thus a null-result (no key deemed selected) may be determined for that particular grouping of keys.)

[0068] The next stage is to determine which of the three intermediate independently selected keys is to be determined as the sole user-selected key. This may be done in a number of ways, for example, based on known techniques for selecting between multiple keys (e.g. greatest output signal, first to go into activation, etc.). Alternatively, the selection may be made in a manner similar to the scheme used to select the keys from within the separate groupings (i.e. by taking account of the positions of the keys selected in the first stage within the UI as a whole, possibly with the keys having different priority rankings in this stage compared to the first stage).

[0069] The preceding description, in particular with reference to FIG. **1**, has focused on capacitive sensors based on what might be termed passive sensing techniques, i.e. sensors in which all of the electrodes defining the sensing areas in the sensing region are individually responsive to a capacitive coupling between a pointing object and respective ones of the sensing areas (i.e. sensors of the type described in U.S. Pat. No. 5,730,165 and U.S. Pat. No. 6,466,036). However, embodiments of the invention may also be based on what might be termed active capacitive sensing techniques, e.g. sensors in which sensitive areas are based on paired drive and receive electrodes (such as described in U.S. Pat. No. 6,452,514). The drive and receive electrodes may be arranged in a matrix array where keys (sensing areas) are defined by overlap regions between row and column electrodes. With this type of sensor, changes in a capacitive coupling between a pointing object and respective ones of the sensing areas modify the transfer of a drive signal from the drive electrode to the receive electrode.

[0070] Furthermore, although the above description has focused on user interfaces comprising physically discrete sensing areas, embodiments of the invention may be based on a user interface having a continuous 2-D sensing region in which "virtual" sensing areas are defined. For example, a continuous 2-D region may be notionally divided into an array of virtual discrete keys.

[0071] It will also be appreciated that position sensors embodying the invention may incorporate a variety of additional features. For example, in some applications it is desirable to have a 'wakeup' function, whereby the entire device 'sleeps' or is in some quiescent or background state. In such cases, it is often desirable to have a wake signal from mere proximity of a human body part some distance away. The element can be driven as a single large capacitive electrode without regard to position location, while the unit is in the background state. During this state the electronic driver logic looks for a very small change in signal, not necessarily enough to process as a 2D coordinate, but enough to determine that an object or human is in proximity. The electronics then 'wakes up' the overall system and the element is driven so as to become a true position sensor once again.

[0072] Also, although the term "touch" may be used in this description, a position sensor of the kind described above can be sufficiently sensitive that it is able to register the location of an adjacent finger (or other object such as a stylus) without requiring physical contact. The term "touch" as used herein should therefore be interpreted accordingly.

[0073] It will be appreciated that although particular embodiments of the invention have been described, many modifications/additions and/or substitutions may be made within the scope of the present invention. Accordingly, the particular examples described are intended to be illustrative only, and not limitative. Furthermore, it will be understood from the above description that features of embodiments of the invention may be combined in ways other than those explicitly set out in the appended claims.

Other Embodiments

[0074] In studying this description, the reader may be aided by noting definitions of certain words and phrases used throughout this patent document. Wherever those definitions are provided, those of ordinary skill in the art should understand that in many, if not most instances, such definitions apply to both preceding and following uses of such defined words and phrases. At the outset of this description, one may note that the terms "include" and "comprise," as well as derivatives thereof, mean inclusion without limitation; the term "or," is inclusive, meaning and/or. The word 'key' as generally used in this disclosure refers to a touchable portion of a mechanical to electrical transducing device that is non-bistable in nature. This term specifically excludes conventional mechanical switches in which two or more electrical conductors are moved into or away from contact with each other to make or break an electrical connection. The terms 'keyboard', 'keypad' and the like all refer to arrays of keys for data input without limitation as to the size or configuration of the array. A 'key' can also be a dimensional sensing surface such as an XY touch screen or a 'trackpad', or a sensing zone not intended for normal human data entry such as an object or body part sensor. 'Touch' can mean either human or mechanical contact or proximity to a key. 'User' can mean either a human or a mechanical object. A 'finger' can be, inter alia, a human finger, a mechanical finger or a stylus. 'Upper' key can mean a key in an upwardly spaced location with respect to another key on a keypad. 'Lower' key can mean a key in a downwardly spaced location with respect to another key on a keypad.

[0075] Capacitive sensors, unlike bistable electromechanical switches which are either open or closed, provide a signal that varies with the degree of touch or extent or coupling between a user's finger and a sensing element of a keyboard. Other non-bistable touch sensors, such as an array of piezoelectric sensors in which the output from a given sensor increases with increasing activation force, share many of the properties of capacitive keys. Thus, much of the subsequent disclosure should be understood as being relevant to non-capacitive keys that also provide an output signal responsive to a degree of coupling between the key and a user's finger, stylus, or other key-activating or pointing implement that is proximate the key.

[0076] Referring to FIG. **7**, there is shown an array of 'N' tightly spaced capacitive keys in a key panel **10** which would benefit from the invention. When using such small key panels it is inevitable that a finger will encompass much more than the intended key. A finger touching a principle desired key electrode **12** could easily create a 'fingerprint' outline **20**, as shown in dashed lines, where the fingerprint has a centroid location A. This fingerprint also encompasses key **14** other than the intended key. The amount of intersecting surface area between the dashed line and each key area is a reasonable representation of the amount of signal level change each intersected key will receive due to the touch, although even non-touched keys will also see an increase in signal due to mere finger proximity and to fringe-field effects within the touch panel.