July 2020

EFFICIENT CONTENT NAVIGATION WITH A SINGLE DIMENSION OF INPUT

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ABSTRACT

In general, the present disclosure describes navigating user interfaces that accept one-dimensional input, such as a vehicle dashboard console, a smart watch display, and/or the like. For example, a user interface may include a scrollable menu where the user is limited to just scrolling up or down the menu without dedicated next, previous, or select buttons. Rather than requiring a user to scroll all the way to a fixed location in the list, e.g. the top of the list, to navigate a menu hierarchy in order to select a back, select, next, up, close, or other affordance button, the techniques described herein may modify the user interface such that the affordance button is more easily accessible and may require fewer user inputs to navigate to and select. For example, the affordance button may be hidden until a user indicates an intent to activate the affordance button, the affordance button may remain at a top of the visible area of a scrollable menu even as the user scrolls the list beyond the first page of the list, or the affordance button may move around the user interface such that it remains adjacent to the cursor as the user navigates through the list.

DESCRIPTION

The present disclosure describes the efficient navigation of content while mitigating limitations in user interface design. Users may interact with devices while engaged in other activities (walking, bicycling, driving, or performing some other activity), which limits the amount of attention and time that the user can utilize to focus on navigating the user interface of the device. To accommodate this reduced focus on the user interface, developers may reduce the complexity of the user interface by, for example, including less information, changing how the information is organized, and simplifying navigation within the user interface. For example, the information may be arranged in a list to allow single dimension input (e.g., scrolling up and down or left and right). While limiting the user input to a single dimension may make it easier to move through the currently displayed information, most user interfaces include information in a hierarchical structure, which necessitates explicit affordances to navigate that structure: these are commonly located at the top of the list, or supported through the use of a dedicated physical control. With only a single dimension of input and no supporting physical control, navigating to the aforementioned affordance is made difficult because the user may need to navigate through the entire length of the list to reach that affordance.

In accordance to the techniques described herein, the user interface includes a hierarchical menu navigation affordance item that is more easily accessible to the user and may require fewer user inputs to navigate to and select as compared to conventional user interface design. The hierarchical menu navigation affordance action may be included within the displayed information as a menu item that is restricted such that the affordance element remains displayed on the screen even while other menu items are scrolled off of the screen. When a user scrolls through the menu to navigate to the affordance action menu item, the device may cause the cursor to navigate to the displayed menu item, including the affordance menu item, prior to scrolling the menu list to display additional menu items. In this way, devices configured in accordance with these techniques may reduce the number of user inputs required to navigate menu hierarchies or select items, which may improve the user experience.

FIGS. 1A-1C are illustrations that, in sequence, show an example of an affordance button for navigating hierarchical menus in single dimension input menu GUIs that is selectively hidden. The techniques described herein may be implemented in any computing device or system having a user interface limited to a single input dimension. That is, the techniques described herein may also be implemented by vehicle head units, computerized watches, computerized glasses, smartphones, tablets, or other wearable and non-wearable computing devices.

