CLAIMS

What is claimed is:

1. A stylus and touch sensitive device comprising:
    a. the stylus comprising a stylus transmitter for transmitting a stylus signal;
    b. the touch sensitive device comprising
        i. a plurality of row conductors, each of the plurality of row conductors associated with a row transmitter and a row receiver, the row transmitter adapted to simultaneously transmit a plurality of row signals, each on its associated row conductor, each of the row signals being orthogonal to each other of the plurality of row signals transmitted on each other of the plurality of row conductors, the row receiver being adapted to detect the stylus signal;
        ii. a plurality of column conductors, each of the plurality of column conductors associated with a column receiver, the column receiver being adapted to detect the presence of each of the row signals transmitted by the row transmitter associated with each of the row conductors and the stylus signal to the extent that such signals are present on the column conductors;
        iii. the path of each of the row conductors crossing the path of each of the column conductors;
        iv. processor for determining a location of the at least one transmitter with respect to the touch sensitive device based upon the signals received by the row receivers and the column receivers;
    c. wherein the at least one stylus signal is orthogonal to each of the plurality of row signals.

2. The apparatus of claim 1 further comprising another stylus transmitter for transmitting another stylus signal, the another stylus signal being orthogonal to the stylus signal and to each of the plurality of row signals transmitted on each of the plurality of row conductors, and wherein the row and column receivers are further adapted to detect the another stylus signal.

3. The apparatus of claim 2 further comprising yet another stylus transmitter for transmitting yet another stylus signal, the yet another stylus signal being orthogonal to the stylus signal, the another stylus signal and to each of the plurality of row signals transmitted on each of the plurality of row conductors, and wherein the row and column receivers are further adapted to detect the yet another stylus signal.

4. The apparatus of claim 3 further comprising a further stylus transmitter for transmitting a further stylus signal, the further stylus signal being orthogonal to the stylus signal, the another stylus signal, the yet another stylus signal and to each of the plurality of row signals transmitted on each of the plurality of row conductors, and wherein the row and column receivers are further adapted to detect the further stylus signal.

~~5. A stylus and touch-sensitive device comprising:~~

~~a. the stylus comprising at least three stylus transmitters, each stylus transmitter adapted to transmit a unique stylus signal orthogonal from the other unique stylus signals;~~

~~b. the touch sensitive device comprising~~

~~i. a plurality of row conductors, each of the plurality of row conductors associated with a row receiver, the row receiver being adapted to detect each of the unique stylus signals;~~

~~ii. a plurality of column conductors, each of the plurality of column conductors associated with a column receiver, the column receiver being adapted to detect each of the unique stylus signals;~~

~~iii. the path of each of the row conductors crossing the path of each of the column conductors; and~~

~~iv. processor adapted to determine a position of the stylus with respect to the touch sensitive device based upon the unique signals received by the row receivers and the column receivers.~~

~~6. The apparatus of claim 5 wherein the at least three stylus transmitters are each adapted to simultaneously transmit a unique stylus signal orthogonal from the other unique stylus signals.~~

~~7. The apparatus of claim 5 wherein the position is a location of the stylus with respect to the touch sensitive device.~~

~~8. The apparatus of claim 5 wherein the position is a rotational orientation of the stylus with respect to the touch sensitive device.~~

~~9. The apparatus of claim 5 wherein the position is an angular position of the stylus with respect to the touch sensitive device.~~

~~10.~~5. A method for detecting a position of a stylus with respect to a touch sensitive device, the touch sensitive device comprising a plurality of row conductors and a plurality of column conductors, the path of each of the row conductors crossing the path of each of the column conductors, the method comprising:

simultaneously transmitting each of a plurality of orthogonal row signals on a respective one of at least some of the plurality of row conductors;

transmitting at least one stylus signal from a stylus in proximity to the touch sensitive device, the orthogonal stylus signal being orthogonal to each of the plurality of orthogonal row signals;

detecting an amount of each of the plurality of orthogonal ~~signals (~~row signals and stylus signals~~)~~ present on each of the plurality of column conductors;

using at least the detected amount of the orthogonal stylus signal to detect a position of the stylus with respect to the touch sensitive device.

~~11.~~6. The method of claim ~~10~~5, further comprising:

simultaneously transmitting each of a plurality of orthogonal column signals on a respective one of at least some of the column conductors, each of the plurality of orthogonal column signals being orthogonal to each other of the plurality of orthogonal column signals, each of the plurality of orthogonal row signals and the at least one stylus signal; and,

detecting an amount of each of the plurality of orthogonal column signals present on each of the plurality of row conductors.

~~12.~~7. The method of claim ~~10~~5, wherein the orthogonal stylus signal comprises a plurality of orthogonal stylus signals emitted from a plurality of transmitters on the stylus.

~~13.~~8. The method of claim ~~12~~7, further comprising using at least the detected amount of the orthogonal stylus signal to detect a tilt angle of the stylus.

~~14.~~9. The method of claim ~~12~~7, further comprising using at least the detected amount of the orthogonal stylus signal to detect an angle of rotation of the stylus about its longitudinal axis.

~~15.~~10. The method of claim ~~10~~5, wherein the step of transmitting at least one orthogonal stylus signal is performed in response to a change of the state of a switch in the stylus.

~~16.~~11. The method of claim ~~15~~10, wherein the switch is a pressure sensor.

