

other types of controllers such as microprocessors, application specific integrated circuits (ASIC), or other such controllers.

[0036] If the embodiment includes a microphone (520), it would be coupled to the transmitter (501) for modulation of the speech signal for transmission. Similarly, if the embodiment incorporated a speaker (525), it would be coupled to the receiver (505) for changing the demodulated signal received from the base station into an aural signal to be radiated by the speaker (525).

[0037] The process of the present invention is illustrated in FIG. 6. This process begins with the controller generating the icons indicating the different modes of the communication device (step 601). The controller then displays these icons on the touchscreen display. The user touches the telephone icon to put the communication device into the telephone mode (step 610). The controller reads the contact on the touchscreen display and, knowing the coordinates of the telephone mode icon on the display, puts the device into the telephone mode (step 615). Once in the telephone mode, the controller generates the number icons and causes the touchscreen display to display them in a keypad-style format (step 620). The controller also generates the other telephone keys, such as "send", "end", and the telephone number display and displays them in the proper format on the touchscreen display.

[0038] When the user contacts the touchscreen over the appropriate number to generate the desired telephone number, the controller reads these contacts and displays those numbers in the telephone display section of the touchscreen display (step 625). The user then contacts the "SEND" icon to instruct the controller to transmit the telephone number to the central switch for dialing (step 630).

[0039] FIG. 7 illustrates a received call process of the present invention. If the communication device receives a call, the device alerts the user by vibrating, flashing the display, or generating an alert tone (step 701). In the preferred embodiment, the communication device automatically changes to the telephone mode (step 705) and displays any information received regarding the incoming call (710). This information includes the calling telephone number and calling party name.

[0040] FIG. 8 illustrates a tactile touchscreen as used on the communication device of the present invention. The screen is capable of providing raised keys for the telephone numbers or other icons. Using this type of screen, the user has a tactile feedback, similar to depressing a telephone keypad button, when operating the communications device. The tactile touchscreen also provides assistance to visually impaired people by having the capability to display the Braille character set.

[0041] As illustrated in FIG. 8, the display is comprised of a matrix of individually addressable dot or tactile elements. The elements are arranged in an evenly spaced grid covering the entire display. In an alternate embodiment, the tactile portion of the display is only on part of the display, such as the lower half, in order to provide a "telephone keypad" area when in that particular mode. In the preferred embodiment, the elements are spaced less than 0.10 inch apart in order to allow the sensation of a continuous line.

[0042] Each tactile element is switchable between an inactive position in which the dot is flush with the surround-

ing surface and an active position in which the dot is raised above the surrounding surface. The mechanism to provide this may be of any type including: electromechanical, electromagnetic, and switchable dimpled plastic film. In the preferred embodiment, the tactile display is transparent in order to permit the conventional liquid crystal display to be seen below the raised surface.

[0043] In one embodiment, the tactile display uses a clear fluid that can be pumped to each element by x/y coordinate addressing by the communications device controller. The controller switches the appropriate valves along the x and y axes in order to allow fluid to flow to a certain element or elements. This has the effect of raising that element or elements.

[0044] Another embodiment uses a clear material that warps when a predetermined voltage is applied to the element. Again using the x/y coordinate addressing, the controller applies the predetermined voltage to the particular element or elements that are desired to be raised. The memory effect of the material causes it to return to its flat state when the voltage is removed.

[0045] These described methods for raising the elements on the tactile display are for illustration purposes only. Any other method for raising the individual elements is encompassed by the present invention.

[0046] In operation, referring to FIG. 8, when the controller detects that the communications device is in the telephone mode, it raises the tactile elements in the appropriate positions on the display in order to simulate buttons on a telephone keypad (810). Additionally, the icon for each key is generated and displayed behind each tactile element-by way of a darkened (or lightened) area simulating a key on the liquid crystal display.

[0047] The controller also raises the appropriate elements for other such displays. For example, if a multimedia display is being presented, the controller can raise the appropriate elements to form fast forward, reverse, and other types of keys. The controller can also shape the screen to produce maps.

[0048] The tactile display of the present invention also has the added benefit of providing vision-impaired individuals with Braille elements so as to allow the visually-impaired user to operate the communications device. For example, the controller can raise the Braille equivalent of the numbers on a telephone in order for the impaired user to input a telephone number. The controller can also use the Braille elements in order to display directions to a location that the user desires to find.

[0049] The size of the touchscreen display of the present invention provides the communication device with the ability to display multimedia deliveries from the Internet or other sources. The display could show the presentation along with dynamically changing control buttons such as fast forward, back, review, stop, and pause.

[0050] The present invention also has the ability to display local maps and the present position of the communications device. Using either a built-in GPS receiver or the cell-phone network's locator capability, the map can display present position and directions on going to another location. Additional maps can be downloaded from the Internet.