

UC SANTA BARBARA

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## **NEW COMPUTER SOUND MAPS WILL HELP BLIND**

A new technology will help blind computer users with special sound maps that allow them to move through landscapes, diagrams and graphs by using their ears and fingers.

The new auditory maps, being developed by researchers at the University of California, Santa Barbara, rely on a glass "touch window" with a calibrated electric current that can be activated by the touch of a finger or stylus. By touching the glass, which lies flat like a mousepad, users can trace across streets, buildings, lakes, and other landscape features, activating sounds, like traffic, as well as spoken words, such as street names.

The system also employs "earcons," a play on the word "icons." Earcons are tone-based symbols combining pitch and rhythm which provide additional instructions for navigating around the map.

Dan Jacobson, a visiting post-graduate researcher in the Department of Geography who developed the new system, recently presented the research at the national meeting of the Association of American Geographers. Jacobson explained that there is a huge need for these sound-based maps, since only 10 to 12 percent of blind people read Braille.

He said that sound maps can improve on the daily living problems facing blind people by leading to higher quality of life through enhanced orientation, mobility and independence.

He reported that ten testers of the prototype, five visually impaired and five blind, were able to successfully navigate the map after only fifteen minutes of instruction. This included individuals who had never before used a computer. The blind users who tested the sound map prototypes also obtained better and faster information than a control group using only tactile maps.

The testers gave the sound maps high marks. One 37-year-old visually impaired female said, "It was very easy to use, you could stop, take your time, or go back to get information. It helps you to build up a mental picture of the area. It would be good for mobility, if you wanted to get around a new area, and build up a picture of how things are in relation to each other."

Jacobson mentioned that the increasingly visual nature of the World Wide Web has frustrated many people with limited vision in their efforts to access that information.

The new system uses a conventional computer with web browser software, and is perfectly suited for adaptation to the World Wide Web. The hyper-linked multimedia sound maps are layered and linked so that the user can zoom in on certain features, getting to know all the details about a certain portion of landscape, or many landscapes.

"It's almost as limitless as the web behind it, allowing multiple users to access any one map from anywhere with a suitable internet connection," said Jacobson who plans to design a prototype for lease to schools.

There are many potential applications in addition to use by the blind for example, sound maps may be helpful to dyslexics, young children and foreign language speakers.

Along with the touch window, Jacobson is pioneering the use of a haptic mouse -- haptic refers to sense of touch. The haptic mouse is shaped like a conventional mouse but is connected to a rod and a box. Its movement is based on a fixed frame of reference, and gives feedback to the user via effects such as the feeling of a washboard surface to indicate certain types of terrain, or a feeling of resistance that defines a "virtual" border or a wall.

In order to disseminate the technique as widely as possible, the researchers are working on software tools that would enable sighted users to easily convert conventional computer graphics to auditory maps.

Jacobson is collaborating with an interdisciplinary team of researchers including Reginald G. Golledge, professor of geography; Mary Hegarty, associate professor of psychology; and, JoAnne Kuchera-Morin, professor of music and associate dean of Computing and Technology, College of Letters and Science; Stephen T. Pope, researcher in the Department of Music, and graduate and undergraduate students from the Department of Computer Science.

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