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# A Faster, More Energy-Efficient GPS

New software could help make location-aware devices ubiquitous.

By Kate Greene

If you want to add location information to pictures today, it's a fairly tedious process. Many people manually annotate their pictures after they've uploaded them to a computer. And while some high-end cameras come equipped with a Global Positioning System (GPS) chip that captures the location information, this extra hardware is slow and can drain battery power. Now Geotate (http://geotate.com/) , a U.K.-based spinoff of Philips Research (http://www.research.philips.com/) , thinks that it can make GPS faster and more energy efficient in any device.

As more people take pictures on digital cameras, there's a growing interest in making sure that those pictures are geotagged. When pictures contain location information, they could be easier to sort in personal photo software like iPhoto. And if geotagged pictures are uploaded to a photo-sharing site, such as Flickr, then others can benefit from the information when, say, planning a vacation. Right now, only a small fraction of photos contain any information about where they were taken.

To be sure, Geotate isn't the only company trying to make geotagging more common. Eye-Fi (http://www.eye.fi/) announced this week that it will sell a memory card for cameras that can automatically and wirelessly upload geotagged photos to a computer or photo-sharing site. Eye-Fi's technology differs from Geotate's in that it approximates a camera's location from the local Wi-Fi routers--information that's accessed via Skyhook (http://www.skyhookwireless.com/) Wireless's extensive database of Wi-Fi hot spots covering 70 percent of the United States.

Since Geotate's approach doesn't require a Wi-Fi signal, it's practical in more-remote locations. However, it falls short in major urban areas, where GPS signals tend to get blocked by tall buildings. Ultimately, the best geotagging results would come from a combination of services that use a variety of location-tracking technologies, suggests Alexandre Bayen (http://www.ce.berkeley.edu/~bayen/) , a professor of civil and environmental engineering at the University of California, Berkeley.

The basic idea behind Geotate's approach, called Capture and Process, is to collect only a small amount of information from the GPS satellites that help determine location, explains Chris Marshall, the company's CTO. And instead of processing this

information on a GPS chip within a gadget, it's processed, with the help of software developed at the company, on a computer when the photos are uploaded. "If you can do the processing in software," says Marshall, "then you don't need a dedicated chip."

Traditional GPS systems require a lot of electronics, including amplifiers, filters, an antenna, and a processing chip. A GPS-enabled device listens to signals, which contain orbit information, from the GPS satellites. Using this information, the device can calculate the distance between itself and the satellite, and from that determine where it is. But it can take 30 seconds for a satellite to stream its position to a GPS receiver. And only after the GPS system decodes the orbit information from four satellites can it calculate the location--a process that requires the processor to churn through a relatively large amount of data.

Geotate's approach is a redesign of the system that loses the processor. Instead, the hardware simply captures a small sample--200 milliseconds worth--of satellite orbit information and it stores it in memory. When a person uploads her pictures to a computer, the accompanying GPS data is used to calculate location information by employing the computer's processor and by querying Geotate's database of historic satellite positioning. The process requires only 10 millijoules of energy at the time the picture is taken, says Geotate's Marshall, which is about one-hundredth of the energy used in a traditional GPS system.

While the company doesn't provide any specific hardware, it is working with personal electronics companies to incorporate the approach in cameras. But ultimately, Geotate's product is the GPS processing software and the database used to locate the satellites after the fact. Marshall says that he expects Capture and Process add-ons for cameras to be available by the end of the year.

Bayen suspects that geotagging photos and other objects will start to be more popular in the coming years as people get more used to location-based services and location-aware devices such as the iPhone. It's unclear if Geotate's approach will be widely adopted in the industry, but it is approaching the industry wisely by attempting to solve energy-efficiency problems. In order to get more people to geotag their photos, says Bayen, the location technology needs to not drain the battery.

## Upcoming Events

[The Front End of Innovation (http://www.iirusa.com/feiusa/fei-home.xml)](http://www.iirusa.com/feiusa/fei-home.xml)

Boston, MA

Monday, May 18, 2009 - Wednesday, May 20, 2009

http://www.iirusa.com/feiusa/fei-home.xml (http://www.iirusa.com/feiusa/fei-home.xml)

**MIT Sloan CIO Symposium: Sustaining CIO Leadership in a Changing Economy (http://www.mitcio.com/)**

Cambridge, MA

Wednesday, May 20, 2009

http://www.mitcio.com/ (http://www.mitcio.com/)

**TieCon East (http://www.tieconeast.org/2009/)**

Boston, MA

Thursday, May 21, 2009 - Friday, May 22, 2009

http://www.tieconeast.org/2009/ (http://www.tieconeast.org/2009/)

**2009 Medical Innovation Summit (http://www.ClevelandClinic.org/innovations/summit)**

Cleveland, OH

Monday, October 05, 2009 - Wednesday, October 07, 2009

http://www.ClevelandClinic.org/innovations/summit (http://www.ClevelandClinic.org/innovations/summit)