[0013] **FIG. 1A** is a schematic of an exemplary embodiment of a capacitance touch slider with two triangular conductors each having its own oscillator.

[0014] **FIG. 1B** is a schematic of another exemplary embodiment of a capacitance touch slider with two triangular conductors each sharing an oscillator via a switch.

[0015] **FIGS. 2A-2C** are top views of various exemplary embodiments of conductors that may be used in a capacitance touch slider.

[0016] **FIG. 3A** is a schematic of another exemplary embodiment of a capacitance touch slider with two triangular conductors each having its own oscillator, along with circuitry for measuring and determining the position of a finger on the conductors.

[0017] **FIG. 3B** is a block diagram showing an exemplary embodiment of how the capacitance touch slider of **FIG. 3A** may be coupled with a personal computer or other device.

[0018] **FIG. 4** is an exemplary timing diagram showing the various signals that may be generated in the circuitry of the capacitance touch slider of **FIG. 3**.

[0019] **FIGS. 5A, 5B**, and **5**C are a top view, a side view, and another top view, respectively, of an exemplary capacitance touch slider with a corresponding chart showing the number of pulse counts measured as compared with the pressure and position of a finger on the conductors of a capacitance touch slider.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0020] Referring to **FIG. 1A**, an exemplary embodiment of a capacitance touch slider **100** has two capacitive nodes such as conductive plates **101, 102**. The conductive plates **101, 102** function to sense the position of, e.g., a human finger, along an axial direction d. As will be discussed below, the conductive plates **101, 102** may be variously shaped, although in the present example each of the conductive plates **101, 102** is triangular in shape.

[0021] To allow the position of the finger to be sensed, each conductive plate **101, 102** may be a capacitive part of a respective different oscillator. In the present embodiment, a first digital resistor-capacitor (RC) oscillator (hereafter called "oscillator A" in this embodiment) includes conductive plate **101** (which provides capacitance), a resistance R_A such as from a simple resistor, and an inverter **103** preferably of the Schmitt type. Also, a second digital RC oscillator (hereafter called "oscillator B" in this embodiment) includes conductive plate **102** (which provides capacitance), a resistance R_B such as from a simple resistor, and an inverter **104** preferably of the Schmitt type.

[0022] Inverters **103, 104** are preferably Schmitt inverters to ensure stability. However, any type of inverter may be used. Also, although simple digital oscillators are shown in this embodiment, any oscillator circuits may be used, whether they be digital or analog. For instance, a conventional analog RC oscillator circuit may be used in conjunction with an analog-to-digital converter (A/D converter) to produce an output similar to a digital oscillator circuit. In this regard, the term "pulse" as used herein refers to any type of periodic signal wave feature, such as a digital bit or a peak portion of an analog sine wave. The term "pulse" as used herein also encompasses a negative pulse or other negative wave feature.

[0023] Each of the two oscillators A and B generates a respective output signal ClkA and ClkB. The ClkA and ClkB signals each include a train of pulses with a frequency that depends upon the capacitance and resistance used in the respective oscillator. More particularly, the capacitance (represented as C_A) between conductive plate **101** and ground, along with R_A, determines the frequency of the pulses of ClkA. The capacitance (represented as C_B) between conductive plate **102** and ground, along with R_B, determines the frequency of the pulses of ClkB. Since the conductive plates **101, 102** are not rectangular in this embodiment, the amount of surface area between a human finger and each individual conductive plate **101, 102** varies depending upon the position of the finger along the axial direction d. This varying surface area thereby causes each of C_A and C_B to also vary depending upon the position of a human finger. In turn, the pulse frequencies of ClkA and ClkB also depend upon the position of the finger along the axial direction d.

[0024] Two oscillators are used in the present embodiment so that a ratio-metric output may be calculated to ensure a more stable measurement. Such a ratio-metric output is preferably the ratio between the frequencies f_A of ClkA and f_B of ClkB, such as f_A/f_B or f_B/f_A. If desired, the ratio-metric output may be scaled, such as by multiplying the ratio-metric output by and/or summing it with another factor. Thus the ratio-metric output includes the ratio of two different pulse frequencies each dependent upon the position of the finger along d.

[0025] A significant advantage of such ratio-metric measurement is that common-mode errors are diminished if not fully removed. In an example, the user's finger is at a first position along the axial direction d and depressed with a first pressure against a thin insulating surface (not shown in **FIG. 1**) between the conductive plates **101, 102** and the finger. In such a case, signal ClkA would produce a pulse train with frequency f_{A1} and signal ClkB would produce a pulse train with frequency f_{B1}, each frequency being dependent upon the surface area covered between the finger and the respective conductive plate **101, 102**. A ratio-metric output would then be the ratio f_{A1}/f_{B1} (or alternatively, f_{B1}/f_{A1}). The surface areas covered by the finger are dependent upon two factors: the position of the finger along axial direction d, and the pressure of the finger against the insulating surface. This is because the greater the pressure applied, the more the finger flattens to allow for more skin surface area to press against the insulating surface. Now assume that the finger location remains at the first location, but more pressure than the first pressure is applied by the finger. Now the surface area increases for both conductive plates **101, 102**, thereby changing both f_{A1} and f_{B1} to new values of f_{A2} and f_{B2}. Since both the numerator and the denominator of the ratio-metric output change in the same direction, the resultant change in the ratio-metric output is minimal. For instance, where $f_{A1}=100$ and $f_{B1}=75$, then the ratio $f_{A1}/f_{B1}=1.33$. Upon higher finger pressure, assume that $f_{A2}=120$ (an increase of 20%) and $f_{B2}=90$ (also an increase of 20%). The ratio-metric output now would still be 1.33, which has not changed at all. In reality, there would probably be some change in the ratio-metric output, however this change would be minimal. Thus, by using the ratio-metric measurement, the capaci-