A virtual jog wheel for quick, accessible navigation

Public invention disclosure

July 2013

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Abstract

Disclosed is an input method for navigating the elements displayed on a touchscreen device in an efficient manner that is accessible to people who are blind and others. The input method is a virtual jog wheel control on which the user makes circular gestures, which are then translated by the system to linear navigation through the elements on the screen. As the user navigates with the jog wheel, a focus cursor may be displayed and the elements may be provided in speech output to the user. Also disclosed are potential methods for interacting with focused elements and for activating and deactivating the virtual jog wheel mode.

Keywords

Virtual jog wheel, scroll wheel, navigation, touchscreen, accessibility, blind, screen reader, text to speech

Enabling Disclosure

Introduction to the problem

People who cannot see need to be able to access all of the information and controls of an interface. Frequently, such individuals use a navigation paradigm: where they move linearly, step-by-step through the elements that are displayed on the screen; the system provides speech output related to those elements; and then the user can interact with the elements as desired. To navigate touchscreen devices currently, the most common methods are to press navigation buttons repeatedly or to make repeated swiping gestures. Such motions can be fatiguing or awkward to make continuously. Navigating using these common methods may also be slower and less efficient than other methods, such as the one described in this document.

People who are blind and some people with other disabilities need a way to navigate the screen on touchscreen devices in a quick manner. With this invention, the user can activate a virtual jog wheel input mode and then make circular gestures to navigate through onscreen elements.

Description of system

The user interacts with a system, which is comprised of: a touchscreen sensor, optional buttons or other user inputs, a display associated with the touchscreen sensor, a microprocessor, memory, and a method for providing audio output (e.g., speakers, a headphone jack, and

wireless audio connection). The system might take the form of a phone, tablet computer, kiosk, or other device. A schematic diagram of the system is shown in Figure 1.
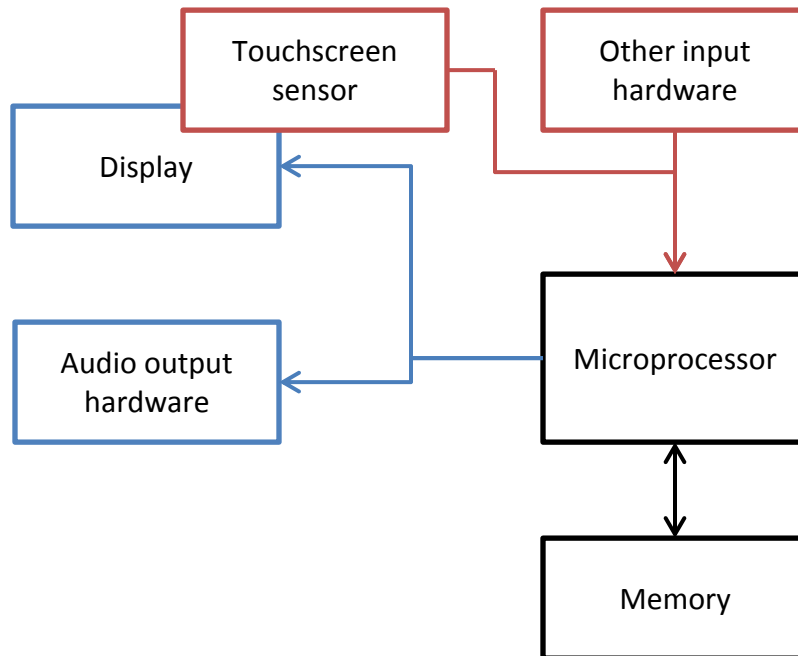
Figure 1. A diagram of the system. For input, the system has a touchscreen sensor and other optional input hardware. The touchscreen sensor directly overlays a display. For output, the system has at least a display and audio output hardware. The input and output components are connected to a microprocessor which runs software that may be loaded into memory.

The virtual jog wheel mode, which enables the user to more quickly navigate through elements on a screen, is implemented in software that runs on the system.

