

7. A haptic feedback touch control as recited in claim 1 wherein said user contacts said touch surface with a physical object held by said user.

8. A haptic feedback touch control as recited in claim 7 wherein said physical object is a stylus.

9. A haptic feedback touch control as recited in claim 1 wherein said touch input device is integrated in a housing of a handheld device operated by at least one hand of a user.

10. A haptic feedback touch control as recited in claim 9 wherein said handheld device is a remote control device for controlling functions of an electronic device or appliance.

11. A haptic feedback touch control as recited in claim 1 wherein said at least one actuator is a first actuator that outputs a first force in a first lateral direction approximately parallel to said surface of said touch input device, and further comprising a second actuator coupled to said touch input device and operative to output a second force on said touch input device in a second lateral direction approximately parallel to said surface and approximately perpendicular to said first lateral direction.

12. A haptic feedback touch control as recited in claim 1 wherein said actuator is a linear actuator that provides an output force in a linear degree of freedom, and wherein said actuator is coupled between said touchpad and a grounded housing.

13. A haptic feedback touch control as recited in claim 12 wherein said actuator is a rotary actuator that provides an output force in a rotary degree of freedom, said output force being converted to said linear force.

14. A haptic feedback touch control as recited in claim 12 wherein said actuator is an E-core actuator.

15. A haptic feedback touch control as recited in claim 14 wherein said actuator includes at least one roller allowing a backing plate of said actuator to slide relative to a magnet of said actuator.

16. A haptic feedback touch control as recited in claim 15 wherein said actuator includes a flexure providing a spring return force between said backing plate and said magnet.

17. A haptic feedback touch control as recited in claim 1 wherein said actuator oscillates said touch input device laterally.

18. A haptic feedback touch control as recited in claim 1 wherein said touch input device includes a plurality of different regions, wherein at least one of said regions provides said position signal and at least one other region provides a signal that is used by said computer to control a different function.

19. A haptic feedback touch control as recited in claim 18 wherein at least one of said regions is associated with a different haptic sensation output on said touch input device than another one of said regions.

20. A haptic feedback touch control as recited in claim 18 wherein a haptic sensation is output when said user moves a contacting object from one of said regions to another one of said regions.

21. A haptic feedback touch control as recited in claim 1 wherein said actuator is a first actuator, and further comprising at least one additional actuator coupled to said touch input device, wherein said actuators are E-core actuators that have been surface mounted to a printed circuit board.

22. A haptic feedback touch control as recited in claim 1 wherein a graphical object is displayed in said graphical environment, wherein when said cursor is moved over said

graphical object, a pulse is output on said touch input device by laterally oscillating said touch input device.

23. A haptic feedback touch control for inputting signals to a computer and for outputting forces to a user of the touch control, the touch control comprising:

a touch input device including an approximately planar touch surface operative to provide a position signal based on a location on said touch surface which said user presses, said position signal representing said location in two dimensions, wherein said computer receives position information derived from said position signal;

a surface member located adjacent to said touch input device, wherein said user can contact said surface when pressing said touch input device; and

at least one actuator coupled to said surface member, said actuator outputting a force on said surface member to provide a haptic sensation to said user contacting said surface member, wherein said actuator outputs said force based on force information output by said computer.

24. A haptic feedback touch control as recited in claim 23 wherein said surface member is translated laterally, approximately in a plane parallel to said surface of said touch input device.

25. A haptic feedback touch control as recited in claim 24 wherein said surface member is positioned over said touch input device and at least approximately coextensive with said surface of said touch input device, such that said user presses said surface member to press said touch input device.

26. A haptic feedback touch control as recited in claim 25 wherein said actuator is a linear actuator.

27. A haptic feedback touch control as recited in claim 25 wherein said actuator is a rotary actuator, wherein a linkage converts a rotary output force to an approximately linear output force on said translated surface member.

28. A haptic feedback touch control as recited in claim 23 wherein said actuator is a voice coil actuator, wherein a wire coil is physically coupled to said surface member.

29. A haptic feedback touch control as recited in claim 23 wherein said surface member is positioned to a side of said touch input device such that said user touches said touch input device with one finger and touches said surface member with a different finger or palm.

30. A haptic feedback touch control as recited in claim 26 wherein said surface member is positioned over a physical button that is located adjacent to said touch input device.

31. A haptic feedback touch control as recited in claim 23 wherein said force on said surface member is a linear force output approximately perpendicularly to a surface of said surface member.

32. A haptic feedback touch control as recited in claim 31 wherein said linear force is an inertial force output by an actuator assembly that includes said actuator and moves an inertial mass, wherein said inertial force is transmitted through said surface member to said user contacting said surface member.

33. A haptic feedback touch control as recited in claim 32 wherein said actuator assembly moves said actuator as said inertial mass.