tance touch slider is relatively insensitive to pressure changes when measuring the position of the finger along the axial direction d. For any finger pressure dependency in the reported slider position, an appropriate pressure term may be factored in when computing the slider position to reduce the pressure effect.

[0026] By way of contrast, if a single conductive plate were used, the frequency of the signal generated by the single associated oscillator would be greatly determined not only by the finger position along d but also the pressure of the finger. For example, assume that the finger is at the first position at the first pressure such that the single output pulse train frequency is $f_1=100$. Now assume that the finger pressure has increased, but the finger is still at the first position, such that the frequency is now $f_2=120$ (a 20% increase). Now, since the frequency has changed by 20%, the position of the finger is difficult to measure unless the finger pressure is also known. This is because a change in finger position along the axial direction could also have produced the same 20% difference in output frequency. In other words, such a single-conductor design cannot distinguish between a change in finger position and a change in finger pressure.

[0027] Returning to the example where two conductive plates **101**, **102** are used to produce ratio-metric measurements, both the finger position and the finger pressure may be independently determined and distinguished. In general, the finger pressure is related to the sum (or average) of the two frequencies from oscillator A and oscillator B. Thus, while finger position may be determined from the ratio f_A/f_B, finger pressure may be determined from the sum f_A+f_B. Thus, not only does ratio-metric measurement decrease sensitivity to common-mode errors such as increased pressure for both conductive plates **101**, **102**, but also allows the finger pressure to be determined independently from the finger position. The ability to sense both finger position and finger pressure is useful for many purposes such as in a system where the finger position controls a scrolling direction on a display screen and the finger pressure controls another factor such as scrolling speed.

[0028] The conductive plates **101**, **102** may be variously shaped, such as is shown in **FIGS. 2A and 2B**. In **FIG. 2A**, two exemplary conductive plates **201**, **202** are of different shapes from one another, wherein both conductive plates **201**, **201** have curved edges. However, any number of the conductive plates may have one or more curved edges. In another exemplary embodiment shown in **FIG. 2B**, two conductive plates **203**, **204** are also of different shapes from one another, wherein conductive plate **203** is triangular and conductive plate **204** is rectangular. Thus, the conductive plates may be of the same shape or of different shapes as compared with one another.

[0029] More than two conductive plates may be used, such as is shown in **FIG. 2C**. In this exemplary embodiment, multiple interdigitated plates **205-212** are used. For this embodiment, it is important that the relative amount of surface area proximate to the finger changes as the finger moves along the axial direction d. Thus, for instance, it would not be desirable to have both of the conductive plates rectangular like conductive plate **204** such that the surface area remains constant as the finger moves.

[0030] In other embodiments, three, four, five, six, seven, eight, nine, ten, or more interdigitated capacitive nodes may be used. Preferably, an even number of interdigitated capacitive nodes are used (e.g., eight) so that each oscillator has an equal number of conductors associated therewith. As shown in **FIG. 2C**, conductive plates **206**, **208**, **210**, **212** ("group A") are coupled to a first node A and conductive plates **205**, **207**, **209**, **211** ("group B") are coupled to a second node B. The group A capacitive nodes are interleaved, or interdigitated, with the group B capacitive nodes. As shown in **FIG. 2C**, the interleaved capacitive nodes may be adjacent to one another such that there are not other capacitive nodes disposed between the capacitive nodes of groups A and B. The nodes A and B of **FIG. 2C** correspond to the nodes A and B, respectively, of **FIG. 1**, which in turn correspond to the inputs of oscillators A and B, respectively, of **FIG. 1**. Thus, in the present embodiment, and as is shown in **FIG. 2C**, each of the conductive plates are interleaved and interdigitated with each other in the following order along a direction perpendicular to the axial direction: plate **205**, then **206**, then **207**, then **208**, then **209**, then **210**, then **211**, and then **212**.

[0031] An interdigitated arrangement solves the potential problem where, when only two conductive plates are used, movement of the finger in a non-axial direction (e.g., perpendicular to d) could cause a change in the ratio-metric output (since such a movement could cause a non-common-modal error), even where there is no movement of the finger at all in the axial direction d. In other words, such an interdigitated configuration reduces the effect of non-axial movement of the finger such that the interdigitated configuration effectively sensed finger movement substantially only in the axial direction, while ignoring movement perpendicular to the axial direction.

[0032] For example, assume that the finger is disposed at a first position along the axial direction d and centered precisely over the group of conductive plates **205-212** in a direction perpendicular to the axial direction d. Now assume that the finger is moved perpendicular to the axial direction d while remaining at the same first position along the axial direction d. In the interdigitated embodiment shown in **FIG. 2C**, there would be minimal change in the ratio f_A/f_B since the surface area defined by the group A capacitive nodes and the surface area defined by the group B capacitive nodes are spread over a larger interleaved area. The result is that the total surface area of the group A capacitive nodes that is covered by the finger, and the total surface area of the group B capacitive nodes that is covered by the finger, may both increase and decrease together, more or less. This means that the ratio f_A/f_B is less affected by non-d-axial movement. All other factors being equal, the more interdigitated conductive plates that are used, the less sensitive is the device to non-d-axial movement. By way of contrast, in the embodiment shown in **FIG. 1A**, there would be comparatively more of a change in the ratio f_A/f_B since the respective covered surface areas of the conductive plates **101**, **102** would change much more noticeably and indeed in opposite directions.

[0033] In the circuit of **FIG. 1A**, the coupling from conductive plate **101** to conductive plate **102** and vice versa can cause cross-mode locking. In other words, the measurement taken from oscillator A can be affected by oscillator B, and vice versa. This problem is preferably eliminated by enabling only one oscillator at a time and simultaneously grounding or otherwise disabling the other. Thus, the fre-