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SWAN guides the way

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Georgia Tech researchers are developing a wearable computing system to help the visually impaired, fire fighters, soldiers and others navigate in an unknown environment. Called the System for Wearable Audio Navigation (SWAN), it is particularly designed for when vision is obstructed or impaired.

The SWAN system, consisting of a small laptop, a proprietary tracking chip, and bone-conduction headphones (“bone phones”), provides audio cues to guide the person from place to place, with or without vision. It incorporates additional sensors including GPS (global positioning system), a digital compass, a head tracker, four cameras and light sensor.

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 compute the user's location and in what direction he is looking, maps the travel route, then sends 3D audio cues to the bone phones to guide the traveller along a path to the destination.

The 3D cues sound like they are coming from about one metre away from the user's body, in whichever direction the user needs to travel. The 3D audio, a well-established sound effect, is created by taking advantage of humans' natural ability to detect inter-aural time differences. The 3D sound application schedules sounds to reach one ear slightly faster than the other, and the human brain uses that timing difference to figure out where the sound originated.



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