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Slider User Interface with Precise Value Selection Using Gestures

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Slider User Interface with Precise Value Selection Using Gestures

ABSTRACT

Sliders are user interface elements that enable users to view and select values from a predefined range along a horizontal or vertical bar. Values on a slider are usually incremented with preset multipliers. When a user wants to select a value that requires precision that is not supported by the preset multipliers, the user is not able to achieve the desired accuracy. Such limitations are due to the limited amount of physical space and/or touch sensitivity available for interactions such as tapping or swiping. This disclosure describes a slider user interface that enables users to fine tune value selection using finger interactions (or equivalent) without requiring the use of a keyboard or other auxiliary mechanism. Per the techniques, the user can grab the slider knob (e.g., via touch and hold) and drag it at different angles to access multipliers with different levels of precision. The distance from the initial position is used to determine the selected value.

KEYWORDS

- Slider mechanism
- Slider user interface
- Slider graduation
- Slider knob
- Multiplier selection
- Value selection
- Gesture input

BACKGROUND

Sliders are user interface elements that enable users to view and select values from a predefined range along a horizontal or vertical bar. Values on a slider are usually incremented with preset multipliers. Icons or value ranges are used at both ends of the bar to represent a numeric or relative scale. Sliders are used in a variety of applications where graduation in value selection is required, e.g., on devices with touchscreens for finger or stylus based interaction.

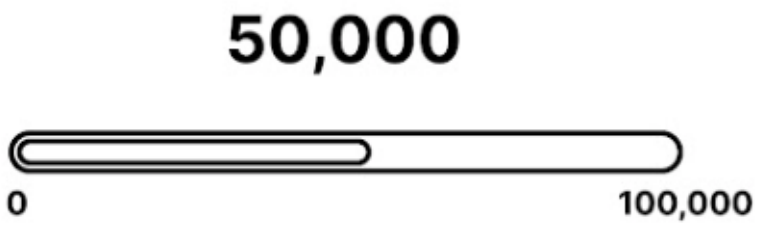

Fig. 1: Basic Slider mechanism

Fig. 1 illustrates an example of a basic slider mechanism in a user interface. The scale shown in the example ranges from 0 to 100,000 with the values increasing from left to right horizontally. To set a particular value, the user can tap and hold the knob at center and move their finger until the appropriate number appears (e.g., displayed as a preview above the slider). In this example, the current selected value is 50,000 and the preset multiplier for horizontal movement is set at a predefined value of 2,000. The user can thus set the value at 50,000 or the next higher value of 52,000 but not a value in between, since the next step available via the slider mechanism is 52,000.

Thus, when a user wants to select a value with precision that is not supported by the preset multiplier, the user is not able to achieve the desired accuracy. Such limitations are due to the limited amount of physical space and/or touch sensitivity available for interactions such as tapping or swiping. In many use cases, e.g., when performing financial transactions, when

editing dimensions of a three-dimensional object in a mechanical drawing, etc., where a user requirement is to be able to arrive at a precise numerical value without typing the exact number using a keyboard.

DESCRIPTION

This disclosure describes a slider user interface that enables users to fine tune value selection using finger interactions (or equivalent) without requiring the use of a keyboard or other auxiliary mechanism. Per the techniques, the user can grab the slider knob (e.g., via touch and hold) and drag it at different angles to access multipliers with different levels of precision. The distance from the initial position is used to determine the selected value.