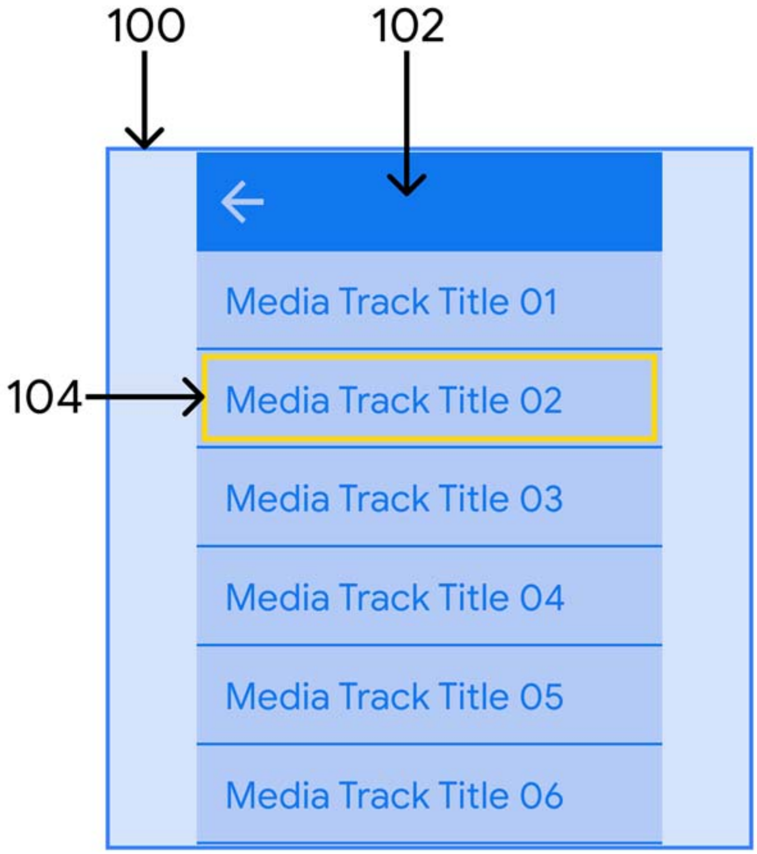

FIG. 1A

As illustrated in FIG. 1A, graphical user interface (GUI) 100 is a single dimension input GUI and includes a scrollable list of menu items associated with an application being executed by the device, such as a media application, and a navigation affordance button 102. The menu items may be included within a particular level of a plurality of different levels in a menu hierarchy of the media application. Button 102 includes a backwards arrow to signify a "back" or “up” navigation action within the menu items or menu hierarchy. In some examples, a different affordance action is implemented for button 102, such as a forward arrow to signify a “next” or “down” navigation action within the menu item or menu hierarchy. In general, button 102 is a graphical user interface (GUI) element that, when activated, enables the user to navigate back/up a level in the content hierarchy; by activating that button, the interface presents content items for that requested hierarchical level. While FIG. 1A illustrates button 102 in a top position of the menu’s list, button 102 may be located in other positions within the list of menu items. It should be further noted that other affordance buttons (e.g., a close list or close application button) may be selectively included with the list of menu items.

Cursor 104 visually indicates a current one of the menu items that will be selected if a user provides select user input. A user may select one of the menu items using a physical input device (e.g., a button, a scroll wheel, etc.).

If a user selects the menu item highlighted by cursor 104, the media application receives an indication of the user input and performs an action associated with the selected menu item. For example, if the selected menu item is a media track, the media application may begin playing that track. If the selected menu item is button 102, the media application may output, for display by user interface, a higher hierarchical level of the menu.

In general, the computing system may infer user intent to predict upcoming user actions. Such predictions may cause the device to include different affordance action menu items within a menu and may be used to determine locations within the menu at which to include the affordance action menu items. When predicting user intent, the device may analyze one or more different signals, such as previous user actions, a change in a navigation or cursor movement direction, a movement of the cursor towards or away from a menu item affordance button, an amount of time spent navigating one list, or any other movement where the user does not select the affordance button.

