January 2021

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VIRTUAL KEYBOARD WITH INTEGRATED SUGGESTION FEATURES

ABSTRACT

A computing device may present a virtual keyboard with integrated suggestion features that improve the speed and efficiency of correcting typographical errors (e.g., spelling and/or grammar errors) or text otherwise warranting correction. The virtual keyboard may be configured to present one or more suggestions for correcting typographical errors (also referred to herein as "typos") identified by the computing device. The computing device may display a virtual keyboard graphical user interface (GUI) that includes one or more suggestions for correcting each typo in a suggestion strip GUI. The suggestion strip GUI may be a contiguous region in line with and/or directly above the virtual keyboard rather than within a graphical element that overlays a portion of the virtual keyboard GUI and visually obscures the virtual keyboard GUI. In some instances, the suggested correction or an explanation of the error may be included within the virtual keyboard GUI in place of the keyboard itself or a combination thereof (e.g., a suggested correction within the suggestion strip GUI and an explanation of the error in place of the virtual keyboard GUI).

DESCRIPTION

The present disclosure describes techniques for improving the speed and efficiency of correcting typos or text otherwise warranting correction by using a computing device to present a virtual keyboard with integrated suggestion features. In particular, a virtual keyboard graphical user interface (GUI) may include one or more suggestions for correcting each typo in a suggestion strip GUI (e.g., a contiguous region in line with and/or directly above the virtual

keyboard) rather than within a graphical element that overlays a portion of the virtual keyboard GUI and visually obscures the virtual keyboard GUI.
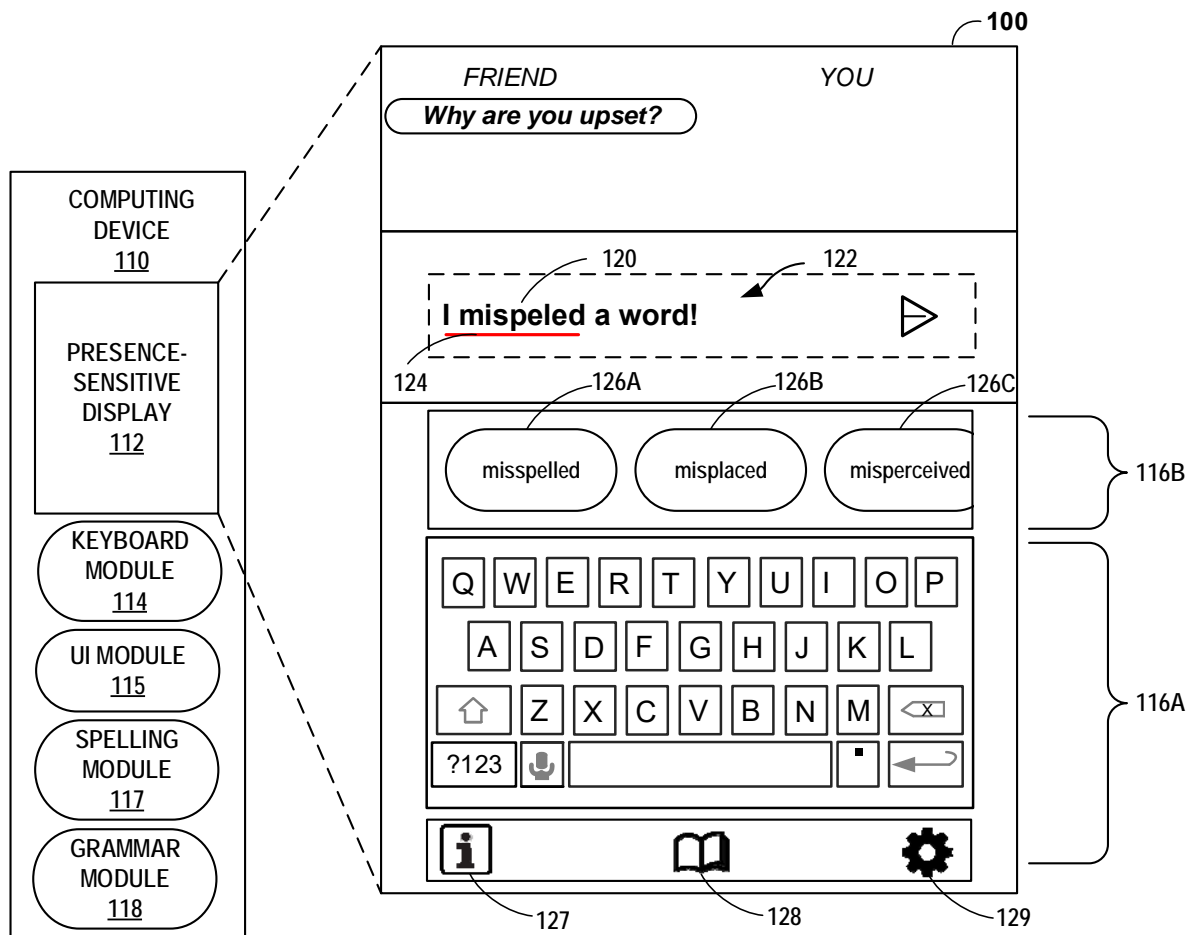
FIG. 1

