most data will be featured.

The SETI@home software analyzes the data to identify signals that could be of extraterrestrial origin, which should stand out from normal cosmic background noise based on signal strength and frequency characteristics. Crunching the data takes about 24 hours of computer time, which may take several days in real time, depending on how much your computer is turned off or used for other tasks. Then the software tells the user what it found and requests that the user connect to the Internet, allowing the program to upload the information back to the SERENDIP project's website (a SETI project with continuous access to the Arecibo radio telescope).[5]

The data sent from your computer will be further processed by the SERENDIP project. Since mathematics is considered a universal language, a candidate signal might contain an identifiable mathematical pattern,

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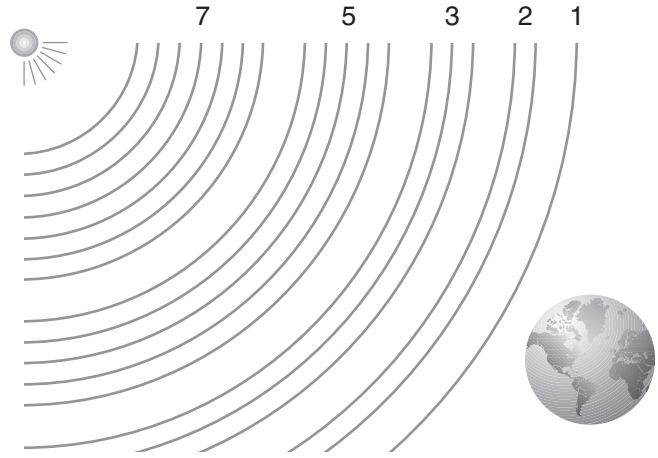
such as a series of prime numbers (see Figure 1). For example, 2, 3, 5, 7, and 11 are consecutive primes. There are no known natural electromagnetic sources of prime numbers in the universe.[2]

The hunt is on

Despite a few false alarms, SETI scientists have yet to discover an unidentified, artificial signal from space.[6] It is the thrill of the hunt, however, that will motivate students to learn more about the astronomy, mathematics, physics, biology, and technology involved in the search. Equally important is the opportunity to involve your middle school students in an ongoing, real-life science experiment. To make the data analysis more concrete, the project will make available actual "sounds" received by the giant antenna at the Arecibo radio telescope: With a sound card and speakers, you will be able to *hear* cosmic background noise and natural electromagnetic radiation emanating from stars.

Of course, there is a only a very slight chance that your classroom computer will be the first to detect the subtle whisper of an intelligence beyond Earth. Considering the profound implications though, can you think of anything better your computer could be doing while you sleep?

Figure 1.



A representation of prime numbers transmitted from a distant solar system.

References

1. Sagan, C. and J. Hart. 1997. *Contact* (the film). Warner Brothers. Transcript: *hourglass.ml.org:8080/contact/contact.htm*.
2. SETI@home. *setiathome.ssl.berkeley.edu*.
3. Sullivan, J. August 3, 1998. Wired News. *www.wired.com/news/news/technology/story/14174.html*.
4. SERENDIP. *sag-www.ssl.berkeley.edu/serendip*.
5. Snyder, B. August 17, 1997. PC World Online. *www.pcworld.com/news/daily/data/0897/970814175019.html*.
6. Edelson, E. 1979. *Who goes there: The search for intelligent life in the universe*. New York: McGraw-Hill.