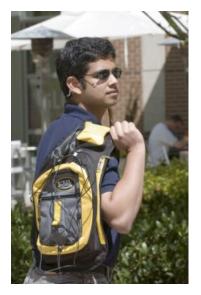# Emerging Technology Trends

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A SWAN to guide blind people

Posted by **Roland Piquepaille** @ 10:44 am

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Researchers at the Georgia Institute of Technology have developed SWAN (an acronym for 'System for Wearable Audio Navigation'), **a wearable computing system to help blind people** navigate in unfamiliar environments. The current prototype is composed of a laptop (or soon a PDA) carried in a backpack, several GPS trackers, four cameras and various sensors. But the most important component consists of special headphones called 'bone phones,' which send 'auditory signals via vibrations through the skull without plugging the user's ears, an especially important feature for the blind.' This system might also be used by firefighters or soldiers in situations where their vision is impaired. Read more...

Before going further, here is a photograph of a user carrying the SWAN system in a small backpack (Credit: Georgia Tech).

This project started five years ago, when two assistant professors at Georgia Tech, **Frank Dellaert**, specialized in artificial intelligence, and **Bruce Walker**, an expert in human computer interaction, met to discuss how they could help blind people. Here is how Dellaert comments this research program.

> "SWAN is a satisfying project because we are looking at how to use technology originally developed for military use for peaceful purposes," says Dellaert. "Currently, we can effectively localize the person outdoors with GPS data, and we have a working prototype using computer vision to see street level details not included in GPS, such as light posts and benches. The challenge is integrating all the information from all the various sensors in real time so you can accurately guide the user as they move toward their destination."

Below is a photo of Dellaert (left) and Bruce Walker (right) showing the various components of the SWAN hardware.

Now, why this team decided to use 'bone phones'? Here are more details about the SWAN system.

> The researchers selected bone phones because they send auditory signals via vibrations through the skull without plugging the user's ears, an especially important feature for the blind who rely heavily on their hearing. The sensors and tracking chip worn on the head send data to the SWAN applications on the laptop which computes the user's location and in what direction he is looking, maps the travel route, then sends 3-D audio cues to the bone phones to guide the traveler along a path to the destination.

And what's so special about these 3-D cues?

> The 3-D audio beacons for navigation are unique to SWAN. Other navigation systems use speech cues such as "walk 100 yards and turn left," which Walker feels is not user friendly. "SWAN consists of two types of auditory displays – navigational beacons where the SWAN user walks directly toward the sound, and secondary sounds indicating nearby items of possible interests such as doors, benches and so forth," says Walker.

The researchers are now working on smaller versions, both on the computing side or the visual and audio hardware components. In other words, this system is not ready for an immediate commercialization.

But if you want more information, you can visit **the SWAN web site** or read **this Powerpoint presentation** (PDF format, 39 pages, 2MB).

Sources: Georgia Institute of Technology news release, via EurekAlert!, August 15, 2006

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