FIG. 1 is a conceptual diagram illustrating a computing device 110 configured to present a virtual keyboard with integrated typo correction suggestion features. As shown in FIG. 1, computing device 110 may include a presence-sensitive display (display) 112, a keyboard module 114, a user interface (UI) module 115, a spelling module 117, and a grammar module 118.

In the example of FIG. 1, computing device 110 is a mobile computing device. However, computing device 100 may be any mobile or non-mobile computing device, such as a cellular

phone, a smartphone, a personal digital assistant (PDA), a desktop computer, a laptop computer, a tablet computer, a portable gaming device, a portable media player, an e-book reader, a watch (including a so-called smartwatch), an add-on device (such as a casting device), smart glasses, a gaming controller, or another type of computing device that may present a virtual keyboard GUI with integrated suggestion features.

Computing device 110 may include display 112. Display 112 may be a presence-sensitive display that functions as an input device and as an output device. For example, the presence-sensitive display may function as an input device using a presence-sensitive input component, such as a resistive touchscreen, a surface acoustic wave touchscreen, a capacitive touchscreen, a projective capacitance touchscreen, a pressure sensitive screen, an acoustic pulse recognition touchscreen, or another presence-sensitive display technology. The presence-sensitive display may function as an output (e.g., display) device using any of one or more display components, such as a liquid crystal display (LCD), dot matrix display, light emitting diode (LED) display, microLED display, organic light-emitting diode (OLED) display, e-ink, active matrix organic light-emitting diode (AMOLED) display, or similar monochrome or color display capable of outputting visible information to a user of computing device 110.

Computing device 110 may include keyboard module 114, UI module 115, spelling module 117, and grammar module 118. Modules 114, 115, 117, and 118 may be operable (or, in other words, executed) by one or more processors (e.g., of computing device 110, a computing system, etc.) to perform various actions, operations, or functions of computing device 110. That is, modules 114, 115, 117, and 118 may form executable bytecode, which when executed, cause processors to perform specific operations in accordance with (e.g., causing computing device

110 to become a specific-purpose computer by which to perform) various aspects of the techniques described herein.

Keyboard module 114 may represent an application, service, or component executing at or accessible to computing device 110 that causes computing device 110 to execute functionality associated with virtual keyboard GUI 116A and suggestion strip GUI 116B. Virtual keyboard GUI 116A may be associated with the functionality of a traditional virtual keyboard (e.g., generating a virtual keyboard layout for display at display 112, mapping detected inputs at display 112 to selections of graphical keys, determining characters based on selected keys, etc.). Suggestion strip GUI 116B may be associated with suggestion functionality for improving the speed and efficiency of correcting typos.