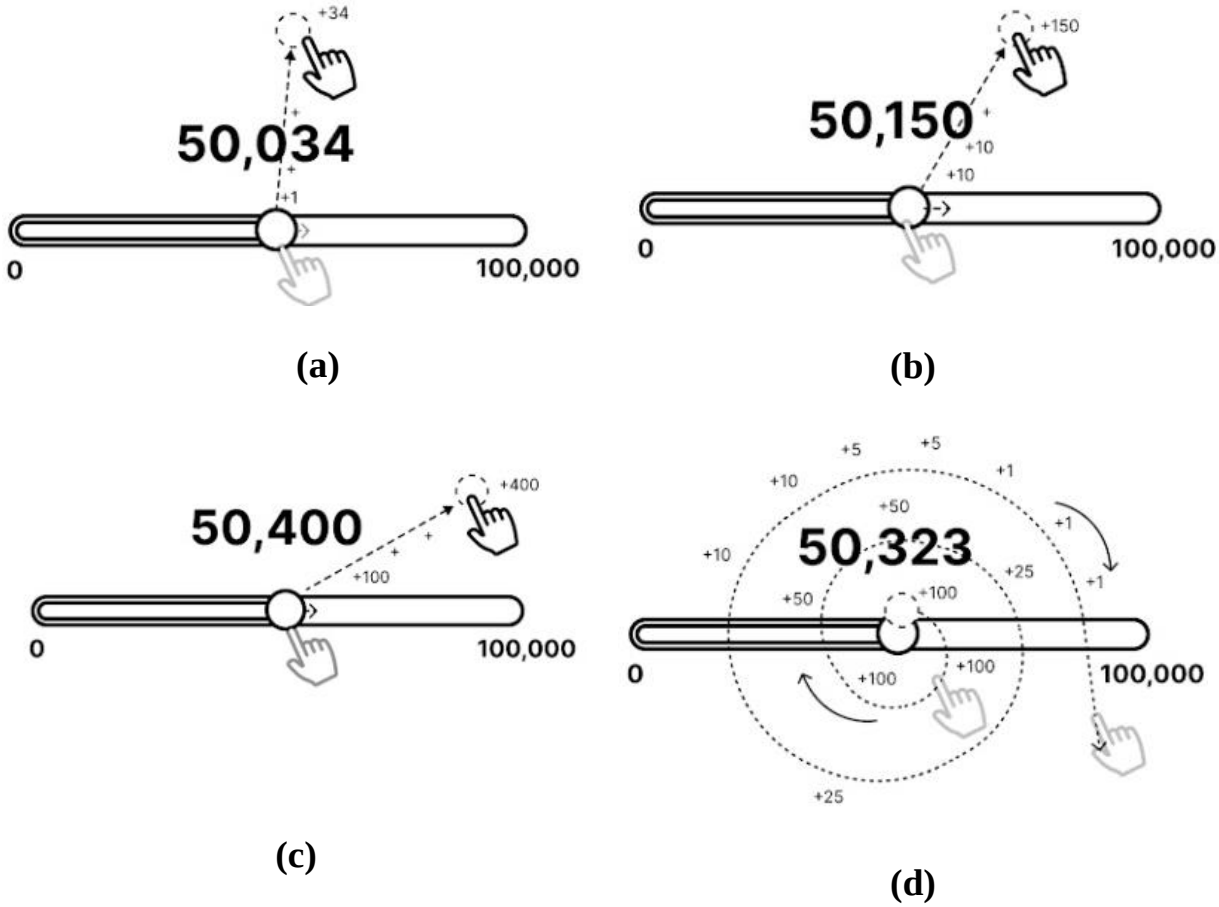

Fig. 2: Selecting a precise value on positive side

Fig. 2 illustrates an example of precise value selection on the positive side using finger interactions. When the knob is tapped, held, and dragged on outside at an angle less than 90° as shown in Fig. 2(a), the values are increased in multiples of 1 in equal proportion of the distance from origin of press and hold. When the angle is less than 60° as shown in Fig. 2(b), the incremental value is changed with a different multiplier - 10 in the example of Fig. 2(b). The selected value is proportional to the distance from the origin of press and hold. Similarly, the multiplier is increased further - 100 in the example of Fig. 2(c) - as the angle of drag angle is reduced below 30°. If the required increment is a combination of multiple value steps, a clockwise spiral gesture can be used as shown in Fig. 2(d). As the distance from the point of press and hold increases, the incremental value is reduced to enable the user to select the right value on the scale easily. Gestures can be performed on the opposite side of the slider user interface to values smaller than on the knob.

Fig. 3 shows examples of selecting precise values on the negative side. As illustrated in Figs. 3(a)-3(b), the angles of movement are changed inwards to obtain precise reduction of values. The smaller the angle, the higher the negative adjustment value. The value is proportional to the distance from the origin of press and hold. In case of multiple step value reduction, an anticlockwise spiral gesture can be used, as illustrated in Fig. 3(c) to obtain the precise target value.

