

**USER FRIENDLY SELECTION APPARATUS
BASED ON TOUCH SCREENS FOR VISUALLY
IMPAIRED PEOPLE**

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to touch screen based selection apparatus used in places such as transaction kiosks (ATM machines), and more specifically to a method and apparatus to make such selection apparatus more user-friendly to visually impaired people.

[0003] 2. Related Art

[0004] Selection apparatuses are often implemented using touch screens. An example touch screen is described in a document entitled, "Anatomy of a Touchscreen System"; Available from <http://trace.wisc.edu>, Authors: UNKNOWN. In a common scenario, a menu of choices is displayed on such a touch screen and a user selects among the choices by touching a specific portion on the touch screen. The selection information is often passed to a processing system which performs an action (or actions) associated with the selection.

[0005] Such selection apparatus are used in places such as transaction kiosks (e.g., ATM machine to perform routine banking operations). An example architecture of an ATM machine is described in a document entitled, "Architecture of an Automatic Teller Machine Usable by All Using The Java Platform", Author: PETER KORN, available from the following URL: <http://www.sun.com/access/articles/wp-aatm/#blind>.

[0006] It is often desirable to allow visually impaired people to use touch screen based selection apparatus. For example, in some countries such as USA, compliance with laws (e.g., Americans with Disabilities Act (ADA)) requires that public terminals be usable by visually impaired people.

[0007] At least for such reasons, attempts are made to facilitate even the visually impaired people to use touch screen based selection apparatus. An example of such attempt is described in a document entitled, "Making Information/Transaction Machines (ITMs) Accessible"; Final Report, Spring 2000; Available from the following URL: <http://trace.wisc.edu/world/kiosks/itms/>.

[0008] One challenge with making touch screen based selection apparatus usable by visually impaired people is that such people may not be able to see the displays on touch screens. Accordingly, such people may find it challenging to locate the specific portion of a touch screen to make a selection. As a result, touch screens based selection apparatus are often augmented with various approaches to simplify the selection task for the visually impaired people.

[0009] In one prior approach, touch screen based selection apparatus are complemented with audio systems which further guide a visually impaired person by audio instructions in making a selection. For example, in a document entitled, "Cross Disability Access to Touch Screen Kiosks and ATMs", by Gregg C. Vanderheiden (hereafter "Vanderheiden I"), available from the following URL: http://trace.wisc.edu/docs/thci97_cross_disability/x_disab.html, several techniques are described as 'EZ Access Techniques'.

[0010] In a first EZ access technique, a "Quick Read" feature is provided in which a user presses a green diamond button to have a presently touched item on a touch screen read out loud. However, the feature may not aid a visually impaired person to quickly locate an item of interest.

[0011] In an alternative EZ access technique (described in Vanderheiden I), referred to as "Talking Touch and Confirm", a user may explore the screen with his/her fingertip. Touching items on a screen causes the corresponding option to be read out. Acoustic cues are given to guide the individual in exploring the screen. To actually activate (select) the item, the user merely needs to press a pre-specified button. Even this technique does not aid the user in quickly locating a desired choice as the user may continue to search for the desired choice for a long time before locating the choice.

[0012] In another alternative technique (described in Vanderheiden I) referred to as "List Mode", a solid reference/anchor point (the edge of the screen) is provided which users can use to guide their motion. By moving their fingers up and down the edge of the screen, the users can find all of the information and action items. The list mode approach may be complemented with the Talking Touch and Confirm approach noted above to enable selection of a desired choice. The implementation of the edge may add substantially to the overall cost as sensors may need to be present in the edge to sense the movement of fingers/objects.

[0013] Several variations and enhancements to the approaches noted above have been attempted and/or described. For example, a document entitled, "Ergonomics [sic] of a Non-Visual TouchscreenInterface: A Case Study", by Gregg C. Vanderheiden (hereafter "Vanderheiden II"), available from the following URL, describes the above techniques, the lessons learned, results and the training modules employed to train the users: http://trace.wisc.edu/docs/touchscreen_ergonomics2000/ergonomics.html

[0014] The techniques are summarized in further detail in a document entitled, "Cross Product, Cross Disability Interface Extensions: EZ Access", Authors: Gregg C. Vanderheiden et al (hereafter "Vanderheiden III"), at the following URL: http://trace.wisc.edu/kiosks/eZ/resna_ez_access_paper.html

[0015] In another document entitled, "The Development of a Simple, Low Cost Set of Universal access Features for Electronic Devices", by Chris Law and Gregg Vanderheiden (hereafter "Law"), several techniques and design principles are noted. Example principles (requirements) include, (A) At any point in time there are a finite number of information items and control choices that a user has to work with; (B) Combining discoverability, simplicity and speed; (C) Standard controls cannot easily be identified independently by people who cannot see, cannot read, or do not understand symbols; (D) Some people cannot perform simultaneous/chorded functions (cannot perform more than one task at a time); (E) Some people do not understand or are unable to memorize product procedures, and should not have to refer to the manual; (F) Access features in public and unfamiliar devices must be fast to learn and easy to comprehend for first-time users; (G) A Standard symbol for EZ Access will help indicate its presence on a device; (H) EZ Access should not force changes to regular operation; (I) Public devices have different requirements and constraints than personal