UI module 115 may cause display 112 to display GUI 116, including virtual keyboard GUI 116A and suggestion strip GUI 116B. UI module 115 may also cause display 112 to apply an emphasis 124 to typo 120 found within text 122 to help a user visually identify typo 120. UI module 115 may emphasize typo 120 by underlining, highlighting, and/or italicizing typo 120. Additionally, UI module 115 may use one or more colors to further visually identify typo 120. For example, if typo 120 is a spelling error, UI module 115 may use a first color (e.g., red) to underline typo 120. If typo 120 is a grammar error, UI module 115 may use a second color (e.g., blue) to underline typo 120. In this way, the type of emphasis 124 applied to typo 120 may visually indicate to the user of computing device 110 the type of error of typo 120. Computing device 110 may identify typo 120 by executing spelling module 117 and/or grammar module 118. Thus, in the example of FIG. 1, computing device 110 identified typo 120 (e.g., 'mispeled'), which is a spelling error, by executing spelling module 117, and UI module 115 applied emphasis 124 (e.g., red underline) to typo 120.

Virtual keyboard GUI 116A may include suggestion strip GUI 116B. For example, suggestion strip GUI 116B may be a contiguous region in line with and/or directly above the virtual keyboard) rather than within a graphical element that overlays a portion of the virtual keyboard GUI and visually obscures the virtual keyboard GUI. Suggest strip GUI 116B may include predicted next words, predicted word completions based on an entered character string, typo correction suggestions, etc.

To correct typo 120, the user may select typo 120 by providing an input to display 112 (e.g., by tapping, pressing, and/or using some other gesture) near the location at which typo 120 is displayed. Responsive to the user input, keyboard module 114 may cause suggestion strip GUI 116B to include one or more candidate replacement words 126A-126C (collectively, "candidate replacement words 126") associated with functionality for correcting each typo 120. Candidate replacement words 126 may include one or more corrections that spelling module 117, grammar module 118, and/or another module of computing device 110 suggests for correcting typo 120. In some examples, candidate replacement words 126 may include a primary candidate replacement word 126A. Primary candidate replacement word 126A may be the candidate replacement word computing device 110 predicts the user is most likely to select.

In any case, the user may review and/or interact with candidate replacement words 126. For example, to correct the spelling error (e.g., as visually indicated by emphasis 124, which is shown as a red underline) in text 122 (e.g., "I mispeled a word!") the user may select primary candidate replacement word 126A to replace typo 120 (e.g., "mispeled") with the contents of the primary candidate replacement word 126A (e.g., "misspelled"), thereby correcting typo 120. In some examples, primary candidate replacement word 126A may initially and/or always be

located in a specific region of suggestion strip GUI 116B (e.g., the leftmost region of suggestion strip 116B).

If there are too many candidate replacement words 126 for suggestion strip GUI 116B to include in a manner suitable to the user (e.g., without making candidate replacement words 126 so small that the contents of candidate replacement words 126 are unintelligible), suggestion strip GUI 116B may include fewer than all candidate replacement words 126 but visually indicate to the user the existence of additional candidate replacement words 126 not currently displayed. For example, suggestion strip GUI 116B may include a truncated candidate replacement word 126C, a candidate replacement word with a gradient, and the like.

In some examples, GUI 100 may include a graphical element, such as an info icon 127, associated with providing additional information (e.g., a definition, grammar rule, etc.) about the contents of a particular candidate replacement word. For example, responsive to the user selecting info icon 127, computing device 110 may display additional information about primary candidate replacement word 126A. In some examples, info icon 127 may reconfigure (e.g., minimizing, collapsing, etc.) virtual keyboard GUI 116A so that computing device 110 displays an area in which additional information about the contents of primary candidate replacement word 126A. In other examples, selecting info icon 127 may cause computing device 110 to replace or overlay at least a portion (e.g., the key portion) of virtual keyboard GUI 116A with the additional information. In this way, the suggested correction or an explanation of typo 120 may be included within virtual keyboard GUI 116A in place of the keyboard itself or a combination thereof (e.g., a suggested correction within suggestion strip GUI 116B and an explanation of typo 120 in place of virtual keyboard GUI 116A).

