amps. (It is believed that 1 microamps may be the lowest level current that someone could sense.)

[0033] In at least one embodiment, not specifically illustrated, the device includes a resistance-measuring circuit that measures the user's fingertip skin resistance; the voltage of the generated pulses can be adjusted up or down accordingly. Additionally, in another embodiment, the device is configured to vary the pulse as a function of the button, icon, selection, or other GUI selected. In particular, the pulse pattern, strength, intensity, frequency, and/or duration can be varied to stimulate different tactility as a function of the screen selection that has been made. In this manner, the user is able to differentiate by feel what input he or she has made to the handheld wireless device. For example, the device may be configured to provide more intense stimulus when moving a volume "slider" to increase the volume of the device and less intense stimulus when moving the volume slider to decrease the volume of the device. Also, the device may be configured to provide a slight stimulus each time a possible selections is passed over by a cursor, e.g., when scrolling through a list of email contacts.

[0034] Thus, to summarize, a focus of this disclosure is on a handheld wireless communication device which includes a hand cradleable body; a display screen (e.g., a color LCD display screen) disposed on the body, with the display screen configured to display to a user of the device images of buttons, icons, and/or other graphical user interface items; a touch-sensing assembly with components disposed on or adjacent to the display screen, with the touch-sensing assembly being adapted to recognize when the user has touched the display screen and to discriminate where the user has touched the display screen; and a haptic assembly with components disposed on an upper surface of the display screen, with the haptic assembly being adapted to provide tactile stimulation to the user when the user has touched the display screen at a location corresponding to the image of a button, icon, or other graphical user interface displayed on the display screen. In specific embodiments, the haptic assembly is adapted to provide electrical stimulation to the user, and the haptic assembly comprises transparent electrical conductors arranged in a grid on the upper surface of the display screen. Specifically, the transparent electrical conductors may be arranged in the form of interleaved combs, and they may be formed from indium tin oxide, antimony tin oxide, or other transparent, electrically conductive material. The haptic assembly is adapted to provide electrical stimulation in the form of pulses. Preferably, the device is configured such that the electrical stimulation varies as a function of the button, icon, or other graphical user interface touched by the user. Additionally, the device may include a skin resistance-measuring circuit, such that the level of electrical stimulation provided by the haptic assembly is varied as a function of skin resistance measured by the resistance-measuring circuit.

[0035] Reverting now to more general features of a device according to this disclosure, the various characters, commands, and functions associated with keyboard typing in general are traditionally arranged using various conventions. The most common of these in the United States, for instance, is the QWERTY keyboard layout. Others include the QWERTZ, AZERTY, and Dvorak keyboard configurations. The QWERTY keyboard layout is the standard English-language alphabetic key arrangement **44***a* shown in FIG. **4**. The QWERTZ keyboard layout is normally used in German-speaking regions; this alphabetic key arrangement **44***b* is shown in FIG. **5**. The AZERTY keyboard layout **44***c* is normally used in French-speaking regions and is shown in FIG. **6**. The Dvorak keyboard layout was designed to allow typists to type faster; this alphabetic key arrangement **44***d* is shown in FIG. **7**. In other exemplary embodiments, keyboards having multi-language key arrangements can be contemplated.

[0036] Alphabetic key arrangements are often presented along with numeric key arrangements. Typically, the numbers 1-9 and 0 are positioned in the row above the alphabetic keys **44***a-d*, as shown in FIG. **4**-**8**. Alternatively, the numbers share keys with the alphabetic characters, such as the top row of the QWERTY keyboard, as is also known in the art. Yet another exemplary numeric key arrangement is shown in FIG. **8**, where a "ten-key" style numeric keypad **46** is provided on a separate set of keys that is spaced from the alphabetic/numeric key arrangement **44**. The ten-key styled numeric keypad **46** includes the numbers "7", "8", "9" arranged in a top row, "4", "5", "6" arranged in a second row, "1", "2", "3" arranged in a third row, and "0" in a bottom row. Further, a numeric phone key arrangement **42** is exemplarily illustrated in FIG. **9**.

[0037] Some handheld devices include a combined text-entry key arrangement and a telephony keyboard. Examples of such handheld devices **300** include mobile stations, cellular telephones, wireless personal digital assistants (PDAs), two-way paging devices, and others. Various keyboards are used with such devices and can be termed a full keyboard, a reduced keyboard, or phone key pad, while in other handheld devices **300**, the key arrangements can be presented upon user request, thereby reducing the amount of information presented to the user at any given time and enabling easier reading and viewing of the same information.

[0038] In embodiments of a handheld device **300** having a full key arrangement, the alphabetic characters are singly associated with the plurality of physical keys. Thus, in an English-language keyboard of this configuration, there are at least 26 keys in the plurality so that there is at least one key for each letter.

[0039] The International Telecommunications Union ("ITU") has established telephone standards for the arrangement of alphanumeric keys. The standard telephone numeric key arrangement shown in FIGS. **9** (no alphabetic letters) and **10** (with alphabetic letters) corresponds to ITU Standard E.161, entitled "Arrangement of Digits, Letters, and Symbols on Telephones and Other Devices That Can Be Used for Gaining Access to a Telephone Network." This standard is also known as ANSI TI.703-1995/1999 and ISO/IEC 9995-8:1994. As shown in FIG. **2**B, the telephone numeric key arrangement with alphabetic letters can be presented on the adaptive display screen **322**. The telephone numeric arrangement as shown can be aptly described as a top-to-bottom ascending order three-by-three-over-zero pattern.

[0040] The HTS display screen **322** of the present disclosure is capable of presenting key arrangements as described above, including those taking the form of one of the following: a navigational key arrangement, a text entry key arrangement, a symbol entry key arrangement, and a numeric entry key arrangement. In addition to the alphabetic character and numeric character arrangements described above, the navigational key arrangement can be like the ones shown in FIGS. **2**A and **2**B. The navigational key arrangement as described herein includes at least a navigation tool. Furthermore, the navigational key arrangement can include keys located proximate to the navigation tool that are used in performing navi-