

13. The apparatus of claim 8, wherein the control signal is configured to cause a plurality of haptic effects including the haptic effect, each of the plurality of haptic effects having a frequency within at least two frequency ranges from a plurality of frequency ranges, the control signal being configured to cause the haptic effect to be output having a frequency in an intermediate frequency range from the plurality of frequency ranges, the intermediate frequency range being between the at least two frequency ranges.

14. The apparatus of claim 8, further comprising:

a haptic device coupled to the controller, the haptic device being configured to receive the control signal and to output the haptic effect and the audio effect.

15. The apparatus of claim 8, further comprising:

a haptic device coupled to the controller, the haptic device including an actuator, the haptic device being configured to receive the control signal and to output the haptic effect and the audio effect via the actuator.

16. The apparatus of claim 8, further comprising:

a haptic device coupled to the controller, the haptic device including an actuator and an audio output device substantially collocated with the actuator and to receive the control signal, the haptic device being configured to output the haptic effect via the actuator, the haptic device being configured to output the audio effect via the audio output device.

17. The apparatus of claim 8, further comprising:

a plurality of controllers including the controller, each controller from the plurality of controllers being associated with a frequency range from a plurality of frequency ranges, each controller from the plurality of controllers being configured to output an associated control signal, the associated control signal output by each controller from the plurality of controllers being configured to cause a haptic effect to be output having a frequency within the frequency range associated with that controller, at least one controller from the plurality of controllers being configured to output the control signal configured to cause the haptic effect and the audio effect to be output substantially concurrently.

18. The apparatus of claim 8, further comprising:

a resonant vibrotactile haptic device coupled to the controller, the resonant vibrotactile haptic device being configured to output the haptic effect having a frequency within a pre-determined operational frequency range, the pre-determined operational frequency range having a frequency associated with a resonant mode of the resonant vibrotactile haptic device.

19. The apparatus of claim 8, wherein the control signal includes a plurality of pulses, the control signal being configured to cause the haptic effect to be output at a desired output frequency, each pulse from the plurality of pulses having a width associated with the desired output frequency.

20. The apparatus of claim 8, further comprising:

a plurality of controllers including the controller, each controller from the plurality of controllers being configured to output a control signal from a plurality of control signals, each control signal from the plurality of control signals being uniquely associated with a frequency range from a plurality of frequency ranges and being configured to cause a haptic effect to be output,

a first control signal from the plurality of control signals being output by a first controller, the first control signal being configured to cause the haptic effect to be output substantially concurrently with the audio effect, the audio effect being configured to cause a user to perceive the haptic effect as having a perceived frequency different from the frequency of the haptic effect.

21. The apparatus of claim 8, further comprising:

a plurality of controllers including the controller, each controller from the plurality of controllers being configured to output a control signal from a plurality of control signals, each control signal from the plurality of control signals being uniquely associated with a frequency range from a plurality of frequency ranges and being configured to cause a haptic effect to be output, a first control signal from the plurality of control signals being output by a first controller, the first control signal being configured to cause the haptic effect to be output substantially concurrently with the audio effect, the audio effect being configured to cause a user to perceive the haptic effect as having a perceived frequency different from the frequency of the haptic effect; and

a haptic device coupled to the plurality of controllers, the haptic device being configured to output a plurality of haptic effects associated with the plurality of control signals, the plurality of haptic effects including the haptic effect.

22. The apparatus of claim 8, further comprising:

a plurality of controllers including the controller, each controller from the plurality of controllers being configured to output a control signal from a plurality of control signals, each control signal from the plurality of control signals being uniquely associated with a frequency range from a plurality of frequency ranges and being configured to cause a haptic effect to be output, a first control signal from the plurality of control signals being output by a first controller, the first control signal being configured to cause the haptic effect to be output substantially concurrently with the audio effect, the audio effect being configured to cause a user to perceive the haptic effect as having a perceived frequency different from the frequency of the haptic effect; and

a plurality of haptic devices, each haptic device from the plurality of haptic devices being uniquely associated with a controller from the plurality of controllers, each haptic device from the plurality of haptic devices being configured to output the haptic effect caused by the control signal output by the associated controller.

23. A method, comprising:

outputting a haptic effect at least partially based on a control instruction; and

outputting an audio effect substantially concurrently with a haptic effect at least partially based on the control instruction, the haptic effect having a frequency, the audio effect having a frequency different from the frequency of the haptic effect, the audio effect and the haptic effect being output by a common device;