~~17.~~12. The method of claim ~~10~~5, wherein a property of at least one of the at least one orthogonal stylus signal is changed in response to a change of the state of a switch in the stylus.

~~18.~~13. The method of claim ~~10~~5, wherein a property of the orthogonal stylus signal is changed in response to actuation of a switch in the stylus, and wherein the state of the switch is changed when the stylus is in contact with a surface of the touch sensitive device.

~~19.~~14. The method of claim ~~18~~13, wherein a property of the orthogonal stylus signal is changed in response to actuation of a switch in the stylus, and wherein the state of the switch is changed when the stylus is hovering above and not in contact with a surface of the touch sensitive device.

~~20.~~15. The method of claim ~~10~~5, wherein a property of the orthogonal stylus signal is changed in response to actuation of a switch in the stylus, and wherein the state of the switch is changed when the stylus is hovering above a surface of the touch sensitive device.

CLAIMS

What is claimed is:

1. A stylus and touch sensitive device comprising:
    a. the stylus comprising a stylus transmitter for transmitting a stylus signal;
    b. the touch sensitive device comprising
        i. a plurality of row conductors, each of the plurality of row conductors associated with a row transmitter and a row receiver, the row transmitter adapted to simultaneously transmit a plurality of row signals, each on its associated row conductor, each of the row signals being orthogonal to each other of the plurality of row signals transmitted on each other of the plurality of row conductors, the row receiver being adapted to detect the stylus signal;
        ii. a plurality of column conductors, each of the plurality of column conductors associated with a column receiver, the column receiver being adapted to detect the presence of each of the row signals transmitted by the row transmitter associated with each of the row conductors and the stylus signal to the extent that such signals are present on the column conductors;
        iii. the path of each of the row conductors crossing the path of each of the column conductors;
        iv. processor for determining a location of the at least one transmitter with respect to the touch sensitive device based upon the signals received by the row receivers and the column receivers;
    c. wherein the at least one stylus signal is orthogonal to each of the plurality of row signals.

2. The apparatus of claim 1 further comprising another stylus transmitter for transmitting another stylus signal, the another stylus signal being orthogonal to the stylus signal and to each of the plurality of row signals transmitted on each of the plurality of row conductors, and wherein the row and column receivers are further adapted to detect the another stylus signal.

3. The apparatus of claim 2 further comprising yet another stylus transmitter for transmitting yet another stylus signal, the yet another stylus signal being orthogonal to the stylus signal, the another stylus signal and to each of the plurality of row signals transmitted on each of the plurality of row conductors, and wherein the row and column receivers are further adapted to detect the yet another stylus signal.

4. The apparatus of claim 3 further comprising a further stylus transmitter for transmitting a further stylus signal, the further stylus signal being orthogonal to the stylus signal, the another stylus signal, the yet another stylus signal and to each of the plurality of row signals transmitted on each of the plurality of row conductors, and wherein the row and column receivers are further adapted to detect the further stylus signal.

5. A method for detecting a position of a stylus with respect to a touch sensitive device, the touch sensitive device comprising a plurality of row conductors and a plurality of column conductors, the path of each of the row conductors crossing the path of each of the column conductors, the method comprising:

simultaneously transmitting each of a plurality of orthogonal row signals on a respective one of at least some of the plurality of row conductors;

transmitting at least one stylus signal from a stylus in proximity to the touch sensitive device, the orthogonal stylus signal being orthogonal to each of the plurality of orthogonal row signals;

detecting an amount of each of the plurality of orthogonal row signals and stylus signals present on each of the plurality of column conductors;

using at least the detected amount of the orthogonal stylus signal to detect a position of the stylus with respect to the touch sensitive device.

6. The method of claim 5, further comprising:

simultaneously transmitting each of a plurality of orthogonal column signals on a respective one of at least some of the column conductors, each of the plurality of orthogonal column signals being orthogonal to each other of the plurality of orthogonal column signals, each of the plurality of orthogonal row signals and the at least one stylus signal; and,

detecting an amount of each of the plurality of orthogonal column signals present on each of the plurality of row conductors.

7. The method of claim 5, wherein the orthogonal stylus signal comprises a plurality of orthogonal stylus signals emitted from a plurality of transmitters on the stylus.

8. The method of claim 7, further comprising using at least the detected amount of the orthogonal stylus signal to detect a tilt angle of the stylus.

9. The method of claim 7, further comprising using at least the detected amount of the orthogonal stylus signal to detect an angle of rotation of the stylus about its longitudinal axis.

10. The method of claim 5, wherein the step of transmitting at least one orthogonal stylus signal is performed in response to a change of the state of a switch in the stylus.

11. The method of claim 10, wherein the switch is a pressure sensor.

12. The method of claim 5, wherein a property of at least one of the at least one orthogonal stylus signal is changed in response to a change of the state of a switch in the stylus.

13. The method of claim 5, wherein a property of the orthogonal stylus signal is changed in response to actuation of a switch in the stylus, and wherein the state of the switch is changed when the stylus is in contact with a surface of the touch sensitive device.

14. The method of claim 13, wherein a property of the orthogonal stylus signal is changed in response to actuation of a switch in the stylus, and wherein the state of the switch is changed when the stylus is hovering above and not in contact with a surface of the touch sensitive device.

15. The method of claim 5, wherein a property of the orthogonal stylus signal is changed in response to actuation of a switch in the stylus, and wherein the state of the switch is changed when the stylus is hovering above a surface of the touch sensitive device.