The invention claimed is : ~~CLAIMS~~

1. A haptic device comprising:

a drum configured to rotate about an axis;

a cord wound around the drum;

a user-actuatable lever operatively coupled to the drum and configured to receive a user-actuation force;

a position sensor configured to determine a rotational position of the drum; and

an actuator operatively coupled to the cord and configured to apply a tension to the cord that further applies friction to brake the drum to cause the user-actuatable lever to provide a user-perceived resistance that opposes the user-actuation force, ~~and~~ where the user-perceived resistance varies as a function of the rotational position of the drum and where the cord slips on the drum when the tension is less than a threshold and does not slip on the drum when the tension is greater than the threshold.

2. The haptic device of claim 1, where the user-perceived resistance is configured to change according to a resistance profile for a rotation range of the drum selected from a plurality of predetermined resistance profiles.

3. The haptic device of claim 2, where the resistance profile specifies that the user-perceived resistance changes linearly over a least a portion of the rotation range of the drum.

4. The haptic device of claim 2, where the resistance profile includes a hard stop at a designated position within a rotation range of the drum.

5. The haptic device of claim 1, further comprising:

a communication subsystem communicatively coupled to a computing device and configured to:

send the rotational position of the drum to the computing device, and

receive a -feedback signal from the computing device, where the actuator is controlled based on the signal to apply the tension to the cord to provide the user-perceived resistance, and where the user-perceived resistance is determined further based at least on a parameter of the computing device.

6. The haptic device of claim 1, where the user-actuation force is a first user-actuation force applied in a first actuation direction, where the cord is a first cord wound around the drum in a first direction, where the haptic device further comprises:

a second cord wound around the drum in a second direction that opposes the first direction, where a tension is applied to the second cord that further applies friction to the drum to cause the user-actuatable lever to provide a user-perceived resistance that opposes a second user-actuation force in a second actuation direction that opposes the first actuation

direction.

7. The haptic device of claim 1 , where the cord is a first cord, where the actuator is a first actuator, and where the haptic device further comprises:

a second cord wound around the drum;

a spring coupled to the second cord and configured to bias the user-actuatable lever;

a second actuator operatively coupled to the second cord and configured to apply a tension to the second cord that further applies friction to brake the drum to cause the user-actuatable lever to provide a user-perceived resistance that includes a spring force of the spring and opposes the user-actuation force.

8. The haptic device of claim 1, where the user-actuatable lever includes a trigger joint, and where the haptic device further comprises:

a finger ring operatively coupled to the trigger joint and configured to wrap around a user's finger and rotate about the trigger joint based on the user-actuation force.

9. The haptic device of claim 8, further comprising:

a trigger bias spring operatively coupled between the finger ring and the user-actuatable lever.

10. The haptic device of claim 8, where the user-actuatable lever includes a trigger switch configured to determine a position of the user's finger on the finger ring, and where the user-perceived resistance is determined based on at least the position of the user's finger on the finger ring.

11. The haptic device of claim 1, further comprising :

a vibrotactile actuator operatively coupled to the haptic device and configured to vibrate based on a signal received from a computing system.

12. The haptic device of claim 1, further comprising :

a voice coil actuator operatively coupled to the haptic device and configured to vibrate to convey a virtual texture based on a signal received from a computing system.

13. A haptic device comprising :

a drum configured to rotate about an axis;

a cord wound around the drum;

a user-actuable lever operatively coupled to the drum and configured to receive a user-actuation force;

a position sensor configured to determine a rotational position of the drum;

a communication subsystem communicatively coupled to a computing device and configured to :

send the rotational position of the drum to the computing device, and

receive, from the computing device, a signal that varies as a function of the rotational position of the drum; and

an actuator operatively coupled to the cord and configured to apply a tension to the cord that further applies friction to brake the drum to cause the user-actuatable lever to provide a user-perceived resistance that opposes the user-actuation force based on the signal, and where the cord slips on the drum when the tension is greater than the threshold.

14. The haptic device of claim 13, where the user-perceived resistance is configured to change according to a resistance profile for a rotation range of the drum selected from a plurality of predetermined resistance profiles.

15. The haptic device of claim 14, where the user-perceived resistance includes a hard stop at a designated position within a rotation range of the drum.

16. The haptic device of claim 13, where the user-perceived resistance is determined further based at least on a parameter of the computing device.

17. The haptic device of claim 13, where the user-actuation force is a first user-actuation force applied in a first actuation direction, where the cord is a first cord wound around the drum in a first direction, and where the haptic device further comprises :

a second cord wound around the drum in a second direction that opposes the first direction, and where a tension is applied to the second cord that further applies friction to the drum to cause the user-actuation lever to provide a user-perceived resistance that opposes a second user-actuation force in a second actuation direction that opposes the first actuation direction.

18. The haptic device of claim 13, where the cord is a first cord, where the actuator is a first actuator, and where the haptic device further comprises :

a second cord wound around the drum;

a spring coupled to the second cord and configured to bias the user-actuatable lever;

a second actuator operatively coupled to the second cord and configured to apply a tension to the second cord that further applies friction to brake the drum to cause the user-actuatable lever to provide a user-perceived resistance that includes a spring force of the spring and opposes the user-actuation force.

19. The haptic device of claim 13, further comprising :

a voice coil actuator operatively coupled to the haptic device and configured to vibrate to convey a virtual texture based on a signal received from a computing system.

20. A haptic device comprising :

a drum configured to rotate about an axis;

a first cord wound around the drum in a first direction;

a second cord wound around the drum in the first direction;

a spring operatively coupled to the second cord;

a user-actuatable lever operatively coupled to the drum and configured to receive a user-actuation force;

a position sensor configured to determine a rotational position of the drum;

a communication subsystem communicatively coupled to a computing device and configured to :

send the rotational position of the drum to the computing device,

receive, from the computing device, a first signal that varies as a function of the rotational position of the drum, and

receive, from the computing system, a second signal;

a first actuator operatively coupled to the first cord and configured to apply a tension to the cord that further applies friction to brake the drum to cause the user-actuatable lever to provide a first user-perceived resistance that opposes the user-actuation force based on the first signal; and

a second actuator operatively coupled to the second cord and configured to apply a tension to the second cord that further applies friction to the drum to cause the user-actuatable lever to provide a second user-perceived assistance that includes a spring force of the spring and opposes the user-actuation force based on the second signal.