Mode Activation: To activate the virtual jog wheel input method, the user issues a command to the processor running software that is in memory on the system. The command may be issued in response to using any of the user input channels available on the system (e.g., making a gesture on the touchscreen, tapping a control in a settings menu on the touchscreen, and pressing one or more buttons on the device).

Mode Use: To use the virtual jog wheel for navigation, the user makes dragging gestures on the touchscreen sensor. The user starts the jog wheel navigation gesture on the area of the screen dedicated to the virtual jog wheel and makes a motion or gesture on the touchscreen. The software running on the system translates the user's gesture to step the system focus forwards or backwards through the onscreen elements, which may make up a user interface or web page for example. This translation may be related to the angular displacement and/or angular velocity of the finger about the virtual jog wheel. When an element is stepped to, it is "in focus" and this state may be displayed by a focus cursor or other indication. Speech output related to each focused element may be provided to the user through the system's audio output. The user may interact with focused elements with gestures or other commands.

Description of usage

The preferred directions for navigation using the virtual jog wheel are:

- Clockwise rotation: Moves forward through onscreen elements.
- Counter-clockwise rotation: Moves back to previous onscreen elements on the screen.

As the user moves to each item, the item would be in focus and could be read to the user through text to speech. The focus cursor (which may or may not be visible) would navigate from item to item as the user makes a gesture. The user would have to start the jog wheel navigation gesture on the virtual scroll wheel, but could then deviate from the boundaries of it as they make a curving or circular motion on the touchscreen.

The focused element can then be activated or interacted with in any number of ways, for example:

- Pressing a physical button
- Double-tapping the screen anywhere
- Tapping on the virtual jog wheel
- Making a linear swipe gesture
- And so on.

It is envisioned that the virtual jog wheel would cover a portion of the screen (perhaps semi-transparently) and that area would be reserved for jog wheel-related input (see Figure 1). In other embodiments, the virtual jog wheel might not be visible, but an area of the screen would be dedicated to the virtual jog wheel control when the mode is enabled.
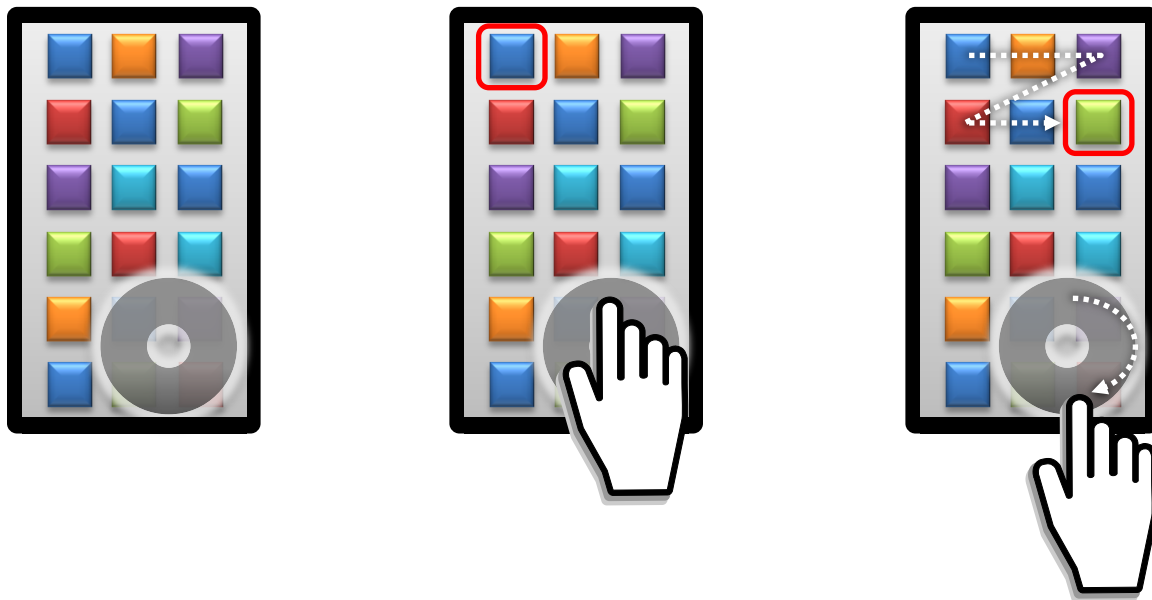
Figure 2. The virtual jog wheel in use. The first part of the figure shows the jog wheel displayed in the lower right corner of the screen on a touchscreen device. In the second part of the figure, the user's finger is on the jog wheel and a focus cursor is displayed as a rounded rectangle around the first element on the screen. In the third part of the figure, the user has made an arc gesture starting on the jog wheel and the highlight has moved through several elements. Continuing the gesture in a circular manner would move through more elements on the screen.

