

channels of the MIDI file being analyzed. This translation curve **1602** can be adjusted to change which effect frequencies will be output for sounds in a given MIDI channel. Of course, other mappings (e.g., as defined using differently shaped translation curves, etc.) can be used for other types of haptic effects according to one or more embodiments of the invention.

[**0094**] From the foregoing, it can be seen that systems and methods for ordering haptic effects are discussed. Specific embodiments have been described above in connection with a system that is configured to order multiple, basis haptic effects to create timeline haptic effects. A file format is provided for defining a timeline haptic effect. Additionally, various aspects of an operating system are provided for creating, editing, modifying, and/or ordering haptic effects to create a timeline haptic effect.

[**0095**] It will be appreciated, however, that embodiments of the invention can be in other specific forms without departing from the spirit or essential characteristics thereof. For example, while some embodiments have been described in the context of timeline haptic effects created using multiple ordered basis haptic effects, one can also use timeline haptic effects, as well as other types of effects, as components to create other timeline effects according to the principles described above. Additionally, the GUI computer windows and file formats described herein are intended as examples only, and can be varied in numerous ways to provide the same or substantially similar functionality, all of which is considered within the scope of the invention.

What is claimed is:

1. An apparatus, comprising:

a first component configured to associate each basis haptic effect from the plurality of basis haptic effects with a time slot from a plurality of time slots; and

a second component configured to associate each basis haptic effect from the plurality of basis haptic effects with an effect slot from a plurality of effect slots, the second component being further configured to cause each basis haptic effect from the plurality of basis haptic effects to be output during the time slot associated with that haptic effect.

2. The apparatus of claim 1, further comprising:

a client interface component configured to receive a signal; and

a driver in communication with the client interface component, the first component, and the second component, the driver being configured to coordinate communications between the client interface component, the first component, and the second component at least partially based on the signal received by the client interface component.

3. The apparatus of claim 1, further comprising:

a client interface component configured to receive a signal; and

a driver in communication with the client interface component, the first component, and the second component, the driver being configured to coordinate communications between the client interface component, the first component, and the second component at least partially based on the signal received by the client interface

component, the second component being configured to cause each basis haptic effect from the plurality of basis haptic effects to be output at least partially based on the signal received by the client interface device.

4. The apparatus of claim 1, further comprising:

a haptic device in communication with the second component, the haptic device being configured to output the plurality of basis haptic effects.

5. The apparatus of claim 1, further comprising:

a resource manager in communication with the second component, the resource manager configured to manage resources available in the second component, the resources being associated with causing each basis haptic effect from the plurality of basis haptic effects to be output, the resources including the plurality of effect slots.

6. The apparatus of claim 1, wherein the second component is configured to cause a ramp-up effect to be output before a second basis haptic effect from the plurality of basis haptic effects is output.

7. The apparatus of claim 1, wherein the second component is configured to cause a braking effect after a penultimate basis haptic effect from the plurality of basis haptic effects is output.

8. The apparatus of claim 1, further comprising:

a client interface component configured to receive a signal, the client interface component being further configured to control at least one of creating a basis haptic effect, deleting a basis haptic effect, starting a basis haptic effect, stopping a basis haptic effect, and modifying a basis haptic effect, at least partially based on the received signal.

9. The apparatus of claim 1, further comprising:

a client interface component configured to receive a signal, the client interface component being further configured to control at least one of creating a basis haptic effect, deleting a basis haptic effect, starting a basis haptic effect, stopping a basis haptic effect, and modifying a basis haptic effect, at least partially based on the received signal;

a resource manager in communication with the second component, the resource manager being configured to manage resources available in the second component, the resources being associated with causing each basis haptic effect from the plurality of basis haptic effects to be output, the resources including the plurality of effect slots; and

a driver in communication with the client interface component, the first component, and the second component, the driver being configured to coordinate communications between the client interface component, the first component, and the second component at least partially based on the signal received by the client interface component, the second component being configured to cause each basis haptic effect from the plurality of basis haptic effects to be output at least partially based on the signal received by the client interface device.

10. The apparatus of claim 1, further comprising:

a client interface component configured to receive a signal, the client interface component being further configured to control at least one of creating a basis