Researchers search for better way to help people navigate

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Satellite-based navigation gadgets can guide motorists
from high above, saving bumbling drivers countless hours and extra trips to the gas station. But directing people on a much smaller scale _ such as inside an office _ is a much greater challenge.

Locator equipment based on Global Positioning System satellites is accurate to about 10 feet (3 meters)_ fine for drivers searching for the next right turn but not for pedestrians seeking a front door. And the range of GPS is limited indoors, and it can't on its own differentiate between a path and a wall.

Georgia Institute of Technology researchers are trying to pick up where GPS leaves off. Its System for Wearable Audio Navigation, or SWAN, consists of a wearable computer connected to a headband packed with sensors that help sight-impaired users know where they are and how to get where they're going.

Besides a pendant-sized wireless GPS tracker, there are light sensors and thermometers that help distinguish between indoors and outdoors. Cameras gauge how far away objects and obstacles are. A compass establishes direction. And an inertia detector tracks the roll, pitch and yaw of the user's head.

All the data are crunched by a computer in a backpack, which relays high-pitch sonar-like signals that direct users to their destinations. It also works with a database of maps and floor plans to help pinpoint each sidewalk, door, hall and stairwell.

Bruce Walker, an assistant psychology professor who helped develop the system, said in a few years it could be used to help guide blind people, first-responders to emergencies or soldiers through unknown territory.

"It's going to take time," Walker said. "But getting floor plans for buildings is possible. We're trying to show that given a map, we can show the blind how to get places."

Like a sonar device, the SWAN system sends out audible blips that quicken as users move closer to a preprogrammed target and slow as they get farther away. The sound of a hinge opening plays as it passes by a door, and cues can signal bathrooms, restaurants, stores, and other attractions.

The sounds are sent through bone-conducting headphones, specialized devices that are worn behind the ears to appease users reluctant to have their ears covered.

"This is not intended to replace a guide dog or a white cane," Walker said. "This just supplements it."

Besides university research, a handful of companies have tackled the tricky business of helping people navigate on a small scale.

HumanWare, a company with headquarters in Montreal and New Zealand, markets a GPS system that attaches atop a computer organizer and pipes in directions to blind users. Like other GPS-based technology, the $1,700 (euro1,342) device has limited range indoors and its accuracy can vary, but it

improves every year, said Nicolas Lagace, the company's marketing manager.

"It's a revolution for blind people," he said.

A new rival could lead to more precise navigation. Galileo, the European Union's answer to the U.S. military-controlled GPS, promises to improve accuracy of up to a few feet for some users. By 2008, consumers should be able to buy receivers that can switch back and forth between GPS and Galileo.

The venture, however, will not be fully functional until 2010 and could still be saddled with some of the same limitations as GPS, including limited indoor range.

Georgia Tech's Walker and Frank Dellaert, a computer professor at the university, hope their use of sensors makes up for those drawbacks.

Blind advocacy groups, such as the Washington-based American Council of the Blind, are hopeful.

"We all know that GPS is a marvelous addition to our array of options," said Melanie Brunson, the council's director. "But it does have limitations as far as its accuracy goes. If they could come up with some way to make the system more accurate, it would be appealing to a lot of people."

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On the Net:

Georgia Tech: http://www.gatech.edu

American Council of the Blind: http://www.acb.org

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