GUI 100 may include a graphical element, such as a settings icon 128, associated with adjusting settings of GUI 100, including virtual keyboard GUI 116A and suggestion strip GUI 116B, and/or the associated suggestion functionality. For example, responsive to the user selecting settings icon 128, computing device 110 may adjust settings of virtual keyboard GUI 116A, suggestion strip GUI 116B and/or the respective associated functionality. The settings may include disabling one or more features, enabling one or more features, providing suggestion functionality for one or more languages (e.g., English, Chinese, German, etc.), and the like. For example, the user may adjust settings of suggestion strip GUI 116B so that UI module 115 applies emphasis 124 to typo 122 and/or suggestion strip GUI 100 includes candidate replacement words 126 for correcting typo 120 when text 122 is in one or more languages (e.g., multilingual typing).

In some examples, GUI 100 may include a graphical element, such as an add to dictionary icon 129, associated with adding a string of characters (e.g., a name, word, etc.) to the dictionary of computing device 110, effectively making it so that the word is no longer "out-of-vocabulary." In this way, the user may cause computing device 110 to stop determining that the string of characters added to the dictionary is typo 122. For example, responsive to the user selecting add to dictionary icon 129, computing device 110 may add a unique name to the dictionary of computing device 110. As a result, computing device 110 may no longer determine the unique name to be typo 122 and thus no longer apply emphasis 122 or present candidate replacement words 126 in suggestion strip GUI 116B with respect to the unique name.
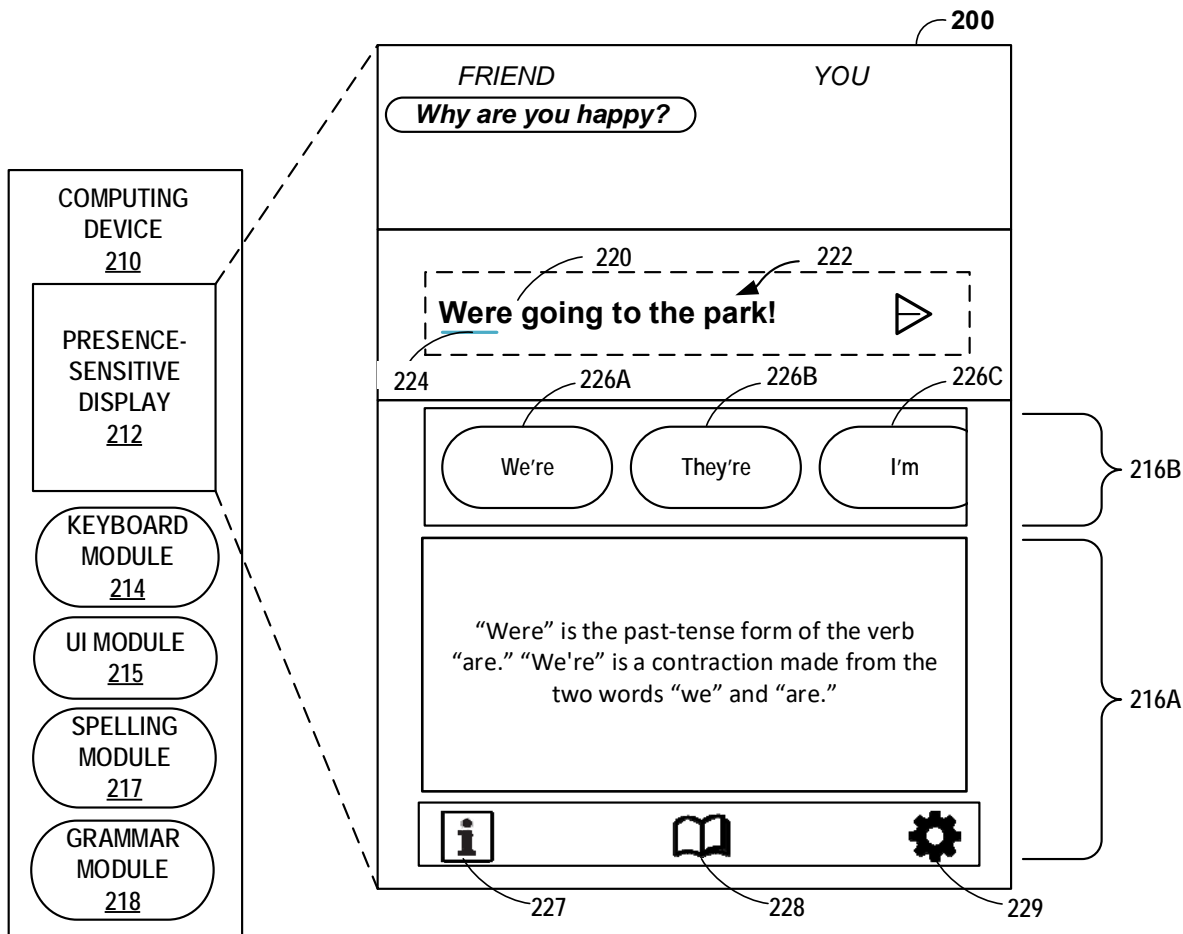
200

