respond to a specific range of frequencies thereby each spring **808** can produce a unique haptic sensation.

[0057] FIG. **9**(*a*) illustrates a top view diagram of a multi-touch haptic display **900** having laminar flow of fluid in accordance with one embodiment of the present invention. Display **900** includes a fluid inlet reservoir **902**, an array of MEMS cells **904**, a fluid exit reservoir **906**, and a display **908**. Fluid inlet reservoir **902** and fluid exit reservoir **906** facilitate and guide laminar flow **910** from fluid inlet reservoir **902** to fluid exit reservoir **906** as indicated by large arrows. Laminar flow **910** is nonturbulent, streamline, or smooth flow of a viscous fluid between layers. It should be noted that laminar flow **910** and MEMS cells **904** may be substantially transparent thereby objects or images displayed in display **908** can be viewed through laminar flows **910** and MEMS cells **904**. It, however, should be noted that display **908** is not a necessary component in order for the device to function.

[0058] Display **900** contains an array of individually addressable MEMS cells or haptic elements **904**. MEMS cells **904**, also known as MEMS turbulence inducing cells, are used to create multiple asynchronous local haptic effects **912** across the display surface. Each asynchronous local haptic effect **912** occurs when a local turbulence is induced by an associated MEMS cell **914**. When a MEMS cell **914** is activated, it produces local turbulent flow and induces a vibration or change of surface film texture of the cell **904**, which creates a haptic sensation or effect. When a MEMS cell **904** is deactivated, laminar flow can flow through an associated MEMS cell smoothly without any turbulence. Each MEMS cell **904** can be activated independent of other MEMS cells **904** in display **900**.

[0059] FIG. **9**(*b*) illustrates a cross-section view diagram of a multi-touch haptic display **950** having laminar flow of fluid in accordance with one embodiment of the present invention. Display **950** includes a fluid inlet reservoir **902**, an array of MEMS cells **904**, a fluid exit reservoir **906**, a display **908**, and a thin flexible transparent membrane **952**. As shown in FIG. **9**(*b*), smooth laminar fluid flow **954** flows from fluid inlet reservoir **902** to fluid exit reservoir **906** as indicated by many small arrows.

[0060] MEMS cells **904** includes multiple redundant deformable structures wherein the deformable structures actuate out of the plane of MEMS cell **904** when it is activated. When a MEMS cell **962** is activated, it activates the deformable structures, also known as hairs, which cause a local patch of flowing fluid to transition from laminar flow to turbulent flow **960**. Fluid turbulence flow **960** causes local vibration of membrane and creates a localized haptic sensation **958**. Each MEMS cell **904** is addressable and can be activated independent of other MEMS cells **904** in display **950**.

[0061] The present invention includes various processing steps, which will be described below. The steps of the present invention may be embodied in machine or computer executable instructions. The instructions can be used to cause a general purpose or special purpose system, which is programmed with the instructions; to perform the steps of the present invention. Alternatively, the steps of the present invention may be performed by specific hardware components that contain hard-wired logic for performing the steps, or by any combination of programmed computer components and custom hardware components. While embodiments of the present invention will be described with reference to the Internet, the method and apparatus described herein is equally applicable to other network infrastructures or other data communications environments.

[0062] FIG. **10** is a flowchart illustrating a process of providing multiple haptic effects in accordance with one embodiment of the present invention. At block **1002**, a process displays an image, which is viewable through an insulated layer. In one embodiment, the display can be a flat panel screen or a flexible display. Alternative, the process displays an opaque background without any images. Also, the images may be projected onto the insulated layer from the above or below. It should be noted that if the application does not require displaying images, the display is not necessary and may be removed. In an alternative embodiment, the insulated layer is capable of interfacing with users and receiving inputs. After block **1002**, the process moves to the next block.

[0063] At block **1004**, the process monitors the insulated layer. In one embodiment, the process identifies the image and the possible inputs can be detected in accordance with the image. The process is capable of monitoring multiple contacts substantially same time. The process proceeds to block **1006**.

[0064] At block **1006**, the process detects a first deformation of the insulated layer in response to a first depressing by a first finger. It should be noted that the finger can also be a stylus or any finger-like pointed objects. The process can also detect the first and the second deformations depressed by the same finger. After block **1006**, the process moves to the next block.

[0065] At block **1008**, the process detects a second deformation of the insulated layer substantially the same time as the first deformation. The process is also capable of sensing the second deformation in response to a second depressing by a second finger. It should be noted that the second finger can be a stylus or any kind of pointed objects. The process is capable of detecting more deformations of the insulated layer if more depressions or contacts are made. After block **1008**, the process moves to the next block.

[0066] At block **1010**, the process generates a first input in accordance with a location of the first deformation and a second input in accordance with a location of the second deformation. The process is capable of generating more inputs if more contacts or depressions are detected.

[0067] At block **1012**, the process activates a first haptic cell with a first haptic effect in response to the first input and a second haptic cell with a second haptic effect in response to the second input. In one embodiment, the process initiates the first haptic effect and the second haptic effect substantially the same time. In another embodiment, the process activates a first piezoelectric material of the first haptic cell to generate the first haptic effect and activates a second piezoelectric material of the second haptic cell to generate the second haptic effect. In another embodiment, the process activates a first MEMS element of the first haptic cell to generate the first haptic effect and activates a second MEMS element of the second haptic cell to generate the second haptic effect. In yet another embodiment, the process activates a first fluid filled pocket of the first haptic cell to generate the first haptic effect and activates a second fluid filled pocket of the second haptic cell to generate the second haptic effect.

[0068] While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that, based upon the teachings herein, changes and modifications may be made without departing