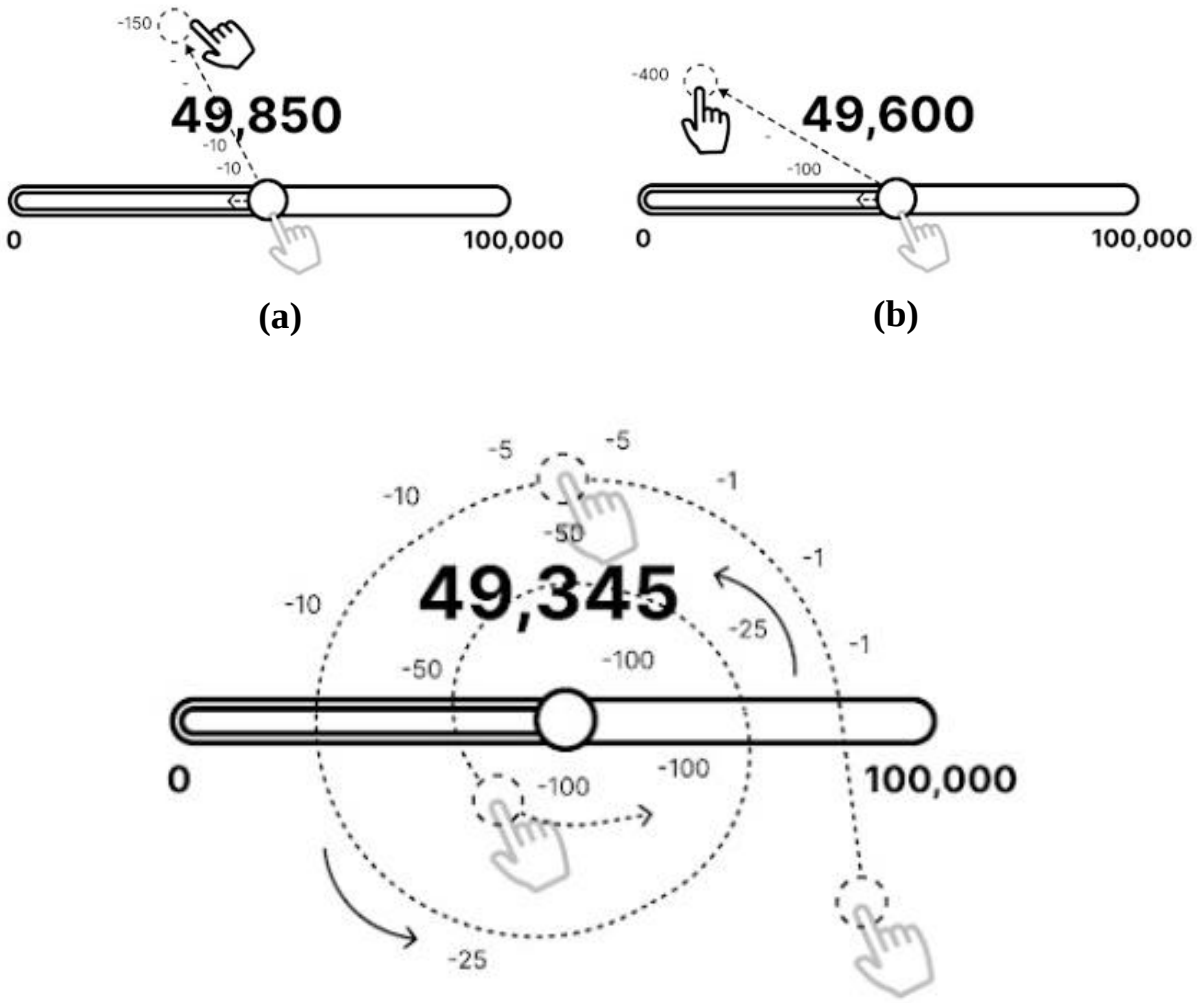

Fig. 3: Selecting a precise value on negative side

This slider mechanism can be provided when screen space is available to the user to select the value on the slider via gestures that extend above or below the slider. A similar mechanism can be provided to the left/right of a vertical slider to enable precise input of values. While Figs. 2-3 show selection of numerical values, any other selection (e.g., color gradient, strength of an effect, etc.) can be performed using a slider mechanism as described herein. As the user performs a gesture, haptic and/or auditory feedback can be provided to the user.

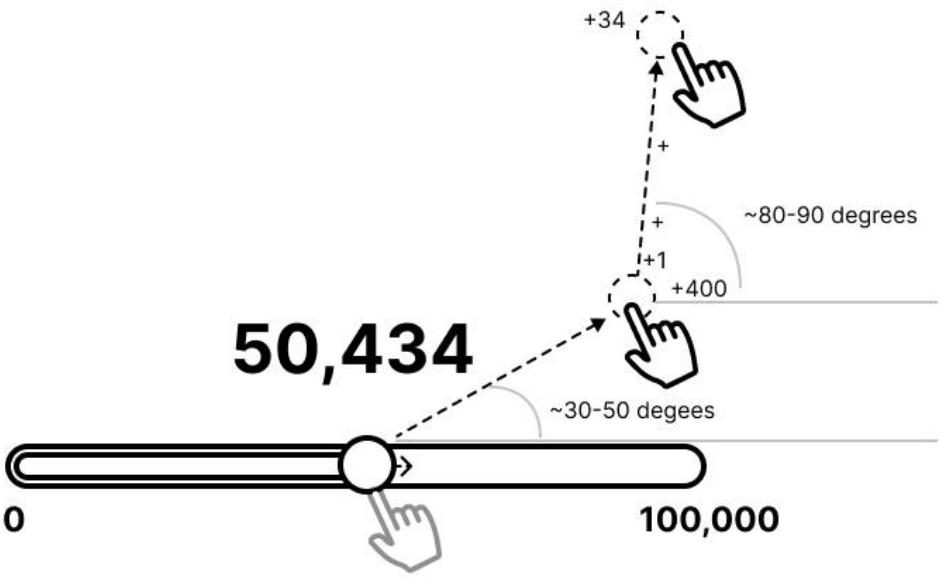

Fig. 4: Achieving precision in value selection with different gesture angles and distance

