subsystem **1006**, panel processor **1002** and peripherals **1004** can be integrated into a single application specific integrated circuit (ASIC).

[0102] Touch sensor panel **1024** can include a capacitive sensing medium having a plurality of drive lines and a plurality of sense lines, although other sensing media can also be used. The drive and sense lines can be formed from a transparent conductive medium such as Indium Tin Oxide (ITO) or Antimony Tin Oxide (ATO), although other transparent and non-transparent materials such as copper can also be used. The drive and sense lines can be formed on a single side of a substantially transparent substrate, on opposite sides of the substrate, or on two separate substrates separated by the dielectric material. Each intersection of drive and sense lines can represent a capacitive sensing node and can be viewed as picture element (pixel) **1026**, which can be particularly useful when touch sensor panel **1024** is viewed as capturing an "image" of touch. (In other words, after panel subsystem **1006** has determined whether a touch event has been detected at each touch sensor in the touch sensor panel, the pattern of touch sensors in the multi-touch panel at which a touch event occurred can be viewed as an "image" of touch (e.g. a pattern of fingers touching the panel).) Haptic feedback can be transmitted to the location of the "image" of touch according to embodiments of the invention. The capacitance between the drive and sense lines and local system ground appears as a stray capacitance Cstray and the capacitance at the intersections of the drive and sense lines, i.e., the pixels, as a mutual signal capacitance Csig when the given drive line is stimulated with an alternating current (AC) signal. The presence of a finger or other object near or on the touch sensor panel can be detected by measuring changes to a signal charge present at the pixels being touched, which is a function of Csig. Each sense line of touch sensor panel **1024** can drive sense channel **1008** in panel subsystem **1006**.

[0103] Haptic system **1050** can include controllable nodes and associated haptic feedback circuitry as described previously to provide haptic feed back to a surface of touch sensor panel **1024** according to embodiments of the invention.

[0104] Computing system **1000** can also include host processor **1028** for receiving outputs from panel processor **1002** and performing actions based on the outputs that can include, but are not limited to, moving one or more objects such as a cursor or pointer, scrolling or panning, adjusting control settings, opening a file or document, viewing a menu, making a selection, executing instructions, operating a peripheral device coupled to the host device, answering a telephone call, placing a telephone call, terminating a telephone call, changing the volume or audio settings, storing information related to telephone communications such as addresses, frequently dialed numbers, received calls, missed calls, logging onto a computer or a computer network, permitting authorized individuals access to restricted areas of the computer or computer network, loading a user profile associated with a user's preferred arrangement of the computer desktop, permitting access to web content, launching a particular program, encrypting or decoding a message, and/or the like. Host processor **1028** can also perform additional functions that may not be related to panel processing, and can be coupled to program storage **1032**, haptic system **1050**, and display device **1030** such as an LCD display for providing a UI to a user of the device. Display device **1030** together with touch sensor panel **1024**, when located partially or entirely under the touch sensor panel, can form a touch screen. Haptic system **1050** together with touch sensor panel **1024**, when proximate to the touch sensor panel, can provide haptic feedback to the surface of the touch sensor panel.

[0105] Note that one or more of the functions described above can be performed by firmware stored in memory (e.g. one of the peripherals **1004** in FIG. **13**) and executed by panel processor **1002**, or stored in program storage **1032** and executed by host processor **1028**. The firmware can also be stored and/or transported within any computer-readable medium for use by or in connection with an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions. In the context of this document, a "computer-readable medium" can be any medium that can contain or store the program for use by or in connection with the instruction execution system, apparatus, or device. The computer readable medium can include, but is not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus or device, a portable computer diskette (magnetic), a random access memory (RAM) (magnetic), a read-only memory (ROM) (magnetic), an erasable programmable read-only memory (EPROM) (magnetic), a portable optical disc such a CD, CD-R, CD-RW, DVD, DVD-R, or DVD-RW, or flash memory such as compact flash cards, secured digital cards, USB memory devices, memory sticks, and the like.

[0106] The firmware can also be propagated within any transport medium for use by or in connection with an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions. In the context of this document, a "transport medium" can be any medium that can communicate, propagate or transport the program for use by or in connection with the instruction execution system, apparatus, or device. The transport readable medium can include, but is not limited to, an electronic, magnetic, optical, electromagnetic or infrared wired or wireless propagation medium.

[0107] It is to be understood that the sensor panel is not limited to a touch sensor panel, as described in FIG. **13**, but may be a proximity sensor panel or any other sensor panel capable of sensing a touch or hover event and providing haptic feedback thereto according to embodiments of the invention. Furthermore, although the touch sensors in the touch sensor panel may be described herein in terms of an orthogonal array of touch sensors having rows and columns, it should be understood that embodiments of this invention are not limited to orthogonal arrays, but can be generally applicable to touch sensors arranged in any number of dimensions and orientations, including diagonal, concentric circle, and three-dimensional and random orientations. In addition, the touch sensor panel described herein can be either a single-touch or a multi-touch sensor panel.

[0108] Although some embodiments of this invention may be described herein in terms of touch sensitive devices with haptic feedback, it should be understood that embodiments of this invention are not so limited, but are generally applicable to input devices utilizing some type of sensing technology with haptic feedback. For example, an alternate input device may be a navigation device utilizing a moving action with haptic feedback.