

to define this corresponding relationship, as he/she prefers. Furthermore, the total number of functions could be increased to 10 if one also includes the thumb of the left and right hand as shown in FIG. 1.

[0042] As it is shown in FIG. 2, the key idea of the system and method 200 of the present invention is that a user selects 210 only one fingertip at a time. The user is aware of the particular function that corresponds to the selected fingertip. With the selected fingertip, i.e. only the selected fingertip, the user touches and activates 220 an input sensor. It is important to realize that the user is not using his/her other fingertips when touching the input sensor. This offers great advantages to systems and methods in which it would now be possible to maximize the number of functions while minimizing the size of the input sensor. With a single input sensor, a manufacturer of the device or system has the opportunity to define up to 10 different functions, i.e. when n is 10, which correspond to different fingertips for a single input sensor. This would not only increase the functionality of the system, it would also make the selection process easier as well as it would decrease potential injuries such as repetitive strain injuries associated with repetitive typing or pressing.

[0043] Once the user selects a fingertip, he/she is aware of the selected function, however, the system or device on which the user wants to select the function is not. Imaging 230 is used in order for the system and method of the present invention to determine and identify which fingertip touches and activates the input sensor. Imaging 230 requires at least one image of a part of the user's hand large enough to identify the selected fingertip that activates the input sensor. After the image is obtained, the image is processed 240 to determine which fingertip touched and activated the input sensor (more details about imaging and processing are provided infra). Processing includes that the identified fingertip based on imaging is compared in a look-up table. The look-up table contains the dependent relationship between the fingertips and functions in order to determine the corresponding function for the identified fingertip.

[0044] Understanding the concept of the present invention described so far, it would be possible to further increase the number of possible functions for a single input sensor. This is established by having an input sensor that is not only capable of detecting on/off activation, but also capable of detecting a motion that is performed by the user at the same time when the user activated the input sensor. For only one fingertip one could then define p motions for a single input sensor (whereby p is an integer). In general, m_1, \dots, m_n motions could be defined respectively corresponding to n fingertips whereby the total number of selectable functions for that single input sensor increases to

$$\sum_{i=1}^n m_i$$

[0045] (whereby m_1 are integers; note that n fingertips is also corresponding to n functions as discussed supra with respect to FIGS. 1-2). FIG. 3 shows an example of two different fingertips for the right hand whereby each fingertip corresponds to an upward motion and a downward motion.

By having two fingertips (i.e. when n is 2) and two different motions for each fingertip (i.e. when m_1 is 2 and m_2 is 2) the total number of different functions is then 4, i.e. $m_1+m_2=4$. FIG. 4 shows a system and method 400 that is similar to system and method 200 as it is discussed supra and with respect to FIG. 2. The difference between FIG. 2 and FIG. 4 is the addition of providing motion 410 by the selected fingertip. Since a function is now dependent on the selected fingertip and the provided motion by the selected fingertip, processing 420 now further includes determining the function that corresponds to the identified fingertip based on imaging 230. A look-up table that contains the dependent relationship between the fingertips, motions and functions is used to determine the functions given the identified fingertip.

[0046] The input sensor could be an arbitrary small input sensor. The input sensor could also be substantially as small as or smaller than the selected fingertip. Input sensor could include any kind of electrical elements or heat-conducting elements to either sense binary on/off activation and/or resistive membrane position elements or position sensor elements to sense motion. Input sensors could therefore take different forms such as, for instance, but not limited to, a keypad, button, a contact point, a switch, a touchscreen, a trackpad, or a heat-conducting pad. Although for some applications it would be preferred and advantageous to utilize a small input sensor, such as a small keypad, the present invention is not limited to the use of a small input sensor. The concept of the present invention would also work for large input sensors. It would for instance be easier for a user to locate a large input sensor, large input sensors would be advantageous for the applications when the user has to select one out of a plurality of functions without looking at the input sensor, based on the tactile feedback only. These large input sensors (e.g. substantially larger than the area of a fingertip) would be equipped with a coordinate location mechanism (such as in laptop trackpads) for identifying the coordinate of the contact point of the selected fingertip with the input sensor, which would then be used by the image recognition algorithm.

[0047] FIGS. 5-10 show different examples of input sensors or devices. FIG. 5 shows the dorsal site of a user's right hand 510. User's right hand 510 shows the dorsal part 511 of the hand which is opposite from the palm of the hand, thumb 512, index finger 513, middle finger 514, ring finger 515, and little finger 516. Thumb 512, index finger 513, ring finger 515, and little finger 516 are shown in a flexed position (i.e. bringing the fingertips in a direction toward the palm site of the hand), whereas index finger 513 is in an extended position, substantially extended position or partially flexed position. It would only be necessary for the non-selected fingers to not obscure the view of the selected finger by the imaging device; thus the non-selected fingers can also be in substantially extended or partially flexed position. In the example of FIG. 5, the user has selected fingertip 513-FT of index finger 513 to touch and activate input sensor 520. Input sensor 520 could be a keypad, a switch or a button. It should be noted that the size of input sensor 520 (530 shows a top view of input sensor 520) in this example is substantially as small as fingertip 513-FT.

[0048] FIG. 6 shows a similar example as in FIG. 5 with the difference that the user has selected fingertip 514-FT of middle finger 514 to touch and activate input sensor 520. In