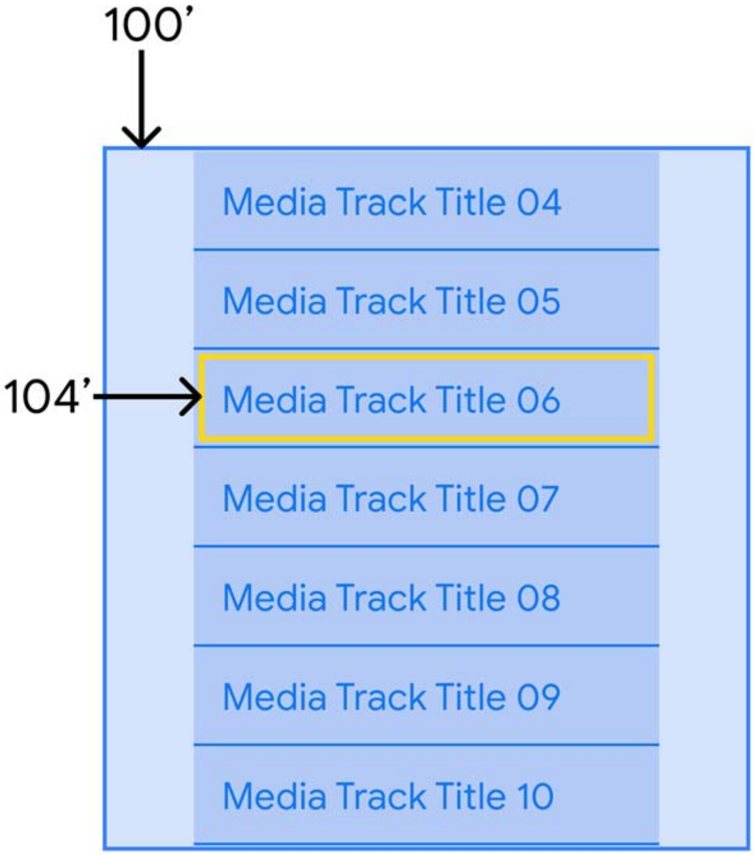

FIG. 1B

FIG. 1B illustrates an example graphical user interface (GUI) 100' generated after a user has begun scrolling down the list of menu items. In the example of FIG. 1B, the user is navigating down the menu list (e.g., to the next menu items in the list). Because the user is navigating away from button 102, the computing system infers that the user is not intending to navigate towards button 102 and, in response, displays an additional menu item instead of button 102. That is, as the user is scrolling down the menu, the computing system may predict that the user does not intend to navigate to a higher menu level within the menu hierarchy and, as a result, hides button 102 within GUI 100'.

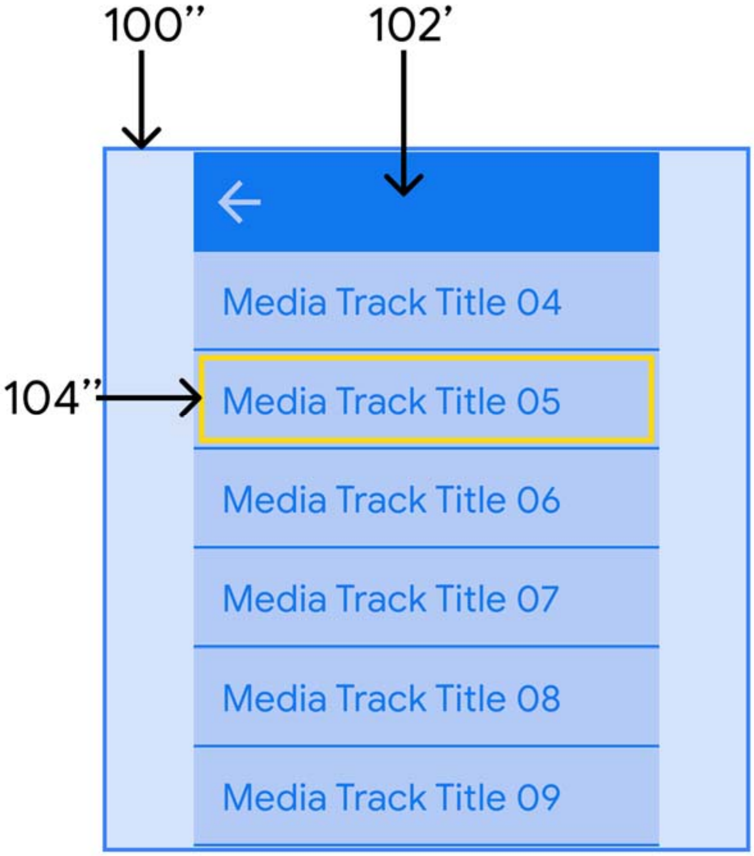

FIG. 1C

FIG. 1C illustrates an example graphical user interface (GUI) 100'' generated after the user scrolled further down the list of menu items as compared to GUI 100' of FIG. 1B and then began scrolling back up the list of menu items. Based on the user beginning to scroll back up the list of menu items, the computing system may predict that the user intends to navigate up a level in the menu hierarchy and, in response, include back button 102' within GUI 100''. If, instead of selecting 102', the user continues to navigate up the menu items, 104'' stays near the top of the list of menu items while the back button 102' moves down and may eventually disappear from view, or stay visible below cursor 104''. In this way, by selectively hiding the affordance button, users may be able to navigate between levels in the menu hierarchy without having to navigate all the way to the top or bottom of the list of menu items (where it is commonly found) while also not reducing the number of menu items shown while the user is moving up or down through the list of menu items.

FIGS. 2A-2C are illustrations that, in sequence, show an example of a pinned affordance button for navigating hierarchical menus in single dimension input menu GUIs. The pinned button, an example of an affordance button, is shown in FIGS. 2A-2C includes a backwards arrow to signify a “back” or “up” action associated with the button. In some variants, the pinned button may include other graphics indicative of different affordance actions.

