ultrasound intensity may be varied to cause different feelings to the object. Varying of sensations may also be done by changing focal point sizes.

[0027] Ultrasound layer **205** comprises of an array of coupled ultrasound transducers and/or detectors that may emit directional ultrasound waves, rays, or beams through air to objects at location points **206**, **208**, and/or **210** in sensation zone **202**. Layer **205** also detects reflections of the emitted waves off of the objects at location points **206**, **208**, and/or **210**. Layer **205** is controlled in part by elevation, indenting, or texturizing controller **121**. Sensation zone **202** may be the space, part of the space, or a force field above display device layer **204** that defines the range of ultrasound perception. Sensation zone **202** may be defined using approximate boundaries in order to limit the space ultrasound are emitted over display device layer **204** for safety or power conservation. Another benefit of having sensation zone **202** is that a user can have space in other areas of display device layer **204** for normal operation of device **100**.

[0028] In addition to providing airborne ultrasound in the direction of the user, ultrasound layer **205** may be configured with transducers and detectors directed away from the user. This double-sided configuration is desirable to provide ultrasound sensations to fingers placed behind device **100** for grasping in mobile applications. Airborne ultrasound zone behind device **100** may be used to give a user the ability to virtually grasp from afar images on screen perpendicular to device **100**.

[0029] Objects at location points **206**, **208**, and/or **210** may be any one of a finger, part of a finger, a hand, part of a hand, skin, any body part, a special ultrasound sensitive glove, part of a special ultrasound sensitive glove, an ultrasound sensitive finger attachment, an ultrasound sensitive thimble, an ultrasound sensitive wand, a material that reacts in response to ultrasound, or a material that is perceptive to ultrasound, as desired.

[0030] FIG. **2***b* is a diagram showing various approximate airborne ultrasound patterns **222**, **224**, **226**, and **228** emitted over display device surface **231**. Substantially cubicle pattern **222** may be provided by emitting rays by ultrasound layer **205** to provide a substantially cubicle sensation. FIG. **2***e* shows an example of a focal point pattern **2221** for providing a substantially cubicle pattern sensation on finger **2222** by ultrasound layer **205**. Ultrasound control or focal points shown in FIG. **2***e* or other figures are not drawn to scale and may be approximate in size. Dot or dimple pattern **224** may be provided by emitting rays by ultrasound layer **205** to provide a substantially spherical sensation. FIG. **2***e* shows an example of a focal point pattern $\mathbf{224}_1$ for a dot or dimple pattern on finger $\mathbf{224}_2$ emitted by ultrasound layer **205** to provide a substantially spherical sensation.

[0031] Moreover, substantially cylindrical pattern **226** may be provided by emitting rays by ultrasound layer **205** to provide a substantially circular sensation. FIG. **2***e* shows an example of a focal point pattern $\mathbf{226}_1$ for a cylindrical pattern sensation on finger $\mathbf{226}_2$ provided by ultrasound layer **205** to provide a substantially circular sensation.

[0032] Substantially rectangular pattern **228** may be provided by emitting rays by ultrasound layer **205** to provide a substantially rectangular sensation. FIG. **2***e* shows an example of focal point edge patterns **2281** and **2282** for a rectangular pattern sensation on finger $\mathbf{228}_3$ provided by ultrasound layer **205**. Although two edges are shown on finger $\mathbf{228}_3$, a single or multiple edges may be projected. Edge projections are desirable for virtual keyboard applications where the projected edges help to define the boundaries of a key.

[0033] In the examples given in FIG. **2***b* ultrasound layer **205** may be controlled in part by ultrasound source/detector **125** in combination with elevation, indenting, or texturizing controller **121**. In FIG. **2***e*, the ultrasound may be swept or stroked over each focal or control point in a pattern at high frequency or variable pulsating frequencies using various intensities levels dependent upon the desired sensation or virtual effect. Although well-defined shapes are shown in the FIGS. **2***b* and **2***e*, actual sensations will vary from person to person and by the accuracy of the phased array ultrasound source.

[0034] FIG. **2***c* is a diagram providing an example configuration of display device layer **204** and ultrasound layer **205**. Display pixels $\mathbf{232}_1$ to **232***n* may lay partially adjacent, on the same level, or on the same layer to elevation, indenting, or texturizing cells $\mathbf{234}_1$ to $\mathbf{234}_n$ each having an ultrasound transducer, source, and/or detector. Alternatively, display pixels $\mathbf{232}_1$ to $\mathbf{232}_n$ may lay partially above elevation, indenting, or texturizing cells $\mathbf{234}_1$ to $\mathbf{234}_n$. Display and ultrasound array or matrix **233** also comprises of display pixels $\mathbf{236}_1$ to $\mathbf{236}_n$ adjacent to elevation, indenting, or texturizing cells **2381** to **238***n* that are adjacent to display pixels $\mathbf{240}_1$ to $\mathbf{240}_n$. The elevation, indenting, or texturizing cells may be controlled by elevation, indenting, or texturizing controller **121** to adjust the intensity, orientation, or direction of the ultrasound emitted to location points **206**, **208**, or **210**.

[0035] FIG. **2***d* shows an embodiment of a display device array or matrix **235** from a top view where ultrasound transducer, source, or detector cells **239** and **241** are placed selectively within two predetermined areas without display pixels so that the surface of display device array or matrix **235** is mostly comprised of display pixels **237**. In an alternative embodiment, cells **239** and **241** may line the perimeter of display device array or matrix **235**. When around the perimeter, integration with existing display device layout may be more easily enabled.

[0036] FIG. **3** is a diagram comprising of processes for an electronic device providing elevated, indented, or texturized sensations to an object near display device **302** using ultrasound. For the examples given in FIG. **3**, the object provided elevated, indented, or texturized sensations near display device **302** using ultrasound may be any one of a finger, part of a finger, multiple fingers, a hand, part of a hand, or two hands as desired. Display device **302** may be assembled with at least some of the components described in device **100**.

[0037] For inputting or triggering a request action, a "click here" displayed universal resource locater (URL) or hyperlink is provided to an object that may be at location points **206**, **208**, and/or **210** with an elevated substantially circular ultrasound pattern **304**. Clicking may be performed by tracking the motion, momentum, or velocity of the object as provided in the example in FIG. **5** below. Motion of the object relative to display device **302** that can be recognized as an input, gesture, or command may be a push towards display device **302**, a pull away from display device **302**, sideway or lateral motion relative to display device **302**, a circle gesture, a square gesture, a rectangular gesture, a spiral gesture, a swirl gesture, a swipe gesture, a pinch gesture, a flick gesture, a customized gesture, a user defined gesture, a multiple finger coordinated motion, or a single finger gesture, as desired. In particular, single finger gesture control is desirable since the