

Cart 54, Where Are You? The Tracking System Knows

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"LOCATION, location, location" is no longer a truism limited to real estate agents: it has become the mantra of a growing number of wireless companies as they seek new ways to track people and things.

Inside stores, hospitals, warehouses and factories, where Global Positioning System devices generally do not work, systems are being developed that keep tabs on where people and objects are. They can help users navigate the building, picking up information at useful points.

Indoor positioning systems based on Wi-Fi, the popular wireless technology that is proliferating in cafes, on college campuses and in homes, are helping people use hand-held or tablet PC's to navigate supermarkets, libraries and museums. Other systems built on infrared and radio frequency technologies are being used in hospitals to quickly pinpoint the location of patients, doctors and equipment.

A typical indoor positioning system, or I.P.S., tracks people wearing badges or carrying devices that transmit wireless signals to receivers in ceilings or on walls. The receivers, connected to a local network, send the data to servers that calculate location and make the information available in various ways.

One place where indoor positioning has taken hold is the Operating Room of the Future, a state-of-the-art suite created by Massachusetts General Hospital in Boston to evaluate new surgical devices and information systems technologies. The system enables the hospital to track surgeons, nurses, patients and equipment during 20 or so surgical operations every week and to store the information in databases. The data helps researchers analyze whether the devices and processes being tested are more efficient than those used in conventional operating rooms.

Massachusetts General officials say the advantages of the indoor positioning system have already persuaded them to deploy it throughout the hospital's 50 conventional operating rooms, which span four buildings.

Doctors say that by making it easy to see exactly where surgeons, staff members and equipment are at any given moment, the system will enable them to plan more efficiently. "That is where its real potential lies," said Dr. Warren Sandberg, director of anesthesia for the Operating Room of the Future. "Just knowing what the capacity of things are upstream and downstream will help me make decisions that are good for my patients."



Knowing where people and things are also makes it possible to react more quickly to emergencies. The badges worn by patients, for example, have panic buttons that can alert doctors and nurses. Quick access to tools also helps, Dr. Sandberg added. "To be able to walk to a workstation and type in 'find me the nearest defibrillator' and have it give you a map with the location of the nearest one would be a godsend," he said.

The system in use at Massachusetts General was developed by Radianse, a start-up company based in Lawrence, Mass. The battery-powered badges worn by doctors and patients give off both infrared and radio frequency signals that are picked up by receivers connected to the hospital's computer network. Web browsers can be used to search for items with tags or for people with the badges and to view diagrams of floors showing real-time locations of doctors, patients and equipment.

Another indoor system, developed by Versus Technology of Traverse City, Mich., was introduced in July in the busy emergency department at Albert Einstein Medical Center in Philadelphia. Based on infrared signals, it helps the staff manage traffic more efficiently and quickly shift resources as bottlenecks or problems develop, hospital officials said. "To know where staff is at any given time, at the blink of an eye, is huge for emergency medicine," said Dr. Carl R. Chudnofsky, chairman of the hospital's department of emergency medicine.

Cost can be a significant hurdle in deploying indoor positioning systems based on infrared or radio-frequency technology. Generating accurate information on location often requires large numbers of receivers, which can be expensive. Developers of Wi-Fi-based positioning systems say this could translate into an opportunity for them because Wi-Fi hot spots are inexpensive and often already in place, and their range can be significantly wider.

At the Metro Group Future Store, a futuristic supermarket in Rheinberg, Germany, a Wi-Fi-based "personal shopping assistant" was developed with software from Ekahau, a California company. Using tablet PC's affixed to the front of shopping carts, shoppers can find their way to groceries they need, learn about sale items and obtain product information. A similar system based on the software but developed for museums was demonstrated at the Metropolitan Museum of Art this year during private showings of the "Manet-Velázquez" exhibition. That system, developed by the technology services company Accenture using Ekahau software, provided and displayed images and information about paintings as users carrying tablet PC's approached the artworks, company officials said.

Another Ekahau-based system, in use at the University of Oulu in Finland, allows students with palmtops to locate over 250,000 books at the main library.

Ekahau officials say they have begun testing their software for use in other industries as well, including health care. Medical personnel could be tracked if they toted Wi-Fi-enabled palmtops, for example, and patients would wear Wi-Fi transmitters that are expected to become available early next year, said Tuomo Rutanen, vice president for business development at Ekahau.

Among the other developers of location technology is Wheels of Zeus, a company run by an Apple co-founder, Steve Wozniak, that is working on portable hot spots that can be moved around to track people, pets and things. That system, which is expected to become available in 2004, can cover a range of one to two miles using radio frequency technology, the company says. Symbol Technologies and Cuesol have begun testing "shopping buddies" mounted in shopping cart handles at three Stop & Shop stores in the Boston area, and mobile phone locators like mapAmobile in Britain enable users to pinpoint the location of a cellphone.

Privacy issues remain to be resolved, but people who are at the forefront of putting such tools to work, like Dr. Sandberg at Massachusetts General, are optimistic. "In the future, we will be applying a sort of continuous quality improvement effort to all operating rooms using Radianse technology and things like it," Dr. Sandberg said. "It's the wave of the future."