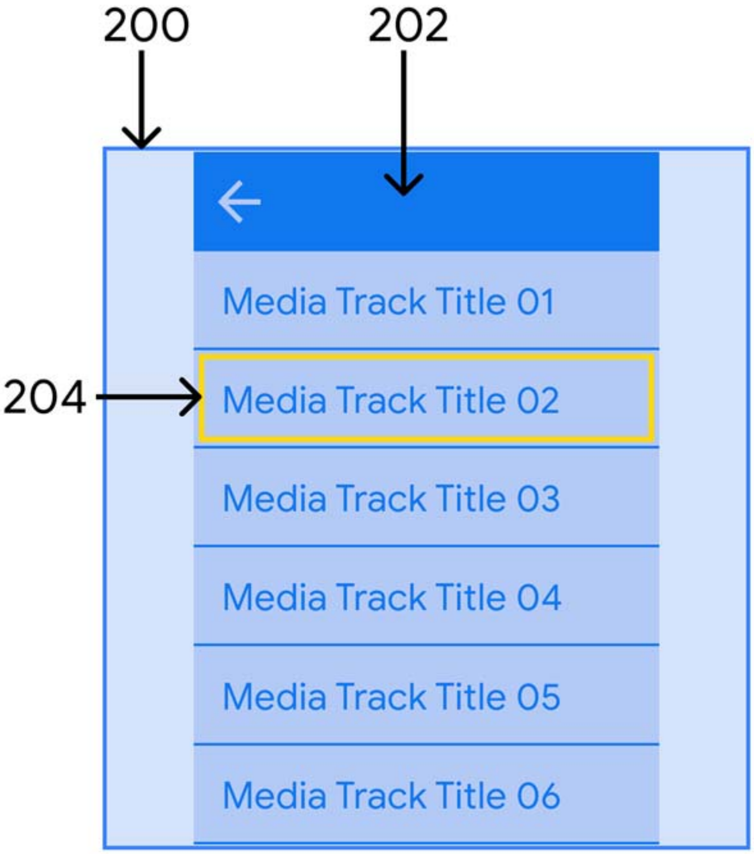

FIG. 2A

In FIG. 2A, GUI 200 includes a menu listing media tracks with back button 202 at a top position and cursor 204 that corresponds to a possible media track as a menu choice. Back button 202, when selected, causes the application interface to output an updated GUI 200 that includes menu items at a higher level of the menu hierarchy. Cursor 204 is shown as being positioned at the "Media Track Title 02" menu item such that a "select" input causes the application interface to playback that media track. Entering "next" or "previous" inputs into interface 200 may move cursor 204 down or up the list of media tracks.

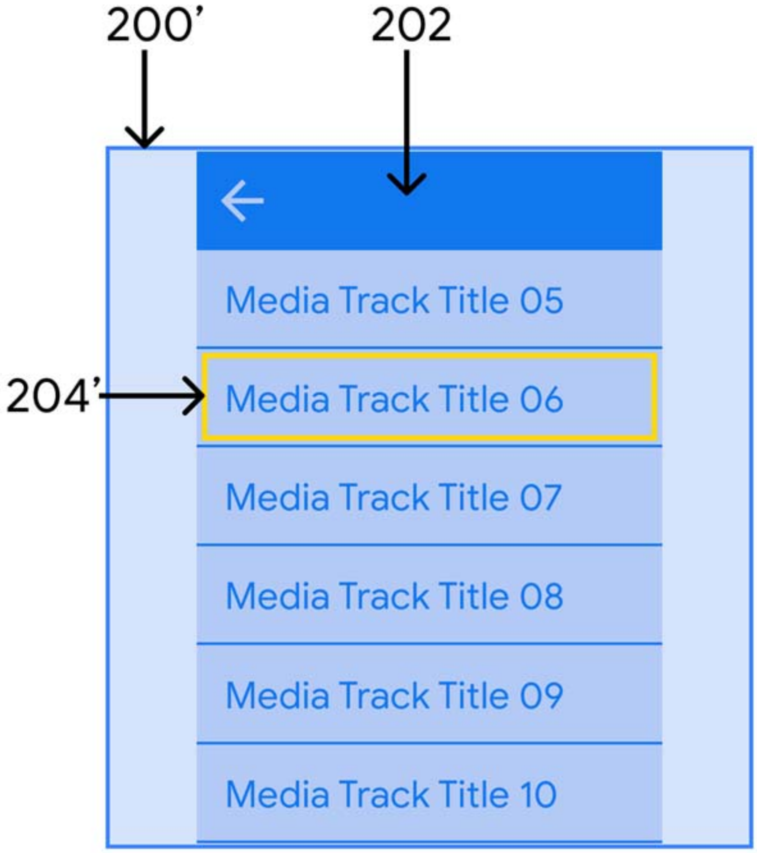

FIG. 2B

In FIG. 2B, GUI 200' includes the menu listing music tracks that could be played with back button 202 and cursor 204'. GUI 200' may be generated and output after a user navigates down the list of menu items. In this example, rather than ceasing to include a back button within the menu items, GUI 200' continues to include the back button at the top of the list of menu items.