FRIEND   YOU

(**Why are you happy?**)

220   222

Were going to the park!   ▷

224   226A   226B   226C

(We're)   (They're)   (I'm)   216B

"Were" is the past-tense form of the verb
"are." "We're" is a contraction made from the
two words "we" and "are."   216A

ℹ   📖   ⚙
227   228   229

FIG. 2

FIG. 2 is a conceptual diagram illustrating a computing device 210. In the example of

FIG. 2, a text 222 includes a typo 220 (e.g., 'Were') that is a grammar error. Computing device

210 may identify typo 220 using grammar module 218. A UI module 215 may apply an

emphasis 224 so that the user may visually identify typo 220. Emphasis 224 may be visually

distinguishable from emphasis 124 so that the user may identify the type of error (e.g., a

grammar error instead of a spelling error) of typo 220 based on the emphasis applied. For

example, emphasis 224 may be a blue underline (instead of the red underline used in the example

of FIG. 1) to visually indicate that typo 220 is a grammar error.

Computing Device 210:
PRESENCE-SENSITIVE DISPLAY 212
KEYBOARD MODULE 214
UI MODULE 215
SPELLING MODULE 217
GRAMMAR MODULE 218

Responsive to identifying typo 220, grammar module 218 may suggest corrections to typo 220. Keyboard module 214 may cause suggestion strip GUI 216B to include the suggested corrections as candidate replacement words 226 for the user of the computing device to review. Candidate replacement words 226 may include a primary candidate replacement word 226A, which may be similar if not substantially similar to primary candidate replacement word 126A.

GUI 200 may include a graphical element, such as an info icon 227 (which may be similar if not substantially similar to info icon 127), associated with providing additional information (e.g., a definition, grammar rule, etc.) about the contents of a particular candidate replacement word. For example, responsive to the user selecting info icon 227, computing device 210 may display additional information (e.g., the semantic difference between "were" and "we're") about primary candidate replacement word 226A. As shown in the example of FIG. 2, selecting info icon 227 may cause computing device 210 to reconfigure (e.g., minimizing, collapsing, etc.), replace, and/or overlay at least a portion (e.g., the key portion) of virtual keyboard GUI 216A with the additional information. In this way, the suggested correction or an explanation of typo 220 may be included within virtual keyboard GUI 216A in place of the keyboard itself or a combination thereof (e.g., a suggested correction within suggestion strip GUI 216B and an explanation of typo 220 in place of virtual keyboard GUI 216A).

One or more advantages of the techniques described in this disclosure include the ability of the user to simultaneously access the functionality of a traditional virtual keyboard as well as the integrated suggestion functionality. Due to the configuration of the GUI (e.g., virtual keyboard GUI 116A and suggestion strip GUI 116B), the suggestion strip GUI includes candidate replacement words (e.g., candidate replacement words 126) in a non-obtrusive manner (e.g., without obstructing virtual keyboard GUI 116A, which would otherwise prevent the user

from entering text). Another advantage includes presenting the user with a plurality of candidate replacement words, which increases the probability that the user will ultimately interact with one of the candidate replacement words (e.g., primary candidate replacement word 126A) and replace typos with the contents of one or more of the candidate replacement words, thereby improving the speed and efficiency of correcting typos.

References

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2. US Patent Application Publication No. US20140173494A1