Using the jog wheel, users could still navigate to and activate any elements that might be visually under the jog wheel. The jog wheel could potentially be in any position on the screen, but a bottom corner may be the best position. In the bottom corner, many users could control the jog wheel with their thumb while holding the device in the same hand. The virtual jog wheel can coexist with other typical accessibility-mode gestures that are made in other areas of the screen. In this way, people could potentially make coarse, quick movements with the jog wheel and then single element-by-element navigation by swiping for example.

The virtual jog wheel makes it simple for the software on the system to disambiguate between various gestures that might be used on the device, because jog wheel navigation gestures must start on the virtual jog wheel. Gestures and movements that start elsewhere on the touchscreen would be recognized as other types of input.

There are a number of possible methods of activating the virtual jog wheel mode, including:

- Starting from an accessibility mode (where alternate gestures are used and not all standard gestures are recognized):
  - Swiping up from the bottom of the screen to drag up the virtual jog wheel.
  - Making a circle gesture. This could bring up the virtual jog wheel at the gesture location.
  - Any of the other gestures listed below
- Starting from the standard mode (where only "standard" gestures are recognized):
  - Swiping up from the bottom of the screen to drag up a virtual jog wheel. If this conflicts with standard gestures, a multi-finger swipe may be used.
  - Making a double-circle gesture (like a circle on top of or nearly on top of a circle). This could bring up the virtual jog wheel under the location where the gesture was made. This double gesture is less likely to conflict with standard gestures (but could potentially conflict with a drawing application for example).
  - Making a circle gesture (or double circle) with two or more fingers.
  - Pressing physical buttons in a particular combination and/or holding them down for a particular length of time.

When the jog mode is on, there are a number of methods or gestures that could be used to deactivate the jog wheel mode:

- Swiping down from the top of the screen.
- Swiping down starting near the top of the jog wheel control.
- Making an X or other Exit-like gesture on the virtual jog wheel.
- Pressing or holding a key or combination of physical controls

Advantages

Currently the most common methods of navigation are to press navigation buttons repeatedly or to make repeated swiping gestures. These methods of input are slower, less efficient, and more fatiguing than the disclosed invention.

With the disclosed invention, a dedicated physical control need not be provided (i.e., a hardware jog or "click" wheel) because the gesture can be made on a touchscreen. Once the

jog wheel mode is activated, there is no worry about the circular gesture conflicting with other gestures one might use on a touchscreen.

Potential prior art

- Jog wheels—such as those found on remotes and popularized by the non-touchscreen Apple iPod® devices with click wheels

- Navigating and reading onscreen elements with a jog wheel. Two notable examples:
  - Hart Intercivic eSlate voting systems have a physical jog wheel that the user can spin to move through items on the screen. Those items are read with either text to speech or recorded speech.
  - Later generation, non-touchscreen Apple iPod devices that had VoiceOver. People could rotate the tactile jog wheel/click wheel and items would be read to them (using pre-recorded text-to-speech-generated files).

- Dials and knobs on pointer-based user interfaces. One example is a dial control in Yahoo's User Interface JavaScript library/toolkit: http://yuilibrary.com/yui/docs/dial/. Such dials could be used on touchscreen devices.

- Scrolling by using a touchscreen virtual jog wheel (one implementation described and demonstrated at http://www.embeddedinteractions.com/touch%20screen%20gestures.html#FlashID10)

Acknowledgement