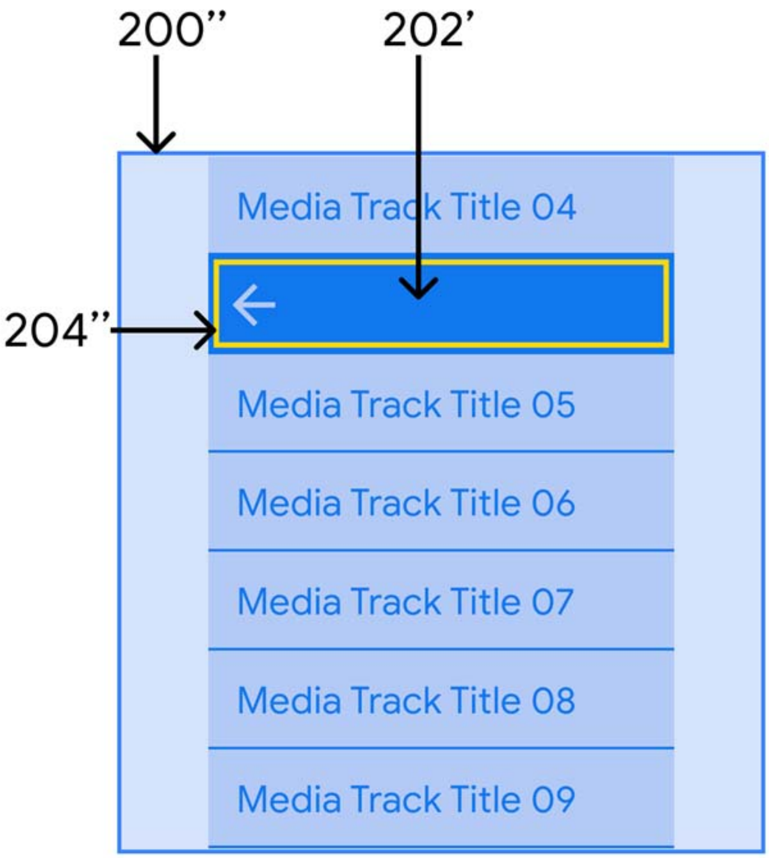

FIG. 2C

In FIG. 2C, interface 200'' includes the menu listing media tracks that could be played with back button 202' and cursor 204''. GUI 200'' is generated and output after the user begins to navigate back up the list of menu items. The first input to navigate up the list of menu items (e.g., a "previous" input) may indicate the user's intent to select back button 202. In response to the first input, the application interface may cause back button 202'' to be displayed in a different size or in a different visual style to emphasize it. As shown in GUI 200'', back button 202' is positioned next to the top position to avoid occluding a top menu choice of the menu listing the media tracks. If, instead of selecting back button 202', the user continues to navigate up the menu items, back button 202' will move below cursor 204''. Back button 202' may move down the list of menu items and eventually disappear from view, or instead remain visible at a location fixed relative to cursor 204'', making back button 202' quickly accessible again. Optionally, when cursor 204'' reaches the point when the first menu item in 200'' were to become visible, back button 202' could move to its original position above the first menu item in the list. In this way, the pinned affordance button may enable users to navigate between levels in the menu hierarchy without having to navigate all the way to the top or bottom of the list of menu items.

FIGS. 3A-3C are illustrations that, in sequence, show an example GUI that includes a trailing affordance button. The trailing affordance button is depicted in FIGS. 3A-3C as having a backwards arrow to signify a back or up button but, in some variations, the trailing affordance button may include different graphics and may be associated with a different affordance action.

