

Two hackers Alice and Bob at Harvard are inspired by a Salon article from June 11 2002 (see below). They want to track one of their friends at Harvard using triangularisation. By knowing the distance to their friend Charls, they are able to figure out, where the friend is. On the area photo below you have indicated the location of the two friends A, B .

A measures a distance to C which is equal to her distance to B .

B measures a distance to C which is $\sqrt{2}$ his distance to A .

Where do they find C , the location of Charles?



Students at the University of California at San Diego are tracking their friends' locations with PDAs.

By Randy Dotinga, www.salon.com

June 11, 2002 — SAN DIEGO — It's 11 p.m. Do you know where your boyfriend is? If he attends the University of California at San Diego, finding him may be as easy as turning on a PDA.

The university is equipping hundreds of students with personal digital assistants that allow them to track each other's location from parking lot to lecture hall to cafeteria. The technology is sophisticated enough to pinpoint where a person is in a building — say, a dorm — within a margin of error of one floor.

No one is forcing students to use the \$549 Hewlett-Packard Jornada PDAs, which are provided for free, or requiring them to allow their buddies to watch them wander across campus on a zoomable map. But students still worry about protecting themselves from stalkers, university administrators, FBI agents and nosy parkers.

"I don't necessarily want even my friends knowing where I am," says Ben Shapiro, a 22-year-old senior who is designing the project's privacy rules. "Maybe students aren't out of the closet and don't want people to know they're going to the Gay and Lesbian Resource Center. Maybe you're cheating on your girlfriend and you don't want her to know you're in somebody else's dorm room. It's creepy Big Brother."

Shapiro is no stranger to speaking his mind. In his freshman year, he and the ACLU successfully sued UCSD after he got in trouble for posting a handwritten sign that said "Fuck Netanyahu and Pinochet" on his dorm room window. But Shapiro actually likes the location-tracking software despite his misgivings. "If the system has enough protections for people's privacy and enough people use it, it could be really great," he says.

The official goal of the PDA project is to test whether location trackers will encourage students to find each other more easily on a sprawling and rapidly growing campus. "What used to feel like a small town is starting to feel like a big city," said William Griswold, a computer science professor who is overseeing the project.

The PDAs detect each other through the university's Wi-Fi (Wireless Fidelity) network, the same radio wave-based system that allows lap-toppers to go online from coffeehouses and airports.

The location-tracking software itself, developed by a 15-year-old student at the university, draws upon triangulation technology used by global positioning system (GPS) devices. The PDAs figure out their locations by comparing the strength levels of signals traveling from the devices to various Wi-Fi antennas.

The software only allows a person to track the location of another user if both agree. If Shapiro doesn't want his best friend to track him, he can leave him off his PDA's equivalent of an America Online "buddy list." According to Griswold, the location data is protected by the standard SSL Internet encryption technology.

But critics are skeptical. "They have created a security risk for every single student who uses the software," says Nick Van Borst, a 25-year-old senior majoring in world literature who criticized the tracker system in a university magazine. "People are hacking things on campus all the time, and there's always these crazy viruses going around. Somebody's going to want to (hack) it just for the hell of it to see if they can."

Hackers don't even need to be on the campus to invade the PDA location tracker system. Students can log in to a Web site from anywhere and check where their friends are. The system offers both a zoomable map of the campus – with moving dots representing their friends – and a text list of where people are. If students program their PDAs properly, their buddies can also track their locations around the world whenever they log into a Wi-Fi network.

System administrators can gain access to the locations of students or employees equipped with the PDAs, although designers hope to eventually make that impossible. Law enforcement officers could also conceivably try to track someone without their knowledge, but "it's not our intention to be a party to activities like that," Griswold says.

The PDA project will get bigger. UCSD has a few dozen more donated PDAs to give away to students, and it hopes to equip 330 freshmen with them this fall when it opens a sixth mini-college on campus.

Hewlett-Packard, which has provided the PDAs for free, wants to know what college students do with the devices, Griswold says. "What 18- or 20-year-olds will do with these PDAs today is what 35-year-olds will be doing with them tomorrow."

That's what worries privacy advocates who are already monitoring the growing use of location-tracking GPS microchips in cellphones.

Trouble looms around the corner "even if there's a rock-solid privacy policy, even if certain safeguards are built in," says Beth Givens, director of the San Diego-based Privacy Rights Clearinghouse. "Whenever someone develops a new service that uses personally identifiable information, there will be in the future other uses found for that information. You can count on it."

UCSD officials contend that students know what they're getting into. The PDA project is an experiment so users must sign waivers before using the devices, Griswold said. "The approach we've taken is to put control into the hands of the user and explain to them what it means. The students at this university are very bright, and we expect them to all be able to understand the things we say to them."

Some students don't even bother looking at the waiver. They turn down the new technology for a very old-fashioned reason. "They're afraid that if they break them, we'll charge them for it," Griswold said.

For now, at least, both their pocketbooks and their privacy will remain intact.

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