[0255] Such a method is described in U.S. provisional patent application No. 60/406,662, in which the amplifier input (negative or positive) is determined using the magnitude of signals received by the neighbor conductors.

[0256] The method is further explained as follows: If the user places a finger on the display panel during the mapping process, and then removes it, a finger signal pattern is detected as explained above. This method differentiates such a signal pattern from an actual finger that is placed on the display panel in the following manner: Sometime after the mapping process, a given differential amplifier amplifies a differential in the signals of the two conductors it connects. This differentiation's pattern fits the magnitude of a finger's pattern.

[0257] The pattern is the result of the following scenarios:

[0258] 1. A user's finger has been placed on the display panel through the mapping process. The finger has sent a signal through the sensor conductor connected to the positive input of the differential amplifier, and, as a result, a signal (F1s) is sent to the differential amplifier (N). The sensor conductor also receives a steady noise signal (D1s) from the display panel. The sensor conductor connected to the negative input of the differential amplifier receives a steady noise signal (D2s) from the display panel. The differential consequently received and amplified by the differential amplifier equals {(D1s)+(F1s)}−(D2s). The finger is now removed. The differential signal amplified upon removal of the finger now equals {(D1s)−(D2s)}. The DSP now subtracts the value stored in the differential map from the new value. The result equals {(D1s)−(D2s)}−[{(D1s)+(F1s)}−(D2s)]=−(F1s). Realistically, the (F1s) value represent the magnitude, and the (−) sign represents the phase shift.

[0259] 2. The pattern (magnitude and phase) is the result of a real finger currently sending a signal through the sensor conductor connected to the negative input of the differential amplifier.

[0260] By using the magnitude of signals received and the neighboring conductors method disclosed in subchapter 4.6 of U.S. provisional patent application No. 60/406,662, which subchapter is hereby incorporated by reference, the DSP detects whether the source is the negative input of the differential amplifier or the positive input thereof.

[0261] If the signal's source was the sensor conductor connected to the positive input of the differential amplifier then scenario number 1 appears to be the case and the differential map is not valid. A new mapping process or initialization is launched.

[0262] If the signal's source was the sensor conductor connected to the negative input of the differential amplifier then scenario number 1 mentioned above did not happen and the mapping is valid. The DSP consequently detects a finger.

[0263] This method functions in an identical manner when the two options are:

[0264] 1. A finger was sending a signal through the sensor conductor connected to the negative input of the differential amplifier, and has now been removed.

[0265] 2. A finger is currently sending a signal through the sensor conductor connected to the positive input of the differential amplifier.

[0266] In order to increase the reliability of the detection of doubts in the mapping, either while using phase information or while using any other method, the system may limit the initialization of re-learning steady noises only to cases in which such doubts are presented for at least a predetermined minimum duration of time. Since the signals created by a pseudo finger are steady and never change over time, stability over time is an additional differentiation factor between real and pseudo signals.

[0267] In one preferred embodiment of the present invention the signal induced by the finger is much larger then the steady noise signals. This ensures that a finger presence is always distinguished from the steady noise, hence enabling correct mapping process. For example, returning to **FIG. 15**, when capacitors **216** and **218** are of lower capacitances then the finger induced capacitance—a signal created by a finger touch is greater then the differential signal originating from capacitors **216** and **218**. Hence, the steady noise originating from the coupling of the sensor array and the display screen cannot be mistaken for a finger touch. Any detected signals are translated into finger touch only when the received signal is considerably higher then the steady noise. Under these conditions, it is quite simple to identify a situation in which no fingers are present on the sensor plane to create a correct differential map.

[0268] One possibility for creating such conditions is ensuring an air gap between the conductive lines of the sensor and the display screen. The existence of an air gap in such a location reduces the coupling capacitance between the sensor lines and the display screen to such a level that finger signals are much greater then the steady noise. Another possibility comprises placing the sensor plane in close proximity to the user finger, thus ensuring that the finger induced signal is greater then the steady noise.

[0269] Reference is now made to **FIG. 19**, which is a simplified flow chart summarizing the three principle embodiments of the present invention. In **FIG. 19, a** stage **1** involves providing an oscillating electrical signal. In one embodiment the oscillating signal is transmitted, so as to be picked up by the finger etc doing the touching. In a second embodiment the oscillating signal is provided to one of the two groups of conductors. The oscillating signal is capacitively connected to the second group of conductors in the presence of a finger touch but not otherwise. In the third embodiment the detection device or the conductors are floated with the oscillating signal and the finger touch provides an AC short to earth.

[0270] In stage **S2**, the capacitive effect is detected by monitoring of the conductors in the grid. Depending on the embodiment, the capacitive effect may be the signal from the finger, the signal connected from the other set of conductors, or the drop in voltage due to the AC short provided by the finger connection. In other embodiments, any other capacitive effect may be used.

[0271] In stage **S3** the signal is filtered. Depending on the embodiment the filtering stage may take on different forms, some of which are discussed in detail above. In stage **S4** the filtered signal is used to identify where on the grid a touch has occurred.