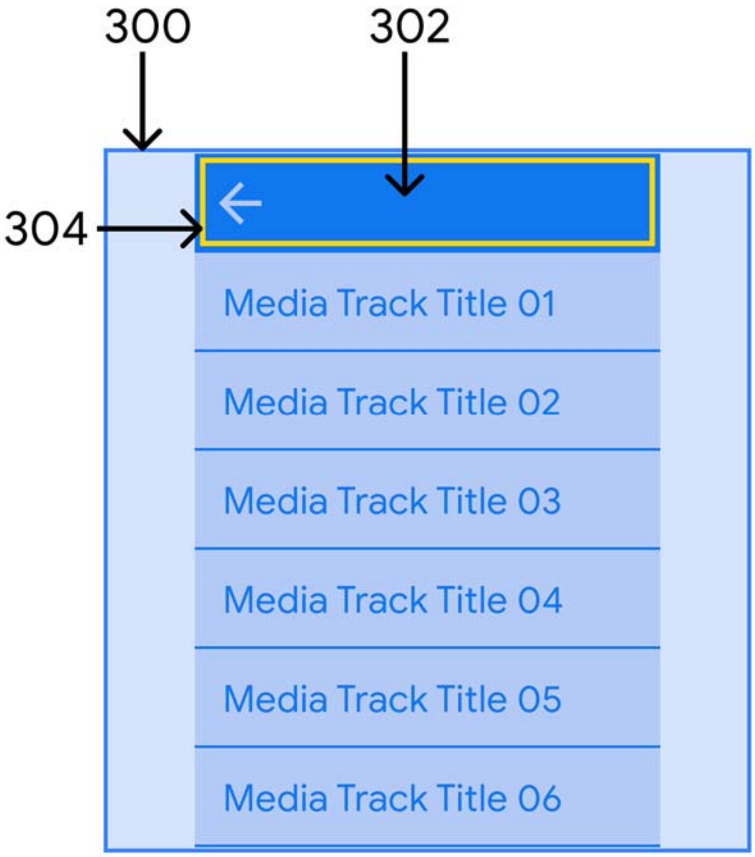

FIG. 3A

In FIG. 3A, GUI 300 includes a media playback application listing media tracks with back button 302 at a top position and cursor 304 at back button 302. Because back button 302 is included within the list of menu items, if a user provided a select input while cursor 304 is positioned over back button 203, the computing system may navigate the hierarchical menu structure to move "back" or "up" a level.

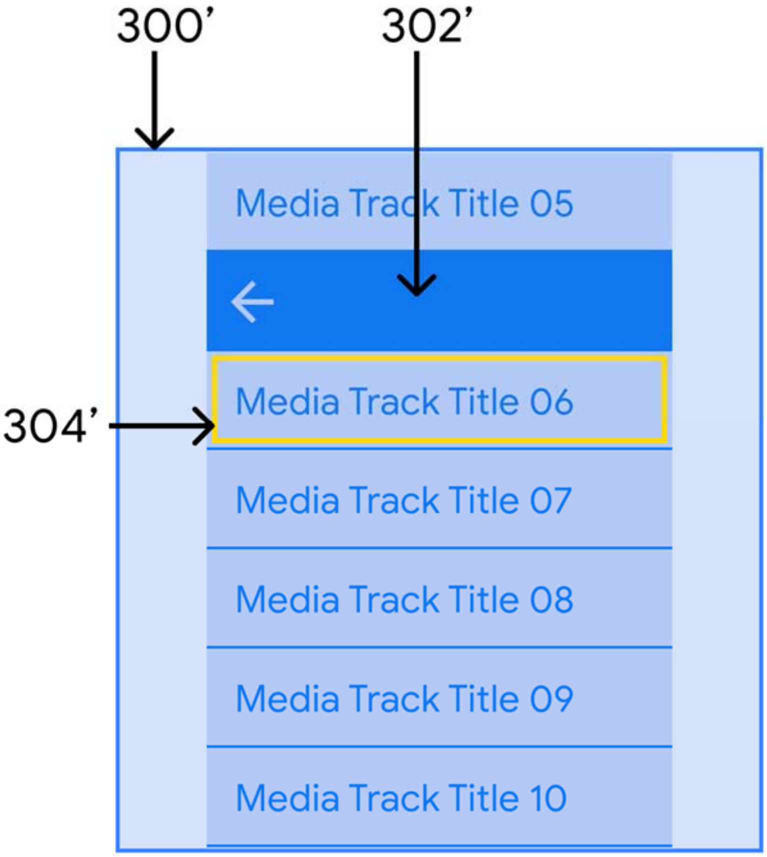

FIG. 3B

In FIG. 3B, GUI 300' includes the menu listing media tracks with back button 302' at a trailing position above cursor 304'. That is, when a user navigates down the list of menu items, the computing system may be configured to cause back button 302' to move along with cursor 304' such that back button 302' is positioned adjacent to cursor 304'. In the example of FIG.

