surface of display **216** or through some other part of messaging device **200**, for example via manipulandum **214** or housing **202**. In some embodiments, the processor may modify this haptic effect as the user moves his/her finger over the surface of textured ball **204**, in order to simulate changes in texture.

Illustrations of Systems for a Texture Engine

[0059] FIG. **3***a* is an illustration of a system for a texture engine according to one embodiment of the present invention. FIG. **3***a* comprises a messaging device **300**, such as a mobile phone, PDA, portable media player, portable gaming device, or mobile computer. The messaging device **300** is configured to send and receive signals comprising messages, such as voicemail, text messages, and other data messages, over a network such as a cellular network or the Internet. The messaging device **300** may comprise a wireless network interface and/or a wired network interface (not shown in FIG. **3***a*). Although the device **300** is illustrated as a handheld messaging device in FIG. **3***a*, other embodiments may comprise different devices, such as video game systems and/or personal computers.

[0060] As shown in FIG. **3***a*, messaging device **300** comprises a display **316**. Display **316** is configured to receive a display signal, and output an image based at least in part on the display signal. Messaging device **300** further compromises a processor (not shown in FIG. **3***a*) configured to transmit the display signal to display **316**. Messaging device **300** further comprises a touch-sensitive interface **314** mounted overtop of display **316**. Touch-sensitive interface **314** is configured to detect a user interaction and transmit an interface signal corresponding to the user interaction to the processor. Display **316** comprises two icons **302** and **304**. When the user interacts with one of icons **302** and **304**, touch-sensitive interface **314** will detect the user interaction and transmit a corresponding interface signal to the processor. Based on this interface signal, the processor may determine that the user has opened a file linked to one of the icons or performed some other action known in the art.

[0061] As shown in FIG. **3***a*, each of icons **302** and **304** comprises a texture. In the embodiment shown, icon **302** comprises the texture of bricks and icon **304** comprises the texture of rocks. In other embodiments, different textures may be used, for example, the texture of sand, water, oil, grass, fur, skin, leather, ice, wood, or some other texture known in the art. When the user, shown in FIG. **3***a* as finger **306**, interacts with the section of display **316** associated with each icon, the processor will determine a haptic effect configured to simulate the texture of that icon. The processor will then output a signal associated with the haptic effect to an actuator (not shown in FIG. **3***a*) configured to output the haptic effect. For example, in the embodiment shown in FIG. **3***a*, when the user interacts with the section of display **316** associated with the icon **302** the processor will determine a haptic effect associated with the texture of bricks. This haptic effect may be characterized by a random signal punctuated with high powered pulses as user's finger **306** moves across mortar. In other embodiments, other haptic effects will be used to simulate different textures that may correspond to the image shown on display **316**.

[0062] FIG. **3***b* is an illustration of a system for a texture engine according to one embodiment of the present invention. In the embodiment shown in FIG. **3***b*, determining the haptic effect comprises mapping the display signal to the actuator. The embodiment shown in FIG. **3***b*, comprises a magnified section of a display **350**. Display **350** is configured to receive a display signal from the processor. The display signal comprises a plurality of pixels that are each associated with a color and an intensity of that color. Display **350** receives this display signal and outputs an image associated with the display signal. In the embodiment shown in FIG. **3***b*, the magnified portion of display **350** comprises six pixels: **351**, **352**, **353**, **354**, **355**, and **356**. Each pixel is associated with a color and an intensity for that color ranging from 1-10. For example, pixel **355** is associated with the color green, and the color intensity 3 out of 10. Thus, the display **350** will output the color green at an intensity of 3 at the location of pixel **355**.

[0063] In the embodiment shown in FIG. **3***b*, the processor will determine the haptic effect based, at least in part, on the display signal and an interface signal received from a touch-sensitive interface mounted overtop of display **350** (not shown in FIG. **3***b*). For example, in the embodiment shown in FIG. **3***b*, the processor uses the display signal to associate, or "map," a haptic effect with each pixel. For example, in the embodiment shown in FIG. **3***b*, the processor may determine a different frequency haptic effect for each color. The processor may further associate the intensity of the haptic effect at each pixel with the intensity of the color at each pixel. For example, the processor may determine that a pixel with a color intensity of 8 will also have a haptic intensity of 8. When the processor receives an interface signal associated with user interaction overtop of the pixels on the display, the processor will output a haptic signal associated with the pixels the user is interacting with. This haptic effect is configured to cause the user to feel a texture on the surface of the display.

[0064] For example, in the embodiment shown in FIG. **3***b*, the processor may determine blue pixels are associated with a knocking haptic effect, red pixels are associated with a pulsing vibration, and green pixels are associated with a clicking haptic effect. In such an embodiment, when the touch-sensitive interface detects that the user's finger has passed over pixel **351**, the processor will determine a knocking with an intensity of 1. Then as the user's finger moves over pixel **352**, the processor will determine a pulsing vibration with an intensity of 5. And, as the user's finger continues to move across display **350** to pixel **353**, the processor may determine a clicking effect with an intensity of 3.

[0065] These haptic effects are configured to cause the user to feel a texture on the surface of display **350** as the user moves his/her finger over the surface of display **350**. In some embodiments, the processor may be in communication with more than one actuator, and each color may be associated with its own actuator. In other embodiments, different combinations of colors, intensities, and haptic effects may be used to cause the user to feel a texture on the surface of the display.

[0066] FIG. **4** is a flow chart of a method for a texture engine according to one embodiment of the present invention, which is discussed with respect to the device shown in FIG. **1**. As shown in FIG. **4**, the method **400** begins when processor **110** receives a display signal comprising a plurality of pixels **402**. The display signal may comprise a vga, hdmi, svga, video, s-video, or other type of display signal known in the art. The display signal may comprise a graphical user interface, or other image that the messaging device will display to the user via display **116**.

[0067] Then, touch-sensitive interface **114** transmits an interface signal to processor **110**, which receives the interface signal **404**. In some embodiments, touch-sensitive interface