Fig. 4 illustrates another example user interface for achieving precision in value selection with different gesture angles and distance. As shown in Fig. 4, the user can initiate input when the knob is at the value 50,000. The user can drag their finger at a small angle (~30-50 degrees) that is associated with a value increment of 100 until they reach 50,400. The user can continue to drag their finger at a higher angle (~80-90 degrees) that is associated with a value increment of 1 until the target value of 50,434 is reached.

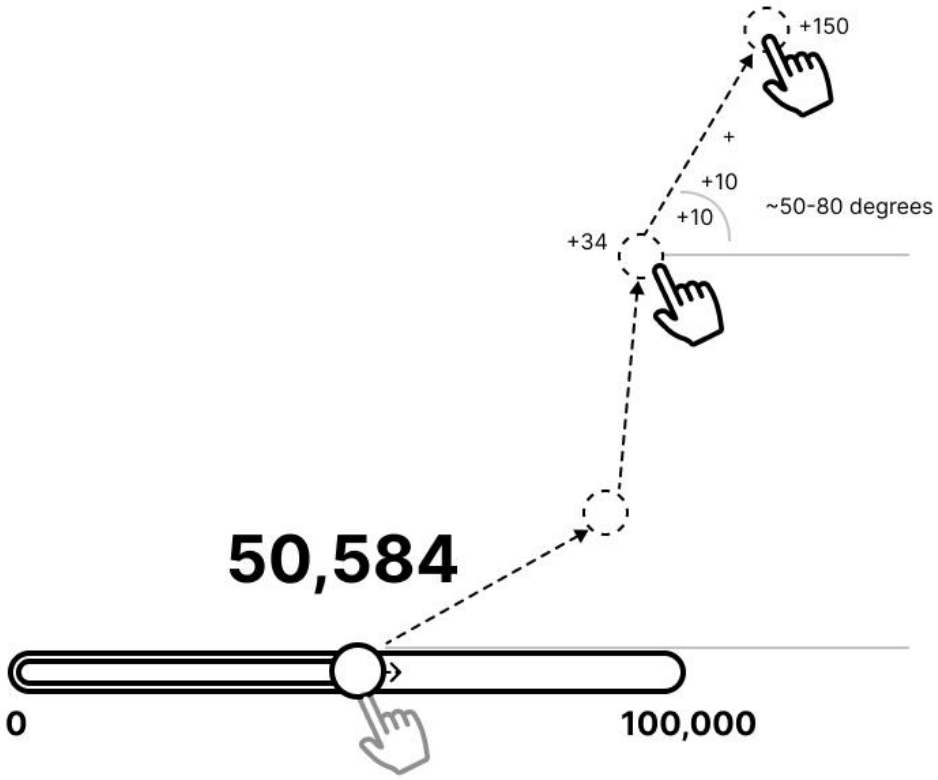

Fig. 5: Achieving precision in value selection with different gesture angles and distance

Fig. 5 illustrates another example of achieving precision in value selection with different gesture angles and distance. As shown in Fig. 5, the user can initiate input when the knob is at the value 50,000. The user can drag their finger at a small angle (~30-50 degrees) that is associated with a value increment of 100 until they reach 50,500. The user can continue to drag their finger at a higher angle (~80-90 degrees) that is associated with a value increment of 1 until the value of 50,534 is reached. The user can further continue to drag their finger at an intermediate angle (50-80 degrees) that is associated with a value increment of 10 until the target value of 50,584 is reached.

Thus, the user interface enables flexible input of values - the value update proceeds in large increments (e.g., 1,000 or 2,000) along the slider, and at different increments (e.g., 100,

10, 1) at different angles starting from the slider. The user can choose to initiate input on the slider and continue input at different angles to the slider to achieve the target value.

The user interface mechanism described herein can be used in any touch or gesture based interfaces. For example, the techniques can support augmented/virtual reality (AR/VR) interactions where the user can perform hand gestures in the air that are detected and translated to specific value selections. The user interface as described herein provides sliders with a large range of values while enabling precise selection, without constraining the user to a minimum incremental step.

CONCLUSION

This disclosure describes a slider user interface that enables users to fine tune value selection using finger interactions (or equivalent) without requiring the use of a keyboard or other auxiliary mechanism. Per the techniques, the user can grab the slider knob (e.g., via touch and hold) and drag it at different angles to access multipliers with different levels of precision. The distance from the initial position is used to determine the selected value.