3B, back button 302' is in a trailing position as the user is providing inputs to navigate down the list of menu items.

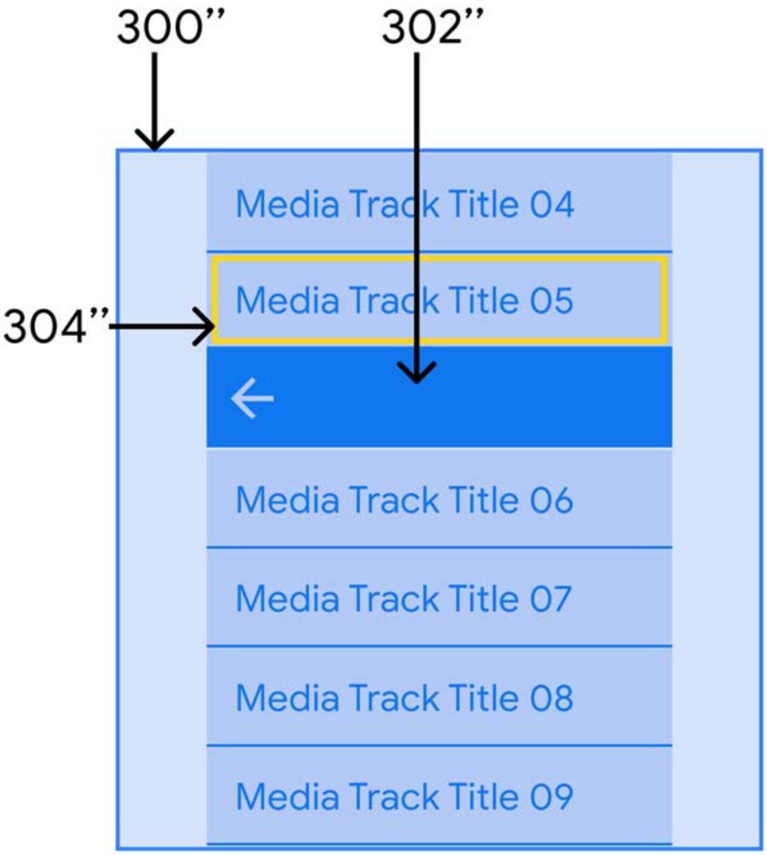

FIG. 3C

In FIG. 3C, GUI 300'' includes back button 302" positioned adjacent to and below cursor 304''. In the example of FIG. 3C, the user provided input to move cursor 304" up the list of menu items (e.g., "previous" or "up" input). In response, rather than displaying back button 302' above cursor 304' as shown in FIG. 3B, back button 302" is positioned below cursor 304". After navigating down the list of menu items, rather than immediately switching the location of back button 302" in response to the user providing a single input to navigate up the list of menu items, cursor 304 may be positioned over back button 302' of FIG. 3B. Similarly, if the user begins navigating up the list of menu items shown in FIG. 3C, rather than moving back button 302" to being positioned above and adjacent to cursor 304”, cursor 304” may be positioned over back button 302”. The user may then provide a selection input to select back button 302” and navigate up the menu hierarchy. Instead, the user may continue to provide input to navigate up the menu items, in which case back button 302’’ may stay below cursor 304’’, but remain immediately adjacent to cursor 304’’ as the user moves up the list. Optionally, when reaching the top of the list, back button 302’’ may move to its original position above the first menu item in the list. In this way, the trailing affordance button may enable users to navigate between levels in the menu hierarchy with only an input to move to the trailing affordance button and an input to select the affordance button.

It is noted that the techniques of this disclosure may be combined with any other suitable technology or combination of technologies, including those listed as references below.

REFERENCES

1. United States Patent No. 7818672.

2. United States Patent No. 7818683.

3. U.S. Patent Application Publication No. 20030193525.

4. Bos, Bert. "Web Style Sheets CSS Tips & Tricks.” *W3C*, January 17, 2001, updated November 5, 2019, https://www.w3.org/Style/Examples/007/menus.en.html#details.