

from this invention and its broader aspects. Therefore, the appended claims are intended to encompass within their scope all such changes and modifications as are within the true spirit and scope of this invention.

What is claimed is:

1. A tactile touch panel comprising a plurality of piezoelectric cells forming a piezoelectric layer having a first and a second surfaces, wherein said first surface of said piezoelectric layer is configured to receive inputs, wherein each one of said plurality of piezoelectric cells includes at least one piezoelectric material, wherein said piezoelectric material is configured to provide a haptic effect independent of other piezoelectric cells.

2. The tactile touch panel of claim 1, wherein said plurality of piezoelectric cells is capable of sensing said inputs.

3. The tactile touch panel of claim 1, further comprising an electrical insulated layer having a third and a fourth surfaces, wherein said fourth surface of said electrical insulated layer is situated adjacent to said first surface of said plurality of piezoelectric cells and said third surface of said electrical insulated layer is configured to interface with said inputs.

4. The tactile touch panel of claim 3, wherein said third surface of said electrical insulated layer is capable of transmitting said inputs to said first surface of said plurality of piezoelectric cells.

5. The tactile touch panel of claim 1, further comprising a display coupled to said second surface of said piezoelectric layer, wherein said display is capable of projecting images viewable from said third surface of said electrical insulated layer.

6. The tactile touch panel of claim 5, wherein said display is a flat panel display or a flexible display.

7. The tactile touch panel of claim 1, further comprising a plurality of electrical wires connected to said plurality of piezoelectric cells.

8. The tactile touch panel of claim 7, wherein said piezoelectric material deforms in response to electrical potentials applied from at least one of said electrical wires.

9. The tactile touch panel of claim 1, wherein each one of said plurality of piezoelectric cells is configured to be less than 5 millimeters by 5 millimeters in size.

10. The tactile touch panel of claim 9, wherein multiple adjacent piezoelectric cells of said plurality of piezoelectric cells are capable of providing multiple haptic effects substantially simultaneous.

11. A haptic touch panel comprising a plurality of Micro-Electro-Mechanical Systems ("MEMS") cells formed a MEMS layer having a first and a second surfaces, wherein said first surface is capable of receiving inputs, wherein each one of said plurality of MEMS cells includes at least one MEMS element, wherein said MEMS element is configured to provide a haptic effect independent of other MEMS cells.

12. The haptic touch panel of claim 11, further comprising an insulated layer having a third and a fourth surfaces, wherein said fourth surface of said insulated layer is situated adjacent to said first surface of said MEMS layer.

13. The haptic touch panel of claim 11, further comprising a display coupled to said second surface of said MEMS layer, wherein said display is capable of projecting images viewable from said third surface of said insulated layer.

14. The haptic touch panel of claim 13, wherein said display is a flat panel display or a flexible display.

15. The haptic touch panel of claim 11, further comprising a plurality of electrical wires wherein each one of said plu-

rality of MEMS cells is connected to at least one of said plurality of wires for facilitating said haptic effect.

16. The haptic touch panel of claim 15, wherein said MEMS element is a cantilever-spring.

17. The haptic touch panel of claim 15, wherein said MEMS element is a shape memory alloy ("SMA").

18. The haptic touch panel of claim 15, wherein said MEMS element is made of piezo materials.

19. The haptic touch panel of claim 15, wherein said MEMS element is a resonant mechanical retractable device, wherein said resonant mechanical retractable device vibrates in response to a unique frequency.

20. The haptic touch panel of claim 19, wherein multiple adjacent MEMS cells of said plurality of MEMS cells are capable of providing multiple haptic effects in response to different frequencies.

21. The haptic touch panel of claim 15, wherein said MEMS element deforms in response to electrical potentials provided by said electrical wires.

22. A method for providing multiple simultaneous haptic effects comprising:

detecting a first deformation of a sensing layer;
detecting a second deformation of said sensing layer substantially same time as said first deformation;

generating a first input in accordance with a location of said first deformation and a second input in accordance with a location of said second deformation;

activating a first haptic cell with a first haptic effect in response to said first input and a second haptic cell with a second haptic effect in response to said second input.

23. The method of claim 22, further comprising:
displaying an image viewable through or on an insulated layer; and

monitoring said insulated layer in accordance with said image.

24. The method of claim 23, wherein said detecting a first deformation of a sensing layer further includes sensing said first deformation of said insulated layer.

25. The method of claim 22, wherein said detecting a first deformation of a sensing layer further includes sensing said first deformation of said first haptic cell.

26. The method of claim 22, wherein detecting a first deformation of said sensing layer further includes detecting said first deformation in response to a first depressing by a first finger.

27. The method of claim 22, further comprising detecting said first and said second deformations depressed by a same finger.

28. The method of claim 22, wherein said detecting a second deformation of said sensing layer further includes sensing said second deformation in response to a second depressing by a second finger.

29. The method of claim 22, wherein detecting a first deformation of said sensing layer further includes detecting said first deformation in response to a first depressing by a stylus.

30. The method of claim 22, wherein said activating a first haptic cell with a first haptic effect in response to said first input and a second haptic cell with a second haptic effect in response to said second input further includes initiating said first haptic effect and said second haptic effect substantially same time.

31. The method of claim 22, wherein said activating a first haptic cell with a first haptic effect in response to said first