Auditory Direct Manipulation of Acoustical Objects by Blind Computer Users

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1 SPUI-B: StereoPhonic User Interface for Blind

An assistive user interface for blind computer users, which provides

- the advantages of a window system, without adapting given graphical user interfaces,
- effective use of three-dimensional direct manipulation of acoustically represented objects (hearcons) with the mouse.

2 What are Hearcons?

A HEARCON is an acoustically *active* object (sounding permanently),

- which is characterized by its sound (representing the object), its position coordinates in space, its volume, and its snapping region,
- which can be placed anywhere in the space by using spatialized sound,
- which enables the blind user to manipulate the object to his own needs.

There is no limitation to a specific class of sounds as in the SonicFinder (environmental sounds) or with Blattner's earcons (synthetic tones in structured combinations). Only for one of the objects, represented by the actual hearcon, the user can receive content information by speech output or refreshable Braille.

3 How Does Direct Selection of a Hearcon Work?

The blind user will be able to select a hearcon directly, because

- The use of spatialized sound and acoustically active objects enables the user to hear the topographical arrangement of the objects and to recognize in which direction the mouse has to be moved to reach the target object.
- The sound output depends on the relative position of the mouse cursor to the hearcons; the user hears whether s/he moves the cursor towards/away from a hearcon.

- The selection of a hearcon is announced immediately, either by an 'alarm' or by a difference in sound.

4 Research Problems

Besides developing the user interface, several open problems are experimentally investigated in our project:

- the mode, by which a user can interactively localize a hearcon and drag it to another hearcon
- the simultaneous acoustical presentation of many hearcons
- the choice of appropriate sounds representing the system objects