

[0151] In one version of the invention, a networked connection may be provided, for example as described in U.S. patent application Ser. No. 09/153,781 filed on Sep. 16, 1998, which is incorporated herein by reference in its entirety. In this version, a user may download an application program, such as a virtual reality simulation program, or a file of haptic sensations from a remote location. Also, a user may interact with a simulation running at a remote location. In another version, the haptic interface may be used as a master device to control a remote slave device. The slave device may be representative of the user's hand or fingers for example, and the user may control the slave to, for example, perform a procedure at a remote location. In an advanced version, the slave device may be equipped with sensors to detect conditions of the slave device, such as pressures or forces. The sensed conditions may then be used to provide haptic sensations to the user via the master device, the haptic sensations being related to the sensed conditions of the slave device.

[0152] While this invention has been described in terms of several preferred embodiments, it is contemplated that alterations, permutations and equivalents thereof will become apparent to those skilled in the art upon a reading of the specification and study of the drawings. For example, many different types haptic sensations can be provided with the haptic interface of the present invention and many different types actuators and user objects can be used, including the use of two user objects to detect manipulation of both hand of a user. In addition, the haptic interface can be replaced by a non-haptic interface, for example, when the mapping of the graphical image is broken. Furthermore, certain terminology, such as terms like x, y, z, left; right, up, down, etc., has been used for the purpose of descriptive clarity, and not to limit the present, invention. Therefore, the appended claims should not be limited to the description of the preferred versions contained herein and should include all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.

1-25. (canceled)

26. A manipulandum comprising:

a position detector to detect movement of the manipulandum, wherein the position detector is configured to provide a position signal representative of the movement to a computer operable with a display, the position signal configured to manipulate a graphical image on the display in at least a first degree of freedom; and

a first sensor selectively operable by touch and configured to provide a first sensor signal to the computer to manipulate the graphical image in at least a second degree of freedom.

27. The manipulandum of claim 26, wherein the manipulandum is moveable over a planar surface in two dimensions.

28. The manipulandum of claim 26, wherein the first sensor provides a second sensor signal to manipulate the graphical image in an additional degree of freedom.

29. The manipulandum of claim 28, wherein the first sensor provides a third sensor signal to manipulate the graphical image in yet another degree of freedom.

30. The manipulandum of claim 26, wherein the graphical object is manipulable in an additional degree of freedom

when the sensor provides the signal and the position detector provides the position signal simultaneously.

31. The manipulandum of claim 26, wherein the sensor is operable to manipulate the graphical object in a first additional degree of freedom when operated in a first direction and in a second additional degree of freedom when operated in a second direction.

32. The manipulandum of claim 26, wherein the graphical image is a cursor on the display.

33. The manipulandum of claim 26, wherein the manipulandum is a computer mouse.

34. The manipulandum of claim 26, wherein the manipulandum is a glove.

35. The manipulandum of claim 26 further comprising a second sensor selectively operable by touch and configured to provide a second sensor signal to the computer to manipulate the graphical image in at least a third degree of freedom.

36. A computer mouse comprising:

a position detector configured to detect movement of the mouse along a planar surface and provide a position signal to a computer coupled to a display, wherein the position signal is capable of manipulating a graphical image on the display in at least a first degree of freedom; and

a sensor operable by touch and configured to provide a first signal to the computer when sensing touch, wherein the graphical image is manipulable in at least a second degree of freedom when the computer receives the first signal.

37. The computer mouse of claim 36, wherein the first sensor provides a second sensor signal configured to manipulate the graphical image in an additional degree of freedom.

38. The computer mouse of claim 37 further comprising a second sensor configured to provides a signal configured to manipulate the graphical image in yet another additional degree of freedom.

39. The computer mouse of claim 36, wherein graphical image is manipulable in an additional degree of freedom when the computer simultaneously receives the signal and the position signal.

40. The computer mouse of claim 36, wherein the graphical image is a cursor on the display.

41. The computer mouse of claim 36, wherein the sensor is operable to manipulate the graphical object in a first additional degree of freedom when operated in a first direction and in a second additional degree of freedom when operated in a second direction.

42. A computer mouse comprising:

means for detecting movement of the mouse along a planar surface, wherein the means for detecting is configured to provide a position signal to a computer in operation with a display, wherein the position signal is capable of manipulating a graphical image on the display in at least a first degree of freedom; and

means for sensing a user's touch, wherein the means for sensing provides a signal to the computer to manipulate the graphical image in at least a second degree of freedom.

43. The computer mouse of claim 42 wherein the graphical image is manipulable in an additional degree of freedom when the computer simultaneously receives the signal and the position signal.