

Controlling Menus on a Wearable Platform

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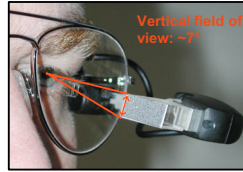
Project Goal

Creation of a menu interface that minimizes the need for visual feedback.

Target Platform

Wearable computers with small field-of-view displays, for which handheld input devices are inconvenient.

Design Considerations



Wearable display devices have relatively small field of view

Interaction method should reduce the need for visual feedback

Elimination of cursor and use of an absolute device demand less attention from user



On screen elements should be easily identifiable and easily legible

Menu layout should allow the use of large fonts (approximately 2/3-1° vertical)

Large on-screen elements can be easily read at a glance even when display is off the optical axis and peripheral vision is used



Scrolling Strip Device

Prototype: Synaptics TouchPad™ programmed with Synaptics SDK

(Reports absolute coordinates of contact, and applied pressure)



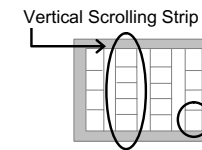
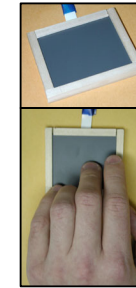
Overview

TouchPad width is roughly equivalent to width of four fingers.

Device surface is virtually subdivided into four vertical strips, one per finger.

Horizontal coordinate is used only to identify which vertical strip is active. (Only one strip can be active at a time, since the prototype can detect only a single point of contact.)

Vertical coordinate can be used to control any 1D parameter, with or without the use of discrete increments.



Sample placement on belt



Sensor Subregion

Other placement possibilities:

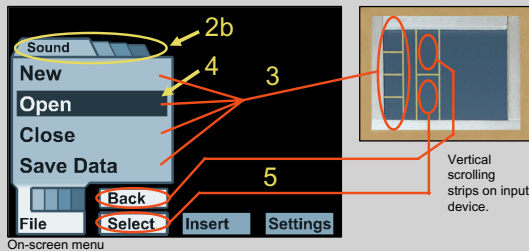
- Upper thigh
- Upper chest
- Lower arm
- Opposite wrist

Menu Display



Leftmost two menus extend to the right. Selecting "Camera" invokes in-place second-level menu with tab "Camera"

Rightmost two menus extend to the left



On-screen menu

Menu Interaction

1. Each menu is two columns wide, to make items more legible

The two leftmost menus, controlled by the two leftmost fingers, extend to the right; the two rightmost menus extend to the left. This allows the use of larger menu items. Title of top-level menu is displayed at bottom.

2. Menu depth is indicated by tabs

2a. For second-level menu and below, title of current level is displayed in tab at top. 2b. Additional tabs at right indicate menu depth. Current title is always displayed in leftmost tab to decrease search time, minimizing the time that the user's attention is distracted from the environment.

3. Vertical scrolling strips are divided into subregions

Each finger is used to control navigation in one of four top-level menus. Each top-level menu scrolling strip is divided into the same number of subregions as there are menu items.

4. Highlighting indicates current menu item

When the user's finger crosses a subregion border within a strip, the highlight moves to that menu item.

5. Selection is accomplished by touching the lower half of the adjacent strip. Going back in the menu hierarchy is done by touching the upper half of the adjacent strip

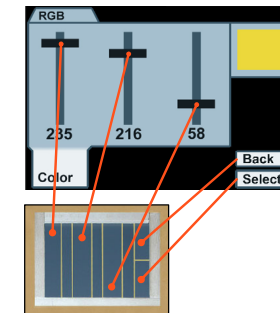
The scrolling strip adjacent to the strip that controls highlighting is subdivided into upper and lower subregions. Since the upper and lower frames of the device can be felt by the user, after highlighting a menu item, the user can easily position the adjacent fingertip in the appropriate half of the strip.

Future Directions

(Mockup screens)

Absolute parameter adjustment

Each scrolling strip could be absolutely mapped to the value of a parameter.



Relative parameter adjustment

Dragging within a strip could incrementally increase or decrease a parameter's value. Pressure could be used to control the size of the increment.

