

**53.** A control for determining a position of a touch on a surface by means of sets of acoustic waves having incrementally varying paths, at least two of said sets of waves differing in frequency or wave propagation mode, comprising a processor for determining a characteristic of a touch based on said sets of waves.

**50.** A control for determining a position of a touch on a surface by means of a set of acoustic waves having incrementally varying paths, receiving signals corresponding to said set of acoustic waves, said control being capable of sensing a perturbing influence by detecting an increase in a signal amplitude.

**51.** A substrate for an acoustic touch sensor system comprising:

an acoustically transmissive medium having a surface with a touch sensitive region having at least one side;

at least two reflective arrays, disposed parallel to one another and on the same side of the touch sensitive region, together having a two dimensional Fourier transform with at least two useful spacing vector components.

**52.** The substrate according to claim 51, wherein said two useful spacing vector components are for waves scattering at different angles

**53.** The substrate according to claim 51, wherein said two useful spacing vector components are for waves of differing frequencies.

**54.** The substrate according to claim 51, wherein said two useful spacing vector components include at least one acoustic wave mode conversion.

**55.** The substrate according to claim 51, wherein said reflective arrays are superposed.

**56.** The substrate according to claim 51, wherein said reflective arrays are not coaxial.

**57.** The substrate according to claim 51, wherein said reflective arrays each comprise reflective elements, corresponding elements of each reflective array having differing angles.

**58.** A touch sensor comprising:

an acoustic wave transmissive medium having a surface and a touch sensitive portion of said surface;

a transducer system for emitting acoustic energy into said medium; and

a receiver system for receiving the acoustic energy from the substrate, for determining a perturbation of said acoustic energy due to a touch on said surface,

said touch sensor comprising a reflective array having a plurality of spaced elements for scattering portions of an incident acoustic wave as waves having a different propagation vector than said incident wave and passing other portions unscattered, said array being provided an array selected from the group consisting of:

- (a) an array associated with said medium situated along a path, said path not being a linear segment parallel to a coordinate axis of a substrate in a Cartesian space, a segment parallel to an axial axis or perpendicular to a radial axis of a substrate in a cylindrical

space, nor parallel and adjacent to a side of a rectangular legion of a small solid angle section of a sphere;

- (b) an array situated along a path substantially not corresponding to a desired coordinate axis of a touch position output signal;
- (c) an array situated along a path substantially non-parallel to an edge of said medium;
- (d) an array having a spacing of elements in said array which differs, over at least one portion thereof, from an integral multiple of a wavelength of an incident acoustic wave;
- (e) an array having elements in said array which are non-parallel;
- (f) an array having an angle of acceptance of acoustic waves which varies over regions of said array;
- (g) an array which coherently scatters at least two distinguishable acoustic waves which are received by said receiving system; and
- (h) combinations and subcombinations of the above,

except that said array in (d), (e) or (f) is not provided parallel and adjacent to a side of a rectangular region of a small solid angle section of a sphere.

**59.** The touch sensor according to claim 58, wherein said array is associated with said medium being situated along a path, said path not being a linear segment parallel to a coordinate axis of a substrate in a Cartesian space, a segment parallel to an axial axis or perpendicular to a radial axis of a substrate in a Cylindrical space, and parallel and adjacent to a side of a rectangular region of a small solid angle section of a sphere.

**60.** The touch sensor according to claim 58, wherein said array is situated along a path substantially not corresponding to a desired coordinate axis of a touch position output signal.

**61.** The touch sensor according to claim 58, wherein said array is situated along a path substantially non-parallel to an edge of said medium.

**62.** The touch sensor according to claim 58, wherein said array has a spacing of elements in said array which differs, over at least one portion thereof, from an integral multiple of a wavelength of an incident acoustic wave, said array not being provided parallel and adjacent to a side of a rectangular region of a small solid angle section of a sphere.

**63.** The touch sensor according to claim 58, wherein said array has elements in said array which are non-parallel, said array not being provided parallel and adjacent to a side of a rectangular region of a small solid angle section of a sphere.

**64.** The touch sensor according to claim 58, wherein said array has an angle of acceptance of acoustic waves which varies over regions of said array, said array not being provided parallel and adjacent to a side of a rectangular region of a small solid angle section of a sphere.

**65.** The touch sensor according to claim 58, wherein said array coherently scatters at least two distinguishable acoustic waves which are received by said receiving system.

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